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NEW ZEALAND.

OPOSSUMS IN NEW ZEALAND.

REPORT ON AUSTRALIAN OPOSSUMS IN NEW ZEALAND, BY PROFESSOR H. B. KIRK.

Presented to both Houses of the General Assembly by Command of His Excellency.

Wellington, 31st March, 1920.

The Hon. the Minister of Internal Affairs.

SIR,—

Report on Australian Opossums in New Zealand.

I was asked, through the New Zealand Institute, to find answers to the two following questions :—

- (1.) Whether the damage to forests is likely to outweigh advantages to settlers in being able to earn a revenue by trapping or taking opossums in new country.
- (2.) On what areas these animals could be liberated with reasonable security against their overrunning and damaging State forests.

I am in a position to answer the questions, as under :—

- (1.) The damage to New Zealand forests is negligible, and is far outweighed by the advantage that already accrues to the community. That advantage might be enormously greater. On the one hand, the damage to orchards and gardens is indisputable. Much annoyance, and a loss statable at hundreds of pounds, is caused. On the other hand, the volume of the present trade in skins is statable in thousands, but the loss is borne by one section of the community while the gain from trade is made by another section.
- (2.) Opossums may, in my opinion, with advantage be liberated in all forest districts except where the forest is fringed by orchards or has plantations of imported trees in the neighbourhood.

In seeking for the material to answer these questions I have obtained from various sources information that I deem it my duty to place at your disposal, and I therefore make a report embodying the recommendations that, after discussion with men who know, it seems to me ought to be made in regard to the means of dealing with the opossum as an animal of value to the community, yet one capable in some circumstances of being troublesome and the cause of loss. I deal first with the aspect of the question that concerns concrete damage that the opossum does, or is likely to do.

I. ORCHARDS.

Damage done in orchards that are situated in districts in which opossums are numerous is often considerable. Opossums eat the leaves and young shoots of apple-trees, of peaches, and all other stone-fruits; they damage lemon-trees in a similar fashion; they bite fruit of all kinds, sometimes consuming the whole fruit, frequently, however, leaving it damaged on the tree or causing it to fall. Settlers north of Auckland drew my attention to the fact that lemons which were still on the tree frequently had the peel quite consumed.

A district from which many complaints have come as to damage done in orchards is Albany, some ten miles north of Birkenhead, near Auckland, where opossums are not protected. Mr. Cawkwell, who owns land in this place, informs me that grey opossums were turned out, probably from Kawai, by Mr. W. P. Featherston, about 1894. They are certainly very numerous now, and do a great deal of damage to fruit-trees. Of both these facts I saw indisputable evidence. The district is interspersed with native bush and scrub, and in this the opossum finds a safe harbourage. During the winter they do little damage to gardens and orchards, but with the advent of spring they attack the young trees, eating shoots and leaves, and later destroying much fruit. Several settlers have, since protection was removed in 1912, shot opossums freely, but no concerted measures have been taken. The skins have generally not been marketed. The principal reason for this seems to be that there is no means known to the settlers by which a few skins can be profitably disposed of without undue trouble.

It seems to me certain that if a market were found for the skins the local fruitgrowers' association constitutes the organization required for collecting small numbers of skins and marketing them. Thus, if skins taken at various seasons were worth no more than 2s. apiece on an average it would pay

the settler to sell them. By this means the district would clear itself automatically, and no more complaints would be heard. It is necessary that the settlers should be acquainted with the best and easiest methods of trapping and with the way of preparing the skins for market. As bearing on these points, I append to this report notes by Mr. E. C. Evans, of Orari Gorge, who is an experienced trapper, and Mr. H. H. Ostler, who has had a little experience as an amateur trapper. These notes will enable settlers in fruit districts to know how they should deal with opossums and how the skins should be prepared for market.

I could not find at Albany that any professional fruitgrower had found the ravages of opossums so serious that he had decided to abandon fruitgrowing, or that any intending fruitgrower had abandoned his intention on account of the presence of opossums.

The trouble caused by opossums in orchards might, I think, be dealt with on the lines suggested to the Minister of Internal Affairs on the 15th July, 1913, by Mr. L. O. Tripp, after consultation with Mr. T. W. Kirk, of the Department of Agriculture.

In Section XI of this report I have made suggestions for regulations to deal with the fruit districts.

II. GARDENS.

Less serious damage is done by opossums in gardens than in orchards, but very many garden-plants suffer. Buds and shoots of roses and of many shrubs are bitten off; peas, when the pods are filling, are attacked; beet is sometimes eaten, as are other vegetables.

III. PLANTATIONS.

In February last the Forestry Branch of the Lands Department called the attention of the Department of Internal Affairs to articles in the *Australian Forestry Journal* for January. One of these articles was by Mr. Walter Gill, Conservator of Forests for South Australia. Mr. Gill knows the thing of which he writes, and he writes strongly against the opossum, which has been found to be a dangerous pest in pine plantations. It strips the bark from leading shoots of Aleppo pine (*Pinus halepensis*) and of *P. maritima*, killing hundreds of trees. Thousands of self-sown seedlings are destroyed at a height of 5 ft. or 6 ft. Opossums have had to be destroyed in Bundaleer Forest, in Worrabura Forest, and in Mount Burr Forest. Having this very weighty evidence before me, I examined plantations carefully in all places in which I could find indications that opossums were present in the neighbourhood, but I have been unable to find that any damage to plantations has at present been done in New Zealand. I looked for evidence of such damage, particularly in the plantations of the Leith Valley Reserve, Dunedin, seeing that opossums are present in the adjoining portions of the reserve that carry native bush. I could find no damage. Mr. Tannock, Superintendent of Reserves, has kindly undertaken to report any damage that he or his man observe.

Of special importance are the plantations at Whakarewarewa, the Waiotapu Valley, and on the Kaingaroa Plains. I have not yet found time to examine these plantations, not regarding an examination as absolutely necessary in view of the fact that on the 19th September last the Department of Tourist and Health Resorts informed the Department of Internal Affairs of the Ranger's report to the effect that the opossums liberated in the Rotorua district in 1906 had disappeared. I will seek an opportunity to examine these plantations if you wish it.

Since the foregoing paragraph was written I have had the opportunity of examining a portion of the plantation at Whakarewarewa in company with Mr. Goudie, the officer in charge of the forest station. I could find no trace of opossums, and Mr. Goudie informs me that he does not know of any being in the Rotorua district. The weighty and convincing evidence referred to above makes it perfectly clear that opossums should not be liberated at any place from which they could spread to the plantations of the Rotorua district—say, at any place between the Rangitaiki River and the open lands of the Waikato and the Thames Valleys. If they are now present in that area they should be destroyed. It is further clear that detached plantations within, say, ten miles of the area should be watched sufficiently to ensure that they do not harbour opossums. The like precautions should be used with regard to extensive plantations in other districts.

So far as imported trees used for purposes of afforestation are concerned, the only evidence of damage that I have been able to obtain is in connection with *Pinus insignis*. Settlers in the Albany district, in the neighbourhood of Auckland, are unanimous in stating that the young male cones of this tree are much eaten by opossums.

In the Waterworks Reserve of the Wellington Corporation at Wainuiomata there is, near the caretaker's house, a group of oak-trees from which the leaves have been eaten to such an extent that the trees may be said to have been stripped. This process has only to be repeated a few times to kill the trees. Opossums were liberated in the Wainuiomata about twenty-five years ago, and it is only within the last ten years or so that they have become numerous and have done such damage as that referred to. It would seem, therefore, that an oak plantation in which opossums are numerous would be completely ruined. On the other hand, it has to be borne in mind that the number of oak-trees in the group referred to is small—five or six—and the opossums have evidently chosen the trees as furnishing a kind of food different from that available in the surrounding bush. It does not follow that in a plantation of oaks they would do damage in the like proportion. It is none the less certain that opossums should not be allowed to exist in oak plantations.

IV. PLANT AND ANIMAL SANCTUARIES.

Although I am convinced that opossums do no serious damage to the New Zealand bush, as is, I think, clear from the evidence I have given below, I strongly urge that they should be exterminated in plant and animal sanctuaries where they exist. They enter into competition with some birds in the matter of food, and this competition may at times be quite serious. Further, the whole idea of the sanctuary is that birds and other animals, as well as plants, should be conserved in their natural environment. Any intrusive element may modify the original environment in a way that, although it may not be immediately noticeable, may be very important.

V. DAMAGE TO FORESTS.

When I began this investigation I believed that considerable damage was caused to forest by opossums when they were numerous. This point has been to me the most interesting of all, and I have paid the closest attention to it in the places that I have visited. There are several places where opossums are found that I have not had time to visit. I have chosen what seemed to me to be typical localities and have studied them carefully.

Although, for reasons stated above, I think opossums should be entirely excluded from all sanctuaries for New Zealand plants and animals, yet I do not think they are doing serious damage in forests. The damage usually attributed to opossums is caused mainly by cattle, deer, and pigs—often by rabbits. Cattle eat and trample the undergrowth, preventing the regeneration of the forest, allowing the forest-floor to dry and cake, letting the wind have unhindered sweep. They destroy the protective fringe so essential to all our forests except beech. Thus, to admit cattle and to permit them to remain is really to pass a death sentence upon the forest. Deer do similar damage, and in addition often bark trees. Pigs destroy the undergrowth. Rabbits consume the undergrowth and bark trees of almost all kinds. Opossums consume a comparatively small amount of the undergrowth, so small that close examination generally fails to discover the damage. I have found no evidence of their eating ferns or moss, although in some cases, as in Mr. John Galder's bush in the Catlin's district, they appear to trample the growth of filmy ferns on specially favoured logs, leaving the logs bare. I have found no instances of trees barked by opossums, although the evidence of the South Australian Forestry Department, referred to in Section III of this report, shows clearly that plantation trees are barked and killed. Where, in the New Zealand bush, bark is bitten by opossum there is nothing like ringing, such as rabbits, and hares, and deer achieve. There is usually a single bite and a tear, stripping a piece of bark sometimes for a few inches up and down. I have once seen the bark of the makomako, or wineberry (*Aristotelia racemosa*), torn for 20 in. in a strip from 1 in. to 2 in. wide. The bark seems to be bitten in playfulness rather than for food, although transverse grooves are sometimes bitten 1 in. or more in length on bark of various kinds of matipo and of tawa, and of some other trees.

In the Hadfield bush at Paraparaumu, referred to elsewhere, I have found a young tawa-tree that had been bitten much as a rabbit bites, at a height of 4 ft. from the ground. I suppose that this was done by an opossum, but could not be sure, as the teeth-marks do not show. This is, within my experience, an isolated example of comparatively extensive injury, but one which in this case would not prove fatal.

The opossum eats leaves and young shoots of makomako (*Aristotelia racemosa*), of karaka (*Corynocarpus laevigata*), of houhou (*Schefflera digitata*), of mahoe (*Melicope ramiflora*), of broad-leaf (*Griselinia lucida*), of konini (*Fuchsia excorticata*), of matipo (*Pittosporum eugenoides* and other species), of kohekohe (*Dysoxylum spectabile*), the soft parts of miro-fruit and of the nikau-fruit (*Rhopalostylis sapida*), the fruit of the konini, and many others. By his weight he breaks young shoots, causing them to wither. I have examined the upper branches of many favourite food trees, but have never found that greater damage has been done than I have here described, and the trees branch freely below the wound.

I have found no native tree that has, in my opinion, been killed by an opossum. The favourite plants of the opossum are damaged by constant climbing and playing, but this generally happens near houses or at the edge of a clearing, but I have never seen serious damage of this kind in the forest. I think it necessary to refer specially to the case of the big New Zealand fuchsia. On Kapiti Island I was shown trees that had died in the forest, presumably killed by opossums, although I did not regard the evidence of cause as being convincing (see "Transactions of the New Zealand Institute," Vol. 51, 1919, p. 469), seeing that the trees still bore abundance of small twigs and that the bark was unharmed. Moreover, the fuchsia is a very hard tree to kill. I was told that in the scenic reserve on Lake Kanieri the fuchsia had been killed by opossums. Mr. Anderson, the Crown Lands Ranger, kindly accompanied me to this place. We found that although the fuchsias of the forest fringe were undamaged and healthy, those in the bush itself were rarely healthy and many were dead. These trees were of all sizes, and in various positions with regard to the drainage of the soil and with regard to shade. Many of them still bore their smaller twigs uninjured, and the bark was in all cases intact. They presented all the appearance of having died from a bacterial or fungoid disease. Some had been heavily attacked by scale insects.

In the Wellington Waterworks Reserve at Wainuiomata a similar state of things exists. The fuchsias in the bush itself, in one gully at all events, stand dead or dying, many with all their twigs upon them, while those on the forest fringe are in a thoroughly perfect condition. Behind the assistant caretaker's house is a small fuchsia-tree which has been freely bitten by opossums, but has branched again below the wounds. Such examples are of importance, because they negative the only theory that occurs to me to explain how the fuchsia-tree, having most of its twigs still upon it, could be supposed to have been killed by opossums—the theory that the opossum-bite sets up in the fuchsia a poisonous action that it does not set up in other plants. But healthy fuchsias occur abundantly in bushes heavily stocked with opossums. In Mr. Telford's bush at Otanomomo, referred to later in this section, large fuchsia-trees are numerous and healthy, and I could find no dead trees. The same is true of all the bushes I examined in the Catlin's district, and of bush at the Orari Gorge, Peel Forest, and at Geraldine. It is true of the Wellington Botanical Gardens, where there are a few opossums.

Paraparaumu.—In the scenic reserve of 1,300 acres in the Maungatukutuku Valley opossums are numerous, and the marks of their claws are to be found on many of the trees. Trees that here show indications of serving as food plants for opossums are quite common, but I found no trees that showed very serious damage. Irreparable damage is being done here by cattle, and to a less extent by deer. These animals clear the undergrowth, letting the wind sweep among the trees and allowing the forest-floor to dry—two conditions that New Zealand forests of the mixed kind cannot endure. It is not too much to say that a limit is being set to the life of the forest through damage compared with which all damage that opossums do is negligible.

In contrast with this forest is a small detached bush belonging to the Hadfield Estate, about three-quarters of a mile from Paraparaumu. This is fenced against cattle. Although there are many opossums here the undergrowth is everywhere luxuriant. One can find here and there among the undershrubs and young trees marks of biting and breakage by opossums, but they are certainly not menacing the life or even the welfare of the bush. It is to be borne in mind that this bush is detached from the forest and that its proximity to a village renders it liable to poaching. It is therefore little liable to be overstocked by opossums. Yet they are in sufficient numbers to show that reasonable protection of opossums does not in itself constitute a menace to the bush.

Peel Forest, south of the Rangitata River, is now a scenic reserve. In the past milling was carried on there, and cattle evidently had the run of the forest—indeed, some are still there. The bush is now making a satisfactory recovery—as satisfactory as such a recovery can be, almost—and the reserve is a most valuable and charming one. Opossums are numerous—of this the evidence is indisputable and ample—yet I could find no evidence of damage done by them. If damage is done it is so little as to have escaped the notice also of that trained and careful observer, Mr. R. M. Laing, of Christchurch, as may clearly be seen from his interesting notes on Peel Forest published in the *Timaru Herald* of the 24th January last. There is much evidence that a few opossum-brained human beings with pen-knives do more damage in half an hour than the whole opossum population of Peel Forest could do in a decade; and the opossums are of value to the community.

Wainuiomata.—Opossums are numerous, but do no serious damage to the forest, as far as I can find. Very considerable damage is being done by deer in this forest.

Scenic Reserve at Lake Kanieri.—Here, in addition to dead fuchsias, there were many dead trees of rata and of kamahi (*Weinmannia racemosa*). I have already referred to the case of the fuchsia. The dead trees of rata and of kamahi show no discoverable damage by opossums, or even by deer, which are numerous. The trees are not dead throughout the whole of the reserve, but only on certain slopes. In some cases they can be found with all their twigs upon them, and a few were observed from which the withered leaves had not yet fallen.

Leith Valley Reserve.—The Leith Valley Reserve of the Dunedin City Corporation is a waterworks reserve from which during the last ten years or so cattle have been excluded. Where the native bush still survived this is recovering from the damage done by cattle. Opossums are fairly numerous in the bush, but do no damage. This reserve is of especial interest on account of the plantations of imported trees that have been made upon it. These are referred to in Section IV.

Catlin's District.—In the Catlin's district there are still considerable areas of heavy bush, and here opossums are very numerous indeed. Except that in some cases filmy ferns have been killed, probably, I think, by opossums, I could discover no damage.

Otanomomo.—The most instructive instance I have met of the smallness of the amount of damage to bush that opossums do is furnished by a piece of detached bush, about 20 acres in extent, owned by Mr. Thomas Telford, of Otanomomo, near Balclutha. About twenty years ago there was still a homestead—that of Mr. Redpath—in this piece of bush. Cattle ran through the bush freely, and continued to do so until about ten years ago. Then Mr. Telford, into whose hands it had come, fenced it against cattle and rabbits, although a number of rabbits are still within the enclosure. He has always protected opossums with the utmost care, and the result is that to-day, in spite, no doubt, of some poaching, the bush is quite heavily stocked. It is a mixed bush, and, owing in part to its isolation, is rather dry. It shows that the undergrowth had been completely trampled out by cattle. As a result, an unusual amount of bush-lawyer has penetrated, and a few introduced plants such as gooseberry, hawthorn, &c. Most of the sapling trees show barking, more or less severe, by rabbits, the wounds of trees that have survived this treatment having healed with great scars. But the important feature is that seedlings are everywhere springing up of the trees that constitute the bush—totara (*Podocarpus totara*), rimu (*Dacrydium cupressinum*), matai (*Podocarpus spicatus*), broadleaf (*Griselinia lucida*), &c. No important constituent of the original bush is now unrepresented by seedlings, and in some cases, as in that of totara, the seedlings are numerous and are of various ages from several years down to a few months. The bush shows, then, that in spite of the presence of opossums recovery is possible from the original great damage wrought by cattle. This is in some cases more striking in the Hadfield bush at Paraparaumu, for there the original damage had not gone so far and the opossum population is less numerous.

Cairn Forest, Dunvegan, near Clinton.—Mr. James Begg, of Dunedin, gave me the following information about Cairn Forest, on his property: The forest occupies a ridge, and has a length of about ten miles by a width seldom greater than two miles. About 1894 there were liberated in it twenty-one grey opossums. Since they increased in number the bush has probably been poached frequently, if not constantly. When in 1912 protection was lifted the bush was raided heavily by trappers, and probably not less than ten thousand skins were taken. That estimate cannot be regarded as exact, but it is certain that at one time there were twelve camps of trespassing trappers in the bush. In 1913, about six weeks before protection was reimposed, Mr. Begg gave to two men exclusive rights of trapping, if they could enforce them. They were to hand over one skin out of three. They had about five weeks' actual work under this agreement when protection came again into force. The two men then brought in a total of 1,800 skins. Through Mr. Begg's kindness I was enabled to examine a part of this forest. It is a mixed forest, originally continuous with the Catlin's Forest, and having a very large proportion of rata. Cattle and pigs are present in numbers, and they have done much damage to the undergrowth. Opossums are numerous, but do very little damage that I could discover.

VI. EVIDENCE OF THE PRESENCE OF OPOSSUMS.

When opossums are present in bush the fact is easily recognized by the marks of their claws upon trees. These marks are generally very distinctive—a set of oblique marks directed outwards, caused by the claws of the hind feet, and more or less vertical marks made by the claws of the front feet. They are especially easy to see on trees with whitish bark that is not too hard—as, for example, kohekohe, matipo, mahoe, &c. They are difficult to see on trees with flaky bark, such as that of rimu. Trees of all sizes are climbed, and claw-marks may be seen on dead stumps, especially near

clearings, and on telegraph-poles where these are in the neighbourhood of opossum bushes. At the edges of clearings especially one often finds playing-grounds of opossums, where the grass is more or less trampled and marked by tufts of fur torn out in scuffling. In the bush itself regular runways are frequently found intersecting each other at various angles and extending over long distances. Opossum-dung lying about is often the first evidence of the presence of these animals.

VII. CATTLE, DEER, ETC.

I have not been asked to report upon the damage done by other animals than opossums, but I should consider myself failing in duty if I made no reference to the matter. In scenic reserves and on other Crown lands cattle are doing enormous damage. They eat and trample out the undergrowth, and their continued presence means death to the forest. Deer, when numerous, are almost as bad as cattle. Pigs are very harmful. In some cases rabbits do much damage. None of these animals should be allowed in forest reserves or in scenic reserves. It is not too much to say that in cases where bush is to be preserved not one head of cattle or deer should be allowed, and pigs should as far as possible be killed. The last Commission with regard to State forestry took much evidence on this point. Where the amount of fencing required is small, reserves should be protected by a fence on the sides on which they are open to invasion. In some respects more ranging, and perhaps the giving of power to rangers to destroy trespassing animals, would lead to the clearance of the forests. The cost of these measures could be met, in part at least, by revenue derived from opossums.

VIII. HABITS OF OPOSSUMS.

The opossum naturalized in New Zealand is the Australian opossum—*Trichosurus vulpecula*. Whether the short-haired Australian opossum—*Trichosurus canina*—is present or not I am uncertain.

Of the opossum naturalized in New Zealand there are two races—the grey, found in many parts of the Australian Continent, and the brown (or, as it is frequently called, the black, or the blue), especially characteristic of Tasmania. These two races are not distinct species, and there is little doubt that they have crossed in New Zealand. Some of the hybrids, at all events, appear to have fur intermediate in colour between the brown and the grey.

Opossums are nocturnal in habit, and during the day conceal themselves in hollow trees or in tufts of plants growing in the branches of trees, or frequently, as far as New Zealand is concerned at all events, under dry logs, or dry fern, or other plants. Their breeding-habits are of considerable importance in forming an idea of the rate at which they are likely to increase, and of what difficulty may be expected in getting rid of them if they should at any time prove altogether undesirable—a thing that, in my opinion, will never happen. Opossums breed once in each year, although occasionally there may be a second breeding. An opossum rarely produces more than one young animal at a birth, and never more than two. So rarely does it happen that two young are produced in one year that the departures from the normal state of things must be more than counterbalanced by occasional failure to breed and by mortality among the young animals. There need, therefore, be no fear that opossums can ever increase in numbers as the rabbit has increased in New Zealand.

Not only is the rate of increase slow, but the opossum is so easily trapped, snared, poisoned, or shot that man could check undue increase speedily and profitably, as is now done lawfully in some open districts, and unlawfully in protected districts. Probably no animal is more endowed with the curiosity that leads it into danger than the opossum, or is less gifted with the cunning to escape from danger, or even the sense to recognize it.

IX. POACHING.

In all protected districts in New Zealand in which opossums are present, and especially in those districts in which they have become numerous under protection, poaching is alleged to be carried on. There is in no case reason to doubt that the allegations are fully justified. In several districts the amount of poaching is undoubtedly great, and thousands—in some cases several thousands—are taken each year. This will continue until the trade is recognized as a legitimate one and is developed along well-controlled lines.

The evidence on which I have based my conclusions as to the state of poaching is not always evidence that I can produce, seeing that much of it has been given to me in confidence. I have had the pleasure of discussing the matter with many settlers who have considerable knowledge of the subject on which they speak, but who cannot, so far as their own personal experience is concerned, speak of opossums other than those incidentally caught in traps set for rabbits.

X. VOLUME OF TRADE.

The correspondence in the office of the Department of Internal Affairs, and that of the Department of Agriculture and other Government Departments, gives various estimates of the value of the opossum trade. The estimates vary from £20,000 to £200,000 or more a year. In no case could I find a basis upon which the estimates had been made. I therefore endeavoured to discover a basis for a fresh estimate, in discussion with men engaged in the trade or having first-hand knowledge of it.

It is to be borne in mind that in protected areas the law does not recognize the trade. I have become certain that the number of New Zealand skins that find their way on to the market is great, although I cannot quite say how great. Much of the information has been given to me by men who are engaged in the fur trade, who would like to see trade in New Zealand skins carried on under legal control, but who do not in the meantime see their way to refuse to handle skins when these are thrust upon them. If they did refuse to handle them, then they would stand on a much higher plane than that generally supposed to be occupied by business men, seeing that the thing is easy, the profits are large, and the illegality not very certain so far as the actual buyer of skins is concerned. It would be miraculous if all the members of the trade refused these obvious profits. It is even too much to expect that many should refuse them and so place themselves in a disadvantageous position in keen competition with less scrupulous competitors.

For the purposes of this report there is no need to distinguish between licit and illicit trade, and some reliable estimate can be made of the total volume—a volume that would be largely increased if there were proper control and development.

There is some import of raw skins from Australia and Tasmania. There is also a re-export of raw skins to America, more going now to America than formerly went to Britain. Numbers of skins are made up in New Zealand and placed on the local market. The manager of an important Dunedin firm, from whom I have received most valuable information, states the value of his manufactured skins for last year at £2,415. It has to be borne in mind that this is the value of the local trade only, to one only of the Dunedin firms. Export figures are running up so rapidly that one year's figures are not reliable as a guide to what may be expected in the next year, but since the beginning of December this firm has filled an American order for 2,000 "best Tasmanian greys" at 14s. f.o.b., and it has prepared a further consignment for sale in America of 1,820 skins. For this consignment they have already been offered 16s. f.o.b. in Dunedin, but, not being satisfied with this offer, prefer to place the skins on the open market in America. As there are other firms operating in Dunedin, and as there is a market for skins—smaller, indeed—in Christchurch, it is safe to assume that trade with America alone has already a volume of not less than £10,000, and it is almost certainly much greater.

Of actual transactions in opossum-skins other than those referred to may be mentioned the Crown lands sale of last season's skins from Kapiti—about 2,000 skins at an average of 10s.—and a sale on behalf of the Summit Road Scenic Board of Canterbury of 145 skins at an average of 10s. The price quoted in these two cases is the price given by the local dealer—the price that a trapper might expect.

With regard to imports and exports, no definite information can be got from the Customs returns, seeing that there is no special heading for opossum-skins.

As the New Zealand skins are better all round than the Australian skins, owing in part probably to our colder climate, the whole of the re-export trade might be replaced by genuine export trade in New Zealand, and the local market could also be supplied.

Taking local and American trade it seems to me perfectly safe to assume that the present volume of trade is certainly not less than £15,000 a year. Mr. R. S. Black informs me that £50,000 would be a low estimate. That the demand for export is unlimited is evident from the following figures:—

Messrs. Funsten Bros., St. Louis, U.S.A., submitted at the last fall sale, September, 1919, 171 lots of opossum-skins, comprising 158,996 skins. The average upset price was 2.22 dollars. That the average price was kept down by the presence of many poor skins is evident from the following quotations from the list, quotations that I have made to include the best and the lowest skins and to show the range:—

Lot.	Price.	Number of Skins.	Quality.
	\$		
2684	1.75	1,080	I, pt. II—medium and small.
2685	2.43	424	II—extra large and large.
2690	3.90	500	I—extra large, black.
2691	5.05	748	Fine blue.
2698	3.20	1,000	I—small blue.
2766	0.63	764	III and IV.
2778	0.20	1,581	III, pt. IV—medium and small.
2780	0.18	2,588	IV, pt. V.

I have taken these figures from Messrs. Funsten Bros.' catalogue, kindly lent me by Mr. Stewart, of Messrs. J. K. Mooney and Co., Dunedin. I understand from Mr. Stewart that there are at least two other large firms doing business on a similar scale in St. Louis alone, and that Chicago has a large fur-market.

NOTE.—Since the report was written there has appeared in the daily papers of the 3rd April the following cablegram:—

"Australian and N.Z. Cable Association, Montreal, March 27.—Nearly five million dollars' worth of furs were sold at auction. A feature of Saturday's session was the sale of 236,000 dollars' worth of Australian opossum."

Also, in the *New Zealand Times* of the 4th April appeared an extract from the *Sydney Sun*: "An enormous trade in fur skins is being built up in New South Wales. . . . The following figures show the weight and value of fur skins exported through Sydney port for the six months ended 20th January: Fox, 244,909 lb., £182,047; kangaroo, 785,218 lb., £201,743; opossum, 684,470 lb., £851,025; wallaby, 191,459 lb., £75,541; wombat, 401,483 lb., £133,220; other fur skins, 4,923 lb., £1,012."

XI. OPEN SEASON; LICENSED TRAPPING; REGISTERED DEALING.

I strongly recommend that an open season be declared during which opossums may be lawfully taken, and that for the present the open season be the months of May, June, and July, as in Tasmania. Most of the practical men in New Zealand are in favour of these months, but there is some difference of opinion. I will make later suggestions for determining the date in New Zealand on actual observation of opossums taken for that purpose. An open season should only be declared in any district on the advice of the acclimatization society's rangers, or of Rangers appointed by the Crown, or by some local body charged with this duty.

The advantages of an open season may in general terms be stated thus:—

A considerable amount of trade that is at present carried on illegally would be much more under control, and would be capable of indefinite extension.

A licensed trapper, no longer a poacher, would be able in an open market to get the full first-purchase value of skins. At present in an underground trade he cannot always make the best terms with the buyer.

The licensed trapper will find it to his interests to discourage by all means in his power the unlicensed man. At present, where nearly all is illegal, no man can adequately protect his own interests against other men.

The owner of opossum-bearing country will be able to reap the advantages he is entitled to. At present there are many settlers who own bush that they will not trap themselves because they will not break the law. They have the constant mortification of knowing that their bush is being poached to the great advantage of other men. The opossum-poacher is sometimes a settler otherwise desirable. Sometimes, however, he is a man who cares for no interests whatever but his own. Such men resent all interference with their unlawful trade, and there are instances of owners who have suffered from the revenge that follows attempts to prevent poaching on their land. Such instances would be very numerous if more of the law-abiding owners were to take vigorous measures of protection.

Instead of a trade that drains the bushes all the year round there would be a trade that would spare the summer, autumn, and spring skins, which are of comparatively small value, though still worth taking. Thus great wastage would be avoided.

The registered dealer would, if trade in New Zealand skins were legalized, be able to take advantage of the high quality of New Zealand skins in general, and of the southern skins in particular, by advertising "best New Zealand skins," instead of having to dispose of New Zealand skins to the local furrier or to export them as Australian skins. The difficulty at present felt is, I understand, so far as the dealer is concerned, not a legal one so much as a moral one, as it is doubtful whether the dealer, not himself a poacher, could be punished for dealing.

The dealers would be assured, during three months, of a supply of skins taken when all were at their best, instead of a supply of skins of a poorer average quality because many of them are taken when at their worst. It is quite certain, in my opinion, that the majority of dealers would prefer a clearly legalized trade and would honestly endeavour to make a success of reasonable regulations tending to secure it. If some were following a legal trade, it would be to the general advantage of the others to do so.

In spite of the advantages summarized above that would follow from legal trapping during an open season, it would probably be too much to expect that the buying of skins taken in the close season would altogether cease, or poaching be altogether abandoned. Regulations can only regulate within the limits which human nature sets, and unless the machinery for enforcement is quite adequate some men will always follow natural instincts towards an illegal gain, or will yield to a perverted spirit of adventure. The aim should be reduction of illegal action to a minimum that shall constantly dwindle. I make these remarks because I have met several very intelligent men who, in discussing the question of poaching, object to every proposal that is brought forward, basing the objection on the impossibility of eliminating poaching. The present position they admit to be as bad as it can be, but they do not approve of any change unless that change would be entirely free from evil. Such a change neither they nor I have yet been able to propose, and I propose the scheme that seems to me, after consideration with shrewd men that have expert knowledge, open to the least objection.

Rangers should advise as soon as possible after an open season has come to an end as to how far the bushes have been depleted, and as to whether an open season should be declared in the following year. Public notice should be given not later than January of each year as to whether an open season will be declared or not in any particular district. As a rule it will be found advisable, if circumstances warrant it, to have an open season declared for at least all the districts of the South or of the North Island at one time.

Licensing Trappers; Kind of Traps to be used.—Regulations as to trapping should provide that after a fixed date—say, 1922—no rabbit-traps shall be used for the taking of opossums, seeing that these frequently break the animal's leg and involve quite needless cruelty. The regulation trap should be the American jump trap, which is much less severe in its action and is perfectly safe. It has the advantage to the trapper that it is lighter. The only other method of taking opossums that should be open to a licensed trapper is by means of the snare, largely used in parts of Australia and by poachers in some parts of New Zealand. In the notes written by Mr. Ostler and appended to this report there is an adequate description of this device.

In a district other than a fruit district no person, whether on his own property or not, should kill an opossum except during a declared open season, nor should he then kill without a license. Further, the license should be held by the man who kills. A license should not entitle the possessor to engage an unlicensed person to kill. A license should give no right of entry upon private property or upon Crown lands. A property-owner might, without having a license, empower a licensed trapper to trap his property, but he should at once report to the nearest post-office that he has done so, giving the name of the trapper and the number of the license, of the validity of which he should have taken all reasonable steps to assure himself. Any unlicensed trapper who secures such permission from an owner shall be liable to a minimum penalty of £5, in addition to a penalty of £2 for each skin taken. The skins should become the property of the Crown. Default in payment of the fine should involve a serious term of imprisonment.

Within fifteen days after an open season has come to an end a licensed trapper should have disposed of his skins to a registered dealer, or should have produced them to be marked and recorded by any officer in the district appointed by the Crown to do so. A license fee of £1 should be paid before the issue of the license. I suggest that the amount of these fees should be handed over to the acclimatization societies to secure a larger amount of ranging.

Licenses should be issued by the Minister of Internal Affairs, who might empower police officers or other officers to be gazetted to issue licenses on his behalf.

I make with less confidence a suggestion that owners of opossum-bearing property who under license trap their property or have it trapped should pay to the Crown a royalty of 1s. for each skin taken. My hesitation in making this recommendation is not due to any doubt as to its equity, of

which I am assured, but to a doubt as to whether such a provision might not easily be evaded. Other points on which I do not see my way to make definite recommendations, but with regard to which, if it were possible, some limitation should be made, are (1) the number of traps that any licensed trapper might use, and (2) the number of skins which he may take from any given bush. With regard to the first point, if the number of traps or snares, or both together, be limited it will be difficult to prevent the shooting of opossums by men having a license to trap; or poisoning might even be resorted to. The poisoning of opossums ought in all circumstances whatever to be rigidly forbidden, except perhaps in fruit districts. With regard to directly limiting the number of skins that a trapper may take in any one season, it is obvious that a trapper who had secured the maximum number would be able to make over his surplus skins to a trapper who had secured a smaller number. There would be a pooling of skins among all the licensed trappers in a given district.

The best recommendation I can make is one on lines suggested to me by Mr. H. H. Ostler, and is as follows: The license shall entitle a trapper to take up to 100 skins without further fee for license; for every twenty-five additional skins that he takes he shall, before offering the skins for sale, pay an additional fee of £1.

The proposal does not succeed in placing a limit on the number of skins that may be taken; but it may, in the case of any area, be very desirable to have the means of imposing such a limit. It is true that I have suggested that an open season should not be declared unless the ranger is satisfied that such a declaration is justified. But it is highly desirable to avoid depletion of the bushes to such an extent that an open season in the next year will be impossible. It seems certain that the fostering of a trade, particularly of an export trade, would depend much upon regularity of supply, and that is one of the most difficult problems, as it seems to me, that has to be solved. I do not know what the experience of the Australian States has been in this matter. It would be of the greatest service to have this information when deciding upon what steps are to be taken.

With regard to the amount of the license fee payable by a trapper I have been in some doubt. During the earlier part of my investigations on this subject I considered that a trapper, having a very lucrative occupation in virtue of his license, should pay a license fee of not less than £5, the amount to go towards defraying the cost of ranging; and I also thought that the registered dealer should pay a royalty on all skins which he bought. With regard to the first point, a discussion with Constable Heywood and Mr. John Calder, of Owaka, convinced me that a heavy license fee would lead to one man taking out a license and working in conjunction with perhaps a number of unlicensed men. I think that the objection is valid. I have therefore recommended the trapper shall pay £1 for his license, and that the Government should depend for the necessary contribution that the opossum trade should make to the revenue mainly on the sale of trapping-rights for trapping Crown lands, for which rights payment might, if it were desired, be made in skins.

The royalty which might be payable by the dealer is, I now think, inadvisable, seeing that no inducement whatever should be placed in the hands of dealers to give other than a perfectly honest statement of the number of skins they handle. On the other hand, Mr. E. C. Govan, of Te Anau, who has had much experience both as a trapper and as a fur-buyer, is strongly of opinion that no license fee should be charged to the trapper, and that no charge should be made for trapping-rights on Crown lands, but that dealers should pay a sufficient royalty on all skins they handle.

The possession of skins during the currency of a close season, except in the case of registered dealers, and, so far as the days of grace at the beginning of the close season are concerned, except in the case of licensed trappers, shall be held to justify prosecution if the police think that the circumstances warrant it; and the onus of proving that possession is not unlawful shall be upon the defendant.

Registration of Dealers.—The Otago Acclimatization Society in March, 1912, drew up proposed regulations with regard to the registration of dealers and to the licensing of trappers, so far as the Otago District was concerned. I base my proposal for the registration of dealers upon these regulations, a copy of which I append to this report. I recommend that all buyers and sellers of opossum-skins should be registered as dealers, the registration being without charge. Registration should involve the obligation to register all skins purchased, the name of the person from whom each purchase was made, and the number of his license. Further, the register should show correctly the number of skins imported from the Australian Commonwealth, the entry being made immediately on landing. The register should also show how all skins, whether imported or purchased locally, are dealt with. Police officers and officers of the acclimatization society charged with that duty should have at all times the right to inspect any register. Irrespective of any inspection, every registered dealer should within fourteen days of the close of an open season forward to the Hon. the Minister of Internal Affairs a copy of the entries in his register so far as opossum-skins are concerned for the preceding twelve months.

Fruit Districts.—In any district that has been declared a fruit district any resident may kill opossums at any time without penalty, on condition that he immediately report the killing to the local Postmaster on a form obtainable at any post-office. If he removes the skin to another fruit district he must in like manner report the possession of the skin to the Postmaster in that district. Any person found in possession of unreported skins should be liable to a heavy penalty upon conviction. Every Postmaster in a fruit district should, on the 1st day of each month, send to the Hon. the Minister of Internal Affairs a return showing the names of persons reporting the possession of skins during the previous month, and the number of skins that each person named in the return has reported. Skins from fruit districts should be sold only through the fruitgrowers' association of the district, and only then provided that that association registers as a fur-dealing organization under the provisions of the previous paragraph. A district in which opossums were troublesome might be proclaimed a fruit district even if fruitgrowing were not a principal occupation of the settlers.

The harbouring of opossums within a fruit district should be made punishable. A difficulty will certainly arise from the existence of unprotected fruit areas in proximity, in some cases, to protected forest areas. Mr. Tripp's suggestion to deal with this is by the issue of permits to kill, the skins being handed over to the local authorities or to the acclimatization society of the district. In my opinion, the owner of the land should have undisputed right to skins of opossums killed on his land. Difficulty

would be much lessened if some way could be devised of marking undressed skins submitted to local authorities for the purpose.

Mr. Dasent, secretary to the Wellington Acclimatization Society, and with him Mr. Willson, the society's ranger, do not think the difficulty of possession a serious one. If an opossum-trapper poaching a protected area has a base in an open district his movements would soon become known to the ranger, and steps could be taken to watch him. Nevertheless, it seems to me that in some districts the difficulty may be a serious one.

Regulation and Legislation.—If the value of the opossum trade is recognized, then it will be seen that there is a necessity for heavy penalties for those who deliberately break the law. At present an opossum-poacher is an offender against what is regarded as a game law, and he often receives a considerable amount of sympathy, concealed or unconcealed. In many cases he is in little danger of a serious punishment. The stealing of opossums ought to be regarded as an offence no less serious than the stealing of sheep. It is probable that to make this view effective legislation would be needed. I do not know whether all opossums are now the property of the Crown, or how far they vest in acclimatization societies, or what rights the landowner has. I think opossums should be the property of the Crown, which should give to landowners such rights upon such payments as shall from time to time be fixed by regulation. If legislation is needed it should, in my opinion, be enacted at the earliest possible date, and in the meantime the best regulations that the present law permits should be brought into operation. If a definition of "opossum" is wanted it should probably be as follows: "Opossum," or "Australian opossum," shall mean a member of the genus *Trichosurus*, whether *T. vulpecula* (either grey or brown) or the short-eared *T. canina*.

XII. CONFERENCE.

It is of the utmost importance that every step in the initiation of what ought to prove a most valuable trade shall be taken as carefully as possible, nothing that can be foreseen being left to afterthought. I recommend, therefore, that the proposals I am submitting, and with regard to which I have already consulted many men who have knowledge, should be discussed by a conference of representative men who know. Such a discussion may show weaknesses or omissions that individual consultation has failed to discover. The proposed conference should, I think, be constituted somewhat as follows: A representative of the Internal Affairs Department; a representative of the Forestry Department; a representative of the Lands and Survey Department; a representative of the Horticultural Division of the Agriculture Department; a professional member of the Crown Law Department; two representatives of acclimatization societies; two representatives of the fur-dealers of Dunedin; two rangers, or ex-rangers, chosen by the acclimatization societies; Ranger O'Neill, Crown Lands Ranger of Otago; a representative of the Fruitgrowers' Federation; and, finally, Constable Heywood, of Owaka, who has had much experience of the difficulties that at present exist. A man with practical experience in trapping, or perhaps two such men, might with advantage be added to the conference. I suggest Mr. John Calder, of Catlin's, and Mr. E. C. Evans, of Orari Gorge. The Department of Internal Affairs should appoint the chairman, either from the personnel of the conference or not, and should attach to the conference a stenographer. I think that I could be of some use on such a conference if it could be held at a time when I could attend. Reports on the opossum question in the Australian States should be available.

The conference should report especially on the date and duration of an open season, on the question of licensing regulations, and on the development of the trade generally, the proposals that I have submitted serving as a basis of discussion. The meeting could take place in Wellington or in Dunedin—preferably in Wellington—and the work could probably be concluded in two or three days. The cost would probably be from £150 to £200.

XIII. CONDITION OF OPOSSUMS AT VARIOUS SEASONS.

I make the following suggestion with a view to determining with some certainty what is the best time for an open season, although not with a view to postponing the declaration of an open season in May, June, and July of this year if the rangers recommend it and if the present law permits it. The suggestion is that from three districts of New Zealand—Paraparaumu, Orari Gorge, and Catlin's district—opossums should be sent to Wellington, dead or alive, in each month from March to September inclusive. Six opossums should be sent from each district to ensure the likelihood that both males and females would be present and that animals of a fair average condition are sent. If these animals were sent immediately to me I could make the necessary examination with regard to the state of gestation or the actual development of the young. This is very important in view of the desirability of fixing an open season, if possible, so as to obviate the destruction of young animals, while at the same time securing skins at their best or nearly their best. The skin of each animal could be numbered or branded. The necessary notes as to the condition of the animal and the skin could be registered, and the skins could then be preserved for reference in the settling of doubtful questions.

In addition to the expense that would be involved in the sending of these animals to Wellington, it would be necessary to provide some one who could immediately come to Victoria College to skin them on my telephoning him, and to provide for the tanning of the skins. In addition to the obvious advantage in the interests of humanity and economy that such a course might ensure, the possession of typical skins taken at various times might conduce to the settlement of questions arising in legal actions with regard to skins.

XIV. GREAT ALPINE RANGE.

The Otago Acclimatization Society and other bodies have urged upon the Government in the past the desirability of stocking with opossums the forests on either side of the Great Alpine Range. I strongly recommend this course. Here are great areas of forest, much of which will never pay for felling or milling on account of inaccessibility and the broken nature of the country, and in some cases of the low milling-value of the accessible timber. The country should suit opossums well. It might be made a great fur-bearing country, enabling the fur trade to reach proportions at least equal to those attained by the Tasmanian trade—say, over £200,000 a year.

The animals to be liberated in the area should, if obtained in New Zealand, not be taken indiscriminately from all districts in which opossums are now found, but only from places where the stock is particularly good, as Stewart Island. Undoubtedly the best plan, and one that would conduce to the greatest permanent advantage, would be to obtain from Tasmania as many "mountain black" opossums as are necessary. This would be more expensive than the plan of liberating animals trapped in New Zealand. Transport would be more expensive, there would be mortality on the road, and there would be at least a royalty to be paid to the Tasmanian Government; but the results would certainly justify the additional expenditure. I suggest that about five thousand animals should be liberated, not of necessity all in one year, and I estimate the cost at about £7,500.

The animals obtained should be liberated in fifties or in hundreds at different places on both sides of the range, the localities chosen generally being about twenty miles apart. On the western side liberation would be most easily effected by a steamer landing at different suitable places. The opossums should be liberated, generally speaking, not in the immediate neighbourhood of settlement, but as far back as possible. Every centre of liberation should be chosen with regard to the natural boundaries that would tend to limit distribution. Thus, if the locality has on either side of it two broad rivers running up near to the snow-line, that would be an insular locality so far as the opossums are concerned. They might accidentally be transported out of this locality by flood or otherwise, but they would not be likely to distribute themselves voluntarily. Also, an extensive tract of open country should be considered a barrier. The animals should be so liberated that every isolated tract should have a centre of liberation, and where there are large unisolated tracts there should be several centres of liberation.

It is safe to say that the stocking of this subalpine area, if carried out on the scale mentioned, would prove to be a remunerative investment probably within a score of years. The brown or "black" opossum is a more valuable animal than the grey, owing in part to its larger size, in part to the quality of the fur being generally better.

The proposal to stock the Great Alpine Range with opossums brings up the question as to whether opossums would succeed in the pure beech forests that form so important a part of the forest covering in the mountain country. As opossums were reported to be numerous and on the increase at the head of Lake Wakatipu, I made careful examination of typical localities at Mount Alfred and the Routeburn Valley, the valley of the Rees, and the Lower Dart generally. I found no evidence that opossums were numerous. About Paradise they are evidently present in fair numbers. In the Rees and the Routeburn Valleys very few traces were found. I did not see any opossums in this district, but the skins are said to be good.

That opossums can maintain themselves in a beech forest is certain, but I am unable to say whether such a forest is as suitable as a mixed forest. Mr. Sadd, Commissioner of Crown Lands at Dunedin, informs me that opossums are numerous and flourishing in a beech forest on the Lees River, near Brightwater, in the Nelson District. I had not time to visit this district.

Among the advocates for stocking the Great Alpine Range before declaring an open season is Mr. Thomas Telford, of Otanomomo, a well-known and successful animal-breeder, a successful farmer, and one who has preserved a bush well stocked with opossums, which he has always done his best to protect—a man, in short, thoroughly well qualified to speak. He points out that in his own bush, as at Catlin's and other places, opossums could now be secured easily for liberation in various parts of the Central and West Coast forests, but if an open season is first declared it would be more difficult to obtain the animals for liberation; that once an adequate number have been liberated an open season could be declared without interfering with the increase in the newly stocked areas, which would not be trapped for many years, at all events not until opossums became so numerous there that there would be an inducement to the trapper to follow them into the remote forests found difficult of access.

If my suggestion to import "black" opossums from Tasmania for stocking the Alpine Range be given effect to there is no need to consider the objection stated above. If the range is to be stocked by means of opossums obtained in New Zealand, the objection is worthy of the gravest consideration.

There are certain considerations to be taken into account: (1.) It is generally advisable when a state of indifference to law exists to end that state as speedily as possible. In particular, it is advisable that at the earliest possible date a band of men should find their interests on the side of the law instead of opposed to it. (2.) The value of skins has never been so high as it is now, and therefore the present is a better time than there has ever been for formally entering the world's market. (3.) The bulk of the export trade is with America, and the world position in respect of trade makes it of great importance just now that we should sell to America and not merely buy from her. It seems to me that an open season should be declared as soon as possible, not applying to any district in New Zealand from which opossums for the Great Alpine Range are to be taken. These should be taken and liberated at the earliest possible date. This is on the supposition that opossums are not to be obtained from Tasmania.

XV. SUMMARY.

I may summarize the conclusion I have come to in the following fashion:—

Damage is done to orchards. Districts in which fruitgrowing constitutes an important industry, and perhaps certain other districts, should be declared "fruit districts," with a perpetual open season under the rights and restrictions referred to in Section XI.

Although plantations are liable to suffer, as in South Australia, from attack by opossum, New Zealand bush does not suffer appreciably, and can be heavily stocked with opossums without endangering its existence or even its welfare (Section V).

The opossum trade is already a valuable one, almost certainly not less than £15,000 a year, and could be made many times more valuable if developed (Section X). To develop it the following steps are recommended: The institution of an open season when this is recommended by the rangers; the issue of licenses to trappers, the license good only for the open season; the institution of penalties for unlicensed trappers; revenue to be derived from the license fee, and from the sale of trapping-

rights on Crown lands, perhaps from a royalty paid by owners of opossum-bearing bushes; only registered dealers to buy skins; the revenue derived by the Crown to be devoted for some time to the development of the opossum trade and to the conservation of forests by increased ranging.

Finally, the Great Alpine Range should be stocked as soon as possible, preferably with a new stock of best Tasmanian brown or "black mountain" opossums imported for the purpose.

XVII. ACKNOWLEDGMENTS.

In obtaining the information for this report I received very valuable help from gentlemen in various parts of the Dominion. Among these I may mention the following: Messrs. G. A. Cawkwell, B. F. Cranwell, and H. H. Ostler, of Auckland; Messrs. W. Hooton, H. Day, and other settlers of the Albany district; Mr. L. O. Tripp, president of the Wellington Acclimatization Society; Mr. Dasent, secretary of the Wellington Acclimatization Society; Mr. Willson, ranger to the Wellington Acclimatization Society; Mr. T. W. Kirk, Department of Agriculture, Wellington; Mr. Phillips Turner, Forestry Department, Wellington; Dr. Bennett, of Kapiti Island; Dr. Teichelmann, of Hokitika; Mr. King, president of the Acclimatization Society, Hokitika; Mr. R. S. Galbraith, Commissioner of Crown Lands, Hokitika; Mr. Anderson, Forest Ranger, Hokitika; Mr. McKenzie, Superintendent of Reserves, Wellington; Messrs. A. J. Blakiston and E. C. Evans, of Orari Gorge; Mr. G. W. McIntosh, president of the Otago Acclimatization Society; Mr. Sadd, Commissioner of Crown Lands, Dunedin; Mr. O'Neil, Crown Lands Ranger, Dunedin; Mr. Stewart, of J. K. Mooney and Co., Dunedin; Messrs. Walters and Ritchie (Walters, Ritchie, and Co.), Dunedin; Mr. James Begg, of Roslyn, Dunedin; Mr. Thomas Telford, of Otanomomo, Balclutha; Messrs. James D. and John Calder, of Catlin's; Mr. Chesney and Mr. James Nelson, of Owaka, and other settlers of the Catlin's district; Mr. Alex. White, of MacLennan, Catlin's; Mr. R. S. Black, of Messrs. R. S. Black and Co., Dunedin; Mr. R. C. Covan, of Te Anau. If this report proves to be of service it will be largely, if not mainly, because of the help and information given by these gentlemen.

H. B. KIRK.

APPENDICES.

APPENDIX A.

TRAPPING OPOSSUMS, AND METHOD OF PREPARING SKINS: NOTES BY MR. E. C. EVANS, OF ORARI GORGE.

THE opossum is a very easy animal to trap. The best trap for sale at present for catching the opossum is the American jump trap. These traps are not as severe as the ordinary rabbit-trap. In setting the trap, drive a nail in a tree about 2 ft. from the ground, and bait it with a piece of apple or carrot. Set the trap immediately below the bait and about 6 in. from the base of the tree. The trap need not be covered. Be careful that the ground round about the trap is clear of all sticks. If this is not done the opossum, when in the trap, will gather them in in his struggles, and the result will be that those sticks will strip the fur from him. A large number of skins are spoiled through this.

The best and easiest way to kill an opossum in a trap is to stand behind him with a pea-rifle, entering the bullet behind the head and to come out between the eyes. If this is done properly the opossum will die immediately. When dead, take him from the trap and hang him up by one of his back legs, and leave him until quite cold. Do not touch his fur while he is warm, as it will come out very easily. The method of skinning an opossum is to lay him on his back, legs up; run knife from tip of tail up middle of belly to mouth; cut from one back foot to the other, and the same on fore legs; clear skin from legs and belly; clear skin from head and pull back, finishing off at tip of tail; be sure to fold fur in and grip fleshy part of skin when pulling.

To stretch skins, tack them out on a board, fur down. Do not stretch much—the more they are stretched the more open it makes the fur. After they are dry, take a scraper and clean all grease and particles of flesh off skin. The better the skin is cleaned the better it will keep and the more it is worth.

APPENDIX B.

NOTES ON KILLING OPOSSUMS, BY H. H. OSTLER, LL.B., AUCKLAND.

The two following methods of taking opossums have been proved by me to be very successful.

1. Opossums come out at night and feed on the grass along the edge of the bush. If one looks carefully he will observe their droppings on the grass and the logs along the edge. I have known them travel as far out as a quarter of a mile, but never farther. When disturbed while thus feeding they will run for the nearest cover, and if too far from the green bush they will run up the nearest high stump or dead tree. There they will cling with their claws, looking down at the disturber. If a .22 rifle is used it will be found impossible to see the sights, and therefore impossible to kill the opossum cleanly. If, however, an electric torch is taken and held in the left hand alongside the barrel of the rifle, it will not only light up the sights, but the light will reflect in the eyes of the animal, which show like two rubies. It thus makes a perfect mark, and it is easy for any fair shot at such short range to hit it in the head and kill it cleanly. A quiet dog will greatly assist, for he takes the opossum by surprise, and it makes for the nearest stump or dead tree and does not try to run for the bush. On one occasion the writer, with a setter dog, a .22 rifle, and an electric torch, got seventeen opossums in one evening. The dog set them and drew quietly on to them as though they were pheasants, and they never seemed to become aware of him until he was so close that they scrambled up the first available high stump or dead tree. Lyman sights are no good for this method of shooting, as the back sight is too far behind the light of the torch to be lit up by it. The ordinary V back

sight must be used. Opossums cannot be skinned while warm without destroying the fur. The least pressure while the body is warm brings the fur out in handfuls, and the writer has had several skins damaged while shooting them, in this way : by the animal falling on to a log or root when shot and knocking out enough fur to make a large bare spot on the skin. When shot they should be hung up by the tail and left till next morning, when they will be stone-cold and can be skinned without injury to the fur.

2. The most successful method I ever adopted of taking opossums was by catching them in a noose made of four strands of fine copper wire twisted together. In an opossum bush the animals sleep by day in the forks of the larger trees. They favour those trees which have large bunches of kiekie growing in their forks, and if these trees are examined the marks of their claws can be seen on their trunks. Sometimes a regular track is worn up the trunk. A tree showing such well-worn tracks is selected ; a straight green sapling about 3 in. through and 10 ft. long is cut and leaned against the tree at an angle of about 60 degrees, the top of the sapling being propped against a track. Into the underneath part of the sapling, about 6 ft. or 7 ft. from the ground, a stout staple is driven. The snare, which is made exactly like a rabbit-snare, is attached to this staple by a stout piece of twine. If the end of the snare is attached directly to the staple, when the animal is caught in it his struggles twist the wire and it is apt to break, but the twine will twist without breaking. The snare is set up on the top side of the sapling and at right angles to it. The loop should be about 4 in. or $4\frac{1}{2}$ in. in diameter and round in shape, and about 1 in. from the sapling. It should be placed so that an opossum running along the sapling will thrust his head through it. His momentum draws the loop tight round his neck and jerks him off the sapling, from which he hangs to the staple and is very quickly killed. On the first occasion on which the writer tried this method he spent an afternoon in the bush and set twenty-five snares. The next morning, on visiting the snares, he found twenty opossums hanging dead, neatly caught round the neck, with no mark of violence on them and the skins in perfect condition. Moreover, every animal was stone-cold and could be skinned at once, thus showing that they had been caught early the previous evening. The snares were reset at the same trees without moving the poles, and next morning again there were fourteen dead opossums. We never tried them for the third night, as our leave was up. But the snares can be reset at least once with fair prospects of success. One of the snares had been set rather low, and the animal caught in it on the second night had, apparently while still warm, been clawed by another opossum from the ground, and its skin had consequently been ruined. The snares should be set so that the lowest part of the animal when hanging will not be less than at least 3 ft. or $3\frac{1}{2}$ ft. from the ground.

This method was found far more successful than ordinary rabbit-traps. It is also far less cruel, and far cheaper. One of the disadvantages of the rabbit-traps is that when the opossum is found in it in the morning it is alive, and must be killed, but it cannot be then skinned, and a further visit is required when it has grown cold, to recover the skin.

APPENDIX C.

PROPOSED REGULATIONS, OTAGO ACCLIMATIZATION SOCIETY, 28TH MARCH, 1912.

1. Licenses to take or kill opossum in the Otago Acclimatization District shall be issued by the secretary of the said society subject to its approval of the applicant.
2. This license authorizes only the holder thereof to take or kill opossums by means of shooting or trapping only.
3. No right of entry upon any property in pursuit of opossum is conferred by this license without the permission of the owner or occupier thereof.
4. All opossum-skins taken in terms of this license may be sold only through registered dealers, who shall keep a register of all skins purchased, with the number and name of holder of the license from which the skins are purchased.
5. Any person may be registered as a dealer in opossum-skins upon application to the secretary of the Otago Acclimatization Society, without charge other than the obligation to keep a register as above provided for, which register shall at all reasonable times be open for inspection by every ranger, police officer, and officer of the Otago Acclimatization Society ; and every registered dealer shall, within fourteen days after the close of the season on the 31st July, forward to the Hon. the Minister of Internal Affairs, with a copy to the Otago Acclimatization Society, a return of the names of license-holders from whom purchases have been made and the number of skins purchased by them.
6. Every person who shall take or kill opossums without having first taken out a license as hereinbefore provided shall upon conviction be liable to a penalty of not exceeding £20 and not less than £5 ; and every dealer failing to register and comply with these regulations shall be liable on conviction to a fine of not less than £2 and not any more than £20.

Any property-holder destroying opossums on his or her property by reason of their being a nuisance in terms of section 34 of the Animals Protection Act, 1908, or amendments thereof, shall not be authorized to dispose of the bodies and [or] the skins of opossums so destroyed without first having taken out a license at the aforesaid fee of £3 ; and no person acting under appointment of any *bona fide* occupier of any lands in terms of regulation per *Gazette*, 1904, Vol. i, p. 1248, shall be authorized to dispose of the bodies and [or] skins of opossums so taken without first having taken out a license as aforesaid at a fee of £3, subject to the penalty provided for in clause 6 of these regulations.

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