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Division of Fish and Wildlife

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(THESE REPORTS ARE FOR INTRA-DEPARTMENTAL INFORMATION AND NOT FOR PUBLICATION)

RUSSIAN HUNTING

Introduction by Dr. C. H. D. Clarke

For some time we have received the Czech game management magazine "Myslivost." Written in Czech, its contents remain inaccessible to us. The best that can be done was to look over the titles and record a few interesting items against the time when someone carrying on a related investigation might be sufficiently concerned to want a translation. In the November, 1957 issue, however, were a series of articles, intended to inform Czech hunters on hunting and wildlife in the Soviet Union, which we could see were too good to pass up. After all, the Soviet territories are known to be rich in game beyond anything found elsewhere, and, not unnaturally, the Russian has always been the world's most devoted and incorrigible hunter. The very word "hunt" in Russian means something done willingly, and "hunter" corresponds to "volunteer" in English. A regime that tried to keep Russians from hunting would not last overnight. Obviously, under the Soviet regime, they hunted, but who, where, when and how, and what about management? Foreigners who have visited the country were either not interested, or not allowed to leave the city streets.

We sent these articles to the Canadian Wildlife Service, who in turn sent them to the central translating bureau in Ottawa, who have sent us back all of two articles and most of a third. It is no better than a peek through a couple of knotholes, but still most interesting.

Myslivost (Hunting and Gamekeeping), Volume 5 (35), Number 11, November 1957, pages 163-164, (Czech).

"Forty Years of Soviet Hunting and Gamekeeping Economy", by F. Ramkov, Director of the "Hunting and Gamekeeping" Pavilion at the All-Union Agricultural Exhibition in Moscow.

Part: "About 'Sports' Hunting and Gamekeeping."

Great work has been done in the field of sports hunting and gamekeeping under the Soviet Government. After the decision of the All-Union Central Executive Committee and the Council of the People's Commissars of the R.S.F.S.R. (Russian Soviet Federative Socialist Republic) of February 10th, 1930, a part of the hunting grounds was given for the use of hunting organizations. On the basis of this decision and of the decrees of the Union Republics, numerous hunting and gamekeeping organizations were created in the U.S.S.R. Up to the year 1940, there were established in all territories, regions and republics, voluntary hunting associations, and in districts, the collectives of hunters. Today, the hunting associations have over 1.5 million members.

Hunting and gamekeeping organizations pay a great deal of attention to the protection of the game and to the enrichment of the hunting grounds. Thus, for example, last year, the Moscow organization released into the hunting grounds below Moscow over 3,000 ducks and 2,000 partridges. Last year, members of the hunting and gamekeeping organizations exterminated over 28 thousand wolves and delivered to the state furs in the value of 14 million roubles.

A significant place in the activity of the hunting and gamekeeping organizations is taken up by the manufacture of hunting and trapping equipment, inventory, and marketing. In the years 1955 and 1956, 464 sales outlets of the hunting and gamekeeping organizations sold various game and fish in the value of more than one billion and five hundred and eighty thousand roubles. In 1956, 83 manufacturing workshops produced hunting and gamekeeping equipment made of local raw materials, in the value of 27.1 million roubles. Hunting and gamekeeping farms and branches of all hunting and gamekeeping organizations became bases for the development of the sport of hunting and gamekeeping. Today, there are, in the Soviet Union, over 330 hunting and gamekeeping farms.

Their activity can be characterized by the example of the Volchikhin hunting and gamekeeping farm of the hunting and gamekeeping collective at the Novotrub plant of the Sverdlovsk territory. This farm was established in 1945, and is destined for the use of the collective of hunters, of whom there were 561 on January 1st of this year. Of this number there were: 347 labourers, 129 engineers and technical workers, and 85 clerks. The farm covers 72 square kilometers in area, which is covered by coniferous, leafy, and various other trees, and about 30 per cent of the area is covered by water. This territory is inhabited by all types of game and fowl which are typical of the Middle Urals, such as moose, roe-deer, squirrel, fox, sable, kolinsky (?), white hare, capercaillie and hazel grouse. Crane, snipe, jack snipe, plover, ducks, geese, bald coot, and other fowl nest here in the spring and summer. Besides this, there are water reservoirs rich with fish.

In order that the arriving hunters have every comfort, the farm has, on its grounds, two large houses and five huts. About one hundred hunters can be accommodated there at any one time. Two houses, of two stories each, are permanently occupied by the gamekeepers who also raise various small domestic animals.

Besides the living areas, there is, on the floors, a locker-room for the personal possessions of the hunters, and further a cellar, ice-house, gunpowder magazine, two hundred boats and a variety of other equipment. All-around care is given to the game in the hunting grounds. Their nests are protected, harmful conditions are eliminated or, at least, lessened to a more acceptable measure, the game is provided with food, their watering places are cleaned, and remises and everything else which is involved in proper gamekeeping are established.

Hunting is allowed on the territory of the farm only with a special permit, which states the hunter's name, and also the sector in which he is allowed to stay, the length of his stay for hunting purposes and the quantity and the kind of game he is allowed to hunt.

All these measures bring about positive results and the number of hunters who visit the hunting grounds increases from year to year; last year, 4,017 members of the organization visited there. The best proof that hunters there are doing so well is evidenced by the fact that, in the last few years, furs in the value of 5,000 to 6,000 roubles were purchased from them. Last year, the members killed or trapped 1,883 animals.

The hunting and gamekeeping farm became, for the members of the hunting and gamekeeping organization, one of the most desirable places of rest, and many of them spend their holidays there, together with their families.

Not everything could be compiled in this article to enable the Czechoslovak reader to form a complete picture of the Soviet hunting and gamekeeping. It is outside the realm of a magazine article. However, I hope that I have succeeded in showing that, in forty years, in other words, since the October Socialist Revolution, the hunting and gamekeeping economy in the U.S.S.R. grew and flourished with every year, and also that all the conditions for its future development were created.

Myslivost (Hunting and Gamekeeping), Volume 5 (35), Number 11, November 1957, pages 164-166, (Czech).

"The Significance of the Forty Years for the Enrichment of the Game and Industrial Fauna in the U.S.S.R.", by Professor N. Lavrov.

In the Soviet Union, nature is enlivened on a large scale with various animals, beginning with the tiny insects and ending with the buffalo, a giant weighing over a ton. But for the most part, those animals which are important for hunting and gamekeeping are acclimatized. It is only natural, for besides the cultural value, these animals have, for their venison and, primarily, their fur, an economic value as well.

After the Great October Socialist Revolution, even during the years of the Civil War, various measures were undertaken for the protection of disappearing fauna and for the economic exploitation of the hunting and gamekeeping economy. For the first time in the history of the Soviet land, planned hunting or trapping of fur-bearing game was introduced. Hunting seasons were established with special regard for the geographical conditions and for the economy of individual territories. At the same time, hunting or trapping of certain game was forbidden and organization of a chain of game parks and government reservations was begun.

All these renovating and organizational measures were of great significance in the improvement of the hunting and gamekeeping economy of Russia. However, with these measures alone could be assured neither the needs of national economy, primarily as far as furs were concerned, nor could the public demand be satisfied.

Therefore, the organization of big state and collective farms for gamekeeping was begun, hunting of game of the so-called "second degree", such as moles, hamsters, water voles, and susliks, was introduced, and the year 1925 brought the beginning of the acclimatization of commercial game and, afterwards of fowl.

In the first four years, only 513 animals and those of only three species were set free. However, the acclimatization work was spreading quickly. In the year 1939, already over 13,000 animals of eleven species were set free. During the Patriotic War (World War II) only muskrat, and in small quantity at that, was set free. Nevertheless, in the post-war years, the renovating measures were greatly increased. Thus, for example, in 1953, over 21,000 animals were set free.

In forty years, over 241,000 animals of thirty-six species were released: 4,760 musk-shrews and moles; 9,270 foxes (among them, silver and polar foxes), martens, Tartar foxes (corsacs); 23,200 sables, stone martens, pole-cats, American minks, Siberian weasels, Eversmann weasel, and sea otters; 670 raccoon dogs; 13,700 marmots, susliks (ground squirrels), squirrels; 170,000 muskrats; 3,270 European and Canadian beavers; 3,600 nutrias (coypus), and 11,360 common hares, white hares and wild rabbits. From the ungulata 1,300 animals, and besides that, over 5,000 forest fowl were set free.

All acclimatization measures, of course, did not meet with equal success and did not have equal economic effect. Thus, for example, the acclimatization of the polecat, stone marten, wild rabbit, grey squirrel and silver fox failed completely.

The most successful acclimatization of all was that of the muskrat, particularly in the results of the year 1948. But even the earlier ones were successful. In the last thirty years, muskrat was established in more than five hundred administrative districts of 150 territories, regions and republics. This little animal became successfully acclimatized everywhere. It lives even above the north polar circle, where, on the water reservoirs, there is ice for nine months every year, but it is doing just as well there as in the deserts of Central Asia and on the lakes of the high mountains of Kirghiz.

The hunting of muskrat in the U.S.S.R. was begun in 1935, and today, more of them are killed there than in Canada. The extent of its range is greater than its natural distribution in the U.S.A. Today's share of the muskrat represents 12 per cent of the total sum of fur supplies in the U.S.S.R.

Good acclimatization results were achieved also with the American mink. Since 1935, there are about 10,500 of these animals in twenty-nine territories, regions and republics. Particular attention was paid to the propagation of this animal in Siberia and in the Far East. The attempts to introduce raccoon into some hunting grounds also deserve attention. Only a few of these little animals had been brought to the Soviet Union, some of them having even been bred in captivity, which is certainly not conducive to their propagation in nature. At first, raccoons were released in the Kirghiz and

Azerbaijan S.S.R. in Azerbaijan, the trapping of live raccoons was begun after eight years, and afterwards, these animals were deposited in other territories. In 1955, the fur trapping of the raccoon commenced. In the last few years, raccoon was released in fifteen centres of North Caucasus, Kazakhstan, Byelorussia and in the Pomerania.

Finally, the interesting experiments with the acclimatization of the nutria (coypu) should be mentioned. This little tropical animal was brought to the U.S.S.R. from South America in 1930. Its first release in the Krasnodar region and elsewhere ended in failure: the nutria (coypu) was unable to adapt itself to the new conditions, which were vastly different from those to which it was accustomed in its land of origin. The nutria (coypu) took a good hold in Trans-Caucasus, where its trapping commenced after two or three years. However, even there, it finally succumbed to the cruel nature, particularly to the cold and lack of food.

It took many years of stubborn work before the hereditary characteristics of the nutria (coypu) were overcome and before the right method for its breeding was discovered. Today, it is accomplished by putting the breeding stock of the nutria (coypu) into large cages for the winter season, thus preventing their mass extermination. Nutria (coypu) living in the U.S.S.R. have, with time, adapted themselves to their new domicile, and differ from their South American sisters primarily in their greater resistance to winter. This example is typical: Small American animals released in 1932, in the Kuban Plain, perished during the first and relatively warm winter, while the acclimatized nutria (coypu) released in the same areas seventeen years later, survived several unusually severe winters, and multiplied.

Good results were achieved also in the game-stocking of various territories with native game, in other words, the animals which have inhabited the territory of the U.S.S.R. for a long time. Particular attention is paid to the planting of the beaver. Before the Great October Socialist Revolution, this valuable species of animal became almost entirely extinct. A few were saved in the Ukraine, Byelorussia, and in the Voronezh, Tumen and Tuvin territories, altogether hardly 1,000 beavers. Effective measures were needed, in order to save the beaver. An order, banning the hunting of the beaver was issued; a chain of reservation was built and afterwards, the depositing work was begun. Since 1930, over 3,200 beavers were released into the hunting grounds of many territories, regions and republics. They took hold in almost all areas and are multiplying successfully. Today, the eastern border of the expansion of this animal runs through the Irkutsk territory in Siberia. Altogether, the beaver population in the U.S.S.R. today is several tens of thousands. Also, there is no further talk of saving the beaver - as a naturalist's keepsake - but rather, about what is to be done in order that the beaver may be included, as quickly as possible, on the roster of the commercial furbearing game.

The beaver, it seems, is an important fur-bearing animal of the near future. Because of its value and biological peculiarities, and because of the great quantity of natural water reservoirs in the European and Asiatic part of the U.S.S.R., the beaver is given priority over many other types of game in the work on the enrichment of commercial fauna.

The sable situation before the Great October Socialist Revolution was equally poor. Owing to the predatory extermination of the species, the number of these valuable little animals decreased catastrophically in pre-revolutionary Russia; the earlier territory of its distribution disintegrated into many sections, separated from one another by thousands of kilometers.

For the restoration of sable and for the expansion of their range, a complete system of measures, not excluding the depositing of these animals, was instituted under the Soviet government. Since 1927, some 12,500 of these little animals were released into the hunting grounds of more than one hundred districts of eighteen territories, regions and autonomous republics. The task was not only to fill up the "slowly becoming deserted" preserves, and to expand the quantities of this species, but also to improve the quality of the entire species. Therefore, sable possessing the most valuable characteristics were released first. The most extensive swing in the expansion of the preserves with the sable was registered in the post-war years, and particular attention was paid to the Far East, Yakutsk A.S.S.R., and the Irkutsk territory. The sable is deposited today far behind the borders of its present zoological domain as well: in the Sverdlovsk and Magadan territories and in Yakutsk. The result of all these measures is the fact that, in the past few years, more sable skins are being processed in the U.S.S.R. than in the same territory one hundred years ago.

The domain of such animals as raccoon dog and common hare was also considerably expanded. The territory of distribution of the raccoon dog in the area of the U.S.S.R. was, until recently, bounded by the southern border of the Far Eastern Territory. The first attempts with the acclimatization were undertaken in 1929. Since then, about 9,000 raccoon dogs were deposited into seventy-six territories, regions and republics, primarily in the European part of the U.S.S.R.

The raccoon dog has shown resistance and ability for comparatively fast acclimatization in new conditions. By depositing and natural process, the territory of its distribution was enlarged many times over in a short time. Today, we find this little animal in many localities of the European territory of the U.S.S.R., in the Caucasus, and many territories of Central Asia. In places, the raccoon dog even crossed the state boundaries and settled down in some of the neighbouring countries, such as Finland, Poland and Roumania.

From the standpoint of the fur processors, good results were achieved with the acclimatization of the Usuriisk raccoon dog in the northwestern territories of the European part of the Soviet Union. There, the "raccoon" became one of the principal fur-bearing animals. In the last few years, in the districts where the "raccoon" settled, four times as many skins are processed than in the territories which it inhabited previously.

The acclimatization of the common hare began in 1936, but on a comparatively small scale. In three years, approximately 1,300 hares were released in Siberia. They took hold everywhere, although

in places, the rate of their expansion was slowed down because of unsatisfactory protection, various illnesses and diseases which plagued local fauna, and also because of severe winters with great quantities of snow and because of the excessive numbers of foxes and wolves.

The release of the hare was continued in 1951. In the past few years, over five hundred of them were released in western and eastern Siberia. In the last twenty years, the hare settled down in twenty districts of ten territories, regions and autonomous republics. The Irkutsk territory serves as the best example to indicate their rate of multiplication. There, the hare was released in one administrative district, and today it is found in ten districts.

The ungulata were deposited only on a very small scale, and these were mostly experiments.

First of all, a word about the buffalo which, during the Patriotic War (World War II), was almost wiped out in its entirety. None the less, the attempts to save the buffalo were successful in spite of this and, after a few years, even the attempts to increase its numbers were successful. It is acclimatized in the Belovezh primaeval forest, and in the Caucasian, Khoper and Prioksk-Terasov reservations.

The next member of this group, the red deer, which was preserved in reduced numbers only in the Pomeranian region, successfully took hold in seven reservations of the European part of the Soviet Union, in the Kalinin, Yaroslavl and Moscow territories, in the Stauropolsk region and in the Azerbaijan, Armenian, Lithuanian and Latvian republics.

In addition to this, tests on the acclimatization of the European moose were made in the Kharkov territory and tests on the acclimatization of the Siberian and Caucasian stag were made in the Moscow, Kalinin and Yaroslavl territories, and in the Bashkir and Mordovian A.S.S.R. The hybrid deer from the Askaniya mountain was taken to Moldavia and to the Khersonsk territory. The roe-deer became new inhabitants in the Ukrainian and Latvian republics, in the Urmut and Mordovian A.S.S.R., in the Yaroslavl, Vladmir and Moscow territories, and the deer-kind animals in the Kiev territory and in the Moldavian S.S.R. Saigas (Antelopes of the steppes) and dzeren gazelles (Mongolian antelopes) were released on the Island of Borsa-Kelmes in the Aral Sea, and wild boars in the Moscow, Riazan, Kalinin, Vladimir and Minsk territories.

Game birds were deposited mainly for the "sporting" reasons, in other words, for the pleasure hunters. The greatest attention was paid to the partridge. It was released, together with the vousatou partridge in the Moscow, Yaroslavl, Vladimir and Kiev territories. The red partridge was released in the first three above mentioned territories; pheasants in Moldavia, Estonia and in the Ukraine, and further in the Kalinin and Moldavian territories. In addition, acclimatization experiments were made with the bald coot, gray goose, capercaillie, black grouse and hazel grouse.

It is absolutely impossible to describe in this article all that has been done for the enrichment of the game and the industrial fauna during the forty years of the existence of the Soviet government. All these tasks are the result of a close co-operation between science and practical experience. Although this work was commenced only a very short time ago, it has already proven its great economic importance. The game industry gives the country every year many million roubles worth of the "soft gold", as the fur of the acclimatized fur-bearing fauna is known.

However, in spite of all this, neither the demand for fur and for game, nor the requirements of the vast army of sports hunters have as yet been satisfied. Even more emphatically evident is the task of the hunting and gamekeeping economy to increase the supply of raw material. To some extent, this problem can be solved by acclimatization, which is one of the principal methods of increasing the usefullness of the hunting grounds.

In the Soviet land, where natural conditions are so varied there are also immense supplies of vegetable and animal organisms, which are not utilized at all and, if they are, then only partially. Many of them can constitute a splendid fodder basis for new species of game and industrial fauna, and can be utilized for the production of very valuable furs and fauna. In other words, in the U.S.S.R., there exist excellent conditions for further successful depositing of native fauna into more and more territories and for the acclimatization of fauna from other places.

From the magazine Okhota i okhotnichiye khozyaistvo (Hunting and Hunting Economy).

Myslivost (Hunting and Gamekeeping), Volume 5 (35), Number 11, November 1957, pages 166-167, (Czech).

"A Short Visit Into Soviet Hunting Grounds"

This will really be only a short visit into the Soviet hunting grounds, and only into some of them, because we could hardly find all the necessary time if we wished to visit each and every one of them. However, even this brisk walk through some regions will enable us to learn many a thing about the magnitude of the Soviet Union which, to the north, reaches behind the polar circle and to the south, touches the Himalayas.

The Karelian Hunting Grounds.

The taiga of the Karelian hunting grounds stretches north from Petrozavodsk and also includes the plains of the Kola peninsula. The country is covered with coniferous forests and almost a third of its territory is covered by lakes and rivers.

There is a great deal of game in this region, and in places it consists primarily of the capercaillie, ptarmigan, hazel grouse and black grouse.

Capercaillie and black grouse begin to mate at the beginning of May, during the "white" nights. Hunting of capercaillie during this period is very successful, and a good hunter can bag from six to eight birds in one morning. The mating of black grouse is of shorter duration, and usually takes place on the frozen marshes and lakes where it is difficult to build a watch. There are no aquatic birds here because the lakes are rocky and, consequently, animals on shore do not find sufficient food. Hare and fox seldom appear in this area. Hunting is done with the aid of a "laika" (Eskimo dog), usually in the hunting grounds near the road. Hunting off the road is very difficult and in winter, it is quite impossible.

In the littoral hunting grounds, there is a zone of medium sized islands, scattered along the coastal bays and gulfs of the White Sea. These islands are rocky, and larger ones are covered with coniferous forests. Winter here is very severe, with heavy snow storms and blizzards.

As soon as the rivers thaw and the White Sea gulfs are free of ice, large quantities of aquatic birds fly in. Almost all species of northern ducks appear here, as do the giant goose and a large quantity of brant "berneshkas" as they are called. The "berneshkas" fly in at the end of May and at the beginning of June in coveys of several thousands, and settle down on small islands. The hunters wait for them 5 to 8 kilometers from the coast. There are usually snow storms at this time of the year, and often it is impossible to think of returning home for several days; therefore, the hunters bring along enough food supplies for a week. During the high-tide, the "berneshka" remains at sea, and at low-tide flies onto shoals in search of food, returning afterwards to the open sea. The hunters usually take full advantage of these flights.

Hunting Grounds in the Urals

The territory of the river Belaya is one of the routes of the migratory aquatic birds. Its northeast section is richly covered with forests. These forests, composed of a variety of trees, are easily accessible and only the area of the lower stream is thickly overgrown with black nightshade and wild rose. There are many lakes here, some of which are covered with thick overgrowth. About one hundred kilometers east of the confluence of the rivers Belaya and Kama, the forest ends, and the fields and meadows begin; these, too, are dotted with many lakes and marshes.

When the river Belaya thaws, many aquatic birds appear in its basin; some remain there, others fly north. In the forests, there are numerous capercaillie, black grouse and hazel grouse and also hare and small fur-bearing animals.

The most successful and most interesting hunting on the river Belaya is that of ducks on "day-time rest". As soon as the ducklings are partially grown and begin to fly, they congregate in flocks of several hundreds. In day-time, they rest on one of the lakes and at dusk, they fly to pasture in corn and buckwheat fields which are sometimes scores of kilometers removed; they return again in the morning. During their morning return, they fly high and descend for their "day-time rest". The hunter determines the lake

on which the ducks rest, and there he builds a watch, either on shore or in a boat hidden in the reeds. The watch is usually of a horseshoe shape, and is roofless. The hunter waits until the flock settles on the water and then he fires, first at the sitting ducks, and afterwards, at rising ducks. If he is a good shot, he fires at descending ducks as well.

Northern Kazakhstan.

In the north, spreads a steppe with small forest oases. In the springtime, the steppe is overgrown with sappy vegetation which, however, changes completely in the summer as the burning sun-rays scorch everything. South of the village of Smirnova the region of lakes begins, which lakes, though not too deep, are thickly overgrown with reeds. During the rainy season these lakes are covered with aquatic birds. This is a region rich in game. On the lakes there are many ducks, geese and swans, and in the steppe and in the forests there are numerous black grouse, snezny partridge, partridge, and quail. In the winter there are, in the steppe and forests, many hares, foxes and wolves.

Owing to the fact that the steppe is bare, it is difficult to get within range of the black grouse and partridge which pasture on the steppe.

The Azerbaijan Steppe

On the western shore of the Caspian Sea spreads the steppe region of the Trans-Caucasus, the eastern part of which is covered with marshes, and the western part of which is steppe. In the spring, the steppe is green, but later the sun scorches it, as was the case with the previously discussed hunting ground. In November, the winter rainy season commences and lasts until March; it seldom snows and even then, snow melts quickly.

Almost all aquatic and steppe fowl nesting in northern and central zones of the Soviet Union, spend the winter in the Trans Caucasus. Vast coveys of bustards and sand grouse (birds related to pigeons), are concentrated in this area, and on the larger lakes, Akh-chala and Makhmud-chala, are concentrated great quantities of aquatic birds. In addition, in the marshes live wild boars and wild fencats and, on the steppe live jackals, foxes, wolves, hares and porcupines.

The hunting of aquatic fowl in the Azerbaijan steppe differs from that in other territories of the Soviet Union in that it is usually successful only during a wind and rain storm. The difference rests also in the fact that, during a wind storm, ducks fly all day and not only in one definite direction, but all over. They are often joined in their wild flight by geese. Bagged ducks have to be fetched immediately, otherwise they are swiped by the jackal.

Duck-shoots take place also at night. The hunter chooses a moonlit night when the skies are covered with clouds. On the light background of the clouds, ducks are clearly visible and they are not too cautious and fly low. Hunting is very successful when the ground is covered with snow. The hunter wraps himself in a

white sheet in order to blend with his surroundings; the duck cannot see him and flies directly into him.

The Talysks Ridge

This hunting ground is situated in the Azerbaijan Republic some 25 to 30 kilometers northwest of the city of Lenkorani. The promontory is covered with forest and is extremely rocky. Winter in the promontory is often rainy and blizzards rage only in the mountains. The slopes of the Talysks Ridge are overgrown with subtropical forest, interwoven with climbing plants. Here, the hunter meets the harmless porcupine and the dangerous tiger. The pheasant lives in the thicket and is joined, during the autumn by the woodcock. The most rewarding shoot is in the winter when, in addition to the above mentioned "domestic or native" birds, the migratory game fowl make their home here. One of the most interesting hunting methods is that of luring the wild animals with bait. In a suitable place on the circuit, the hunter digs a hole for his watch. If he is in a marshy terrain, he sinks a barrel into the ground and crouches in it. To set the bait, the guts of a wild boar, for example, about two hours before the wait he drags it all over the ground, but not closer than 15 or 20 steps of his watch. The hunter usually rides a horse so that human scent cannot be detected by the animal. A fox, wolf or jackal creeps up to the bait. It is quite obvious that for such a wait, a moonlit night is the most suitable one, and a strong wind is equally necessary.

Different Region - Different Custom

With the differences among various Soviet regions corresponds also the difference among the animals and also the method of hunting. This is only natural, since the hunting and gamekeeping season is influenced by the climate and the weather conditions on one hand, and by the hunting customs on the other. Let us have a closer look then at the fowling of the black grouse in the U.S.S.R.

The hunting and gamekeeping season differs according to the location of the hunting grounds, as we have already mentioned. In some places the hunting commences as early as August. During this period the black grouse is found mostly in the glades, meadows or in the young forests with thick and tall grass, usually adjoining a dense forest. Towards the end of August they begin to pass to the edges of the forest, towards the spring fields or towards the moss-grown morasses where they feed on the whortleberries (red bilberries) and on the cranberries.

The fowling begins usually after sunrise and ends between nine and ten o'clock. The hunter moves by the forest and the dog moves by the meadow. In searching for the covey, the best clue is the concentration of discarded plumage, because in the places where the black grouse stay, they also moult. Young black grouse moult individually. If the covey is driven into the trees by an inexperienced dog, the dog is recalled, and one waits 20 to 30 minutes. After a short time, the black grouse fly down and begin to call one another. The hunter, by listening to them, knows where to search for them. At the beginning of September the black grouse reach

maturity; the black cocks remain apart from the covey; in October, the black cocks and grey hens form independent coveys.

At the end of September when the black grouse sit in coveys in the trees, the fowling of the black grouse with a stuffed black grouse commences. As soon as it begins to snow, the main source of food of the black grouse is the birch catkin. The black grouse fly regularly during this period into birch-woods. The hunters choose their shelter, usually on the edges of the glades near trees in which the black grouse sit, or, if in a low forest, near tall birch trees. When the wind dies down, the stuffed black grouse is placed on the very top of the tree, its beak pointing into the sun; if it is windy, its beak should be pointed into the wind. Everything is ready before the sunrise. Here, it is possible to use the chasers who carefully chase the black grouse from the trees and towards the shelter. The best wait is on a quiet, bright and not too chilly day.

In the winter the hunters exploit the habit, peculiar to the black grouse, of spending the night under the snow where they are protected from the wind and the frost. The fowling usually commences at the end of October during severe frosts, blizzards and in deep snows. At dusk, after the feeding, the black grouse fly into the meadows or into a thin forest. Once there, they either settle down in the trees or directly on the snow, push a hole through the snow all the way to the ground and form a passage about one half of a meter long. They spend the night at the end of this passage. In the morning they re-emerge either through the snow directly above them, or, if an ice-crust formed overnight, they fly out through the hole they pushed in the snow on the previous night. The entire covey usually spends the night on not too large an area.

The hunters reach this area on skis, most frequently at dusk, when the fowl are under the snow. The black grouse hold up very well during that time and a good shot has considerable success. The deeper the snow, the easier the fowling, especially on dull days and during a fresh snow-fall, when the black grouse sit under the snow for the better part of the day.

During the spring mating, the black grouse is hunted by the already known method.

As is evident from this article, even in hunting, the proverb applies: Different region - Different custom.

According to the Soviet sources.

INAUGURAL MEETING OF MIDWEST PHEASANT COUNCIL, MADELIA, MINNESOTA, JANUARY 14-15, 1958

by
J. K. Reynolds

Report of Attendance

When the Association of the Midwest Fish, Game and Conservation Commissioners held its Annual Meeting at Itasca State Park, Minnesota, on July 10th and 11th last, the attached resolution was passed.

In order to implement this resolution, the inaugural meeting of the Midwest Pheasant Council was held at the Madelia Research Station, near Madelia, Minnesota, on January 14th and 15th, 1958. (See attached list for attendance).

In brief, the purposes for which the Council was formed are:

a) Elimination and duplication in pheasant and research investigation,
b) Increased efficiency,
c) Co-ordination and integration of efforts

It was decided that attendance would be limited to those persons actively engaged in pheasant research or in supervision of pheasant research. However, some discretion may be left to the official delegates, providing that care was taken to keep the attendance down to an absolute minimum.

It was felt that the meeting should preferably be held between the beginning of January and the middle of April each year, with a distinct preference for the end of this period.

The locations of the various meetings should be selected with care to avoid duplication of similar biotypes. Meetings should preferably have a range of about three days of which one day should be devoted to field trips.

Subject to the approval of the authorities of the State of Ohio, next year's meeting will be held in northern Ohio, probably at Bowling Green, with the field trip being organized to Pelee Island, Ontario. Should these arrangements not prove to be possible, an area in Southwestern Nebraska will be selected.

Regarding Officers for the direction of the Council's activities, it is agreed that there should be a Chairman, Vice-chairman, and Sec.-Treas. The Chairman would be the official delegate from that State which is playing host to the respective year's meeting. The Vice-chairman would be the representative of the following year's post State. The Sec.-Treas. will be elected biennially.

Regarding by-laws, for the Council, the current year's Chairman, Dr. S. W. Harris, of Minnesota, is to appoint a Committee to prepare a draft set of by-laws for presentation next year.

Discussions

1) Chief problem - virtually each State and the Province of Ontario agreed that inadequate harvest of present crops is the leading problem in the northern and eastern sections of pheasant range of North America today. Mr. V. S. Janson is to canvass each state and province individually and incorporate their views with remarks made at the meeting into a consolidated report of this topic.

In discussions it was pointed out that longer seasons and larger bag limits are unlikely to result in an appreciably larger harvest of pheasants, since few hunters hunt towards the end of the pheasant seasons, and few hunters take the legal bag limit already in existence. It was suggested that there is some merit in split seasons, which present two or more "opening days". Seasonal effects were discussed (e.g. a wet autumn with late harvest of such farm crops as corn and soy beans results in a poor kill in the early part of the season and a resultant early loss of interest on the part of the hunters). Michigan is confident that you cannot overshoot cock pheasants. This is supported by data from the Rose Lake Experiment Station, where it has been found to be almost, if not completely impossible to reduce the population of pheasants below two cocks per one hundred acres of range.

2) WHAT RESEARCH IS BEING DONE? (This excludes routine management activities).

a) Minnesota

1) Determination of recovery of stocked birds and their contribution to the bag,
2) Mortality of pheasants in mowing operations,
3) Population studies in an area of 36 square miles (one entire township).

PLANNED: Experimental aerial census techniques.

b) Nebraska

1) Compilation of data from hunting seasons,
2) Aerial counts and correlations with other "Census" techniques such as crowing counts and brood counts,
3) Cover mapping of a special study area of 28 square miles,
4) Marking techniques,
5) Studies of recoveries of stocked birds of various ages,
6) Fluoroscopy of hens (on an average 10% carry shot).

PLANNED: Evaluation of roadside cover.

c) South Dakota

1) Evaluation of sex and age data,
2) Aerial census techniques and tests of validity,
3) Detailed ecological studies by eight Biologists,
4) Compilation of data from open seasons,
5) Tabulation and evaluation of weekly changes in roadside vegetation.

PLANNED: A study of production of pheasants in various cover types.

d) North Dakota

1) Analysis of eight years' data covering weekly changes in vegetation in selected pheasant range to evaluate both long and short term changes and their effects on populations and nesting success.

e) Ohio

1) There are no full-time Biologists working on pheasant management or research,
2) There are no full scale Research projects underway, but a routine collection of management data from hunting seasons is made.
3) There is also a project aimed at evaluating inventory techniques and another in which it is hoped to test the effectiveness of various genetic strains of pheasants to permit the establishment of pheasants in many areas from which they are now absent.

f) Illinois

1) Determination of kill estimates,
2) Evaluation of crowing-count data. In the Sibley Study Area (36 square miles) a full scale year-round basic ecological study, by a full-time resident Biologist and staff,
3) Evaluation of possible effectiveness of availability of calcium and other soil components in determining pheasant range in Illinois.

g) Colorado

1) Evaluation of roadside crowing-counts as indicies of population densities. At present, approximately eleven different techniques are in use.

2) Studies of the effect of fungicides, herbicides and insecticides on pheasants by nesting, mortality of chicks, mortality of adults, distribution.

3) There are three students employed on this full-time graduate study, involving the evaluation of a program of habitat improvement that has been in effect since 1949 when there was an extremely heavy winter kill of pheasants. The cost of this programme to date is approximately half a million dollars.

   Preliminary evaluation indicates that the programme has not increased populations and its effectiveness in preventing high storm mortality has not yet been put to the test. There is, however, strong indication that in the "improved" areas, hunter success is about two and one-half times as high as in "unimproved" areas. This is very important, since under-shooting of existing populations is extremely prevalent in Colorado.

4) Test of value of "split seasons". In 1957 there was a triple-split season (3 - 3 day seasons with one week intervals). It was found to be very effective in increasing the kill.

h) North Dakota

There is one Biologist on pheasant work full-time, and another about half time.

1) A study of year-round mortality on a specific study area,
2) An evaluation of all experimental food patches and habitat improvement in an area which normally carries almost no pheasants and is not open to hunting. Preliminary indications are that the program will result in new pheasant range open to hunting.
3) Habitat improvement, by means of planting woody species, such as Chinese Elm, Plum and Honey-suckle.
4) Evaluation of effectiveness of a Soil Bank "Conservation Reserve" programme.

i) Iowa

1) Study of pheasant productivity and survival,
2) Study of diseases of pheasants,
3) Evaluation of a restocking programme in which wild-trapped pheasants are being trapped from an area of high pheasant population and transferred to an area of low population in the hope of establishing particularly well-adapted strains in poorer areas,
4) Evaluation of various farm grasses as pheasant cover.

   PLANNED: Development of improved hunter report cards.

j) Kansas

1) A long-term basic ecological study of pheasants by a fulltime graduate student of the University of Kansas,

k) Michigan

1) Habitat evaluation. This is a comparison of crowing-counts on "improved areas" with those on "unimproved areas",
2) Study of nesting-cover preferences.

PLANNED:

1) Determination of nesting success of wild birds,
2) Improvement of resources and reliability of data for establishment of seasons and bag limits and for forecasting the harvest.

l) Indiana

1) No current projects; except inventory and routine management procedures.

PLANNED:

1) Habitat evaluation,
2) Determination of reasons for discontinuities of pheasant distribution.

m) Ontario

1) Little, but inventory and routine management programs,
2) Van Nostrand's study of distribution and populations in Lambton County.

n) Wisconsin

1) Studies of distribution of pheasants,
2) Fluroscopy of hens for determination of hen mortality in hunting seasons,
3) Evaluation of stocking program. More money has been spent on stocking programs in Wisconsin than on all other phases of pheasant management combined. The current study is a 3-or 4-year project at the end of which it is hoped to have specific and detailed analysis available for recommendations to the Legislature,
4) Basic physiology of the pheasant. This is a long-term large-scale study in which the University of Wisconsin and the Department of Conservation are co-operating. A large proportion of the study, involves adreno-pituitary physiology,
5) A genetic study. This is now being finalized,
6) Compilation of 11 years' data of population dynamics (WAGNER)

7) Evaluation of fall vs. spring stocking of hens. Indications are that fall-stocked hens contribute 0.2 cocks in the bag per hen released, while spring releases yield nearly one cock per hen released. The re-stocking programme in Wisconsin costs about one-third of a million dollars. The total annual stocking is about 200,000 birds of which three-quarters are day-old chicks.

Discussions re: Populations, kill estimates and census methods.

a) Desirability of uniformity and standardization,
b) There was a general agreement on the necessity of establishing standards of procedure, reporting and evaluating throughout this Midwest area. At present no single method of census or population index can be applied throughout the entire area.

c) A Committee (Harris and Seubert) was appointed to compile a report and recommendations.

Other Committees appointed:

1) By-laws - E. B. Speaker (Iowa) Chairman

Members - Sandford (Colorado)
Ginn (Indiana)

2) Committee on regulations and hunting. Agee (Nebraska)

3) Research needs. Janson (Michigan)

4) Report of nesting. Wagner (Wisconsin)

Resolution

WHEREAS pheasants are of major importance in almost every state represented in the Association of Midwest Fish and Game Commissioners, and

WHEREAS research is needed to provide answers to management to cope with land use changes, and

WHEREAS many states have special facilities to carry out research needed throughout the midwest states,

NOW, THEREFORE, BE IT RESOLVED that the Association of Midwest Fish and Game Commissioners for purposes of eliminating duplication, increasing efficiency, co-ordination and integration hereby adopts a pheasant management council (or technical advisory committee) consisting of one or more pheasant technicians from each state to prepare lists of needed research projects, list mutually adopted principles of pheasant research findings, agree on areas in which specialized research should be carried out and which state has the best facilities including technicians and training to carry out certain needed research projects and to carry out research assignments given to them by the Association, and further, in order to accomplish their assignments the technicians meet once a year at designated areas at which time they can exchange knowledge, appoint work committees and make reports and that such reports shall be annually made to the Association either at the annual meeting or by circularized reports.

Attendance

COLORADO:
Sandfort, Wayne W.
Room 212 Petroleum Bldg.,
1129 Colorado Avenue,
Grand Junction, Colorado.

ILLINOIS:
Preno, William L.,
State Office Bldg.,
400 So. Spring Street,
Springfield, Illinois.

Greeley, Dr. Fred,
Ill. Nat. Hist. Surv.,
Ill. Dept. of Conservation,
Urbana, Illinois.

INDIANA:
Ginn, W. E.,
Rural Route 7,
Columbia City, Indiana.

IOWA:
Speaker, E. B.,
Iowa State Cons. Comm.,
East 7th and Court Av.,
Des Moines 9, Iowa.

Nomsen, R. C.,
R. R. 2,
Hampton, Iowa.

KANSAS:
Rowe, Gerry,
Dept. Zoology,
U. of Kansas,
Manhattan, Kansas.

MANITOBA:
No representative present

MICHIGAN:
Janson, Victor S.,
Michigan Dept. Cons.,
Lansing 26, Michigan.

MINNESOTA:
Harris, Dr. Stanley W.
600 Shubert Bldg.,
St. Paul 2, Minnesota.

Nelson, Maynard M.,
311 South Elm Street
Fairmont, Minnesota.

Erickson, A.,
Dept. Conservation,
600 Shubert Bldg.,
St. Paul 2, Minnesota.

MINNESOTA:
Chesness, Robt.,
Dept. of Conservation,
600 Shubert Bldg.,
St. Paul 2, Minnesota.

MISSOURI:
No representative present.

NEBRASKA:
Agee, Phillip,
Game, Forestation & Parks
Commission
Lincoln 9, Nebraska.

Linden, Raymond,
Game, Forestation & Parks
Commission,
Lincoln 9, Nebraska.

NORTH DAKOTA:
Grondahl, Chris,
North Dakota Game & Fish
Department,
Bismarck, North Dakota.

OHIO:
Edwards, W. R.,
Division of Wildlife,
Dept. Natural Resources,
1500 Dublin Road,
Columbus 12, Ohio.

ONTARIO:
Reynolds, Dr. J. K.,
Ontario Dept. Lands &
Forests,
Aylmer West, Ont., Can.

SOUTH DAKOTA:
Seubert, Dr. John L.,
Mitchell,
South Dakota.

Trautman, Carl,
Brooking, South Dakota.

Dahlgren, Bob,
South Dakota.

WISCONSIN:
Wagner, Frederic H.,
Nevin State Fish Hatchery,
Route 3,
Madison 5, Wisconsin.

PHEASANT HARVEST - 1957, LAKE HURON DISTRICT

by
R. E. Mason

Methods

The information appearing in this report was collected in the field by sixteen personnel of the Lake Huron District who patrolled the various counties and interviewed hunters each day of the season.

The duration of the season in the County of Oxford was four days, from October 26th to the 30th inclusive. The Counties of Brant, Halton, Huron, Waterloo, Wellington, and Wentworth had a 7 day season from October 26th to November 2nd inclusive. The remainder of the District was open for two weeks, from October 26th, to November 9th.

Information was collected on a township basis regarding the use of dogs, numbers of hunters, numbers of birds bagged, and numbers of birds seen. The information is presented in Table I, stratified according to counties.

Observations

48.7% of 341 parties checked were using dogs. Of these, many parties were using two or more dogs giving an average of 1.46 dogs per party.

TABLE I - Hunter Statistics

County	No. Twps	With Dogs	Without Dogs	No. Hunters	No. Birds Bagged	No. Hours	No. Pheasants Seen: Not Bagged	
							Males	Females
Brant	2	15	7	57	21	237.5	20	73
Huron	2	7	15	55	19	391.0	10	35
Oxford	11	79	53	371	130	1477.0	189	429
Waterloo	1	23	36	117	42	535.0	-	-
Wellington	1	12	30	91	17	295.5	16	25
Wentworth	7	30	34	143	20	348.5	16	38
TOTALS	24	166	175	834	249	3284.5	251	600

Table II gives the hunting success for each county, expressed as the percent successful hunters. In all counties, 834 hunters were checked with 249 birds for an overall hunting success of 29.8%.

TABLE II - Hunting Success

County	No. Hunters	No. Birds Bagged	Percent Success	Birds Bagged Per Hour
Brant	57	21	36.8	.08
Huron	55	19	34.6	.05
Oxford	371	130	35.0	.09
Waterloo	117	42	35.0	.08
Wellington	91	17	18.7	.06
Wentworth	143	20	14.0	.06
TOTALS	834	249	29.8	.076

As can be seen from Table II, hunting success for the better pheasant range in the district was about constant with slightly more than one-third of the hunters being successful.

The following sex ratios have been computed on a series of chi square tests. Some consideration has been given in the calculations to hunter bias in reporting sight observations of hens. This bias would originate with hunters who were not successful in bagging a cock pheasant but who "saw lots of hens". Some bias might also be introduced by the incorrect sexing of short-tailed males, but this would probably be slight.

The ratios for each county are presented in Table III.

TABLE III - Pheasant Sex Ratios

County	Birds Bagged	Observed Males		No. of Females Per Male	
		Male	Female	Pre-season	Post-season
Brant	21	20	73	2	4
Huron	19	10	35	1	3
Oxford	130	189	429	1.5	2
Waterloo	42	-	-	-	-
Wellington	17	16	25	1	1
Wentworth	20	16	38	1	2
TOTALS	249	251	600	1.3	2.5

The hunting pressure in Counties having a four day season declined rapidly after the opening day and remained relatively constant for the rest of the season. During this latter period, hunting parties were actually difficult to find for interviews.

Figure I illustrates the daily hunting pressure for Oxford County. The hunting pressure is expressed as the percent hours hunted on a given date based on a total of 1,417.0 hours.

Hunting pressure is expressed as percent hours in the field as this gives a more accurate picture than percent hunters in the field. This is because many local hunters are in the field after

work or on half holidays, but of necessity cannot hunt for the full day. Hence figures for numbers of hunters would not be comparable from day to day, while figures for time spent in the field are comparable. Curves based on percent hunters are shown in Figures III and IV for comparison purposes.

Hunting pressure in counties exhibiting a seven day season declined rapidly after the first day to remain relatively constant throughout the remainder of the hunt until the final day when the pressure increased to slightly more than one-half that of the first day. During the period between the opening and final days, parties of hunters were again very scarce.

Figure II illustrates the hunting pressure for all counties exhibiting a seven day season. Data are expressed as in Figure I, only based on a total of 1,570.0 hours.

Figure III - Hunting Pressure by the Day - Oxford County (expressed as percent hunters).

Figure IV - Hunting Pressure by the Day - All Counties with Seven Day Season (expressed as percent hunters).

Curves drawn for the percent hunter success each day of the season indicate a gradual decrease from the first to the last of the season. Unfortunately sample sizes for days other than opening day are too small to give statistically significant results. However, curves drawn for the numbers of pheasants shot each day of the season do indicate the decline in hunter success from the first to the last of the season. As can be seen from Figure III, no more birds were shot on the last day of the season than on the second day (in counties with a seven day season), even though the effective hunting pressure was twice as great on the last day.

Figure V - Percent Pheasant Shot Each Day in All Counties With Seven Day Season.

FIGURE I - Hunting Pressure by the Day, County of Oxford, Expressed as Percent Hours

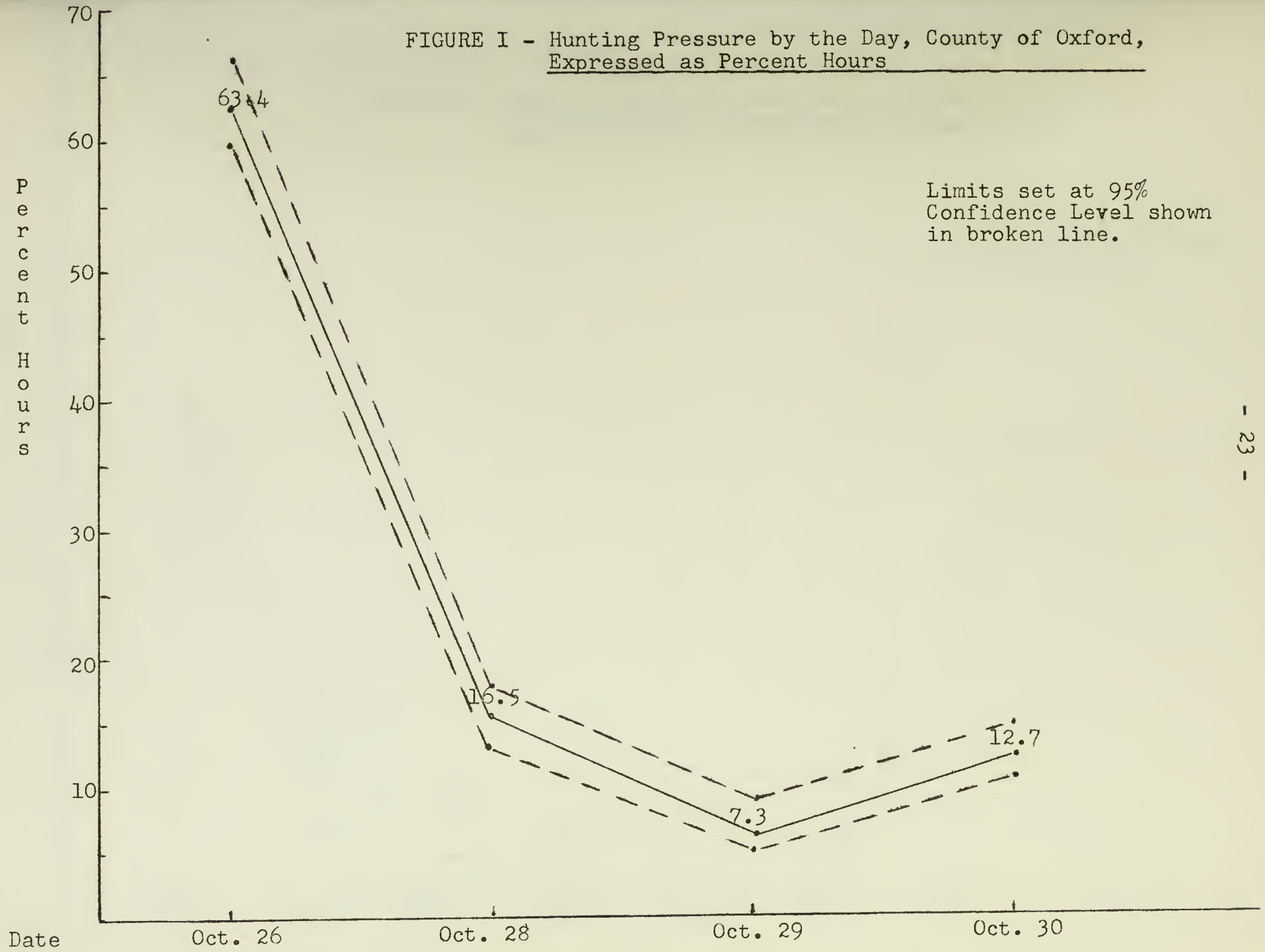


FIGURE II - Hunting Pressure by the Day All Counties With Seven Day Season, Expressed as Percent Hours

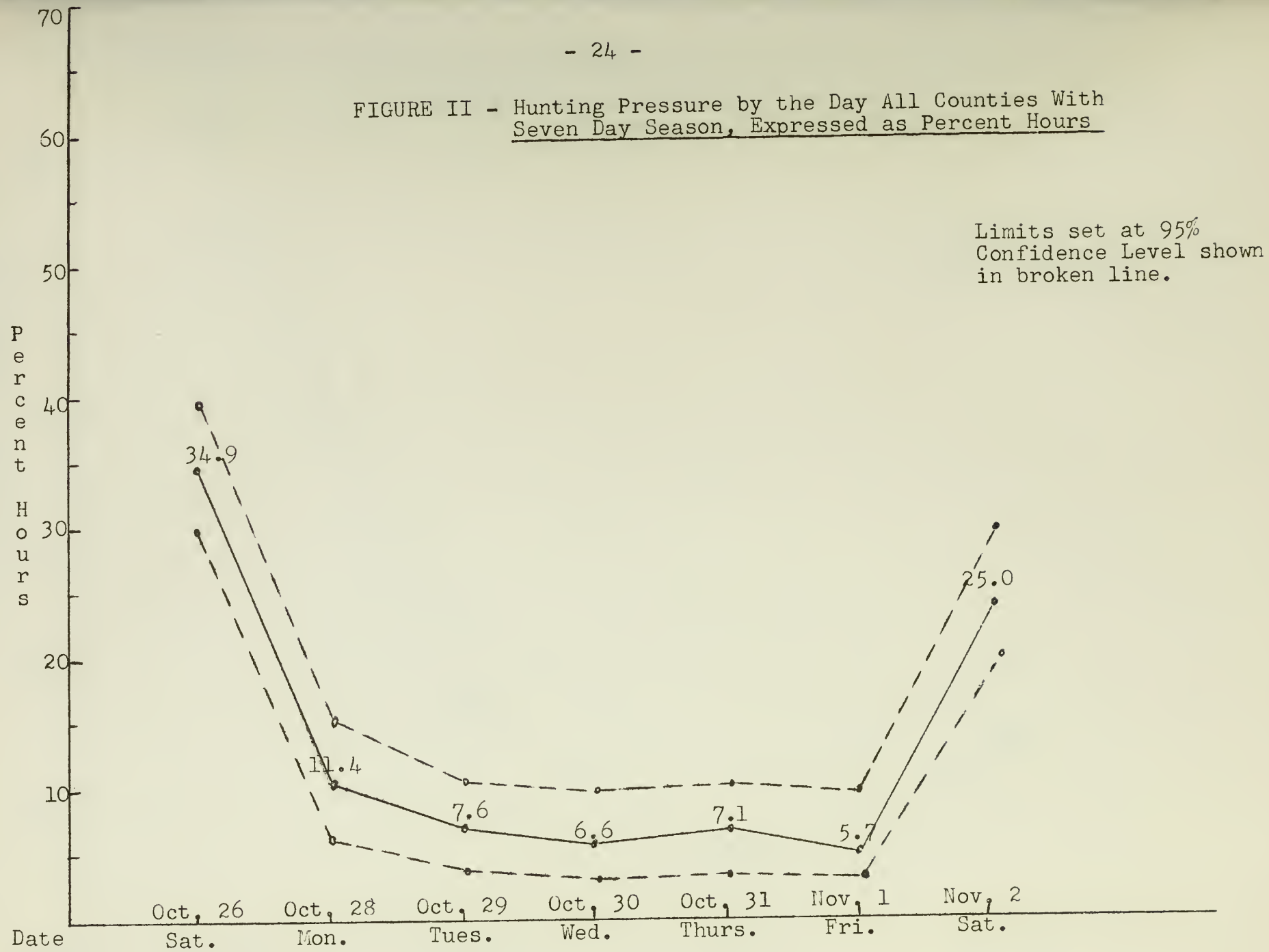


FIGURE III - Hunting Pressure by the Day, County of Oxford
Expressed as Percent Hunters

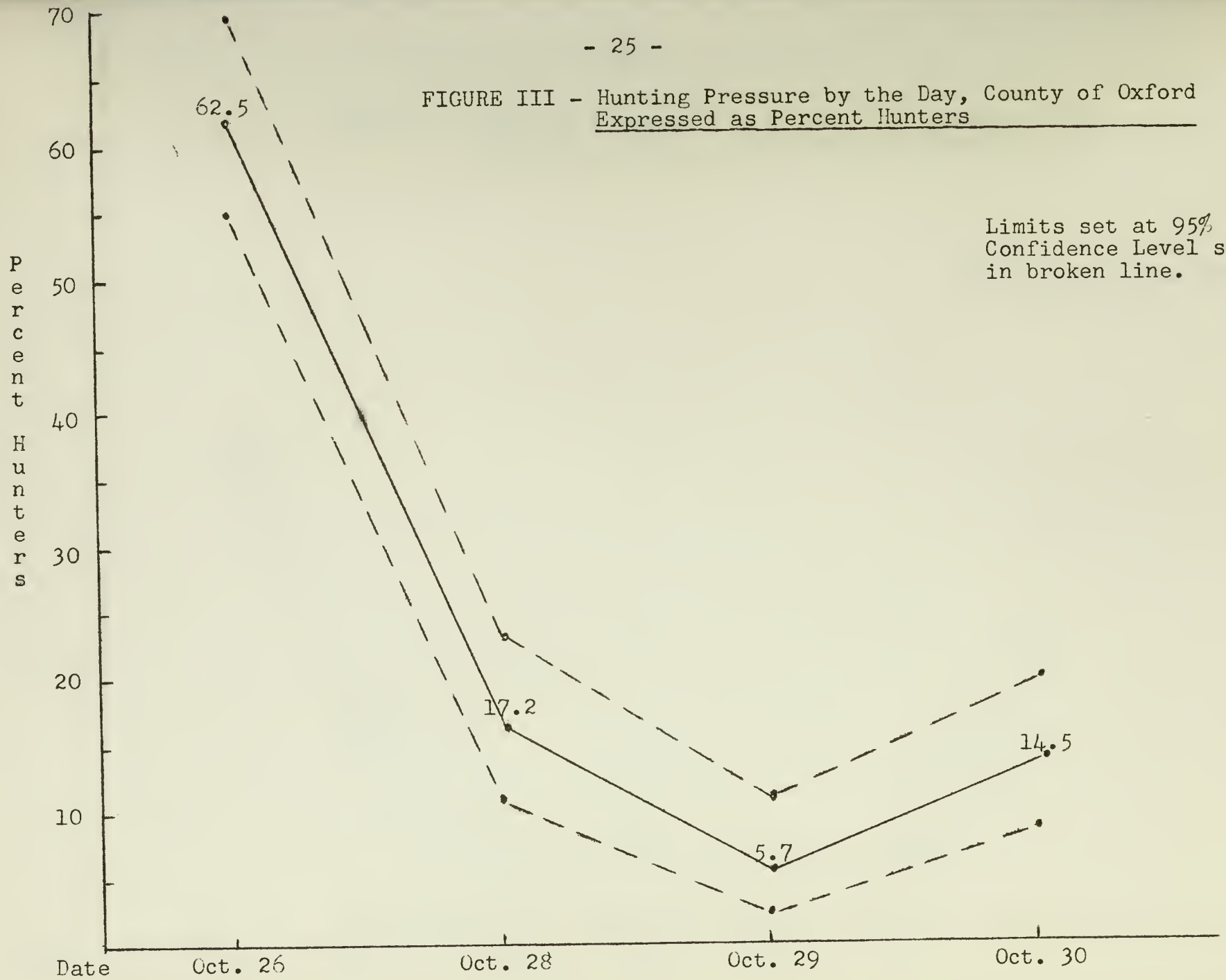


FIGURE IV - Hunting Pressure by the Day, All Counties With Seven Day Season, Expressed as Percent Hunters

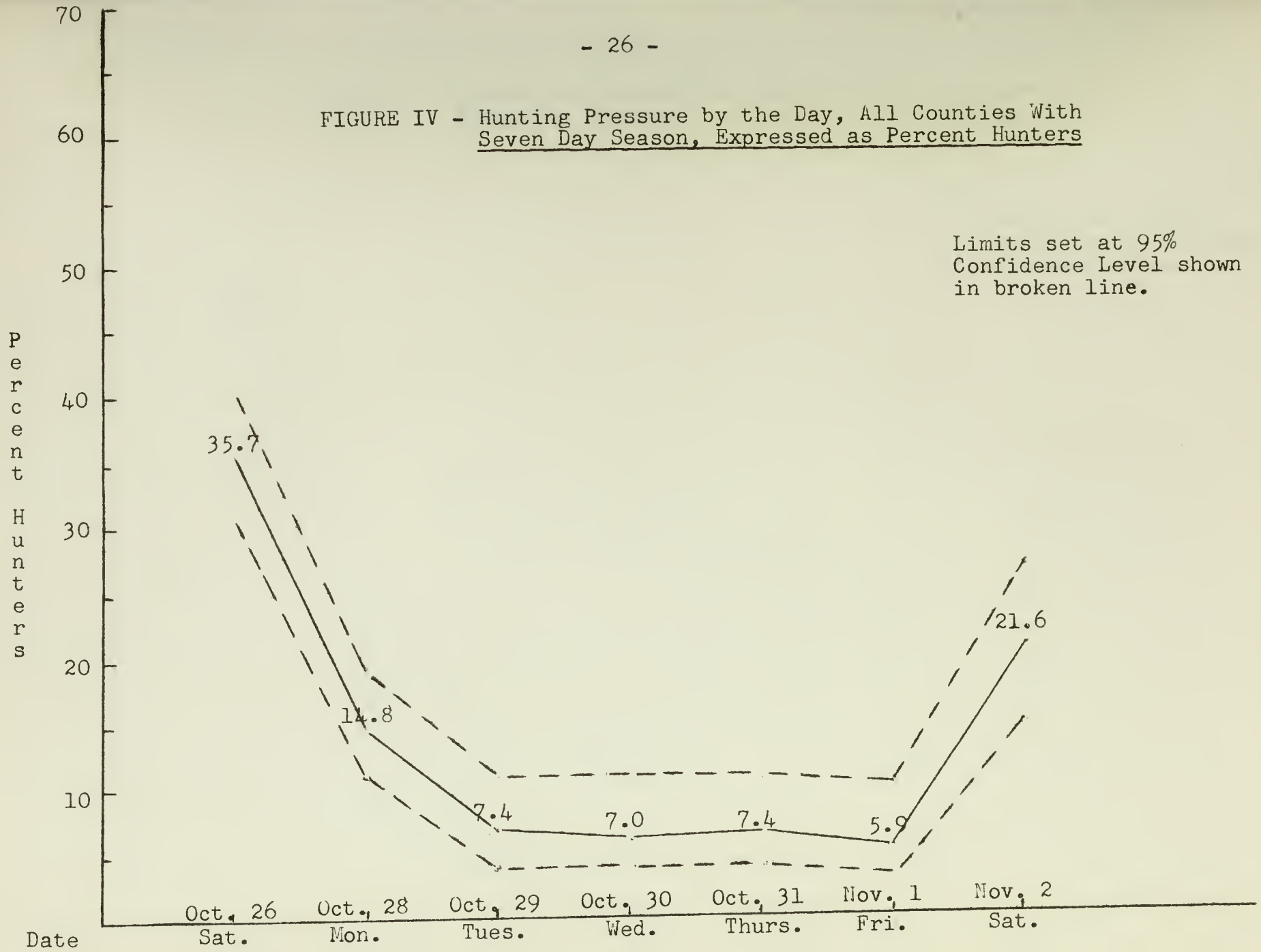
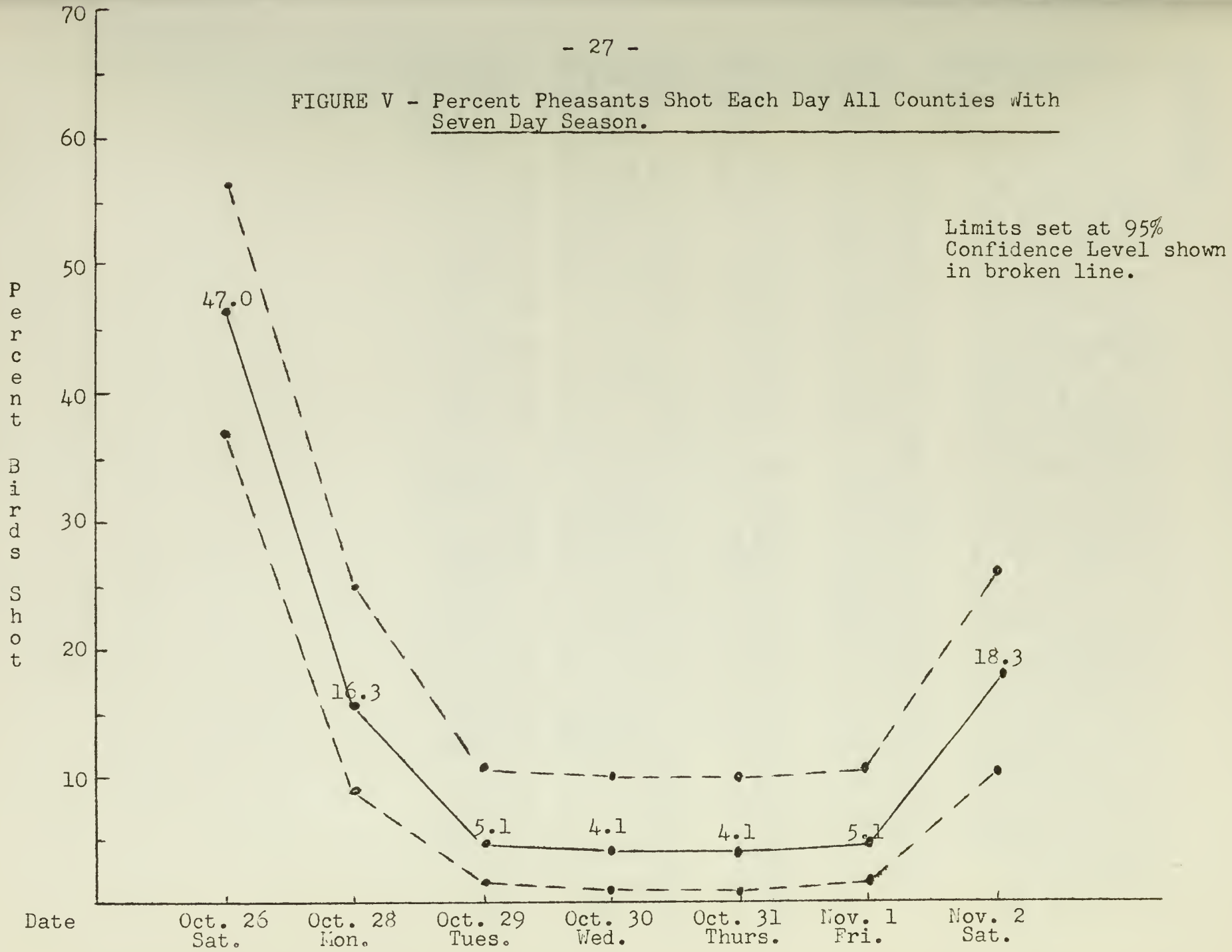


FIGURE V - Percent Pheasants Shot Each Day All Counties With Seven Day Season.



Conclusions

(1) During the period from 1953-1955, studies were carried on in North Norwich Township, Oxford County, to determine the percent return of released birds in hunters' bag. Averages for this three year period show that the return of game farm raised cocks was only 8.4% but that these birds made up 47.7% of all birds shot by hunters. The carry over from one year to the next of these cocks was less than 0.5%. Hence the conclusion is drawn that while game farm raised cocks do contribute substantially to the hunt, they do not abet the production of "natural" birds the following spring to any great extent.

Indications are that game farm raised hens similarly may contribute only slightly to the "natural" production of pheasants. If this were so, then it would seem advisable that hunters be allowed to legally take perhaps one hen pheasant in addition to the 3 cocks already allowed.

An investigation is being planned to determine the biological advisability of this proposal. The legalization of shooting a hen pheasant would certainly curtail the waste of birds shot mistakenly or purposely by hunters, only to be left in the field.

(2) As illustrated in Figures I, II, III and IV, hunting pressure shows a marked decrease after the opening day. In counties having a 7 day season, the pressure increases on the final day but not to the same proportions as that of the first day. The number of birds shot does increase but not proportionately to the numbers of hunters, indicating a decline in the hunter success as the season advances.

It would seem advisable, therefore, that consideration be given to opening the season for pheasants for at least 7 days in all counties in the Lake Huron District. Certainly hunting pressure does not warrant any shorter season, and conditions of cover and the declining hunter success would protect the pheasants from being overshot.

JAMES BAY REPORT, 1957

by
G. F. Boyer

The annual fall waterfowl investigations in the James Bay Region were carried out again this year by the Canadian Wildlife Service. The goose camps at Cabbage Willows, Hannah Bay, North Bluff and Albany were visited and several days were spent on the Moose River estuary. The period of investigation was between September 16 and October 20 and in addition to the routine bag checks two aerial surveys were made. One of these surveys followed the coastline from Hannah Bay along the west coast of James Bay and Hudson Bay to Winusk. This survey will be discussed in more detail later in this report. The other flight, a beaver survey carried out by the Ontario Department of Lands and Forests, provided an opportunity for me to see the country along the drainage of the Moose and Abitibi rivers. Dr. G. M. Stirrett was present during the first part of the work and showed me the technique of flock counting, sexing, aging and weighing of blue geese, and in general acquainted me with the important problems of the region.

This year a checking point was set up on each side of the Moose river just above Ship Sands Island. These checking points were run by the Ontario Department of Lands and Forests assisted by a R.C.M. Police Constable and were manned 24 hours a day. They provided a complete check of all hunters returning up the river from hunting areas along the James Bay coast extending from North Bluff to Hannah Bay.

All members of the R.C.M. Police and Department of Lands and Forests were most helpful and the aerial transport provided by the latter, enabled me to visit many places which would have otherwise been impossible to see. Free accommodation was provided by Wheeler Airlines at Cabbage Willows and by the O.N.R. at Hannah Bay. Unfortunately I was not able to visit Lemoine Island but Col. MacLean very kindly supplied me with complete information on the hunting activities at his camp.

Fall Flight

Observations and interviews gave a strong indication that the migration was considerably delayed. In addition to the aerial count mentioned previously, Lands and Forests personnel provided aerial figures for geese between Winusk and Fort Severn. These counts showed the picture between September 17 and 22 to be, in round figures:

Place	Blues-Snows	Canadas	Unidentified Geese
Hannah Bay	225	900	-
Moosonee-Albany	2000	1250	1450
Albany-Attawapiskat	9409	805	300
Attawapiskat-Lake River		not counted	
Lake River-Winusk	8200	2150	15575
Winusk-Severn	34000	6000	-

From the preceding it may be seen that the blues and snows were still well north in late September and that the Canadas were still present in good numbers. There is good reason to believe that many of the blues and snows had not yet arrived from the breeding grounds as the figures for the Winusk-Severn area were little more than half last year's estimate (Ont. Dept. L. & F.). Large numbers of blues were reported in the vicinity of the Belcher Islands in early October by pilots of the Austin Airways. My personal observations showed a heavy flight at North Bluff on October 8 and 9 and on October 20 observations at Hannah Bay indicated that large flocks of blue geese were leaving the James Bay region for the south.

Breeding Success, 1957

(a) Family Flocks

A total of 1545 family flocks was counted between September 26 and October 20. The results of these counts are outlined in Table I. It is interesting to note that the family sizes in the Hannah Bay area were approximately the same in late October as in the early part of the season. Cooch found brood sizes to be 3.20 for October 1 and 2.80 for October 15 in 1956. This year's brood average of 3.06 compares favorably with Cooch's figures and suggest that there was an improvement in the survival of the young during the 1957 season.

(b) Ratio of Adults to Young

All observed flocks were counted and an attempt was made to identify and isolate family groups. Table II gives the age composition in total numbers as obtained by the flock counts. This table is subdivided into "Family Flocks" and "Other Flocks". The latter were composed either entirely of "Whiteheads" or contained a combination of more than two "Whiteheads" plus a number of young. This would indicate that a good proportion of these "Other flocks" consisted of either sub adults or non breeding birds, although on some occasions two or more families may have united in one large flock. The counts at North Bluff on October 8 and 9 showed a considerable drop in the adult population indicating that large numbers of non breeders had already left the area.

The percentage composition and ratio of adults to young are shown in Table III. Table IV compares these percentages and ratios for the period between 1946 and 1957. Judging from this table it would seem that the breeding success this year was an improvement over 1954 and 1956.

TABLE I - Family Flock Sizes, Blues and Hybrids, 1957

Flock Size	Number of Flocks						
Adult-Young	Cabbage Willows Sept. 26-27	Hannah Bay Sept. 28-30	Albany Oct. 2-5	North Bluff Oct. 8-9	Moose R. est. Oct. 13-14	Hannah Bay Oct. 19-20	Total
0-2	1	-	-	-	-	2	3
0-3	-	-	1	-	-	6	7
0-4	1	1	1	-	-	1	4
0-5	-	-	-	-	-	2	2
0-6	1	-	-	-	-	-	1
1-1	2	2	5	1	2	5	17
1-2	13	4	8	2	8	15	50
1-3	14	3	3	1	9	20	50
1-4	7	8	9	-	3	14	41
1-5	5	1	-	-	-	5	11
1-6	-	-	-	-	-	1	1
1-7	1	-	-	-	-	1	2
2-1	13	15	18	4	5	20	75
2-2	30	95	68	18	17	78	306
2-3	111	151	99	23	28	110	522
2-4	81	99	57	24	13	78	352
2-5	19	14	22	2	5	16	78
2-6	12	3	2	-	-	5	22
2-7	-	-	-	-	-	-	-
2-8	1	-	-	-	-	-	1
Total families	314	396	293	75	90	379	1545
Average no. young per family	3.34	3.02	2.97	2.94	2.86	3.03	3.06

Species Composition of the Goose Flight

Several families of what appeared to be pure snows were counted. Table V may give some indication of the number of snows in the breeding population and their effect on the blue geese migrating through this region.

Table VI shows the percentage composition of the three major species of geese. Samples are based on the total number of birds seen during the counts. The percentage of Canada geese is somewhat higher than usual.

TABLE II - Age Composition - Flock Counts - Blue Geese*, 1957.

Place and Date	Family Flocks		Other Flocks		Total	
	Adults	Young	Adults	Young	Adults	Young
C. Willows - Sept. 26-27	544	1047	619	165	1163	1212
Hannah B. - Sept. 28-30	735	1189	246	45	981	1234
Albany - Oct. 2-5	543	871	409	96	952	967
N. Bluff - Oct. 8-9	143	223	27	10	170	233
Moose R. Est. - Oct. 13-14	157	256	19	6	176	262
Hannah B. - Oct. 19-20	665	1145	155	137	820	1282
Total Sept. 26-Oct. 20	2787	4731	1475	459	4262	5190

* Including mixed families and hybrids - one parent a snow.

TABLE III - Percentage Composition Adults and Young - Blue Geese*, 1957.

Place and Date	Percent		Ratio		Number in Sample
	Adults	Young	Adults	Young	
C. Willows - Sept. 26-27	49	51	1	: 1.03	2375
Hannah B. - Sept. 28-30	44	56	1	: 1.26	2215
Albany - Oct. 2-5	49.5	50.5	1	: 1.02	1919
N. Bluff - Oct. 8-9	42	58	1	: 1.37	403
Moose R. Est. - Oct. 13-14	40	60	1	: 1.49	438
Hannah B. - Oct. 19-20	39	61	1	: 1.56	2102
Total Sept. 26-Oct. 20	45	55	1	: 1.22	9452

* Including mixed families and hybrids - one parent a snow.

TABLE IV - Comparative Adult - Juvenile Ratio Blue Geese 1946-1957.

Year	Percent		Ratio		No. of Geese In Sample
	Adults	Juvenile	Adults	Juvenile	
1946	67	33	1 :	0:49	2300
1947	73	27	1 :	0.37	16900
1948	40	60	1 :	1.5	700
1949	35	65	1 :	1.85	500
1950	57	43	1 :	0.75	2589
1951	60	40	1 :	0.66	672
1952	39	61	1 :	1.6	8145
1953	41	59	1 :	1.4	10928
1954	95	5	1 :	0.06	15103
1955	-	-	-		-
1956	50	50	1 :	1.0	5770
1957	45	55	1 :	1.22	9452

TABLE V - Species Composition (Snows-blues) in the Family Flocks

Locality	Blues		Mixed		Snows		Total
	No.	Percent	No.	Percent	No.	Percent	
Cabbage Willows	280	89.2	32	10.2	2	0.6	314
Hannah Bay (1)	359	89.1	37	9.2	7	1.7	403
Albany	279	90.6	14	4.5	15	4.9	308
North Bluff	72	87.8	3	3.7	7	8.5	82
Moose R. Estuary	89	96.7	1	1.1	2	2.2	92
Hannah Bay (2)	369	95.6	10	2.6	7	1.8	386
Total	1448	91.4	97	6.1	40	2.5	1585

TABLE VI - Percentage Composition of the Three Major Species of Geese.

Locality	Percent by Species			
	Blues	Snows	Canadas	Total Sample
Cabbage Willows	97	2	1	2674
Hannah Bay (1)	95	4	1	2331
Albany	76	5	19	2530
North Bluff	55	5	40	711
Moose R. Estuary	97	3	0	452
Hannah Bay (2)	97	3	trace	2172
Total	89	4	7	10870

White Hunter Kill at the Organized Goose Camps

(a) Daily Kill

Table VII shows that the daily kill for the four main camps averaged 2.56 geese as compared with 3.92 in 1956. The biggest drop in kill occurred in September and the camps showing the greatest contrast were Albany and North Bluff.

(b) Total Kill

The total kill per hunter at the five organized camps is shown in Table VIII. In every case except one there was a drop in the goose bag. At Hannah Bay and Cabbage Willows the difference was slight being only 0.5 birds per hunter in each case. It was considerable, however, at Albany and North Bluff where the drop was 4.2 birds and 8.4 birds per hunter respectively.

(c) Ratio of Adults to Young in the Blue Goose Kill

Table IX shows that the age ratio of the kill was in favour of the young in all five camps. If this table is compared with Tables III and IV it tends to support the indication that this years production was slightly better than average.

Weights of the Blue Geese

A total of 463 blue geese was weighed in 1957. These weights are compared with previous years in Table X. In all cases weights were down from last year. This loss in weight appeared to be more noticeable in the case of adult females and juveniles of both sexes, possibly indicating a later breeding season in that the females did not have quite as long to recover from egg laying and the young birds were not as fully developed as usual.

TABLE VII - Daily Hunter Success at Four Camps

	Hannah Bay	Albany	North Bluff	Cabbage Willows	Average
September	1.79	2.08	1.84	1.96	1.94
October	4.05	2.99	1.86	4.40	3.03
Average	3.09	2.54	1.85	2.79	2.56

TABLE VIII -

Location	No. of Hunters	No. of Geese	No. of Ducks	No. of Geese Per Hunter	No. of Ducks Per Hunter
Hannah Bay	131	1178	475	9.0	3.6
Cabbage Willows	34	433	298	12.7	8.8
Albany	107	1026	68	9.6	0.6
North Bluff	85	571	115	6.7	1.4
MacLeans	9	139	48	15.4	5.3
	366	3347	1004	9.1	2.7

TABLE IX - Ratio of Adults to Young in the Blue Goose Kill, 1957.

Location	Adult : Young	Numbers In Sample
Cabbage Willows	1 : 1.15	400
MacLean's	1 : 1.26	105
Hannah Bay	1 : 1.66	1054
Albany	1 : 1.36	532
North Bluff	1 : 1.59	403
	1 : 1.47	2454

TABLE X - Weights in Pounds of Blue Geese

Classification		Five Year Average Weight	1956 Weight	1957 Number	1957 Weight
Juvenile	Male	5.00	4.71	134	4.55
	Female	4.70	4.30	109	4.25
Adult	Male	6.12	6.01	81	6.02
	Female	5.75	5.78	69	5.35
Sub adult	Male	5.89	5.88	32	5.74
	Female	5.47	5.68	38	5.24

Moose River Estuary

Daily records similar to those in use at the sporting camps were kept at the checking stations. I feel that there should be some modification in the forms in use as under present circumstances it is impossible to differentiate between local and outside kill and the data cannot be broken down into individual daily bag. We have, however, information on the following:

(a) Residence Address of Hunters.

Residence of Hunters Checked at Moose River Station

Address of Hunters	Number of Trips		
	One trip	Subsequent trips	Total trips
Moose Factory and Moosonee	225	227	482
Other Places in Ontario	124	17	141
Province of Quebec	1	-	1
United States	40	-	40
Total	390	274	664

This table shows that, as expected, by far the greater part of the hunting pressure was from local hunters. However, outside hunters made a significant contribution. In fact, the number of outside hunters exceeded that of any of the goose camps (165 as compared with 131 at Hannah Bay).

Some local hunters, as would be expected, made several trips.

This year, for the first time, employed Indians at Moosonee and Moose Factory purchased licenses and came under the normal waterfowl regulations. In the future it should be possible to separate these hunters from the other Indians for the purpose of analyzing kill data.

(b) Kill In The Moose River Estuary Area

Total Kill Checked At Moose River Stations

No. of Hunters	No. of Geese	No. of Ducks	Geese Per Hunter	Ducks Per Hunter
390	3630	1667	9.3	4.3

Blue Goose Kill Moose River Estuary Area

Adults	Juveniles	Totals
1752	1592	3344

From the preceding statistics it will be noted that the kill for this area is not excessively large. It should be pointed out that several of the local hunters were out at least six times and yet the total kill per person corresponds very closely with that at the goose camps.

The age ratio of the blue goose kill is in favour of the old birds. This probably is largely due to the fact that most of the hunting pressure was by local Indians. Other investigators have pointed out that the Indians are selective hunters and make a special attempt to shoot white-headed geese. These figures, therefore, do not necessarily indicate an age ratio in favour of adult birds in the flocks frequenting this general area.

Species of Waterfowl in the Bag for the Camps and the Moose Estuary

Species	Number	Percent of Total	
Blue goose	6156	60.6	67.5
Snow goose	446	4.8	
Canada goose	173	1.9	
Richardson's goose	19	0.2	
Brant	6	trace	
Pintail	1294	13.8	32.5
Black	646	6.9	
Mallard	470	5.2	
Others	115	1.2	
Total	9325	100.0	

The principal hunting effort in the James Bay area is directed towards the geese but in spite of this it will be seen that ducks form a substantial portion of the bag.

Indian Kill

We now have a very good idea of the white hunter kill in the James Bay area but the native kill which probably constitutes by far the greatest hunting pressure on the geese is still a matter of considerable controversy.

Figures obtained from the Department of Lands and Forests through interviews by their personnel with Indians show the native kill for the fall and spring of 1956 and 1957 to be as follows:

Waterfowl Kill by Indian Bands for Fall and Spring
1956 and 1957

Species	Moosonee		Albany		Attawapiskat		Total
	Fall	Spring	Fall	Spring	Fall	Spring	
Canada goose	189	569	299	1086	486	1296	3923
Snow goose	3228	581	3771	2295	4459	2596	16930
Ducks	1003	290	659	340	1108	529	3929
	4420	1440	4728	3721	6075	4421	24782

Although this does not take into consideration the Indians at Winusk and Little River it no doubt accounts for a considerable portion of the Indian kill.

The total goose kill for the fall of 1957 for both Indians and whites in the area affected by the Moosonee band was 3630. The reported goose kill in 1956 for this area was 3417. It will be

noted that these figures agree very closely although the 1957 figures include an unknown proportion of white hunting pressure. This would indicate that the kill reports furnished by the Department of Lands and Forests are reasonably correct.

Kill data of Indian hunters camped at Cabbage Willows and Hannah Bay goose camps were obtained by the R.C.M. Police Officer stationed at these camps. The kill for Cabbage Willows was:

No. of Hunters	Geese Killed	Ducks Killed	Geese Per Hunter	Ducks Per Hunter
30	141	49	4.7	1.6

Blue Goose Kill

Adults	Juveniles	Total
85	51	136

The preceding figures were arrived at by bag checking. It will be noted that the kill of adult blues was greater than that of juveniles, again indicating that the Indians are selective hunters.

The Indian kill at Hannah Bay, between September 16 and October 20 is based on voluntary reports and worked out to 1196 geese shot by 27 hunters or 44.3 geese per hunter. Individual figures were obtained for each hunter and it was noted that some were far more successful than others and bags ranged from 20 to 86 birds. There were some Indians at this camp that were not engaged in guiding.

Enforcement

In general, the enforcement situation seems much better. Six charges were laid by the Lands and Forests personnel and the R.C.M. Police on the Moose River estuary. These charges included night shooting, unplugged shot guns and having over the possession limit. As the result of my personal observations I can say that the patrols carried out by Check Station personnel on the Moose estuary were most energetic and effective.

Reports on the use of swamp buggies and lights at North Bluff (Hennessey's Camp) were investigated but no evidence was found that there was any intent to disturb the geese. These vehicles are used to transport hunters to the camp from the mouth of the Moose River and between the camp and the blinds. While this use is undesirable it is not illegal. I suspect that the very poor hunting success at this camp may be influenced by the use of these vehicles and also by the general poor location of the camp. Should there be occasion to establish hunting camps in the James Bay area in future I feel that matters such as these should be thoroughly gone into prior to any recommendations for their establishment.

Summary

The goose shooting at James Bay was poorer than average and the birds shot were slightly lighter in weight than usual. I feel that this was largely due to a later breeding season and continued fine and warm weather on the breeding grounds, which delayed the migration. The production of young blue geese was slightly higher than average this year.

MIDWINTER INVENTORY FOR ONTARIO - 1958

by
G. F. Boyer
Canadian Wildlife Service

This year the same areas were covered as in 1957. This included ground counts by Nature Clubs and private individuals as well as an aerial survey by the Ontario Department of Lands and Forests. The aerial coverage included Lake Ontario and the St. Lawrence River from Presqu'ile to the Quebec border and Lake Huron, St. Clair River, Lake St. Clair, Detroit River and Lake Erie shore to Niagara River, Lake Ontario to Hamilton Bay. A Beaver aircraft was used and personnel from Tweed, Kemptville and Aylmer Forest Districts took part.

There was heavy icing around Howe and Wolfe Island as well as Amherst Island except on the east side. The south side of Prince Edward County was open. A large portion of the St. Lawrence River was iced over. The east end of Lake Erie was clear of ice and in the west end a channel one-quarter of a mile wide was clear. Small streams and marshes, Inner Long Point Bay, Rondeau Bay and ports were frozen over. A few small open pockets appeared in Lake St. Clair. St. Clair River was largely closed and Detroit River was closed in some sections. There was extensive ice in Lake Huron.

In the attached table columns (1) and (2) showed a comparison with the 1957 coverage. In column (3) are listed the areas duplicated by the Michigan Conservation Department which included the St. Clair and Detroit Rivers and were taken on the same day as our aerial counts. It was agreed that the Michigan Department should include these areas in its report to the U. S. Fish and Wildlife Service. Therefore, the Ontario totals for the purpose of the continent-wide report are found in column (4).

Species	(1) 1957	(2) 1958	(3) Duplicated by Michigan Dept. Conservation	(4) Usable Totals, 1958
Canada Goose	3,087	2,800	-	2,800
Blue Goose	-	20	-	20
Mallard	4,210	3,229	1,070	2,159
Black Duck	3,382	6,247	1,371	4,876
Wood Duck	36	50	-	50
Ring-necked	1		-	-
Scaup	21,851	18,499	282	18,217
Redhead	159	-	-	-
Canvasback	32,715	27,703	19,657	8,046
Goldeneye	7,310	12,854	807	12,047
Bufflehead	76	617	-	617
Eider	2	2	-	2
Harlequin		2		2
Oldsquaw	5,777	10,088	-	10,088
Merganser	2,479	232	-	232
Coot	30	-	-	-
Unidentified	9,686	7,788	3,924	3,864
TOTALS	90,801	90,131	27,111	63,020

SUMMARY OF WATERFOWL CONDITIONS IN THE MISSISSIPPI FLYWAY, WINTER OF 1957-1958

by
Arthur S. Hawkins
Mississippi Flyway Representative
U. S. Department of the Interior

Waterfowl wintering in the Mississippi Flyway are slightly reduced in numbers as compared to a year ago but still numerically stronger than the average for the eight-year period 1950-57. This information came to light in a report just released by the U. S. Bureau of Sport Fisheries and Wildlife. Basis of the report was the annual mid-January waterfowl survey which spans the North American wintering grounds for waterfowl from Alaska to Central America. Object of the survey is to determine the size and distribution of the continental waterfowl population.

In this massive operation, 900 observers took part in the Mississippi Flyway states alone which is the portion of the survey covered in the above mentioned report. Transportation for this small army of trained wildlife specialists included 49 aircraft, 710 cars, and 36 power boats. About 76,000 miles were traveled within the Flyway during the survey which began on January 13 and ended ten days later.

All duck hunters know that the Mississippi Flyway is an administrative unit established by the federal government, roughly corresponding to the major routes taken by waterfowl during their fall migration. This Flyway included the following States: Minnesota, Wisconsin, Michigan, Ohio, Indiana, Illinois, Iowa, Missouri, Kentucky, Tennessee, Arkansas, Louisiana, Mississippi, and Alabama. Conservation department personnel and the federal Bureau of Sport Fisheries and Wildlife work together in conducting the survey, aided by aircraft furnished by the Department of Defense.

Here are some of the facts and figures found in the Mississippi Flyway survey report:

1. Waterfowl of the Flyway probably 'never had it so good' as they have this winter. Large numbers of mallards and Canada geese still waxed fat on South Dakota corn at the time of the inventory. Those which had taken the trouble to continue beyond the Dakotas into the Mississippi Flyway couldn't believe their eyes. In Arkansas, for example, it was reported that there was waterfowl habitat "the quality and quantity of which has never been equaled." Similar conditions prevailed over much of the southland. The upshot was that although several hundred thousand mallards never reached the south,

comparable numbers of other kinds of ducks liked what they found in the lower Mississippi Valley so well they decided to stay rather than continue farther south as usual.

2. Counting all kinds of waterfowl recorded, the total was 8% below 1957 but 24% above an 8-year average (1950-57).
Total ducks were 11% below 1957 but 25% above average.
Total puddle ducks were 9% below 1957 but 28% above average.
Total diving ducks were 20% below 1957 but 6% above average.
Total geese were 2% above 1957 but 6% above average.
Total coots were 57% above 1957 but 53% above average.

3. The increase in wintering mallards in the Dakotas and Nebraska balanced the decrease noted in the mallard population of the Flyway. Therefore, the recorded decrease during the inventory did not appear significant.

4. This Flyway has not played host during the winter to so many baldpates, gadwalls, blue-winged teal or shovelers for many years, apparently the direct result of the unusually fine habitat conditions.

5. The status of the wood duck, canvasback, ringneck, and goldeneye appears somewhat unfavorable and should be watched closely.

6. For the first time in almost a decade the Mississippi Flyway Canada goose population showed a loss. An unusually large take by hunters last fall apparently made the difference.

The report concludes that in general the status of waterfowl at the beginning of 1958 appeared favorable. It points out, however, that all kinds of waterfowl are not blessed 'equally'. Some may need special attention if they are to maintain their numbers. The recent survey also points up the importance of waterfowl habitat in determining the distribution of the birds. Good habitat and healthy waterfowl populations go hand in hand.

ADDITIONAL NOTES ON THE BIRDS, MAMMALS, AND FISHES OF EXTREME NORTH-WESTERN ONTARIO

by
J. A. Macfie

In 1953, the writer prepared a list of observations resulting from field work in the Hudson Bay Coast region of Ontario during 1952 and 1953*. The present observations were made from July 4th to August 10th, 1955, during the course of a cooperative waterfowl banding project. Many of the observations recorded are those of George Arthur of the Illinois Conservation Department, and R. Vaught, of the Missouri State Conservation Commission.

The area covered includes an 80 mile strip of coast between the Niskibi and Shagamu Rivers, and the Shagamu River and Shell Brook for distances of about 25 miles up stream from the coast.

Birds

This is not a complete list of birds seen; we had difficulty identifying small shorebirds, and undoubtedly some other common species went unnoticed.

Pacific Loon - Phillip Mathew (Indian Guide) identified a loon seen off the Shagamu River mouth as this species.

Red-throated Loon (*Gavia stellata*) - Commonly seen on Hudson Bay.

American Bittern (*Botaurus lentiginosus*) - I saw one near the coast at Shell Brook.

Whistling Swan (*Cygnus columbianus*) - We saw two swans at the mouth of the Severn River on August 8th. They were probably whistling swans.

Canada Goose (*Branta canadensis*) - See report "Waterfowl Banding, Fort Severn, 1955".

Snow Goose (*Chen hyperborea*) - George Arthur saw two near the mouth of Shell Brook on July 4th.

Mallard (*Anas platyrhyncos*) - George Arthur saw a nest containing nine eggs about 10 miles up the Shagamu River on July 10th. On July 11th, I saw five males in spring plumage. Mallards were most plentiful east of Fort Severn, where they seemed about as common as green-winged teal and blacks.

* See Fish and Wildlife Management Report No. 16, April, 1954.

Black Duck (Anas rubripes) - These were common all along the coast, more so west of Fort Severn. No nests, and no broods (with one possible exception) were seen. Although flying adults were seen frequently, we never found more than a few flightless birds together. The first flightless adult was found on July 6th, and the last on August 7th.

Pintail (Anas acuta tzitzihoa) - This was the most numerous of the ducks on the coast west of Fort Severn. We found a brood two-thirds grown on July 12th and flightless adults on July 14th. On July 23rd, we found an occupied nest on an island 2 miles up Goose Creek. Only a few flightless pintails remained on August 8th.

Green-winged Teal (Anas carolinensis) - These were among the most common ducks around the Shell Brook mouth. They were somewhat less plentiful west of Severn. I saw a two week old brood of nine on July 12th, and flightless birds were captured as late as August 7th.

Baldpate (Mareca americana) - We found these in relatively small numbers all along the coast.

Lesser Scaup (Aythya affinis) - I saw a pair (able to fly) on a coastal pond near Shell Brook on July 14th. Undoubtedly many of the ducks seen in the distance on the Bay were scaups.

Common Eider (Somateria mollissima) - This duck was seen near the Shagamu River.

White-winged Scoter (Melanitta deglandi) - These were seen frequently as we travelled on the Bay. On July 30th, we passed through a group of 100 or more flightless birds at sea.

American Scoter (Oidemia nigra) - These were also common off the coast.

Hooded Merganser (Lophodytes cucullatus) - George Arthur saw what he believed to be a hooded merganser on a beaver pond off the Shagamu River. Phillip Mathew called it "amisk-asip", or beaver duck, and identified it in Peterson's Field Guide as this species.

American Merganser (Mergus merganser americanus) - I saw a female with nine downy young on Shell Brook on July 8th. On July 23rd, a similar group was seen on Goose Creek.

Red-breasted Merganser (Mergus serrator) - On July 9th, I found a nest 23 miles up Shell Brook. It was located among small balsam poplar, 12 feet from the river. Probably the many mergansers seen on the Bay were of this species. We passed a group of two dozen or more flightless mergansers at sea on July 4th.

American Rough-legged Hawk (Buteo lagopus) - I saw one of these at its nest in a large spruce tree, 15 miles up Shell Brook.

Bald Eagle (Haliaeetus leucocephalus) - Arthur saw one at the Shagamu River.

Marsh Hawk (Circus cyaneus hudsonius) - These were common on the coastal plain.

Osprey (Pandion haliaetus carolinensis) - Arthur saw one at the Shagamu River.

Ruffed Grouse (Bonasa umbellus) - R. Vaught saw a flock of these on the Shagamu River, near the only grove of trembling aspen encountered on the River.

Willow Ptarmigan (Lagopus lagopus) - We saw 20, apparently all adults, as follows: 2 at Treeline on Shell Brook, 3 at treeline on Goose Creek, 15 on the tundra at Niskibi River.

Sandhill Crane (Grus canadensis) - George Arthur saw one flying over the camp 25 miles up the Shagamu River. Philip Mathew said he had seen sandhill cranes only once or twice before, but his home ground is west of Fort Severn.

Semipalmated Plover (Charadrius hiaticula) - Commonly seen on the coast.

Ruddy Turnstone (Arenaria interpres) - George Arthur saw this bird at the Niskibi River.

Wilson's Snipe (Capella gallinago delicata) - During the period July 11th to 19th, I frequently saw these birds and heard their whistling on the tundra at Shell Brook.

Hudsonian Curlew (Numenius phaeopus hudsonicus) - I saw a dozen or so near treeline at Shell Brook about July 15th. They acted as if they had young hidden in the tundra.

Spotted Sandpiper (Actitis macularia) - Commonly seen on the rivers above treeline. On July 11th, I saw a pair with two young which were almost able to fly.

Greater Yellowlegs (Totanus melanoleucus) - Commonly seen.

Lesser Yellowlegs (Totanus flavipes) - Commonly seen.

Red-backed Sandpiper (Erolia alpina) - We identified some of these at Shell Brook.

Dowitcher (Limnodromus griseus) - Commonly seen on the tidal flats.

Semipalmated Sandpiper (Ereunetes pusillus) - These were seen in flocks of up to 1000 birds along the coast at Shell Brook.

Hudsonian Godwit (Limosa haemastica) - We identified a few of these at Shell Brook, and a flock of 50 northwest of Fort Severn. Undoubtedly we saw many more than these.

Northern Phalarope (Lobipes lobatus) - Commonly seen on coastal ponds.

Jaeger (Sp.) - We saw one jaeger 25 miles northwest of Fort Severn, and three more two miles west of Niskibi River.

Herring Gull (Larus argentatus) - Commonly seen.

Arctic Tern (Sterna paradisaea) - About 25 pairs had nested on an Island in Goose Creek at treeline. On July 23rd, the young terns were partially feathered and took to the water when we approached. We placed #4 leg bands on 18 of the young.

Caspian Tern (Hydroprogne caspia) - One of these was shot by an Indian at the mouth of the Severn River while we were at Fort Severn. It is now in the Royal Ontario Museum.

Great Horned Owl (Bubo virginianus) - We saw one on Goose Creek, and a family group on the Shagamu River.

Snowy Owl (Nyctea scandiaca) - We saw one on the coast near the Niskibi River. Two flightless adult pintails, with flesh torn from their backs but still alive, were said by Phillip Mathew to have been victims of Snowy Owls.

Short-eared Owl (Asio flammeus flammeus) - These were seen occasionally on the coastal tundra.

American Three-toed Woodpecker (Picoides tridactylus) - I saw one on Shell Brook.

Horned Lark (Eremophila alpestris) - On July 5th, on a sandy beach ridge near Shell Brook, I saw a horned lark that appeared to have a nest, or young nearby.

Canada Jay (Perisoreus canadensis) - We saw a few of them in the forest.

Crow (Corvus brachyrhynchos) - I saw one at treeline on Shell Brook.

Robin (Turdus migratorius) - I saw one at treeline on Shell Brook.

Rusty Blackbird (Euphagus carolinus) - About two dozen of these were observed in the muskeg 24 miles up Shell Brook.

Slate-colored Junco (Junco hyemalis) - I saw some 25 miles up Shell Brook.

White-crowned Sparrow (Zonotrichia leucophrys) - Seen at Shell Brook.

White-throated Sparrow (Zonotrichia albicollis) - Commonly seen and heard.

Song Sparrow (Melospiza melodia) - Seen at Shell Brook.

Mammals

Black Bear (Ursus americanus) - I saw tracks of one along Shell Brook. The head of an adult black bear, probably killed in the spring, was noted among the remains of an Indian camp at the mouth of the Niskibi River.

Polar Bear (Thalarctos maritimus) - We observed nine polar bears, as follows:

Shell Brook mouth: July 15th - 1 adult and 2 cubs
July 18th - 1 lone adult
July 21st - 1 lone adult

Vicinity Niskibi River mouth: August 2nd - 1 lone adult
August 6th - 1 lone adult
August 8th - 1 lone adult

Half way between Severn & Niskibi Rivers: Aug. 8th - 1 lone adult

An old polar bear skull found near the Niskibi River has been placed in the Royal Ontario Museum.

Mink (Mustella vison) - We saw one mink on the Shagamu River, one dead mink floating in Goose Creek, and a single fresh mink track on Shell Brook.

Wolverine (Gulo luscus) - An old skull, found in the eroding river bank at Fort Severn, has been placed in the Royal Ontario Museum.

Otter (Lutra canadensis) - Four were seen, three on the Shagamu River and one on Shell Brook.

Red fox (Vulpes fulva) - We saw three of these. Fox dens were common on the beach ridges but we were unable to distinguish red fox from arctic fox dens. One den overlooked a pond where flightless ducks were concentrating. Feathers scattered about the den showed the foxes had killed a good many ducks.

Arctic Fox (Alopex lagopus) - We saw about eight of these on the coastal tundra. Included were an adult and two pups, and a lone nearly grown pup seen on August 7th.

Timber Wolf (Canis lupus) - I saw the tracks of a single large wolf on upper Shell Brook.

Bearded Seal (Erignathus barbatus) - We saw about a dozen at sea and in the Severn River. The Indians at Fort Severn had shot about six up until August 10th. Carcasses of three young and one adult were found washed at separate points along the coast. The skull of one young seal has been placed in the Royal Ontario Museum of Zoology.

Woodchuck (Marmota monax) - Woodchuck holes were noted in the stream bank on Shell Brook.

Beaver (Castor canadensis) - There were five occupied beaver houses on Shell Brook between treeline and 27 miles upstream. Arthur saw one house on the Shagamu River and one in a nearby muskeg pond. Two beaver were seen on Shell Brook and two on the Shagamu River. A fresh cutting was seen just above treeline on Goose Creek. Beaver seemed plentiful on Shell Brook. Small groves of balsam poplar were being fully utilized. Willow, however, was more plentiful and appeared to be the main food species for beaver. This type of river presents few suitable sites for beaver houses. It should be noted that the holder of this trap-line has not trapped for three years, but other Weenusk Indians were licensed to trap there last winter, and a beaver set was noted on a dam near a now unoccupied house.

Ungava Phenacomys (Phenacomys ungava) - One skull, found on a beach ridge near the mouth of Shell Brook, has been placed in the Royal Ontario Museum of Zoology.

Boreal Redback Vole (Clethrionomys gapperi) - One skin and skull, obtained at treeline on Shell Brook, has been placed in the Royal Ontario Museum of Zoology

Meadow Vole (Microtus pennsylvanicus) - These were frequently seen on the tundra. One skin and skull from Shell Brook has been placed in the Royal Ontario Museum of Zoology.

Muskrat (Ondatra zibethica) - We saw about six, in the rivers and coastal ponds.

Woodland Caribou (Rangifer caribou) - George Arthur saw a single caribou, probably a yearling, and tracks of several others on the Shagamu River. Elsewhere we saw caribou tracks as follows:

Shell Brook - 2 adult
- 1 adult and 1 yearling
- several older tracks

Tidal flats near Niskibi River - 2 adult

A fragment of caribou jawbone from Niskibi River has been placed in the Royal Ontario Museum of Zoology.

White Whale (Delphinapterus leucas) - Two carcasses were found washed up on the beach near Shell Brook. An incomplete skelton has been placed in the Royal Ontario Museum of Zoology.

Fish

The Shagamu and Niskibi Rivers, Shell Brook and Goose Creek all provided good Speckled Trout (Salvelinus fontinalis) fishing, yielding fish weighing up to five pounds. The Shagamu River and Shell Brook also produced some Northern Pike (Esox lucius).

Whitefish (Coregonus clupeaformis) weighing up to one pound were taken in nets in the Shagamu and the Niskibi Rivers.

A number of scale samples and measurements were taken of the above species.

SEX RATIOS OF THE WESTERN REGION DEER HERD

by
R. Boultbee

From 1951 to 1956 inclusive a Big Game Check Station has been operated in the Western Region. Deer have been Classified by age and sex. This study uses the sex records to draw conclusions about the sex ratios of the deer herd. Only the data from 1953 to 1956 inclusive are used. Sex ratios by age classes are also investigated.

Table one summarizes the deer checked in the four years.

TABLE I

Check Year	Males Checked	Females Checked	Total Checked	Proportion of Males
1953	282	268	550	0.513
1954	188	192	380	0.495
1955	478	376	854	0.560
1956	223	222	445	0.501
Totals	1171	1058	2229	0.525

A short examination of the proportion of males, i.e. the sex ratios, leads to the thought that the herd is essentially evenly divided between the two sexes. The ratios for 1953, 1954 and 1956 are so close to 0.500 as to leave little doubt. The ratio of 0.560 for 1955 must reflect a significant variation from the others, though the departure from 0.500 is not too disturbing to our sense of proportion.

If binomial significance tests are made assuming that all sex ratios are samples from a population with sex ratio 0.500 it will be found that all fall well within the ninety-five percent confidence limits except the ratio for 1955. The latter is significantly different from 0.500 at well beyond the five percent level and it is safe to conclude that some influence other than chance caused it to vary.

Table two presents the same totals broken down by age classes.

TABLE 2

Check Year	Age Classes 0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	Total
1953	64-53	107-56	53-76	41-31	11-22	2-12	3-9	1-9	-	282-268
1954	30-30	58-39	61-59	27-26	5-11	1-8	5-8	0-9	1-2	188-192
1955	104-70	113-77	107-98	88-61	34-31	13-11	6-10	6-13	7-5	478-376
1956	39-34	48-36	32-44	60-58	34-25	7-9	2-5	0-9	1-2	223-222
Totals	237-187	326-208	253-277	216-176	84-89	23-40	16-32	7-40	9-9	1171-1058
Sex Ratios	0.559	0.610	0.477	0.551	0.486	0.365	0.333	0.175	0.500	0.525
Significance	*	*	none	none	none	*	*	*	none	*

(* :- significant at 5% level or better)

The two figures in a single cell represent male and female counts from left to right and top to bottom. In the second to last row the totals are expressed as sex ratios (proportions of males). Below that line is shown the significance of each ratio's departure from 0.500. An interesting pattern is seen: the two youngest age classes are significantly high in males; the three next age classes are essentially evenly divided between the two sexes; the older age classes are significantly low in males (high in females).

The question arises, could the age class pattern of sex ratios have been caused by the abnormal effect of the 1955 count? If the 1955 animals had been excluded from table two the last two lines would have been

Sex Ratios	0.532	0.619	0.449	0.527	0.463	0.256	0.312	0.036	0.333	0.504
Significance	none	*	none	none	none	*	none	*	none	none

Thus it is seen that the age class differentiation of the sex ratios is present in ordinary years, although the effect is not as strong as before. The 1.5 year age class ratio of 0.619 is a departure from 0.500 that could have happened by mere chance less than one time in twenty thousand. Such odds make us conclude that this sex ratio was raised by some influence other than chance.

The age class differentiation can be seen in individual year checks, but is more easily proved statistically by combining the data of two or more years.

We must give thought to the way the data were gathered. They are hunting data only, and anything they tell about the unharvested herd must be inferred. Two points seem possible: first, young males may get around more and present more frequent targets, and second, hunter preference may be at work. The harvest of Western Region deer is considered to be low and hence the effect of the hunt on the sex ratio of the herd is probably also low. The only reasonable assumption we can make about the herd is that it is essentially evenly divided between males and females.

The writer is not sure what fascination sex ratios have for Biologists, but it does give us a better picture of the herd to know that the task of recruitment is carried on by half the herd's members. This information should simplify studies of birth rates and allied subjects.

SURVIVAL RATES, APPARENT AND ACTUAL OF THE WESTERN REGION DEER HERD

by
R. Boultbee

The Western Region of the Ontario Department of Lands and Forests has operated a deer check station in hunt season for six years. The results are given in table one in percentage form.

TABLE I - Game Check Percentages

Check Year	Age Classes 1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	Total
1951	21.4	15.5	25.7	18.9	9.2	6.8	1.0	1.0	0.5	100.0
1952	32.6	15.3	11.5	15.9	8.9	5.7	5.7	2.5	1.9	100.0
1953	37.4	30.1	16.4	7.5	3.4	2.7	2.3	0.2	0.0	100.0
1954	28.5	37.3	16.6	5.5	3.9	4.4	3.1	0.8	0.0	100.0
1955	28.3	29.6	21.8	10.1	3.7	2.6	2.6	1.3	0.0	100.0
1956	22.2	21.2	31.2	15.7	4.6	1.9	2.4	0.8	0.0	100.0
Total	170.4	149.0	123.2	73.5	33.7	24.1	17.1	6.6	2.4	600.0
Average	28.5	24.9	20.5	12.2	5.6	4.0	2.8	1.1	0.4	

The line of averages represents a fairly steady set of proportions about which the annual hunt data fluctuate. It is probable however that hunt data for a lightly hunted herd are not typical of the herd. We can estimate the true proportions of the herd by drawing a freehand curve through groups of averaged age classes. This is a subjective way to estimate true herd proportions but it is difficult to find a better.

The bottom two lines of table one can be grouped to yield the following values:

	Age Class Groups 1.5 to 3.5	4.5 to 6.5	7.5 to 9.5
Average Age	2.39	5.12	7.94
Average Percentage	24.59	7.29	1.45

These points are plotted freehand in figure one. The dotted line is the same curve reduced to percentages, including fawns. The age class percentages read off the dotted line are as follows:

FIGURE I - True Herd Proportions

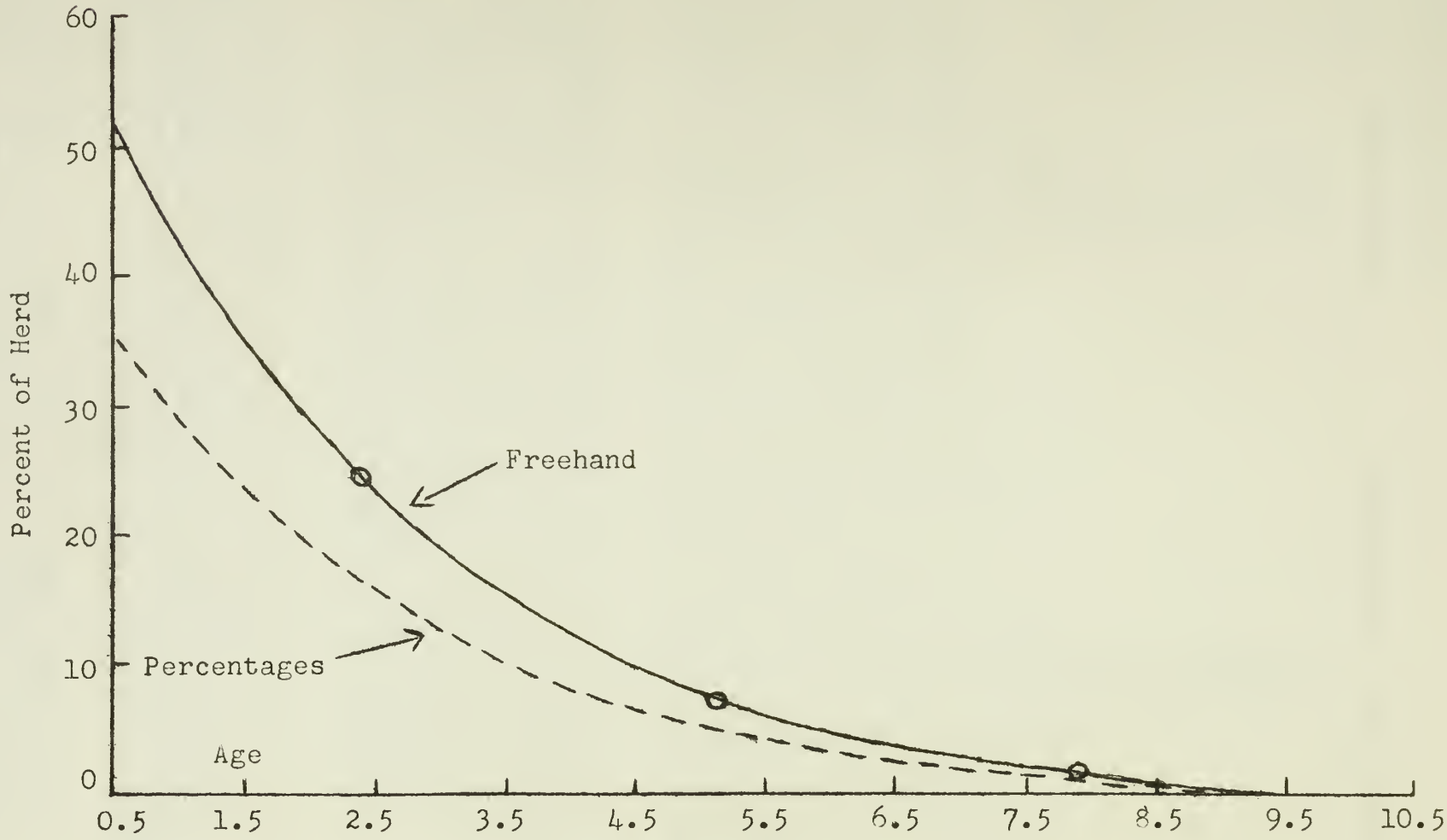


TABLE 2 - True Herd Proportions

Age Class	Percentages	Percentages, Fawns Excluded
0.5	35.1	
1.5	23.6	36.4
2.5	15.9	24.5
3.5	10.2	15.7
4.5	6.6	10.2
5.5	4.0	6.2
6.5	2.5	3.8
7.5	1.4	2.1
8.5	0.7	1.1
9.5	0.0	0.0
Totals	100.0	100.0

The true herd proportions of table two are an average about which the herd fluctuates and to which it tends to return. This statement implies a static situation, and such is the case with proportions but not with numbers. A previous study using hunting data (See the Department's Fish and Wildlife Management Report, number 36, page 11) calculated that a representative herd of one hundred deer in 1951 increased to 140.7 in 1956. This is an increase of 7.1 percent per year compounded. Table two must therefore provide for an increasing recruitment. Under static conditions recruitment and mortality exactly offset each other. Since the herd actually increased from 1951 to 1956 table two must show an inflated mortality rate.

As an example of what is meant we can note in table two that 15.9 deer aged 2.5 are reduced to 10.2 deer a year later, an apparent mortality of 5.7. However since the herd is increasing at 7.1 percent we know that 5.7 is 107.1 percent of the actual mortality. The actual mortality of the 2.5 year age class is therefore 5.7/1.071 which is 5.3. Expressed as survival the number is 15.9 minus 5.3 which is 10.6, and the actual survival rate is 10.6/15.9 = 0.667. The apparent survival rate was 10.2/15.9 = 0.642. The few data available do not justify three places of decimals. The apparent survival rate can be rounded off at 0.6 and the actual survival rate at 0.7.

If a full set of actual survival rates for all age classes could be obtained we would be able to construct a population table similar to table two but based on actual, not apparent, survival. Such a table would show what happens to a herd, with the inflation of increasing recruitment removed. The true herd could be compared to such a table to study trends. Since the table would be a standard measurement we could call it a 'normal population table.'

It may at first be thought that the normal herd is an unrealistic concept, since the inflation of increasing recruitment is in fact present. However the normal herd is itself as factual as the inflated herd. If we note that a year class of fawns is subjected to actual mortality until it finally passes out of the herd we realize that the normal herd is the summation of year class data,

and the inflated herd is the summation of age class data such as is made by the annual check station.

The purpose of this paper is to reassemble the check station data to obtain year class readings and hence the normal population.

The first step is to convert the hunting data of table one to the true herd shape, based on the third column of table two. Thus the deer aged 1.5 years in table one have an average value of 28.5. We wish to raise the average to 36.4 as in table two, a rise of 7.9. We do this by adding 7.9 to each figure in the 1.5 year column of table one. Each age class is treated similarly and table three is the result. The line of averages corresponds to column three, table two.

TABLE 3 - Hunting Data Converted to True Herd Proportions

Check Year	Age Classes									Totals
	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	
1951	29.3	15.1	20.9	16.9	9.8	6.6	0.3	1.0	0.1	100.0
1952	40.5	14.9	6.7	13.9	9.5	5.5	5.0	2.5	1.5	100.0
1953	45.3	29.7	11.6	5.5	4.0	2.5	1.6	0.2	-0.4	100.0
1954	36.4	36.9	11.8	3.4	4.5	4.2	2.4	0.8	-0.4	100.0
1955	36.2	29.2	17.0	8.1	4.3	2.4	1.9	1.3	-0.4	100.0
1956	30.1	20.8	26.4	13.7	5.2	1.7	1.7	0.8	-0.4	100.0
Totals	217.8	146.6	94.4	61.5	37.3	22.9	12.9	6.6	0.0	600.0
Averages	36.4	24.5	15.7	10.2	6.2	3.8	2.1	1.1	0.0	

Table three is still not suitable for year class readings since the figures are percentages and have moved up or down according to the influence of their neighbours. We must form an hypothesis that will permit us to change table three to absolute numbers. If necessary we can revise our hypothesis till we go as far as our data permit.

A previous study (Fish and Wildlife Management Report number 36, page 28) shows that deer have their best and most stable survival from age 2.5 to age 3.5. The only estimate we have of this survival is the rate of 0.7 obtained earlier. This is our hypothesis.

Let us say that the line for 1951 in table three is a representative herd of one hundred deer, and the figures therefore actual counts rather than proportions. There are 15.1 animals aged 2.5. Our hypothesis says that these will result in (15.1)(0.7) = 10.6 survivors in 1952. In the 1952 line of table three we note that 3.5 year animals occupy 6.7 percent of the herd, but in the new table we substitute 10.6 as an absolute count. To complete the new 1952 line we multiply each remaining number in the 1952 line of table three by the factor 10.6/6.7. The process is repeated till we obtain table four.

TABLE 4 - Absolute Herd Numbers (1951 = 100)

Check Year	Age Classes 1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	Absolute Totals
1951	29.3	15.1	20.9	16.9	9.8	6.6	0.3	1.0	0.1	100.0
1952	64.1	23.6	10.6	22.0	15.0	8.7	7.9	4.0	2.4	158.3
1953	64.3	42.2	16.5	7.8	5.7	3.6	2.3	0.3	-0.6	142.1
1954	91.0	92.2	29.5	8.5	11.2	10.5	6.0	2.0	-1.0	249.9
1955	137.3	110.8	64.5	30.7	16.3	9.1	7.2	4.9	-1.5	379.3
1956	88.5	61.2	77.6	40.3	15.3	5.0	5.0	2.4	-1.2	294.1

We can now find actual survival rates from year classes by taking ratios diagonally. Several inconsistencies can be seen such as 91.0 deer aged 1.5 years in 1954 becoming 110.8 deer a year later, but by averaging them with the others we obtain acceptable results. The averaging process is performed by grouping the animals concerned. For instance deer aged 1.5 years from 1951 to 1955 total 386.0, and one year later (1952 to 1956) they total 330.0. This means a survival rate of 330.0/386.0 = 0.855. This is repeated for each pair of age classes to obtain the first line of table five.

TABLE 5 - Actual Survival Rates

	Age Classes 0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5
Rough Averages		0.855	0.700	0.770	0.739	0.636	0.738	0.574	-0.156
Smoothed Averages	0.760	0.771	0.775	0.769	0.740	0.698	0.639	0.538	0.000

The rough ratios of table five are graphed in figure two and a free hand curve is shown from which the smoothed values were read.

If we wished we could use the smoothed 2.5 year survival rate of 0.775 as a second hypothesis. If we did we would obtain a new value of about 0.800. Such a small difference has no significance in view of the few data, and the writer prefers to accept the smoothed values of table five.

Table six gives the normal population obtained from the smoothed survival rates of table five.

FIGURE 2 - Actual Survival Rates

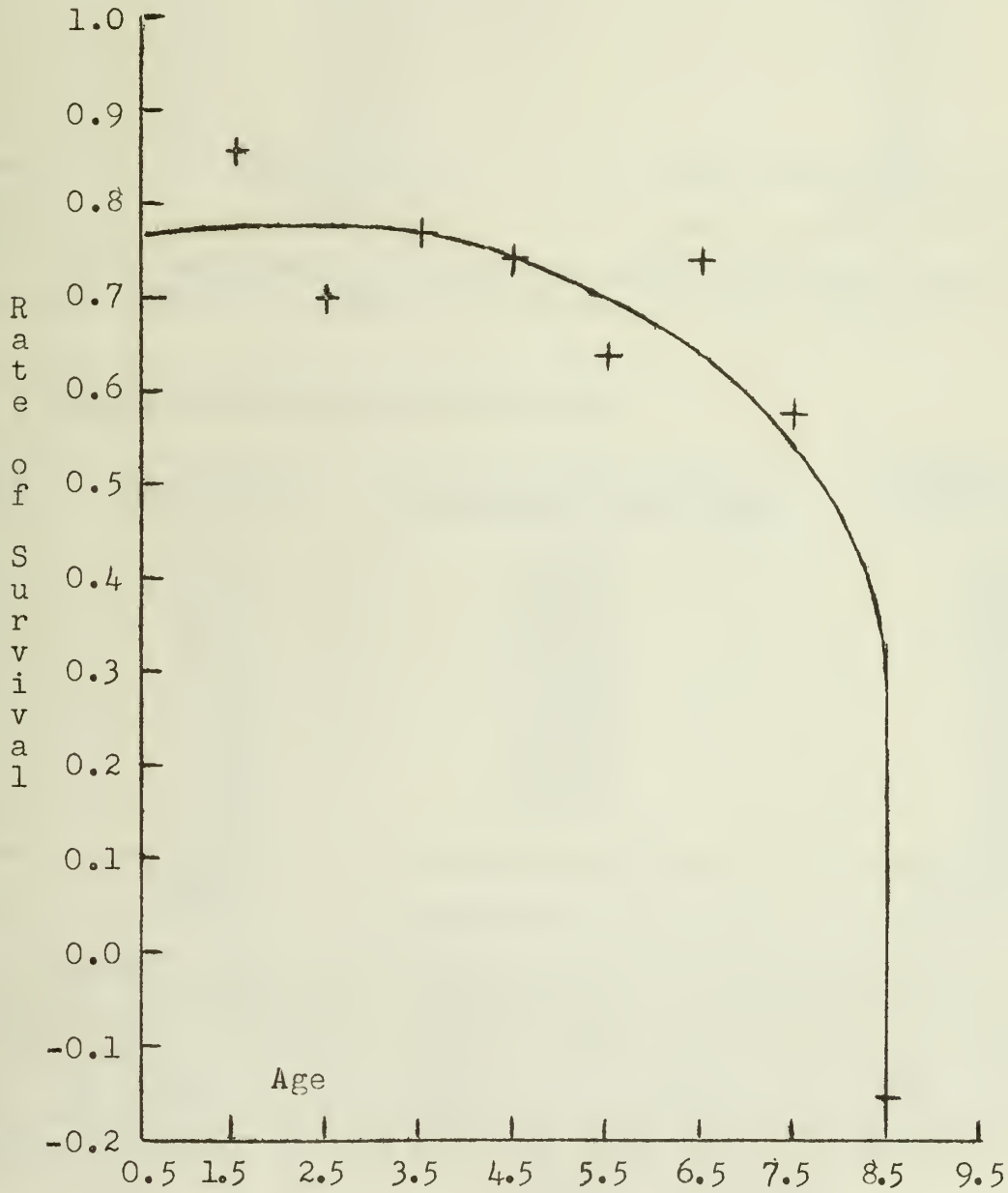


TABLE 6 - The Normal Population (Based on Actual Survival Rates)

Age Class	Percentages	Percentages, Fawns Excluded
0.5	26.6	
1.5	20.2	27.5
2.5	15.6	21.2
3.5	12.1	16.4
4.5	9.3	12.6
5.5	6.8	9.3
6.5	4.8	6.5
7.5	3.0	4.2
8.5	1.6	2.3
9.5	0.0	0.0
Totals	100.0	100.0

It is interesting to use the actual survival rates to calculate the rate of increase of the herd. This is done in table seven.

TABLE 7 - Increase in Numbers in One Year

Age Class	True Herd	Actual Survival Rates	Survivors After One Year
0.5	35.1	0.760	40.6
1.5	23.6	0.771	26.7
2.5	15.9	0.775	18.2
3.5	10.2	0.769	12.3
4.5	6.6	0.740	7.8
5.5	4.0	0.698	4.9
6.5	2.5	0.639	2.8
7.5	1.4	0.538	1.6
8.5	0.7	0.000	0.8
9.5	0.0		0.0
	100.0		115.7

In table seven the actual survival rates are applied to the true herd of table two. The survivors one year later are placed in the next older age class. For instance if 0.760 of 35.1 fawns survive they will be 26.7 in number. This number is found opposite age 1.5. The figure of 40.6 fawns was determined by adding the survivors after one year and allotting them fawns at the rate of 35.1 per 64.9 adults. In one year the herd increases from 100 members to 115.7, and increase of roughly 15 percent.

A compound rate of increase of 15 percent per year means that the herd will double its numbers in five years. This statement should not be taken too literally. Six years' data are too few to reach a solid conclusion. Also the data do not include a full range of conditions, such as two or more severe winters in succession, or a population crash due to lack of food. Time will add these data if they are characteristic of the herd's environment.

The normal herd can be considered as being in the state that just meets the demands of the Western Region deer environment. The additional potential of the true herd would thus represent the margin by which the herd exceeds the requirements of its environment, and with which it increases its numbers.

Future refinements of the actual survival rates seem probable as more data are accumulated. In time we will probably be able to show actual survival rates for all ages, after favourable seaons, after severe seasons, after two or more severe seasons in succession, and so on.

LIVE TRAPPING OF FISHER IN ALGONQUIN PARK, WINTER OF 1957

by
M. G. Loucks

I wish to acknowledge with thanks the valuable assistance and co-operation rendered by Mr. Rod Stanfield, and his staff of Nick Yaskovitch, John White, and Tom Catachee, who devoted a considerable amount of their time towards making this project a success and also the men from Pembroke District.

The Air Service Division Pilots, George Cambell, Ralph Stone, Louie Poulin, Boyd Smith, and their respective engineers deserve a lot of credit and thanks for their co-operation and co-ordinated effort in transporting the animals to their destination.

To the Conservation Officers of Parry Sound District I extend special thanks for their co-operation, enthusiasm, and interest shown, and also for the extra time they cheerfully contributed in carrying out this work. Without their wholehearted cooperation and volunteered labour the live trapping project could not possibly have been undertaken.

The project was first suggested by Maple to see if it was feasible to be carried out. The original plan suggested was a joint effort between the two Districts, Pembroke and Parry Sound. At a meeting of the Fish and Wildlife staff in Parry Sound District the project was suggested to them. Needless to say they were quite interested and volunteered to undertake the extra work. The Fish and Wildlife staff of Pembroke District were contacted and agreed to help.

It was decided at the beginning that if we expected to accomplish any results a large area would have to be trapped, since fisher travel quite freely and do not tend to congregate in small areas. To do this type of travelling the trap line would have to be along an open road or highway. This was the main reason for picking the main highway through Algonquin Park, a distance of 36 miles with two travelled side roads and approximately 10 miles in the centre where no trapping was done. It was further decided to pre-bait along this route in an effort to assess the population from the tracks at the baits and to see if the number of animals attracted would warrant starting the project, also to entice them to areas close to the highway so that they might be trapped more easily.

Baits consisting of whole beaver, and wolf carcasses and large portions of deer meat, were placed at likely looking spots picked at random along the highway. Before this had progressed very far, it was decided that since the men engaged in this work would be changing every week the new men would experience difficulty in finding the baits. They were then placed at each mileage post or close to it regardless of forest cover type. The traps on the side

road were indicated by red rags or blue tags. Although an effort was made to pick cover of a sort on one side of the highway, which ever was best suited.

Some carcasses were wired or fastened in trees, five or six ft. from the snow; others were thrown under evergreen trees. It was found that hanging the bait in trees produced the best results, since foxes and wolves could not get at them and drag them away or eat them. A number of carcasses were either completely eaten or taken away when they were placed on the ground, and due to a fresh fall of snow, it was impossible to tell whether fisher had visited this bait station or not. Approximately fourteen of these baits were employed at first, more could have been put out, but at the time none was available. The baiting was carried on for a period of approximately three weeks with ground baits being renewed once during this period. During the first week of the baiting period, the baits were inspected once a week. The inspection of the baits should be after two or three days of clear weather or just before a snow storm. Fisher tracks showing around the baits were quite numerous, hence we decided that trapping could be carried out successfully.

Trapping was started on the 8th of Feb., with seven traps being set. The next day the setting was completed with a total of 32 traps being set. Sixteen of these were the larger size (9½ x 9½ x 32) (all that were available) with the remainder being the smaller marten type (6½ x 6½ x 24). Two traps were placed at each bait (one of each size) with one or two baits, and where a large number of fisher tracks were noted three traps were set. Traps were set in the conventional manner with the rear end against a tree or stump or in a hollow log after having first blocked the rear end. Some were also set alongside of a log, whichever was convenient.

The best set, we believe, was where the bait could be put in a hole beneath the large trap, then the trap covered with dead wood and evergreen brush. It was also found that fisher and marten could be taken with the bait still hanging in a tree nearby. At the beginning, different scents were used on half of the traps, the other half were baited with a different meat. The meat was tied to the roof of the inside of the trap at the rear, with the scent being placed at the back. It is interesting to note that all sets took fisher, but a preference was shown to beaver meat as bait, and the scent being a mixture of oil of anise, oil of rodium (equal parts) and muskrat scent glands. The folding rear end of all traps was reinforced with baling or hay wire, as it was decided at the beginning that the clips were not sufficient to hold these animals. This extra precaution probably accounted for no losses in trapped animals. When the traps are set, after making certain that there is sufficient brush underneath to keep drifting snow from freezing the pan, they should be sprung. Through the front entrance use a light stick or even your hand and press the pan until the trap is sprung, then withdraw your hand or stick and check to see if the door falls into place unhindered. Some misses were encountered by traps having been bent sideways with heavy wood and brush on the top; this will not allow the door to close properly. The same test can be made by shoving a stick down through the top of the trap and springing it.

The traps should be visited every day, with a holding pen or two carried in the truck or car to transport the trapped animal back to the main camp. The animals fight the trap quite vigorously while being transported, and may break their teeth if a holding pen is not available. Care should be exercised in the transfer of the animal from the trap to the holding pen to see that all avenues of escape are blocked, especially with the smaller type trap, which when placed in the entrance of the holding pen has several inches on each side through which the animal can escape. A piece of plywood, cut in the shape of a "T" Square to block this, is quite handy.

When the animals have been brought to the camp they should be given food and water, with a liberal amount of hay or straw being placed in the holding pen beforehand. It was found that feeding and watering once a day was sufficient, either in the afternoon or evening. The fisher, unlike the marten, did not eat during the day time. The animals were changed to a clean pen every two days, with the fisher being by far the cleaner animal.

Sexing, aging and tagging the fisher was done with the use of a cone made of inch chicken wire and fastened to the end of the trap, which had the end gate wired open or removed. The trap was set and placed into the entrance of the holding pen, with all escape routes being blocked. A potato bag or a coat should be placed over the trap and cone, leaving the end of the cone open to light. The fisher can then be chased into the cone by blowing vigorously at the cracks in the rear of the holding pen, and if this fails, by blowing smoke into these cracks and prodding the animal with a stiff wire. These methods were successful in tagging all fisher that were trapped in the project. After the animal is tagged in the left ear, and tattooed in the right, blowing in his face will make him retreat quite easily back into the holding pen. During this operation, a clean pen can be substituted if necessary.

The trapping was carried on from Feb. 9th., when all traps were set, to March 25th when all traps were lifted. During this period of 44 trapping nights a total of 29 fisher (16 F, 13 M) and 10 marten (2 F, 8 M) were caught. In this period of time there were two nights when the traps were not in full operation; first, because there were no holding pens available; second, because trapping had lagged and the trappers decided to boil and wax all the traps, removing blood and decaying meat from them.

From our experience it is believed that the live trapping of fisher can be successfully carried out in an area where travel is permitted by motor vehicle, and the area has a good population of these animals. We are also of the opinion that pre-baiting contributed a major part towards the success of this project.

The approximate cost of the operation was as follows:

Conservation Officers wages	$727.50	(not charged to project)
Man hired by Pembroke for 24 days	202.80	
Meals for all men engaged in project	301.50	
Mileage for private cars on the project	242.50	
Hay, feed, express, waxing and boiling traps, etc.	32.57	
Gasoline for sedan deliveries and trucks on project	80.04	(not charged to project)
TOTAL COST OF PROJECT	$1586.91	

The following is a summary of conditions, daily trapping and the average trapping effort for the animals:

Date	Traps Set	Traps Inspected	Traps Sprung	Fisher	Marten	Others	Weather
FEB. 8	7	Nil	Nil	-	-	-	Clear
9	25	7	-	-	-	-	Rain
10	First full trapping day						
	3	32	4	1 F	-	1 cat	Clear
11	35	35	4	1	-	1 red squirrel	Clear
12	35	35	3	2	-	2 red squirrels	Cloudy
13	34	34	4	2	-	3 red sq., 1 cat	Cloudy
14		30	4	1	1	-	Snow
15		30	Nil	1	-	1 mink, 1 cat	
16		30	3	2	-	-	Snow
17		29	2	1	1	-	Cloudy
18		29	1	-	-	-	Cloudy
19		28	-	1	-	-	Clear
20		28	2	1	-	-	Clear
21		27	2	-	-	-	Clear
22		23	-	-	-	-	Cloudy
23		17	-	1 M	-	-	Snow
24		27	-	1 F	-	-	Rain
25		31	3	-	-	-	Rain
26		28	Nil	-	-	1 red squirrel	Rain
27	3	28	Nil	-	-	1 cat	Clear
28		31	Nil	2 M	-	-	Clear
MAR. 1	7	31	Nil	2 (1M, 1F)	-	-	Cloudy
2	1	29	Nil	-	1	1 cat	P. Cloudy
3		30	Nil	2	-	-	Clear
4		30	Nil	-	-	-	Clear
5		30	1	-	-	-	Clear
6		30	1	-	1	1 blue jay	Cloudy
7		30	4	1	1	1 blue jay	Cloudy
8		30	4	-	-	1 blue jay, 1 fox, 1 weasel	Cloudy
9		30	Nil	-	-	-	Cloudy

cont.

	Date	Traps Set	Traps Inspected	Traps Sprung	Fisher	Marten	Others	Weather
	MAR. 10		30	-	1	-	-	Clear
	11		30	-	-	1	-	Rain
	12		19	-	-	-	-	Rain
	13	5	19	-	1	-	-	Cloudy
	14	10	5	-	-	1	-	Clear
	15		14	-	-	-	-	Rain
	16	9	14	-	-	-	-	Snow
	17	4	23	-	-	-	-	Snow
	18		27	-	-	-	-	Cloudy
	19	1	27	-	2	1	-	Cloudy
	20		28	-	1	-	-	Cloudy
	21		28	2	-	-	-	Clear
	22		28	5	-	1	-	Clear
	23		25	2	1	1	2 sq. fly.	Clear
	24		26	2	-	-	2 sq. red, 1 raccoon	Cloudy
	25		4	1	1	-		Clear
TOTAL	46 days		1146	54	29 fisher	10	9 red squirrels 2 flying squirrels 1 mink 1 fox 1 weasel 1 cat (6 times) 3 blue jays	

24.9 average traps set per night.
29.3 average trapping effort per fisher and marten.
39 average trapping effort per fisher trapped.

A CREEL CENSUS OF THE BLACK STURGEON AREA, 1957.

by
C. A. Rettie

The Black Sturgeon Area was opened to travel in the summer of 1956 for the first time since the summer of 1948. During this summer a study of the fishing pressure etc., in this area was made by R. A. Ryder, District Biologist, PORT ARTHUR and presented in his report "A Creel Census of The Black Sturgeon Area - 1956". During the summer of 1957 the area was again open to travel. The following Creel Census is a continuation of the study commenced by Mr. Ryder. Therefore, I would like to refer you to his paper for a complete history of this particular area, objectives of this survey and methods used. The only variation from 1956 was in the style of Creel Card used.

During the winter of 1956-57, a few fishermen entered this area for the purpose of ice fishing, mostly to Shillabeer Lake for pike. Following the spring break-up and for the purpose of this study, the first person entering this area for the purpose of angling did so on May 16. For a period of 3 days during the summer sportsmen were refused admittance because of the high fire hazard. However, those fishermen already in the area were not required to leave and could continue with their sport. Because of a few acts of vandalism at Camp 3, the road to Nonwatin Lake was closed for the period of the river drive. This shows up and accounts for the small number of people fishing Nonwatin Lake. The survey terminated on September 30, but a few anglers (147) continued entering the area until freeze up. On December 15, the first party of ice fishermen returned to Shillabeer Lake.

Two thousand and fifty-one angling parties passed through the gates at the Great Lakes during the period from May 16 to September 30 inclusive. Each party received a Lands and Forests Travel Permit and a Creel Card to be completed for each day's fishing. This involved a great deal of extra work on the part of the Company gatemen. Of this total, one hundred and seventy-four creel cards were returned incompletely filled in some respect such as the name of the water fished etc., and were of no use for this study. This left a total of one thousand, eight hundred and seventy-seven angling parties reporting on a total of twenty-two waters (16 lakes and 6 streams). Of these, 5 waters including Lake Nipigon were omitted from this survey as being outside the actual Great Lakes Concession. All other waters were tabulated only if fifty or more anglers had fished them during the census period from May 16 to September 30. This deleted the few trout lakes and streams and left 10 waters (7 lakes and 3 streams) which include the seven waters used last year plus three new ones.

All these waters have as their main populations pickerel and/or pike, with other species present only to a much smaller extent and considered taken only incidentally to the pickerel and pike.

Results of Census:

A total of 3964 anglers fished 23923 hours on the 10 waters selected for computation. They captured 6487 pickerel, 12704 pike, 32 lake trout, 94 speckled trout, 4 whitefish, 75 perch, 2 sturgeon, 64 smallmouth bass, 8 saugers, 13 suckers and 1 carp.

The lake trout were all taken in Disraeli Lake. The speckled trout were all taken in Leckie Creek. The one carp reported captured was taken below Camp 1 dam on the Black Sturgeon River which flows directly into Black Bay of Lake Superior. The catch of Pickerel was almost negligible in Shillabeer Lake (7) and Disraeli Lake (16). These figures may be erroneous as to my knowledge this is the first pickerel reported from either lake. These were previously believed to contain no pickerel.

The following tables have been prepared similar to those in Mr. Ryder's report of 1956 for ease in comparison.

TABLE I - Average Catch Per Angler - Black Sturgeon Area - 1957 x

	*Fishing Pressure (% of total no. of hours)	Fishing Hours Per Angler	Average No. of Fish Per Angler	Average No. of Pickerel Per Angler	Average No. of Pike Per Angler	Average No. of Bass Per Angler
Sturge Lake	21%	6.6	7.2	3.3	3.9	<0.1
Muskrat Lake	16%	6.2	5.3	2.1	3.2	<0.1
Black Sturgeon L.	12%	6.3	5.2	0.9	4.3	<0.1
Black Sturgeon R.	8%	5.0	2.7	2.2	0.5	<0.1
Nonwatin Lake	1%	5.5	2.8	1.0	1.8	-
Little Sturge L.	16%	6.0	4.0	1.4	2.6	<0.1
Spruce River	6%	5.3	2.4	0.6	1.8	<0.1
Shillabeer Lake	6%	5.6	7.5	<0.1	7.5	-
Disraeli Lake	10%	6.1	3.6	<0.1	3.6	-
Leckie Creek	4%	6.2	3.4	2.0	1.4	-
All Waters	100%	6.0	4.8	1.6	3.2	<0.1

* Percentages were rounded off to closest unit of value, therefore the total does not necessarily add up to 100%.

Values less than 0.1 are indicated by <.

x Each fishing trip counted as a separate entity.

TABLE II - Fishing Success - Black Sturgeon Area - 1957*

	Fish Per Hour	Pickerel Per Hour	Pike Per Hour	Bass Per Hour
Sturge Lake	1.1	0.5	0.6	<0.1
Muskrat Lake	0.8	0.3	0.5	<0.1
Black Sturgeon L.	0.8	0.1	0.7	<0.1
Black Sturgeon R.	0.5	0.4	0.1	<0.1
Nonwatin Lake	0.5	0.2	0.3	-
Little Sturge L.	0.7	0.2	0.4	<0.1
Spruce River	0.5	0.1	0.3	<0.1
Shillabeer Lake	1.3	<0.1	1.3	-
Disraeli Lake	0.6	<0.1	0.6	-
Leckie Creek	0.5	0.3	0.2	-
All Waters	0.7	0.2	0.5	<0.1

* Compiled from returns of 3964 anglers who caught a total of 6487 Pickerel, 12704 Pike and 64 Smallmouth Bass.

TABLE III - Fishing Success By Month - Black Sturgeon Area - 1957

	*Fishing Pressure (% of total no. of hours)	Fish Per Angler	Pickerel Per Angler	Pike Per Angler	Fish Per Hour	Pickerel Per Hour	Pike Per Hour
May	5.4%	3.8	0.9	2.9	0.8	0.2	0.6
June	33.0%	5.8	2.0	3.8	0.9	0.3	0.6
July	32.2%	4.3	1.7	2.6	0.7	0.3	0.4
August	14.1%	4.0	1.2	2.8	0.8	0.2	0.6
September	15.2%	4.8	1.2	3.6	0.8	0.2	0.6

* Percentages were rounded off to the closest unit in value. Therefore the total does not necessarily add up to 100 percent.

Comparison With the Black Sturgeon Creel Census, 1956:

The greatest difference lies in the great increase of anglers using this area, resulting in a much higher number of fish being taken. An increase of 2816 anglers captured 4199 pickerel and 9576 pike over the preceding year's total.

From Table 1 we see that fishing hours per angler were reduced by 0.3 hours while the average number of fish per angler increased by 0.1 fish. Anglers caught 0.4 less pickerel each this year but made up for this by taking 0.5 more pike.

This trend continues in Table 2 where it may be seen that while the fish caught per hour was similar to 1956, the catch of pickerel per hour decreased by 0.1 and the catch of pike increased by 0.1 per hour.

The greatest fishing pressure was exerted in June followed by August. Also more fish per angler and more fish per hour were caught during June than any other month.

Sturge Lake replaced Muskrat Lake as the most popular fishing grounds and also replaced the Black Sturgeon River as the best fishing spot for pickerel in terms of effort expended (0.5 per hour). More pickerel per hour were taken in June and July than any other period.

Shillabeer Lake far exceeded all other waters as the best spot for pike (1.3 per hour). However this is the first year that this lake has been included in the census and no comparison is possible with previous years. July was the poorest month for pike per hour with all other months being equal.

TABLE IV - Comparison Chart - Black Sturgeon Area.

	1956	1957
General		
Angling parties	558	1877
Total Fishermen	1148	3964
Waters selected	7	10
Total hours fished	7271	23923
Pickerel caught	2288	6487
Pike caught	3128	12704
Bass caught	39	64
Table 1		
Fishing hours per angler	6.3	6.0
Average no. fish per angler	4.7	4.8
Average no. Pickerel per angler	2.0	1.6
Average no. Pike per angler	2.7	3.2
Table 2		
Average no. fish per hour	0.7	0.7
Average no. Pickerel per hour	0.3	0.2
Average no. Pike per hour	0.4	0.5
Table 3		
Fishing pressure May	-	5.4%
Fishing pressure June	13%	33.0%
Fishing pressure July	45%	32.2%
Fishing pressure August	33%	14.1%
Fishing pressure September	7%	15.2%

Acknowledgments:

The gatemen employed by the Great Lakes Paper Company are again largely responsible for the success of this year's Creel Census. Without their efforts in distributing and collecting the census cards, this project would not have been possible.

Conclusions:

1. Pickerel and pike are the main species attracting anglers to the Black Sturgeon area.

2. Pickerel fishing may be considered only fair in this area.

3. Pike fishing may be considered fair to good in this area with the exception of Shillabeer Lake which is excellent.

4. All other species form only an insignificant part of the creel except in a few individual catches.

5. Although fishing pressure on this area has incresed by over 3 times that of 1956, it may be classed as only medium.

6. The new type creel card used this year is much superior to creel census form F. C. 17 for this particular area. It is more readily understood by the sportsmen and easier to complete and compute.

7. There are no doubts as to the value of this study to management and sportsmen and should be continued in the future to obtain a better analysis of this area as a recreation area.

8. Greater numbers of sportsmen are obtaining access each year through the Great Lakes gate but continuing north to fish outside the Great Lakes limits, especially Lake Nipigon. This new area would also warrant a study.

Literature Cited:

Ryder, R. A.
A Creel Census of the Black Sturgeon Area, 1956.
Fish and Wildlife Management Report No. 39, pp. 41-49, February, 1958.

WINTER FISHING PRESSURE ON LAKE TROUT, PORT ARTHUR DISTRICT, 1957

by
R. A. Ryder

From January to April, 1957, a winter fishery survey was conducted on nineteen lakes in the Port Arthur District subjected to the heaviest angling pressure for lake trout. The primary purpose of this survey was not to obtain catch per unit effort data from ice fishermen but rather to make a preliminary estimate on the numbers of lake trout harvested through winter angling. Many local sportsmen do not believe that lake trout, a species possibly subject to over-exploitation by angling, should retain a year round open season. It is their contention that the lake trout is harvested much more easily during the winter months and that legal bag limits are the rule rather than the exception. To evaluate the numbers of lake trout harvested during the winter, counts were made of the number of anglers on each lake and the total number of lake trout in possession. This count was taken chiefly by the Conservation Officers on their regular winter patrols. In order to obtain the maximum count of lake trout harvested, the checks were generally taken in the late afternoon, as far as possible. Most of the checks were made on weekends and holidays when the greatest number of anglers were out fishing. A definite routine check was impossible to establish because of weather conditions and interference with other duties. However, the heaviest fished lakes were checked as often as possible each weekend from January to April.

Results of Census

During the four month period, a total of 525 lake trout anglers were checked on nineteen different lakes. They possessed a total of 225 lake trout or 0.43 trout per angler (Table 1). In none of the lakes did the lake trout harvest exceed more than one fish per angler-day, the average being considerably less than that rate. It becomes obvious that should the figures obtained from the sample days be applied to the whole winter's angling, the subsequent catch is still exceedingly small. It must be remembered that most ice-fishing takes place during the week-ends in this area, the same days on which the majority of the checks were made. Hence close to maximum figures for fishing pressure and harvest were obtained.

Discussion

From our observations of open water lake trout fishing in this District, it seems probable that the subsequent harvest is at least ten times greater than that of the winter anglers. In any event it seems unlikely that our lake trout are being over-exploited at this time. The decline in the quality of angling in some of our lake trout lakes can usually be associated with the introduction of an undesirable species or the destruction of habitat.

TABLE I

Lake	Number of Anglers	Number of Lake Trout	Number of Lake Trout Per Angler	Number of* Times Checked
Arrow	14	6	0.43	2
Castle	14	6	0.43	2
Cliff	19	6	0.32	4
Fallingsnow	48	46	0.96	3
Greenwater	28	14	0.50	3
Huronian	58	9	0.16	6
Jessie	2	0	0.00	1
Loch Erne	141	41	0.29	5
Loftquist	27	6	0.22	7
Mountain	6	2	0.33	3
North Fowle	3	0	0.00	1
Oliver	33	19	0.58	2
Pete	10	7	0.70	3
Rudge	11	2	0.18	1
Shebandowan	3	0	0.00	1
Silver	39	4	0.10	3
Stewart	45	41	0.91	7
Stetham's	19	16	0.84	4
Sunset	5	0	0.00	1
TOTAL	525	225	0.43	59

* Includes only the times anglers were present and fishing specifically for lake trout.

Winter angling using live minnows for bait tends to capture a smaller lake trout than the average sized trout caught in the open water season on artificial lures which are the principal baits used. This makes better use of the lake trout population by harvesting the younger and more numerous year classes thereby reducing natural mortality and intraspecific competition.

Angling pressure is also reduced on the larger and more desirable lake trout.

The more nearly homothermous quality of the water in the winter will diminish the mortality rate on any trout that may be released.

Conclusions

Winter angling does not overexploit the lake trout populations in the Port Arthur District at the present time under existing fishing pressures. The winter harvest of lake trout constitutes only a small portion of the annual catch. Decrease in the quality of fishing in local trout lakes is usually associated with the introduction of an undesirable fish species, or some other alteration of the habitat, and not by winter angling.

COARSE FISH REMOVAL, HEART LAKE, 1957

Murray G. Johnson
Biologist, Dept. of Planning & Development

Description

Heart Lake Conservation Area is situated in Chinguacousy Township, approximately five miles from the town of Brampton. It is now one of several Conservation Areas under the supervision of the Metropolitan Toronto and Region Conservation Authority. It has many natural advantages for recreation, including swimming, boating and the study of natural history.

The area comprises about 150 acres, including some woodland, an area of open land, and the lake with its 40 acres of water surface. This is one of a number of small lakes to be found on the height of land running across Peel and York Counties. The maximum depth of Heart Lake is 34 feet; the average depth approximately 10 feet. No marked inlet or outlet is present.

Apparently some years ago, this lake provided bass fishing of good quality. Reports of fair-sized largemouth black bass being caught were noted. Recently brown bullheads and pumpkinseed sunfish have comprised the bulk of the catch. In order to restore angling for game species, treatment to remove the coarse fish population was recommended.

This project was carried out on November 3rd by the Metropolitan Toronto and Region Conservation Authority, with the help of the Islington and West Toronto Sportsmen's Clubs.

Treatment

In order to apply at least 1 p.p.m. of Pronoxfish to the 80 million gallons in Heart Lake, two 55 gal. (U.S. measure) drums - a total of 88 Imperial gallons - was added to the water, giving a concentration of 1.1 p.p.m.

Pronoxfish is available from the S. B. Penick Company, 50 Church Street, New York, and costs $224.40 per 55 gal. drum. Non-governmental agencies can also obtain the product duty-free as a pesticide by filling out a P.S. 58 form (Canada Dept. of Agriculture).

The bulk of the poison was applied using a Jackmite pump with a double intake, one intake removing pure poison from a ten gallon drum also in the boat, the second taking lake water from beneath the boat. By means of separate valves, the ratio of poison to water was regulated close to 1:20. The ten gallon drum of Pronoxfish was emptied in approximately eight minutes, and the poison was allocated to different sections of the lake on a pre-arranged work plan using a relatively uniform and moderate speed. An eight foot spray boom held in position over the wake of the craft about two feet

behind the 7½ h.p. motor delivered the poison. This assured good mixing of the poison into the lake water.

The apparatus described, including drum, valves, fittings, rubber hose, spray boom and clamps, as well as labour in design and construction, cost $94.00. (Automatic Pumping Equipment, Woodbridge, Ontario).

While power treatment was being carried out, two boat crews applied ten gallons of poison to the shallows about the perimeter of the lake using pack pumps. In addition, ten gallons of Pronoxfish was pumped into the lake about 15 feet below the surface by detaching and submerging the spray boom. The operation was completed in less than four hours.

Harvest

Many small fish began to appear on the surface two to three hours after poisoning was completed. Creek chub and sunfish appeared first. The following day, bullheads appeared in large numbers.

The creek chub (*Semotilus atromaculatus*) was the commonest fish in numbers. The brown bullhead (*Ameiurus nebulosus*) and pumpkinseed (*Lepomis gibbosus*) were somewhat less common, and approximately of equal proportions. Golden shiners (*Notemigonas crysoleucas*) were collected in fewer numbers than any of the aforementioned fish. Suckers (*Catostomus commersonnii*), mud minnows (*Umbra limi*), and brook sticklebacks were present in very low numbers. No largemouth bass of any size was observed.

The fish were collected and weighed in bushel baskets. A total of 7100 pounds of all seven species was collected, representing a minimum figure of 178 pounds per acre, as the standing crop of Heart Lake. Many fish were not recovered. The bottom of the lake in several areas was partly covered with dead fish, and large numbers of foraging herring gulls recovered another unknown quantity of fish.

Recommendations

Because Heart Lake has produced good largemouth bass angling in the past, and because areas of pond lily (*Nuphar*) are present and appear to be suitable bass habitat, it has been recommended that this species be stocked in 1958.

It would be advisable to prohibit the use of minnows as bait in the lake. It may prove desirable, however, to introduce one species of minnow as a forage fish.

Fishing should be prohibited until the introduced bass have spawned once.

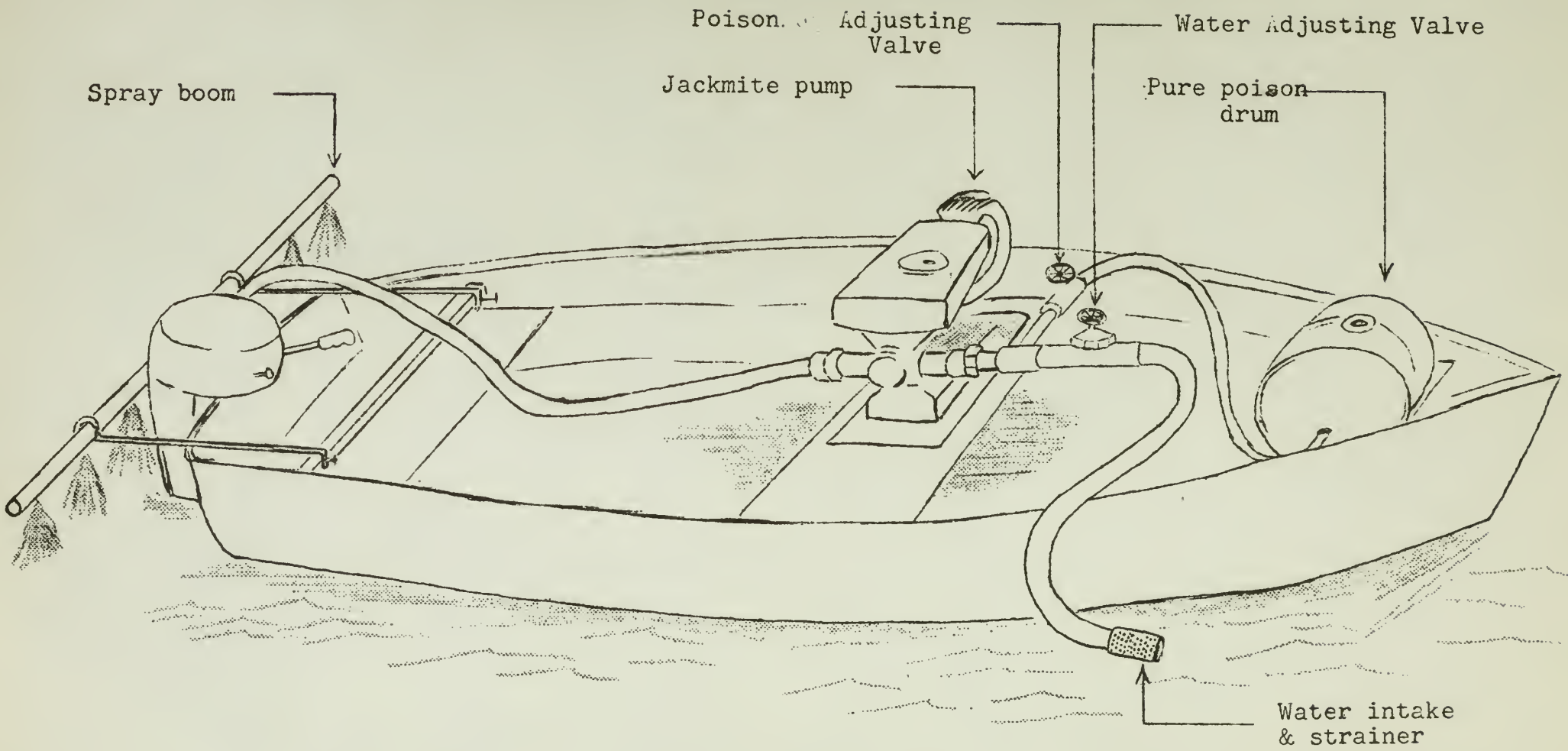


Diagram of Power Spray Rig and Boat Used in the Treatment of Heart Lake