

SOME PROBLEMS IN THE CONTROL OF WILD AND DOMESTIC ANIMALS IN A CRITICAL HYDRO-ELECTRIC CATCHMENT*

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Summary

The valleys of the Avoca and Harper Rivers have been used for sheep grazing for nearly 100 years. Red deer, chamois, rabbits, hares and opossums have been present for 40 to 100 years. The total number of wild plus domestic animals now clearly exceed the safe carrying capacity of the land, particularly in view of the use made of the water yield for power generation.

Animal control operations, underway or proposed, are outlined. Drift fences are to be erected for control of domestic stock and huts are to be built at strategic points to facilitate wild animal control. Pellet lines have been established and these will provide much required information relative to the seasonal movements of the various groups of animals and to the population densities of each from point to point. This information will permit the design of appropriate control measures and assessment of their effectiveness.

...Herd studies (deer and chamois) are also under way for determination of herd structure, range, productivity, behaviour, forage habits, etc., and it is thought that this work will produce facts applicable over a far greater extent of country.

Introduction

The Harper-Avoca story is a well documented one. For these river catchments records of land-use and of domestic and wild animal stocking are probably more complete than for any other South Island catchments.

The first fires, in European times, were set at the Acheron Stream by Stoddard in 1851 (Packard 1947), and the first sheep were depastured in the area by G. A. E. Ross in 1858 (Dick 1948). Samuel Butler visited the Avoca in 1860 and records firing the tussock for the first time (Packard loc. cit.). Further fires, in accordance with the standard practices of the period, burned at intervals over the next 50 years. There are many traces of extensive fires during the decade 1900-1910.

Red deer (*Cervus elaphus*) were liberated in the nearby Rakaia Valley in 1897 and again in 1901 and are thought to have entered the Avoca and Harper Valleys about 1910. Chamois (*Rupicapra rupi-*

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capra) liberated at Mt. Cook in 1907, probably did not reach the Harper until the late 1920's. About 1928-29, the Rakaia catchment was shot by the Muir Bros. for the Acclimatisation Society and although actual tallies are not known they are described as enormous (Boyd 1956). In 1939, the Department of Internal Affairs turned its attention to the Harper-Avooca and destroyed 700 deer and 200 chamois. In 1941, a further 880 animals were shot; in 1951, 300; and in 1953, in the first intensive hunting trial, 346 deer and 64 chamois were destroyed in three weeks by the author and three hunters. In addition of course, many animals have been shot by private hunters and by station employees, particularly during the years of high skin prices. At present the deer population appears as great if not greater than the 1953 population. The chamois population has definitely increased.

That the rate of population increase indicated by these figures is a purely local phenomenon, i.e., that it is not to be accounted for by mass immigration of animals from neighbouring valleys, appears certain from the tallies of animals shot in the adjoining Waimakariri-Wilberforce Valleys over the same period. The headwaters of the Waimakariri have been shot in spring each year for the past five years, with 150-200 kills each season. There have been no sudden peaks in tallies. Results of operations in the Wilberforce have been comparable.

Some movement of animals must normally take place between these various catchments but this can be described as a slight leakage, not a cascade. Mass movement may take place during early stages of animal dispersion but is not a feature of the present situation.

Opossums (*Trichosurus vulpecula*), are not a serious problem in the Harper and Avooca valleys. Their probable spread has been from a liberation at Whitecliffs in 1890 where 22 were released (Kean and Pracey, 1951). They are present throughout but in no great numbers. They are not known ever to have been a cause for concern in forest of the type found in the Harper and Avooca—pure mountain beech forest.

The dates of entry of rabbits and hares are not known but, with the long continued burning and grazing of the tussock grasslands, ideal habitat conditions for these animals have been created. Hares are now well out of control with no immediate prospect of control. Rabbits are locally numerous though confined in the main to the river flats where they compete with sheep on the critical winter range. Rabbit populations are subject to the normal wide fluctuations, the present trend being upwards.

The Present Animal Problem

During the summer months (December-April) sheep graze above the highest limits of fencing at altitudes of 4,000 ft. or more, in direct competition with chamois, deer and hares. For these months

grazing pressure is most intense where the vegetation is weakest and erosion, both normal and accelerated, is most active. Whenever there is a sharp drop in temperature, heavy rain, snow, or strong wind, the animals move down to the timberline, working their way down avalanche shutes, slides and gullies, and grazing pressure at the forest margins is extreme. After the autumn muster the sheep are confined to the river flats until October, hares also coming down to winter on the flats, hares, sheep and rabbits competing for the sparse winter feed. Deer and chamois remain in the upper levels of the forest for the greater part of the winter, feeding around the edges of slips, shingle slides, and other forest clearings.

In spring, mature female deer and chamois remain within the forest until their young are born, mature male deer feeding around the upper limits of the forest until antler growth is nearly completed when they move from the forest. Male chamois congregate and descend to feed on the river flats in competition with sheep, hares, and rabbits. By December, deer, sheep, chamois, and hares are moving upwards to their summer country above the timberline.

These seasonal movements of sheep have continued for 98 years, with active competition from other animals for nearly half this period. Little vegetation now remains above 5,000 ft. and there is much bare, eroded, and eroding ground particularly at altitudes between 3,000 and 5,000 ft. Animal control measures must be the first step in catchment repair. Without this, no revegetation work can be successful. The trespass of sheep into State Forest can be reduced by the erection of drift fences at points X & Y (see map) and, possibly by the establishment of quick-growing belts of trees across the low ground between the Harper and Avoca Rivers. These, themselves, offer no barrier to sheep movement during periods of low river flow. But control of wild animals is not possible, or is not possible at reasonable cost, without much more information than is at present available concerning their movements and habits.

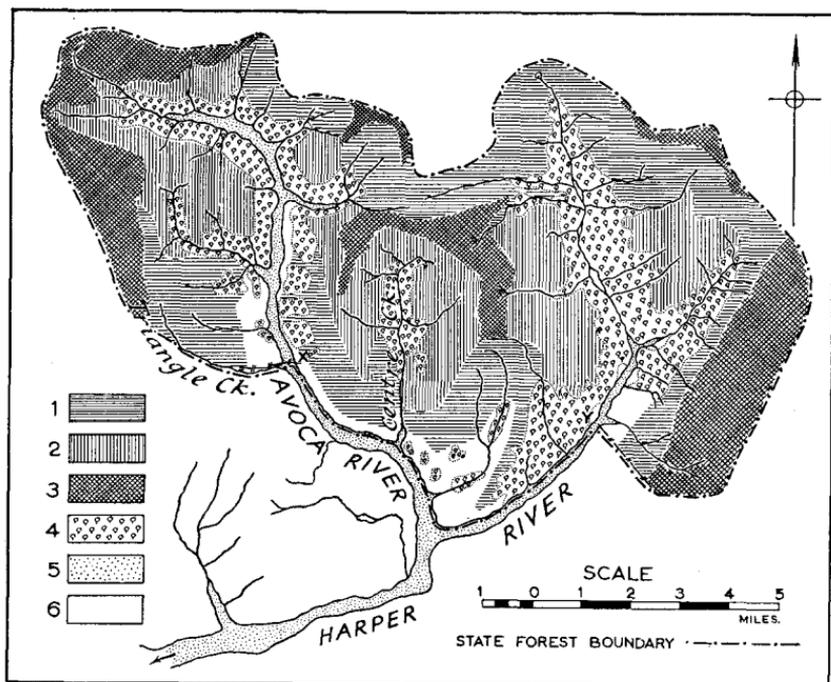
Pellet Line Studies

The pellet count technique is used to gain a knowledge of animal distribution and density. The technique has been described by Riney (1955), and consists in counting all animal droppings present within milacre plots at 20 pace intervals along pre-determined compass lines running up the mountain slopes, pellets being approximately classed as fresh (1 week), medium (1 month), and old (over 1 month). The counts permit ready comparisons to be made between one locality and another and, repeated at intervals, enable herd movements, population density changes, etc., to be followed. A total of 25 pellet lines have been run. They have already provided much information. A few typical items are listed below:

Avoca Valley. Hare densities are greatest in the lower sections

of the valley where sheep densities are highest. Hare densities are also high on tussock grassland now kept heavily grazed by deer, chamois, and hares. Most lines recorded a low opossum density. Lines where droppings were not recorded were solely grassland lines. Opossum distribution appears complete in Avoca forest but without immediate cause for concern. Maximum deer densities are recorded where the lines traverse mixed forest and grassland little grazed by sheep, aspect warm, forest of old age class, remote from casual hunting pressure. Density is much reduced in younger age class forest, on cold aspect slopes, and on fire induced grassland where competition with sheep and hares is extreme. All sheep densities recorded were from trespassing stock.

Harper-Avoca Catchment. Animal Distribution map.



Legend:

1. High country, summer range for sheep, hare, deer and chamois.
2. High tops, summer range for chamois, hares and deer.
3. Rock tops, mainly hare and chamois summer range.
4. Forest, available winter range for deer and chamois.
5. Open river bed.
6. Flats, and easy sloping country, available winter range: lambing country for sheep, and hares.

Harper West. Highest deer densities on relatively easy slopes offering more than normal shrub browse. Aspect not of such importance as in the Avoca. Hare densities restricted except on one line which sampled fire induced scrub and grassland above timberline. Opossum distribution complete but significant on only one line with a possibility of a build up on another. High chamois densities recorded for the eastern slopes of the Grey Range with the highest local densities for the entire Harper-Avoca catchments. Sheep, local trespass grazing in Spring.

Harper East. All lines high deer density. Winter range with adjoining summer range above forest line to east and south. Competition with hares, chamois, and sheep not so marked as in Harper West or Avoca. Maximum hare use made of remnant strips of tussock grasslands above timberline, aspect north. Only one line showed a high chamois density. On southern side of East Harper chamois present at high altitudes in summer but appear to winter over the range in the Craigieburn Valley (Waimakariri Catchment) or well down in the East Harper forests. Opossums present in greater number than elsewhere but still not serious.

The utility of this class of information in the planning and direction of control operations will be evident. As information of this sort accumulates following periodic and seasonal remeasurement of the pellet lines it will be possible to use available man-power to better and better advantage.

Herd Studies

Simultaneously with the pellet line studies, more fundamental research on the deer and chamois herds is being undertaken. By various methods, including observations and counts of all animals seen and autopsies of all animals shot, an endeavour is being made to provide answers to the following questions:

1. *Herd Composition.* What is the composition, by sex, of each age group?
2. *Reproductive Rate.* What number of fawns are born, and raised to yearlings, for each 100 breeding females in each catchment each year?
3. *Fertility.* How many embryos are conceived, aborted, resorbed, born alive, stillborn, for each 100 breeding females? How does fertility vary with age—yearlings, 2-year-olds, mature females?
4. *Condition.* How much kidney, back, and brisket fat is seasonally stored by animals of each age class and sex in each catchment?
5. *Ageing.* What is the age structure of the herds? Teeth formulae will be collected for all animals killed, with information on jaw length, chamois horn growth rings, horn length, and other physical measurements.

6. *Stomach Contents.* What are the staple food plants and seasonal food preferences? Identifiable stomach material will be recorded for all animals killed in support of observations made in other ways.
7. *Seasonal Range.* What are the seasonal movements of deer and chamois? All kills will be pin-pointed on a master map with notes re habitat, type, etc., and checked against pellet line observations.
8. *Disease, etc.* What are normal mortality rates? All cases and causes of death or injury will be investigated—accident, weather extremes, disease, parasite infestation, etc.

When the answers to these questions are known, and pellet line studies have been pursued for some years, enough should be known to permit the forecasting of herd behaviour, herd movements, and probable population increments under varying circumstances; in other words, sufficient for real and effective control.

Application

One concrete example of the application of work of this kind might be given. Riney (loc. cit.) has suggested the application of inter and intra-population condition class differences in herd management work. Condition differences in the adult male, significant at the 5% level, "are considered consistent with the belief that the home range of deer, for the season the sample was taken, was a somewhat localised area, enough so that population on either side of the ridge, the boundary between the Avoca and the Harper, could be treated as essentially different populations and could be studied accordingly." Because of higher condition rating he suggested that the Avoca population is capable of more rapid recovery after the observation that, over a period of years, there had been little free movement of deer noted between Harper and Avoca. Hunting timetables can be adjusted to suit. In other words the Avoca herds must be shot more regularly than the Harper herds and this is not likely to lead to movement of deer between the two.

This kind of information enables better placement of huts, better use of all management resources, and more intelligent design of experimental control measures. Pending the outcome of these research projects, control is at present proceeding on the assumption that herd movement is restricted, for example that intensive hunting can be undertaken in the Harper without danger of mass movement of deer into the Avoca. In fact, it is intended to take this, experimentally, a stage further, hunting small tributary catchments intensively, experimenting with control of deer on one side of a valley, leaving the other side untouched, concentrating on one small side stream, moving two streams on, returning to the middle stream, and so on.

Winter hunting will also be attempted. Snaring has been considered

but is not thought to be immediately practicable under local conditions. The presence of trespassing domestic animals militates against the possible use of lures and poisons. As a general rule it is proposed to shoot hinds and fawn and not mature stags, the principle being that the breeding element of the population should be hit hardest. Exclosure plots and vegetation lines, fully charted and recorded, have been established parallel to the pellet lines for the purpose of measuring the effects on the vegetation of the shooting campaigns (Wendelken, 1956).

In future years it may be best to concentrate all effort on specific herd groups for restricted periods, possibly shooting females only and then only during the rutting season and leaving stags to be dealt with by sportsmen hunters. As experience is gained and research results come to hand, a host of new techniques will be born and tested.

Control measures against chamois pose many difficulties, not the least of which is the difficulty of the country they frequent, particularly in summer. Light weight rifles—a high power, light ball .222 rifle fitted with telescopic sights is under test—will be a help. Carefully sited high alpine bivouacs are needed. Winter shooting in the high snow basins will be attempted. But above all, chamois control is dependent upon acquisition of a better understanding of the animals themselves and of their habits.

Hares will probably, in the long run, be the most difficult animals to bring under control. Poisoning and trapping on the winter range will be attempted. No worthwhile suggestion has yet been advanced for control of hares on their high alpine summer range.

Rabbits can be brought under control using tried and proven methods. Control of domestic animals demands the full and willing co-operation of runholders. Opossums, as already indicated, are unlikely to become a serious menace in these valleys. With a constant check kept on opossums by way of the pellet lines, they will be quickly controlled by local poisoning campaigns.

This is the job in hand in that fragment of the high country, the Harper-Avooca—the job that must be completed before there can be restoration of the vegetation to denuded mountain slopes, before accelerated erosion can be brought to a halt, and the yield of useful water improved.

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