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REESTABLISHING AND PROPAGATING BEAVER

IN OREGON

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A THESIS
Submitted to the
OREGON STATE COLLEGE

in partial fulfillment
of the requirements for
the degree of
Bachelor of Science

MADE IN U.S.A.
BOND
HAWK
June 1935

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REESTABLISHING AND PROPAGATING BEAVER
IN OREGON

Twenty thousand years ago, at the beginning of the age of man, beaver lived on this earth. Fossils of these "giant beavers" have been found which were as large as our present black bear. They apparently lived somewhat as do our present beaver. It is obvious that they were influential in shaping the earth's surface, as it was carried on by weather, sun, and glaciers. These great beaver of the early ages are supposedly the ancestors of our present beaver.

The fur of these animals has always been prized by furriers, and was excellent in the early days of this country as clothing for the pioneers. The skin of the beaver was a unit of barter for some of the North American native Indian tribes. The meat of the beaver was a welcome tidbit in the larder of both the natives and the settlers of this country. It is not surprising, then, that these animals were one of the most important factors involved in the settlement and development of this country.

When the pioneers arrived here they found many meadows in the middle of wooded and mountainous areas that seemed made to order. There were many fertile wooded valleys with meadows and ponds. Many a tired pioneer was

thankful for these things after a long trek through the wilderness, but not realizing where they had come from, later was to bring havoc and destruction to the furry tribe that had been his benefactor.

DESCRIPTION

The beaver is the largest North American rodent.¹ It has a heavy compact body, a strong frame and powerful muscles. There are two coats of fur; one is a dense, fine, soft, waterproof under-coat, and the other is an outer-guard coat of coarse hairs.² The average adult will weigh from 40 lbs. to 60 lbs; however, there are records of beaver weighing much more than that. One raised in captivity weighed 83 lbs. when it was two years old. Old fat beavers have been recorded that weighed from 100 lbs. to 110 lbs. Charles Eugene Johnson describes them as land animals especially adapted to locomotion in water, and as being clumsy and handicapped on land.³

¹A rodent is an animal belonging to the order Rodentia of the class Mammalia.

²Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 4, Oct., 1927.

³Johnson, Charles Eugene, The beaver in the Adirondacks; Roosevelt Wild Life Bulletin Volume 4 No. 4, July, 1927.

The color of their fur varies; the under fur from buffy yellow to brownish black, and the outer fur from light brown to dark chestnut.¹

The front feet are small, hand-like, and unwebbed. They are used mainly for holding food, carrying and handling building material, and for walking on land. When the animal is swimming the forefeet are held close to the sides so as to offer the least resistance.

The hind feet are webbed and powerful. They are used mainly for walking and swimming. The first and second toes, called "double combing claws", are specialized for combing the fur.

The tail is broadly flattened, scaly, and naked of fur or hair. It is used as a rudder, for sculling or as an "accessory propellor", for support when the animal is felling trees, and as a signal organ. It is never used as a paddle, a trailer or travois or barge as has been widely supposed.² It is sometimes as large as $10\frac{1}{2}$ inches long and $5\frac{3}{4}$ inches wide.

The head is shaped like that of other rodents. The ears are very sensitive; they are small and specialized

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 4, Oct., 1927

²Johnson, Charles Eugene, The beaver in the Adirondacks; Roosevelt Wild Life Bulletin Volume 4, No. 4, July, 1927.

so as to close when under water. The nose is also very sensitive and specialized so as to keep the water out when the animal is submerged. The eyes are small and very poor. The mouth is specialized so that the animal can use its incissor teeth for cutting or tearing roots, or sticks, or its mollars for grinding, while submerged, without admitting water to the mouth. This is possible because the incissor teeth protrude from the head outside of the lips, and the lips are large enough so that they can remain shut when the jaws are open for grinding with the mollars. The animal can stay under water and work for many minutes without coming up for air.

NATURAL HISTORY

Beaver have been given credit for a higher degree of intelligence than most other animals. They are not, by any means, in the lowest groups of intelligence; neither are they in the highest. Early explorers were so much awed by the dams, houses, and tree felling works of the beaver that they credited the animals with a high degree of intelligence. Vernon Bailey sums up the truth of the situation in a few words; "patience, persistence, and industry are more important factors in their work than quick wit or versatile mentality".¹

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct. 1927.

These animals have a gentle disposition. They seldom if ever fight, even though their incissor teeth would be very effective against any of their predatory enemies.

There is one account of a group of beaver attacking in body an otter which was invading their waters, however, this may have been a case of inaccuracy on the part of the observor, or an exception or coincidence with the animals. If the otter is an enemy of the beaver, as is thought, it is natural that they should fight it, but not as an organized body.

Beaver are very playful. They break the routine of their living by chasing one another as if in games of tag and by other doings of the type.

They are shy but if carefully handled are tamed very easily. Even adults caught wild will cause no trouble at all if care is taken so as not to frighten or excite them.

Beaver, as is known, live in colonies, and are more or less socialized. Often two or three families live in one series of ponds and use the same set of dams, canals and other workings. Families in one lodge may be made up of one old beaver and two or three females with their last seasons young. However, when the families increase, and there is a possibility of danger to the food supply in the vicinity the young are often driven off to other grounds

when old enough. The families will normally double their number in a year by reproduction if given fair protection from adverse factors.

As is evident by the type of family groups found, an adult male and one to three females will live together and mate. The young enter the pond from the lodge in two or three weeks after birth. They are weaned at six weeks. They usually stay with the family until a year old or older.

The members of a family or families that make up a colony build and use the same dams, canals, and roadways. The members of a single family all work on the family lodge and food supply as well as on the community workings. However, strange as it may seem, these animals never work in real cooperation. They have never been observed to work on the same tree in felling it, or to aid another that was having difficulty with any particular task. They have been watched when one beaver was having a great deal of difficulty with a log or stick for the lodge or food pile and others swam fast within inches of the struggle and didn't even seem to notice it. Nevertheless, they do work on the same projects and all strive for the same objectives. In case of danger they slap their flat tail on the water making a loud noise of warning. Whether or not this is done with the definite purpose of warning the

others is not known.

Beaver used to work in the daylight, but after the advent of the white people they began to confine their hours of industry to the hours of darkness. Where they are protected they have begun to revert, somewhat, to their former habit. They come out in the early, and late hours of the day, and are often observed without being particularly disturbed.

Beavers are wanderers to some extent. If they are mated their average range is only about one half mile. Unattached males have been found as far as fifteen or twenty miles from the closest beaver workings, however, the average range for unattached males is twelve miles.

BEAVER WORKS

Beaver live in houses of two types, bank dens and lodges. The bank dens are usually very simple quarters or they may be a combination of a bank den and a lodge. The bank is undermined with holes and caverns and the entrances are holes leading into the stream under water. There are usually at least two entrance and exit holes. The combination house is merely a bank den supplemented by a lodge of mud, sticks and stones over the entrance and projecting into the water.

The lodges are made of mud, sticks, grass, and stones.

They are usually built out in the stream or on a little island. They are built large enough to have the living quarters above the surface at high water time. The lodge usually has one main opening for living quarters; part of it is raised above the other and bedded with leaves and grass. There are usually two or three holes leading from this cavern directly into the water. An opening is left among the sticks in the top of the lodge as a ventilator or breathing hole.

The beaver bring the sticks to the site of the lodge and embed the first ones in the mud of the little island or in the bottom of the stream. Mud, stones, and sticks are added to the pile. In the summer the lodge is left with the crude frame of sticks bared to the weather. In the fall, just when the cold weather sets in, the beaver cover the outside of the lodge with a thick coating of wet mud which they bring up from the stream bottom in their hand-like paws. This coating freezes and becomes a solid wall except for the breathing hole in the roof. The house is then ready to protect them from the hardest winters.

The food pile that each family builds near its lodge for winter use is another achievement that is worthy of the animals prowess. The sticks having edible bark and wood are brought near the lodge. Then the beaver takes one end of a stick in its mouth, dives, and embeds the end of it in the stream bottom. More sticks are added in this way, and then

the rest are woven into the pile of sticks that are there. These piles get very large filling the area from the bottom of the stream to the surface of the stream which may be from six to twelve feet deep. This pile is the food supply for winter and can be reached by a short dive from the entrance hole of the lodge without necessitating a visit to the surface of the pond or stream.

Nearly every colony builds a dam or a series of dams. These are usually built of sticks, stones, and mud, which are the main building materials used by the beaver for any purpose. Contrary to popular belief the dams are not started by falling a tree across the stream. The base is made by embedding sticks in the stream bottom and adding sticks, stones, and mud. The sticks are layed parallel to the stream flow so that their upper ends extend out of the dam pointing upward into the air and downstream. Usually these dams are from two to four or five feet high but some have been found that were eight or ten feet high. They vary from a few feet in length to as long as five hundred feet or longer. Wherever there is a colony of beaver living, their dams will always be found in the best conditions. Beaver are very industrious animals. They keep all their works in first class condition. Attempts have been made to discourage beaver from living

in certain areas by breaking holes in their dams. This has proved to be a more or less futile method. If interfered with enough times they will eventually move on or build new structures, but the work of discouraging them from repairing the old is too much to be feasible. They are very persistent. A hole made in a dam one day will nearly always be in full repair the next unless the whole dam is destroyed for some distance.

Many times the food supply is some distance from the pond. The animals need some protection in going after the food, because they are more or less defenseless on land. For the purpose of such protection and to make the work of transporting the wood easier, canals are built from the stream to a point as near as possible to the location of the food supply. Edward R. Warren says, "I am somewhat disposed to believe that in some respects the canal is a higher engineering achievement than the dam. To deliberately plan and dig a channel in which to float logs to a pond, and not only that, but also to build dams in this channel to hold the water to a desired level, is an intelligent act. This is what the animals do, however, when the trees are at a distance from the shore, and the ground is flat enough to permit of carrying water in on

a level, or controlling it by miniature dams".¹ Beaver are very cautious when going ashore; they usually stay as near to the canal or pond as possible while working, and will dive into the water on the slightest provocation, not waiting to find out the cause of the disturbance.

Trails are built from the pond or canals to the scene of operations so that the logs and sticks can more easily be transported. In building a trail the beaver flatten the grass and reeds with their heavy bodies as they pass over them and they utilize all sticks, twigs, and logs that are of any value for food and construction.

Bank slides are only used at landing places and where trails come to the waters edge for added ease in handling their burdens. The beaver have not been observed to build them and use them solely for play as does the otter.

These animals have been given credit for having considerable knowledge of tree falling. The falsity of this is easily seen upon closely observing them in action or by examining the results of their works. They work alone, never purposely working together on the same tree. They gnaw chips from the trunk from any or all sides, depending upon convenience, until the tree falls. They use no

¹Warren, Edward R., A study of the beaver in the Yancey region of Yellowstone National Park, Roosevelt Wild Life Annals, Vol. 1, Nov. 1 & 2, 1926.

particular judgment in selecting trees. Many poor specimens may be found that were felled or partly felled and left. They evidently cannot control the direction of falling. Many specimens are found that have fallen in the wrong direction or have lodged on other trees or stumps. The animals are often hit by the falling tree branches. At the first sign of failure of the trunk they seem to become panic stricken and scurry for the water as fast as they can go, and not coming back for some time.

DETRIMENTAL OR ADVERSE FACTORS

Very little disease is known among the beaver. They do have some type of distemper, but little is known about it or its extent.

Likewise, little is known about parasites. However, they have beetles in their fur which they comb out with their double-combing claws, and there are worms that parasitize them.

There are many land enemies among the predatory animals, but only one water enemy, the otter. The extent of danger from this water enemy is not known. Predatory animals kill some of the beaver when they come on shore for food. Among them the most important are, Cougar, wolves, coyote, lynx, wolverines, bob-cats, bear, fox, fisher, and dogs.

Large-snapping turtles are blamed for some mortality among the young beavers. Large birds-of-prey, such as eagles, owls, large hawks, and goshawks get a few of the animals.

It can readily be seen that a hard drought would seriously effect them. A hard winter following a dry fall would be a serious menace.

BEAVER FOOD

Their food supply may be divided into two groups, preferred foods and emergency foods or "salads" and "desserts". Most any species of the genus populus are prized. Aspen is usually the favorite seconded by cottonwood. Boxelder, alder, birch, willow, pincherry, ash, bush maples, small bushes such as hazel and serviceberry are also in the preferred food class. In the emergency food and "salad" class are shoots or roots of bushes, cow parsnips, wild rose (one of the more favored of this class), wild geranium, grasses, bedstraw, Solomon's seal, sedges, berries, flags, mushrooms, and many water plants. Other trees than mentioned, particularly conifers such as ponderosa pine, roots of lodgepole pine, hemlock, spruce, and balsam, tamarack, Norway and jack pines, are used when other foods become scarce. Douglas fir is a favorite in this class. Edward R. Warren says, "The adaptability of the beaver to the

conditions of its changing environment is in many ways remarkable. In the Yellowstone it has established colonies along streams wherever its chief food the aspen, is to be found, though the topography and water conditions may often make its engineering work very difficult. Where once established it appears inclined to linger for many years even after the exhaustion of the aspen supply, lately even resorting to the bark of coniferous trees for food."

DAMAGE

Since the reestablishment of beaver in the Adirondacks of New York, in Pennsylvania, in Minnesota and perhaps in other states there has been considerable agitation by the people for open seasons. Much propaganda has been spread concerning the damage they are supposedly doing since under protection. Most of this clamor for permission to trap them is because certain people seeing the increasing number of valuable furs want to increase the size of their own pocket-book. Charles Eugene Johnson says, "Not that there may not be justification for complaints against activities of beaver, but for myself personally, in the light of my own experience, it is difficult to escape the conviction

that much of the violent clamor that has been raised against the beaver in recent years has been prompted more by prejudice and selfish interest than by real cause or grievance."¹ However, it is true that the beaver do cause some damage.

Much has been said about the damage to trout by beaver. The beaver have been blasted out of streams because of their supposed harmful influences on fish. There are two or three ways in which they might cause damage to fish. The dams have been said to act as barriers to the fish, especially when they were heading for spawning grounds. "The claim often made that trout cannot pass over beaver dams is shown in hundreds of cases to be erroneous."² This statement was made by Vernon Bailey in his discussion of beaver damage. Some claim that beaver dams slow up the movement of water so that in the summer the water is too warm for trout. Vernon Bailey says, "In cold rapid streams, naturally well adapted to trout, beaver ponds

¹Johnson, Charles Eugene, The beaver in the Adirondacks, Roosevelt Wild Life Bulletin, Vol. 4, No. 4, July, 1927.

²Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 4, Oct. 1927.

rarely become sufficiently warm and stagnant to interfere with the comfort of fishes, and in most cases the deepening and extending of the waters area above the dam increases the feeding and spawning area, providing deep pools and hiding places where the fish thrive and escape detection long enough to grow up to larger size."¹ Some claim that the beaver polute the slow moving water in the pond making it unfit for fish. They say that harmful gasses and other toxic properties collect in the pond bottoms. Experts on fish culture say that a water temperature of 79 or 80° can be withstood for short periods. By tests made in different streams in Wisconsin it was found that the temperature in the bottom of the beaver pond was actually as low or lower than that of the rest of the stream. As for polution it has been found that the dams are actually a very good aerating agency. The water that has passed over the dams is more pure, and often cooler than the water in the stream above the beaver pond.

In the Adirondacks of New York and in other places there has been considerable clamor that beaver do great damage to timber areas. The damage caused by flooding depends upon the character of the shores and the adjoining

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct. 1927.

ground, and on the size, quantity, and species of timber being flooded.

The areas usually occupied by beaver are areas that bear such invaluable wood as aspen, alder, and so on. The shores right on the stream are usually covered with more brush than timber. However, areas where the land adjacent to the creek is low a beaver dam will not have to be very high to flood quite a sizeable area; if the flooded area bears good timber it is evident that there could be considerable damage. Charles Eugene Johnson examined areas that were rumored to contain much of this type of damage; his findings were that most of the land flooded was either of such character that it was not easily flooded or that the cover on the area was of such a type that it was of no consequence. Sometimes there is damage from this cause; control measures should be taken to correct the situation.

Very slight damage occurs when the beaver cut the trees for food. Usually the trees used for this purpose are of little economic importance. Loss from this cause is negligible.

There is other minor damage at times. This may easily be controlled. Improvements such as roads, docks, boat houses, cottages, bridges, culverts, railroad bridges and grades, irrigation and ditches, and water conducts are

sometimes damaged. Vernon Bailey says, "damage done by beavers can be prevented by proper methods of control, based on a knowledge of their habits."¹ Blind drains can be placed under the dams so as to keep the water at a low enough level so as to not cause damage. The tearing out of dams and even the blasting of them has proved ineffective.

Blasting usually works but it destroys or drives the beaver out of the country and is too expensive. Fencing serves very well to keep the range of the beaver restricted. Fencing can be done cheaply by taking advantage of the beaver's habit of never wandering far ashore. A fence stretched across the stream and running out on both sides for about two or three rods effectively keeps them on one side or the other, providing the bottom edge is turned over so that they will be discouraged from passing under the fence. There should also be a continuation of the fence for a short distance along the stream bank. Vernon Bailey explains these control methods and others and gives specifications in the U.S.D.A. Technical Bulletin number 21.

There is a type of damage that cannot be controlled very well unless the beaver are kept out of the area entirely. That is the unsightly appearance of dead trees

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct. 1927.

along the shores of streams.

From the above, one can gather that the damage caused by beaver is not very extensive. The following discussion shows that the value of their beneficial influences far overshadows the harmful influences. Milton P. Skinner, Field Naturalist for the Roosevelt Wild Life Forest Experiment Station in 1927, says "As they are entirely harmless, except for minor interference with man's engineering, they are rightly given complete protection."¹

BENEFICIAL INFLUENCES

Regulation of stream and lake flow and erosion and flood control are serious land problems in the United States. In Wisconsin, as in some other lands, swamps were drained on a large scale. The idea was to get the fertile land for agriculture. In logging in the lake states many of the streams were straightened and cleaned out for the purpose of driving the logs. Dams were put in to keep the water-level up. After the greater part of the land in Wisconsin had been denuded the dams were not kept up. The water not being held back poured forth, rapidly draining all the lands along the streams. This coupled with the draining of the swamps had a great effect on lowering the humidity and depriving vegetation of its soil moisture.

¹Skinner, Milton P., The predatory and fur-bearing animals of Yellowstone Park, Roosevelt Wild Life.

After these harmful influences had gone into operation it was discovered that the streams were rapidly being depleted of their trout. The beaver were blamed with a great deal of this trouble. Their dams were blasted out of the streams and they were allowed to be caught for the fur market. They were also driven out of the swamps in connection with the swamp draining project. That state now realizes her error. Under the National Recovery act dams were to be built in the swamps and rivers to try to partially repair the harm done. It can easily be seen how beaver spread over the state would greatly reduce the cost of this project. Wisconsin is now trying to replenish the state with beaver.

Beaver dams make reservoirs of water in the forest. These reservoirs are great assets in protecting the forests from fire, the land from floods and erosion, and in regulating stream flow throughout the year. The United States Forest Service found that in the Cochetopa National Forest, near San Louis Valley, Colorado, the water stored above the beaver dams in that forest alone amounted to 1241 acre-feet, "the equivalent of 24,000 Colorado state inches running for 24 hours, or enough to irrigate 30,000 acres of land for one day. The total cost of the dams for this project if done by human methods with concrete on the basis of \$5.00 per cubic yard would be about

\$200,000." "A very conservative estimate" based on numbers and sizes of beaver dams in the region.¹

W. T. Cox, former Governor of Minnesota, State Forester of Minnesota, and finally Superintendent of the Upper Mississippi River Wild Life and Fish Refuge says, "The beaver is such a benefactor in preserving the forests from fire, and so valuable for its fur that its extermination in this state would be little short of a calamity".²

In the past few years the trout have been diminishing in numbers greatly, especially in the Lake States and in the east. There has been a great deal of agitation for fish and stream improvement as a result. Among the more important things that were found necessary to improve the streams were aeration of the water to provide more oxygen and an increased fish-food supply. The method for getting aeration is to build dams; as the water passes from their top through the air it picks up oxygen. It is evident since beaver dams have many tiny leaks and a rough top surface where the water flows over, that these dams are just the thing for aeration. The slow water impounded above the dam is just the place for water vegetation to grow.

¹Houk, Ivan E., When beavers aid irrigation, Scientific American, March, 1924, p. 161.

²Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct., 1927.

Many have objected to beaver dams saying that the vegetation in the ponds is evidence of the warm water conditions there that are not right for trout. The truth is that that vegetation is the very source of life for the trout. Myriads of tiny animals live on the vegetation in the stream bottom; these little fauna are what the trout feed on.

These ponds are good spawning grounds because the spawn is not so easily seen and eaten by the trout. The deep wide holes serve as protection from fisherman and other enemies.

Contrary to belief, fish get over the dams. Also, the temperatures are often lower in the bottom of the ponds than in the rest of the stream.

The formation of ponds and meadows is not a small part of the beneficial activities of beaver. As was shown above these ponds and meadows played an important part in the settlement and development of this country. The meadows have been of great importance as a grazing item in the west, both for the livestock industry and for wild life. These meadows vary in size from small ten or fifteen acre plots to sixty acres and over. They are of particular importance where they occur in chains of large meadows as in the Yellowstone National Park area. Milton P. Skinner, Field Naturalist for the Roosevelt Wild Life Forest Experiment Station, in a paper on wild-life in

Yellowstone National Park shows his belief that, "The parks and meadows scattered through the forests are important grazing grounds. Many of them are due to silt caught in old time ponds backed up by beaver dams that may long ago have broken and rotted away, leaving no sign of their presence save the resulting meadows which have since naturally drained."¹ E. R. Warren visited the Yancey Meadows on Lost and Elk Creeks in Yellowstone National Park in 1921 and 1923 and studied beaver works gone into decay that had been studied, mapped and recorded in 1897 by Ernest Thompson Seton as going colonies. Now there is a series of fine meadows in this region with the remains of much of the beaver works still on them.²

The ponds formed by the beaver make fine nestling ponds for water and shore birds as well as resting spots for tired migratory wild-fowl. Edward R. Warren says of them that, "Beaver ponds doubtless have an influence on bird life, attracting water and shore birds, as well as some species of the other orders which prefer such surroundings as the ponds offer. Mr. Skinner records that the tops of beaver

¹ Skinner, Milton P, The predatory and fur-bearing animals of the Yellowstone National Park, Roosevelt Wild Life Bulletin, Volume 4, No. 2, June 1927.

² Warren, Edward R., The beaver in Yellowstone National Park, in Estes Park Colorado, and notes on the beaver. Roosevelt Wild Life Annals, Vol. 1, No. 1-2, October 1926.

lodges, provided the lodges are surrounded by water, are favorite nesting sites of the Canada goose in Yellowstone National Park."¹

A former Assistant Ranger of the Freemont National Forest, in Oregon, tells of the grazing value obtained from beaver meadows in that region. The depleting of that region of its beaver is comparatively recent and since the time of the beaver the meadows and ponds have begun to dry up, leaving the meadows high and dry and of no more value than the rest of the dried up areas in the region. Where there still are beaver, in this region, there is plenty of soil moisture and consequently there are very fine grass areas.

The beaver fur constitutes one of the more important items on the list of the American furrier, although for some time the number of beaver furs has been greatly diminished. In 1924 the people of the Adirondacks in New York enjoyed an open season on beaver that was made possible by the restocking of that area only ten or fifteen years earlier. An estimate made through the furriers

¹Warren, Edward R., The beaver in Yellowstone National Park and Notes on the beaver in Estes Park Colorado. Roosevelt Wild Life Annals, Vol. 1, No. 1-2, October 1926.

of the region showed an income from beaver skins to the Adirondack people of \$80,000. The season was opened again in 1925; the catch was even greater, this time bringing in \$90,000. These estimates were made by Charles Eugene Johnson of the Roosevelt Wild Life Forest Experiment Station. He estimated that the catch would have been even greater in the next open season if the season had not been shortened.¹ According to Mr. Bailey, "Skins from the lower Colorado River and Rio Grande are the palest, lightest furred, and lowest priced, the lowest recent quotations being \$6.00 to \$8.00 each; the heavy-furred, dark-brown skins from Canada and Alaska in 1926 brought \$25.00 to \$37.00; Choice skins from northern Wisconsin have sold as high as \$50.00 each."²

The animals themselves furnish other things such as meat. Their meat was considered as choice by the pioneers and was important food of the Indians. It probably will never be important to the people of this country now. Mr. Johnson says that the meat is very good and that according to his taste it is best parboiled or fried.

The animals would bring good money if handled as breeding stock, but will probably never bring the speculative type of prices that the silver fox once brought

¹Johnson, Charles Eugene, The beaver in the Adirondacks, Roosevelt Wild Life Bulletin, Vol. 4, No. 4, July 1927.

²Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A Technical Bulletin No. 21, Oct. 1927.

in this country.

The raising of beaver for fur farming would prove profitable to some extent but should be done extensively, preferably along with some other industry, such as the raising of water-fowl.

These animals offer a great deal in recreation. They are considered to be most interesting forms of wild life, seconded only to bear in the Yellowstone National Park. "Because of their unique habits they are animals of general interest."¹

They are of great value from a fire protection standpoint because their ponds cause raised humidity, act as barriers of water, and help to keep swamps and lakes from drying up.

The beaver are of some value in education and scientific study so that is easy to see that with this and the fact that beaver are such an interesting form of life they would be a valuable asset in any of our parks or forests.

Another bit of value from beaver can be gained by using the natural interest people have in them as a bait for tourist trade. This is a very important item especially in our National Forests and Parks, and the concessions

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct. 1927.

that go along with them. In Southern Oregon there are many people who live on only what they can raise and what they can sell to the tourists in service and product. The more items of interest they have with which to draw trade the better. Beaver would be very important serving in this manner.

Mr. Bailey fairly well sums up the beneficial influences with the following statement. "There are many localities where, through storing water in the reservoirs along mountain streams, they would do much good by helping prevent floods and extensive erosion, by increasing the stream flow in dry weather, and by improving the fishing resources of streams and lakes. In such places they would not only enrich forests and parks with a unique and intensely interesting form of wild life, but also would add much to the decreasing supply of valuable fur."¹

REGULATION AND CONTROL

One of the first things to be done in connection with the reestablishing of beaver in Oregon is to transplant a few so as to establish initial colonies.

It will first be necessary to obtain the authority to capture the beaver. Then the beaver should be caught alive

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct. 1927.

from regions in Oregon where they are plentiful, especially from those regions from which complaints against them have come.

The people would have to be educated to the idea of propagating the beaver for benefits other than the value of their fur, so that they would not want to turn in false and petty claims that beaver were doing considerable damage in order to get permission to trap them as was done in the Adirondacks of New York. This should be done through newspapers, radio talks, and personal contacts in the field.

A survey or investigation should be made in the State of Oregon and in other parts of the country for the purpose of locating the best places from which to take the beaver. This investigation should be made on the basis of the numbers of beaver in any particular place, whether or not they are doing damage, whether there have been claims of damage against them, whether or not the authority will be given so that they can be captured there, and the physical condition and type of the beaver in that particular place. Physical condition should include diseases, parasites, and other adverse factors prevalent if any. Type should include particularly the type of fur depending somewhat on the region in which the animals are caught. Those with the darkest, deepest colored, and most valuable

fur come from the Lake States Region. Those from Alaska and throughout Canada are second in value only to those from the Lake States. Those in Oregon, Washington and in the Northern Rocky Mountains of the United States are good. Those south of Oregon and throughout the southern part of the United States grade downward and are the less desirable types. Of course, there is the possibility that if the low grade beaver were planted instead of the high grade that the public would be less difficult to handle in connection with trapping the beaver, but since under normal conditions the beaver tend to double their number annually by reproduction it would appear to be better to plant valuable beaver and later allow some of the crop to be harvested at intervals.

In the U.S.D.A. Technical Bulletin No. 21, Mr. Bailey gives some very useful methods for capturing beaver alive. One of the best methods is to set live traps for the adults. The main drawback of this method is the cost of the traps. Mr. Bailey gives all of the specifications and the approximate cost of the traps. Another good method, that he gives, is to watch the ponds till the young beaver begin to make their first appearances in the pond. It is quite easy to float near the lodge till the young come out and then to capture them with a dip net as they swim near the boat. They only weigh about two to four

pounds at this stage and are easily handled.

Fenced enclosures can be made with trap doors, the sliding, drap-door being the best and simplest. Bait made up of vegetables or choice aspen or willow sticks can be placed inside the enclosure to attract the beaver. The trigger on the trap door may be tripped by an observer or it may be connected with the bait so that the beaver will trip it.

After the beaver are caught they are easily handled and easily tamed. If handled carefully they are calm, quiet, and gentle from the first.

In transplanting the beaver it must be made certain that there is plenty of food. If there is plenty of food and a stream of water, even a small one, the beaver will stay put and do well unless molested by man. Mr. Warren says of them that, "In the Yellowstone it has established colonies along streams wherever its chief food, the aspen, is to be found, though the topography and water conditions may often make its engineering work very difficult. Where once established it appears inclined to linger for many years even after the exhaustion of the aspen supply, lately even resorting to the bark of coniferous trees for food."¹

¹Warren, Edward R., The beaver in Yellowstone National Park, Roosevelt Wild Life Annals, Vol. 1, Nos. 1-2, Oct. 1926.

With such a high reproductive ratio it is easy to see that under full protection the beaver could soon get too plentiful. Sometimes in individual places even when there isn't full protection they get so numerous as to cause trouble. Steps must be taken in these cases to control them. The original method of control was the "balance of nature". This is rather a large subject for which there is not space to go into detail about here. However, this "balance of nature" is very important in the management of any wild life. It is being used to an advantage in Germany but has not been given enough recognition in this country as yet. Before interference by the white people the animals all lived together in a state of harmony. There were enough of one kind of animal to prey upon another and keep its numbers in control while the adaptability and the reproductive powers of the other kind of animal were so adjusted as to keep up the numbers as the first kind of animal tended to cut them down. The people of the United States have greatly destroyed this balance by killing the predatory animals. One might say that there is trouble enough in trying to keep up the numbers of the animals wanted without allowing the predatory animals to kill them off. However, upon investigation one finds that where the animals have been over-protected in this manner they have become so numerous as to be a big problem such

as is the case of the deer on the Kaibab plateau of Arizona and again on the Gila National Forest of New Mexico. Another bad feature of this over protection is that it tends to breed poorer animals and weakens the whole race or tribe of them. If predatory animals are controlled, but not wiped out completely, they will be an asset to the handling of beaver as well as other wild life.

There are other methods of controlling the numbers of beaver. One of the most valuable of these is to allow trapping of the animals by the public. Another method that will apply in the earlier stages of this problem when the beaver are not numerous enough for trapping is to capture and transplant them in regions where they are needed.

Sometimes the situation can be handled by controlling the area of their activity. This can be done by allowing trapping outside restricted areas or by fencing across the streams for from two to three rods on each side of the stream. The latter method is given in detail by Mr. Bailey in the U.S.D.A. Technical Bulletin No. 21, of October, 1927.¹

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, October 1927.

Often the damage done depends upon the size of the pond and the stream level. This can be controlled by the use of a blind drain under the dam so as to discourage building or by a drain that merely keeps the stream level from going above a maximum height. The latter is accomplished by placing a pipe or pipes, probably about four inches in diameter depending upon the volume of stream flow, with the upstream end buried in a pile of rocks, so that the beaver won't see it and plug it up and with the downstream end extending through the dam with its opening at the height of the desired stream level. This downstream end must be out far enough from the dam so as to baffle the beaver.¹

Investigations and surveys should be made regularly after the beaver have been transplanted, especially where there are rumors of damage or other control problems. These investigations should be made in person by competent field men. There is a great chance of prejudice and inaccuracy in the case of "second-hand" information. The surveys should include personal visits by the field men to areas in question. Damage should be carefully measured according to the true value of the timber or property in

¹Bailey, Vernon, Beaver habits and experiments in beaver culture, U.S.D.A. Technical Bulletin No. 21, Oct. 1927

question. Numbers of the beaver should be taken by counting the lodges, being careful to find all bank dens as well as other lodges and allowing for the time of year. In certain seasons of the year, the summer mainly, many of the males will have left the colonies and wandered away to establish new homes or to explore and perhaps return in early fall. In the winter and spring the offspring of the preceeding summer are still with the family; later they move to new homes. In counting the numbers of beaver the lodges serve as a much more accurate criterion than do the dams since there is usually an average number of beavers in a family and one family to a lodge, but there may be from one to several dams to a family or from one to several families to a dam. The size of the family can be estimated from the season of the year and from the age and condition of the lodge and workings.

Beaver should not be cultivated intensively, raised in confined quarters or cages, but should be handled extensively in ponds giving considerable freedom. If they are being raised for breeding purposes, or to transplant, or for their fur, they can be well handled in connection with other industries such as bird-life refuges or farms, other types of fur farming, or grazing.

BEAVER IN OREGON

Surveys should be made before any attempt is made towards propagation and reestablishment of beaver in Oregon. These surveys should disclose the areas where the beaver are needed, where the conditions of food and water are suitable for them, where they will have the best chance to become established, and from what regions they can best be obtained. The Blue Mountains and Cascades would greatly profit in many areas by the presence of beaver. Their workings would greatly enhance the values of these regions as watersheds. The effects would be felt for some distance through reduced erosion, stream control, and the like. These effects could be achieved in most any dry, hilly or mountainous region in Oregon where enough food and water could be found to sustain them. They would be of great value to the grazing industry in Eastern Oregon through increased moisture for grass and through the formation of meadows. Their value in drawing tourists and recreationists and getting them to stay longer and spend more money in Oregon would be no small item.

The necessary regulation and control could best be carried on under present conditions by the United States

Forest Service in connection with the new wild-life regulation G-20-A.

This project is possible in Oregon since it has areas with the necessary conditions and it has the initial beaver to transplant. It also has the need. All that is needed is the initiative.

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