Land Forest Wildlife

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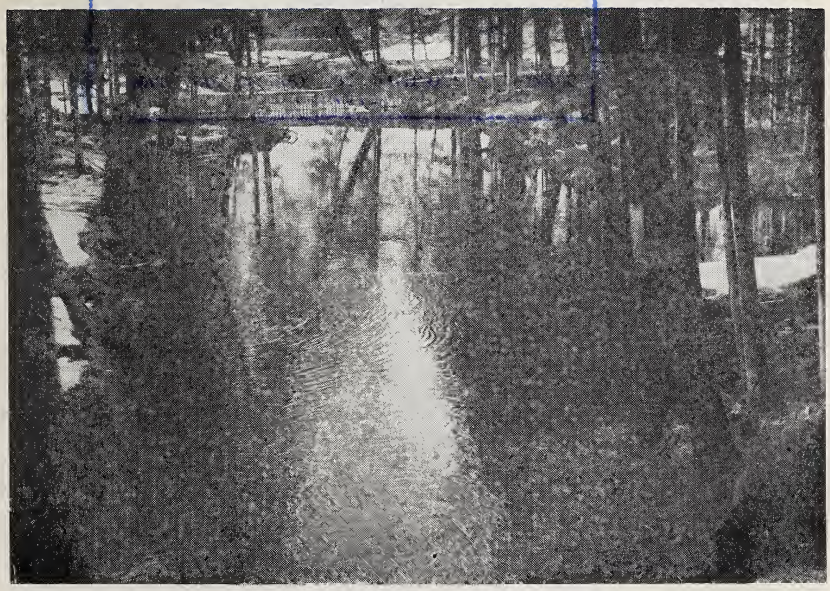

AT RAVEN TROUT REARING STATION

Land Forest Wildlife

Vol. 1, No. 2 June - July, 1958

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DEDICATED TO THE WISE USE AND MANAGEMENT OF THE PROVINCE'S RENEWABLE NATURAL RESOURCES; ITS LAND, ITS FOREST AND ITS WILDLIFE.

HON. NORMAN WILLMORE, Minister.
H. G. JENSEN, Deputy Minister.

EDITOR—W. H. MACDONALD

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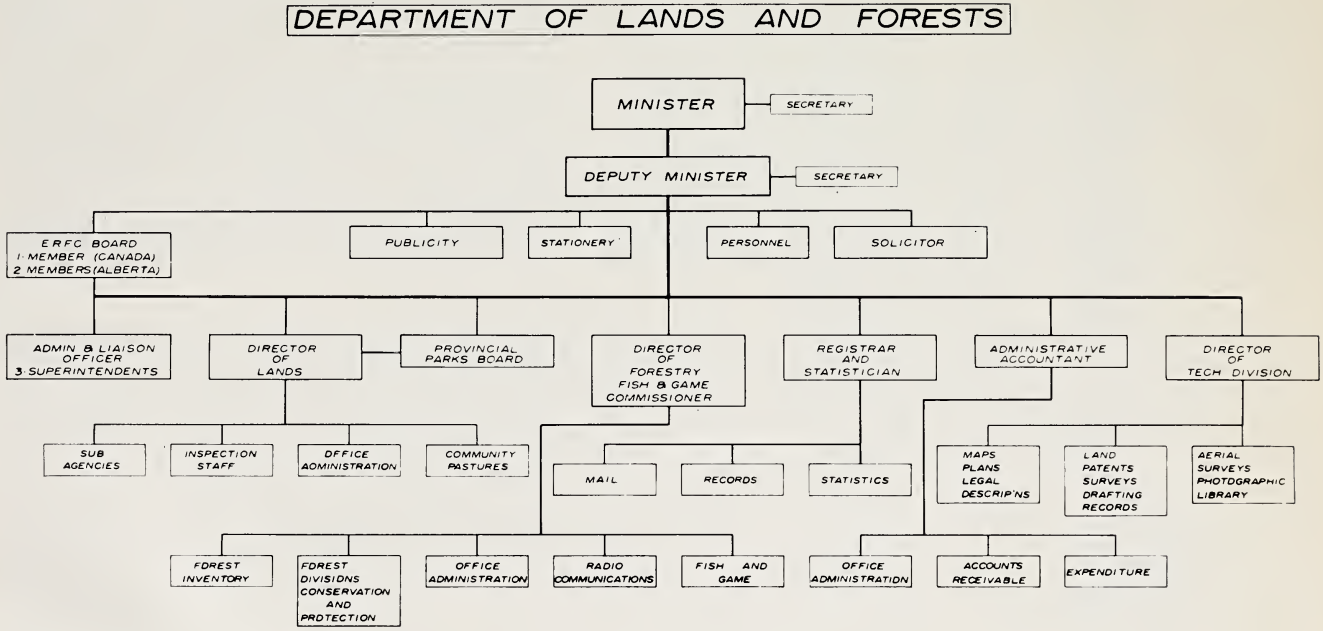
ORGANIZATION CHART OF THE DEPARTMENT



"POTHOLE" TROUT MANAGEMENT

R. C. Thomas—Fishery Biologist

Alberta fishermen started a ball rolling in 1950 with their sponsorship of the "pothole" trout planting program. Young trout gorged themselves on the bounty provided by virgin waters, reached great size in two or three years and, "blooey!!!" — anglers couldn't raise a fish where hundreds had been taken the year before. What happened? What is the remedy? Biologist Ron Thomas here provides a forthright picture of what has taken place together with some suggestions for the future. This is a program that Alberta anglers will want to sustain if the means can be found.

HISTORY

Scattered throughout Alberta are many small lakes not connected with river systems, which maintain their levels by surface drainage and springs. Many of these waters contain populations of northern pike and perch. A few contain native trout, while cyprinids (minnows) and sticklebacks are native to many. Depletion of dissolved oxygen during winter months has, from time to time, caused "winter kills" to occur in certain of these waters. In such cases the game fish are destroyed and, as no connection with rivers or other lakes exists, no natural repopulation of the waters is possible. In some cases the minnows and sticklebacks also perish, while in others these hardy little fish survive and remain the only fish present in the lake. Until recently, such lakes were restocked with perch or pike and natural reproduction usually rebuilt the fishery to its former productive state.

The increasing demand for more and better sport fishing, and increasing angling pressure on the streams and rivers of the province, sparked investigation of the feasibility of planting trout in this type of lake. The lakes investigated were found to be rich in plankton and insect forms, principal components of the food supply of young trout. It seemed likely that most of the shallower lakes would suffer severe oxygen depletion and consequent loss of fish during **some** winters; but, survival of plantings could be expected during less severe winters.

Among the early trials of this type was a planting made in the foothills, near Rocky Mountain House, using fingerling rainbow trout. Mitchell Lake is typical; with an area of 20 acres, a maximum depth of 24 feet and a maximum summer temperature of about 68° Fahrenheit. The only fish species present at the time of planting was the northern pearl dace, a minnow. Mitchell Lake was stocked with 415 fingerling trout on May 20, 1950. By August, 1951, after nearly two summers growth these fish averaged two pounds in weight. A second planting of 700 fingerlings was made in May, 1952, and a third of 1,200 fingerlings in June, 1953. The lake was very heavily fished; no precise catch records are available but random research indicated that a percentage of the first plant, less of the second, and none of the third was taken by anglers. The fish of the first planting reached seven pounds in three years and after five summers growth fish of 17 to 18 pounds were reported.

The history of two other foothills lakes, stocked in this area, has been the same. There was a great initial success with two years of good angling and thereafter a rapid deterioration.

The excellent angling provided by these plantings encouraged trials in other similar lakes throughout the province as well as in reservoirs and impoundments of like quality. By 1955 about 65 of these warm, relatively shallow lakes and reservoirs had been planted. The popular term applied to them was "pothole". Hence the advent of numerous articles on Alberta's "Pothole Rainbows".

Lakes and reservoirs throughout the settled portion of the province were planted and fishing success varied greatly. In some cases the fish did not survive the first winter while in others only a few survived and provided poor fishing. In the majority, however, excellent fishing resulted for the first two or three years and then declined rapidly. Gill net and creel census checks revealed that the third planting in any lake provided little or no angling to the sportsman. This is apparently due to the presence of larger fish, residues of the first two plantings.

TRIALS

Several experiments were carried out to determine the effect of resident non-trout species on planted fish. The presence of sticklebacks and minnows evildenty does not interfere with survival and growth of rainbows. It has been noted however that large trout seem more difficult to caatch in lakes where forage fish are present. The trout utilize some of these small fish for food although their main diet continues to be insect larvae and other invertebrates.

The presence of perch in Cottage Lake (near Edmonton) did not prevent survival of trout but experiments indicate that growth rate and survival were reduced. In 1956, both Chichako Lake (no perch present) and Cottage Lake were heavily fished with gill nets. Chichako Lake produced 231 trout averaging three pounds in weight while only 147 trout averaging two pounds were taken from Cottage Lake. ' Anglers catches in Chichako were also superior in numbers and size to those in Cottage Lake.

The effect of resident northern pike on planted trout is even more noticeable. In 1953, Whitewood Lake (in the same area as Cottage and Chichako Lakes) contained a small population of yearling pike. The adult pike had been removed by low dissolved oxygen levels the previous winter. Rainbow trout were planted in 1953, 1954 and 1955. The few trout that were recovered averaged only 30 ounces in weight (36 in Cottage and 50 in Chichako Lake). Gill net operations in March, 1956, took three trout and 284 northern pike. Several other lakes containing adult northern pike, one in the same area, received rainbow trout plantings. In these, no survival of trout has been observed or reported.

SURVEY

Biological surveys of hundreds of bodies of water were carried out in an attempt to find all the lakes and impoundments suitable for trout production. The "pothole" program caused great interest in all parts of Alberta and many groups and individuals requested surveys of waters which they thought might support fish. Naturally many of these lakes were found to be unsuitable. Some were far too shallow, others were connected to river drainages while many others contained populations of pike or ling.

Those lakes which were found suitable may be generally described as follows: They vary in area from two to over 200 acres, although some impoundments as large as 1,000 acres have been planted. Lakes of less than 200 surface acres are favored as concentrated fishing pressure, necessary for a good harvest, is more easily attained and losses are less when winter kills occur. Population management is also less difficult and expensive than on the larger lakes. Maximum depths vary from 18 to 50 feet and in preferred cases no permanent inlet or outlet navigable by fish is present. Rainbow trout quickly find any flowing water and leave the lake in which they are planted. In several instances they have found their way to

STOCKING TROUT AT COTTAGE LAKE (EDMONTON BEACH)

unsuitable waters or areas inhabited by pike, etc. The escape of planted fish also lowers the number present and proportionately decreases angling returns. The lakes should be well exposed to wind action and not protected by dense tree growth or high banks. During the spring and fall all lakes reach a uniform temperature (39° F.) and winds may then cause the waters to circulate from top to bottom thus saturating the water with dissolved oxygen. Lakes of small area, extreme depth and with very protected shorelines often receive incomplete mixing and consequently low oxygen supply increasing the likelihood of winter kill.

PROBLEMS

Suitable lakes and reservoirs are planted at the rate of about 500 fingerling trout per surface acre the first year, about 750 fish per acre the second year, and no further plantings are made. The fish reach catchable size by the fall of the first year and fishing continues for about three years, then declines. Four years after planting the few large fish remaining should be removed and the lake replanted as above. Further stocking without removal of the adult population has proved to be of little benefit to the fishery. Survival of third and fourth plantings is low and the growth rate diminishes considerably.

Several problems have risen in the management of the prairie "pothole" system of fish planting. Foremost of these is the method of removing the large fish from the lake or reservoir following deterioration of the fishery. The best but most expensive method is the use of a commercial fish toxicant such as rotenone. When added to the water, this material causes constriction of the blood vessels in the gills, stopping circulation and suffocating the fish. This in no way affects the eating qualities of the fish. To date, toxicants have not been used on a large scale as a management tool in Alberta, although it is the only means, known at present of ensuring complete removal of the fish by artificial means. "Winter kill" may accomplish the same thing.

BIOLOGIST RON THOMAS EMBARKS ON A POTHOLE SURVEY

A second method employed to remove the large resident trout is gill netting. Large numbers of fish can be removed in this way but complete removal is difficult if not impossible. When the numbers are reduced the catch drops off, interest wanes and fishing ceases.

Severe oxygen depletion and resulting winter kills may aid in the program but natural kills are unpredictable and can only occasionally be an aid to management. In many of the "man-made" reservoirs it is possible to lower the water level in the fall and induce a winter kill. However, since the primary purpose of these reservoirs is water storage, this is often not practical.

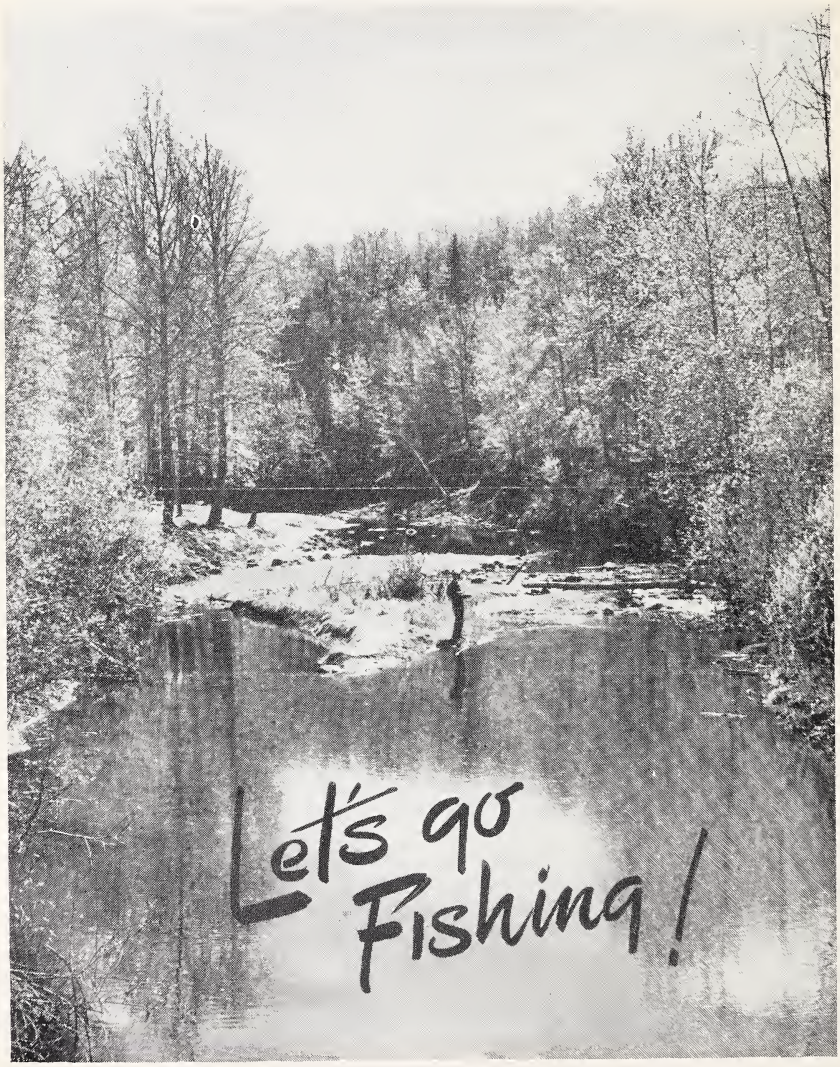
The ideal situation would be complete removal of the planted trout by the anglers but this is not likely to be attained. As the number of fish present becomes smaller the fishing success decreases and the fishermen move to more productive waters. General use of toxicants such as rotenone appears to be the only known reliable method of artificially removing existing populations and restoring the lake to a favorable condition for restocking.

Another management problem has developed in the "pothole" planting system. The planting of several newly constructed reservoirs in southern Alberta produced spectacular fishing for two or three years and were a definite benefit to the districts involved. However, the connection of such reservoirs with irrigation systems containing whitefish, pike, suckers, ling, and other coarse fish allowed the introduction of these species to the reservoir. After two or three years the coarse fish species become established in the lakes and take over much of or all of the water area previously utilized by trout. In most "potholes" no spawning facilities are available for trout and all restocking must be done with hatchery fish. As the coarse fish are much better adapted to this type of lake and are usually capable of reproducing themselves, they very rapidly populate the lake to capacity, making further plantings with trout impractical.

The general public, recalling the excellent trout fishing of previous years,

obtained from planting trout, naturally demands further plantings on the assumption that planted fish are bound to survive and produce more fishing. As previously stated, the presence of non-trout species reduces the growth rate and in the case of pike and ling (burbot) completely inhibits survival of planted trout. To attempt to combat natural reproduction of such prolific species as pike and burbot with hatchery fish production is futile. A few hundred adult pike with adequate spawning facilities can produce more young fish than the total annual production of the Alberta Government Hatchery.

(Continued on Page 26)



Game Survey

PARKLANDS DEER SURVEY

January - February — 1958

R. Webb — Game Biologist

Quantitative information describing deer populations east of highway number 2 and south of the North Saskatchewan River is non-existant. Stories suggesting a recent upsurge in deer numbers, particularly white-tailed deer, have persisted. A study was organized to obtain data on the present distribution and numbers of the two species of deer in the eastern parkland zone. (Map 1). Following is a report of the survey.

A fixed wing airplane of high performance belonging to the Department of Lands and Forests, a "Helio-Courier", was used exclusively. Approximately 52 flying hours were expended from January 14th to February 9th, inclusive.

A series of tabulating flights from point to point, ("transects"), occupied about one-third of the total flying time (Map 2). The balance was used to search at random for deer in the parkland zone. The locations of "transect" flights were chosen because they represented large homogeneous tracts. Areas supporting even moderate stands of conifers were ignored because of visibility difficulties.

All "transects' were flown in a series of straight lines between points clearly marked on maps. A constant altitude of 250-300 feet was maintained wherever terrain permitted. An air speed of 70-80 m.p.h. was maintained throughout. The author sat beside the pilot, observed a strip 110 yards wide on the right side of the plane, recorded for both observers, and navigated. The other observer sat in the rear and watched a strip of similar width on the left side. The observer was usually a Game Officer and was alternated according to the district flown. The pilot, also a keen spotter, helped the observer on the left side.

A total of 12 areas was inspected in this manner. Each flight line, (sub-transect") was one or two miles from the next. When "sub-transects" were flown every 2 miles, 7 to 8 percent of the area covered was actually observed for animals.

"Transects" were flown only when a reasonably fresh snow cover was on the ground and the wind was less than 12-15 m.p.h. They were flown between the hours of 10:00 a.m. and 4:00 p.m.

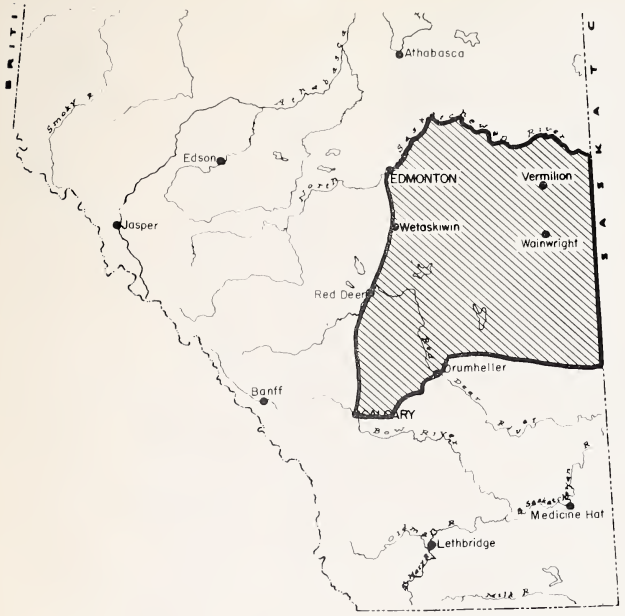
When deer were spotted they were circled and observed more closely. Sex and age were determined whenever possible.

POPULATION DENSITIES

A total of 852 miles was flown over the twelve "transects". Observations made from both sides of the aircraft covered a combined breadth of one-eighth of a mile. Thus the deer population of approximately 106 square miles received detailed analysis during the survey. All observations of coyotes and sharp-tailed grouse were also recorded.

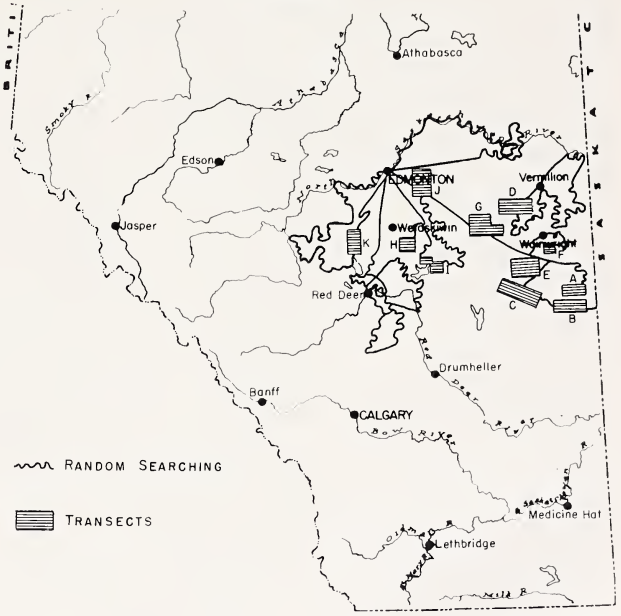
Calculation of sight data obtained from transect flights, discloses that there is approximately one deer for every square mile of area. The exact calculated figure is 1.09, of which 42 per cent were white-tailed and 58 percent were mule deer. The two species were

MAP 1



THE PARKLAND REGION
CENSUSED FOR DEER, 1958
(25,259 Sq. Miles.)

MAP 2

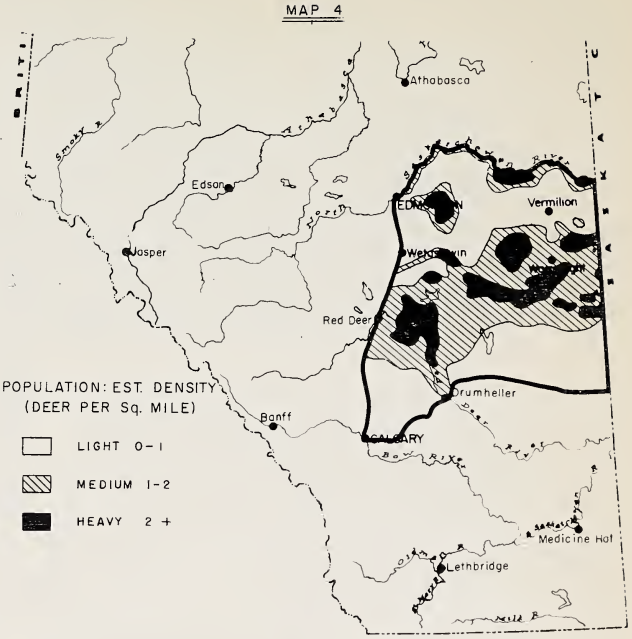


LOCATION OF TRANSECTS AND ROUTES
FOR RANDOM SEARCHING, 1958

MAP 3

DISTRIBUTION OF THE TWO SPECIES
OF DEER IN THE PARKLAND ZONE.
EACH MARK REPRESENTS ONE
AUTHENTIC 1957-58 SIGHT OBSERVATION

MAP 4



WINTER DISTRIBUTION OF MULE AND WHITE-TAILED DEER
IN THE PARKLAND REGION OF ALBERTA-1958

easily distinguished from each other. Only one animal was seen that appeared to have hybrid characteristics.

Sharp-tailed grouse were seen in a ration of 3.69 per square mile and coyotes at a rate of .36 per square mile.

White-tails were most often seen in small groups, usually two to four. Large herds were not seen. However, a tendency of these small groups to winter near each other in preferred aeas was noticed even though snow conditions were not severe (2-6 inches). Densities up to 15-20 per square mile were dis covered in favored localities along the North Saskatchewan, Red Deer, and Battle Rivers, around the Chain Lakes and Buffalo Lake, and in several glacial moraines east of Red Deer and Edmonton. In general these wintering areas were waste "non-agricultural" regions supporting dense stands of scrub or over-mature aspen interspersed with occasional clearings.

SEX AND AGE RATIOS

In some cases it was difficult to age spike bucks. The small antlers were relatively obscure.

In only a few cases could fawns be distinguished from does. Buck fawns probably are as large as yearling does by late January. However, the fragmentary data obtained indicate good reproductive success for both species.

Such observations as could be termed conclusive indicate that the ratio of fawns to does for both species is .86 to 1.00; the ratio of does to bucks is 1.66 to 1.00. The proportion of bucks in all herds is about 38 perecent. Of this amount 19 percent are old enough to be huntable.

DISTRIBUTION

Nearly 50 percent of the deer seen were white-tails, but this may be a conservative estimate. Mule deer are more easily sighted and are possibly represented out of proportion. Generally the two species were seen wintering separately. However, in several of the choicer, more remote areas, both species were seen together in the same environment in large numbers. Where populations are at capacity some competition probably occurs.

(Continued on Page 27)

BIOLOGIST BOB WEBB AND AIRCRAFT USED ON SURVEY

SUSTAINED YIELD FOR NEW PULP LEASE

On May 21st representatives of the Alberta West Forest Products Corporation Ltd. met with the Minister of Lands and Forests to conclude formal signing of a pulp mill supply agreement.

The agreement permits the pulp company to secure wood material for a pulp mill to be constructed in the vicinity of Edmonton. The agreement stipulates that the Corporation must commence construction of the mill within one year of the date of the agreement and complete construction within three years. The capacity of the mill is rated at 300 tons of pulp per day and its cost will exceed 15 million dollars.

Wood material will be obtained from an area of 2,482 square miles lying west of Whitecourt and leased to the com pany for a period of twenty-one years. In addition, a provisional reserve area of 2,500 square miles lying west of the lease area is being set aside to provide for future expansion of the pulp company. The provisional reserve will be available for a period of ten years.

Under the agreement the company is required to manage timber on the lease area under a sustained yield management program. The agreement has been designed with this in mind to provide a perpetual wood supply for the pulp mill.

WATER AND WOOD

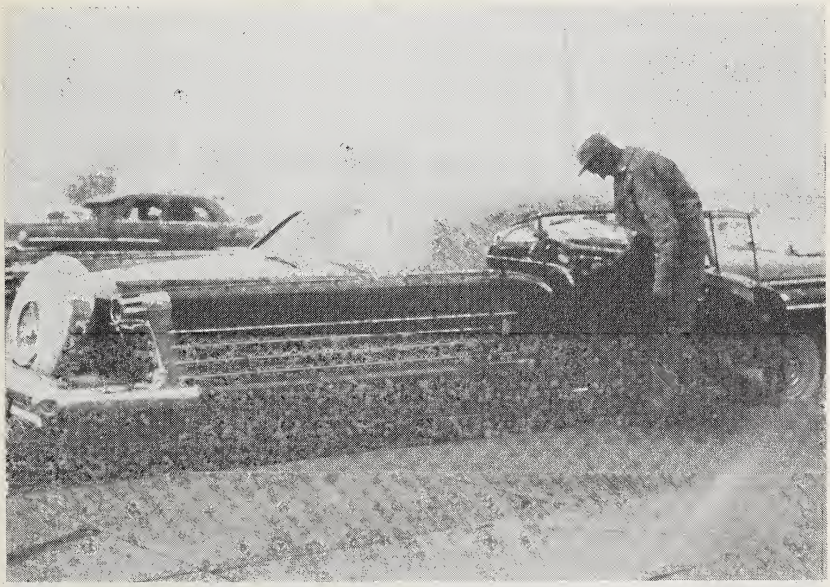
Water plays a role on this earth surpassing in importance that of any known substance.

It is even more essential to life than air; at least it must be present first. Were a seed completely dry, it would never germinate when you plant it. Locked within the dry impervious shell, every seed contains some water.

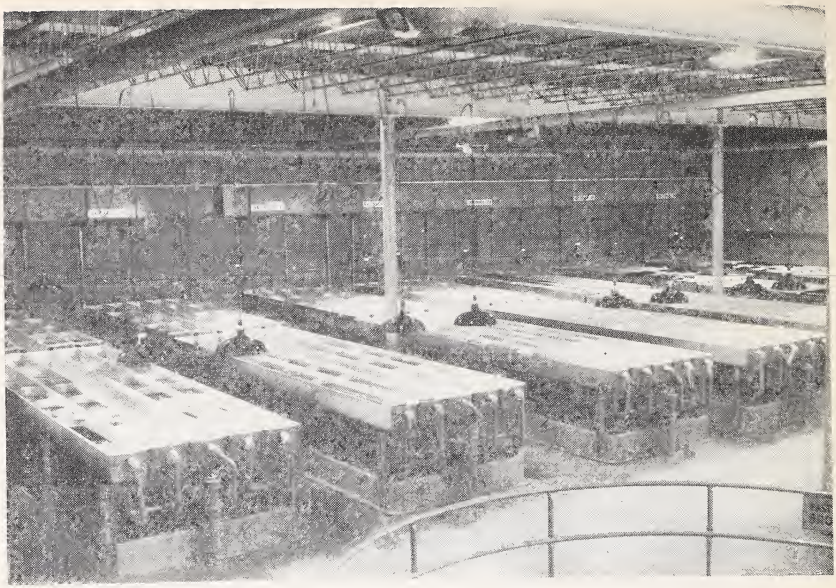
A forester in Arkansas estimated the

(Continued on Page 25)

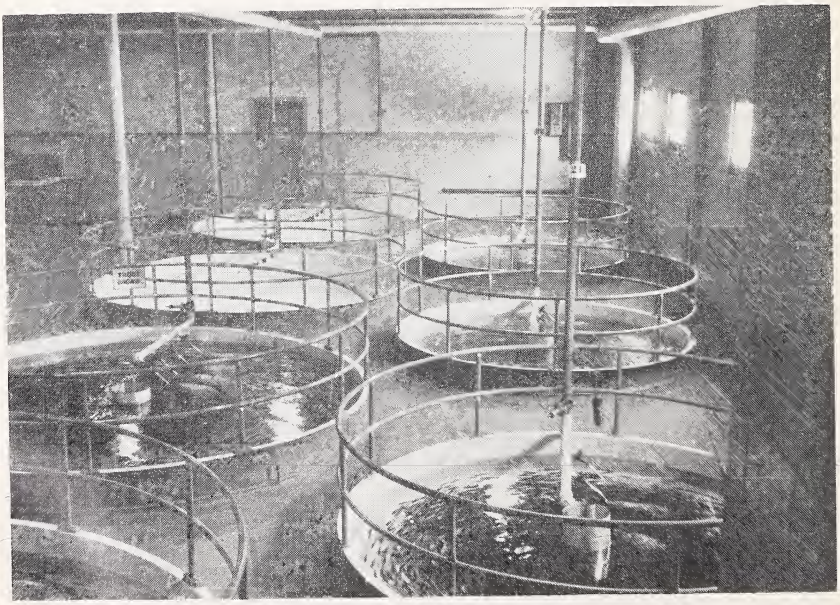
BEAVER TRAPPER — 1958



Edmonton's Game Office staff were somewhat startled recently when Fred Borstell of that city arrived to have his beaver pelts tagged. Fred was "snapped" loading his furs into a 1958 model, continental style, red convertible. We understand that Fred's return from this season's trapping will just about cover the first payment.



HATCHERY TROUGHS



HATCHERY REARING TANKS

ALBERTA'S TROUT HATCHERY

Did you ever wonder how a fish hatchery operates? Next time you are in the vicinity, drop around to the Government fish hatchery on the grounds of the Calgary Brewing and Malting Company on Ninth Avenue East in the city of Calgary. The best time to make your visit is during spring and early summer when operations are in full swing. Autumn visitors are often disappointed to find the hatchery staff is doing their annual clean up job, preparing for a new batch of trout eggs. These usually start arriving in December and January. While there, take note of the big job being done by industry and government, working together.

In 1941 some trout eggs were moved from a spawning camp on Kananaskis Lake to the premises of a Brewing and Malting Company in Calgary, Alberta. Here a series of wooden hatching troughs had been erected and plumbing installed to supply the flowing water required to hatch young trout. All capital expenses, including building space, were generously born by the Brewing Company. The water was pumped from underground springs, also located on the Company's premises. These events marked the beginning of organized trout hatching by the Government in the Province of Alberta.

Many people had a hand in sponsoring this project; both interested sportsmen and government administrators. Mr. J. B. (Jim) Cross of the Calgary Brewing and Malting Company and his chief engineer, Mr. Joe Scarr, led the action. Mr. H. B. (Boney) Watkins, the present Alberta Fisheries Superintendent, and Mr. Geo. M. Spargo, now Secretary-Manager of the Alberta Fish and Game Association, secured the necessary approval. The late Jack Martin of Banff and the late Jack Tait of Lesser Slave Lake operated the early spawn camps. H. E. F. (Fred) Aastrup, now Fish and Game Officer at High River, took part in hatchery supervision during the inaugural stages. There were many others who had a hand in this enterprise but neither space nor memory permits their mention. No doubht they have since received ample gratification in the complete fulfillment of their plans. Furthermore, theirs were the unspoken thanks of countless anglers during the years that followed.

The original equipment has been supplemented greatly since 1940. In 1949 the hatchery was relocated on Brewery premises and nine rectangular concrete holding tanks were added to the 72 troughs in operation. In 1955 a complete new unit was installed in a newly constructed building. The 66 ft. by 72 ft. structure is built of concrete blocks carrying foam glass insulation. Equipment consists of three water storage tanks whose total capacity is 9,000 gallons, 70 steel troughs and seven circular steel tanks. Office facilities and a small laboratory have been provided. The total cost, being in excess of $120,000.00, was again carried by the Calgary Brewing and Malting Company. Both the old and the new units are being used during periods of peak hatching. For example this spring 1958, 142 troughs were carrying young trout in various stages of maturity from eggs to small fingerlings. Tanks were required to accommodate some yearling stocks held over from 1957 and to accept young trout as trough facilities became overloaded.A total of three million trout eggs have been incubated at the hatchery this year. This figure represents a record production for the period.

The saying "cleanliness is next to Godliness" certainly applies at the trout hatchery. The threats of infectious bacteria and epidemic disease are always present. The chief agents of prophylaxis are scrupulous housekeeping, plenty of clean water, a clean and suitable diet and constant vigilence. The matron of a children's nursery could not be more concerned for her charges than the superintendent of a trout hatchery.

The incumbent "super" is A. C. (Alex) Sinclair who has served at the hatchery for twelve years. Working under his supervision are four assistants,

W. S. (Stuart) Shaw, H. J. M. (John) Russell, V. (Vince) Cerny and B. (Bent) Pedersen. Beside the care and feeding of their "charges" this crew operates a modern transport unit and supervises the loading, hauling and releasing of almost all trout leaving the hatchery. Only when the young trout swim off in the waters of an Alberta lake can a member of this crew know their job is completed.

A subsidiary unit to the Calgary hatchery is operated on a branch of the Raven River about forty miles west of Innisfail. It is called the Raven rearing station and consists of earth ponds and four circular wooden tanks. Water is provided by a flowing spring and supplemented from a nearby creek in summer. Trout are transferred each year from the hatchery to the Raven station where they are held until the succeeding summer. The stocks thus produced are planted as yearling trout. C. S. (Curley) Wren is in charge of the Raven facilities, working under the supervision of the hatchery superintendent. Curley has been there for eleven years and during that time has made a great many friends from among the visitors to his station.

Trout hatching and rearing is an important branch of fisheries services in the Alberta Department of Lands and Forests. Much attention is paid to the use of modern aids in hatchery operations. Tests are conducted by hatchery staff and departmental biologists to assist in the provision of a good product at minimum cost. A constant liaison is secured with hatchery units in other parts of Canada and the United States from which a profitable interchange of opinion has developed.

Raising fish is a science requiring a well trained staff, working under the best conditions and dedicated to the profession. The Calgary fish hatchery qualifies in these respects.

Soils authorities advise that the United States has lost one-third of its precious nine inches of top-soil.

—Royal Bank Monthly Letter.

ALEX SINCLAIR — HATCHERY SUPERINTENDENT

FIGHTING FOREST FIRES

At the time of writing men of the seven divisions of the Alberta Forest Protection Service and the three Eastern Rockies Forest Reserves are on constant alert to combat their chief enemy, forest fire. First in their minds are the methods of prevention, the rules of safety that must be observed by every citizen if the annual fire losses are to be checked. Secondly they are prepared to suppress or extinguish fires as these occur in their respective districts. Constant vigilance becomes a normal attitude of life for the successful forest ranger, especially during hot dry weather periods. Wives and children often sit down to lonely meals when the head of the house works for the Forest Service. Sleep is a blessing to be snatched only when exhaustion demands it. Holidays are taken during winter when the big tree crop is safely tucked under a blanket of snow. These are dedicated people and theirs is a big responsibility.

The Department of Lands and Forests believes in the efficacy of team-work and has, therefore, organized its fire suppression into a well co-ordinated unit, called The Forest Protection Branch. From the senior superintendent to the divisional superintendent, and from him to the ranger and the lookout man the instructions are relayed, instructions distilled from months of discussion between all participants and tested to produce the most positive and immediate effect. A towerman's school presents a short course, the radio communications staff provide instruction, the older rangers drop words of wisdom, the superintendent recites and repeats the method of procedure.

Aircraft are purchased, leased and

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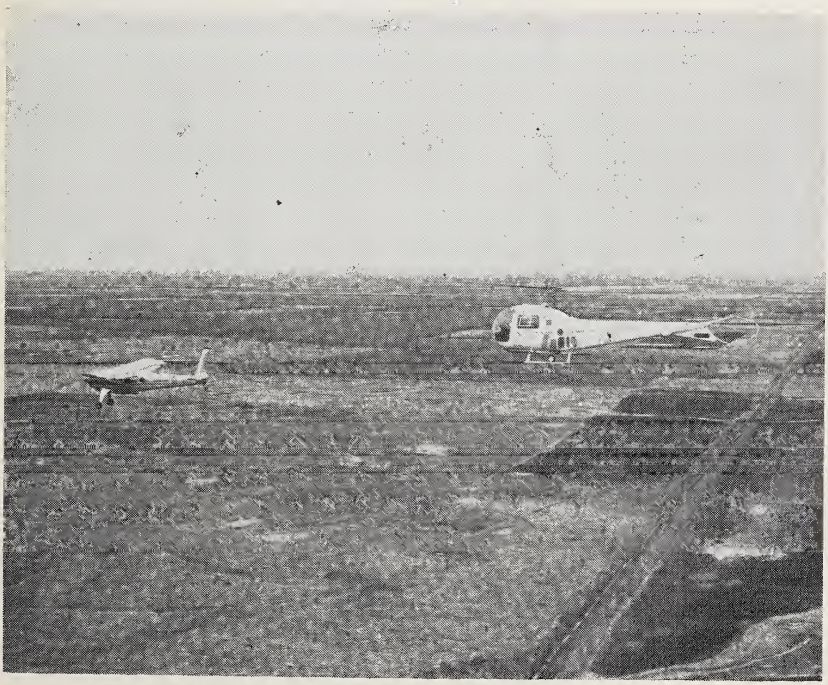


TOOLS OF FIRE SUPPRESSION
Aircraft of the Department of Lands and Forests

THE PREPARATION OF FOREST COVER MAPS

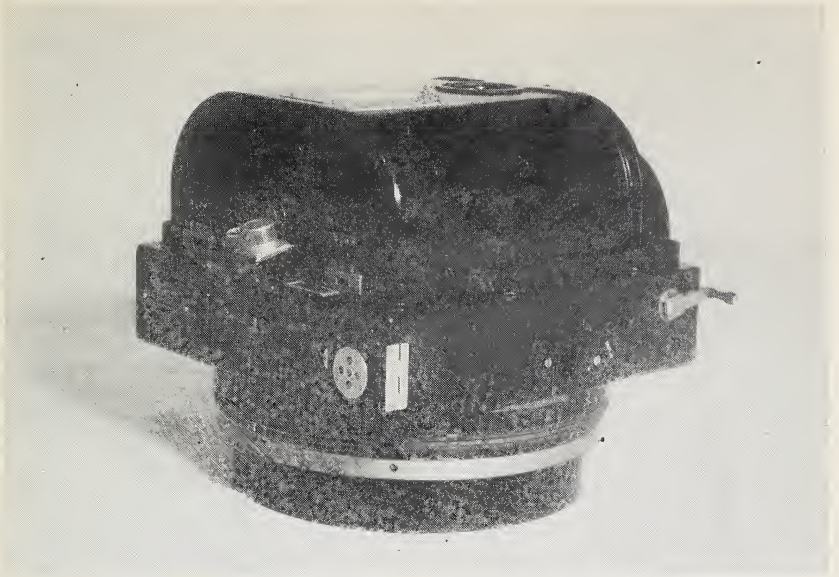
N. B. Nelson — Photogrammetrist

Part I

Could you plan a household spending budget without considering the amount of your income? That would be impossible. Neither can forestry officials plan the "spending" of our provincial forest resources without accurate information about the forest "income". The forestry budget, like your personal budget, must be kept in balance. Definite values of income and expenditure must be known. Concerning our forests, often as much as ninety-nine percent of the information required to obtain an inventory of forest resources is derived from aerial photographs. The photo information is assembled together into a more convenient form to produce Forest Cover Maps. Supplemented by data obtained from field parties, the total information is the basis upon which all forest management plans are made. The production of Forest Cover Maps is one of the important responsibilities of the Forest Surveys Branch of the Alberta Department of Lands and Forests. The maps are prepared either by an outside agency according to Forest Survey Branch specifications, or in the Forest Surveys Offices by members of the staff which include foresters, photogrammetrists, photo interpreters, draughtsmen and compilers.

Today, Forest Cover Maps can be produced in a relatively short period of time—short, that is, when we remember that before aerial photography was available, forest cover information was obtained by field parties travelling by

FOREST SURVEYS STAFF MEMBER PLOTTING MAPS BY MEANS OF STEREOSCOPY



THE WILLIAMSON EAGLE IX MARK 2 AERIAL CAMERA

foot, by horesback and by boat. It would be a long and weary task to investigate Alberta's 171,000 square miles of forests by such means. By using aircraft to obtain aerial photographs it is possible to map an area of this size in a period of time represented by years rather than by decades.

TAKING AERIAL PHOTOGRAPHS

To obtain aerial photographs a specially designed camera is mounted in the fuselage of an aircraft and the aircraft is flown back and forth along parallel lines which are spaced at regular intervals across the entire area being photographed. Pictures are taken at regular, pre determined intervals. The aircraft may be flown at an altitude above the ground varying from 4,000 to 20,000 feet, depending upon the extent of the ground area which is desired on any one photograph. The ground area represented on a photograph is actually the scale of the photograph and it is expressed in the form of a ratio, such as 1 inch (on the photo) equals 2,000 feet (on the ground). The higher the aircraft flies, the more ground area will be shown on one photograph.

In pinciple, an aerial camera is similar to an ordinaray box camera, but the roll of film is approximately 10 inches wide and about 350 feet in length. The developed photo is also larger than the box photo, being 9 inches square in size.

Camera film may be black and white in either panchromatic or infra-red, or it may be color film. Panchromatic film is used for general purposes while infra-red film is used to reveal special conditions such as ground moisture content (moisture is revealed by dark patches), to obtain greater tonal contrast between tree species and to increase the amount of detail visible on the photograph. Color film, because it is costly, is reserved for photographing small projects. All of these films produce better photographs if colored filters are placed over the camera lens. The filters serve to penetrate the atmospheric haze which is always present and also to produce tone contrasts which resemble the tones familiar to the eye.

MAKING A PLANIMETRIC MAP

When aerial photographs have been obtained there is still much to be done before a Forest Cover Map is produced. The photos must be used to make maps, the forest cover on the photos must be identified, marked and then added to the maps, the maps must be checked by field parties, and, finally, the revised maps must be completed in a manner suitable for producing additional copies.

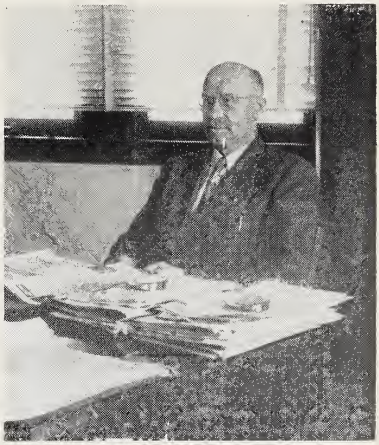
Making maps from aerial photographs is one of the duties of the photogrammetrist. The word "photogrammetry" is derived from three Greek words, one meaning light, one meaning a drawing and the third meaning to measure. Literally then, photogrammetry means obtaining reliable measurements by means of photography; actually, photogrammetry includes the equally important task of photo interpretation, or the ability to recognize and identify photo objects and images. The latter function is the one which is of greatest importance in the work performed by the Forest Surveys Branch, but map-making must also be done in order to have a base upon which photo detail can be shown in a convenient form.

Maps cannot be made directly from aerial photographs, because, like the snapshots taken with your own camera, aerial photos provide a perspective view of all the recorded detail. The perspective view must be transformed to obtain a flat or plan view in which every object

(Continued on Page 26)

L F IN PUBLIC SERVICE

Department of Lands and Forests



NORMAN A. WILLMORE

Cabinet Member of the Alberta Government and Minister of the Department of Lands and Forests, was born in Fessenden, North Dakota, about 48 years ago. He came to Alberta in 1915 with his parents, living first at Clyde and later in Edmonton. Mr. Willmore received his education in the city.

In 1928 he took a short fling at prospecting in Northern Ontario. In 1929 he moved to Edson where he worked in a men's wear store and shoe repair shop. By 1941 Norman Willmore had established his own place of business in Edson. He served on the town council from 1942 through 1945 and was elected to the Provincial Legislature in 1944.

Mr. Willmore received his first Cabinet post in 1953 with the Department

(Continued on following page)

HEBER GOLDEN JENSEN

Deputy Minister of the Alberta Department of Lands and Forests, is a native Albertan. His parents came to the Cardston district to homestead in 1897 and Cardston is his birthplace.

Mr. Jensen received his formal education at Cardston and remained in that district to teach school from 1919 to 1937. He became principal of the school before leaving. In 1937 he was appointed travelling magistrate for a large area in southwest Alberta. In 1946 his "Bench" duties took him to Calgary where he presided as police court magistrate until 1947. In that year he was appointed the sole provincial member of the newly formed Eastern Rockies Forest Conservation Board. In 1951 he accepted the position of Deputy Minister of the Alberta Department of Lands and

(Continued on following page)

HISTORY OF ALBERTA PLACES

FORT CHIPEWYAN — (Hudson's Bay Co. post and settlement) on west end of Lake Athabasca; from a Cree Indian name meaning "pointed skins". The original fort was established by Sir Alexander Mackenzie in 1788.

REDWATER — (North of Edmonton) (village, river) David Thompson named the river "Vermillion" in 1814; the name was changed to avoid confusing it with another river so named.

HIGHWOOD — (Mountain range, river) (South of Calgary) Thompson's map named the river "Spitchee" from a translation of the Indian name "spitzee". So called because the river lies on a level with the prairie instead of in a valley, (in the vicinity of High River town); as a result the belt of trees beside it are "higher" than usual and may be seen from great distances.

BUFFALO — (lake) (east of Lacombe) in Cree "mustus"; so named from its past resemblance, on a map, to the outline of a buffalo hide stretched for drying. A small tributary stream represented the tail of the animal.

WOSTOK — (post-office) (north-east of Edmonton) from a Russian word meaning "east". First settlers were from Russia.

YELLOWHEAD — (pass and station) (west of Jasper National Park); possibly named after Francois Decoigne, fur-trader at Jasper House 1814. Decoigne was nicknamed Tete-Jaune or Yellowhead from the color of his hair. However, another story credits the "yellow head" to an Iroquois trapper who hid furs at the spot so designated.

BELLY — (river) tributary to the Oldman river in southern Alberta; named after the Atsina branch of the Arapaho Indian tribe. Atsinas were known to other Indians as "beggars" or "spongers" whence the tribal sign commonly termed them as the "belly" or "big belly" people. French Canadians called them the "Gros Ventres". The Blackfoot Indians called the river Mokowanis meaning "belly".

IRRICANA — (village); on a Canadian Pacific irrigation canal, a compound of the words "irrigation" and "canal".

HEBER GOLDEN JENSEN

(Continued from preceding page)

Forests, his present post.

Mr. and Mrs. Jensen live in South Edmonton with their youngest daughter. The remainder of their family of five children have grown up to establish homes of their own. The family are devout members of the Church of Jesus Christ of Latter Day Saints.

Mr. Jensen is a Director of the Canadian Forestry Association and a member of the Executive Council of both the National and Provincial Boy Scouts Association. His hobbies are gardening, fishing and golfing. He may often be seen striding the fairways in the early morning at an hour when many of us are groping our way out of bed.

NORMAN A. WILLMORE

(Continued from preceding page)

of Industry and Labor. In August, 1955, he was appointed Minister of Lands and Forests.

Mr. and Mrs. Willmore are at home with son Jack at their South Edmonton residence. Mr. Willmore is a sports enthusiast and maintains an active interest in hunting, fishing, skiing, curling, canoeing, baseball and golf. He wryly admits that perhaps his baseball days are numbered. He is a member of the Masonic Order, a member of the Alberta Research Council and a Director of the Canadian Forestry Association. He has served on committees organized to investigate Workmen's Compensation practices in Alberta. As head of the widely dispersed Lands and Forests Department, Mr. Willmore's duties carry him to all parts of Alberta. These journeys have brought him a host of good friends and associates.

WHITE-TAILED DEER

Food

The food of the white-tailed deer is similar to that of the mule deer and consists of browse with some grasses and herbs.

Reproduction

Mating takes place each year in autumn. Males are usually polygamous, but the extent of polygamy depends upon the ratio of males to females. Fawns are born in the spring. The occurrence of twins is more common among white-tailed deer than among mule deer.

Special Distinguishing Features

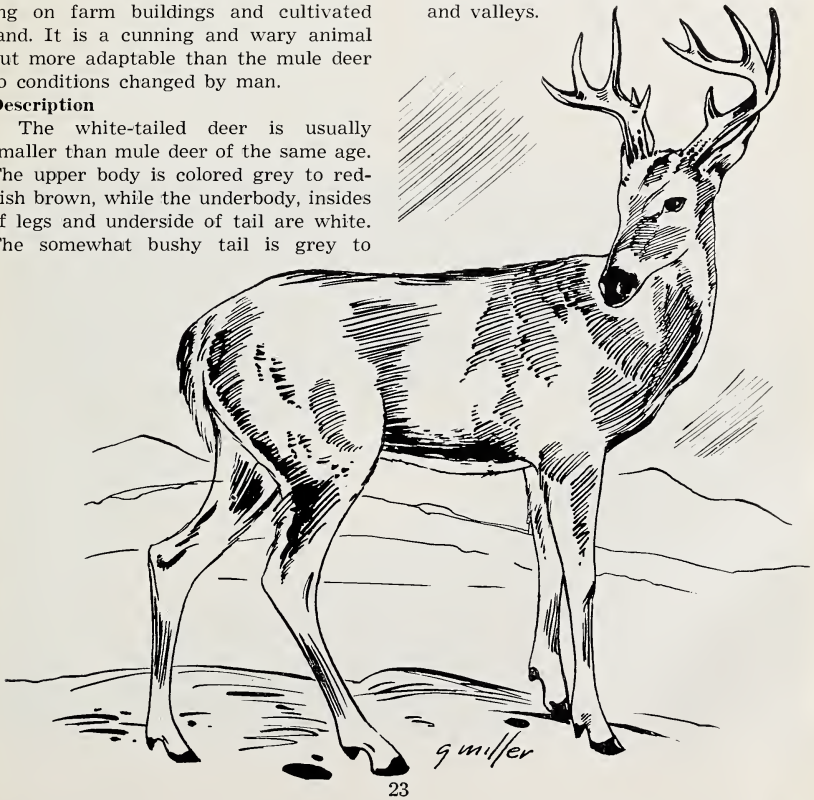
The running gait of the white-tailed deer is featured by a series of short dashes, punctuated by bounds or leaps at fairly regular intervals. The upward thrust and fanned-out display of the tail is a characteristic gesture, particularly when the animal is disturbed. The white-tailed deer readily occupies areas bordering on farm buildings and cultivated land. It is a cunning and wary animal but more adaptable than the mule deer to conditions changed by man.

Description

The white-tailed deer is usually smaller than mule deer of the same age. The upper body is colored grey to reddish brown, while the underbody, insides of legs and underside of tail are white. The somewhat bushy tail is grey to brown on top; however, it is often held erect and flared, particularly when the animal is alerted—hence the name. Normally only males grow antlers, though occasionally a female with small antlers is found. Antlers are projected upward and outward from the head, then sweep forward. Individual tines grow from the two main beams. Fawns are dappled or spotted.

Range

The range of the white-tailed deer in Alberta has been limited but is extending rapidly each year, particularly along main waterways. The heaviest concentrations occur in the eastern regions of the province with only occasional specimens reported from the foothill areas. Range requirements roughly approximate those for mule deer, namely, brushy sheltered glades and valleys.



TRUMPETER SWAN

Olor buccinator

The trumpeter swan is a large white bird with no plumage markings. The lower legs, feet and bill are black. It may weigh as much as 30 pounds and have a wing-spread over six feet in length. The adult "trumpeter" is about one-fourth larger than a whistling swan of the same age, however identification is difficult if adult and juvenile birds of both species appear togther. At close range, the "whistler" may often be distinguished from its larger relative by a yellow blotch commonly found just forward of each eye on the former. "Trumpeters" do not exhibit this mark.

Casual viewers often mistake swans for cranes and vice versa. Some care in observation will reveal the differences in body structure and plumage. Cranes have long legs that trail behind them during flight; they are colored grey to brownish grey (sandhill crane) or white with black wing tips(whooping crane).

The trumper swan has a resonant booming call somewhat similar in tone to a hunter's horn. This is its foremost distinguishing feature and it may "carry" as far as two miles when the birds are in flight; reducing to a series of faint hoarse groans as the flock proceeds away from the listener. The whistling swan's voice is pitched higher and has a sharper, clearer note. The sound does not "carry" like the trumpeter's.

Protection for swans was established in 1917 with the passing of the Migratory Birds Convention Act. Prior to that time they had been sought for their plumage by fur trading companies. During the years 1853 to 1877 one company recorded the sale of over 17,000 swan skins. Undoubtedly, trumpeter swans were taken with whistlers during that period and they now appear in few areas of North America.

The known Alberta nesting area is in the Grande Prairie region where an officer of the Federal Wildlife Service is employed to maintain study and protection. Small colonies are also known to reside in British Columbia, Montana and Idaho. Wildlife officers estimate there are possibly 1,500 "trumpeters" in America. They also estimate that num-

TRUMPETER SWAN

bers of the bird are increasing at this time.

The trumpeter swans appear to practise monogamy, mating for life at about three years of age. They nest after their fourth year, often using abandoned muskrat lodges for nesting sites. The nest proper is made of marsh vegetation and may be four to five feet in diameter. In it the female will lay from three to nine dull white eggs, weighing about 12 ounces each. Only the female takes part in incubation, while the male acts as a sentry. The incubation period is about 35 days.

The food of swans is primarily vegetable. Yellow pond lily, sago pondweed, moss and stems and roots of sedges all contribute to the diet. Apparently during their foraging, swans pick up the spent lead pellets of shotgun ammunition in quantities sufficient to be toxic. Post mortem examination of dead specimens has sometimes indicated that death was caused by lead poisoning.

Wildlife administrators are anxious that the trumpeter swan shall have maximum protection. In view of the difficulties of distinguishing the "trumpeter" from whistling swans, hunters and others are admonished to have the greatest regard for the safety of all these majestic birds. "- - - - If you don't know what it is, don't shoot!"

FIGHTING FOREST FIRES

(Continued from page 18)

readied, fuel dumps spotted and landing fields serviced. Everyone is warned of the need for clear and rapid decision coupled with positive action. The "team" is welded with these principles. It is ready to "take the field".

Fires occur, are reported, judged and action ordered. Back through the chain of command now established go the requests for equipment, men, and counsel. Back go the individual fire reports now plotted on a map in the superintendent's office. Lumber camps are canvassed for assistance, oil crews are taken off the job, settlers are asked to help, bull-dozers commandeered and right smack in the middle of it all is the forest ranger himself.

Meanwhile at head office the maturing of a year's planning is carefully watched. Dispersal of aircraft plays a major role in assisting the fire boss to plan his counter-attack. Hence aircraft are deployed to the best possible advantage of all districts. Consideration is given the type of forest being endangered, the loss to the community involved and the relative needs of individual districts for more protection and more equipment. Such consideration must necessarily be made with haste, however. Speed of action is essential, in fact it is one of the primary agents of successful fire fighting. Week-end leaves are forgotten now and every person involved has a single purpose. "Put out that fire."

Thus does the team react to emergency. Oh, some feelings are bruised, some sensitive souls a little anguished and some equipment occasionally damaged. But a reasonably good record heals these wounds and the spirit that prevails during the time of stress captivates everyone concerned. Who minds a bump or two if the job is well done.

W. H. M.

WATER AND WOOD

(Continued from page 13)

amount of water nature uses to grow a cord of pulpwood to be in the neighborhood of 750,000 gallons. He says that pine timberland takes from the soil the equivalent of 30 inches of rainfall during a normal growing season at his station. Figuring a cord per acre per year for average forest growth, it takes about ¾ million gallons of water to grow this wood. On a weight basis, this is equivalent to 2,000 tons of water to grow one ton of wood.

A mill consuming 850 cords daily uses cellulose which required 636 milliion gallons of water for growth.

This leads to one more interesting point. In these times of water conscious ness and conservation, it may be thought that 25 million gallons per day is a lot of water for an 850 cord mill to use in its process. But actually they use only four percent as much water as it took nature to make the wood in the first place. (From a Canadian Forestry Association Report.)

"POTHOLE" TROUT MANAGEMENT

(Continued from page 8)

RECOMMENDATIONS

The policy has been and should continue to be utilization of such new impoundments as trout lakes until the coarse fish become established; and then allow the reservoirs to revert to natural production of pike, whitefish, etc. Many new impoundments are being completed each year, both by government agencies and private individuals, so the supply of this type of potential trout lake is not, as yet, limited. Some of the formerly famous "trout lakes" have already passed their peak of usefulness and are practically forgotten except by a few people in the immediate area. New potholes are being planted each year to take their place in the eyes of the sportsmen.

In order to facilitate management and provide continuous "pothole" fishing in all settled areas of the province a rotation system is being attempted. When three or more suitable lakes are found within a reasonable distance of each other, one is planted while the others are left barren. Following two annual plantings in the first lake, the second is planted. This lake then provides good fishing during the third and fourth years as the catch in the first lake declines. This pattern is followed with the second and third lakes while the remaining large fish are removed from the original "pothole".

Long term fluctuations in precipitation and water levels have been noted in the past and a general lowering of lake levels may be expected in many of our "potholes" during the next few years. As many "potholes" are now at the minimum depth at which winter survival of trout may be expected, any decrease in water levels could cause annual winter kills to occur. Such a situation would make further plantings of these waters infeasible. Lower water tables and less precipitation and runoff would also cause increased utilization of impounded waters and in many cases water levels in man-made reservoirs would also be lowered to dangerous levels. It seems reasonable to expect that many potholes presently producing trout will winter kill with increasing regularity as water levels subside. This may not mean that a general decline in the number of trout potholes is inevitable. Lower water levels in some lakes now supporting pike and perch populations could cause winter kills and thereby create more lakes suitable for the introduction of trout.

It seems assured that the number of trout producing "potholes" will fluctuate in response to changes in water and weather conditions over the next few years. However, the potential productivity of these rather shallow isolated bodies of water has been realized, and it is likely that the province of Alberta will not lack "pothole" fishing for many years to come. Men, women and children may look forward to the thrill of hooking fighting rainbow trout on the prairies and parklands, as well as in the famous mountain rivers and streams of the province.

THE PREPARATION OF FOREST COVER MAPS

(Continued from page 19)

is shown as though it was seen from a point directly above it. Distances between objects, which vary on the aerial photographs, must be adjusted to conform to a uniform pattern; in other words a definite scale must be established. When these corrections and adjustments have been made the natural and constructed features, such as rivers, lakes, roads, towns, etc., which are visible on the photographs, can be transferred to the paper sheets representing the map. The map sheets must be constructed in such a manner that allowance is made for the curvature of the earth, a feature which can be neglected when mapping an area only a few acres in size but which would introduce a large error if neglected when mapping an area the size of the province of Alberta. When all the photo detail has been transferred to the map sheets, the resulting product is a planimetric map, a map showing a plan view of all the natural and constructed features in their correct relative positions and drawn to a pre-determined scale.

(Continued in the next issue.)

PARKLANDS DEER SURVEY

(Continued from page 9)

Both species are widely distributed over the whole parkland region (Maps 3 and 4). Mule deer were commonly seen in herds of 10 to 15, sometimes in heavily farmed regions (e.g. Camrose). Both species seem to need unbroken and ungrazed tracts of aspen one or more sections in size for their survival in huntable numbers in cultivated regions. In flat regions with good soil such tracts are becoming exceedingly scarce (e.g. Morrin-Rowley).

CONCLUSION

On the basis of the "transect" data a population of at least 20,000 deer has been estimated for the parkland area surveyed (Map 1). This figure is an estimate and cannot be considered final. Harvestable males one year or older comprise 19 percent of the total. At least one half of these males could be harvested without impeding the population's rate of increase. In other words a sustained annual harvest of over 2,000 bucks could be taken from the parkland area and still allow the herds to increase at a maximum rate.

All herds not at range capacity should be allowed to increase. Subsequent range surveys will determine which herds fall into this category. Conversely, herds already at or above range capacity should be stabilized or cut down. Further surveys will also point out herds in this group. It is quite likely, considering the densities of animals observed in this study, that some herds, perhaps many, are already too large. In these areas antlerless animals should be harvested.

A sustained harvest of at least 5 to 6 thousand animals, approximately one-half of them antlerless, is possible without precipitating herd reduction. But such a harvest should be effected only if range surveys indicate a need for stabilizing the deer at present levels. However, before range surveys are com plete, a buck harvest of 2,000 animals could and should be taken if conservation principles are to be practised.

The first indication of mule deer shedding their antlers appeared on January 30th. One prime buck had dropped its right antler. A prime white-tail buck had lost one antler on February 9ht. Antler shedding had not advanced sufficiently by the time the survey ended to introduce discrepancy in the sex class data.

Following are some of the problems encountered in an aircraft survey of game: (1) It was found difficult to maintain a constant altitude over sharply contoured terrain. (2) Deviations in wind direction and speed produced deviations in ground speed of the airplane. (3) Conifers present in even small amounts tended to prevent full visibility. (4) Bright sunshine late in the day produced long shadows that made spotting difficult and encouraged eye fatigue. (5) Differences in the ability of observers to see deer were noticed. However, the pilot's help more than compensated for the source of error. (6) Air sickness impaired the accuracy of some observers. Three of the six alternate spotters became airsick and were observing intermittently. (7) Mule deer were apparently easier to locate than white-tails because of (a) their more gregarious nature, and (b) a tendency to leave cover in the early afternoon for the purpose of feeding. White-tails were rarely seen in motion during the day, and **never** were seen away from the most dense cover available.

"TO RULE THE MOUNTAIN IS TO RULE THE RIVER"

Forest land, in addition to producing timber, forage, and wildlife, has enormous value as a regulator of water flow. In some localities this value far exceeds that of any other forest product or service. Not only do forest soils retain moisture and store water; they also have much to do with controlling water movement both on and beneath the surface. This often spells the difference between clear, steady streams fed by dependable underground sources, and erratic flows of muddy water, rising rapidly after rains, then shrinking rapidly, leaving only dry river beds.

U.S. Department of Agriculture Bulletin.

Dept. of Lands and Forests
Natural Resources Bldg.
Edmonton, Alberta

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MR. J.D.B. HARRISON, CHIEF,
FOREST RESEARCH DIVISION,
DEPT. OF NORTHERN AFFAIRS &
NATIONAL RESOURCES,
OTTAWA, ONT.

The drawing shown above, by artist Glenna Miller, serves to introduce a young conservationist that may soon become a familiar figure to residents of Alberta and readers of LAND — FOREST — WILDLIFE in particular. The central character, "Bertie" the beaver was designed by staff of the Walt Disney studios in Hollywood and original drawings are being provided to the Department of Lands and Forests as a gift from Mr. Disney's organization. It is the intention of the Department to depict "Bertie" in a variety of situations, all aimed toward the wise stewardship of Alberta's natural resources. Keep an eye open for his timely messages in future. Miss Miller, whose appealing poster appears above, is an employee of the Technical division of the Department of Lands and Forests.