

Himalayan Thar Control Plan

1993



New Zealand Government



Department of Conservation
Te Papa Atawhai

Himalayan Thar Control Plan

Department of Conservation

Canterbury Conservancy Conservation Management Series No 3

ISSN: 1171-5391

ISBN: 0-478-01546-1

Published by :

Department of Conservation • Te Papa Atawhai

Private Bag

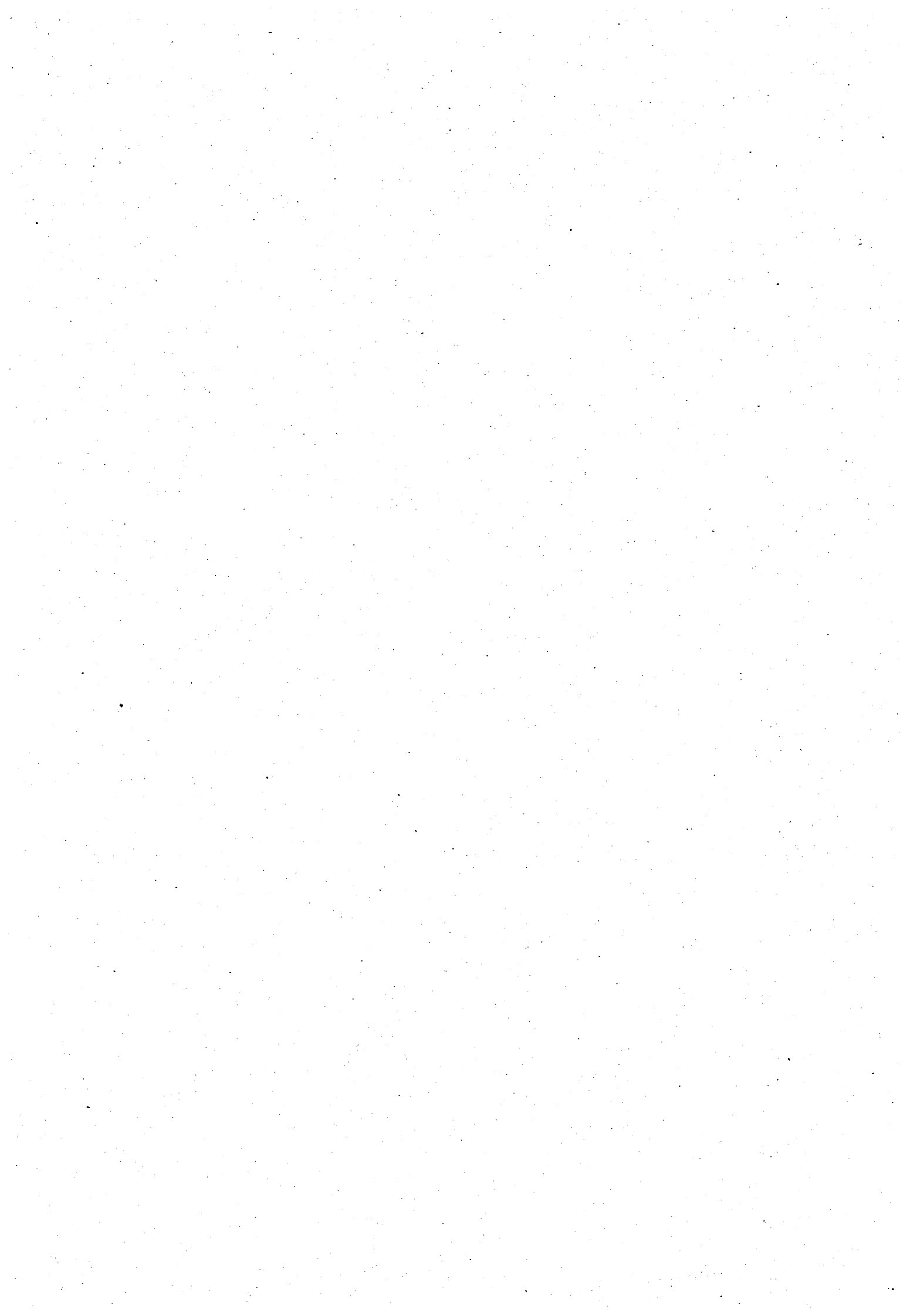
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CONSERVATION
TE PAPA ATAWHAI



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Introductory Statement from the Minister of Conservation

As Minister of Conservation I have decided to introduce this plan with a statement that updates the philosophy, practice and legal background applicable to the control of thar in New Zealand.

If there were no thar in New Zealand I would not support their introduction into the wild. Therefore, if it was possible eradication would be the preferred option for the Department. However, it is not currently possible with present resources and technology and consequently we have to decide what is tolerable, prioritise conservation values over the estate and set densities which do not unduly compromise these values, and organise the control and hunting agents to help protect these values. This plan sets a framework for achieving these actions.

HIMALAYAN THAR CONTROL PLAN

This is a Wild Animal Control Plan for the management of Himalayan thar (*Hemitragus jemlahicus*), prepared in accordance with the Wild Animal Control Act 1977, and gives effect to the requirements of the Himalayan Thar Management Policy (see Appendix 1) which I released in June 1991. I have now approved the plan and it takes effect from 1 July 1993.

INTRODUCTION

A policy on the future direction for management of thar was needed because of the moratorium placed by the Minister of Forests in 1983 on the commercial aerial hunting of thar. The moratorium was imposed as a result of concerns expressed by recreation hunting groups at the 90% decline in thar numbers caused by commercial hunting. The moratorium did not affect recreational hunters or hunting guides who continued to hunt thar, and it did not apply within national parks or over pastoral lease and private freehold land.

Thar populations increased during the moratorium despite recreational and guided hunting. It was clear that the moratorium and the privileged position of recreational hunters and hunting guides could not continue indefinitely.

Public discussion was focused in 1988 by way of release of a Department of Conservation discussion document outlining options for managing thar (Parkes 1988). These options were to attempt eradication, to do nothing or to implement sustained control. Prior to these 1988 discussions, there had been previous rounds of discussion and considerable controversy about thar.

The Himalayan Thar Management Policy (reproduced here as appendix 1) now provides a general direction to achieve the sustained control of thar; thar populations are to be reduced to, and kept below, prescribed levels (which will vary from area to area) at which unacceptable damage to conservation values occurs. The policy

recognises that thar cause impacts on natural ecosystems and to provide recreational and commercial opportunities.

The objectives of this plan were largely prescribed by the policy:

- To determine, and review from time to time in accordance with evidence from monitoring, the population of thar which for any area is consistent with an ecologically acceptable vegetation and estate condition (the target level). (Note: for some particularly sensitive areas within the thar range, the target level may be zero.)
- To ensure that the target level (or intervention density¹) of thar population for each area is not exceeded. (Note: where the level of control required to achieve an appropriate vegetation and estate condition cannot be practically achieved, the lowest practicable thar density will be maintained.)
- To prevent any northwards or southwards extension of the thar breeding range.
- To provide for commercial hunting as a means of maintaining thar at or below the target levels.
- To provide for recreational and tourist hunting as a means of maintaining thar populations at or below the target levels.
- To facilitate control by the Department of Conservation where thar are not being held at or below target levels.
- To allow the commercial use of thar under captive conditions where this poses no risk of extending the thar breeding range.

The policy acknowledges that a thar population at or close to the habitat's carrying capacity (ca. 50,000) will have unacceptable impacts on vegetation, and therefore on native insect and bird fauna. On available evidence a population of 10,000 over the entire range is identified as a presently acceptable maximum, at which impacts on vegetation may be tolerable, and which will provide sufficient hunter satisfaction and commercial opportunities to maintain hunting pressure.

Aerial game recovery operators, recreational and safari hunting are identified as the primary means of thar control. Official control will be implemented to prevent dispersal beyond that area defined as the feral range and to limit the population size to below predetermined maxima within identified management units where this is not achieved by other means. Once achieved the intervention densities set will result in a population size smaller than when this plan was approved.

This plan gives effect to the policy by setting out in more detail how sustained control will be implemented to bring about the protection of ecosystems. It identifies management units and sets maximum thar densities for each according to defined management goals and conservation objectives. It prioritises the control measures necessary to achieve target population levels, suggests areas where recreational hunting groups may contribute to thar control through contractual agreements with the Department of Conservation, and defines the thar feral range and risk zones where specific conditions will apply to the holding of thar in captivity.

¹ The term "intervention density" was not considered in the policy but has been introduced into this plan. Thar densities will not be permitted to exceed levels which compromise management goals and conservation objectives. These maxima are intervention densities at which additional control action will be introduced to reduce populations.

The plan focuses on the sustained control (i.e. in terms of effort and densities) of thar within their feral range but otherwise applies throughout New Zealand to ensure escapees from captive herds do not establish new wild populations. The Department of Conservation moratorium, in place since 1988, on the issue of permits by the Department to hold thar in captivity, has now lapsed with approval of this plan.

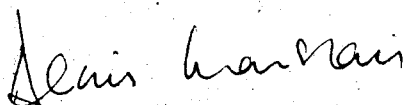
Research and monitoring programmes are proposed, the results of which will form the basis for periodic review of the plan to ensure the achievement of conservation objectives.

The plan applies to all land irrespective of tenure, provided that it is consistent with any legislation applying to the land. The plan is consistent with the National Parks Act which requires eradication or the attainment of the lowest practical levels, until new technology and resources allow total removal, i.e. as modified by NZ Conservation Authority policy. It is consistent with the Reserves Act and Conservation Act, both of which require lands held under them to be managed for conservation purposes. This plan also applies to Crown leasehold and private land, which comprise a significant proportion of the area occupied by thar. I am pleased that the Commissioner of Crown Lands lends his support to those parts of the plan which encompass pastoral lease land. The plan therefore provides the basis for achieving the sustained control of Himalayan thar throughout their feral range in the South Island and management throughout the rest of New Zealand where they may occur from time to time. As such I am confident that consistency will be achieved between this plan and any Conservation Management Strategy produced by the Department and Conservation Boards.

The draft Himalayan Thar Control Plan (Department of Conservation 1992) was released for public comment in 1992. The Department received 126 public submissions which have been independently analysed (Gabites Porter Consultants and Department of Conservation 1993). The comments of the submittees, where justified, have been included in this plan and I am appreciative of that input.

I acknowledge that this plan is, in part, experimental. It acknowledges that information is inadequate in some areas but that all decisions are, of necessity, balanced in favour of protecting nature conservation values; in other words the plan is precautionary in approach. The plan recognises the need to continue monitoring and undertake further research. If the results of this work indicate that conservation values are being compromised then the intervention densities will be changed. Corrective measures could require the Department to play a larger role in control, something I am determined that the Department will do, if necessary.

Approved



Denis Marshall
Minister of Conservation

Part A - The Animal and the Resources²

1. THAR BREEDING RANGE AND SOCIAL BEHAVIOUR

1.1 BREEDING RANGE

The thar breeding range has increased little since the publication of the Department's options paper (Parkes 1988; Map 1). Thar have reoccupied some catchments in Westland National Park where they were removed or were not observed following intensive commercial hunting operations in the 1970's and early 1980's and there has been minor expansion of the range east and west onto lateral ranges.

Thar are present south of the Haast-Wanaka highway in the Wilkin River area of Mount Aspiring National Park, and there have been reported sightings between the Wilkin and Burke Rivers. In the north they occur in the Rakaia and Mungo Rivers.

The breeding range covers National Parks, other Conservation land, Pastoral Lease and a small area of freehold land (Table 1).

Table 1. Land Tenure of 1992 Thar Breeding Range


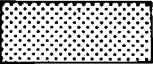
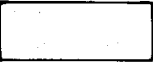

	Area (km ²)
National Parks (Mount Aspiring, Mount Cook, Westland)	1401
Other Conservation land	2922
Pastoral Lease/Freehold	2653
TOTAL	6976*
<p>* This suggests a marked increase in the area of the breeding range estimated by Parkes in 1988 at 5145 km² but is due largely to the fact that no attempt has been made to isolate those areas within the breeding range where thar are absent (as Parkes had done). It should also be noted that the breeding range in 1988 was far reduced from surveys undertaken in 1976.</p>	

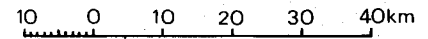
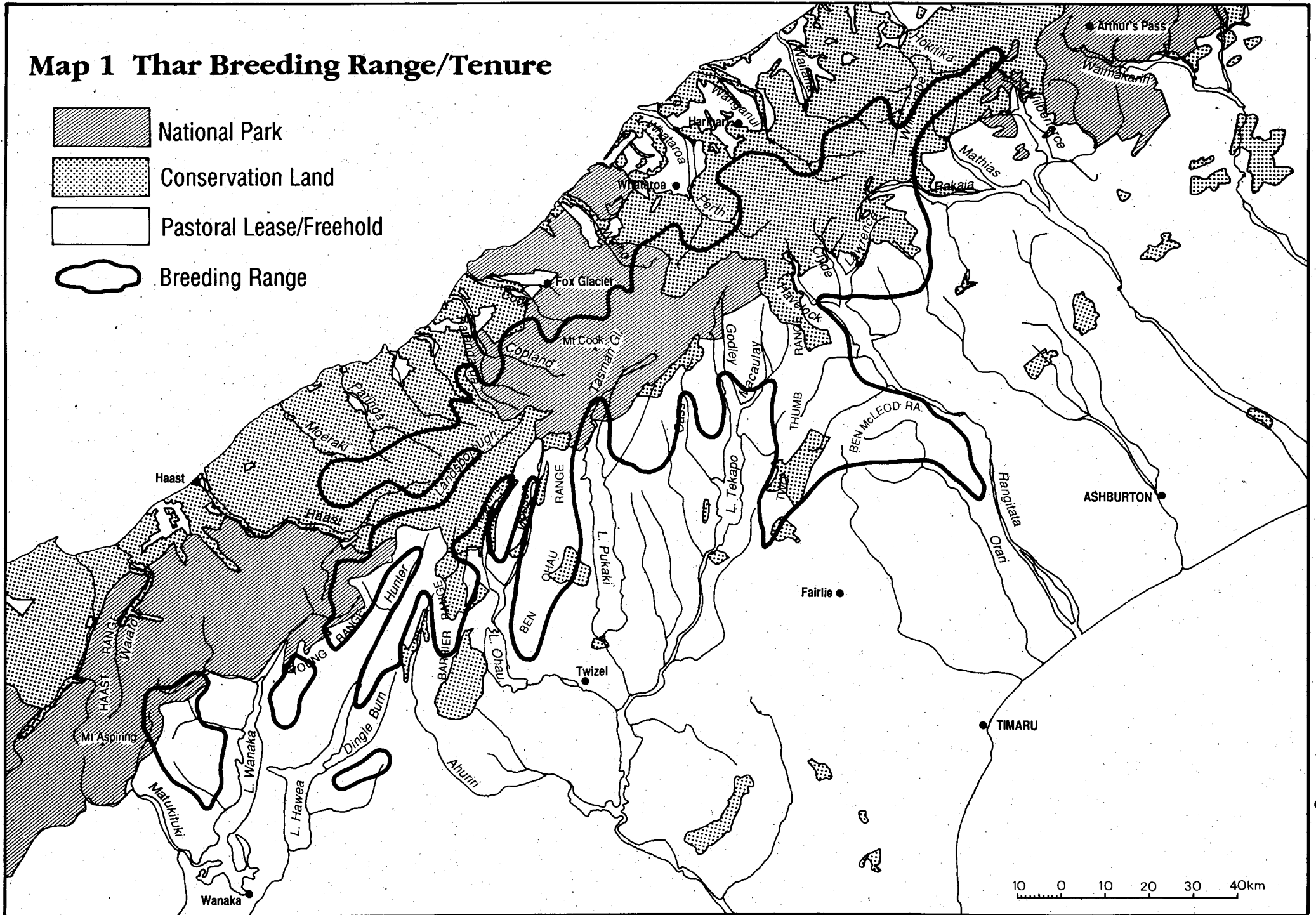
1.2 THAR SOCIAL BEHAVIOUR

Thar usually inhabit the subalpine and alpine zones (1000 to over 2000 m above sea level) of ranges with rock bluff systems and with ridge crests above 1800 m above sea level. They are social animals but segregate into three main groupings at various times of the year. Adult males three years and older live in bachelor groups in spring and summer, returning to female-kid-juvenile range for the breeding season

² Figures concerning numbers and densities of thar are those estimated in 1992 before that season's breeding increment. Numbers and densities have changed in many areas since then. Department of Conservation implementation of the plan will take these changes into account.

Map 1 Thar Breeding Range/Tenure

-  National Park
-  Conservation Land
-  Pastoral Lease/Freehold
-  Breeding Range



in April-May where they remain in loose association with female groups until about October (Parkes 1988).

1.3 THAR DISPERSAL

There has been little research on the mechanisms influencing the dispersal of thar, but preliminary evidence suggests that where they occupy habitat in distinct groups, dispersal is led by adult females and that female-juvenile groups appear to split once group size exceeds about 12, i.e. dispersal is density dependent (Appendix 2). Typically, solitary adult males wander over a wider range. Dispersal direction is influenced by natural features. There are few passes in the central Southern Alps where thar can move freely between east and west coasts and colonisation of the west coast apparently took place via the Elcho Pass in the Hopkins Valley and the Sealey or Denistoun passes in the Godley and Havelock valleys respectively, with subsequent colonisation north and south (Caughley 1970a).

1.4 Discussion

Female thar appear to have discrete home ranges (Tustin and Parkes 1988) and dispersal appears to be density dependent (Parkes and Tustin 1985). Regulating female-kid groups should have the effect of limiting dispersal and minimising the need for control activity at the northern and southern extremities of the breeding range and in any management units where maximum population levels have been set at zero or very low densities.

2. IMPACTS OF THAR

2.1 THAR HABITAT PREFERENCES IN NEW ZEALAND

Thar inhabit bluff systems and adjacent subalpine shrublands and alpine grasslands. They use the drier tussock grasslands of the east coast lateral ranges which are dominated by narrow leaved snow tussock (*Chionochloa rigida*), and fescue tussock (*Festuca novae-zelandiae*) at lower altitudes. Nearer the Main Divide, in the higher rainfall zone, broadleaved snow tussock (*C. flavescens*) and mid-ribbed snow tussock (*C. pallens*) dominate. In winter months when much of their food source is covered by snow thar make use of the vegetation on snow-free bluffs and use higher statured shrubland of turpentine scrub (*Dracophyllum uniflorum*), mountain toatoa (*Phyllocladus alpina*) and snow totara (*Podocarpus nivalis*). In South Westland thar make seasonal use of the upper forest dominated by southern rata (*Metrosideros umbellata*) and kamahi (*Weinmannia racemosa*) north of the Karangarua River and silver beech (*Nothofagus menziesii*) to the south.

Recent research reveals that thar feed most intensively in tall snow tussock (Tustin and Parkes 1988) and current studies of thar diet indicate that grass species constitute over 50% of thar diet, with woody species and herbs constituting less than 25% each (Appendix 3).

2.2 IMPACTS ON THE ENVIRONMENT

There is little quantitative evidence describing thar impacts on flora and fauna. Where evidence exists it is summarised here along with a synopsis of historical reports documenting the impacts of thar on the vegetation.

Historical Perspective

Thar modified the subalpine shrublands and alpine grasslands when most numerous in the 1960's. At these densities tall tussocks (*Chionochloa* spp.) were replaced at lower altitudes by fescue and blue tussocks (*Poa colensoi*) (Caughley 1970b). The thar's habit of camping on small areas caused localised defoliation of turpentine scrub and elimination of palatable species, while leaving surrounding grasslands apparently unmodified, e.g. in Mt Cook and Westland national parks (Wilson 1976, Wardle 1979). With the colonisation of thar through Westland National Park and into the Karangarua there was progressive damage to the sub-alpine shrublands (Wardle 1979). Loss of topsoil following destruction of vegetative cover is also documented (Burrows 1974), but its significance relative to natural soil loss is unknown.

More recent reports describe how the vegetation has returned to similar biomass and associations since a 90% reduction in thar numbers, particularly in the higher rainfall regions, and recovery of species thought to have been eliminated from some sites altogether. For example, Godley (1976) refers to the substantial recovery from thar damage sustained by snow tussock in the headwaters of the Karangarua and Copland valleys, slower recovery of turpentine scrub and growth of the buttercups, *Ranunculus lyallii* and *R. godleyanus* from chewed-down rhizomes.

Plate 1 illustrates the intensity of thar browse on mid-ribbed and curled snow tussock (*C. crassiuscula*) in Carney's Creek where the only tall statured plant species remaining in 1965 was *Celmisia lyallii*. Plate 2 indicates the present condition of the grassland following reduction of the thar population from 710 in 1965, to a low of 26 in 1984 (Challies and Thomson 1989a).

Plant Communities

A resurvey of the grasslands of the Waitaki catchment in 1985/86 describes a general recovery of the grassland and shrubland communities since the first survey in 1973/74. Jane (1988) describes increases in the frequency of turpentine scrub, native broom (*Carmichaelia grandiflora*), *Gaultheria depressa* and other woody species. Narrow leaved snow tussock has increased along with blue tussock although often at the expense of broadleaved, mid-ribbed and slim snow tussock (*Chionochloa macra*). Jane concluded that animal impacts on the vegetation were negligible over much of the Waitaki in 1985/86 and that it was difficult to isolate the effects of one species from another. He also noted that animal induced erosion is not a feature of the landscape. However, three plots did show major changes indicative of thar damage. At some sites thar had induced successional changes and inhibited regeneration of certain species.

Vegetation transects established in 1971 in conjunction with an enclosure in the head of the Karangarua River were remeasured (Wardle 1990). These showed marked increases in the cover and frequency of blue tussock and in the frequency of *Chionochloa oreophila* in the highest altitude transects (1540 m asl) both inside and outside the enclosure.



Plate 1: Carneys Creek 1965

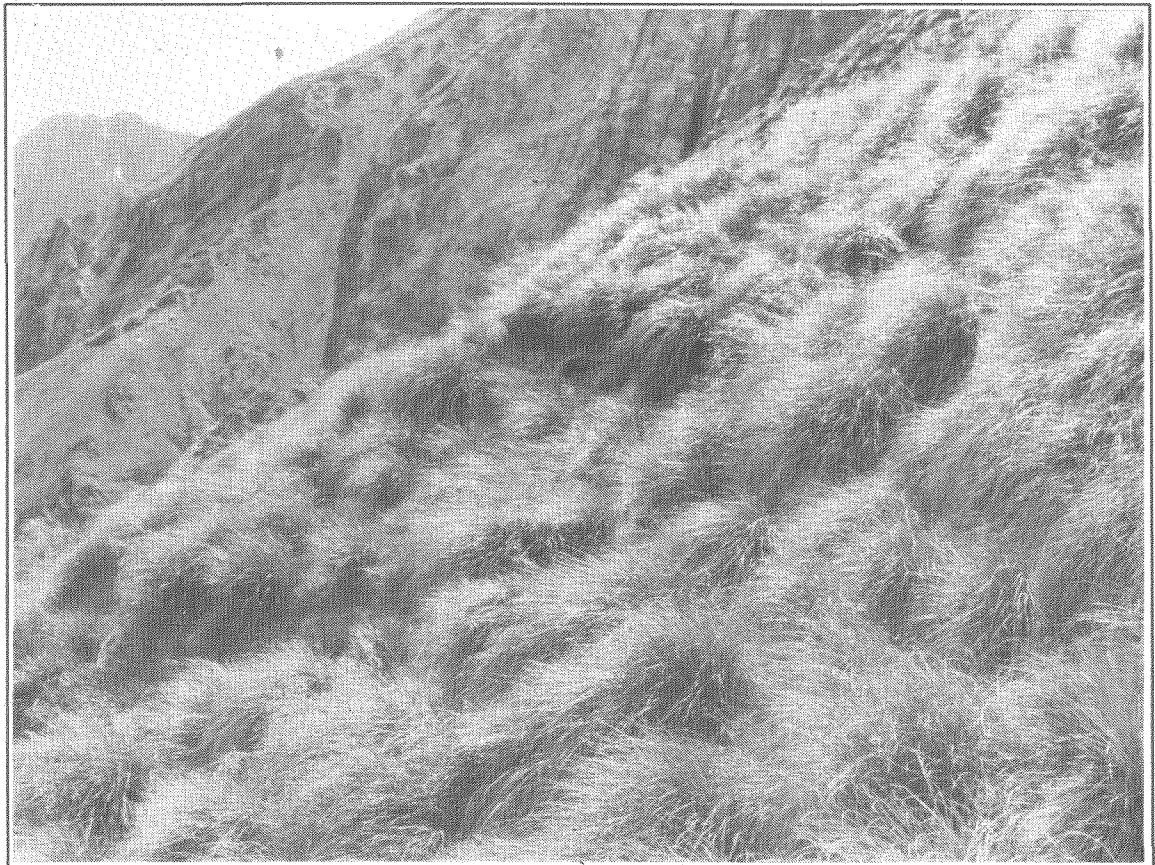


Plate 2: Carneys Creek 1991

Photos : C. Challies

At lower altitude (945 m asl) a change in cover has taken place from blue tussock to mid-ribbed snow tussock both inside and outside the exclosures. These changes are attributable to the reduction in the numbers of thar, and other introduced animals such as red deer and chamois.

A study of the impact of thar on the growth and regeneration of narrow leaved snow tussock in the North Branch showed that thar browsed snow tussock on all plots, and although damage was only locally intensive, snow tussocks are failing to regenerate adequately on most plots (Rose and Allen 1990). They predict that the snow tussock will gradually decline as senescent plants die and are not replaced, and suggest that a reduction of the thar population would result in an increase in tussock regeneration. They also found that thar trampling and browse damage to turpentine scrub and snow totara was locally intensive and that a reduction in cover of these shrubs has occurred. While the density of thar in the whole of the North Branch in 1992 was assessed at 7/km² the pressure exerted on the vegetation of the bluff systems measured by Rose and Allen reflects a locally higher thar density (i.e. they are concentrated in this area at about 20 thar per km²).

Plant Species

Of the many palatable plants, one which has attracted particular attention in the central Southern Alps is *Ranunculus godleyanus*. Parkes (1988), based on Williams and Given (1981), states that *R. godleyanus* is the only plant regarded as vulnerable to thar browsing and that its recovery in recent years suggests that there is little likelihood of the species becoming extinct given current thar population levels. Wardle (1979), describes the scarcity of *R. godleyanus* and other plants in Westland National Park in the early 1970's but suggests it is now much more evident and has reestablished itself through seeding and growth from surviving rhizomes of chewed down plants (P. Wardle pers. comm.).

C. Burrows (pers. comm.) describes 21 plants endemic to the central Southern Alps of which he regards nine as particularly vulnerable to the impacts of thar browsing and trampling. These are *Aciphylla crenulata*, *A. similis*, *Carex enysii*, *Cheesemanian enysii*, *Gentiana divisa*, *Hebe haastii*, *Parahebe birleyi*, *Ranunculus grahamii*, *Raoulia youngii* and *Swainsona novae-zelandiae*. Some of these plants are high altitude crevice plants; others are typical of the drier eastern ranges and others are unpalatable, e.g. *Raoulia* and *Parahebe* species. Some have distributions extending beyond the northern and/or southern limits of thar. While relatively little is known about many of the plants occurring within the thar breeding range there does not appear to be a risk of imminent species extinction. D. Given (pers. comm.) suggests that genetic impoverishment is the real issue and that the long term effects of browsing animals on species and communities is particularly important. Suggestions by Burrows and Given that monitoring of a selection of these species should be carried out as an indicator of thar impacts has much merit. Logically, monitoring should concentrate on species preferred by thar, e.g. *Chionochloa* spp. and *Ranunculus* spp.

There are instances where species found in the floristically more diverse plant communities of the Canterbury frontal ranges may be vulnerable. For example an unnamed edelweiss (*Leucogenes* sp.) grows on Mount Peel, at the fringe of the thar breeding range. While it is probably not subject to thar browsing, and because this

edelweiss is not known to occur in any other locality, it should be monitored for potential impacts from thar.

Animal Species

Thar may be in competition with the indigenous kea (*Nestor notabilis*). The kea uses the subalpine shrublands and grasslands for foraging and nesting (Wilson 1990), but little is known generally about the impacts of wild animals on its wellbeing. The kea relies heavily on species associated with the subalpine and forest areas for its survival (Brejaart 1988). Interim results of diet studies of chamois and thar indicate that chamois are likely to be greater competitors with kea than thar because of greater dietary overlap (J. Parkes pers. comm.; see also Appendix 3 for thar and chamois diet preferences). However, it is not known if thar or chamois compete with kea for resources or if this then leads to a detrimental impact on kea populations.

Almost nothing is known about potential thar impact on other indigenous fauna. The rock wren (*Xenicus gilviventris*) inhabits tall tussock grasslands and shrublands on steep terrain but is unlikely to be affected by thar (R. Hay pers. comm.). Great spotted kiwi does not occur within the current thar range (J. McClennan pers. comm.). Thar impacts on invertebrate species are unknown.

2.3 IMPACTS ON CONSERVATION VALUES

Specific values have not been identified in ecological terms for much of the thar breeding range.

Protected Natural Areas Programme

Fourteen Recommended Areas for Protection (RAPs; Appendix 4) have so far been identified in the thar breeding range under the Protected Natural Areas (PNA) Programme. They range from entire catchments with a continuum of plant communities from low to high altitudes, to small areas with specific values. The Department is seeking management agreements with landholders to ensure the protection of the conservation values within these RAPs.

Intervention densities for the control of thar should be compatible with the management regimes adopted for those RAPs which contain thar habitat. Of the 14 areas, four in particular are likely to contain thar and have conservation values that would be detrimentally affected by large numbers of thar and other herbivores. These are the Upper Duncan Stream, Upper Lawrence, Black Birch and Upper Gladstone RAPs.

Soil and Water Conservation

Earlier perceptions of natural versus anthropic erosion have been challenged, e.g. McSaveney and Whitehouse (1989) found that on measured grassland transects in Canterbury there has been little change in the amount of bare ground exposed in the last 10-35 years. Screens, once thought of as actively eroding, are often stable and some have had parts of their surfaces dated at 2500 years old. Much of the high country erosion is natural rather than induced. They also state that where vegetation is removed erosion from bare soils is up to 10 times faster than from vegetated surfaces. The management implications are that no wild animal population should be maintained at levels which result in vegetation removal. The contribution of thar at high population levels to soil erosion is likely to be significant.

2.4 Discussion

The general recovery of the alpine grasslands and the subalpine shrublands following the reduction of the thar population by more than 90% by the early 1980's has been quite rapid, particularly in the wetter regions.

Notwithstanding this recovery, thar have the potential to cause unacceptable environmental damage. Concern has been expressed about the wellbeing of plant and animal species, some of which are endemic to the area inhabited by thar. The gregarious nature of thar could increase the pressure on some plant associations in localised areas, and this is addressed in prescriptions concerning group size and maximum local densities. Any number of thar or other introduced animals will cause change to natural systems. The greater the level of change the less likely that removal of the causal agent will result in full recovery to the original state. There is insufficient scientific knowledge about many of these species and potential or actual thar impacts upon them (C. Burrows pers. comm.). The need to carry out further work on the vulnerability of some species should be recognised in research projects designed to monitor specific communities and species over a prolonged period. D. Given (pers. comm.) suggests the monitoring of *Ranunculus godleyanus* and *R. grahamii* in a number of locations sufficient to cover a range of thar population densities and climatic conditions. *R. lyallii* is already being monitored in some plots (J. Parkes pers. comm.)

3. THAR CONTROL

3.1 ACCESS

The Rangitata, Tasman, Godley and Whataroa catchments are becoming increasingly popular with recreational thar hunters. There are other areas, which because of lack of road access, difficult terrain or land tenure, that are hard to obtain access to.

Hunters make more use of aircraft in Westland where landings are permitted over most conservation land except for parts of Westland National Park, the Adams Remote Experience Zone (which has one landing site for mountaineering) and the Hooker-Landsborough Wilderness Area, where aircraft landings are prohibited except for management purposes such as wild animal control and for search and rescue (Appendix 5). Aircraft access to that part of Mount Aspiring National Park within which thar may be found is available by permit.

A number of licenced helicopter operators fly recreational hunters and guides with clients into the back country on a regular basis for thar and chamois hunts. They report increasing demand from recreational hunters for helicopter access to hunting areas. For example, in 1991 J. Scott (pers. comm.) transported about 50 guided hunting parties and 200 recreational hunting parties (about 500 hunters) into the area between the Whataroa and Landsborough catchments.

Access onto pastoral lease land is generally refused to recreational hunters where the lessees hold recreation permits providing for commercial safari hunting and

where lessees have permits to hold thar in captivity. At present two lessees hold recreation permits and at least two further applications are being considered. In addition a safari guide holds a recreation permit over a property with the consent of the lessee. Two of these lessees also hold thar in captivity under permit.

3.2 COMMERCIAL HUNTING

The effectiveness of helicopter control of thar has been proven. It is desirable that the option to control thar by helicopter is retained.

There has been no commercial hunting of thar for meat since the imposition of the moratorium by the Minister of Forests in 1983. The moratorium is now lifted and some interest is being expressed in the resumption of thar recovery.

The viability of thar meat recovery and export is questionable. Comments from helicopter operators and the processing and export industry suggest that a viable trade in thar meat and thar by-products will require an annual kill of mature animals at the rate of more than 1000 per year, preferably from the easiest terrain (M. Rice pers. comm.). A specialist internal trade could profit on far fewer animals.

Some wild animal recovery licensees are also engaged as passenger service operators and transport recreational hunters and guides with clients into the back country. They report increasing demand for helicopter services and believe the demand for bull thar is such that any commercial recovery operations should be restricted to females only given the value of a bull thar when taken as part of a safari operation (J. Scott, R. Knight pers. comm.).

3.3 RECREATIONAL HUNTING

In 1988 approximately 1600 hunting permits were issued by the Department to hunt thar on the conservation estate. This increased in 1991 to over 2000. Nugent (1989) estimated that the total recreational harvest of thar from all land for 1988 was 782. While accurate statistics are not available for pastoral lease land or for that matter the conservation estate (not all hunters provide a return to the Department), it is estimated that the present annual kill by recreational hunters is about 900 per annum, increasing at about 10% per year (Appendix 6). Of this total it is believed that up to 50% is taken from pastoral lease land. Information provided for four properties (Godley Peaks, Erewhon, Mesopotamia and Glentanner), indicates that over 200 thar are taken annually by 500 hunter visits on these stations.

Most of the thar taken by recreational hunters are bulls; Challies and Thomson (1989b) found that 75% of the 112 thar taken on conservation estate in the Rangitata catchment in 1988 were bulls.

3.4 SAFARI HUNTING

About 15 professional hunting guides operate full time in the winter season, usually guiding international and New Zealand clients on combined chamois and thar hunts. A similar number of guides operate part-time. An unknown number of overseas guides bring clients to New Zealand. Collectively they take an estimated 150 plus thar per annum, almost exclusively bulls.

Professional guides operate in various ways. Lilybank Safari Lodge offers hunts both in a large enclosure and free-range hunting on the station. Guides use off-road vehicles to gain access to hunting areas (usually on the east coast), or helicopters. Some use helicopters to position their clients on the mountainside close to thar when it is unlikely their client would take a trophy any other way. Those guides operating on the conservation estate are required to hold concessions issued by the Department.

The prices charged by safari guides vary depending on the mode of transport used. The cost of obtaining a trophy bull thar is generally between \$2000 and \$6000 and the revenue obtained from safari guiding for thar alone is conservatively estimated at more than \$350,000.

Two of the busiest taxidermists in the South Island mount or process up to 100 thar trophies annually for overseas hunters. They also mount a further 60-70 trophies for New Zealand hunters. For these two firms alone the estimated revenue from the mounting and export of thar trophies exceeds \$500,000.

Parkes and Tustin (1989) estimate that about 2% of the thar population are adult males with trophy class horns of at least 305 mm length. From a population of 10,000 animals trophy class bulls could be expected to number about 200. While many hunters are satisfied to obtain a trophy of lesser quality it is likely that the combined demand of recreational and safari hunters for trophy class animals is greater than their availability.

3.5 OFFICIAL CONTROL

Since 1983 official control activity has been confined to national parks and to the northern and southern limits of the thar breeding range. Over the last four years an average of about 100 thar per annum have been killed in official control operations.

The cost of control at the extremities of the breeding range (where thar are few) is up to \$500 per animal.

3.6 DISCUSSION

The present total number of thar taken by all hunters is estimated to be up to 1100 and is increasing in those areas where good access to hunting is available. There is an increasing demand for helicopter access to areas in Westland where landing rights for recreational use are currently restricted or prohibited.

Although the figures presented in this section on expenditure on hunting are incomplete they indicate that annual expenditure on thar hunting exceeds \$1,000,000, much of which is in tourism expenditure. There is significant conservation and management value to be achieved in attempting to carry out thar control in a sustained manner and avoid the historical boom and bust patterns of wild animal control.

It is uncertain whether resumption of commercial thar recovery would be viable. There is no doubt that helicopter shooting is the best means of achieving quick reductions in the thar population. There is a need to seek compatibility of future

commercial hunting with the other forms of hunting so that all groups are encouraged to maintain a high level of interest and activity. This may involve restriction on the taking of bull thar by commercial hunters over part or all of the breeding range.

It is likely that the Department will need to carry out periodic inspection and official control in the northern and southern limits of the breeding range to meet the requirements of the thar management policy. It is unlikely that recreational or commercial hunting alone will eliminate thar from priority areas.

4. THAR IN CAPTIVITY

Both the Wild Animal Control Act and the Thar Management Policy allow for thar to be kept in captivity.

Breeding thar populations are held under permit in at least six places within or adjacent to, and 15 places outside their present breeding range. These thar are held for hunting and for research into thar farming. There are a further 13 permits to hold non-breeding thar, most of which are held for display.

5. MONITORING

5.1 CONSERVATION MONITORING

Research is occurring, under contract to the Department by Landcare Research in the following categories:

Vegetation Monitoring

A series of permanent plots has been established in the North Branch, the Hooker Valley, Carneys Creek, Landsborough and Bettison Valleys to assess thar impacts, particularly on *Chionochoa* species. Remeasurement of these plots at about three yearly intervals will provide valuable information on the effect of thar at different densities on cover and regeneration of plant communities. It is desirable, for representative habitat coverage, that these areas be extended to a similar number of sites in Westland.

There are other permanent plots present in thar habitat including some of the grassland plots established in the 1973/74 survey of the Waitaki catchment and plots established by Wilson (1976) in Mount Cook National Park. The suitability of a selection of these plots for monitoring both plant indicator species and general vegetation "health" should be reviewed.

The exclosures established by Wardle in the Karangarua Valley exhibit trends in the recovery of plant communities following reductions in thar and other wild animal populations. Periodic reassessment of these should be continued.

Currently there is no monitoring of vulnerable plant or animal species taking place, except for *Ranunculus lyallii* in some Landcare Research plots. It is desirable that a monitoring programme be undertaken of two or three indicator species over a range of sites to provide additional information on their vulnerability to thar browse.

Thar Diet

A thar and chamois diet study, based on the analysis of rumen samples from animals shot by recreational and Departmental hunters is partially complete. It will indicate diet preferences over a range of locations and on a seasonal basis.

Thar Monitoring

Monitoring of the thar populations of Carneys Creek, the Hooker and the North Branch is carried out annually and is providing information on the relationship between thar density and vegetation impacts and the impact of hunting on the population. It will also contribute to ongoing work on thar population modelling.

5.2 MONITORING THAR CONTROL

With the exception of studies undertaken in the past to determine the total thar harvest for specific areas (e.g. Challies and Thomson 1989a), the statistics provided by the permit return system are incomplete. About 60% of the hunters who obtain permits for the conservation estate provide a return to the Department. Similarly the information provided by pastoral lessees is incomplete. It is desirable that improvements to the monitoring of hunter success be sought. Such statistics are an integral part of the data required to determine regional trends in thar population size and to ensure target thar densities are not exceeded.

5.3 MONITORING THE THAR POPULATION

Since 1984 a number of catchments have been monitored annually or periodically to follow trends in the thar population, to monitor the effects of hunting and to carry out research into thar social behaviour.

Trends in Thar Populations

In 1991 and 1992 thar were counted in 16 catchments or parts of catchments. Of these, six had been monitored at least once previously and three are being monitored annually in conjunction with research being carried out by Landcare Research (Appendix 7).

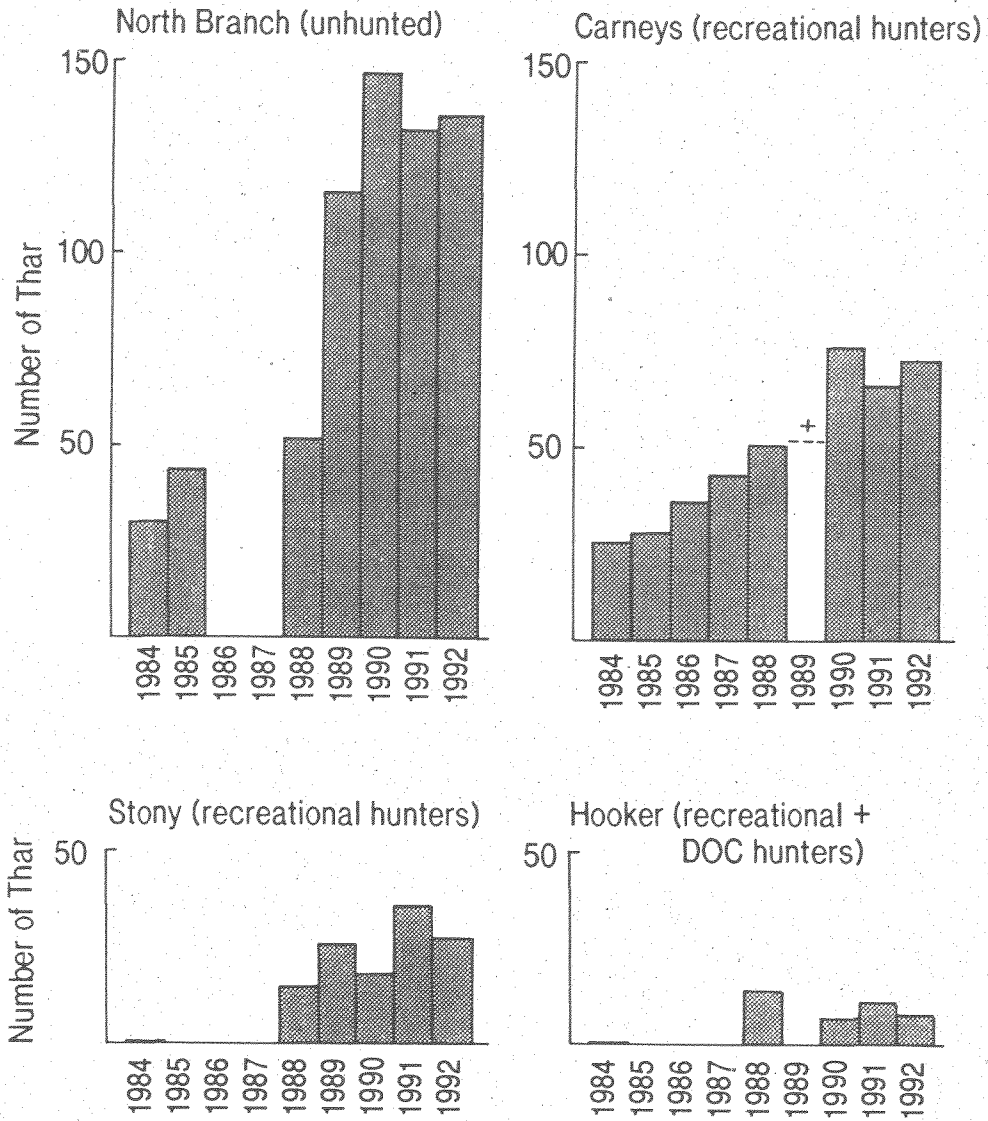
Of particular note is the number of thar counted in the upper Landsborough where the thar count is the highest of all those catchments monitored in the last two years.

Figure 1 demonstrates the range of trends evident in the thar population over the last few years in the North Branch, Carneys Creek, the Hooker River and Stony Stream (Dobson River).

In the North Branch, subject to little if any hunting, the population of mainly female-kid groups has increased to 136 in 1992 from 30 in 1984. Population growth has tapered off in the last two years, suggesting that the carrying capacity, in relation to adjacent thar habitat has been reached. C. Thomson (pers. comm.) reports increased numbers of thar on the front faces of the Godley suggesting that some dispersal out of the North Branch might be taking place.

The thar population appears to have stabilised in heavily hunted Carneys Creek and in Stony Stream. In these two catchments this is attributable to recreational hunting alone. In the Hooker Valley (Mount Cook National Park), a combination of

Fig 1 Thar Population Trends



recreational hunting and official control has maintained the thar population at low levels.

Thar Population Size

While established to monitor population trends, the data gathered from the study areas monitored in 1991 and 1992 have been used to classify the thar breeding range into three zones (Map 2) and along with additional field data provided by experienced observers to calculate the thar population within the zones (Table 2).

Table 2. Thar Population by Density Class

Density Class		Area (km ²)	Present Thar Nos.
Very low or absent	<1/km ²	2889	1150
Low	1-3/km ²	3585	6450
Low-moderate	4-6/km ²	502	2500
TOTAL		6976	10100

Within these zones thar may be locally absent or exceed the class limits; there are also areas, particularly on some pastoral lease land where present knowledge of the thar population is limited. Historically peak densities were as high as 30-40 per km² (Tustin and Challies 1978).

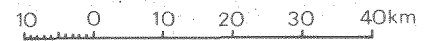
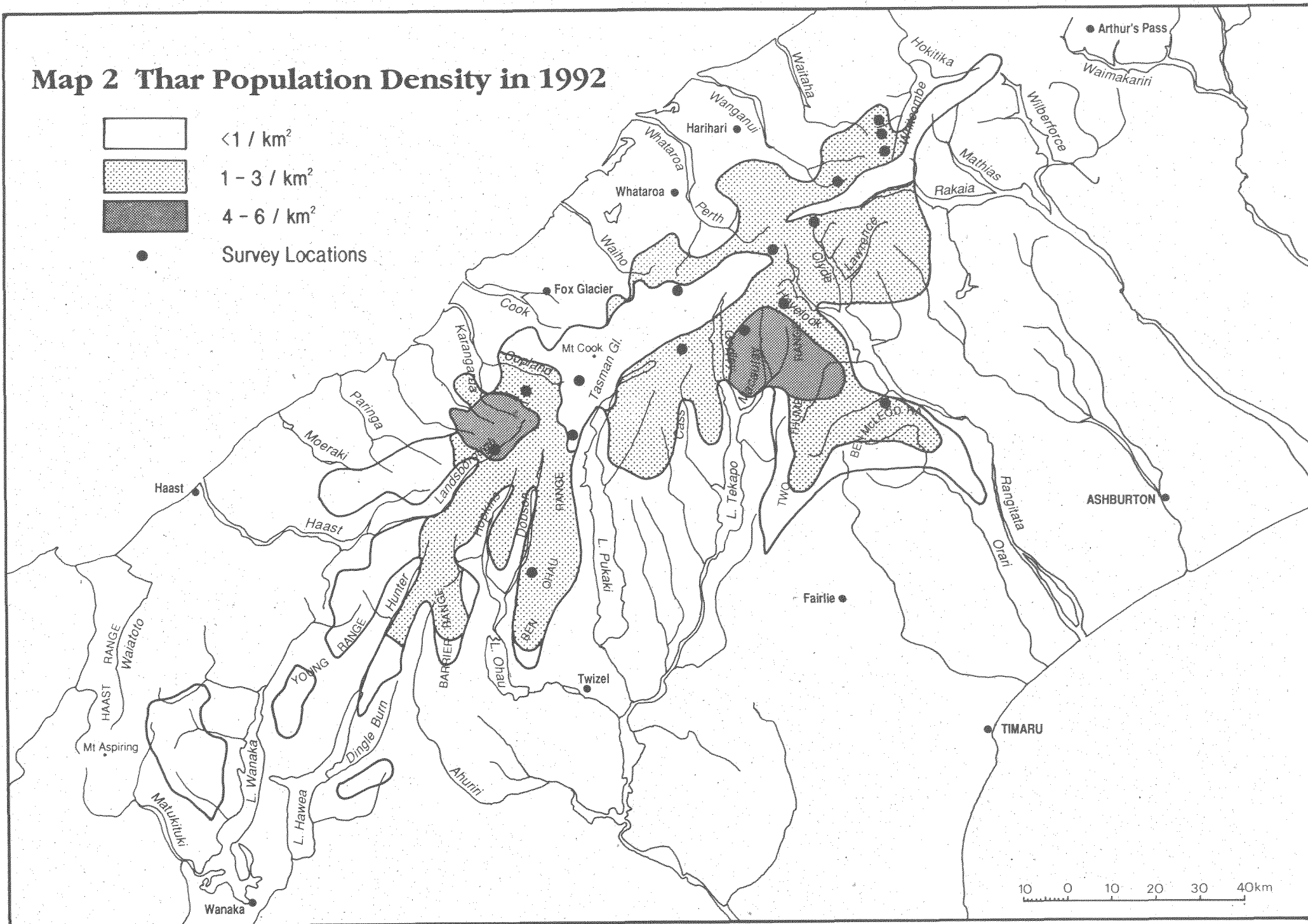
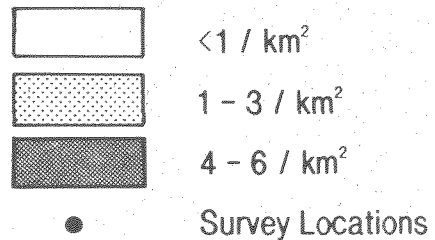
Thar are present in locally high numbers in the head of the Karangarua and Landsborough valleys and in moderate numbers on the Liebig Range and some pastoral lease land on the east coast.

Parkes (1988) calculated a total population of 5780. With an annual finite rate of increase of 1.18, as derived by Parkes (1988) (assuming a rate of harvest of 10% of the population annually), extrapolation of Parkes' 1988 figure would indicate a population of 11,200 thar in 1992. The figure in Table 2 of 10,100 appears realistic given that hunting statistics suggest present harvest rates of greater than 10% of the population in some catchments and less in others. Using Parkes' simple logistic population model, an increase in the total harvest of thar of about 75% is required to stabilise the thar herd at or below 10,000, i.e. an annual kill of about 1900.

Other Browsing Animals

Thar is one of many introduced mammal herbivores in New Zealand mountain environments. All of them - i.e. chamois, hares, possums, red deer and sheep - impact on conservation values, but in no case is the level of individual impact known with certainty (see for example Flux 1967). The relationship between animal species is largely unknown; e.g. the removal of thar may lead to an increase in chamois (J. Parkes pers. comm.). The Department recognises that the protection of conservation values requires that impacts of all of these animals be managed and this plan, dealing with thar alone, is but a starting point.

Map 2 Thar Population Density in 1992



The chamois is the most significant of the other introduced animals present within that range. In some of the that study areas chamois were absent; in others they are present in numbers often approaching those of that and occasionally exceeding them. They are increasing in Carneys Creek, the Lord River and the Bettison. They are present in significant numbers in the Whymper, Douglas, Horace, Walker and Price Rivers. They tend to be more mobile than that, often occupying larger home ranges and many are migratory, often travelling as far as 61 km from their summer range (Clarke 1986). Overall it appears that chamois are increasing over the central Southern Alps despite an annual commercial harvest of up to 1000 by commercial wild animal recovery operators (M. Rice pers. comm.), and an annual estimated kill over the South Island by foot hunters of 1700 (Nugent 1989).

Sustained grazing of snow tussock by merino sheep has in some areas induced vegetation changes similar to those reported for that; increasing dominance of fescue and blue tussock (G. Hunter pers. comm.). In the Neumann Range continued sheep grazing appears likely to prevent a return to a tall snow tussock cover (G. Hunter pers. comm.).

5.4 DISCUSSION

The that population (see Table 2) is slightly above the level envisaged in the That Management Policy as an acceptable maximum. While the recreational, safari and official hunting has slowed the growth of the population an increase in the annual rate of kill is required to stabilise or reduce it.

The monitoring of specific catchments suggests that where access is reasonably good recreational hunting has the capacity to hold that numbers at well below historical levels, but where hunting is prohibited or access is difficult the that population is increasing at a rate approaching the finite annual rate postulated by Parkes (1988), of 1.27.

An ongoing vegetation and fauna monitoring programme will be required to assess the impact of that both on plant communities generally and on the wellbeing of selected species.

An improvement in the collection and coverage of hunting statistics is necessary. Reliable hunting statistics will indicate the level of success of recreational and commercial hunting in the various management units and highlight any areas requiring either added encouragement of recreational or commercial hunting or official control.

6. CONCLUSIONS

- The that population in 1992 was believed to number about 10,100 and was equivalent to that suggested in the That Management Policy as a maximum for the breeding range. While the that herd appears to have stabilised in some heavily hunted catchments there is evidence that it is increasing in most others, particularly where access is limited. Of greatest immediate concern are the numbers of that in the upper Landsborough and Karangarua catchments and to

a lesser extent on the Liebig Range in Mount Cook National Park and on some pastoral lease land, e.g. the North Branch.

- The subalpine shrublands and alpine grasslands were severely depleted when thar were in high numbers but in recent years there has been a substantial recovery both of plant communities generally and of individual plant species. Evidence currently available suggests that healthy plant communities can be sustained while thar are at their present levels - except in some locations where they are in locally high numbers.
- Proposals for the future control of thar reflect the successful attainment of measurable conservation objectives designed to ensure the maintenance of the vigour and diversity of native plant and animal communities and protection of soils.
- Available information suggests that an increase in the annual kill from 1100 to about 1900, i.e. about 75%, is required to stabilise the population; this increased kill should be mostly females from less accessible areas. Either commercial and/or recreational hunting needs to be further encouraged in these areas or official control may have to be considered.
- Present monitoring of the thar population will be supplemented by assessments over larger areas of the thar breeding range to provide a better information base for future management decisions.
- Monitoring of conservation values will be extended to include plant communities on a range of sites in Westland and indicator species, e.g. *Chionochoa flavescens*, and appropriate animal species, over a range of sites over the thar breeding range.

Part B - Management

This part of the plan sets out the prescriptions for the control of thar within their feral range and elsewhere in New Zealand and the methods by which this control is to be achieved.

1. MANAGEMENT UNITS

The current thar breeding range has been divided into seven management units and two exclusion zones, i.e. areas within the breeding range where thar populations will be reduced to a zero density, chosen on the basis of at least one of the following factors:

- where there is a readily identifiable management goal, for example where statutory or other policy has predetermined control priorities, i.e. the Thar Management Policy, the national park management goals as defined in the National Parks Act (1980) and in the NZ Conservation Authority's policy;
- where there are readily identifiable conservation objectives across a unit. Conservation objectives define natural resource conditions to be maintained;
- where there is a community of interest or ownership. For pastoral lease and private land, thar control would be subject to negotiation with the lessee or owner but would take account of the impacts of farm livestock;
- where access or current land management has implications for thar control. Two major considerations are: land tenure (e.g. pastoral and private land); and the Wilderness Policy as it affects aerial access;
- management unit boundaries have been determined where feasible by using major rivers as boundaries which act as barriers to thar dispersal.
- where buffering would be needed between different management units. Generally, buffer zones are not needed for the following reasons (one management unit (Wills/Makarora/Hunter), fulfils in part a buffering function, consistent with the zero density requirements of the Thar Management Policy for this area):
 - Buffer zones will entail greater administrative and management expense, effectively creating additional management units.
 - Effective boundaries for buffer zones are not readily identifiable, especially in the east and south. They would split properties, particularly pastoral leases, and place additional constraints and demands on lessees. In the central part of the range the Main Divide provides a formidable barrier to movement along with those lateral ranges with permanent snowfields and glaciers.
 - Dispersal of females should not be significant providing group size is maintained below that at which density dependent dispersal is likely to occur (a figure of 10 or less is proposed as 12 is about the top figure a group can reach without splitting into two groups).

The number of management units has been kept to a minimum; the more units the greater the demand for resources to implement the control plan are likely to be. The number of units identified in this plan is sufficient to meet the thar management policy objectives. Nevertheless, sub units will be allowed for in some areas as specific conservation objectives are identified or contractual agreements entered into.

1.1 MAXIMUM THAR DENSITIES

Ideally the Department would seek zero thar densities across the feral range. This is currently not practical, and to ensure conservation goals are maintained the Department will discipline itself by setting maximum thar densities at which it will intervene.

Maximum average thar densities have been proposed for each unit. The upper limits are set in this plan and are based on two factors:

- management goals reflecting policy; and
- defined conservation objectives, developed largely from interpretation of available data from permanent vegetation plots.

Thar densities in any management unit will not be permitted to exceed management goals and conservation objectives. These maxima are "intervention densities" at which additional control action will be organised to reduce populations.

More work is required over the breeding range to determine, on an ecosystem and biodiversity basis, exactly what an acceptable limit is. On the basis of research carried out to date it is believed that the present density of thar in the North Branch is higher than the vegetation can sustain in the long term. In the absence of robust data throughout the range, a base limit of about half that of the present North Branch population is proposed as the maximum for any management unit. These limits are intended to be conservative.

The derivation of thar density and population size from the available data should be treated with caution. The figures are "best estimates" which for some management units are based on few if any thar counts. This initial attempt to quantify the parameters required for future thar control should be continually refined.

1.2 CHOICE OF CONTROL METHOD

The initial choice of control methods set out in the management unit prescriptions reflect land ownership and existing hunting patterns. As already outlined, there appears to be only limited potential for the aerial recovery industry to economically harvest sufficient numbers of thar from the existing population without making a significant impact on other hunter groups. Commercial operators are likely to be in direct competition, if not conflict, with professional guides and recreational hunters. All of these hunting sectors will probably give the Department control of populations in inaccessible terrain and in terrain where animals are difficult to recover. The present wild animal recovery licencing and permitting systems are managed to minimise conflicts between hunter groups and avoid boom-bust hunting.

The Department is seeking to avoid boom-bust fluctuations in animal numbers as such events are intrinsically more difficult to manage. To sustain hunting pressure the Department needs to provide opportunities for all the potential control agents - achievement of such an aim requires a careful balancing exercise between competing demands, and acknowledgement of commercial reality.

2. THE FERAL RANGE

To meet the requirements of the Wild Animal Control Act (1977), and the intent of the Thar Management Policy, the feral range requires definition. Feral range is defined in the Wild Animal Control Act, 1977 as "the area that is from time to time occupied by a free ranging population of wild animals of that species, excluding transient wanderers from the main herd and from the range of the main herd."

For the purpose of clearly interpreting the policy regarding captive thar, the feral range defined in this plan includes some lowland areas not commonly frequented by thar, and roads and rivers which provide a "practical feral range" in terms of the plan.

Now that the feral range is defined it is possible to determine the boundaries of exclusion zones from within which breeding groups of thar must be removed.

2.1 THE NORTHERN LIMIT

There are no physical barriers to the northward dispersal of thar along the Southern Alps. Any boundary to the feral range should be, as far as possible, one which forms a barrier to movement over at least part of its length. The Rakaia River and the Hokitika River will create the best available boundary to restrict any northward dispersal, although thar could still move through the Whitcombe Pass area. While other barriers, north or south, could have been selected, none would be so easily controlled.

The northern limit of the feral range will be a line following the south bank of the Rakaia River starting at the junction of Lake Stream with the Rakaia River, upstream to the confluence with Louper Stream, then up Louper Stream over the Whitcombe Pass and west down the south bank of the Whitcombe and Hokitika Rivers.

Ongoing monitoring on both sides of the Whitcombe Pass will be required along with periodic control, to prevent dispersal.

2.2 THE WESTERN LIMIT

The breeding range of thar in Westland is largely confined to the elevated ranges east of the Alpine Fault. Lateral ranges give thar access to alpine grasslands and subalpine shrublands to within a few kilometres of State Highway (SH) 6. Further, the present breeding range lies within 1-2 km of SH 6 in a number of places between the Whataroa River in the north and the Karangarua in the south. Apart from occasional stragglers thar are absent west of the highway.

The western limit of the feral range will be SH 6 from the south bank of the Hokitika River to the north bank of the Haast River.

2.3 THE SOUTHERN LIMIT

The southern limit, as defined in the policy, is not the present limit of breeding groups of thar. The policy requires that thar south of the Wanaka-Haast Highway be exterminated. It follows then that the southern limit of the feral range will be the north bank of the Haast and Landsborough rivers, to the Clarke River confluence, then the east banks of the Landsborough and Haast rivers to SH 6 at Pleasant Flat, then the Haast-Wanaka Highway (SH 6) connecting with the western and eastern limits via SH 8A.

2.4 THE EASTERN LIMIT

Thar are widely dispersed east along the main divide and its lateral ranges. There are several disjunct mountain ranges which presently do not have thar but could be colonised, e.g. the Mt Hutt Range. The eastern limit should protect these ranges from colonisation so long as manageable control boundaries can be identified. A combination of road and river boundaries can be identified to separate most of these areas, e.g. Mt Hutt, from the feral range, but not all, e.g. Lindis Range.

The eastern limit of the feral range will be SH 8 from its junction with SH 8A at Tarras north to Fairlie, along SH 79 to Orari Bridge and SH 72 to the Rangitata Bridge, then upstream along the south bank of the Rangitata River to the confluence with the Potts River, up the centre line of the Potts River to the Hakatere to Potts Road Bridge, east along that road to Hakatere, then north along the road to Lake Heron, and then down the centre line of Lake Heron and Lake Stream to its confluence with the Rakaia River.

The feral range is illustrated in Map 3. This feral range is described and set by the Director-General of Conservation under Section 2 of the Wild Animal Control Act 1977.

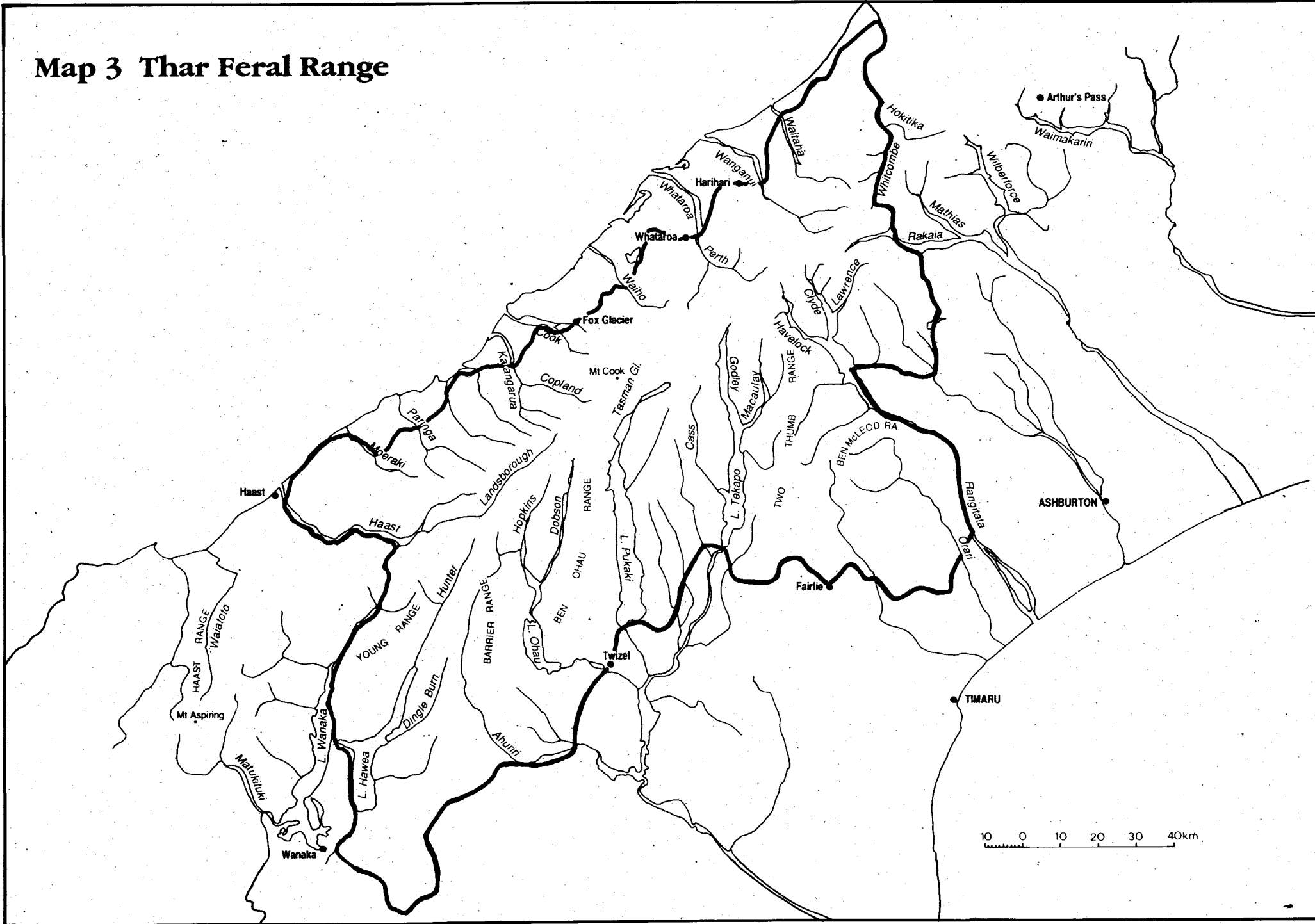
3. EXCLUSION ZONES AND MANAGEMENT UNITS

The existing breeding range is subdivided into exclusion zones and management units as shown in Map 4 (refer to Map 1 for tenure categories)

3.1 DESCRIPTION OF EXCLUSION ZONES

There are two exclusion zones - one north of and the other south of the feral range as defined in this plan. The purpose of the exclusion zones is to maintain two areas with a zero density of thar and which will provide a barrier to their further dispersal.

Map 3 Thar Feral Range



Exclusion Zone 1: North Rakaia/Mathias-North Whitcombe/Hokitika/Mungo

Total area:	ca.200 km ²
Current occupied area:	ca.100 km ² *
Tenure:	Conservation land
Present Thar Density:	<1/km ²
Population Size:	<100
Management Goal:	Prevent expansion of breeding range.
Target Density:	>0**
Control Priority:	Official control.***

* Area refers to that within which thar are currently distributed.

** Wandering males will continue to visit this area. Reported occurrences of thar north of this zone should be promptly validated, if necessary by inspection, and action taken if found.

*** Recreational and commercial hunting may supplement but not replace planned official activity.

Exclusion Zone 2: South Of The Haast to Wanaka Highway

Total area:	ca.1700 km ²
Current occupied area:	ca.296 km ²
Tenure:	30% Pastoral lease 10% Conservation land 60% Mount Aspiring National Park
Present Thar Density:	<1/km ²
Population Size:	<100
Management Goal:	Prevent expansion of breeding range.*
Target Density:	0
Control Priority:	Official control.**

* This is the highest control priority. Areas between the Burke and the Wilkin valleys should be systematically inspected and where located thar should be killed.

** Recreational and commercial hunting may supplement but not replace planned official activity.

3.2 DESCRIPTION OF MANAGEMENT UNITS

The management units will be handled so as to keep thar populations down to specified levels. Management intervention will occur when population density goes over the set level. Most management units will provide an opportunity for regeneration of healthy plant cover and subsequent monitoring of species diversity and plant communities' regenerative capacity. Some will also act as buffer zones, with population control measures designed to prevent further dispersal.

Unit 1. South Rakaia/Upper Rangitata

Area:	980 km ²
Tenure:	70% Conservation land 30% Pastoral lease
Present Thar Density:	1.7/km ²
Population Size:	ca.1400
Management Goal:	Protection of conservation values by thar population control.
Conservation Objective:	Maintain healthy plant cover, species diversity and regenerative capacity of plant communities in thar habitat.*
Intervention Density:	2.5/km ² (ca. 2000)
Control Priority:	- Recreational hunting; - Guided hunting; - Commercial recovery; - Official control as required.

* As measured by monitoring plant communities and nominated indicator species.

Unit 2. South Whitcombe/Wanganui/Whataroa

Area:	640 km ²
Tenure:	Conservation land
Present Thar Density:	1.6/km ²
Population Size:	ca.1200
Management Goal:	Protection of conservation values by thar population control; prevention of dispersal into Westland National Park
Conservation Objective:	Maintain healthy plant cover, species diversity and regenerative capacity of plant communities in thar habitat.
Intervention Density:	2/km ² (ca. 1500)
Control Priority:	- Recreational hunting and guided hunting; - Commercial hunting; - Official control adjacent to park boundaries as required.*

* Periodic inspection and control in conjunction with control operations in National Parks may be necessary along the southern boundary of this unit, in Tartare Stream and adjacent to some high passes, e.g. Sealy Pass.

While the Adams Remote Experience Zone limits aerial access by recreational hunters and hunting guides to part of this management unit, thar densities are currently low.

Unit 3. Gammack/Two Thumb

Area:	1680 km ²
Tenure:	90% Pastoral lease 10% Conservation land
Present Thar density:	2/km ²
Population Size:	ca.3000
Management Goal:	Protection of native flora and fauna conservation values by thar population control; prevention of dispersal into Mount Cook National Park via upper Godley Valley and Liebig Range.
Conservation Objective:	Maintain healthy plant cover, species diversity and regenerative capacity of plant communities in thar habitat generally; minimise thar impacts on native plant and animal communities in RAP's.
Intervention Density:	2/km ² * (ca.3000)
Control Priority:	- Landowner control (on lease or private land);** - Recreational hunting and guided hunting; - Commercial hunting; - Official control as required adjacent to Park boundary.**

* A significant proportion of this unit is marginal thar habitat and is lightly populated. There will be areas within this unit where thar densities are substantially higher than the intervention density; localised thar density should not exceed 5/km².

** The control of wild animals on crown lease land is the direct responsibility of lessees, although overall responsibility is with the Minister of Conservation. This control is generally achieved by recreational and safari hunting at the invitation of the lessee. There are localised areas where reductions in the thar population are desirable to limit dispersal into neighbouring units and where present densities appear to be inhibiting regeneration of tussock grassland and shrubland communities. There are also areas where agreements may be reached between the Department and lessees to limit thar densities in areas identified by the PNA programme. The extent and method of control should be determined by the lessees, and where warranted, in consultation with the Department.

In terms of individual pastoral leases the Commissioner of Crown Lands agrees that the intervention densities are the levels above which the conditions of the lease are no longer being met and at which he will support the Department initiating control. This determination is based on application of section 99 of the Land Act 1948 and on the Land Settlement Board Policy Number 17.

Unit 4. Mount Cook/Westland National Parks/Adjoining Conservation Land on Liebig Range

Area:	1350 km ²
Tenure:	96% National park 4% Conservation land
Present Thar Density:	1.1/km ²
Population Size:	ca. 1500
Management Goal:	Control of thar population to lowest practicable level.
Target density ³ :	0
Intervention Density:	<1/km ² (ca. <500)
Control Priority:	- Recreational hunting, guided hunting and commercial hunting; - Official control as required.*

- * Achievement of this target is unlikely in the Karangarua, Douglas and Copland valleys by recreational and guided hunting because of remoteness and difficulty of access.

Unit 5. Ben Ohau: (includes Ahuriri Valley on the eastern side of the river)

Area:	870 km ²
Tenure:	62% Pastoral lease 38% Conservation land
Present Thar Density:	1.7/km ²
Population Size:	ca. 1200
Management Goal:	Protection of conservation values by thar population control; prevention of dispersal north into Mount Cook National Park and south into the Hunter Valley.
Conservation Objective:	Maintain healthy plant cover, species diversity and regenerative capacity of plant communities in thar habitat generally; minimise thar impacts on native plant and animal communities in RAP's.
Intervention Density:	2.5/km ² (ca. 1800)
Control Priority:	- Landowner control (on leasehold and private land); - Recreational hunting and guided hunting; - Commercial hunting; - Official control as required.*

- * Comments as for Unit 3, Gammack/Two Thumb, apply.

³ Target density of zero reflects requirements of National Parks Act. Intervention density reflects N Z Conservation Authority policy on non-eradicable pests in National Parks.

Unit 6. Landsborough: (excludes true left of lower Landsborough Valley from Broderick Pass downstream)

Area:	540 km ²
Tenure:	Conservation land
Present Thar Density:	2/km ²
Population Size:	ca. 1100
Management Goal:	Protection of conservation values by thar population control; prevention of dispersal south of the Haast River and into Mount Aspiring National Park.
Conservation Objective:	Maintain healthy plant cover, species diversity and regenerative capacity of plant communities in thar habitat.
Intervention Density:	1.5/km ² (ca. 900)*
Control Priority:	- Recreational hunting, guided hunting and commercial hunting; - Official control as required.

* The low intervention density reflects the importance placed on preventing dispersal south of the Haast and limiting dispersal into the Hunter valley; this requires a reduction in numbers, especially in the lower Landsborough.

Unit 7. Wills/Makarora/Hunter: (includes the true left side of the lower Landsborough Valley from Broderick Pass to the Haast Highway)

Area:	630 km ²
Tenure:	59% Conservation land 23% Pastoral lease 18% National Park
Present Thar density:	<1/km ²
Population Size:	<500
Management Goal:	Protection of conservation values generally; control of thar population to lowest practicable level in that part of Mount Aspiring National Park lying north of the Haast Highway; prevention of dispersal south across the Makarora valley.*
Conservation Objective:	Minimise thar impacts on native plant and animal communities in the Park. Elsewhere maintain healthy plant cover, species diversity and regenerative capacity of plant communities in thar habitat.
Intervention Density:	<1/km ² (ca. <100)**
Control priority:	- Recreational hunting and commercial hunting. - Periodic official control will be required to meet this target.

* The achievement of the management goal will reduce the thar range; this unit therefore acts as a buffer zone in preventing the southern dispersal of thar. Control priority should be highest in the lower Landsborough, Wills, Makarora and the west bank of the Hunter River.

** Assumes there will continue to be some movement across ridges between the Landsborough, Hopkins and the headwaters of the Hunter.

3.3 CONTROL PARAMETERS

Several guidelines apply to all management units.

- Thar densities are not to exceed 5/km² for any localised area (this is less than half the current thar density within preferred habitat of the North Branch of the Godley); this is because very localised groups will have detrimental impacts on vegetation.
- Female-kid groups will be restricted, especially in close proximity to unit boundaries, to 10 or less per group;
- In management units where recreational hunting has been accorded priority, commercial hunting will be considered only after encouragement has been given to recreational and guided hunters and they have failed to meet targets;
- In exclusion zones recreational hunting, guided hunting and commercial hunting will be unprofitable as animal numbers will be kept to very low levels. These activities may supplement but not replace official control;
- The control options and priorities will only be employed on pastoral lease or freehold land at the instigation of the lessee or landowner respectively or by the Department after consultation with the lessee or landowner. In the exclusion zones landowner consent will be obtained through consultation, or when the powers of Section 16 of the Wild Animal Control Act are used.
- Recreational hunters will not be denied legal access to any land under Departmental management unless provision of legal access impedes any official control operation.

Priority for Control

Priority for the allocation of government funds for thar control, determined according to the need to stop spread and priorities for protecting conservation values, will be in the following order:

Southern Exclusion Zone
Northern Exclusion Zone
Wills/Makarora/Hunter
Landsborough
Mount Cook/Westland National Parks
South Whitcombe/Wanganui/Whataroa
Hunter/Ben Ohau
South Rakaia/Rangitata
Gammack/Two Thumb.

3.4 HERD REDUCTION

Based on the seven management units there is an implied population maximum of 9-10,000 with a required annual kill rate of about 2000 to restrict further increases. The need for herd reduction to meet conservation objectives currently exists in the following areas:

It is expected that the Department will facilitate hunting opportunities to ensure thar do not reach the intervention densities in units 1, 2, 3 and 5. It is expected that the Department will have to, itself, control thar in units 4 (the national parks) and 7 (very low numbers) and unit 6 (because of its remoteness). This should ensure that the total population is less than the upper limit set in the policy.

Mount Cook/Westland National Parks

A reduction in numbers is necessary in the Karangarua Valley and to a lesser extent in the Douglas Valley and Liebig Range. Current indications are that this will have to be effected by official control activities; however there will be consultation with all hunting interests before this option is taken.

Landsborough

The thar population has increased in the upper Landsborough to the point where herd reduction should be effected by either commercial activity or official control. Indications are that at least 200-300 thar should be removed from this area prior to the next breeding season. Unless the existing restriction on aircraft landing for recreational or guided hunting access to this area is lifted, it is highly unlikely that recreational and guided hunting will have an impact on this population. Therefore landing permits may be granted by the Department to air transport operators who wish to land recreational and guided hunters in the Hooker-Landsborough Wilderness Area for up to an annual twelve week period to run from April till July at the discretion of the Regional Conservator, subject to close monitoring, performance assessment and review.

Gammack/Two Thumb

Herd reduction in the North Branch is necessary to meet conservation objectives. Inspections will be made by the Department of all pastoral leases to better understand population distribution and density. Lessees will then be consulted on any subsequent herd reduction needs.

4. CONTROLS ON THAR IN CAPTIVITY

The Thar Management Policy allows for the holding of thar in captivity throughout New Zealand. This plan sets out conditions under which thar may be held in the four zones, i.e. the feral range, exclusion zones, risk zones and elsewhere (see glossary).

The farming of thar is allowed for only within the feral range.

Risk zones are to be defined as those areas outside of the feral range that would be susceptible to thar colonisation and where unacceptable environmental damage would result should thar escape from captivity. Conditions associated with the holding of thar will be designed to meet the needs of each zone.

The risk zone also includes areas within the feral range which have a zero population objective in terms of this plan, i.e. the Hunter Valley catchment, the Makarora catchment and the upper Haast catchment upstream of the confluence with the Landsborough River.

Thar cannot be held within exclusion zones.

For areas that are outside the feral range, outside exclusion zones and outside risk zones that can be held for any purpose other than farming which is defined as the raising of that for meat, skins, fibre or sale.

4.1 RISK ZONES

The limits of the risk zones (see Maps 5a,b,c) are:

- Fiordland National Park, Eyre Mountains, the Remarkables and the rest of southern Alps outside the southern boundary of the feral range; boundary will be Waiau River from the sea to its source at Lake Te Anau, from there around the SE shore of the lake to Te Anau, then SH 94 to Lumsden, then SH 6 to Garston, then from Garston to Cromwell via the Nevis River Road, and from Cromwell via SH 8 to Tarras, where it meets the southern limit of the feral range.
- Mt Hutt and Mt Somers; boundary will be SH 72 from Rangitata Bridge to Rakaia Gorge Bridge and the south bank of the Rakaia to its confluence with Lake Stream; then along the feral range boundary to the Rangitata Bridge at SH 72.
- The Southern Alps generally northwards of the northern limit of the feral range, including inland and seaward Kaikouras, the Puketeraki and Torlesse Ranges; boundary will be from the Rakaia River confluence with the Acheron River along a straight line to the junction of SH 7 and SH 70 north of Culverden, then north along SH 70 until it meets the Waiau River bridge near Waiau, then downstream along the centre line of the Waiau River until it meets SH 1 south of Parnassus, from there north along SH 1 to Blenheim, west along SH 63 to the junction with SH 6, and along SH 6 to the junction with SH 69 near Inangahua Junction, then south along SH 69 to Reefton, and from Reefton along SH 7 to Springs Junction, and south along a straight line from Springs Junction to Inchbonnie, and from there on another straight line from Inchbonnie to where SH 6 meets the northern limit to the feral range.
- Paparoa Range and North West Nelson; boundary to be from the mouth of the Grey River and along SH 7 to its junction at Reefton with SH 69, then along SH 69 to its junction with SH 6 near Inangahua Junction, then along SH 6 to its junction with SH 61, then north along SH 61 to the Motueka River, and east along the Motueka River to the sea, and bounded to the north and west back to its commencement point by the sea.
- Richmond Range; boundary to be from Renwick along SH 6 via Nelson to the confluence of the Hope and Buller rivers, and from there along SH 63 to Renwick;
- The Tararua Ranges; boundary to be SH 2 from its junction with the Akatarawa Road at Waikanae Road, northwards to the point where SH 2 crosses the Napier-Wellington Railway at Woodville, then west and south along the railway to Waikanae, and from Waikanae along the Akatarawa Road to the commencement point.

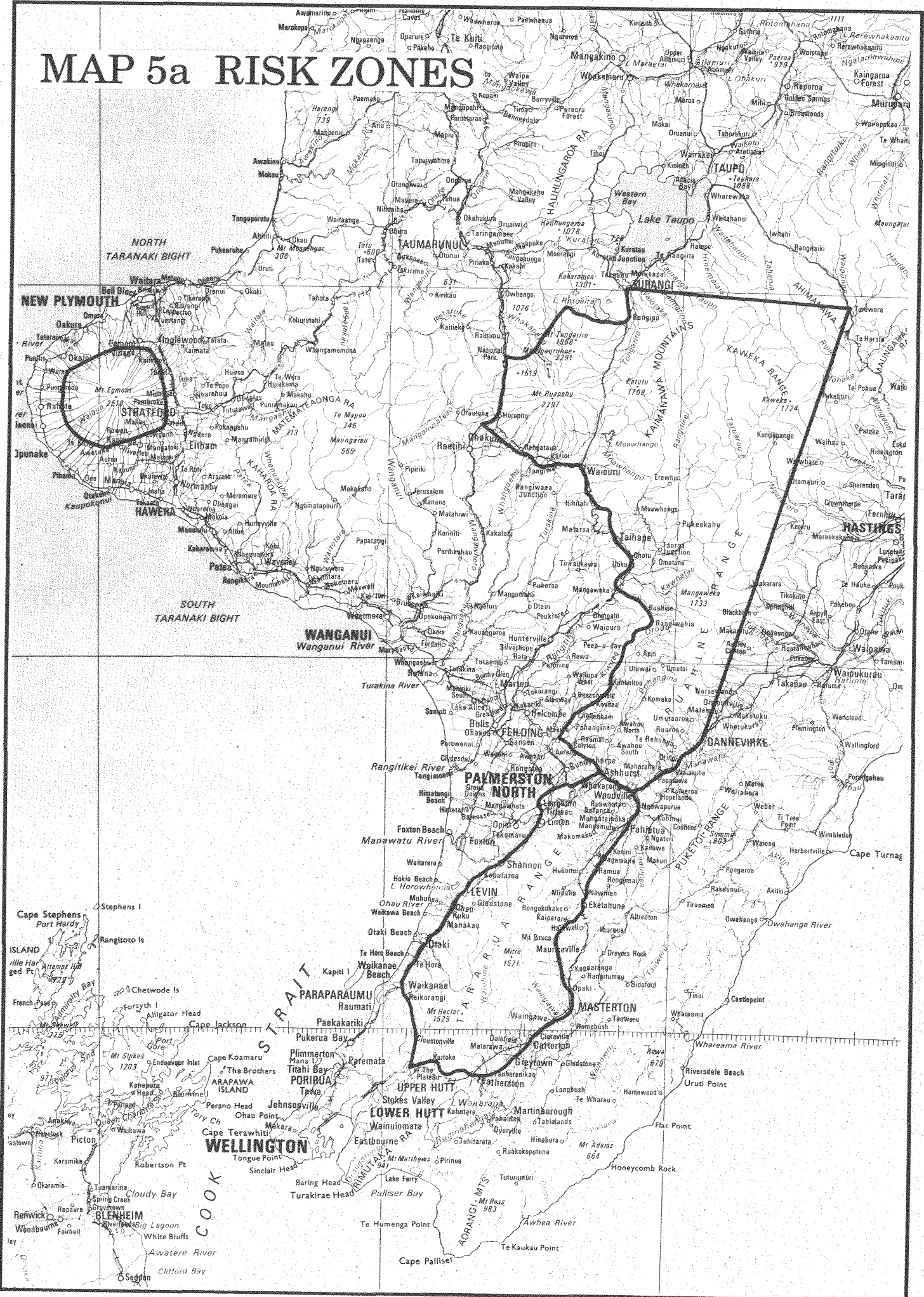
- The Ruahine, Kaweka and Kaimanawa ranges, and Tongariro National Park; boundary to be Woodville along SH 2 to Dannevirke, then a straight line from Dannevirke to Tarawera on SH 5, then another straight line from Tarawera to Turangi at the junction of SH 41 and SH 1, then on SH 41 and 47 to its junction with SH 4, then south to the junction with SH 49A, then along SH 49A and SH 49 to the junction with SH 1 at Waiouru, then south along SH 1 to the junction with SH 54 to its junction with the Colyton Road, then east along that road to SH 2 at Ashhurst, then along SH 2 to the commencement point at Woodville.
- Mount Egmont National Park; boundary will be 7 km outside of the National Park boundary.

4.2 CONDITIONS FOR HOLDING THAR IN CAPTIVITY

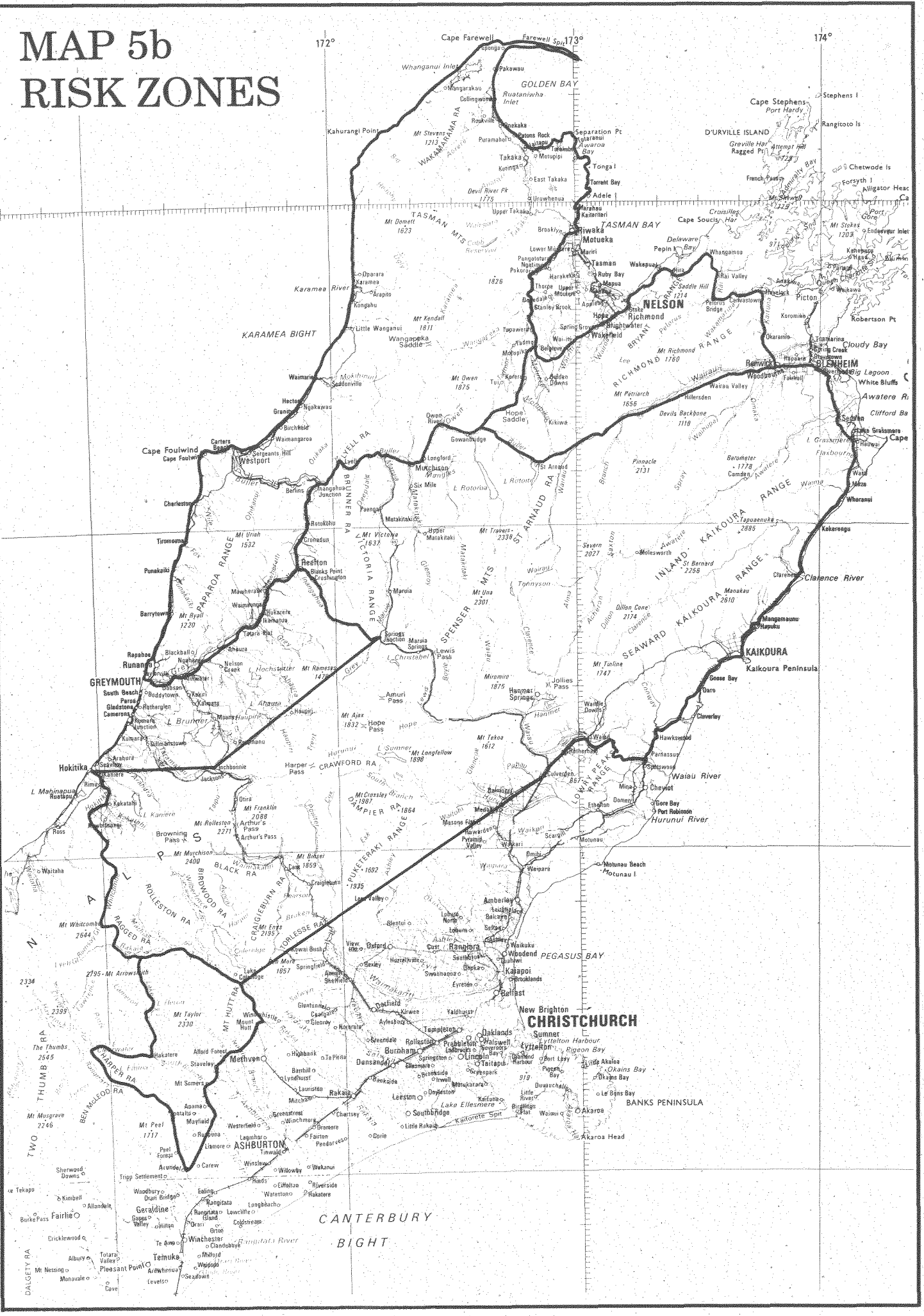
The conditions to apply to the keeping of thar in captivity for whatever purpose shall be:

- A written authority will be obtained from the Department prior to any thar being conveyed to or held on any property.
- The minimum fencing standards will be those specified in the Third Schedule to the Noxious Animals in Captivity Regulations 1969.
- Fencing to contain thar in accordance with these requirements will be completed to the satisfaction of the Department before any thar are taken to or held on the property.
- Live thar will not be disposed of by any person by transfer or sale to another person unless the transferee holds a current and valid authority to hold thar and numbers are within the transferees' maximum limitation.
- Live thar will not be released, liberated or allowed to wander at large outside the approved containment areas.
- Responsibility for the capture or the costs of capturing or hunting or killing thar that have been released or liberated or have escaped from an approved containment area will be on the permit holder.
- No permit to hold thar will continue in force for more than 3 years; renewal for a further period of 3 years will be upon the Department being satisfied:
 - a) that fences are adequate to contain the thar in captivity;
 - b) on the compliance by the permittee with the terms and conditions of the permit.
- Permits are not transferable to another person without the Department's consent.
- The permittee will report the escape or loss through any cause of thar immediately this is known to have happened.
- A permit to hold thar may only be issued for a bone fide commercial reason; permits will not be issued to allow thar to be kept as pets or for other non commercial reasons.

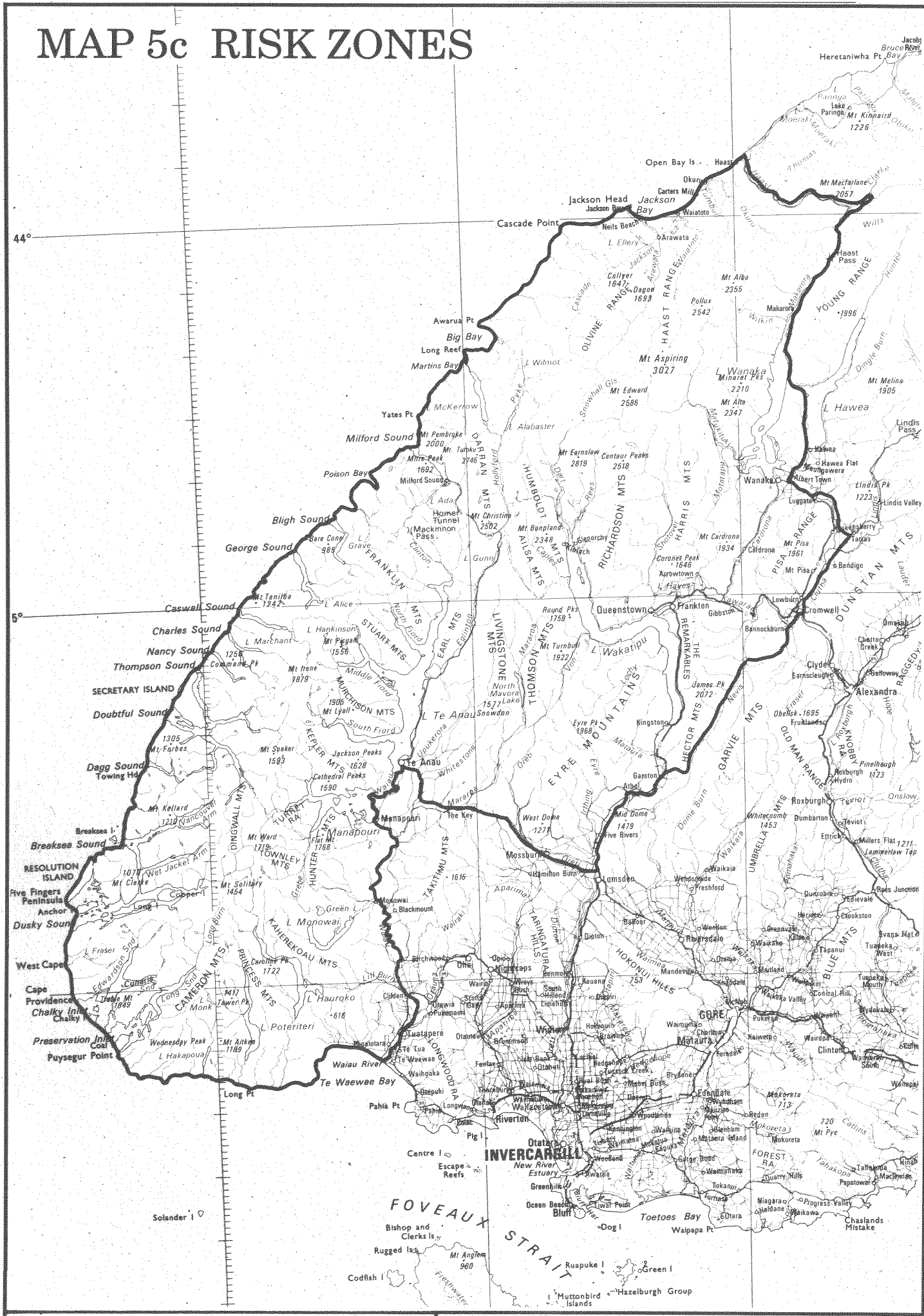
MAP 5a RISK ZONES



MAP 5b RISK ZONES



MAP 5c RISK ZONES



Special conditions:

The following are special conditions that are to apply to thar held in risk zones, and are additional to those set out in the preceding section:

- Thar must be branded in a manner that will enable the Department to identify the property from which they have come.
- Only bull thar will be permitted.
- No permit will be given for any area which is reasonably likely to suffer damage to containment fences from landslip or floods.

Exemptions:

No permits shall be issued for the holding of thar in the exclusion zones for any reason.

The conditions set out above will not apply to any premises or property registered and managed in accordance with the Zoological Gardens Regulations.

Farming of thar, which means the breeding or raising of thar for meat, skins, fibre or sale, is confined to the feral range of the species. The Wild Animal Control Act does not allow the Department to issue any authority for thar farming outside the feral range.

5. HUNTER MANAGEMENT**5.1 RECREATIONAL HUNTERS**

The Department will liaise closely with recreational hunters and hunting organisations to:

- inform them of localised areas where thar numbers are too high;
- keep them informed of management goals and intervention densities applying to management units;
- encourage them to take an active role in herd reduction where this is not being undertaken by commercial operations, i.e. by taking female thar in addition to trophy bulls;
- require participation in the compilation of statistics by the keeping of detailed hunter diaries and responding to hunter surveys;
- inform hunters of results from all parts of the plan implementation.

Possible Contractual Agreements

Two areas, the Wanganui/Whataroa and Rakaia/Rangitata catchments, have the greatest recreational hunting popularity. These management units, or sub-units thereof, may be made available to recreational hunters, safari hunters, or similar groups to manage the hunting under a contractual arrangement with the Department, which meets the conservation objectives specified.

The more exclusive the rights in any agreement, the greater the responsibility to control the herd within the parameters of this plan will be expected from the hunting organisation. In line with Departmental aims of keeping land available to as many hunters as possible the Department will ensure that conservation estate is accessible to recreational hunters.

Other areas of conservation lands where hunting organisations may be able to make a useful contribution to thar control under a contractual arrangement include accessible areas within Mount Cook National Park and the Ben Ohau management unit.

Contractual arrangements may include:

- the organisation and management of hunting by the contracting organisation;
- how hunting opportunities are allocated;
- an undertaking on the contractor's part that it would control thar to below the intervention density set for the management unit;
- an undertaking by the Department to provide information on locations where thar require control;
- agreement that should the contractor fail to control thar to the prescribed level then other control options will be used by the Department;
- assistance with research and monitoring by the contractor;
- revocation of the contract upon failure by the contractor;
- a reviewable term of up to three years, subject to satisfactory annual performance.

The Department will publicly notify areas as they become available for hunting management under a contractual arrangement, and invite expressions of interest.

Permit Administration Fees

While the Thar Management Policy makes provision for the recovery of costs of thar hunting permit issue, the amount of the charge and the timing of its introduction will be decided by way of the Department's general hunting permit policy.

5.2 HUNTING GUIDES

Guides taking clients onto the conservation estate must obtain a concession from the Department. Hunting guides also have arrangements with lessees and private landowners.

The Department's draft concessions policy deals with concession type, duration, fees and so on. The following provisions, subject to change by the draft concessions policy, apply to guiding concessions as new agreements are issued or existing ones renewed:

1. Either
 - a) Guides will be given the opportunity to tender for conservation areas within which they have sole concession rights but not to the exclusion of recreational hunters generally or;
 - b) Guides will be given non-exclusive concessions for individual management units or collections of units.
2. Guides will be encouraged to cull female thar in their concession areas.
3. Guides advertising the hunting of trophy animals on the conservation estate will be subject to a revised concession fee which takes account of the trophy value of the animals.

5.3 COMMERCIAL HUNTING

The commercial wild animal recovery industry could play a significant role in the achievement of thar control targets in all management units but particularly in Gammack/Two Thumb, Mount Cook/Westland National Parks, Landsborough, Ben Ohau, Wills/Makarora/Hunter. Over all management units there is scope for a sustained annual kill for local or export markets of about 900 to 1000 thar. An estimate of the absolute number available to commercial operators requires further liaison with lessees, particularly those who are likely to offer access to commercial wild animal recovery operations.

Under the Wild Animal Control Act the Department manages the issue of wild animal recovery licences which applies to all land tenures and issues wild animal recovery permits for Crown land.

5.4 OFFICIAL CONTROL

Official control will generally be employed only when other alternatives have not proved to be either successful or viable. The exceptions to this are in the northern and southern exclusion zones and the Wills/Makarora/Hunter and possibly Mount Cook/Westland National Parks management units, where recreational, guided or commercial hunting are unlikely to achieve population targets over the entire area.

6. ACCESS

There is demand for aerial access to some hunting areas where landing is prohibited for recreational use, e.g. the Hooker-Landsborough Wilderness Area. The Wilderness Policy, the National Parks Policy and policies affecting other conservation lands variously restrict aerial access. With respect to the Wilderness Policy however, aerial access is permissible for wild animal control. It is recognised that recreational hunting can be an effective means of thar control and thus concessions may be granted by the Department to air transport operators who wish to land recreational and guided hunters in the Hooker-Landsborough Wilderness Area and the Adams Proposed Remote Wilderness Area during an annual period up to 12 weeks to run

from late April to the end of July each year. Details of such arrangements will be decided by the relevant Regional Conservator by March of each year and will be subject to close monitoring, performance assessment and review.

7. RESEARCH AND MONITORING

Implementation of the thar control plan requires continued research and monitoring. The various elements of a monitoring programme are covered in priority order under each of three headings; vegetation, thar and hunter monitoring. Proposals for new research relating to implementation of the control plan will be encouraged, and that these will be reviewed as part of the annual Foundation of Research, Science and Technology and Departmental science and research funding rounds.

7.1 VEGETATION

Snow tussock and vulnerable species will be used as bio-indicators of ecosystem health. The current 50 permanent vegetation plots, established in thar habitat in the North Branch (21), Carneys Creek (20), and the Hooker Valley (9), will continue to be monitored. The purpose of these plots is to determine thar impacts on indicator species in snow tussock communities. Regeneration of snow tussock in areas of known thar density is being studied.

Further plots have been established in similar catchments in Westland, with low to high thar densities and where thar counts are also being carried out periodically, e.g. the Lord River, Bettison or Whymper and Landsborough. Up to 45 plots will be established and remeasured on a regular basis - about three per year.

Permanent plots will be established in at least one location on the Two Thumb Range (e.g. Cloudy Peak), and one on the Ben Ohau Range (e.g. Stony Creek).

Vulnerable Species

The status of indicator species is to be monitored by the establishment and remeasurement of permanently marked plots containing such species. Initially *Ranunculus godleyanus* will be monitored. A number of sites containing this and possibly other species, e.g. *R. lyallii*, would be identified and remeasured over a five year period initially. Landcare Research already has *R. lyallii* in some plots; the Department will liaise with Landcare Research over monitoring these plots.

The possibilities for monitoring vulnerable animal species or communities will be assessed.

Exclosure Plots

The exclosure plots described in Section 2 of this plan will be evaluated to determine whether they are in thar habitat. Those subject to occasional or more frequent thar browse will be remeasured periodically to follow vegetation trends; at about five year intervals.

Where other vegetation plots other than those referred to above have previously been established in thar range (e.g. in the Waitaki), they are to be evaluated to

determine whether they should be remeasured periodically. If there are insufficient plots then the Department will investigate the feasibility of establishing new plots, possibly also some on pastoral lease lands.

7.2 MONITORING THE THAR POPULATION

Monitoring Study Areas

The 16 study areas where thar observations have occurred are listed in Appendix 7. These will be assessed to see whether they provide sufficient coverage of the thar range and their ability to provide consistent thar counts. The monitoring method of Challies (1992) will be used. Monitoring will be carried out approximately at three yearly intervals.

Thar Diet Study

The interim results of the thar diet study published in this plan are from research to be completed by Landcare Research in 1993. The need to continue rumen sample analysis will be determined at the conclusion of this project.

Thar Harvest Model Development

The development of a harvest model, through the monitoring of a selection of catchments, is due to be completed by Landcare Research in 1993. It is anticipated that ongoing measurement of study areas will continue to contribute information on thar impacts, the influence of hunting on the thar population and will refine predictions of harvest requirements by sex and age to ensure target population densities are not exceeded.

7.3 HUNTER SUCCESS MONITORING

Kill data will contribute to monitoring performance and refining population knowledge. The Department will undertake kill monitoring by surveying hunter success.

8. CONTROL PLAN IMPLEMENTATION AND REVIEW

The Plan spans the whole of New Zealand. Its successful implementation will require a proactive approach and co-operation between the Department, conservation boards and the NZ Conservation Authority and the various interest groups.

The Plan will apply for an initial term of five years. It is experimental and changes necessary to protect conservation values will be made when required, including amendments to intervention densities and management unit boundaries should they be justified and feasible. Affected parties will be notified and consulted about any such changes.

An operational plan that identifies planned actions for each management unit will be prepared by relevant field centres and subject to annual reporting by July 31 of each year (see Parkes 1993 for format).

A summary of the above reports should form the basis of an annual report on plan performance and will be provided to the New Zealand Conservation Authority; the report will include conservation and animal monitoring details, a financial summary and progress on ongoing research (Appendix 8).

ACKNOWLEDGEMENTS

In the preparation of this plan many authorities, organisations and individuals have contributed statements of policy, information and advice both written and verbal. While not all of these contributors are referred to in the plan their viewpoints, proposals, scientific information, advice and anecdotal information have been taken into account in its preparation. They are acknowledged, with appreciation:

CENTRAL AND LOCAL GOVERNMENT ORGANISATIONS:

Canterbury Regional Council
West Coast Regional Council
Landcorp Management Services Ltd
G. Hunter, Landcare Research, Lincoln
J.P. Parkes, Landcare Research, Christchurch
G. Nugent, Landcare Research, Christchurch
B. Molloy, Landcare Research, Lincoln
C. Thomson, Landcare Research, Christchurch
P. Wardle, Landcare Research, Lincoln

CONSERVATION ORGANISATIONS - INDIVIDUALS:

Maruia Society, Christchurch
Royal Forest and Bird Protection Society Inc.
C.J. Burrows, University of Canterbury
D.R. Given, Christchurch
C.N. Challies, Christchurch
DOC Field Staff from Westland, Canterbury and Otago, particularly P. Hondelink, C. Main, T. Farrell, J. Mead, S. Hall, D. Anderson, N. Bolton.
H. Robertson, DOC, Wellington.

RECREATION ORGANISATIONS:

Federated Mountain Clubs of New Zealand Inc.
New Zealand Deerstalkers Association
Safari Club International
Professional Hunting Guides
N.Z. Registered Hunting Guides Association
B. Hayward, Wanaka
G. Joll; Lillybank Safari Lodge, Tekapo
D. McClunie, Hokitika
D. Musgrave, Invercargill
S. Peterson, Franz Josef
L. O'Rourke, Pleasant Point
W. Preston, Tekapo
W. Speck, Tekapo
A. Thompson, Harihari
P. Wilson, Christchurch

LICENCED WILD ANIMAL RECOVERY AND PASSENGER SERVICE OPERATORS:

C. Bint; Marlborough Helicopters, Blenheim
 N. Boyd, Mt. Fyffe Holdings Ltd. Kaikoura
 C.R. Deaker; Glacier Helicopters Ltd., Franz Josef
 R Hayes; Southern Lakes Helicopters Ltd., Te Anau
 K.E. Hollows, Te Anau
 R. Knight; The Helicopter Line, Franz Josef
 E.G. McNutt; Winged Hunters Ltd., Canterbury
 J. Scott, Karangarua

Questionnaires were sent out to 30 Pastoral Lessees; 24 replies were received.
 Additional information was obtained from:

I. Ivey, Glentanner
 L. Prouting, Mesopotamia
 B. Scott, Godley Peaks
 C. Urquhart, Erewhon

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GLOSSARY

Breeding Range: That area which is from time to time occupied by free ranging herds of animals of both sexes. Generally synonymous with "feral range".

Conservation Estate: National Parks, Reserves and other lands administered under the Conservation Act, 1987.

Conservation Land: That part of the Conservation Estate excluding National Parks.

Exclusion Zone: Areas where the Department is seeking to maintain a zero density of the thar population.

Feral Range: Defined in the Wild Animal Control Act, 1977 as "the area that is from time to time occupied by a free ranging population of wild animals of that species, excluding transient wanderers from the main herd and from the range of the main herd." For the purpose of clearly interpreting the policy regarding captive thar, the feral range defined in this plan includes some lowland areas not commonly frequented by thar.

Pastoral Lease Land: Areas of Crown Land usually leased for the purpose of pastoral grazing for a term of 33 years and renewable in perpetuity. They are commonly referred to as high country runs.

Risk Zones: Areas outside of the feral range that would be susceptible to thar colonisation and where unacceptable environmental damage would result should thar escape from captivity.

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APPENDIX 1: HIMALAYAN THAR MANAGEMENT POLICY

PURPOSE

This policy document defines the manner in which Himalayan thar will be managed by a management regime which ensures that hunting and other control pressure is maintained at levels which provide protection to natural values.

The document outlines the ecological implications of the management regime and how management will be achieved to fulfil the Minister's and Department's statutory roles under the Wild Animal Control Act 1977, the Conservation Act 1987 and National Parks Act 1980.

BACKGROUND TO HIMALAYAN THAR MANAGEMENT

The Himalayan thar *Hemitragus jemlahicus* (subsequently referred to as thar) is a large goat-like animal native to the central Himalayas. Thar were introduced into New Zealand from a captive herd held at Woburn Park, England. The Department of Tourist and Health Resorts liberated two groups of thar near Mount Cook in 1904 and 1909. Some were released also at Franz Joseph in 1913 and on the Sealey Range in 1919.

Since their release thar have established and progressively expanded their range. Today, the breeding range (i.e. where females are present in the population) covers at least 6,000 km² of the central Southern Alps, and some of its lateral ranges. Surveys since 1984 have confirmed the absence of females north of the Rakaia River and south west of the Hunter River, although in 1989 a small herd was located west of Lake Wanaka, and there are signs that female thar may still be present in that area. Adult males are regularly seen outside the breeding range. Their northern limit seems to be south of the Wilberforce and Hokitika/Mungo Rivers. Male animals have been reported south of Haast Pass.

Thar have been liberated, or have escaped from captivity, outside of their feral range. They have been seen in the Tararua Range, in Marlborough, and more recently on the Remarkables, near Queenstown. They have

been reported from a number of other localities. It is thus presumed that thar have the capability of establishing in areas outside their current breeding range.

Breeding populations of thar are held in captivity, under authority, in at least seven places within or adjacent to the species breeding range, and in another 19 places outside their breeding range. A further 10 non-breeding captive herds are being held.

The thar breeding range includes a mix of land tenures and status. About 12% of the range lies within national parks (Mount Cook, Westland). A further 24% lies on other conservation and stewardship lands. The remaining 64% of thar range is on about 30 Crown pastoral lease lands (with small areas of freehold land intermingled).

The introduction of thar into New Zealand was to provide recreational hunting and to generate tourism by attracting overseas hunters. From the time of their liberation, they were given protection. Once their numbers had increased they were listed in the schedule of introduced game animals in the Animals Protection and Game Act 1921-22. This allowed them to be hunted under regulated hunting seasons. Thar numbers continued to increase so protection was removed and official operations to eradicate them commenced in 1937. Over the following 25 years over 25,000 thar were shot in official control campaigns. Recreational hunting accounted for an unknown number. Despite this thar numbers and their breeding range continued to expand:

During the 1970's the thar population was reduced by about 90% by commercial hunters using helicopters. This reduction resulted in a moratorium on commercial hunting of thar being imposed by Government in 1983. Once commercial hunting ceased, thar numbers began to increase. Monitoring of the thar population was established in Carneys Creek, in the Rangitata River catchment (this is a typical example of thar habitat). Numbers increased between 1984 and 1988 by about

20% per year. During 1988 recreational hunters shot sufficient thar to prevent a further increase. Hunting pressure in Carneys Creek is far higher than in most other areas so it may be assumed that thar numbers outside of the prime hunting areas will be increasing.

LEGISLATIVE PROVISIONS

WILDLIFE ACT 1953

Animals living in a wild state are classified according to their perceived values by the Wildlife Act 1953. The Sixth Schedule to this Act specifies animals declared to be noxious animals. Thar is included in this Schedule.

WILD ANIMAL CONTROL ACT 1977

The Wild Animal Control Act defines, in Section 2, those species which are to be treated as wild animals for the purposes of this Act. Thar is one of the species specified. The long title describes the Wild Animal Control Act as:

"An Act to make better provision of the control of harmful species of introduced wild animals and the means of regulating the operations of recreational and commercial hunters, including wild animal recovery hunting using aircraft, so as to achieve concerted action and effective wild animal control ..."

Section 4 of the Act provides that it shall apply to all land, having regard to the provisions of any Act applying to the land. This section provides, that the Act shall be for the purposes of:

- *controlling wild animals generally, and of*
- *eradicating wild animals locally where necessary and practicable.*

Both purposes are to be fulfilled as "dictated by proper land use, and to ensure concerted action against the damaging effects of wild animals on vegetation, soils, waters and wildlife". The Act provides for the keeping or farming of wild animals.

The Wild Animal Control Act empowers and authorises the Minister of Conservation to

give effect to the Act. The Minister may, (amongst other things), in giving effect to the purposes when taking actions in respect of thar, achieve co-ordination of hunting measures and provide for the regulation of recreational hunting, commercial hunting and wild animal recovery.

NATIONAL PARKS ACT

The National Parks Act 1980 is an Act applying to 12% of the thar breeding range lying within Mount Cook and Westland National Parks. It is one of the Acts applying to Mount Aspiring and Arthur's Pass National Parks which lie outside of the thar breeding range, into which breeding and non breeding thar could spread.

The National Parks Act contains a number of principles concerning its purpose and how it shall be administered. The provisions of the Act "*shall have effect for the purpose of preserving in perpetuity as national parks, for their intrinsic worth and for the benefit, use, and enjoyment of the public, areas of New Zealand that contain scenery of such distinctive quality, ecological systems, or natural features so beautiful, unique and scientifically important that their preservation is in the national interest*". National Parks shall be administered and maintained so that"

- *they shall be preserved as far as possible in their natural state;*
- *except where the National Parks and Reserves Authority (now the NZ Conservation Authority) so determines, the native animals and plants of the parks shall as far as possible be preserved and the introduced plants and animals shall as far as possible be exterminated;*
- *their value as soil, water, and forest conservation areas shall be maintained;*
- *subject to conditions relating to the necessity for the preservation of the native plants and animals or for the welfare in general of the park, the public shall have freedom of entry and access to the park so they may receive in full measure the inspiration,*

enjoyment, recreation, and other benefits that may be derived from mountains, forests, sounds, seacoasts, lakes, rivers and other natural features.

The former National Parks and Reserves Authority exercised its discretionary authority under Section 4(2)(b) of the National Parks Act 1980. The Authority's policy number 9 (General Policy for National Parks; 1983 - National Parks and Reserves Authority) sets out the Authority's policy and position regarding introduced animals in national parks. This general policy is the policy of the New Zealand Conservation Authority, established following the abolition of the National Parks and Reserves Authority. Those parts of the policy which are relevant to that are set out below.

9.4 *"Total extermination of introduced animals is reaffirmed as Authority policy in terms of the Act. However, until the technical means of achieving this have become available, the authority in the exercise of its discretion under Section 4(2)(b) has determined that the immediate objective shall be the reduction by all available means of their numbers to a level the flora and fauna can tolerate. Where necessary, the extermination of animals in particular areas will be undertaken if this is possible. In further exercise of its discretionary powers under this section, the authority has qualified its policy in respect of the extermination of salmonids and game birds.*

9.5 *As a means of reducing wild animal numbers, and subject to controls to ensure public safety, both commercial and recreational hunting will be encouraged by methods most appropriate to the individual park or situation.*

9.6 *The ecological impact and effectiveness of control methods should be monitored, with the aim being to replace those which have adverse ecological impacts or little effectiveness with more acceptable methods. Public safety must always*

remain an important factor when considering and implementing methods for the control of introduced plants and animals.

9.7 *The use of herbicides, pesticides and poisons will be permitted only under stringent controls and where no effective alternatives are available".*

Management plans prepared under the provisions of the National Parks Act have the purpose of setting out the objectives and policies so that the Department of Conservation in managing national parks gives effect to the principles of the Act. The policies, and thus the management plans, must conform to the policies of the New Zealand Conservation Authority.

CONSERVATION ACT 1987

The 24% of that breeding range on conservation and stewardship areas is subject to the Conservation Act 1987. The purpose of the Act is given in the long title which states "An Act to promote the conservation of New Zealand's natural and historic resources ...".

Relevant definitions are:

"Conservation" is defined as meaning the preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generations.

"Preservation", in relation to a resource, means the maintenance, so far as is practicable, of its intrinsic values.

"Protection", in relation to a resource, means its maintenance, so far as is practicable, in its current state; but includes:

- a) *its restoration to some former state; and*
- b) *its augmentation, enhancement, or expansion.*

This Act also contains management planning provisions which have the same purpose as management plans for national parks.

Section 9 of the Act provides that the Minister may adopt a statement of general policy for any conservation area or areas, subject to public notification of the proposed statement. The management plans must conform to any policies for the area concerned. No policies which would have implications for thar management on conservation or stewardship areas have been adopted.

LAND ACT 1948

Most of the land within the thar breeding range (the 64% in Crown pastoral lease) is administered under the Land Act 1948. All leases and licences are subject to the good husbandry provisions of Section 99 of the Act. This includes a requirement that the lessee or licensee will

- keep the land free from wild animals.

Legislation pertaining to freehold land does not restrict the application of the Wild Animal Control Act. This Act provides a mechanism for situations where access onto private (or other occupied) land is required for the purposes of the Act, and provides for notification of an intention by the Minister to gain access to land, and appeals against that intention for the landowner.

IMPACTS OF THAR ON NATURAL RESOURCES

Thar can affect the abundance and perhaps distribution of some species of plants. No plant species has been reported as having been or likely to be driven to extinction by thar. The central part of the Southern Alps contains few species endemic to this region, and only one plant (*Ranunculus godleyanus*) is listed in the Red Data Book of New Zealand as "vulnerable" to thar browsing. However, thar did not exterminate the species when they were at high densities, although the plant has increased since thar densities declined.

The alpine zone has a rich and beautiful flora composed almost entirely of plants unique to New Zealand. The present range of thar contains sensitive alpine and sub-alpine plant communities including the most well-known and showy of New Zealand's flowering plants - the alpine herbs, such as the giant buttercup or Mt Cook lily (*Ranunculus lyalli*).

When thar were at high densities (before the 1970's) they dramatically altered the species composition of some plant communities, notably those dominated by snow tussock and *Dracophyllum* species. The most palatable and susceptible plants became less common or were replaced by unpalatable or less susceptible plants, or bare ground. For example, it has been shown that tall snow tussocks (*Chionochloa* species) were replaced by short tussocks (e.g. *Poa colensoi*) as thar densities increased. At certain times of the year thar camp in favoured basins, thus concentrating their browse impact.

Tustin and Parkes (in press) ranked four main vegetation communities found in North Branch Stream in the Godley catchment according to the feeding intensity imposed by a herd of about 30 thar. The communities most likely to be affected by thar were the tall tussock and podocarp scrub at higher altitudes. The communities least intensively used for feeding were the lower altitude matagouri scrub and short tussock grassland. The higher altitude communities were browsed all year, while the others were browsed mostly in the spring, further evidence that the higher altitude plant communities were most likely to be affected by thar.

Intensive hunting of thar in the 1970s and the consequent reduction in numbers resulted in a rapid recovery of vegetation. This recovery will not result in a return of the vegetation to its original state. The greater part of alpine vegetation has been affected in some degree by a variety of animals or fire and it is doubtful that its original state can now be described.

The contribution of thar at high populations to soil erosion through depletion of vegetation is likely to be significant. However it is now contended that neither thar nor any other wild animal induced erosion has a significant effect on bed load carried by major river systems; such erosion is minor compared with that caused by natural erosion factors such as rainfall or seismic activity.

Part of the thar range is on land designated as world heritage area. This designation reflects the special character of the land and its biota.

POLICY

Thar have the potential:

- * to cause impacts at any population level on indigenous vegetation and soil and water values in New Zealand's alpine lands, particularly when their numbers exceed the capacity of the vegetation to support them without major changes being induced in the character of that vegetation;
- * when causing impacts, to impede the preservation and protection of natural resources;
- * to provide recreation hunting opportunities for New Zealand hunters;
- * to provide employment and economic development opportunities, in attracting overseas visitors to hunt in New Zealand, and in the commercial harvesting of thar and thar products.

The thar management policy will be:

- * to determine, and review from time to time in accordance with evidence from monitoring, the population of thar which for any area is consistent with an ecologically acceptable vegetation and estate condition (the target level). (Note: for some particularly sensitive areas within the thar range, the target level may be zero);
- * to ensure that the target level of thar population for each area is not exceeded.

(Note: where the level of control required to achieve an appropriate vegetation and estate condition cannot be practically achieved, the lowest practicable thar density will be maintained);
- * to prevent any northwards or southwards extension of the thar breeding range;

- * to provide for commercial hunting as a means of maintaining thar at or below the target levels;
- * to facilitate control by the Department of Conservation where thar are not being held at or below target levels;
- * to allow the commercial use of thar under captive conditions where this poses no risk of extending the thar breeding range.

IMPLEMENTATION

The policy will be implemented in the following manner.

Thar population control

- i) Control within the thar's breeding range will be maintained by setting an acceptable level of thar numbers and by applying a number of hunting or control methods to keep numbers within that threshold level. Target population levels will be set in terms of numbers of animals per km². The thar breeding range comprises many ecological associations and land tenures. Accordingly, the target thar density will be set according to the protection needs of each area. A system of land management units will be developed to take account of protection needs and the control goal so that each may be managed as a discrete unit. The target density of thar will thus be variable, from area to area and will range from zero to some high density.

The absence of sufficient information on the interaction of thar and their habitat requires caution in setting a maximum number for the whole of the thar breeding range. A number towards the higher end of the habitat's maximum carrying capacity (est. 50,000 assuming no extension of the current range) is known to have unacceptable adverse impacts on vegetation and is not acceptable. The number (est. 5000) achieved by commercial hunting is likely to be impracticable on a sustained basis.

On available evidence a population of not more than 10,000 should not cause unacceptable impacts on vegetation and other natural values, but will provide reasonable hunting opportunities.

This number is indicative only at this stage and reliable information is required to establish densities appropriate to each area.

- ii) The management objective for lands of all tenure lying outside of the thar breeding range, the limits of which are defined as the Wanaka/Haast Highway to the south and the Wilberforce and Hokitika/Mungo River to the north, will be to achieve a zero population and prevent an expansion of the breeding range. This goal will require zero density objectives to be set for catchments currently within, but at the extremities of the present range of thar, such as the Hunter River.

Acceptable Vegetation and Estate Condition

Baseline data on the condition of vegetation and other natural resources within the thar breeding range, and the impacts that thar have on those values will be gathered through:

- diet studies of thar;
- research and field assessment of vegetation responses to thar;
- research into the carrying capacity, rates of increase and population size for thar;
- research into the impact of other herbivores sharing the thar range;
- research into improved control techniques.

These data will be used in setting and adjusting the maximum thar numbers, area by area and in total.

Commercial, Recreational and Safari Hunting

Hunting will be accorded priority in bringing about control so as to maintain densities at or below target levels.

- i) Commercial hunting for the recovery of meat, skins and other products will be encouraged and facilitated.

Commercial hunters will be required to obtain a hunting permit which in the case of an aerial operator, will be available either as a part of a general wild animal recovery permit or a specific permit to take thar. A fee for the administrative costs of permit issue will be charged. A resource rental for thar to be taken may be fixed in cases where this will not act to exclude commercial hunting.

- ii) Recreational hunting groups that can demonstrate their capacity to do so will be offered contractual arrangements with the Department of Conservation under which they will be given encouragement and assistance to remove thar in excess of the target population level. The area or areas to which these arrangements could apply will be carefully selected to ensure the primary purpose of this policy is met. The Department will not be involved in organising or administering recreational hunting, as this will be a role for the contracted hunting groups. The Department will continue to issue permits for hunting thar on conservation lands. A permit fee to cover the administration cost of issue will be charged.

- iii) Safari hunting guides who wish to take their clients onto conservation lands for thar hunting will be required to obtain a concession from the Department of Conservation. The resource rental, to be fixed for each concession from the Department of Conservation may be abated by the worth of the public benefit arising from the concessionaire removing thar in excess of their clients needs from areas where there is an excess of numbers over the areas target level. This arrangement must first have been pre-defined in the

guides concession. Permits for hunting on conservation lands will also be required, for which the administration costs of issue will be charged.

Employment and Economic Development

- i) Farming of thar within the current feral range of the species will continue to be permitted. The Wild Animal Control Act 1977 does not provide for the farming of thar outside of the species feral range. This policy therefore does not consider the merits or otherwise of thar farming outside the feral range.
- ii) The keeping of thar for public display, research, safari hunting, sale, exporting or other commercial use will be permitted within or outside the feral range under permits issued under Section 12 of the Wild Animal Control Act, subject to the following:
 - a) those parts of New Zealand that would be susceptible to thar colonisation and where unacceptable environmental damage resulting there from could arise will be identified. Thar may be held within this zone provided they are incapable of breeding.
 - b) the minimum fencing standards, to contain thar, to apply throughout New Zealand, will be those specified for thar in the Third Schedule to the Noxious Animals in Captivity Regulations 1969.
 - c) all permits issued will contain conditions relating to inspections by conservation staff of not less than annually, to ensure all conditions under which a permit is held are complied with; the costs of inspections are to be met by permittees.

These provisions are to apply to all permits issued for the holding of thar from the date of this policy. Permits issued prior to this policy will be brought within these

provisions as the opportunity to do so arises.

The Moratorium

The moratorium on the commercial hunting of thar will be revoked by the issue of a notice in the New Zealand Gazette.

Monitoring

Monitoring will be carried out so as to ensure thar numbers remain within set levels and that hunting levels are effective and are meeting performance standards set for recreational and safari hunting and for official control operations.

Official Control

- i) Where thar numbers in the breeding range are not kept within set levels by recreational, safari or commercial hunting the Department will mount control operations to rectify the situation. Control methods will be determined by the circumstances pertaining to the time and place. Where zero or near zero densities have been set for any area official control will be used early in any colonisation by thar to prevent their establishment.
- ii) The movement of thar into lands outside the breeding range, and any colonisation of new areas through migration, escapes or unlawful releases will be dealt with by official control operations by the Department to avoid the animals establishing a new breeding area. Periodic control on the northern and southern limits of the breeding range will be carried out as the need arises to reduce the prospect of thar expanding their range.

Application of this policy

This policy is to apply to lands of all tenure throughout New Zealand so as to achieve concerted action in the localised eradication of thar and their control elsewhere as dictated by proper land use, pursuant to the provisions of Section 4 and the powers of the Minister of Conservation in Section 5(1)(b) of the Wild Animal Control Act 1977.

Wild Animal Control Plan

The detail of how this policy will be

implemented will be set out in a thar control plan to be prepared under the authority of Section 5(1)(b) of the Act. This plan will:

- * define management units;
- * describe the natural resource protection goals for each unit;
- * identify land tenure within each unit;
- * set target thar densities for each unit and for the whole of the feral range;
- * describe the options for sustaining the control measures necessary to ensure the target densities for each unit are not exceeded;
- * define the thar feral range using the northern and southern limits of the breeding range described elsewhere in this policy;
- * define those parts of New Zealand (outside of the feral range) that would be susceptible to thar colonisation and where unacceptable environmental damage could be caused by thar;
- * define the areas where recreational hunting groups may be given contractual arrangements for controlling thar;
- * set out the research and monitoring programmes;
- * contain other relevant material.

The plan will be treated as if it is a management plan authorised under the Conservation Act 1987 so as to provide opportunities for public participation in its preparation.

Date of Effect

This policy shall have effect from the day on which it is dated until it is reviewed and substituted with a new policy.

Denis Marshall, Minister of Conservation
Date 6th day of June 1991.

APPENDIX 2: THAR DISPERSAL

Caughley (1970a) suggested that dispersal of thar was one of diffusion rather than density related. Caughley found also that in the north Rakaia female thar shot within about 2-3 years of establishment of breeding groups were generally mature adults of between 5 and 10 years of age. Further, a female shot in the Copland about 10 years after colonisation was aged 18 years. Dispersal appeared to be led by mature females.

Parkes and Tustin (1985) recalculated exponential dispersal rates for thar and concluded that a density dependent model more accurately reflects thar colonisation up to 1966 "when the population was artificially lowered by hunting". This is supported by Caughley (1977). The model predicts that "as the population increases approximately exponentially but density remains constant at the threshold the area occupied also increases exponentially" (Parkes 1988).

There is little documented evidence indicating threshold thar density or group size which would precipitate dispersal; however Caughley (1970b), suggested high density is indicated by mobs of thar in excess of 15 animals. One female-kid group in Carneys Creek has fluctuated in size from 1984 to 1992, with a low in 1988 of 9, a high in 1992 of 16 and an average for the period of 12. Over this period the number of adult females in the group has fluctuated between 6 and 10. At the same time the number of female-kid groups in the catchment has increased (from annual thar counts carried out by Landcare Research).

While not conclusive, this suggests that female-kid groups do not generally reach more than about 12 before splitting and either occupying under-utilised habitat within the range or dispersing into new range. This then has implications for the integrity of proposed management units and indicates a need to monitor and control group size, particularly in areas adjacent to unit boundaries. This action would have the dual function of minimising localised vegetation impacts.

Thar find the central spine of the Southern Alps a formidable barrier which historically has influenced the rate and direction of dispersal and colonisation. There are relatively few passes from the head of the Landsborough to the Havelock River where thar can move freely between east and west coasts. For example, Caughley (1970), suggested Broderick or Elcho Passes in the Hopkins Valley and Sealey or Denistoun passes in the Godley and Havelock valleys respectively where thar dispersal into Westland took place, with subsequent colonisation north and south.

APPENDIX 3: DIETARY PREFERENCES OF THAR AND ASSOCIATED SPECIES

Current rumen sample analysis being carried out by Landcare Research on diet of thar and chamois is providing detailed information on thar diet and species preferences to focus research on thar impact. The following is a summary of species identified in rumen samples of thar and chamois over a wide geographical range and over all seasons.

THAR

Thar eat a relatively small range of grasses, woody species and herbs. Preferred species of grasses are the snow tussocks, including midribbed and broadleaved snow tussock along with blue tussock, *Rytidosperma setifolia*, *Anthoxanthum odoratum*, *Schoenus pauciflorus* and other grasses. These constitute about 55% of thar diet. Of the woody species *Carmichaelia* and *Gaultheria crassa* are favoured and to a lesser extent *Hebe* and *Dracophyllum* spp. These comprise 24% of thar diet. Herbs comprise about 18% of thar diet, *Celmisia* spp. being preferred above *Aciphylla montana*, *Ranunculus lyallii*, unidentified *Aciphylla* and *Anisotome* spp. and a range of unidentified herbs.

Table 3.1. Percentage of Diet by Dry Weight

Plants	% of Thar Diet (164 samples)	% of Chamois Diet (100 samples)
Tussock-grasses	56.0	21.0
Woody species	24.0	47.0
Herbs	18.0	31.0
Other plant matter	2.0	1.0

These interim results corroborate observations by Tustin and Parkes (1988) in the North Branch of the Godley River where they found that of four vegetation associations thar feeding was most intensive in tall snow tussock.

There are apparent differences in preferences compared to reported browse pressure of 20 years ago, with *Aciphylla* and *Dracophyllum* species now comprising less than 6% of the samples analysed. However analysis of seasonal and regional trends, yet to be undertaken, will establish the validity of this observation.

CHAMOIS

Chamois exhibit different diet preferences, with 100 samples taken from within thar range indicating a much higher preference for woody plants which comprise 47.0% of their diet. Of this proportion, *Carmichaelia* spp. and *Gaultheria crassa*, *Hebe* spp. and *Dracophyllum* spp.

THAR AND CHAMOIS PLANT PREFERENCE VERSUS AVAILABILITY

J. Parkes (pers. comm.) suggests that sympatric thar and chamois have dissimilar diets. Rumen sample analysis of thar and chamois from Carneys Creek and analysis of plant availability obtained from a large number of vegetation reconnaissance plots indicates strong targetting by chamois of some woody and herbaceous species compared to thar. This is depicted in Table 3.2, where Parkes looked at some food items of 10 thar and two chamois from Carneys Creek compared with an index of their availability. Of most significance is the concentration by thar on tussock and grass species compared to their availability and the very high preference of chamois for the buttercup (*Ranunculus lyallii*) and native broom (*Carmichaelia* spp.).

Table 3.2 Plant Availability Versus Consumption

Plant	Availability Index	% Thar Diet	% Chamois Diet
<i>Poa colensoi</i> and <i>Rytidosperma setifolia</i>	9.4	20.9	2.6
<i>Chionochloa flavescens</i>	0.8	10.9	0.0
Other <i>Chionochloa</i> spp.	17.0	14.3	0.0
<i>Ranunculus lyallii</i>	1.0	0.0	17.6
<i>Carmichaelia</i> spp.	3.0	2.7	64.9
<i>Agrostis capillaris</i>	0.1	10.6	1.3
<i>Gaultheria crassa</i>	8.3	2.8	3.8
<i>Podocarpus nivalis</i>	13.1	<0.1	0.0
<i>Dracophyllum uniflorum</i>	4.9	<0.1	0.6

Parkes suggests that broad leaved snow tussock (*Chionochloa flavescens*) is highly favoured by thar and would make an ideal indicator species for monitoring of browse pressure and the establishment of acceptable thar densities. He also suggests that thar and chamois may partition their habitat both physically and by food preferences. Again, these are interim results of ongoing research.

SUMMARY

It is apparent that thar and chamois, browsing for the most part on the same "range" exhibit quite different browse patterns. If they occurred together on the same range it could be argued that together they would exert strong and complementary pressure on the available forage.

It is interesting to note that of the thar samples, covering east and west coasts, about 65% were recorded as being taken in the alpine zone while the remainder were taken in the sub-alpine shrubland zone. Of the chamois, only 40% were taken in the alpine zone. However all chamois were taken within thar habitat.

The samples from which this summary has been taken have been collected all year round for the last six years for thar and for the last four years for chamois. Further data analysis is to be done as part of the research project incorporating a much larger sample base will ascertain seasonal and habitat differences.

APPENDIX 4: SUMMARY OF RECOMMENDED AREAS FOR PROTECTION WITHIN THAR RANGE

HERON ECOLOGICAL REGION

ARROWSMITH ECOLOGICAL DISTRICT

A5 Cameron River

Area: 7035 ha. Altitude Range: 760 - 2790 m.

Representative of major vegetation types in the region, from *Hoheria lyallii* in lower valley, snow totara/matagouri shrubland, narrow leaved and slim snow tussock and fellfield communities.

A6 Upper Lawrence

Area: 642 ha. Altitude Range: 820 - 2370 m.

Mixed Hall's totara, snow totara/mountain toatoa shrublands with narrow leaved and slim snow tussock and golden spaniard. Includes the best examples of Hall's totara in the district.

A7 Hermitage Boulder Field

Area: 73 ha. Altitude Range: 760 - 850 m.

A mosaic of Hall's totara, broadleaf, *Pittosporum tenuifolium* with patches of snow totara and turpentine scrub and a variety of grassland and herbaceous species. A vegetation community associated with a single geomorphic event.

A8 Lizard Gully

Area: 626 ha. Altitude Range: 670 - 1980 m.

Contains mountain beech remnants and the only example of *Myrsine divaricata* in the district. Shrublands consist of mountain toatoa/*Brachyglottis cassinioides* and narrow leaved snow tussock grasslands at the head of the valley are in good condition. South Island edelweiss occurs in bluffs at the mouth of the gully. Significant shell and fossil beds.

TWO THUMB ECOLOGICAL DISTRICT

B1 Stone Hut Moraine

Area: 722 ha. Altitude Range: 910 - 2200 m.

Contains extensive areas of slim snow tussock and *Celmisia lyallii* with narrow leaved snow tussock at lower altitudes, red tussock/*Oreobolus pectinatus* in damper hollows and *Dracophyllum pronum*, blue tussock and *Drapetes* spp. on exposed ridges. Represents altitudinal sequences.

B2 Black Birch Creek

Area: 3977 ha. Altitude Range: 600 - 2545 m.

An altitude sequence of vegetation types of the wetter north east end of the district. Noted particularly for its mountain beech remnant forest.

B3 Bush Stream

Area: 747 ha. Altitude Range: 1400 - 2000 m.

A plateau area above Royal Hut which contains tarns and associated wetland plant communities. Predominantly covered with slim snow tussock and blue tussock, tarn margins contain a variety of wetland communities. Regarded as unique within the district.

B4 Forest Creek

Area: 511 ha. Altitude Range: 670 - 1070 m.

A series of remnant mountain beech stands with the understorey shrubs *Coprosma* spp., *Aristotelia fruticosa*, *Corokia cotoneaster* and a variety of herbs.

B5. North Opuha

Area: 332 ha. Altitude Range: 820 - 1800 m.

Noted specifically for its a stand of red tussock, unusual on the rolling ridge top and hill slopes and uncommon in the district.

B7 Mount Dobson

Area: 2117 ha. Altitude Range: 600 - 2100 m.

Contains the best examples of Hall's totara/hardwood forest in the district. Also a type locality for *Aciphylla dobsonii* and *Helichrysum plumeum*.

BEN OHAU ECOLOGICAL DISTRICT**O1 Upper Duncan Stream**

Area: 180 ha. Altitude Range: 1115 - 1585 m.

High altitude glacially derived tarns and cirques containing fescue at lower altitudes grading into narrow leaved snow tussock, then into slim snow tussock at about 1700 m.

Boulderfields support snow totara, *Senecio cassinioides* and *Olearia* shrubland communities.

O2 Irishman Stream

Area: 425 ha. Altitude Range: 640 - 1280 m.

Probably the largest mountain beech remnant in the MacKenzie Region outside of the Maitland Valley.

O3 Upper Gladstone Valley

Area: 2340 ha. Altitude Range: 825 - 2105 m.

Contains a continuous sequence of tussock grasslands from piedmont floor to the second highest peak of the Mackenzie Region. The upper catchment contains large areas of narrow leaved snow tussock with fescue, *Schoenus* and hard tussock. Shrubland consists of *Cassinia*, turpentine scrub or *Olearia* communities.

MACKENZIE ECOLOGICAL REGION**AHURIRI ECOLOGICAL DISTRICT****D3 Firewood Bush**

Area: 660 ha. Altitude Range: 745 - 1675 m.

This area contains an altitudinal sequence of grasslands from fescue, narrow leaved snow tussock, and slim snow tussock at high altitudes. There are patches of mountain beech and *Olearia* shrubland in the Valley and turpentine scrub on south facing slopes. There is some snow totara. There are snow bank, bluff and scree habitats with accompanying flora.

APPENDIX 5 : ACCESS PROVISIONS WITHIN NATIONAL PARKS, WILDERNESS AND REMOTE EXPERIENCE AREAS

WESTLAND NATIONAL PARK

The Westland National Park Management Plan (Department of Conservation 1989a), provides for 15 landing sites within the Park for tourist activities. Seven of these are dual helicopter - skiplane sites providing access to the Franz Josef, Fox and Horace Walker snowfields and glaciers. The remainder are helicopter landing sites most of which are located in the Fox and Franz Joseph areas. Two provide access to the Douglas and Karangarua Rivers, valleys of particular interest to recreational hunters and professional guides. These sites are licenced to four companies which have access to all or some of the sites: Glacier Helicopters, The Helicopter Line, Alpine Adventures and The Mount Cook Line. The management plan provides for landings elsewhere in the Park for search and rescue, wild animal control and fire control but generally seeks to "retain some areas of the Park free from landing aircraft to retain the natural character of remote experience".

Apart from the southern end of the Park aerial access to areas holding thar is not available, and for much of the area foot access is time consuming if not difficult.

MOUNT COOK NATIONAL PARK

One company, the Mount Cook Group, holds a concession to land skiplanes on 18 sites within the Park, from the Mueller Glacier in the south to the the Murchison Glacier in the north. No access for helicopter landings is generally available, other than for emergency and servicing activities described in the Mount Cook National Park Management Plan (Department of Conservation 1989b), including wild animal control, search and rescue and fire control. As for Westland National Park, aircraft landings are prevented in areas of the Park where a "semi-wilderness experience can be protected." This includes the Hooker and Godley valleys. Generally foot access for recreational hunting up the major valleys within the Park is not difficult.

MOUNT ASPIRING NATIONAL PARK

Compared to the other national parks a much smaller area of Mount Aspiring National Park is inhabited by thar. Further, the limited numbers of thar present in the Park do not attract a high level of hunter interest. Aerial access to that area of the Park inhabited by thar is available by permit.

ADAMS REMOTE EXPERIENCE AREA

Included in the Adams Remote Experience Area and an adjacent area zoned for wilderness experience are parts of the Perth and Wanganui River catchments and the upper headwaters of the Havelock, Clyde and Rakaia catchments. The classification of this area is derived from proposals in the management plan for the Adams Crown Land Management Area (Clifton 1982), and the South Westland Management Proposals (N.Z. Forest Service 1980). Within this area are the Garden of Eden and Garden of Allah snowfields, of particular interest to mountaineers. There is currently one helicopter landing site within the Garden of Eden; aerial access is otherwise restricted to management and for search and rescue. Recreational hunting comes within the category of management when it is undertaken in order to control the number of animal pests in an area.

The remote experience classification recognises the wilderness qualities of the area and seeks to maintain or enhance this by prohibiting further development of tracks, huts and bridges. The Canterbury Draft Recreation Strategy (Department of Conservation 1991) recommends the gazettal of the Adams Remote Experience Zone as a Wilderness Area under Section 20 of the Conservation Act.

HOKKER-LANDBOROUGH WILDERNESS AREA

Gazetted under Section 20 of the Conservation Act, the Hooker Landsborough Wilderness covers the headwaters of the Clarke, Landsborough, Otoko, Mahitahi and Makawhio catchments. It is contiguous with the southern boundary of Westland National Park. Managed in accordance with the Wilderness Policy (Wilderness Advisory Group, 1985), recreation development is prohibited and aerial access is restricted to search and rescue, fire fighting, control of introduced plants and animals, minimal impact prospecting and scientific research which cannot be conducted outside wilderness areas.

Of the areas where restrictions generally prohibit the use of aircraft, the Hooker Landsborough Wilderness, like the Adams Remote Experience Zone, is an area where there exists significant demand for hunter access. This area, along with adjacent catchments in Westland National Park has the highest localised densities of thar on conservation estate, if not over the entire thar range.

APPENDIX 6: HUNTING STATISTICS

RECREATIONAL HUNTERS

In 1988 approximately 1600 hunting permits were issued by DOC to hunt thar on National Parks and Conservation land. This increased to more than 2000 in 1991. Permits returned to DOC indicated a harvest on National Parks and Conservation land of 222 in 1988 and 394 in 1991. This is not indicative of the harvest from the entire thar range (inclusive of Pastoral Lease land) and even for National Parks and Conservation land is likely to be significantly underestimated given the relatively low permit return rate of 60%. For example in a 100% survey of permit holders for the Rangitata catchment in 1988, Challies and Thomson (1989) found that recreational hunters took 112 thar (cf. 92 from permit returns received by DOC). In a nationwide survey of firearms owners in 1988, Nugent (1989), estimated that 782 thar were taken over all tenures by about 950 hunters (excluding those taken by non-resident hunters).

No formal statistics for hunters gaining access to Pastoral Lease land are available but lessees keep good records of those hunting parties booking in to hunt on their properties. Information gathered for four of the more popular pastoral runs (Godley Peaks, Erewhon, Mesopotamia and Glentanner) indicates over 500 hunter visits annually to these properties taking in excess of 200 thar.

Permits issued by DOC are increasing at 20% per year. Of the permits issued for 1991 by DOC over 1000 (50%), are for Mount Cook National Park and the Rangitata Catchment. Next in popularity are the Dobson, Whataroa, Copland and Karangarua catchments (about 400 permits or 20%). While hunting statistics are not complete for National Parks and Conservation land or for Pastoral Lease land it appears that the annual harvest of thar is increasing by up to 10% per year. Although returns for individual catchments fluctuate annually, the increase in popularity is reflected in Table 6.1, which summarises permit returns for some of the most popular areas administered by DOC for the period from 1988 to 1991.

Table 6.1. Permit Returns For A Selection Of Catchments

Catchment	Number of Thar Taken			
	1988	1989	1990	1991
Whataroa/Perth	15	7	20	26
Rakaia/Mathias	6	10	30	18
Rangitata	92	107	131	114
Mount Cook NP	39	42	71	105
Dobson	26	21	44	NA

(NA - not available at the time of writing)

The above figures are in some instances not a reliable indication of hunting success; for instance it is known that many hunters do not obtain permits for conservation estate in Westland and that any permit returns are likely to be a gross underestimate of the actual harvest.

The difficulties of obtaining accurate hunting returns for all land render an estimate of the total harvest of thar by recreational hunters (excluding guided hunters), no more than an informed guess. However available information suggests up to 900 are taken annually.

Nugent (1989) reported that in 1988, New Zealand thar hunters, the majority of whom reside on the east coast of the South Island spent about \$160.00 for every thar killed, a total for 1988 of \$124 500.00, exclusive of vehicle running.

COMMERCIAL RECOVERY

The commercial recovery of thar ceased in 1983 with the imposition by the Minister of Forests of the moratorium on thar recovery. The harvest of thar by the commercial sector fell from about 10 000 in 1974 to 328 in 1982 (Parkes and Tustin 1989).

The returns from the export of wild venison has fallen about 40% in the last three years. Deer and chamois are valued about the same, with chamois meat commanding a premium overseas but venison plus deer by-products together have a similar or higher value (M. Rice pers. comm.). There is no market for many chamois by-products. Thar export prices are about 50% of these and therefore thar recovery operations are likely to be marginally viable if at all.

Winged Hunters, in association with other partners, seeking to test thar meat on the domestic hotel industry was given a permit in 1992 to take 200 number of female thar from National Parks. A small trial to date suggests that the taking of female thar alone from mountainous country will not be economic; the venture will only be economic if thar of 2-3 years or older of both sexes are taken, preferably from easier country where the problems associated with recovering carcasses from steep terrain are minimised (M. Beardsley pers. comm.). The same enterprise is investigating the possibilities for an export market for thar meat and some by-products (winter hair, possibly pelts). The economics of game recovery and international import requirements are such that hunting operations need to be undertaken in concentrated spells of short duration in areas of high thar density and reasonable terrain. Beardsley believes that a total harvest of about 1200 adult thar of mixed sex would be required to give an economic export quantity. (While this is consistent with information supplied by M. Rice, J. Scott (pers. comms.), believes that the only commercial reason for taking bull thar is for their trophy value and their long winter hair.)

Rice suggests that as for chamois currently, thar recovery will probably only be economic as a by catch associated with recovery of deer and then only when 30-40 can be taken on each outing (500 to 1000 chamois are taken annually on this basis, usually in the autumn-winter months). Parkes (1988), reported game recovery operators would earn about \$33.00 for average size thar (22 kg), plus a bonus for long haired adult males. Indications from M. Rice suggest this figure remains a reasonable estimate.

While some licensed Wild Animal Recovery Service licensees see a future in limited thar recovery and indicate a willingness to ensure compatibility with the goals of recreational hunters and professional guides (C. Deaker pers. comm.); others question the viability of the commercial recovery of thar given the present economics of recovery and population size. Most operators are utilising small helicopters (Robinsons) for deer and chamois recovery, a machine unsuited to the effective hunting of thar (N. Boyd, R. Hayes, G. McNutt pers. comms.).

Those operators actively involved in the transport of recreational hunters into the back country report increasing demand for helicopter services and believe the demand for bull thar is such that any commercial recovery operations should be carefully controlled and restricted to females only (J. Scott, R. Knight pers. comms.) and argue that the activity and returns generated from recreational and guided hunting of bull thar far exceed the value to be obtained from the export of bull thar meat and by-products.

APPENDIX 7: THAR MONITORING

From as early as 1984 (apart from Carney's Creek where thar were first counted in 1965), a number of catchments have been monitored during February either annually or periodically to follow trends in thar populations and to carry out research into social behaviour and the impacts of hunting. This has involved closing the study areas to hunting for one month to allow thar groups to settle followed by observations by experienced observers over a 2-5 day period sufficient to allow reliable absolute counts to be made of all thar in the area. Some of these catchments are inhabited only by female groups for much of the year; others contain both male and female range. Also the proportion of preferred habitat varies within individual study catchments; counts therefore require careful interpretation when comparing population density and structure between study areas.

Between 1991 and 1992, 16 catchments or parts of catchments were assessed. Of these nine had been assessed previously and three have been monitored annually in conjunction with research being carried out by Landcare Research. The accompanying table summarises counts made in these catchments in 1991 and 1992. Where available some counts from previous years are included for comparison.

Table 7.1. Thar Counts

Catchment	Area (km ²) Observed	Thar Counts				
		1965	1984	1988	1991	1992
Upper Price (TR)	6.7					31
Upper Price (TL)	5.4					14
Wilkinson	10.0		0	15*		32
Lord	32.0		0			10
Frances	3.9		6		11	
Bettison	14.9		1		25	
Carneys	21.6	710	26	51	66	75
Forest/Rawtor	39.6					31
North Br.	19.4		30	52	132	136
Whymper	60.7					38
Ailsa	11.4		0	24		37
Hooker	21.8		0	14	11	8
Fred	20.9					0
Douglas Horace Walker	22.0		2		58	
Upper Landsborough	25.2					215
Stony	27.0		1	14	36	26

(The locations of the study areas are indicated on Map 2)

(* aerial assessment)

Difficulties were encountered in accurately censusing thar in some of the Westland catchments, specifically the Whymper and upper Landsborough, primarily because of the use of shrubland and upper forest by thar and the difficulties of establishing observation points such that the entire study area could be observed.

APPENDIX 8: ANNUAL REPORT FORMAT

FORMAT FOR ANNUAL REPORT ON THE HIMALAYAN THAR CONTROL PLAN

Abstract

1. Period of coverage:

2. Highlights:

3. Summary of control operations:

4. Status of management units:

Exclusion zone 1:

- Population estimate and change:
- Estate condition trend*
- Outlook and plans for next year:

Exclusion zone 2:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 1:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 2:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 3:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 4:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 5:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 6:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

Management unit 7:

- Population estimate and change:
- Estate condition trend:
- Outlook and plans for next year:

5. Liaison with contributors to management:

- Farmers:
- Recreational hunters:
- Guides:
- Aerial Recovery Operators:

6. Research updates:

7. Financial performance:

Canterbury:

West Coast:

Otago:

* Defined according to formal monitoring and informal assessment from experienced field staff and researchers.