MONTANA *Wildlife*

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TABLE OF CONTENTS

	Page
Trail Trout III	4
More Hunting For Everyone	8
Fisher Are Returned to Montana Forests	16
Your Cooperative Wildlife Research Unit	19
Montana's Stream Rating Map	28

McKee Print.

Dedicated to the Memory of William T. (Bill) Sweet

Bill Sweet was one of the few men still to remember the squeak and rattle of horse-drawn stage coaches. For his seventy-six years he watched the near wilderness of Montana give way before an ever encroaching tide of humanity, the wilderness invaded, stage trails covered with pavement.

His also were memories of market hunters, unrestricted shooting of wildlife, and the ups and downs in game numbers.

Bill served Montana on the Fish and Game Commission for eight years. His intimate knowledge gained from keen interest and years of observation were graciously shared and diligently applied.

He shall long be remembered as both an ardent conservationist and a good friend among men.

Editorial

By Frank Dunkle, Chief, Information & Education Division

Two men stood in the cold white wilderness with a strange pack on the ground between them. It consisted of a scale and a long metal tube. What were these men doing high in the back country on a cold winter day? They were making an annual snow survey that woud give the U. S. Geological Survey and the Soil Conservation Service information necessary to predict the water available for summer use in Montana this year. These men will actually weigh the snow. The weight will indicate the moisture content.

As it stands, water may be critical in the coming months. The snow packs indicate we are slightly below normal in water available for all of the uses in Montana.

Water is rapidly becoming one of the most controversial natural resources in this nation. Confusion and conflict hinder wise management of this very necessary and important resource. Water laws are a hodgepodge and it is one of the most difficult fields to practice for attorneys. Many states have overhauled their laws within the last five years. Others have made some changes. Many more are undecided whether to overhaul or make any changes at all to their water laws. Problems in water range from international difficulties down to two men with conflicting claims for a few second feet of water on very small creeks.

Critical problems are developing in the areas of irrigational, industrial, recreational and domestic use of water. Many times irrigation draw-down on streams causes a complete dry-up of the area. This of course complicates the fisheries management program. With the growth of industry in the state, more and more water is being channeled into this use. The water is being used in processing as well as to carry away waste products. Recreational use of water has increased many-fold. More and more boats are being used. People are swimming, water skiing and, of course, fishing. Domestic use of water with our ever-increasing population becomes more critical each day. Water is used throughout our cities in our everyday needs as well as the vehicle to carry away the waste products.

One of the major problems facing Montanans today is not the amount of water, but the quality of water. Pollution comes from three major sources—agricultural, domestic and industrial areas. Agricultural pollution consists of heavy siltation due to overgrazing and improper irrigation processes. Domestic sewage, of course, is the result of dumping raw sewage from cities into the streams. Industrial pollution is the dumping of waste products from industry into the rivers.

New findings from research are helping us to solve many of these problems. New techniques of irrigation are helping to reduce the amount of topsoil carried away through improper and inadequate agricultural processes. Domestic pollution is receiving a great deal of notice throughout the state. Many of our large cities are now rapidly constructing sewage treatment plants and reducing the amount of raw sewage being dumped into our streams. Industry is placing a great deal of emphasis on research pointed toward reducing industrial pollution. With a reduction of pollution, and an understanding of water needs and uses, Montana will be on the way to solving the water problems of the state.

Trail Trout

By Tom Smith, Education Assistant

(Following is the third in a series of articles about the Montana Fish and Game Department's high mountain lake surveys. These surveys are conducted each summer to secure basic information for the management of remote lakes.)

After unloading the horses from the truck, hobbling and feeding them, we built our fire and studied a map of the area which we would be riding through. We had driven twelve miles northwest from Wisdom to the end of a dirt road. Tommy Schurr, long-time fisheries employee of the department, knew most of the Big Hole country, but had never been into the Thompson, Howell and Hope Creek drainages before. According to our plans we would survey Lion, Mosquito, Crystal and Continental lakes in the Thompson Creek drainage, Mystic Lake on Howell Creek, Hope Lake and two small unnamed lakes on Hope Creek.

Thompson Creek Lakes and Mystic Lake lie on the east side of the Continental Divide in the Anaconda-Pintlar Wilderness Area and northwest of

Wisdom. They are a part of the Big Hole River drainage. Hope and the two unnamed lakes lie just over the mountains on the west side of the divide in the Bitterroot drainage. The nearest — Lion Lake on Thompson Creek — is about seven miles by trail from the end of the road, and is the first one you would reach by the Thompson Creek trail. (see map) Mosquito, Crystal and Continental lakes are scattered upstream from there at intervals of one or two miles. About two miles north, on the main Forest Service trail from Crystal and over a long ridge, lies the Howell Creek drainage with Mystic Lake its source.

From townspeople and Forest Service personnel at Wisdom and from sportsmen groups in central Montana, we had heard that fishing was excellent in Lion and Mystic lakes but poor in the others. The Montana Fish and Game Department receives numerous requests each year to stock high mountain lakes—either because of poor fishing or to sustain good fishing. The policy of the department is to survey lakes before making stocking recommendations in order to get a knowledge of their capabilities—that is, their abilities to sustain adequate fish numbers, their spawning facilities and other qualities which would influence fish numbers and fish condition. In addition, samples of fish are collected to get an idea of what fish are in the lakes to begin with.

We discovered all of these things that night and decided to pack into Lion Lake the next morning, set gill nets in it, and possibly set up our base camp there. It looked like a good location for a camp from which we could take daily trips to survey the other lakes.

The next morning, after an easy ride through rocky, lodgepole pine-covered country, we arrived at Lion Lake. It lies in a pocket of steep, timbered ridges at an elevation of 6,500 to 7,000 feet. Most of its margins are rimmed with sedge grass meadows extending back from the shore 10 to 50 yards. Parts of the shore that appears to be solid ground are actually floating bogs. They will support a man if he is walking; but we found that if we stood in one place very long we would sink through the mat of moss and sedges. For this reason anglers fish from log rafts rather than stand on the bogs.

Although horse feed was limited, we decided to set up base camp here. Using a collapsible rubber life raft we set gill nets to collect a sample of fish. The sample would indicate fish numbers and provide age and growth information. After checking water depths throughout the lake and taking water samples, we drew up a map showing the lake and surrounding area, vegetation, and inlet and outlet streams. The map also showed fish spawning areas.

Our fish samples showed that Lion Lake contained thin, snaky rainbow trout with large heads. The situation was one of too many trout, so further stocking of hatchery fish was not

recommended. Fish foods seemed abundant for a lake so heavily populated with fish and there were adequate spawning facilities to sustain high fish numbers. The lake varies in depth from 30 to 40 feet except for narrow shallow areas near shore.

For the next five days we made daily trips to the other lakes in the area, gathering the survey information. Mystic and Crystal Lakes were quite similar to Lion—large numbers of unusually thin rainbow yet apparently plenty of food and adequate spawning areas. They both have extensive areas of over 30-foot depths and narrow shallow areas around their margins. All three are beautiful high mountain lakes that would benefit by heavier fishing pressure. More fish taken out of the lakes could very well result in larger, healthier fish.

Mosquito Lake is a very small body of water lying off the trail about one-half mile through heavy timber and windfalls. Because of its size and inaccessibility it is not worthy of a plant of hatchery fish.

Continental Lake is a very shallow, rocky-bottomed lake whose only water source is melted snow. It contains no fish and likely could support none through a winter.

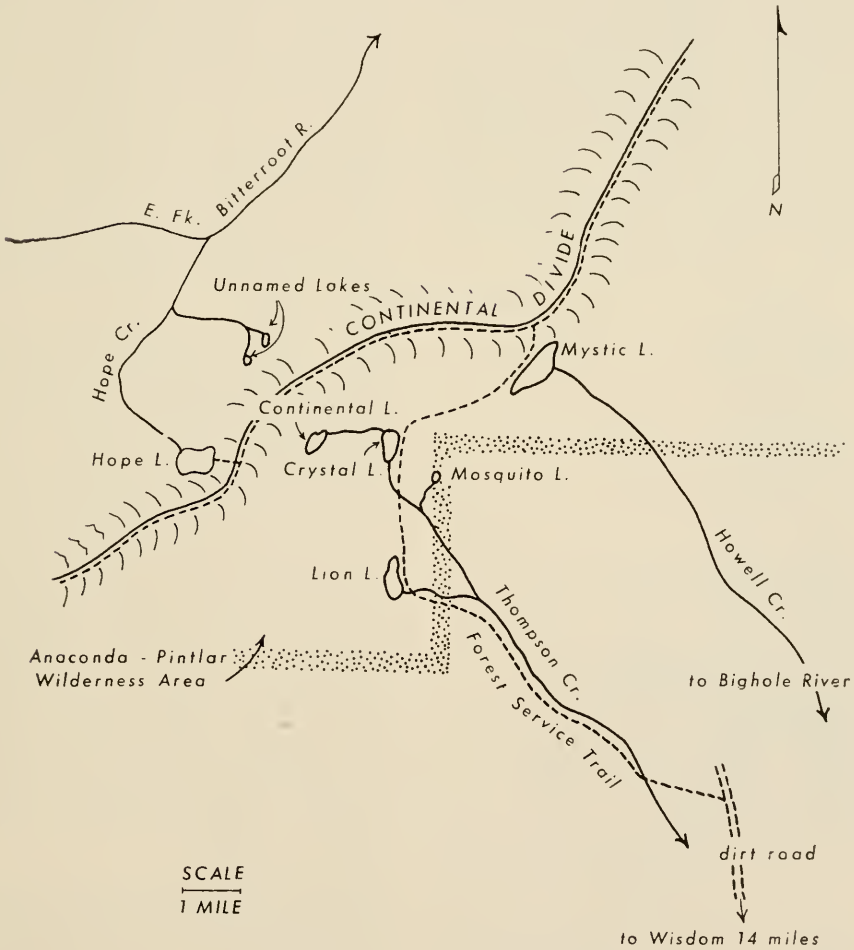
Just over the divide and two to three miles south from the Thompson Creek and Howell Creek Lakes are Hope Lake and two small unnamed lakes on Hope Creek. One of the unnamed lakes is merely a very shallow stagnant pond which could not support trout, and the other — although it would be suitable for a few trout—is too small and inaccessible to warrant planting with hatchery trout.

Hope Lake, lying under the west rim of the Continental Divide, is surrounded on three sides by steep cliffs. On the west of the lake is a sharp drop-off to the East Fork of the Bitterroot River and a magnificent view of the Bitterroot Mountains. Most of the lake is 40 to 50 feet deep, but there are some shallow areas near the shore. At the time of the survey there were a few rainbow trout in Hope Lake. These averaged about 20 inches long and were in good condition. From the survey, fishery workers determined that there was little or no reproduction of fish in Hope Lake and that a plant of hatchery rainbow trout would produce some very good fishing for several years. A month after the survey the department planted approximately 2,700 fingerling rainbow in the lake by airplane.

After completing the field survey of these groups of lakes we packed up our equipment and survey data, including fish-scale samples, water samples and maps. Riding back through the rugged wilderness toward the Big Hole Valley—typical of Montana's wealth of mountain lake country—our only regret was that we did not have the time to do any fish sampling by rod and reel.

Sportsmen who enjoy a touch of the wild with their trout fishing will

find it by packing into the Thompson, Howell and Hope Creek lakes. We saw mountain goats and elk and frequent black bear and moose sign. We surprised a mink on the shore of Lion Lake and often passed within a few steps of blue grouse that stood motionless in their naive "I see you but you don't see me" poses. When he is in country like this, a sportsman knows that he has gained much more than the fish he has cought.



MORE HUNTING FOR EVERYONE

By Harold Titus, Conservation Ed., "Field & Stream"

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Some time ago a Michigan sportsman whom we'll call Clarence McBang went rabbit hunting. Clarence loved rabbit hunting. The year before the Michigan rabbit season had run 78 days and Clarence had been out every possible day of it.

This year, the season had been lengthened to 104 days — enough, you'd think, to delight the heart of a real, serious rabbit hunter. But Clarence, as he clomped out at dawn on the season's first day, was not a happy man.

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The trouble with Clarence was that he was a thinker. What's more, as a lifelong rabbit hunter, he had strong opinions about his favorite sport, based on his own experience. And Clarence was sure that this new season, a third again as long as the old one, was too much.

Left to himself, Clarence would have stuck to the old season. But he had to recognize bitterly that there would be no sense in that. With everybody else hunting 104 days, he wouldn't accomplish anything by limiting himself to 78. Over that long a season too many rabbits would be killed, too few would be left—and where would his hunting be next year?

But if rabbit hunting was going to be ruined anyway, he might as well get his share. With some misgivings, Clarence set forth.

His season was successful, if not joyful. On one tract where he'd got 12 rabbits the year before, he got 15 in the longer season, and everywhere else the results were about the same. It ought to have been the best rabbit hunting he'd ever had, but Clarence couldn't enjoy it. He looked at the extra rabbits in his bag and shook his head, convinced no good would come of it. More rabbits this year—fewer next year. It stood to reason.

Clarence had never met Burton Lauckhart of the State of Washington's Department of Game, who might have told him the extraordinary case of Whidbey Island.

Whidbey is a long, narrow island, about three miles by 50, in Puget Sound. Twenty years ago the strawberry farmers on the island rose in wrath and demanded loudly of the state game commission and everyone else within earshot that the deer on Whidbey Island be eliminated. Under the state's buck-only law, which applied to Whidbey as elsewhere, the deer had become a menace, said the farmers, consuming large quantities of strawberries without paying for them. The deer, said the farmers, must go.

The game commission considered the situation. The annual take of deer on Whidbey was only about 100, the deer herd there probably only about 1,000. Isolated as it was, the island could be given special treatment in the law without affecting hunting anywhere else. The game commissioners shrugged. All right, they said, open up the hunting. Let Whidbey have an any-deer law. That'll do it.

The next season, the deer take on Whidbey was 380. The game commissioners smiled, satisfied. The deer were half gone already. The next year the take was 400. This time the commissioners did not smile. According to the numbers, there should be hardly any deer left. Yet reports indicated there were a lot left.

The commissioners waited another year. The take was close to 500. Frowning, the commissioners investigated Whidbey, to find out what in the world was going on. They found the deer herd in fine shape. In the 17 years since then, the harvest has averaged more than 500 a year. The herd is still in fine shape. There is no report on the shape of the strawberry farmers. With hunting as good as it is, maybe nobody cares any more.

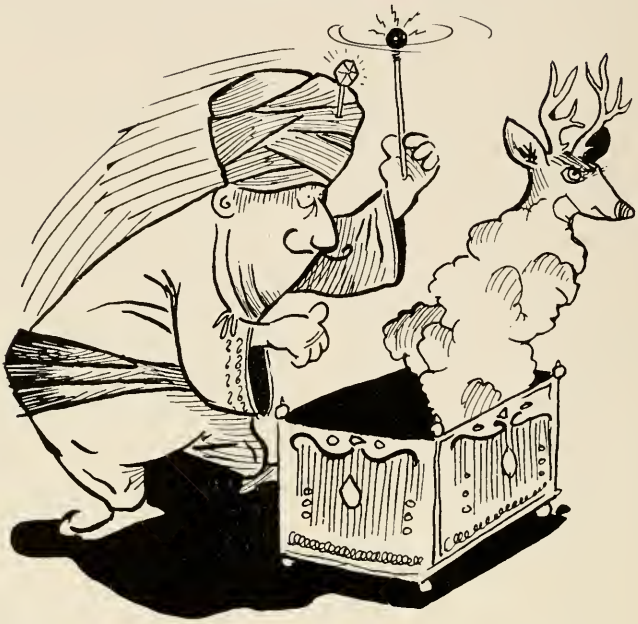
If Clarence had heard this remarkable tale, he would have been astonished. But he probably wouldn't have wholly believed it. As a horsesense thinker, he would have been sure there was some gimmick. How can you go on shooting 500 deer a year out of a small herd, stepping the kill up to five times the accustomed rate, and still have as many deer left as before?

Obviously, you can't. It's like one of those fairy tales, with a magic box or salt shaker or whatever it is that keeps on pouring out and never gets any emptier. Fantasy, for children. But Clarence was no child. He didn't want fantasy, he wanted hunting.

Now it happened that one of Clarence's friends was an enthusiastic bird shooter. Eager to try something new, he'd been out to Nevada to hunt chukar partridge. Great sport, he said, when he came back.

But then, keeping track of news from Nevada, he got worried. There was a drought there. Chukars, he explained to Clarence, like dry country, but they don't like drought — can't survive it, in fact. Shooting ought to be closed down, he said, until the drought was over.

Clarence figured it like one of those fairy tales, with a magic box that keeps on pouring out and never gets any emptier.



The Nevada authorities seemed to agree. They closed down chukar shooting — but not entirely. For some reason or other, they left it open in three counties.

Clarence's friend was good and mad. One of the open counties was the very place he liked to hunt. Those fatheaded fools, he told Clarence indignantly, were going to ruin the shooting there. He was so sore that for three years, while the drought lasted, he wouldn't go near Nevada. Then shooting was opened up again and he went back to the old place, just to see what had become of it.

The shooting was fine. Clarence's friend couldn't understand it at all. It the places where shooting had been closed down it was good too, but no better than in the places where it had remained open. It didn't make sense, but there it was. Back home, the friend told Clarence about it, shaking his head in bafflement. Clarence couldn't make head or tail of it either.

The puzzle annoyed him, like a bothersome tooth. He couldn't let it alone. He knew what he knew and this was impossible—and yet it was a fact. There had to be an explanation.

For his own peace of mind, Clarence set out to find it. He began reading conservation reports. As a practical man, he'd never paid much attention to them before. They turned his world upside down.

He found, for instance, a report on a seven-year study made by two men of the Arizona Game and Fish Commission on Gambel's quail. Twenty-five years ago this quail was Arizona's top-ranking game bird, with a limit of 15 a day and a season of two months. Then, rather suddenly—within a few years—the number of birds dropped sharply.

Shooting was tightened up more and more severely until it was virtually stopped altogether. But the birds didn't come back. Something was wrong. The game commission assigned two men to find out what.

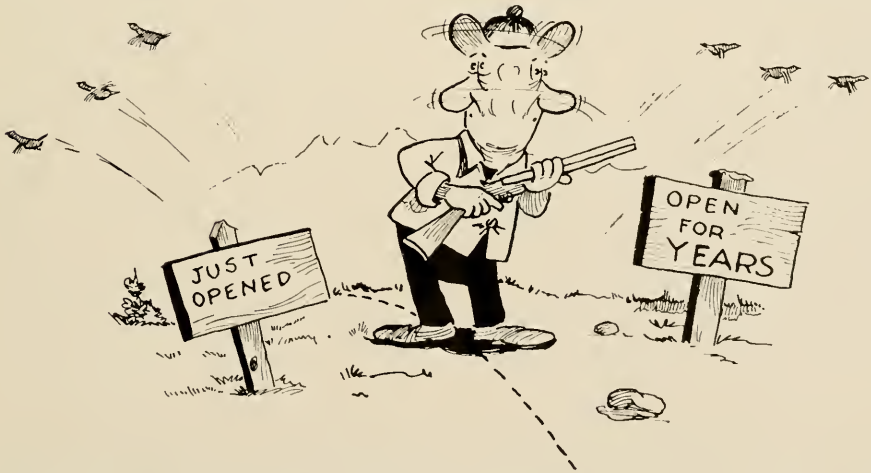
The men set up study areas. Shooting was allowed in some, not in others. Careful arrangements were set up for census, for frequent checking in season and out. The work was detailed, exact and thorough. Of every 1,000 birds counted in September, hunters—where hunting was allowed—took an average of about 200.

Oddly — to Clarence — hunting pressure made practically no difference in the number of birds taken. In one case a rise in the number of hunters from 277 to 510 — nearly double — brought an increase in the total bag of only 3 percent. Losses to natural causes, sickness and predators, were something else again; these accounted for more birds than the hunters did.

Going a step further, the game commission men trapped birds after the hunting season was over, to bring the population down to just half of preseason. The next year the population was right back up again where it had been before.

Plainly, overhunting wasn't cutting down the quail. Throughout the study the bird density was never higher on the unhunted land than it was on the land where hunting was encouraged.

Whatever had cut down the quail, the hunters weren't to blame. For



In places where shooting had been closed down, hunting was no better than in places where it had remained open.

years they had done without sport, thinking they were helping the birds. But in fact they hadn't helped the birds at all, and could have gone right on shooting without hurting the quail population—even if their average of hits had been twice as high as it was.

Pouring over this report and others like it, Clarence began to sense an inadequacy in his arithmetic. He saw reports on deer, quail, squirrels—all kinds of game—and essentially all of them were alike. Gradually he got the hang of a new way of thinking. Start with 1,000 deer, take away any number up to 500 or so, and the following year you'll still have 1,000 deer. Reproductive capacity, of course—the old well-known urge, in full operation. Clarence had no trouble understanding that.

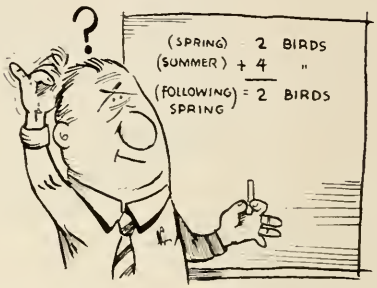
What he couldn't grasp so easily was that if you took none away you'd have no more in a year than if you took away 500. You might even have fewer. Where was good old reproductive capacity in such a case?

Take what happened in Colorado when state officials decided that their mountain sheep might be ready for some hunting. Such an uproar of protest went up that the officials didn't dare to issue permits. The sheep remained fully protected. And instead of flourishing and multiplying, they all but died out completely under no hunting at all.

Take the case of bobwhite quail in Ohio, where the bird has been on the protected list, no hunting permitted, for years. Are there more quail in Ohio than in the neighboring states, all of which have open quail seasons? The answer is, No.

According to expert estimates, there are probably fewer quail in Ohio, per unit of land area, than in the states next door to it.

The single most important factor in game population isn't whether hunting is allowed or not, or even the old reproductive urge; it's what is called carrying capacity.



Clarence became used to a new kind of arithmetic.

A tract of land can feed so many deer, or quail, or pheasants, or squirrels, or whatever. Put that many on it, and everything's fine. But leave them alone there and you'll have trouble.

The reproductive urge works, only to bang its head against the ceiling of the food supply. With not enough food to go around, weak animals sicken and die. As pressure against the limit of food supply continues, females, ill-nourished, bear fewer young, and often the young they bear are runty and deformed. The longer the pressure keeps on, the worse it is for all, until at last even

the reproductive urge itself may weaken and all but atrophy through frustration.

If that happens, your game is gone —and all without any hunter ever firing a shot.

Most hunters, like Clarence, see the problem backward. They're afraid that if they shoot too much game the game population will be diminished. They ought to be more afraid of diminishing the population by shooting too little.

The ability of game to reproduce, where carrying capacity doesn't limit it, is astonishing. When chukars were released in the State of Washington, according to Burton Lauckhart, they increased so fast that much of their suitable range was saturated within five years.

Much of the same thing happened when Hungarian partridge were introduced in Saskatchewan. But once they hit the ceiling, the Huns began to fade again, even though they were only lightly gunned.

In Pennsylvania and some other eastern states, 20 to 30 years ago, logging operations suddenly and greatly increased good habitat for deer. The result was an almost explosive upward surge in the deer population. It hit the food-supply ceiling soon, like the Huns in Saskatchewan, and began to fade. "Too much hunting!" cried sportsmen in a state of great alarm.

But the real trouble was that there hadn't been enough hunting to keep the habitat from being over-browsed. And unless there's more hunting, the deer herd will keep on going down.

Consider the pheasant. As any sportsmen knows, the life of a hen pheasant on a game farm is about five years. Taking that figure, a man with good sound arithmetic, like Clarence McBang, can "prove" that a kill of 20 percent a year will just keep the population in balance. Right? No.

On a range whose carrying capacity is fully occupied, the life of a hen pheasant is not five years, but one. This has nothing to do with losses by hunting.

Assume there is no hunting. Assume each hen raises two young a year, one of these a hen. Increase of her population at end of one year: 100 percent. If you assume the original birds and all their descendants live, the population increase in five years would be 1,600 percent.

But the carrying capacity of the range was full to begin with. Therefore, this explosion never gets going. The first hen born, together with its mother bird, makes one too many. By the end of a year, before any more are born, one must die. So your population turnover per year is not 20 percent, the way Clarence figured it out. It's 100 percent. And the amount hunters ought to take each year isn't 20 percent, but 50 percent—in order to keep the population stable.

The way you figure the proper harvest for hunters to take is not by considering the life span of the game

under ideal, noncompetitive conditions. The way you figure it is by combining reproductive capacity. If the reproductive capacity is 20 percent a year, the life span on the actual wild range will be five years, no matter what it may be for the same animal on a game farm, and the correct harvest will be 20 percent a year to keep the population in balance.

What it all boils down to is that you can't stockpile game. If you don't harvest enough, nature will. You get it when it's there, or you don't get it at all.

Around the country, game biologists are trying to drum this fact into the heads of hunters. It's a tough job. Too many, like Clarence McBang, just can't grasp that the way to have more game next year is to take more, not less, now. Others do grasp this all right but hesitate to come out and fight for more hunting. Some of them have been battered before, by well-meaning animal lovers who apparently think that if it weren't for hunters all animals would live forever.

These are vocal people, and their appeal to sentiment is strong. But they're contradicted by the facts of wildlife, and more often than not the protection they demand for wildlife does the game itself more harm than good.

Time and again, when game management men have proposed longer hunting seasons, or shooting doe deer as well as bucks, the first to oppose them have been sportsmen, who either don't understand the facts themselves, or are reluctant to stand up openly and assert them.

Clarence McBang, beginning to see the light, took another look at his new rabbit-hunting season. In the 78-day seasons the rabbit population in Rose Lake region of Michigan ran from 16 to 84 per hundred

acres, with an average of 41 just before the season began. In the four years of 104-day seasons, the population per hundred acres ran from 34 to 50, with a preseason average of 42.

In the 78-day seasons the hunters' average take of rabbits per hundred acres was 12, or 28 percent of the preseason population. In the longer seasons hunters averaged 15 rabbits per hundred acres, or 38 percent of the preseason number. Better hunting than ever before — and just as many rabbits to hunt next year.

Clarence was convinced. When Michigan's game management men suggested that still more rabbits ought to be taken, he didn't fly off the handle. The season was length-

ened to 131 days. With a calm smile Clarence went out to enjoy it. At last report, he was having a fine time.

That's the way most sportsmen have to learn — by seeing results with their own eyes. There is certainly nothing wrong with that. It is, in fact, a very good thing. Game biologists, being human, can make mistakes too and the observations of good sportsmen can do much to correct them quickly, before they do any serious damage.

But it is important that sportsmen see honestly and clearly, that they look at the facts and not at their own ideas of what "must" be so, or at their fears of what somebody else might say about them. There's an immense amount of fact, and more coming in all the time. Most of it contradicts flatly what the majority of sportsmen think about game supplies.

And the longer sportsmen shut their eyes to the facts or refuse to stand up and call attention to them, the worse things will be for the sportsmen and for the game they think they're protecting.

If recent recommendations by wildlife researchers are heeded by the officials who make our hunting regulations, there will be proposals in many parts of the country to lengthen seasons or increase limits of game. Among the men who know the facts, the view is almost universal that we are not hunting enough to keep our game supply at its best and most plentiful.

But when these proposals are made, what will sportsmen do? That's the question and the right answer to it is worth a lot more than $64.

Clarence McBang, for one, knows it now, after considerable self-education. If enough others recognize it and will say so, we can all have more and better hunting than we've ever had before, not just now but in all the years to come.

Fisher Are Returned to Montana Forests

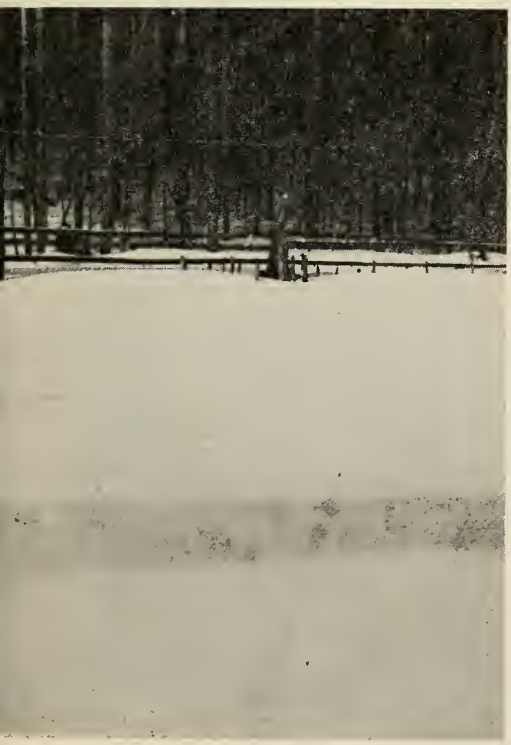
By Vernon D. Hawley, Fur Resources Biologist
Photos by Author.

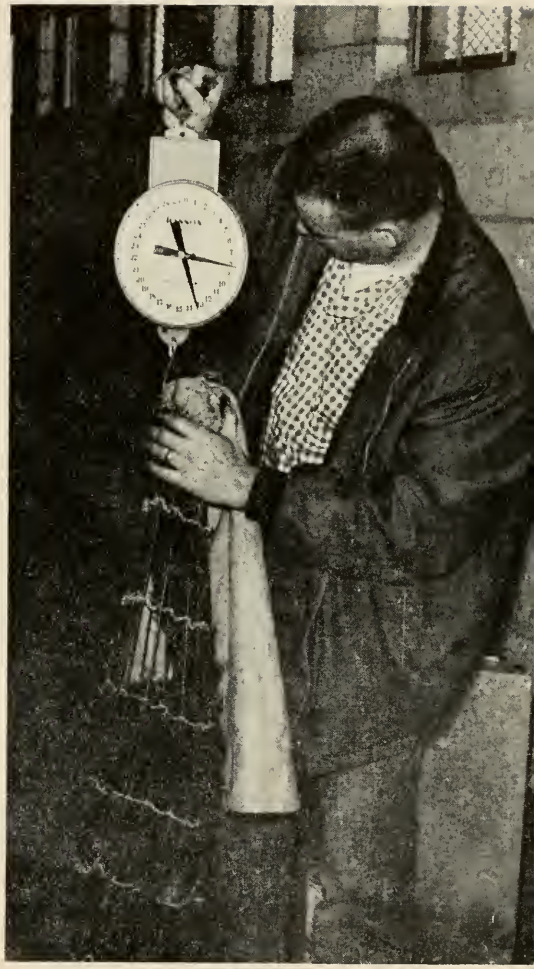
Fisher, one of the largest members of the weasel family, were once residents of western Montana forests, but their presence has not been recorded since the 1920's. The reasons for their disappearance are not surely known but apparently the animals were eliminated by heavy trapping early in the century. Because fire has created a nearly treeless barrier between Montana and the nearest good habitat occupied by fisher in Canada, the furbearers have not become reestablished naturally.

The food of the fisher is mainly small animals (mice, squirrels, snowshoe hare, etc.) that inhabit the forests where fisher live. An intriguing aspect of their feeding habits is that they are very efficient predators on

porcupines. Fisher can capture and kill this awesomely armed "quill-pig" with apparent ease and, although they occasionally get stuck up a bit, the quills do not seem to affect their well-being. It is reported that porcupines, when numerous in the forest, are so frequently eaten by the fisher that their numbers become reduced if not eliminated.

The U. S. Forest Service desired the fisher returned to Montana to help control the excessive numbers of porcupines which do a great deal of damage to forests by chewing away bark around small trees to obtain food. Since the Montana Fish and Game Department also desired the return of this interesting native





ABOVE

Chuck Jonkel weighing fisher before release. This one tipped the scales at 8.2 pounds and was probably a male. Although there is some overlap in weight, females weigh approximately four to six pounds and males eight to twelve pounds. Adult males may weigh as much as eighteen pounds.

LEFT

In a few years as the fisher increases in numbers, their tracks will be easier to locate. These tracks greatly resemble those of the marten and wolverine as to gait but are larger in size than those of the marten and smaller than the tracks of wolverine. Fisher tracks will usually not be found in such open situations but under the forest canopy to which this fisher has hurried.

The fisher had their first view of Montana through the mesh of their cages. This photo of an adult female shows the general appearance of the fisher in profile and the large feet that enable the animal to travel over the deep soft snows found in the mountains.

Montana animal because it is a valuable furbearer, a cooperative restocking program was initiated in 1958. The U. S. Forest Service financed the project the first year and a portion of the cost in the second. The Montana Fish and Game Department made the biological studies, arranged for the procurement of fisher and handled the actual restocking activities.

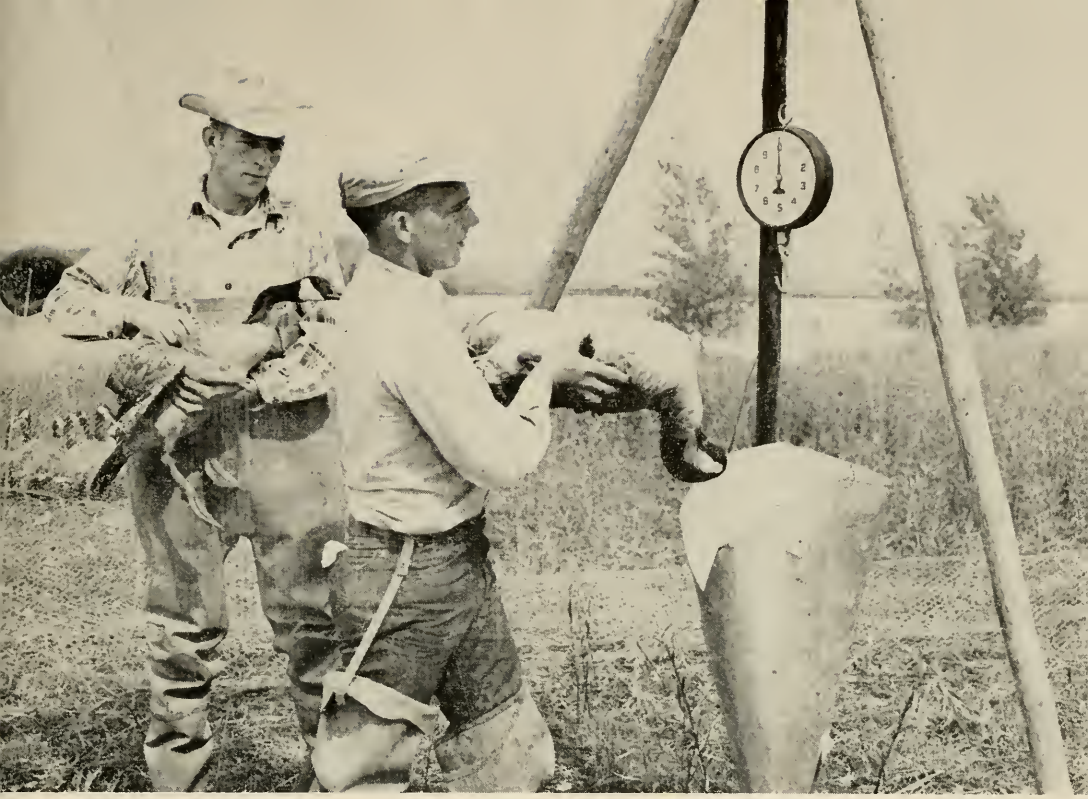
In 1959, the Montana Fish and Game Department also financed the purchase and transportation of a portion of the fisher obtained that winter. The British Columbia Game Branch cooperated by handling all aspects of the program in British Columbia.

In the two winters of 1958-59 and 1959-60, forty fisher were obtained in British Columbia. Three releases were made in Montana consisting of nine fisher at Pinkham Creek south of Rexford in northwestern Montana, fifteen fisher near Holland Lake in the Swan River drainage and twelve fisher near Moose Lake in the drainage of the Middle Fork of Rock Creek southwest of Philipsburg.

Because fisher are easily trapped and are often caught in traps set for marten, these areas have been closed to marten trapping to protect the fisher and allow their numbers to increase. Of course, fisher trapping is prohibited throughout the state.

Plants of the size of each of these three were adequate to establish the fisher in Nova Scotia; therefore, Montana should have a good population of fisher in a few years that will yield a harvest of valuable pelts to Montana trappers.

The success of the plants are determined through periodic checks of the release sites made mostly during the winter when tracks are visible. The few fisher now present, the large area to be covered, and difficult travel conditions make it hard to gather adequate information. The use of oversnow vehicles, helps tremendously but in many instances there is no recourse but to cover the more difficult terrain on the slow man-powered snowshoe.



Unit workers weigh Canada geese in the course of a Flathead area goose study.

YOUR COOPERATIVE WILDLIFE RESEARCH UNIT

By John J. Craighead*—Photos by Author

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What are the functions of the Montana Cooperative Wildlife Research Unit? Is it part of the state university? What connection does it have with the State Fish and Game Department- How is it financed and administered? How is it connected with the U. S. Fish and Wildlife Service? These and many other questions have been asked over the past nine years by laymen and biologists alike. The present article is an attempt to answer some of these questions and to acquaint the reader of "Montana Wildlife" with the objectives, personnel and activities of the unit.

The nation-wide cooperative unit program was initiated in 1935 to help train men in the field of wildlife management and to provide information for better management of wildlife resources. Montana joined this program in 1950 when the wild-

life research unit was established at the state university. Sixteen units are now operating in various land-grant colleges and universities throughout the United States, including Alaska.

The Montana unit is operated through the cooperative efforts of the U. S. Fish and Wildlife Service, the Montana State University, the Montana Fish and Game Department and the Wildlife Management Institute, a private, non-profit, national organization in Washington, D. C. The unit thus is an integral part of each of these organizations and although it is administered as a separate entity, it is nevertheless financed by all four agencies. It is governed by a local coordinating committee consisting of a representative of the University, the Fish and Game Department and the U. S. Fish and Wildlife Service, which considers for approval the annual work program, the yearly budget, policy and personnel matters, and periodically reviews accomplishments.

The major objectives of the 16 units are similar. They are:

to train personnel in the field of wildlife management;

to conduct basic research on wildlife and related subjects;

to promote education in the field of resource management through the medium of lectures and publications;

to provide technical assistance on wildlife management problems to the four cooperating agencies.

By pooling funds, facilities, technical know-how and manpower, the several units have produced results which none of the agencies could have accomplished independently and at little expense. According to the most recent records compiled by Dr. D. L. Leedy, Chief, Branch of Wildlife Research, U. S. Fish and Wildlife Service, 2,964 wildlife students have been graduated from the unit schools since their inception. These include 2,109 with bachelor's degrees, 752 with master's degrees, and 103 with doctoral degrees. During the same period, the units have contributed 2,833 publications covering a wide range of subject matter dealing with biology, ecology and resource management.

Approximately 150 bachelor degrees have been awarded at Montana State University since the wildlife program was inaugurated and 18 student fellows have received master's degrees. Some of these have gone on for advanced work and others have been employed in Montana and adjacent states.

The training of students and the publishing of both popular and technical information on wildlife problems have contributed greatly to creating better public understanding of wildlife management and has advanced scientific knowledge of fundamental biological and ecological problems.

The personnel of the Montana unit consists of a leader or director employed by the U. S. Fish and Wildlife Service, an administrative assistant employed by the Montana Fish and Game Department, a secre-

tary on the university payroll and university faculty members and Fish and Game Department employees who serve as unit staff members and project leaders. In addition, the State Fish and Game Department provides funds for a wildlife extensionist who works through the unit.

Four graduate fellowships are provided by the State Fish and Game Department. These run for a period of two years and are offered to promising students to work toward a master of science degree in either wildlife technology or wildlife management. The former degree is offered in the department of zoology and the latter in the school of forestry. The university faculty members are responsible for the basic training of the students. Most graduates, whether enrolled in the zoology department or the school of forestry, receive courses in mammalian physiology, parasitology, genetics, comparative anatomy, population ecology, mammalogy, ornithology, range management, and courses in wildlife and habitat management.

At the present time student fellows are investigating: lungworm infection in bighorn sheep, winter ecology of mule deer in the Rattlesnake Drainage, ecology of marten in Glacier Park, and magpie predation on ring-necked pheasants.

Other agencies and organizations such as the U. S. Forest Service, National Bison Range, National Park Service and the Hamilton Laboratory of the Public Health Service offer help and lend support to the research projects.

Research Activity

The Montana unit has concentrated its efforts on long-term basic research designed to obtain fundamental information that can be applied in solving specific wildlife problems. Emphasis has been placed on studies of mammalian reproduction, research on techniques of sexing and aging birds and mammals, population ecology of waterfowl, predators, furbearers, and big game. Elk nutrition and raptor predation also have been intensively investigated.

Many students and project leaders have contributed to unit research activities over the years. Space will not permit enumeration of the efforts of all those involved, but their work in cooperative undertakings is recognized and appreciated.

The results of this research have been of practical value. For example, **an antelope aging study** has yielded important information that will enable game managers to determine the first three-year age classes without sizable error and identify older age animals within broader limits. Data were obtained over an eight-year period from known-aged animals marked and sacrificed at periodic intervals. The information has practical application in determining population structure of antelope herds from kill data gathered at checking stations. It also helps the game manager determine the desired level of harvest.

Great horned owls with rapidly growing young to feed readily take advantage of young magpies as a source of food.

A study of reproduction in elk, conducted in pens at the National Bison Range, has yielded information on the reproductive cycle of the cow elk — the length of the estrus period, the interval between periods, and data on gestation. An embryonic growth curve was constructed to use in aging embryos from wild cow elk. These basic data obtained during the four years of study will enable the wildlife manager to compute the average conception date and average calving date from embryos obtained from wild elk herds. Such information will enable the biologist and administrators to make more intelligent recommendations for opening season dates on elk herds throughout the state.

Of particular value to the game manager was the establishment of more definite criteria for determining productivity of elk from the analysis of ovaries.

A magpie study in the Bitterroot Valley showed that resistance factors in the environment tend to hold in check the high reproductive potential of magpies. Great horned owls, hawks, crows, pine squirrels, disease, and other factors of the environment cut the potential reproduction in half during the breeding season and by the following nesting season the population is reduced to the initial breeding level. Nature, at no cost, accomplishes the same magnitude of reduction that might be

done with bounties or by control efforts of sportsmen's groups.

From information obtained during the second stage of this study it was concluded that the effect of the magpie on the pheasant population in the study area was slight and when standing alone was not a limiting factor. Magpie predation was important only as it contributed to the total predation.

Intensive magpie control is not supported by the facts of this study.

Seven years of intensive research on the Canada goose in the Flathead Valley has shown that in some years the mortality of young and adults from hunting pressure exceeds the annual recruitment. When this occurs the population declines. Restrictive hunting measures developed from this basic knowledge are proving effective in safeguarding Flathead geese. The study revealed that relatively few hunters were taking a large share of the kill. In 1954, for example, 6 percent of the goose hunters killed 50 percent of the total bag and about 8 percent again shot nearly 50 percent of all geese bagged in 1955. Some experienced hunters took as many as 25 and 30 geese apiece. Restrictive hunting measures setting the annual bag limit at six and shortening the season have reduced the kill and the population appears to be on the increase.

A measure of the number of goslings produced over a six-year period has shown that the population produced an average of three goslings to the flying stage per pair of adults. This is sufficient to maintain the population and allow for increase in numbers, provided overshooting does not occur.

Composite life tables are being constructed for the Canada geese population of the Flathead Valley, Montana. These tables cannot be completed until the band recovery from seven generations of geese are turned in. Beginning with a generation of geese whose members started life together, the life tables will state for every interval of age the number of deaths, the survivors remaining, the rate of mortality (largely hunter kill) and the expectation of further life. This will yield a nearly complete picture of survival and mortality from eggs to last survivors in each of seven generations with many of the causes of mortality recorded. Essentially, these are actuarial tables for geese and will enable the waterfowl manager to determine the proper harvest and suggest regulations for accomplishing this.

Most of the Canada geese reared in the Flathead Valley are killed in Montana but a substantial number are harvested in Idaho, Utah, California, Oregon and Canada.

A six-year study of the use of aerial platforms for nesting by Canada geese has shown that the use of platforms increased from one to ten percent. They induced some geese to change from ground nests to aerial nests. The platforms significantly increased hatching success and reduced predation as a cause

A platform constructed for use by nesting geese.

of nest failure. To be most effective as a management tool, nesting platforms should be rehabilitated annually, erected 20 to 50 feet above the ground, placed where natural sites are subject to heavy predation or flooding, and located remote from human habitation.

For a period of seven winters, cow and calf elk herds in pens at the Blackfoot Game Range were fed to determine their winter food requirements and food preferences. Consumption of approximately two pounds and above of meadow hay per hundred weight per day enabled elk cows and calves to survive the Blackfoot winters without reaching a poor condition.

The feeding experiments showed that elk calves can survive a severe winter on low nutritive forage provided food intake is maintained. Grassy type forage was preferred to browse but various browse species were consumed and enabled elk calves to maintain body weight. In general, willow was preferred to serviceberry. Conifers such as lodgepole pine and Douglas fir appeared to have value as a winter food if combined with bunchgrass. A diet consisting of one-half palatable native grasses and deciduous browse proved to be of high value as a winter maintenance ration.

Since many of Montana's important elk herds are located on browse ranges, good management must insure the maintenance of the better browse species. Only if herd numbers are kept within the winter car-

rying capacity of these ranges can elk obtain enough nutritious food to maintain weight and vigor during the winter and approach their reproductive potential in spring.

By means of live-trapping, marking and releasing, marten were intensively studied in Glacier National Park and adjacent areas for a period of seven years. The information obtained on range and movements of male and female marten, population densities, breeding age, food habits and the physiology of reproduction already has proven valuable in the management of this important furbearer.

Bighorn sheep lambs can be captured and tagged by a systematic coverage of the lambing areas. Ewes will abandon very young lambs but the lambs are able to follow their mothers when only a few days old.

Sixteen lambs were ear tagged with metal stock tags and colored plastic ribbons for individual recognition. Thirteen of the lambs have been observed numerous times subsequent to tagging and it is presumed that the other three died at a fairly early age. A juvenile mortality of nearly 20 percent is probably not unusual for this species.

Data on age specific mortality, population structure, reproductive age and competition of bighorn sheep with mule deer will be obtained over the years and contribute materially to better management of this species.

Preliminary investigations have shown the feasibility of studying

Pens used in elk food studies. Variations of feeds were placed in the shelters at center of corrals.

the grizzly bear in Yellowstone Park. During the course of the summer, 27 grizzlies were immobilized, ear tagged, color marked and released for future identification. Techniques for handling these animals have been worked out and retention of color markers has been satisfactory to date.

One of the marked grizzlies, an adult male, was shot near Cooke City, Montana, by a hunter during the fall hunting season. He was killed more than fifty airline miles away from the point of release and must necessarily have traveled over an area of extremely rough terrain.

Dosages for immobilizing the grizzly with succinylcholine chloride were worked out. A minimum population for Yellowstone National Park of 150 bears has been indicated and some cub-sow ratios obtained.

If the long-range objective of this study are met, the information on population structure, breeding age and behavior, age specific mortality, and population turnover obtained in Yellowstone Park will almost certainly be invaluable in assessing the status of grizzlies in forest areas where they are hunted. Much of the information obtained should have direct application in the management of grizzly bear in Montana and elsewhere.

The detailed results of these long-term investigations will be published by the Montana Cooperative Wildlife Research Unit and the Montana State Fish and Game Department and made available to the public.

The research projects conducted during the calendar years 1958-59 are listed:

1. Mule deer population and winter range studies in western Montana—R. D. Taber, Edward Bailey.
2. Seasonal conditions of mule deer—R. D. Taber.
3. Mule deer winter range forage relations study—R. D. Taber, Donald Klebenow.
4. Aging of fisher and analysis of reproductive systems—P. L. Wright, Malcolm Coulter.
5. Population study of Canada Geese in the Flathead Valley—John J. Craighead and Dwight Stockstad.[1]
6. *Experiments with the plastic jesse-knot marker—John J. Craighead and Dwight Stockstad.
7. *An ecological and physiological study of the pine marten—P. L. Wright and Charles Jonkel.[1]
8. *Magpie predation on ringnecked pheasants—John J. Craighead and Gerry Atwell.
9. Motion pictures of unit activities—John J. Craighead.

10. A physiological and anatomical study of bighorn sheep—P. L. Wright, Clyde M. Senger and C. J. Henry.

11. A study of lungworm infection in bighorn sheep—Clyde M. Senger and Donald Forrester.

12. Quantitative aspects of raptor predation—John J. Craighead and Maurice Hornocker.

13. Big game harvest analysis—R. D. Taber.

14. Systemics of blue grouse in northwestern Montana—R. S. Hoffman.

15. Study of alpine ecology in the northern Rocky Mountains—R. D. Taber and R. S. Hoffman.[2]

16. Bighorn sheep population study — Wesley Woodgerd and William Schoenecker.

17. An ecological study of the grizzly bear—John J. Craighead and Maurice Hornocker. [3] [4] [5]

18. Ecology of the feeding behavior of black bear in northwestern Montana —P. L. Wright and Edward Tisch.[1]

19. Effect of magpie control on magpie population and reproduction—John J. Craighead and Patrick O'Halloran.

Specific information on these projects can be obtained by writing to the research unit or contacting the project leaders directly.

The accomplishments of the unit have been due to the cooperative efforts of many people and to the fine support of all cooperating agencies. The fact that the research unit is an integral part of both the State Fish and Game Department and the University activities cannot be overemphasized.

Perhaps one of the finest tributes to the unit program and one that sums up the basic need for its existence was made recently by C. R. Gutermuth, vice president of the Wildlife Management Institute, when he said — "The units have proven that cooperative effort in wildlife research and resource management is feasible, productive and mutually advantageous to all concerned. The participants have established a pattern for cooperative effort among federal, state and private organizations that is unsurpassed, and one that will no doubt serve as a model for cooperative research in other fields of endeavor."

Footnotes

*Projects completed.

[1]Financed in part by Federal Aid.

[2]Financed by National Science Foundation.

[3]Financial aid by Wildlife Management Institute.

[4]Financial aid by National Geographic Society.

[5]U. S. National Park Service.

Montana's Stream Rating Map

One of the most serious obstacles to the preservation of Montana fishing streams has been lack of a satisfactory method for measuring and presenting their total fishery value—both economic and social. Unlike most other water uses, recreational fishing does not readily lend itself to conventional means of measurement and as a result is usually undersold at the bargaining table of comprehensive resource planning.

An attempt has been made to evaluate and classify the streams of Montana on the basis of their worth for recreational fishing. The major difficulties encountered were: devising a system which would be simple enough for practical application, broad enough to include all important factors influencing fisheries values and at the same time capable of being portrayed in an understandable manner.

It is believed that the stream classification map and tabulation portrays in a realistic fashion the relative value of Montana's fishing streams as they are known. However, it is recognized that values are dynamic and periodic revisions will be necessary. Some of the smaller tributary streams were unclassified primarily because their relative values are unknown.

The classification provides: an inventory, appraisal and location of Montana's fishing streams; a base for calculating material measurements of the fishing resource; and a guide for long-range policy, administration and management of the fishery resource. Broad considerations such as these are necessary if fishing is to have a place in comprehensive planning somewhat commensurate with its social and economic worth to Montana and to the nation.

The classification clearly emphasizes that Montana fishing streams are limited in both quantity and quality. The popular conception that there are 20 to 30 thousand miles of "well stocked streams" in Montana is dangerously misleading in that it has given rise to a false sense of security or complacency in conservation of stream fisheries.

The stream classification committee, composed of representatives from the Montana Fish and Game Department, Montana State College and Missouri River Basin Studies of the Bureau of Sport Fisheries and Wildlife spent more than five years in the consideration and preparation of the stream classification. Joe M. Halterman, member of the committee from the Bureau of Sport Fisheries and Wildlife, tabulated the material for consideration of the committee. State district fisheries managers furnished most of the basic information on the streams of their respective districts and contributed much to the success of this project. Many other individuals concerned with Montana fisheries were freely

Joe Halterman, who was instrumental in creating the stream rating map, is pictured holding trout that would delight the heart of any fisherman.

—Photo by Bob Uppgren, U. S. Fish & Wildlife Service.

consulted regarding waters on which they had special knowledge.

A total of 436 streams or parts of streams totaling 8,923 stream miles were placed in Classes 1, 2, 3 and 4. All remaining streams, including those not yet classified as well as those of restricted local value, were placed in Class 5. Class criteria follows:

Class 1—streams of national as well as state-wide value.

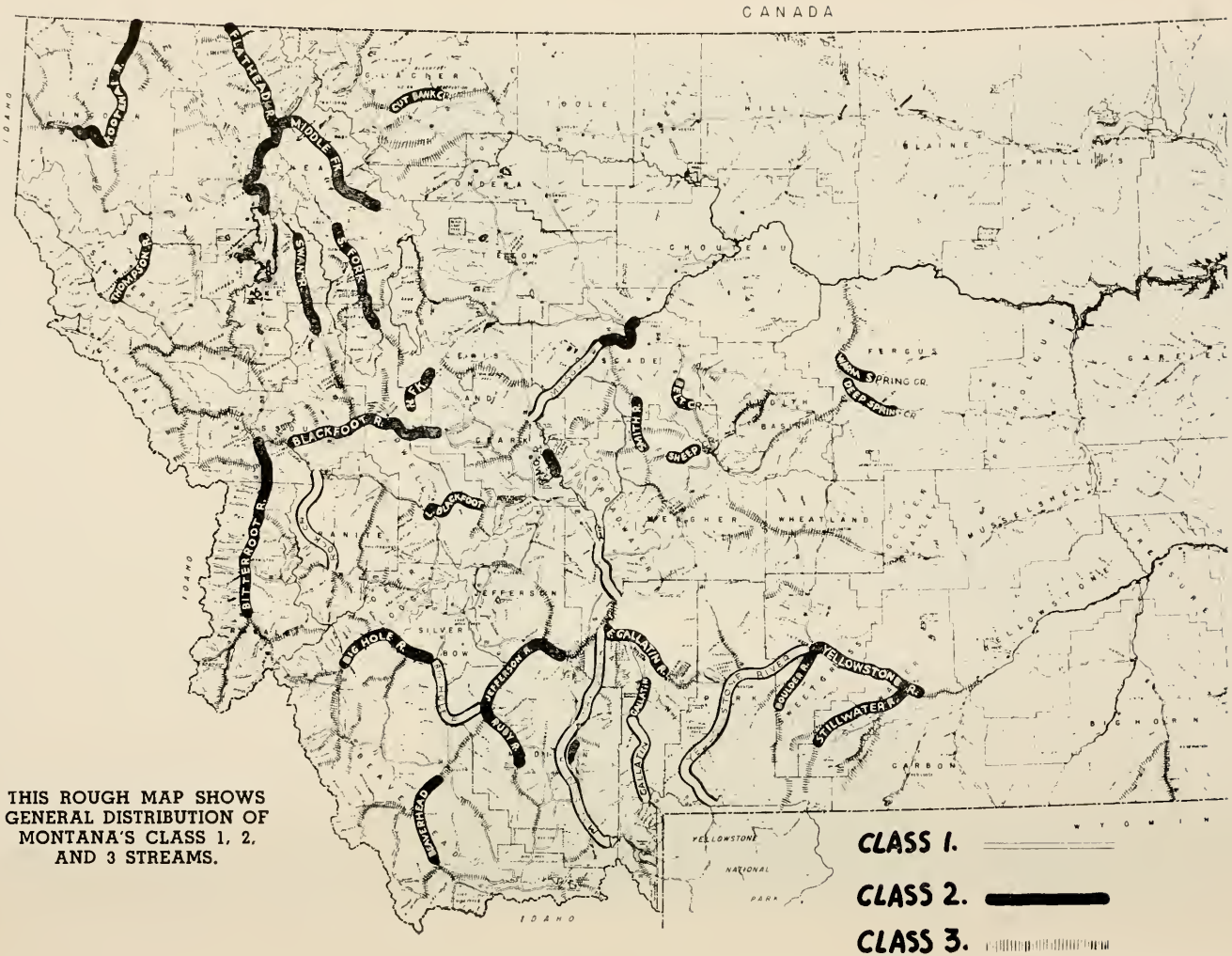
Class 2—streams of state-wide value.

Class 3—streams of value to large districts of the state.

Class 4—streams of value to smaller districts such as counties.

Class 5—streams of restricted local value or not yet classified.

Streams or reaches of streams were placed in appropriate classes after careful consideration of the principal factors of availability, aesthetics, use and productivity. These



THIS ROUGH MAP SHOWS GENERAL DISTRIBUTION OF MONTANA'S CLASS 1, 2, AND 3 STREAMS.

factors obviously are not readily subject to mathematical treatment although considerable statistical and biological information is involved. The committee found no substitute for a thorough knowledge of field conditions. Some of the items considered under each factor are:

Availability—Degree of access such as land ownership, quality and nearness of roads, seasonal influences, stream bank characteristics, kind and number of accommodations such as motels, campsites, and nearness to population centers.

Aesthetics — Intangible values such as natural beauty, clear water, pleasant climate, natural conveniences, freedom from insect pests, snakes and pollution.

Use — Fishing pressures were estimated from creel census records and general use from U. S. Forest Service campsite records and general observations of local authorities.

Productivity—Many things were considered in rating the factor of productivity. The primary considerations were: size in relation to width and depth; pools in relation to riffles and gradient; cover such as undercut banks, shore vegetation, and boulders; spawning areas, temperature, fertility, fish-foods, and abundance of desirable fishes.

The classification map has had an enthusiastic reception since its appearance in late December (1959). Requests for the map, along with commendations, have been received from private and public conservation organizations and from local through national levels. Acclaim has not been limited to those primarily concerned with fishery resources. It has come from other water interests too. This is particularly noteworthy since too often in the past, comprehensive planning has been rendered ineffective by the unwillingness of various water interests to lay the cards on the table. Fishermen, including some of national repute, in lauding the classification declare it is a big step forward in long range planning for the conservation of Montana's fine fishing streams. The Fish and Game Department, Montana State College and Missouri River Basin Studies of the Fish and Wildlife Service are gratified with the reception. However, they are fully aware that the classification is not the end but only a step forward in conservation of the resource.

MONTANA SCORES SECOND LARGEST ELK HEAD IN THE WORLD

Fred C. Mercer of Twin Bridges proved conclusively that Montana rears not only a lot of elk but also some big trophies. The mount pictured here was taken from an elk killed by Mr. Mercer in Madison County, October 1958. When entered in Boone & Crockett national competition, the trophy measured up to be the second largest elk head in the world and the largest ever recorded as taken by man. The first place record head was found in a barn in 1890.

In addition to taking first place in trophy competition, Mr. Mercer was presented the special Sagamore Hill medal given by the Roosevelt family in memory of Theodore Roosevelt. The medal is presented for the best specimen in competition, provided the judges feel any trophy is sufficiently outstanding to deserve such an award.

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