NORTHERN

STEWART ISLAND

WILD ANIMAL SURVEY

1986

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O.D.C. 156.2 (931.7)

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NORTHERN STEWART ISLAND WILD ANIMAL SURVEY 1986

1 INTRODUCTION

During the summer of 1985/86, a wild animal survey of Northern Stewart Island was undertaken by NZFS personnel of the Southland Conservancy.Also at this time a study of forest understorey condition was undertaken in part of the survey area (to be reported on separately).

This was the third such survey carried out in this area. Northern Stewart Island was originally surveyed for wild animals by Southland Conservancy in 1976 as part of a resource survey of forests,grasslands and wild animals (Williamson 1976). The second survey was completed in 1981 in combination with the establishment of permanent vegetation plots to monitor forest condition. (Slater and Cuddihy 1982, Slater 1983).

This report details results of the third and most recent survey (1986).

Recently part of the survey area has been under consideration for Recreational Hunting Area (RHA) status. The area concerned is all the State Forest north of a line from Leask Creek in the west to Ocean Beach on the east coast (Slater and Cuddihy 1982). A number of possible areas of conflict have been identified by Slater and Cuddihy, the main concern being that the central portion of the proposed RHA, but which is not included within the RHA, is Nature Reserve. Previous surveys have shown however, that predominant deer usage is of the coastal areas , the central region being a less preferred habitat. The relative importance of these areas for deer must be examined when considering the RHA proposal.

The role of commercial recovery of deer (which would cease under RHA status) in regulating population levels must also be considered in the proposal.

Maintenance of a healthy protective vegetation cover is of prime importance, hence vegetation assessments have accompanied all wild animal surveys in the area. This report should therefore be read in conjunction with "Forest Condition - N.E. Stewart Island 1986" (Lovelock in prep.).

Aims of the most recent survey were:

(i) To investigate trends in wild animal density and distribution since 1976.

(ii) To reveal habitat preferences of wild animals in the survey area.

(iii) To estimate deer numbers within the survey area.

2 SURVEY AREA

The survey area consists of the entire area of Stewart Island north of a line running from south of Doughboy Bay on the west coast across to Abrahams Bay in Paterson Inlet.This is an area of approximately 83000 ha encompassing a large variety of terrain and vegetation types.

2.1 Climate

Temperatures are cool to mild with few extremes . Frosts and snow occur infrequently.The rainfall averages 1455mm per year at Oban and probably reaches 4000mm in the high country. Precipitation is evenly spread throughout the year.

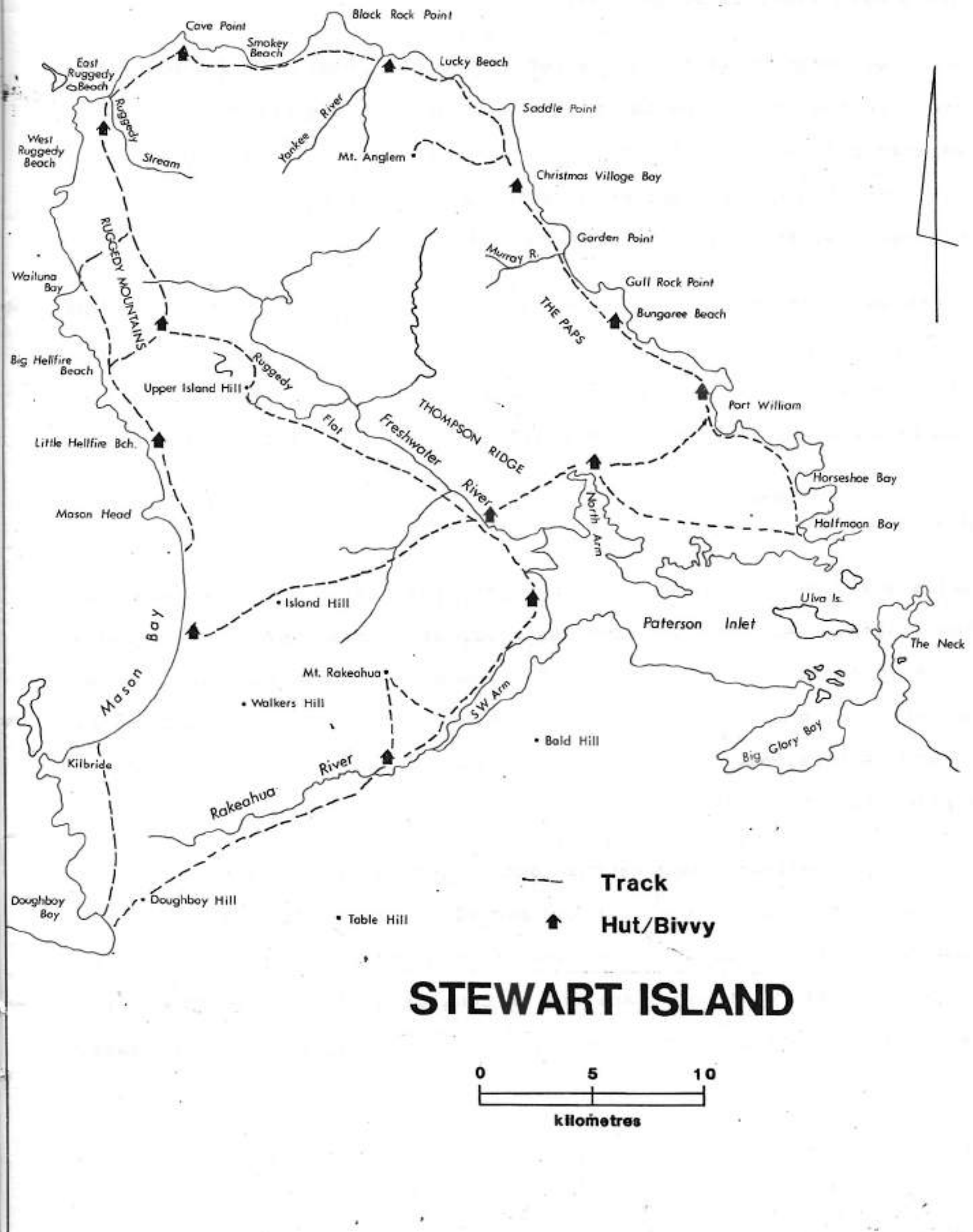
Strong winds, often of gale force, prevail from the west.Easterly storms are less common. The winds bring low cloud, low temperatures and rain to higher areas. The force of the wind is expressed in the plant formation and large areas of wind blown sands on the west coast.

2.2 Geography Of The Survey Area

The survey area is geographically isolated by sea on its western and eastern flanks. Paterson Inlet reaches inland from the east for about 16km, and draining into the head of the inlet are two major watersheds. To the north is the Freshwater Valley and the only extensive area of flat land on the island.On the northern side of the upper valley a number of wide terraces are evident and the lower valley consists of ancient sandunes alternating with extensive swampy areas. To the southwest is the Rakeahua Valley. Mount Rakeahua and its radiating spurs separate this valley from the Freshwater. The western tributaries of the Rakeahua drain the slopes of a block of flat-topped hills which lie between Mason Bay and Doughboy Bay to the

FIG. I

Survey Area



STEWART ISLAND

0 5 10

kilometres

south.

The Doughboy River drains to the west, a catchment of broad-topped hills with steep-sided gullies.

North of Doughboy is the large curve of Mason Bay. A large swampy area inland from the bay drains eastwards to the Freshwater, and is separated from Masons Bay by extensive sandhills up to 120m high.A belt of low hills leads from Mason Bay up to the aptly named Ruggedy Mountains at the head of the Freshwater Valley.

North and east of the Freshwater Valley, a complex of high ridges radiating from Mt Anglem (980m) Little Anglem (740m) and The Paps (600m) reach down to the eastern coast.Thomson ridge (550m), separates the Freshwater from a block of rolling hill country inland from Oban.

2.3 Soils

Soils are formed on diorite north of the Freshwater and on granite to the south. Altitudinal and latitudinal variations to these soils occur throughout.In addition, soils formed on windblown sand occur (mainly in the west) and gley and alluvium soils are found in the inland valleys.Some organic soils on peat deposits occur at higher altitudes.

Podzolised yellow-brown earths occur commonly, intergrading with yellow-brown sands in the west and podzols in the lower Freshwater and Rakeahua Valleys. Gley soils are found in the upper Freshwater Valley. Most erosion scars are of considerable age, recent erosion being limited mainly to areas of wind erosion along the western coast.

2.4 Vegetation

A wide variety of vegetation types clothe the survey area.Principle influencing factors on vegetation type are exposure and drainage. Podocarp-hardwood forest is the predominant lowland vegetation.This forest is dominated by rimu and kamahi.At its upper limit of 300m, forest is succeeded by hardy manuka and low-growing subalpine scrub. Near the coastal shores, the forest merges into a belt of windpruned coastal scrub.

In the Freshwater Valley, the low-lying, wind-swept and often boggy land supports a heath and bog association.

In the exposed western areas, dune vegetation reaches far inland.

The only extensive areas of alpine tussock and elevated bog occur on Mts Anglem and Rakeahua.

For a full description of vegetation types, refer to Slater (1983), "Forests of Northern Stewart Island".

2.5 Modifications To Environment

Due to its isolation, harsh climate and terrain,human changes to Stewart Island have been limited. Logging was undertaken over a limited area, between 1865 and 1930, the largest area of cutover forest lying inland from Oban, east of a line joining North Arm and Port William. This is an area of about 2000 ha. A small block at Murray River was also logged. The timber sought was mainly rimu, miro and totara.Most of the cutover forest has retained its forest structure and is regenerating profusely (Woolmore 1982.)

The Freshwater Valley has had a long history of fires probably dating back to maori occupation.Last century the area was used for grazing sheep and fire was used repeatedly to encourage palatable growth.The last major fire was in 1954 and much of the manuka scrub now present is 2nd, 3rd or even 4th growth. The Rakeahua Valley was also burned but at earlier dates.

Island Hill and Kilbride runs between Mason Bay and Freshwater still supports stock, and up until recently had been burned frequently.This the only extensive area of pastoral land within the survey area. The lease for the Island Hill run is currently being reviewed.

3 HISTORY OF WILD ANIMALS

3.1 Whitetailed Deer

Whitetailed deer (Odocoileus virginianus) were first liberated on Stewart Island at Port Pegasus in the south, in 1905 by the Southland Acclimatisation Society acting for the Government Tourist Department.By the early 1920's the herd (strictly protected at this stage), was reported to be increasing rapidly and spreading throughout the bush covered areas of the island.

Protection of the herd was lifted in 1926, and a bounty of 2/- per tail implemented.

Control was undertaken by the Internal Affairs Department in 1930 and continued up to 1952. Between 1937 and 1952,some 6380 deer (both red and whitetailed) were destroyed (Williamson 1976). Wodzicki (1950) also records that "the bush- dwelling habits of the virginian deer on the island make control measures extremely difficult " and that " officers engaged in deer culling operations in 1937-38 had to admit failure."

Another bounty of 10/- per tail was implemented from 1955-58, and over this period about 2000 tails were submitted, half of these being whitetailed.

From Cockayne's botanical survey of Stewart Island in 1909, before the widespread establishment of deer and possums, it is apparent that the bush environment has been considerably altered. Many plant species listed as common in 1909, because of their susceptibility to browse, now have limited distributions.

Piper (1961) reported that "the interior of the bush is much altered (by deer) ..in most areas, the original undergrowth of ferns, shrubs and seedling trees has gone, and is replaced by the unpalatable hard fern (Blechnum discolor)."He also reported that there was a "marked coincidence between the distribution and concentration of deer , and the occurrence of erosion."

3.2 Red Deer

Red deer (Cervus elaphus) were first liberated in 1901 in the Paterson Inlet area by the Government Tourist Department.The first liberation of six animals were of the Wairarapa herd origin, and the second liberation (1902) from Werribee Park, Australia (Doone 1924). Doone also stated that the spread of red deer was aided by the smaller whitetailed deer opening up the understorey in more impenetrable areas.

3.3 Possums

Pracy (1974), records four liberations of possums (Trichosurus vulpecula) on Stewart Island. In 1890, the Southland Acclimitisation Society released 15 Australian blacks in the hope of estabishing a fur industry. It is likely that many unrecorded liberations were made as well. By the 1920's possums were reported as common throughout the island.

3.4 Other Introduced Ungulates

Feral pigs (Sus scrofa) were released on Stewart Island and recorded by Wodzicki(1950) as being present in low numbers along the northern coast.Wild pigs are no longer found on the island.

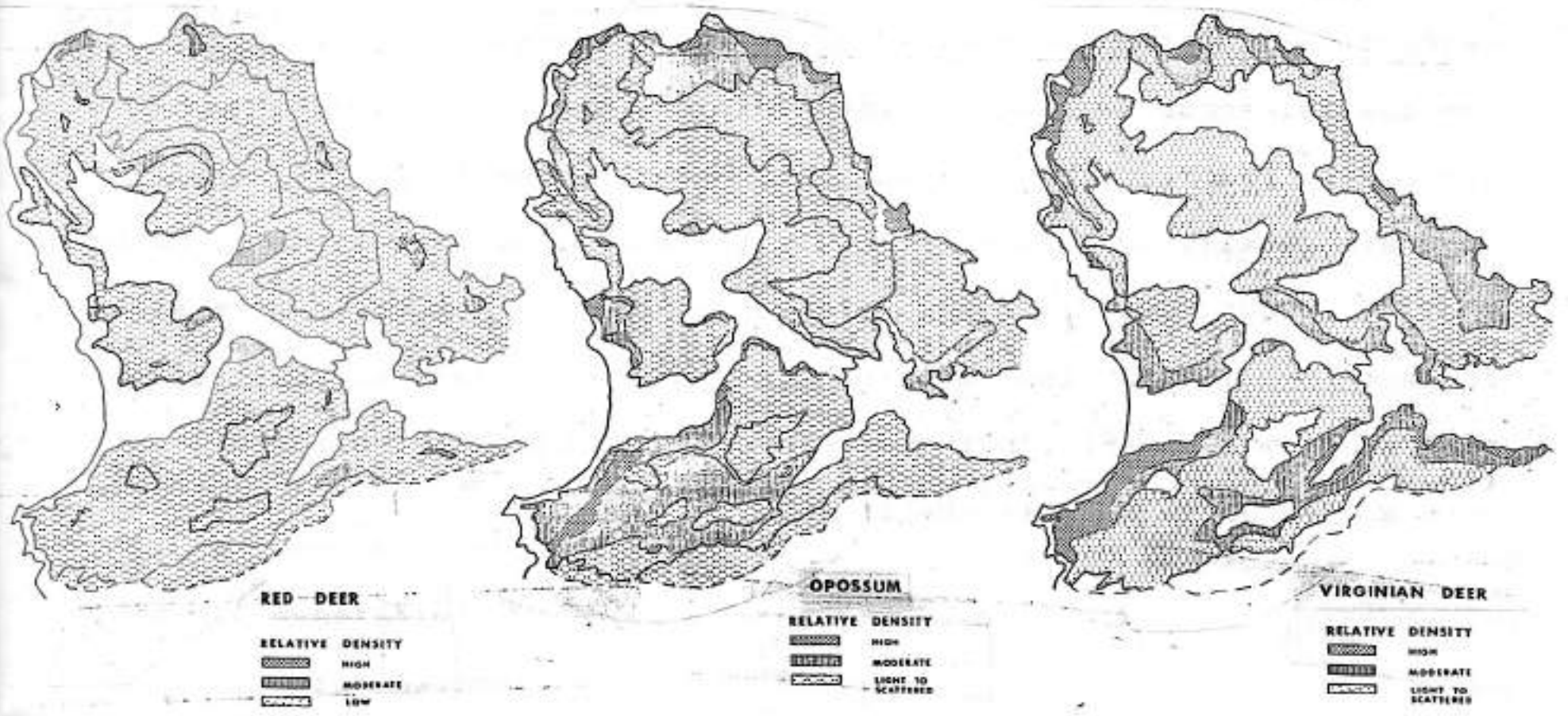
4 PREVIOUS SURVEYS

4.1 1976 Survey

In 1976 a survey of forests and wild animals of northern Stewart Island was carried out (Williamson 1976). Williamson used the faecal pellet count method and found whitetailed deer in high densities in pockets on the west and north-eastern coasts, with the population being concentrated on a narrow coastal strip.Highest densities were obtained at East Ruggedy, Waituna Bay and Mason Bay due to a combination of favourable habitat and access difficulties for hunters.

The favoured vegetation cover was coastal scrub. Cutover podocarp and low altitude rata-kamahi types were also favoured.

Wild Animal Distribution 1976



For red deer, the greatest densities occurred in the Freshwater Valley, but nowhere could numbers be considered high. Red deer were found throughout all blocks of the survey area including areas of subalpine scrub and alpine grasslands. However, the red deer appeared

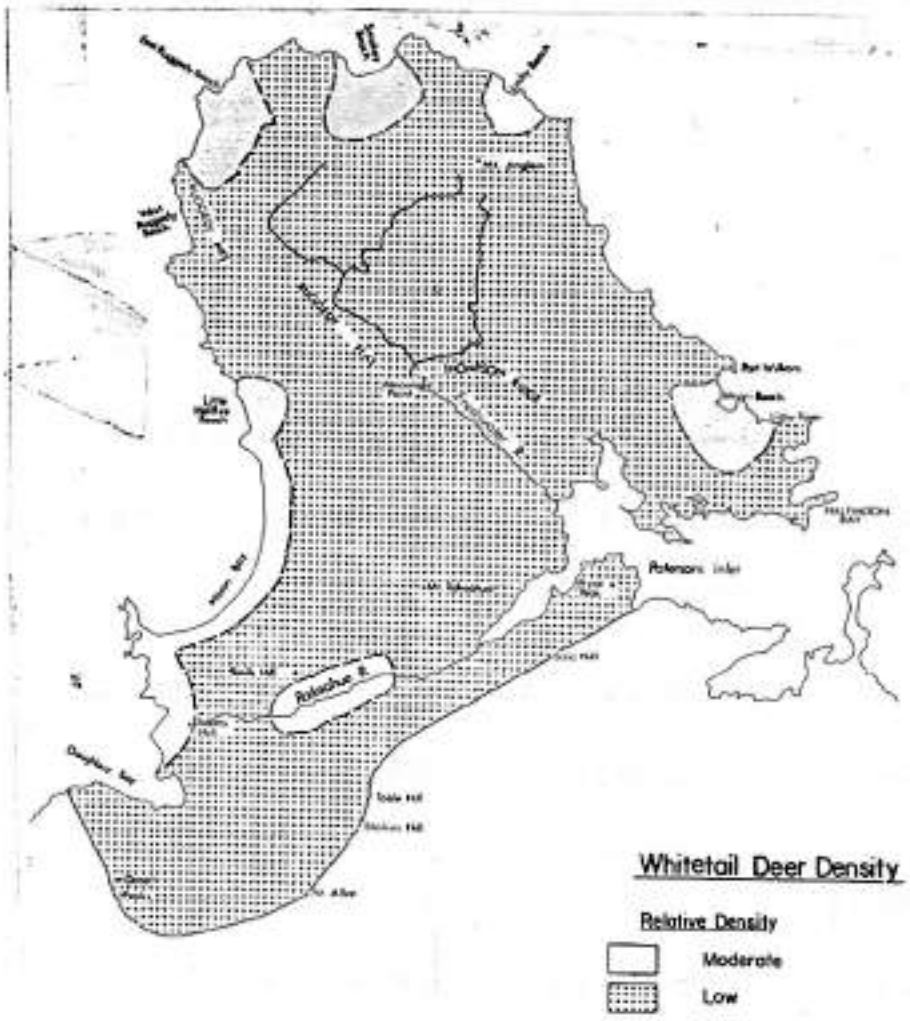
to be in lower densities throughout.

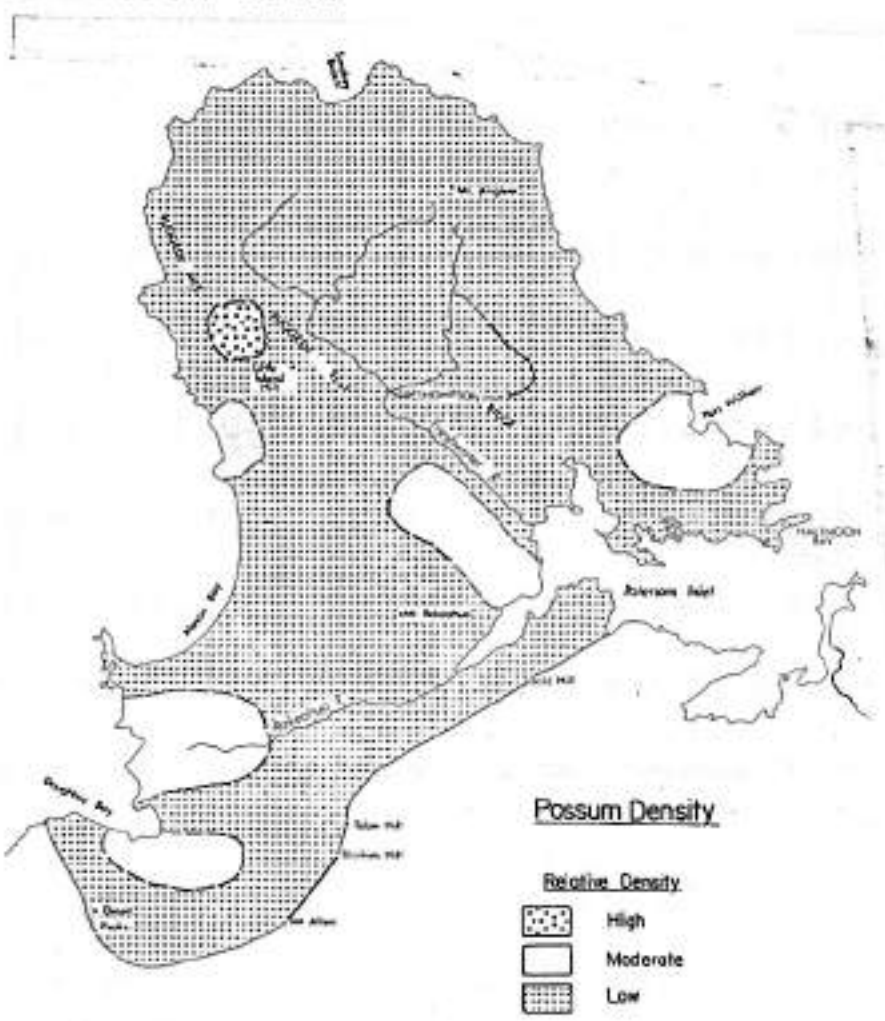
Podocarp-kamahi was the favoured vegetation type. Possums were present throughout the survey area, highest populations being recorded on the west and north-east coasts.The major concentrations were between Saddle Point and Smoky Beach on the north-east coast and along the southern part of Mason Bay. Rata-kamahi and coastal scrub types again returned the highest possum pellet densities.

4.2 1981 Survey

A faecal pellet count undertaken in 1981 (Slater and Cuddihy 1982) showed that in general, whitetailed deer pellet densities were low overall. Densities since the 1976 survey had dropped by 66% overall.The greatest reduction was seen on the west and north-eastern coastlines. Helicopter venison recovery operations and an increase in recreational hunting were cited as probable causes for this reduction. The coastal scrub vegetation type contained such densities that this previously heavily used type was recovering. Some isolated pockets of moderate density were identified along the coastal zone (notably Mason Bay, Ruggedy, Smoky, Lucky and Maori Beaches). Animals were still concentrated in the low altitude forests (coastal scrub, cutover podocarp, rata-kamahi), but there appeared to be an extension of range with a move up to an altitude of 400m.

Wild Animal Distribution 1981





Red deer were present again through much of the survey area but in very low numbers.The Rakeahua Valley returned the highest pellet densities, which were still considered quite low.

The possum was found throughout in generally low densities.The concentrations found on the north and west coasts in 1976 had been reduced to low levels through intensive trapping pressure.Only one pocket of high density was identified - in the upper Freshwater Valley.

In summary, the 1981 survey found deer and possum usage of the forest to be low throughout the entire survey area. Some low altitude and coastal vegetation types were receiving higher usage, but still not to a level which was detrimental to forest health.

5 SURVEY DESIGN AND METHODS

5.1 Survey Design

Faecal pellet count plots were established along a series of transects located throughout the survey area (see figs. 2 and 3 :location of pellet lines). To achieve a comparison with previous surveys,pellet lines from the 1981 survey were used and in areas where increased sampling was desired, pellet lines from the 1976 survey were added.These pellet lines were all originally established on a restricted-random basis. (Now described in Baddeley (1985)).

In addition, a series of shorter transects running from the coast and terminating 800m inland were established on the north-eastern and west coasts. The objective of these pellet lines was to increase sampling intensity in the area of higher animal use as identified by the previous surveys.These coastal pellet lines were also located on a restricted-random basis.

This survey was carried out at the same time of year as the previous surveys to reduce the effects of any seasonal movements of deer on the comparison of results between surveys.

5.2 Field Procedure

Pellet count plots were established at 20m intervals along the pellet lines. Two pellet count methods were employed.

5.2.1 Presence-absence Method - The presence of intact faecal pellets visible above the litter within 1.14m of the plot centre was recorded for deer and possum. An intact pellet for deer was defined as possessing an intact surface coating (see appendix 1 for detailed

FIG. 2 Pellet Transects & Strata

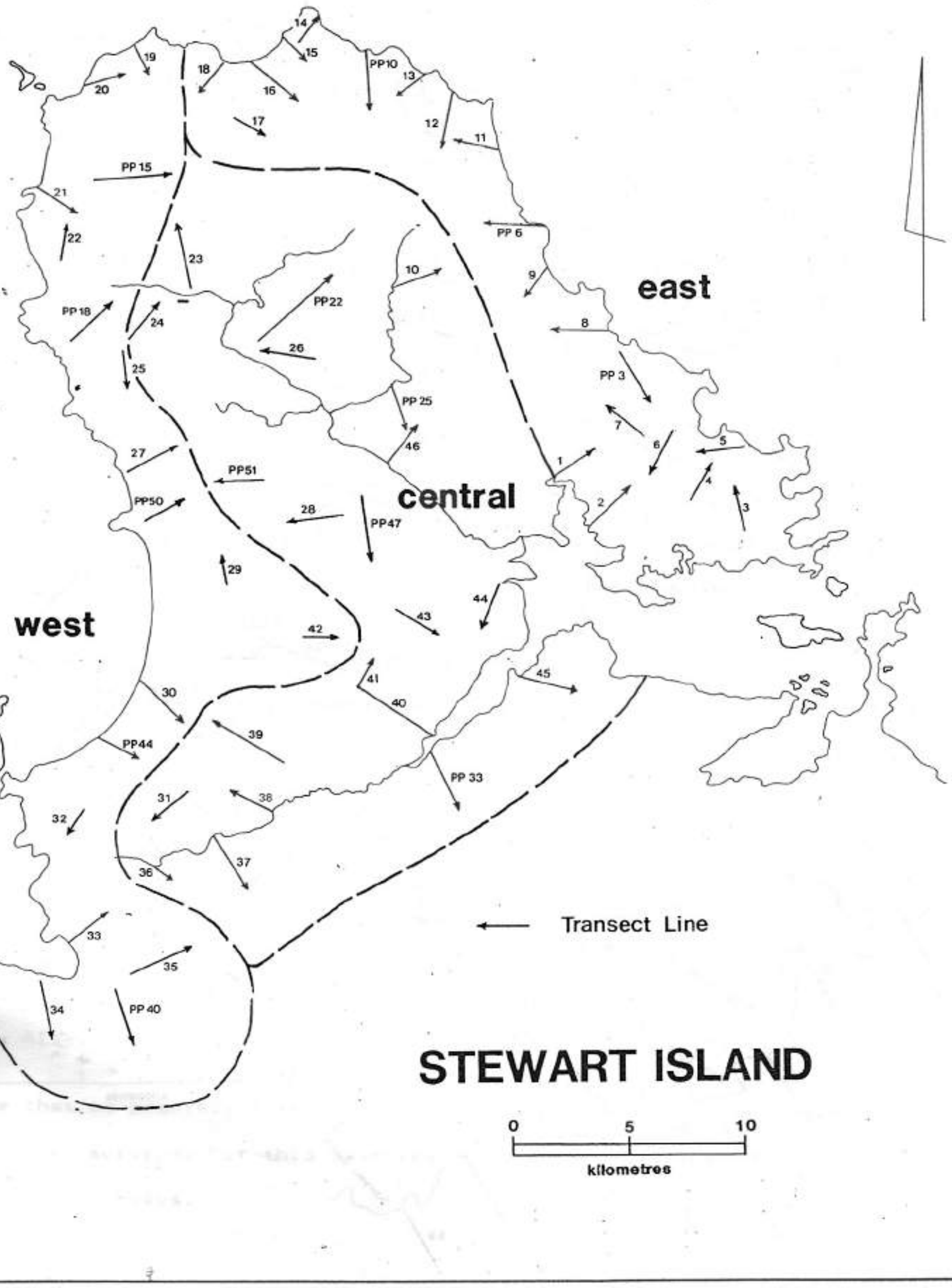
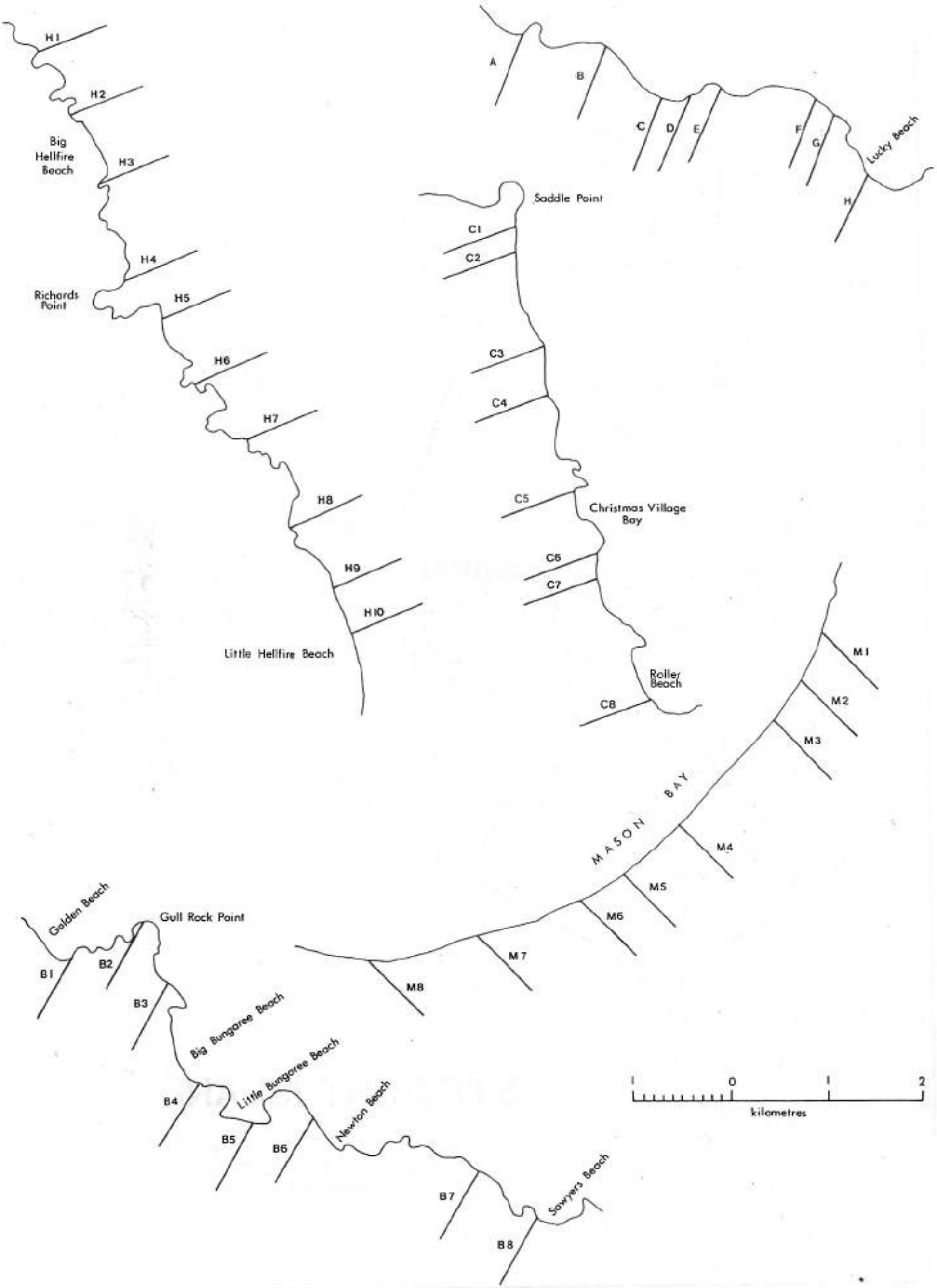


FIG. 3 Coastal Pellet Transects



pellet validity criteria). For possum, the pellet had to be recognizable as having been voided by a possum. Note that this criteria differed from that employed in previous surveys where the pellet to be valid had to retain its sausage-like shape.

5.2.2 Point-distance Method - Distances were measured (horizontally) from the same plot centre as above to thecentre of intact deer pellet groups within 2m, and from the pellet group to its nearest neighbour within a further 2m. An intact pellet group was defined as six or more intact pellets defaecated by one animal at one time (see appendix 1).

Due to anticipated difficulties distinguishing between red and whitetailed deer pellets, pellets from both species were simply recorded just as deer pellets to reduce the error margin during analysis of data.

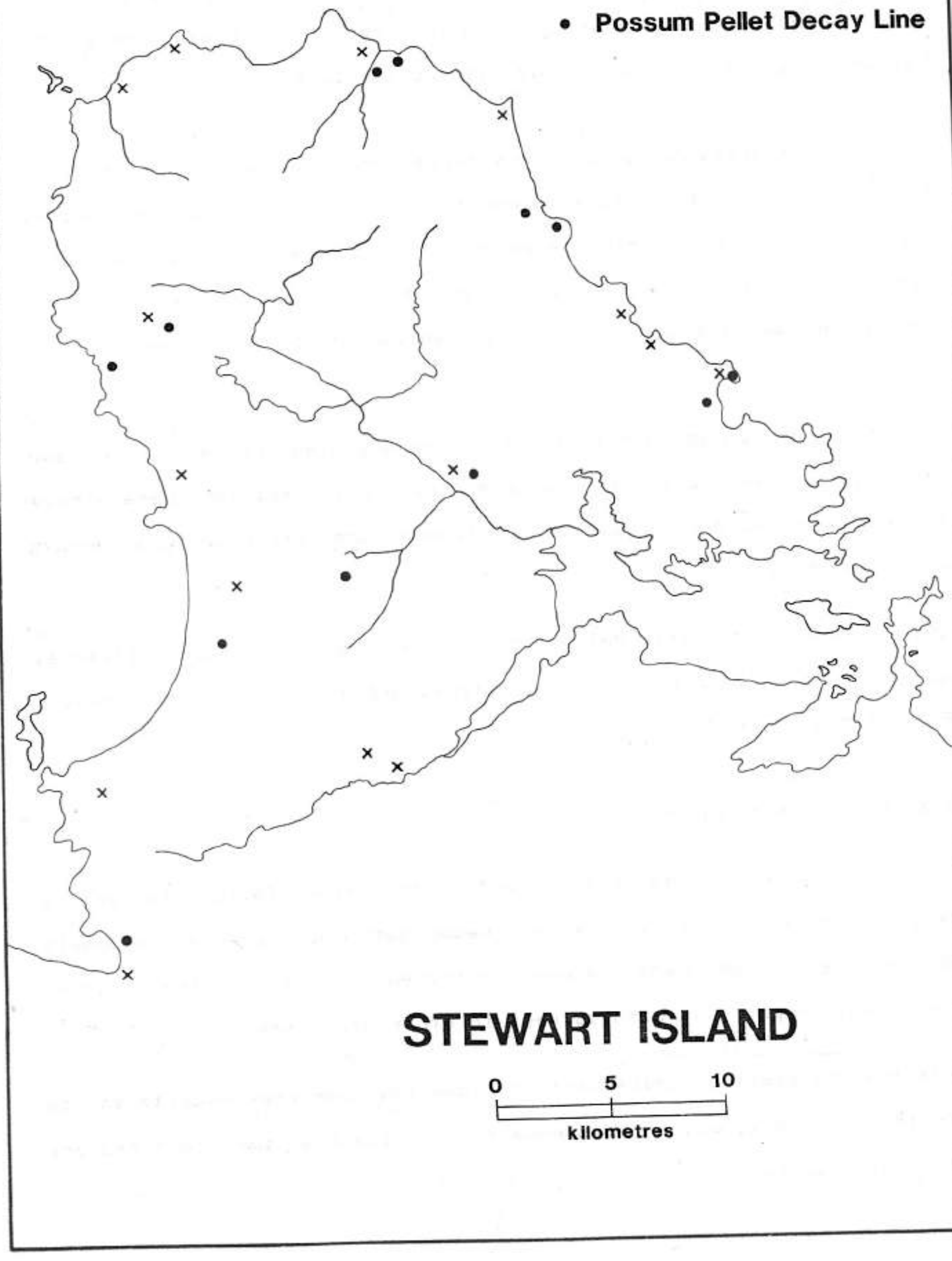
Environmental data were collected at each plot (ie. altitude, aspect, slope, landform, vegetation type, ground cover). See appendix F for forest type descriptions.

5.3 Pellet Decay Lines

The pellet decay rate is an important contributing factor to pellet density.For this survey, pellet decay data was collected to enable comparisons to be made between different parts of the survey area.Also, comparisons with surveys in other areas are valid.

Note that no previous assessment of decay rate has been undertaken in previous surveys, but this assesment will become an important feature of future surveys.

FIG. 4 Deer & Possum Pellet Decay Lines



5.3.1 Deer Pellet Decay - - Decay rates of deer pellet groups were assessed on 15 belt transects established in September 1985. Areas of previously identified high deer usage were selected for the logistic purpose of locating an adequate number of intact deer pellet groups (see fig. 4). Along the approximately 5m wide belt transets, 2m radius plots were established around any intact pellet group found, and a search made for further intact groups within the plot. The position of intact groups was marked by bicycle spoke and recorded. The transects were reassessed three months after establishment ie.mid-survey, and the number of intact groups remaining was recorded.

5.3.2 Possum Decay - - Decay rates of possum pellets were assessed on 11 belt transects established through the survey period. An attempt was made to cover a large variety of habitats with these decay transects.Individual pellets were marked and their location recorded. Transects on the east coast were assessed twice - once midway through survey and again at the end of survey. Transects in central and western areas were assessed once only, at the end of survey. The number of identifiable possum pellets remaining was recorded.

5.4 Analysis And Presentation Of Data

Point-distance and presence-absence data were analysed on the NZFS VAX computer using a programme developed by the Forest Reseach Institute. The programme provides ;

(i) corrected pellet group density (PGD) in the units of pellet-groups per hectare, from the point-distance data. Probable limit of error (PLE), a 95% confidence limit equivalent, is calculated.

(ii) pellet frequencies (percentages), plus 95% confidence limits

(CL) from presence-absence data.

Weighted means were calculated for the east and west strata by combining pellet densities from the coastal and inland portions of these strata.

Means for data which have been stratified by environmental gradients are taken to be significantly different if their PLE's or 95% CL's do not overlap.

5.4.1 Stratification - - Two separate stratifications were undertaken, producing the following five strata;

(i) EAST - the region east of the "main divide" of Thomson Ridge, The Paps, and Mt Anglem, from North Arm to Smoky Beach.

(ii) CENTRAL - the Rakeahua and Freshwater Valleys.

(iii) WEST - Long Harry and the Ruggedy Mountains down to Mason Bay (including Island Hill) and Doughboy Bay catchment.

(iv) COASTAL - a belt of 800m within the entire coastline of the survey area.

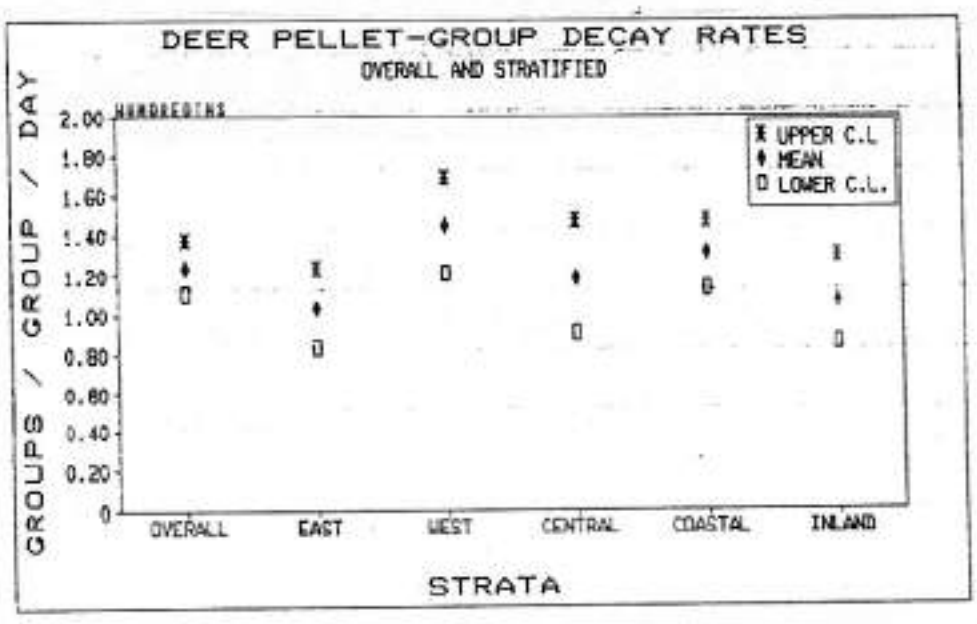
(v) INLAND - all of the area inland from the above coastal belt ie >800m from the coast. (see fig. 2)

5.4.2 Decay Data - Decay rates are presented as groups decayed per group per day, for deer, and as pellets decayed per pellet per day for possum. Probable limit of error (PLE) is given for both of these estimates.

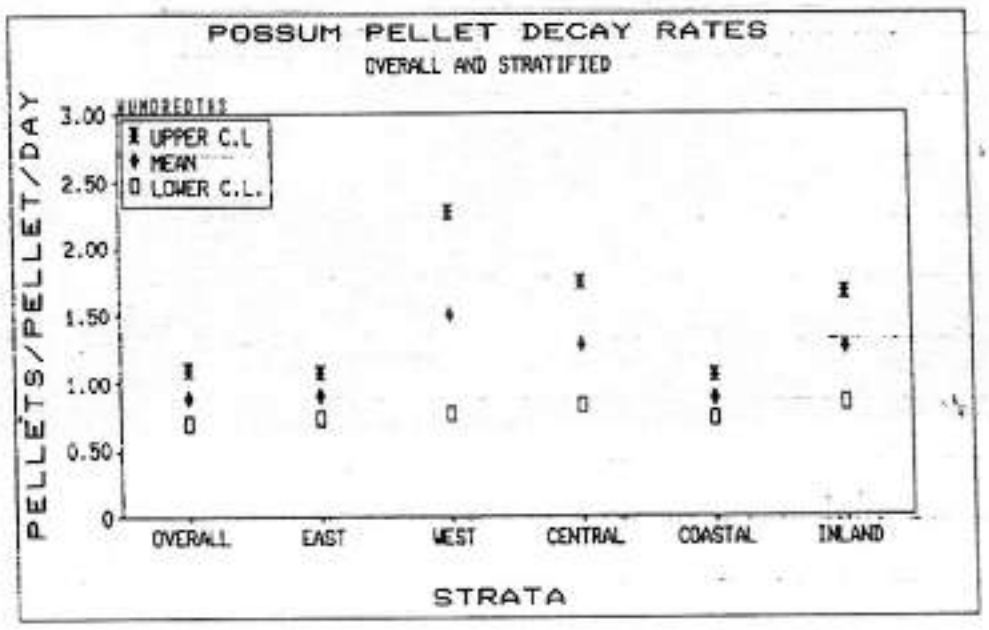
6 RESULTS

6.1 Decay Data

6.1.1 Deer Decay - Of the total of 544 pellet groups marked for assessment, 139 remained intact after an average of 110 days. Overall decay rate was 0.0124 groups/group/day. When decay data was stratified into the five regional strata, no significant differences were noted.



6.1.2 Possum Decay - Of the total of 454 possum pellets marked, 375 were still recognizable after an average of 21.4 days. Overall possum pellet decay rate was 0.0089 pellets/pellet/day. There were no differences detected between decay rates in the five regional strata at the 95% confidence level.



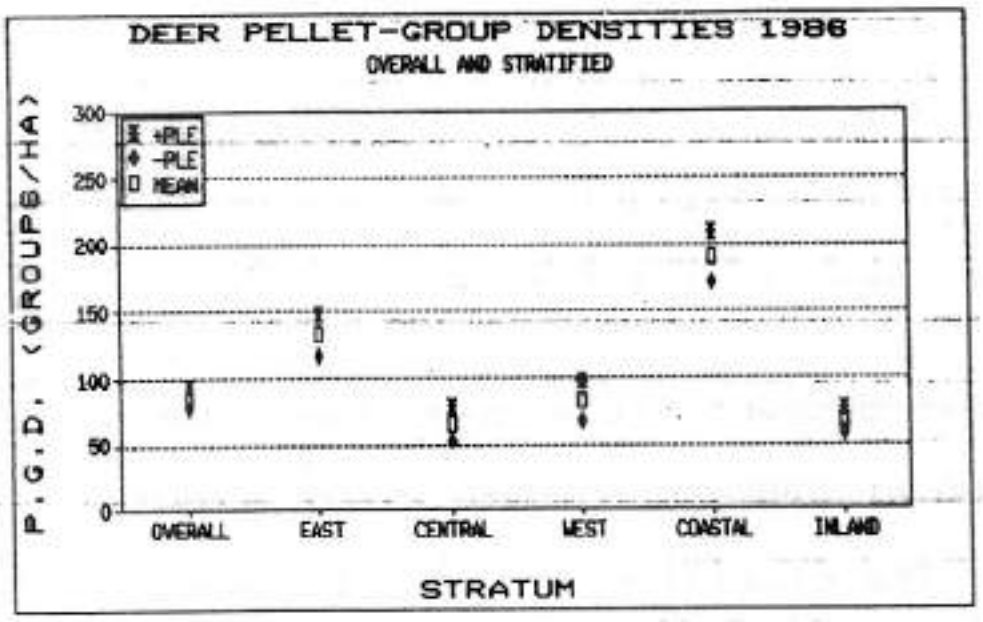
6.2 Distribution And Abundance Of Deer

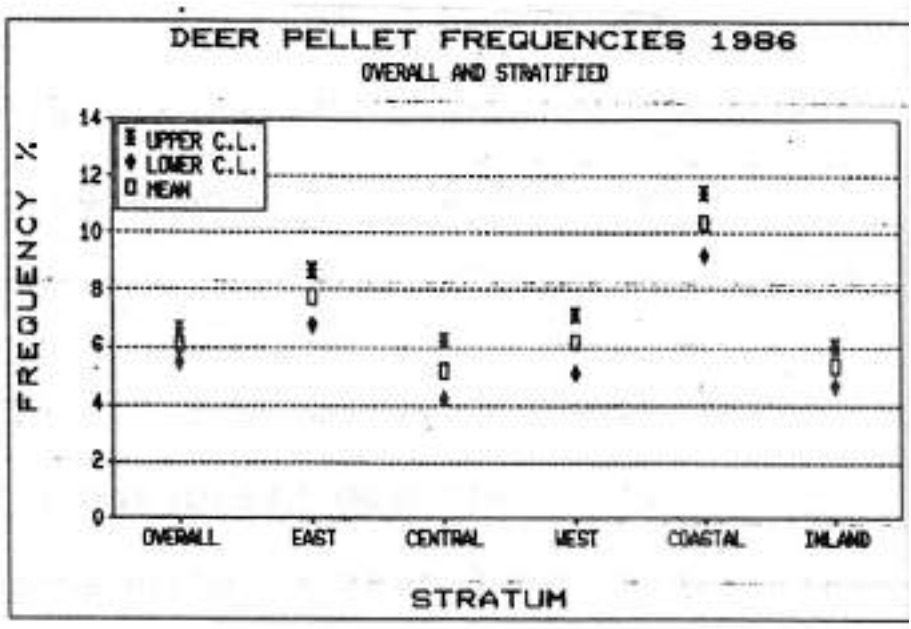
Deer were present throughout most of the survey area. Overall, pellet densities were low to moderate. Both pellet counting methods confirm this . Mean PGD was 85 groups/ha and mean pellet frequency was 6.0%.

However, deer appeared to be in higher concentrations near the coast. The coastal stratum returned a PGD of 189 compared to a PGD for the inland region of just 68 groups/ha. The coastal deer pellet density was higher than for all other areas.

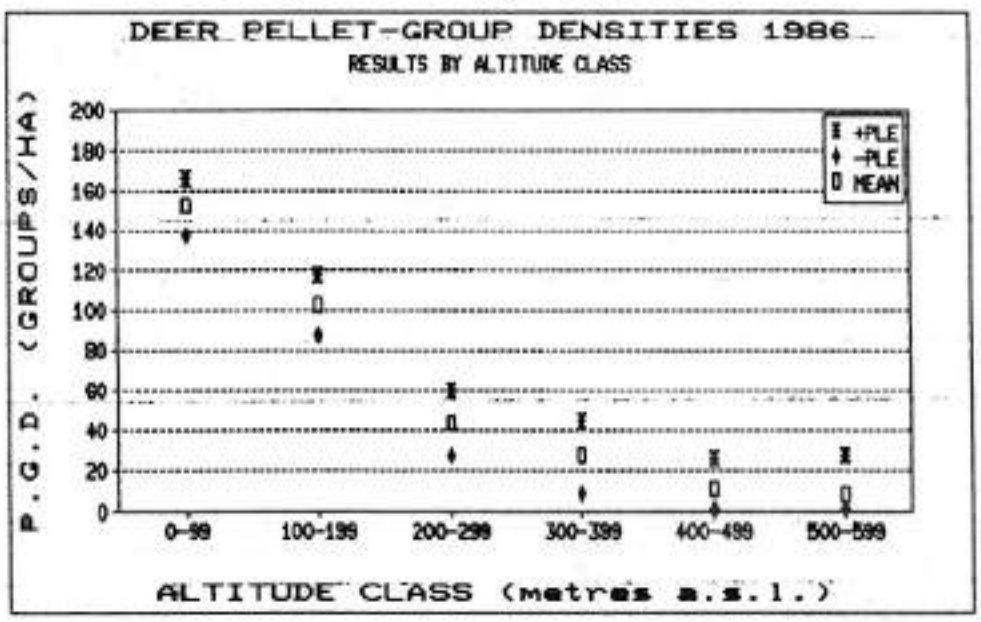
STRATUM	PELLET FREQUENCY	95% CL	PELLET-GROUP DENSITY	PLE
OVERALL	6.0	0.6	85	8
EAST	7.7	1.0	133	16
WEST	6.1	1.0	82	15
CENTRAL	5.2	1.0	65	13
COASTAL	10.3	1.1	189	19
INLAND	5.3	0.7	68	9

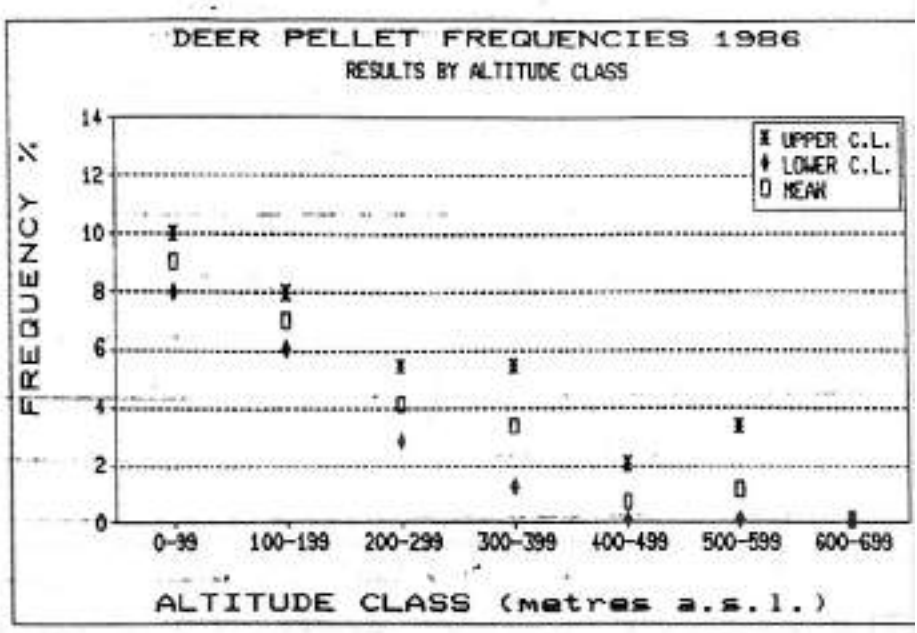
The eastern region returned the next highest pellet density. There was no significant difference between the central and western regions.





6.2.1 Altitude - Deer showed a distinct preference for the lower altitude forest. Highest pellet densities were found from sea level to 100m a.s.l. , with densities progressively decreasing with increase in altitude. Above 200m, no large difference in pellet densities were observed. Above 400m, densities were very low. Only two pellet groups were found above 400m altitude.





6.2.2 Aspect - Highest pellet densities were found on slopes having a northerly aspect. The south-east to south aspect showed a significantly lower pellet density.