A CRITICAL EVALUATION OF HISTORICAL DATA ON TWO DAMAGE CAUSING PREDATORS, *Canis mesomelas* AND *Caracal caracal*

by

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DECLARATION

I hereby declare that this dissertation submitted by me to the University of the Free State for the degree **Magister Scientiae**, is my own independent work and has not previously been submitted by me at another University/Faculty. I further cede copyright of the dissertation in favour of the University of the Free State.

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Bloemfontein

30 May 2008

Abstract

The study focused on monthly hunt reports of two problem animal control clubs in the Mossel Bay district of the erstwhile Cape Province, namely the Cooper Jagklub and the Mosselbaai Sentrale Jagklub. These reports were the most complete set of data retrieved by ALPRU and also covered a substantial period from 1976 to 1992. The study was successful in creating computer software (ALPRU Predator Database) to capture and analyse historical data on predator control activities. Original handwritten records were manually captured on the ALPRU Predator Database and transformed during export to the ArcGIS environment. A large number of data tables and maps were generated for evaluation.

Historical data were used with a view to:

- Investigate whether it was possible to establish the measure of success of predator management practices used in the past.
- To test the capacity and performance of the computer software for further application as a tool in predator management.

The computer programmes could filter out specific sets of data for separate analysis. In the present study only maps showing stock losses as a result of predation and predators killed in control operations, were analysed. The two different sets of data were filtered out for the study period of 16 years, for separate years and for every month in a selection of three years, 1985 to 1987.

The software highlighted several important issues and shortcomings in the dataset, namely:

- The historical monthly hunt reports and especially the way in which the data were recorded, were never intended for further analysis.
- Positive identification of the specific locations of farms proved to be especially difficult and time-consuming.
- The data were incomplete regarding specific information which prevented definitive conclusions being drawn.
- The format in which data regarding predator control activities is recorded and reported needs to be improved.

- Despite the shortcomings in the dataset, the software proved very valuable in analysing major aspects of predation and predator control activities.

The computer programmes can serve as a management tool in analysing data concerning predator activity and animal damage control. Currently, it provides for datasets to be analysed for any period, for example three months (one season), weeks, or even days.

With the aid of the computer programmes developed for this study, the following factors can be analysed separately for more in-depth studies on damage causing animals:

- different classes of different domestic animals killed by predators
- different classes of different predator species killed in animal damage control operations
- different animal damage control clubs, or selected groupings, or geographical areas
- different animal damage control operators (usually referred to as problem animal hunters)
- different methods used in animal damage control operations.

The monthly hunt reports used in the past by official animal damage control clubs were not very useful in creating a clear understanding of how animal damage and animal damage control activities influence each other. This may in part be ascribed to the inadequate design or format of the monthly hunt report.

Incomplete (regarding data) or incorrect (*e.g.* misspelling of farm names prevents positive identification of sites) monthly hunt reports distort the picture that could otherwise have been created by the data. Official quarterly inspection reports from the hunt clubs were useful as summaries of the hunting activities of a club and, when properly executed, may have prevented hunters from submitting incomplete or inadequate hunt reports. However, in this study the information provided by an independent official (supervisory capacity to the problem animal hunters) in the quarterly reports often helped in clarifying incomplete or inconsistent reporting by the hunters.

A thorough understanding of animal damage control in South Africa, as well as more studies using the ALPRU Predator Database to interpret the extent of present day animal damage,

could help to identify shortcomings in animal damage management. Therefore, the programmes developed for this study could assist in formulating more effective animal damage management strategies.

Cooperation from all role players and stakeholders are necessary to enhance the potential and output of this computer programme. The correct filling out of hunt reports, the updating of data and submission of subsequent inspection reports is of utmost importance to ensure data that can be analysed and results that can be portrayed for similar studies.

It is important that computer software such as this be utilised with current data sets to improve the fragmented and uncoordinated predator management activities in South Africa. It may assist in identifying best practices regarding methods and procedures of predator management with a view to reduce the impact of predation on the livestock industry.

Two formats to record Livestock Predation and Predator Control Activities are presented. These include the basic information for the effective interpretation of the impact of predator control operators on damage causing animals and on livestock.

Opsomming

Die studie was toegespits op die maandelikse jagverslae van twee probleemdierbeheerklubs in die Mosselbaaidistrik van die voormalige Kaapprovinsie, naamlik die Cooper Jagklub en die Mosselbaai Sentrale Jagklub. Hierdie verslae was die volledigste wat herwin kon word deur ALPRU en het ook ‘n redelike lang periode gedek vanaf 1976 tot 1992. Die studie was suksesvol in die skep van sagteware (ALPRU Predator Database) om historiese data oor roofdierbeheer vas te vang en te ontleed. Oorspronklike handgeskrewe rekords is met die hand ingevoer op die ALPRU Predator Database en tydens die uitvoer na die ArcGIS omgewing getransformeer. ’n Groot aantal tabelle en kaarte is geskep vir evaluasie.

Historiese data is gebruik ten einde:

- Ondersoek in te stel na die moontlikheid om die mate van sukses te bepaal wat in die verlede met roofdier bestuurspraktyke behaal is.
- Die kapasiteit en verrigting van die sagteware te bepaal as hulpmiddel vir toekomstige toepassing in roofdierbestuur.

Die sagteware kan spesifieke data selekteer vir afsonderlike ontleding. In die huidige studie is slegs kaarte ontleed ten opsigte van veeverliese as gevolg van predasie en roofdiere gedood tydens beheeroperasies. Hierdie datastelle is geselekteer vir die studietydperk van 16 jaar, vir afsonderlike jare en ook vir elke maand gedurende ‘n geselekteerde periode van drie jaar, 1985 tot 1987.

Die sagteware beklemtoon verskeie belangrike sake en tekortkominge in die data, naamlik:

- Die historiese maandelikse jagverslae en veral die wyse waarop die data aangeteken is, was nooit bedoel vir verdere ontleding nie.
- Positiewe identifikasie van die spesifieke lokaliteit van plase was veral baie moeilik en tydrowend.
- Die data was onvolledig ten opsigte van spesifieke inligting wat dit moeilik maak om finale afleidings te maak.
- Die formaat waarin data ten opsigte van roofdierbeheer aangeteken en rapporteer word, benodig aansienlike verbetering.

- Ten spyte van die tekortkominge in die datastel, was die sagteware baie waardevol in die ontleding van belangrike aspekte van roofdierskade en beheermaatreëls.

Die sagteware kan dien as bestuurhulpmiddel om data rakende roofdieraktiwiteite en -beheer te ontleed. Tans kan die sagteware groot datastelle ontleed vir enige periode, byvoorbeeld driemaandeliks (’n seisoen), weke, of selfs dae.

Met behulp van die sagteware wat in die studie ontwikkel is, kan die volgende faktore afsonderlik ontleed word tydens diepgaande studies oor diere wat skade veroorsaak:

- verskillende klasse van verskillende plaasvee wat deur roofdiere gedood is
- verskillende klasse van verskillende roofdierespesies wat tydens skadebeheer gedood is
- verskillende skadebeheerklubs, of geselekteerde groepe, of geografiese gebiede
- verskillende skadebeheeroperateurs (gewoonlik na verwys as probleemdierjagters)
- verskillende metodes wat tydens beheeroperasies gebruik word.

Die maandelikse jagverslae wat in die verlede deur amptelike probleemdierjagklubs gebruik is, was nie baie hulpvol om ‘n volledige begrip te vorm van die wyse waarop roofdierskade en beheermaatreëls mekaar wedersyds beïnvloed het nie. Dit mag gedeeltelik toegeskryf word aan die ontoereikende ontwerp en formaat van die maandelike jagverslae.

Onvolledige (ten opsigte van data) of verkeerde (byvoorbeeld, plaasname wat verkeerd gespel is maak positiewe identifikasie onmoontlik) maandelikse jagverslae verwring die beeld wat andersins vanaf die data verkry kon word. Amptelike kwartaalikse inspeksieverslae van die klubs was waardevol as opsomming van jagbedrywighede en, wanneer behoorlik toegepas, mag dit verhoed dat jagters onvolledige of foutiewe verslae indien. Nietemin, in die studie het die inligting wat deur ’n onafhanklike beampte (toesighoudend oor die roofdierjagters) in die kwartaalikse inspeksieverslae aangebied is, dikwels gehelp om onvolledige of foutiewe gegewens deur jagters op te klaar.

’n Deeglike begrip van roofdierbeheer in Suid-Afrika, sowel as meer studies wat die ALPRU Predator Database gebruik om die omvang van huidige roofdierskade te verklaar, mag help

om tekortkominge in roofdierbestuur te identifiseer. Die sagteware wat in hierdie studie ontwikkel is mag meehelp om meer effektiewe strategieë vir roofdierbeheer te formuleer.

Samewerking deur alle rolspelers en belanghebbendes is noodsaaklik om die potensiaal en bydrae van die sagteware te verbeter. Die korrekte invul van jagverslae, die opdatering van data en indiening van opvolgende inspeksieverslae is van groot belang ten einde te verseker dat datastelle in soortgelyke studies behoorlik ontleed kan word.

Dit is belangrik dat sagteware soos hierdie benut word om huidige datastelle te ontleed ten einde die gefragmenteerde en ongekoördineerde roofdierbestuur in Suid-Afrika te verbeter. Dit mag ook meehelp om beter praktyke te identifiseer ten opsigte van metodes en prosedures van roofdierbestuur ten einde die impak van roofdierskade op die veebedryf te verminder.

Twee formate om Predasie op Vee en Roofdierbeheermaatreëels aan te teken word aangebied. Dit sluit basiese inligting vir die doeltreffende vertolking van die impak van roofdierbeheer deur operateurs op die roofdiere en die plaasvee in.

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1. Introduction

Conflict between damage causing animals, especially predators, and the agricultural sector is a common phenomenon in many parts of the world. Reports of the human-wildlife conflict in South Africa date back to the arrival of the first European settlers (Brand, 1989; Kingwill, 1993; Beinart, 1998; Stadler, 2006). The advent of livestock farming on a large scale in South Africa led to the elimination of most of the larger predators. This may have been an important factor in the increases in numbers of the black-backed jackal *Canis mesomelas* and caracal *Caracal caracal* (Van Rensburg, 1993). These two species are currently the most common and widespread damage causing predators in South Africa.

The black-backed jackal is widespread in Southern Africa and East Africa (Loveridge & Nel, 2004). In Southern Africa it is particularly abundant in the semi-arid regions (Skinner & Chimimba, 2005, Bothma, 1998). It is considered a highly adaptable and non-specialist species with a wide habitat tolerance (Stuart, 1981; Van Rensburg, 1993; Bothma, 1998; Loveridge & Nel, 2004; Skinner & Chimimba, 2005). Also their habitat use varies considerably between different areas (Loveridge & Macdonald, 2002). They do, however, prefer open plains (provided there is a certain amount of shelter) and savannahs, occur in higher numbers along the western and southern coastal regions of the Cape Province (Brand, 1989) and avoid forested areas or very dense bush (Van der Merwe, 1953; Fourie, 1975; Kaunda, 2001; Loveridge & Macdonald, 2002; Skinner & Chimimba, 2005).

The caracal is widespread in Africa and occurs in semi-desert and karroid areas in the distribution range throughout the African continent, especially in the drier woodlands, savannahs and steppes (Skinner & Chimimba, 2005). They occur throughout what was formerly known as the Cape Province of South Africa, with the highest densities in the southern and western parts (Stuart, 1981), along the coastal belt, the coastal mountain zone and the adjacent interior (Stuart, 1983). In these areas, the caracal has become the primary predator of domestic stock (Stuart, 1981) and as a result, is killed on a regular basis. In spite of such predator control operations, the species remains common in this region. The caracal also has a wide habitat tolerance (Stuart, 1981; Skinner & Chimimba, 2005); therefore, it is one of the solitary cat species which is found in almost every habitat in southern Africa (Avenant, 1993). Caracal habitat preferences may differ between geographical regions (Stuart, 1982; Moolman, 1986). According to Avenant and

Nel (1998) caracals in the West Coast Strandveld spend most of their time active in specific areas with the highest rodent densities and species diversities; these areas on the lower slopes of hills could also afford thermoregulatory benefits and cover because of the dense vegetation. Stuart (1981) recorded caracal in all the principal habitat types in the Cape Province, while Lynch (1983) stated that they seem to prefer rocky, mountainous parts and habitats along bushy riverbanks in the Free State.

In most parts of Southern Africa black-backed jackal, and to a lesser extent caracal, were for many decades considered so-called problem animals because of their predation on sheep and goats. For centuries a wide range of lethal (killing of predators) as well as non-lethal (deterring predators) methods have been used in an effort to manage these damage causing animals. However, despite the establishment of official subsidised predator hunting clubs (Stadler, 2006) and the organized killing of thousands of predators, livestock losses have not declined (Avenant *et al.*, 2006; De Waal *et al*., 2006). The many challenges regarding spatial migration of predators were described by Olivier (1993). Today this problem persists in large areas, while it is also reported to be increasing (De Waal *et al*., 2006). A reason for this phenomenon could be the fact that indiscriminate hunting disrupts the temporal and spatial utilisation, activity patterns, feeding ecology, social behaviour and reproduction of these animals (Van der Merwe, 1953; Fourie, 1975; Grobler, 1981; Stuart, 1981; Moolman, 1986; Stuart & Hickman, 1991; Avenant, 1993; Van Rensburg, 1993; Kaunda, 2001).

The concept of damage causing animals has been defined in the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) as:
"Damage causing animal means an individual of a listed threatened or protected species that, when interacting with human activities, there is substantial proof that it –

a) causes losses to stock or to other wild specimens;
b) causes excessive damage to cultivated trees, crops, natural flora or other property;
c) presents a threat to human life; or
d) is present in such numbers that agricultural grazing is materially depleted."

In the context of this study, the term damage causing animal refers to an animal that causes losses to livestock. Animal damage control is defined as those activities carried out to limit or stop damage caused by the animal concerned. In this study damage causing animals are referred

to as “problem animals”, because this term was used to describe them during the time period covered by this study.

Several studies (Robinson, 1943; Van der Merwe, 1953; Janse van Rensburg, 1962, 1965; Hey, 1967; Bothma, 1971; Rowe-Rowe, 1975; Pringle & Pringle, 1979; Rowe-Rowe & Green, 1981; Rowe-Rowe, 1986; Heard & Stephenson, 1987; Brand, 1989; Avenant, 1993; Brand & Nel, 1997; Beinart, 1998; Burgess, 2006; De Wet, 2006; Melville & Bothma, 2006; Stadler, 2006) reported on the relationship between these predators and human activities, and/or the control of these animals in areas where they are a threat to livestock farming. Recommendations regarding the control of damage causing animals were made (Kingwill, 1993), but these were not implemented officially and no meaningful progress has been made to improve the situation (Avenant *et al.,* 2006; De Waal *et al*., 2006).

During the early 1990s many of the official predator control systems operating in South Africa were either stopped (Lensing, 1993; Olivier, 1993) or petered out into non-existence, and therefore official recording of predator control activities became virtually non-existent. However, some private initiative for predator control was retained in isolated cases, which has created lucrative business opportunities for some individuals. By the mid 2000s the situation regarding predation on small livestock by black-backed jackal and caracal became untenable. Although scientific data is mostly lacking, indications are that predation by caracal and black-backed jackal has spread widely over South Africa and is still on the increase. Verbal reports also suggest that small stock farmers are increasingly reducing their flock sizes or switching to other farming practices because of the impact of damage causing animals on their small livestock and, furthermore, wildlife ranchers are also increasingly recognizing the effects of predation by caracal and black-backed jackal (HO de Waal, 2008; personal communication).

The available information on the black-backed jackal and the caracal is of a fragmented nature and information especially from the predator hunting fraternity is not sufficiently documented; thus, it is not easy to apply in a predator management program. Some of the information reported in scientific studies may, however, play an important role in managing these predators. Without negating the role of other factors, the following examples are briefly highlighted. In the past several studies such as Rowe-Rowe (1975), Avenant (1993), Avenant and Nel (1998), Avenant and Nel (2002) and Melville *et al.* (2004) have noted seasonal trends in the damage caused by black-backed jackal and caracal to the small stock industry. Furthermore, studies have

also suggested that these two species regulate each other's numbers, or increase in density where the other has been removed (Pringle & Pringle, 1979; Stuart, 1983). Moreover, very little information exist in the public domain regarding the hotspots in South Africa for predation and predator control activities, how it relates to the physical characteristics of an area, and the extent of damage caused by predators in specific areas (Avenant *et al.*, 2006; De Waal *et al*., 2006).

Given the paucity of data on predator control activities in South Africa, the Canis-Caracal Programme (CCP) was launched on 10 December 2004 under the auspices ALPRU at the University of the Free State, Bloemfontein (De Waal *et al*., 2006). The CCP aims at finding solutions for the widespread predation and to reduce the impact on the small livestock farming industry; it is pursuing the following three main objectives:

- Collecting and interpreting available data and information on the black-backed jackal and the caracal and, after scientific evaluation, to disseminate the relevant and appropriate information to stakeholders and role players;
- Conducting scientific studies on the ecology of these two predator species and their natural food base;
- Assisting conservation authorities, in partnership with livestock farmers and wildlife ranchers, in formulating scientific management strategies and national and provincial policies to manage the black-backed jackal and the caracal.

This study forms part of the first objective of the CCP.

The three objectives were given the same priority by the CCP in terms of focus and resource allocation (HO de Waal, 2008; personal communication). However, from the onset of the CCP it was apparent that the first objective would pose the biggest challenge in terms of locating and accessing existing information and data. The official systems of predator control provided for data and information to be documented. Since the abolition of official predator hunting activities in the early 1990's (Lensing, 1993; Olivier, 1993), some control of predators continued on private initiative. These hunters are paid directly by farmers per animal killed with no incentive to keep records of activities and more importantly to make the information available for wider use. Furthermore, since 1994 South Africa became a democracy followed by new geopolitical arrangements. A very important aspect was the creation of nine new provinces instead of the

previous four South African provinces. New priorities were set and most importantly, many data and filing systems (especially those pertaining to predator control) were not kept up to date.

Events following the new geopolitical dispensation in South Africa after 28 April 1994, have completely overridden the initiative and momentum created by a Problem Animal Control Forum that was held from 4 to 5 May 1993 at Golden Gate in the Eastern Free State. The Forum was well represented and according to Kingwill (1993) the culmination of a long process which brought the NWGA, RPO, Nature Conservation, and Administrations of all four the provinces, as well as representatives from control organisations and the Regional Services Council organisations, together. The National Problem Animal Policy Committee (NPAPC), under its Chairman Mr. Peter Kingwill, was widely commended for taking the lead in formulating a National Policy and Strategy for Problem Animal Control in South Africa. In his opening address to the Forum, Mr. Kingwill listed four key areas being identified by the NPAPC for putting strategies in place, namely communication, control, training, and research and development (Kingwill, 1993).

Unless these factors are considered and appreciated, efforts to conduct research on the efficacy of current and historic predator control activities and develop a practical predator management strategy for South Africa may seem trivial.

In pursuing the objectives of the CCP, a historical data set was located and accessed with the assistance and courtesy of CapeNature. Thus, historic data from two previously active (but which have since become non-existent) predator hunt clubs were used to plan and develop a study with the following specific objectives:

- Estimating the damage caused by black-backed jackal and caracal to the small stock industry in the Mossel Bay district during the period from 1976 to 1992;
- Determining the geographic distribution of predation on one hand and animal damage control on the other hand, as well as trends (increases or decreases) in both these aspects;
- Determining the relationship between predation and predator control (assessing the impact of predation and predator control on each other);
- Identifying possible hotspots for livestock predation; and
- Assessing the value of computer software designed for the present study in determining the abovementioned factors.

If these objectives could be realised in this study by an intensive analysis of a specific data set, the methods and procedures may have wider application. In short, the challenge entailed developing the necessary software to capture and process data obtained from old predator hunt records.

From a brief assessment of the large volume of handwritten original monthly hunt reports submitted by the problem animal hunters and the typed inspection reports submitted by officials it was difficult to detect obvious links between predation and predators killed. Therefore, by using GIS technology the scope and opportunity could now be created for a renewed analysis of the old historical data.

Answers to these questions were important in determining the role and efficiency of official problem animal hunt clubs in managing the damage caused by the predators. This information is urgently needed with the view to implement the best practices in renewed efforts to reduce the impact of predation on livestock.

Therefore, although the present study focused on the activities and monthly hunt reports of two problem animal hunt clubs in the Mossel Bay district, the ultimate goal was to develop and implement technology for application on a larger scale in future management of the impact of predation on the livestock industry in South Africa.

2. Study area, Materials and Procedures

2.1 Study Area

This study was based on data gathered from two problem animal control clubs that have been operating in the Mossel Bay district of the Western Cape Province. Prior to 28 April 1994, the Mossel Bay district formed part of the Cape Province, one of the erstwhile four provinces of South Africa. Since 28 April 1994, the geopolitical landscape of South Africa was transformed with the formation of nine new provinces. The erstwhile Cape Province was divided into three new provinces, namely the Western Cape, Eastern Cape, and Northern Cape Provinces.

Data were obtained for the Cooper Jagklub and the adjacent Mosselbaai Sentrale Jagklub. In the context of this study, the names of the two problem animal control clubs ("Sentrale" = Central and "Jagklub" = hunt club) were not translated from Afrikaans. The activities of the two hunt clubs covered the geographical area of the Mossel Bay district and also five individual farms in the neighbouring Riversdale district to the west.

The study area is located between 33° 54´ and 34º 23´ S and 21º 39´ and 22º 15´ E (Figure 2.1). The geographical area covered by the Mosselbaai Sentrale Jagklub was larger than that of the Cooper Jagklub.

2.1.1 Climate

The long-term rainfall recorded by two weather stations, namely the Albertinia and the Cape St. Blaize (Mossel Bay) weather stations is used in this study (South African Weather Bureau, 2007). The annual rainfall for the Albertinia (*c*. 34° 12' S, 21° 35' E) and the Cape St. Blaize (*c*. 34° 10' S, 22° 08' E) weather stations recorded during the study period (1976 to 1992) is shown in Figure 2.2. Although the study area falls within the winter rainfall region of South Africa, a fair proportion of the rainfall also occurs in summer (Figure 2.3 and Figure 2.4).

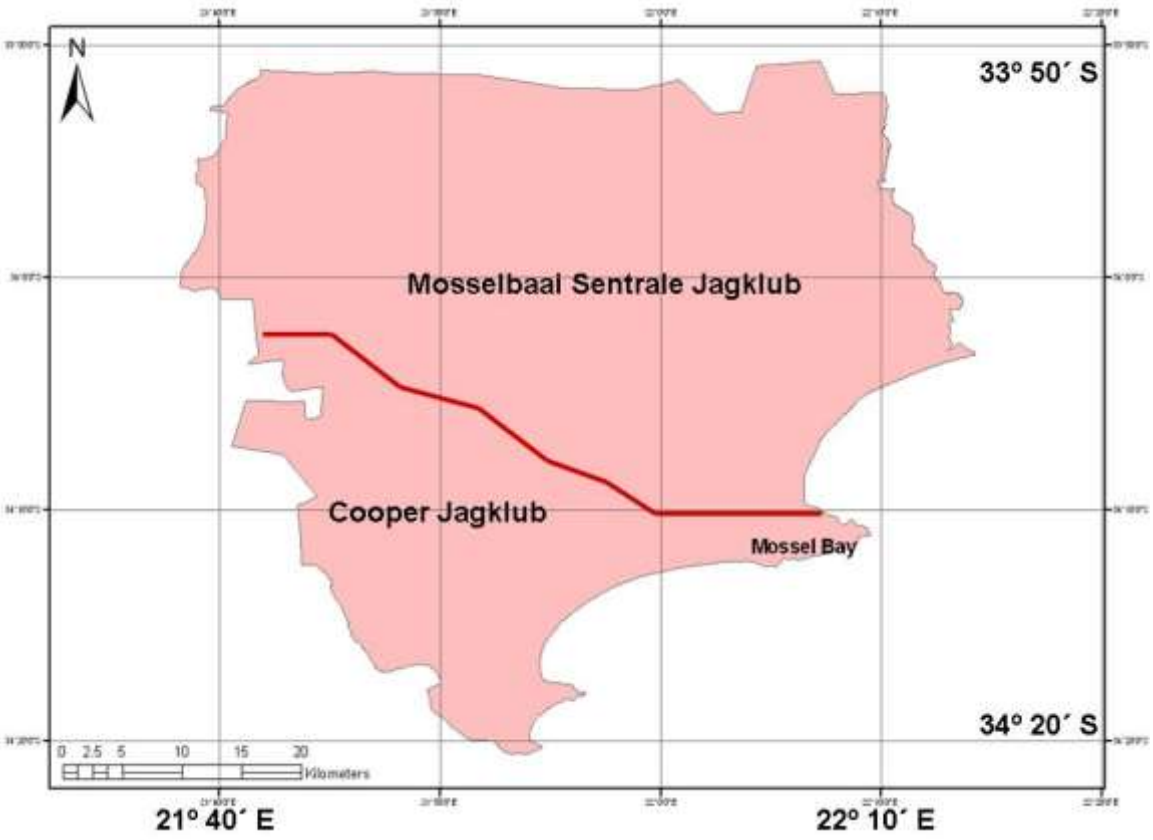


Figure 2.1 A map of the Mossel Bay district, showing the geographical positions of the Cooper Jagklub and the Mosselbaai Sentrale Jagklub; the jagged line from west to east through the Mossel Bay district shows the approximate boundary between the two clubs.

The monthly rainfall at Albertinia (Figure 2.3), varied between about 23 mm (January) and 45 mm (October). At Cape St. Blaize (Figure 2.4), the monthly rainfall varied from about 25 mm (February) to just over 40 mm (April). It was assumed that this variation in rainfall would be typical for the study area.

Mild temperatures are experienced throughout the year with mean daily temperatures of between 14.5°C (min) and 21.1°C (max). Days with relatively high temperatures (between 30 and 40°C) occur in summer. The mean relative humidity for this area is c. 76.7% (Weather Bureau, 1988). Frost is limited to about three days per year (Mucina & Rutherford, 2006).

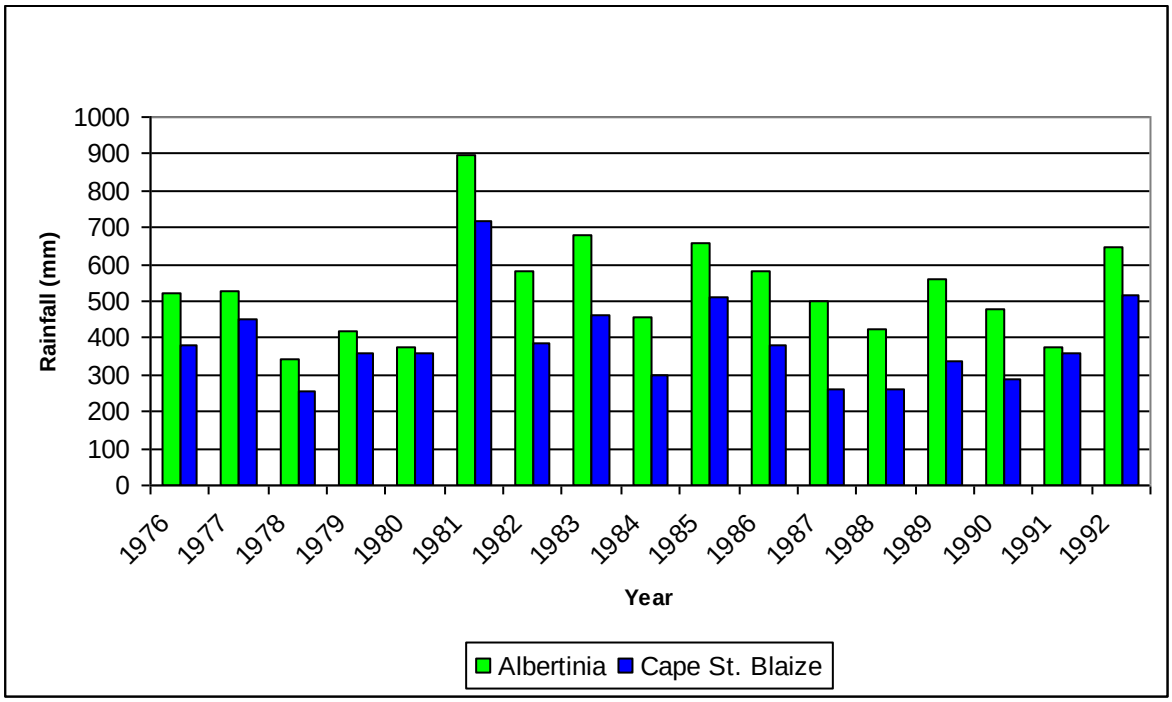


Figure 2.2 Annual rainfall recorded by the Albertinia and the Cape St. Blaize (Mossel Bay) weather stations, 1976 to 1992.

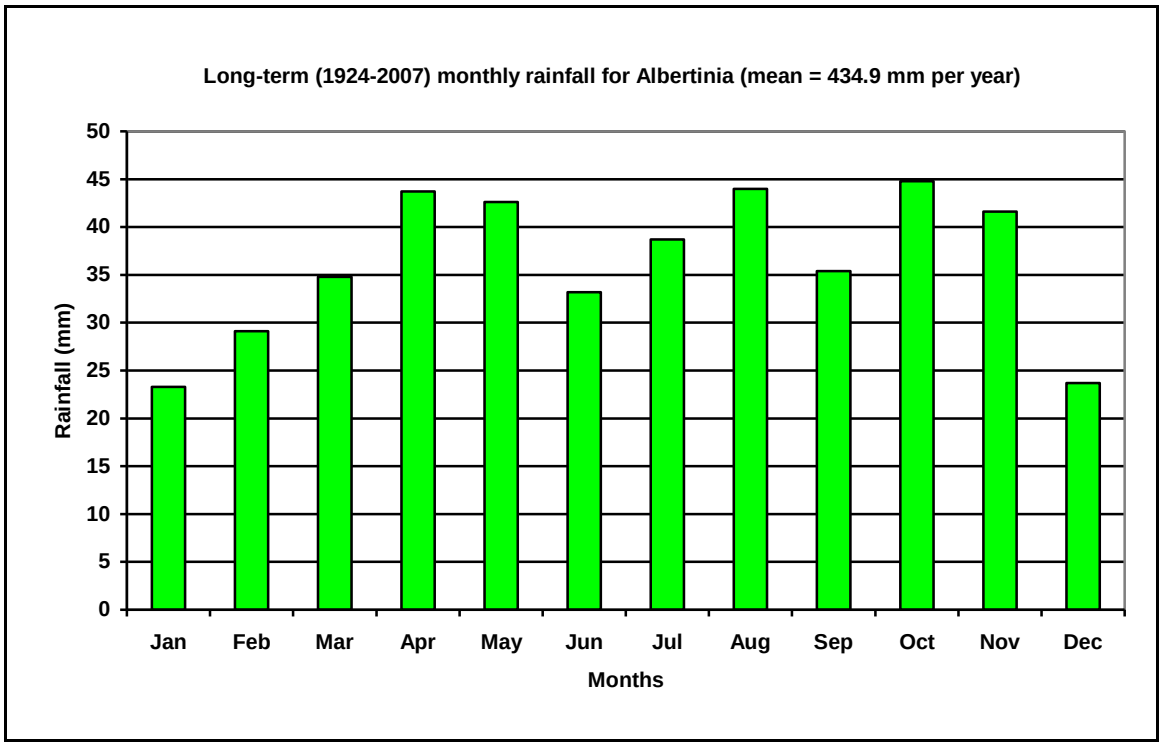


Figure 2.3 Long-term monthly rainfall recorded by the Albertinia weather station, 1924 to 2007.

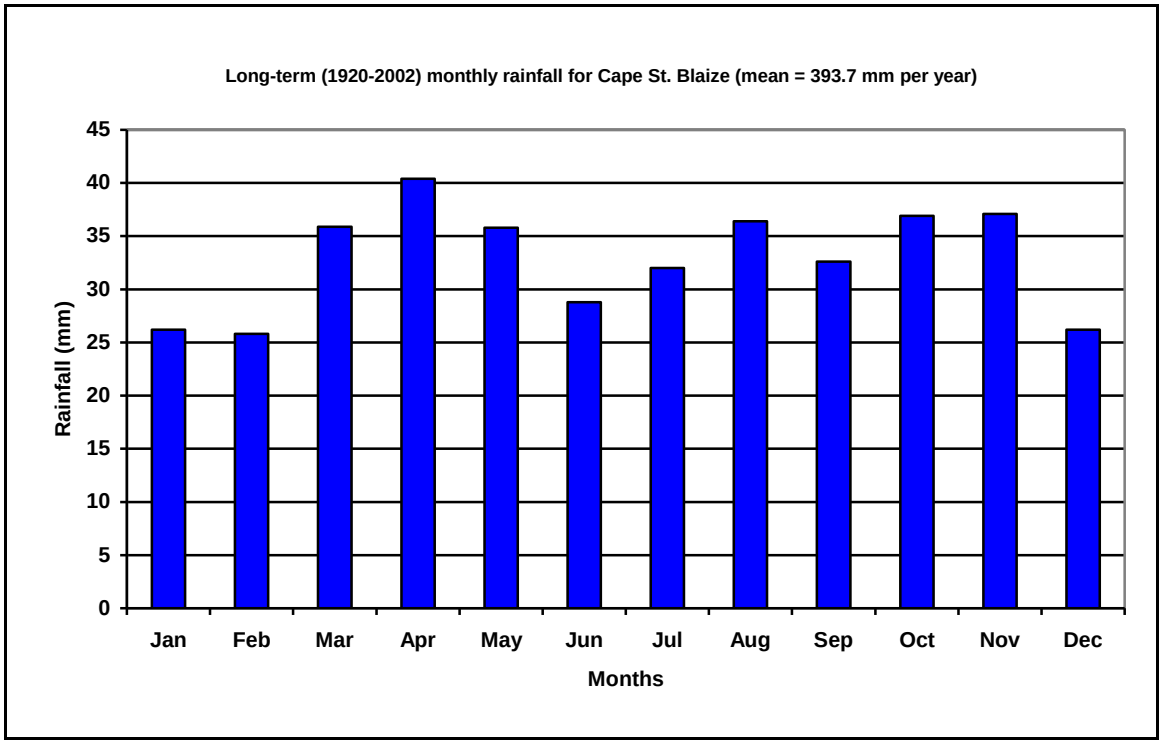


Figure 2.4 Long-term monthly rainfall recorded by the Cape St. Blaize (Mossel Bay) weather station, 1920 to 2001.

2.1.2 Topography

The topography of the study area is shown in Figure 2.5. It ranges in altitude from sea level to 300 m above sea level. According to Wicht (1945) the geological structure of the region determines the topography. Therefore, geological boundaries usually coincide with changes in topographic and related climatic factors. The coastal territory south of the Langeberg mountain range is a well-marked plain of erosion, at one time submerged under the sea, and formed by wave action (Wicht, 1945). It is now raised hundreds of feet above sea level and is cut into deep gorges by rivers. The gorges carry vegetation characteristically different from that of the surrounding level country (Wicht, 1945; Acocks, 1988). There are also a number of large warm springs within the folded region of the Cape (Du Toit, 1954). The largest river in the study area is the Gourits River (Figure 2.5), forming the western boundary of the Mossel Bay district. It originates in the dry interior region of summer rains, and cuts through the Langeberg mountain range at a right angle. The mountain range forms the northern boundary of the district, and the Great Brak River forms the eastern boundary.

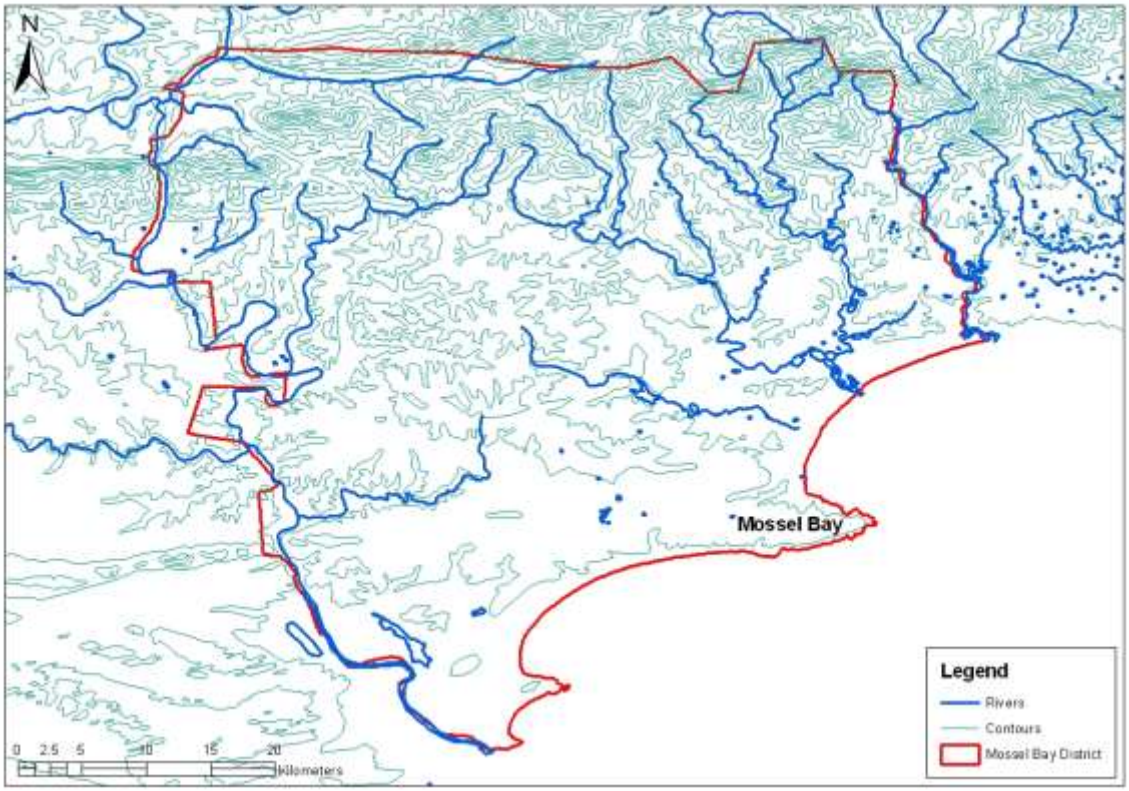


Figure 2.5 Topography of the Mossel Bay district, showing the district boundary, coast line, contours and rivers.

The outstanding large scale feature of the south coast is the series of large asymmetric half-heart embayments and their east-jutting promontories (≈ high points of land extending out into a body of water), notably, in the study area, at Vleesbaai (in the south of the district) and at Mossel Bay (Nordstrom *et al*., 1990). The south coast lowlands are discontinuous, being confined to the embayments noted above and their associated river valleys. The low embayments are separated from each other by sectors of raised coastal plateau with steep cliffs at the shores. Some of these cliffs rise to over 100 m. Dune fields are most extensive against the long curve of the half-heart bays and across their promontories (Nordstrom *et al*., 1990).

2.1.3 Flora

Acocks (1988) described three main types of vegetation in the Mossel Bay district, namely Valley Bushveld, Coastal Renosterveld and Coastal Fynbos.

2.1.3.1 Valley Bushveld (Gourits River Scrub)

This vegetation type is found in the valleys of three rivers, namely the Gourits, Little Brak and Great Brak Rivers. It merges upwards into Fynbos and Renosterveld. The scrub of the southern aspects is non-succulent and non-thorny, but very dense. It contains a larger element of Fynbos.

2.1.3.2 Coastal Renosterveld

Coastal Renosterveld is found on clay soil at an altitude of 0 to 300 m above sea level. At the upper margin of the south coastal Renosterveld it becomes transitional to False Fynbos and Coastal Fynbos. As opposed to the Renosterveld of the west coast belt it often contains a large proportion of grass. At its lower margin it becomes semi-succulent and merges easily into Strandveld.

2.1.3.3 Coastal Fynbos

Coastal Fynbos is also found from sea level to an altitude of 300 m, but on sand and limestone.

2.1.4 Fauna

Studies have shown that mammals are the most common prey for both caracal and black-backed jackal, often contributing more than 80% to their diet (Avenant & Nel, 2002; Kok & Nel, 2004). Therefore, the indigenous mammal species expected in the study area are shown in Tables 2.1 and 2.2.

The diversity of bird species occurring in the study area is described by Hockey *et al*. (2005) and the diversity of reptiles is described by Branch (1998).

Table 2.1 Part 1 of 2: Indigenous mammal species expected in the study area (following Skinner & Chimimba, 2005)

TAXON	COMMON NAME
Order AFROSORICIDA	
Chrysochloris asiatica (Linnaeus, 1758)	Cape golden mole
Amblysomus corriae Thomas, 1905	Fynbos golden mole
Order MACROSCELIDEA	
Macroscelides proboscideus (Shaw, 1800)	Round-eared elephant-shrew
Elephantulus edwardii (A. Smith, 1839)	Cape rock elephant-shrew
Order HYRACOIDEA	
Procavia capensis (Pallas, 1766)	Rock hyrax
Order LAGOMORPHA	
Lepus capensis Linnaeus, 1758	Cape hare
Lepus saxatilis F. Cuvier, 1823	Scrub hare
Order RODENTIA	
Bathyergus suillus (Schreber, 1782)	Cape dune mole-rat
Georychus capensis (Pallas, 1778)	Cape mole-rat
Hystrix africaeaustralis Peters, 1852	Cape porcupine
Graphiurus murinus (Desmarest, 1822)	Woodland dormouse
Acomys subspinosus (Waterhouse, 1838)	Cape spiny mouse
Rhabdomys pumilio (Sparrmann, 1784)	Four-striped grass mouse
Mus minutoides A. Smith, 1834	Pygmy mouse
Myomyscus verreauxi (A. Smith, 1834)	Verreaux's mouse
Micaelamys namaquensis (A. Smith, 1834)	Namaqua rock mouse
Otomys irroratus (Brants, 1827)	Vlei rat
Gerbillurus paeba (A. Smith, 1836)	Hairy-footed gerbil
Tatera afra (Gray, 1830)	Cape gerbil
Mystromys albicaudatus (A. Smith, 1834)	White-tailed mouse
Saccostomus campestris Peters, 1846	Pouched mouse
Dendromus melanotis A. Smith, 1834	Grey climbing mouse
Dendromus mesomelas (Brants, 1827)	Brants' climbing mouse
Steatomys krebsii Peters, 1852	Krebs's fat mouse
Order PRIMATES	
Papio hamadryas (Linnaeus, 1758)	Chacma baboon
Cercopithecus pygerythrus (F. Cuvier, 1821)	Vervet monkey
Order EULIPOTYPHLA	
Myosorex longicaudatus Meester & Dippenaar, 1978	Long-tailed forest shrew
Myosorex varius (Smuts, 1832)	Forest shrew
Crocidura flavescens (I. Geoffroy, 1827)	Greater red musk shrew
Order CHIROPTERA	
Eidolon helvum (Kerr, 1792)	Straw-coloured fruit bat
Rousettus aegyptiacus (E. Geoffroy-St. Hilaire, 1810)	Egyptian Rousette
Taphozous mauritianus E. Geoffroy, 1818	Mauritian tomb bat
Chaerephon pumila (Cretzschmar, 1826)	Little free-tailed bat
Tadarida aegyptiaca (E. Geoffroy, 1818)	Egyptian free-tailed bat
Miniopterus schreibersii (Kuhl, 1817)	Schreibers' long-fingered bat
Neoromicia capensis (A. Smith, 1829)	Cape serotine bat
Myotis tricolor (Temminck, 1832)	Temminck's hairy bat
Eptesicus hottentotus (A. Smith, 1833)	Long-tailed serotine bat
Nycteris thebaica E. Geoffroy, 1813	Egyptian slit-faced bat
Rhinolophus clivosus Cretzschmar, 1828	Geoffroy's horseshoe bat
Rhinolophus capensis Lichtenstein, 1823	Cape horseshoe bat

Table 2.2 Part 2 of 2: Indigenous mammal species occurring in the study area (following Skinner & Chimimba, 2005)

Order CARNIVORA	
Proteles cristatus (Sparrman, 1783)	Aardwolf
Panthera pardus (Linnaeus, 1758)	Leopard
Caracal caracal (Schreber, 1776)	Caracal
Felis silvestris Forster, 1780	African wild cat
Genetta genetta Linnaeus, 1758	Small-spotted genet
Genetta tigrina (Schreber, 1776)	South African large-spotted genet
Cynictis penicillata (G. Cuvier, 1829)	Yellow mongoose
Herpestes ichneumon (Linnaeus, 1758)	Large grey mongoose
Galerella pulverulenta (Wagner, 1839)	Cape grey mongoose
Atilax paludinosus (G. Cuvier, 1829)	Marsh mongoose
Otocyon megalotis (Desmarest, 1822)	Bat-eared fox
Vulpes chama (A. Smith, 1833)	Cape fox
Canis mesomelas Schreber, 1775	Black-backed jackal
Aonyx capensis (Schinz, 1821)	African clawless otter
Lutra maculicollis Lichtenstein, 1835	Spotted-necked otter
Mellivora capensis (Schreber, 1776)	Honey badger
Order WHIPPOMORPHA	
Tragelaphus scriptus (Pallas, 1766)	Bushbuck
Damaliscus pygargus (Pallas, 1767)	Bontebok
Sylvicapra grimmia (Linnaeus, 1758)	Common duiker
Pelea capreolus (Forster, 1790)	Grey rhebok
Raphicerus campestris (Thunberg, 1811)	Steenbok
Raphicerus melanotis (Thunberg, 1811)	Cape Grysbok
Oreotragus oreotragus (Zimmermann, 1783)	Klipspringer

2.2 Materials and procedures

As discussed previously, the study was based on data obtained from the monthly hunt reports submitted by the problem animal hunters from the Cooper Jagklub and the Mosselbaai Sentrale Jagklub. These monthly hunt reports span a broad period of 16 years, from 1976 to 1992.

Computer software was created specifically for analysis of the data. The use of the software is presented and briefly described with the aid of text and input screens.

2.2.1 Brief history of the Cooper Jagklub and the Mosselbaai Sentrale Jagklub

Although the Cooper Jagklub and the Mosselbaai Sentrale Jagklub ceased to exist, it is necessary to provide some detail on their founding and activities.

In the former Cape Province of South Africa, problem animal control clubs were formed by compulsory participation of all farmers in a specific geographical area. Compliance was required in accordance with Article 4 of Ordinance No. 26 of 1957 (Lensing, 1993; Stadler, 2006). Although the term problem animal included other wildlife species as listed in Ordinance No. 26 of 1957, activities mostly focused on predators such as the black-backed jackal and the caracal. Each hunt club was duly formed with a Constitution and an elected Management Committee. During the 1970s until the late 1980s, these clubs were subsidised by Divisional Councils to control so-called problem animals (Stadler, 2006). Membership was limited to farm owners or occupants of all farms larger than 20 ha (Constitution of the Mosselbaai Sentrale Jagklub, undated).

According to the Constitution of the Mosselbaai Sentrale Jagklub, only members of the club were eligible to call on the services of the club. However, non-members were also helped to control predators. In such cases transport and any other costs incurred by the club were claimed from those individuals.

Membership fees were based on a sliding scale according to the number of livestock per owner. In the case of the Mosselbaai Sentrale Jagklub, 40 farmers were listed as being members (undated membership list). However, the monthly hunt records (that were retrieved) show that a large number of non-listed farmers also regularly made use of the services offered by the club. There were also names of some farmers and their farms that did not appear in the hunt records. Furthermore, according to a questionnaire completed by the problem animal hunter of this club, 60 farmers were members of the club. No comparable membership list was retrieved for the Cooper Jagklub. However, in the questionnaire completed by the problem animal hunter of this club, it was indicated that 70 farmers were members of the Cooper Jagklub. It is, therefore, possible that during the period of 16 years (1976 to 1992) covered by this study (based on the hunt records retrieved), these hunt clubs could have lost and/or gained members. Therefore, it is assumed that those names in the hunt records that did not appear in the membership list, were farmers who joined the problem animal control club after the list was compiled. Alternatively, it could have been farmers who were not members of the problem animal control club, but only made use of its services occasionally. However, it is difficult to reconcile this non-compliance of compulsory membership as required by Ordinance No. 26 of 1957.

The problem animal control clubs employed experienced individuals as problem animal hunters to carry out the predator control activities when predation on livestock was reported by farmers. The government provided the problem animal control clubs with hound packs specifically bred and trained for this purpose at the Vrolijkheid Problem Animal Control Station near McGregor. Each problem animal hunter was responsible for taking care of the pack of hounds and equipment supplied to him. The problem animal hunters were obliged to keep record of every hunt carried out and report it in a specific format as shown in Figure 2.6.

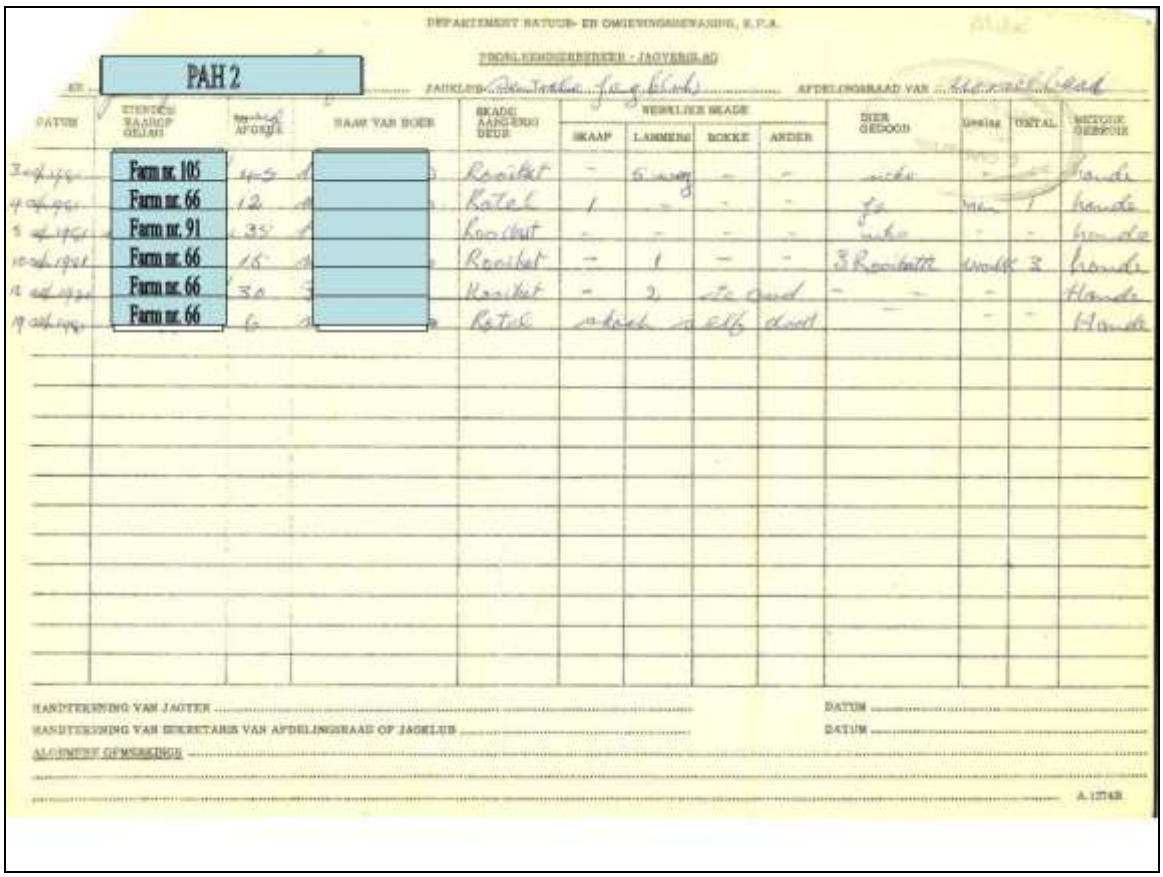


Figure 2.6 A monthly hunt report completed by the problem animal hunter (e.g. PAH 2) of a specific problem animal hunt club. Farms and hunters have been assigned unique identifications to maintain confidentiality.

These monthly hunt reports were submitted to the Secretary of the problem animal control club, who in turn submitted it to the Management Committee of that particular Divisional Council (Constitution of the Mosselbaai Sentrale Jagklub, undated). The problem animal hunter was then remunerated for expenses incurred relating to the animal damage control activities as submitted

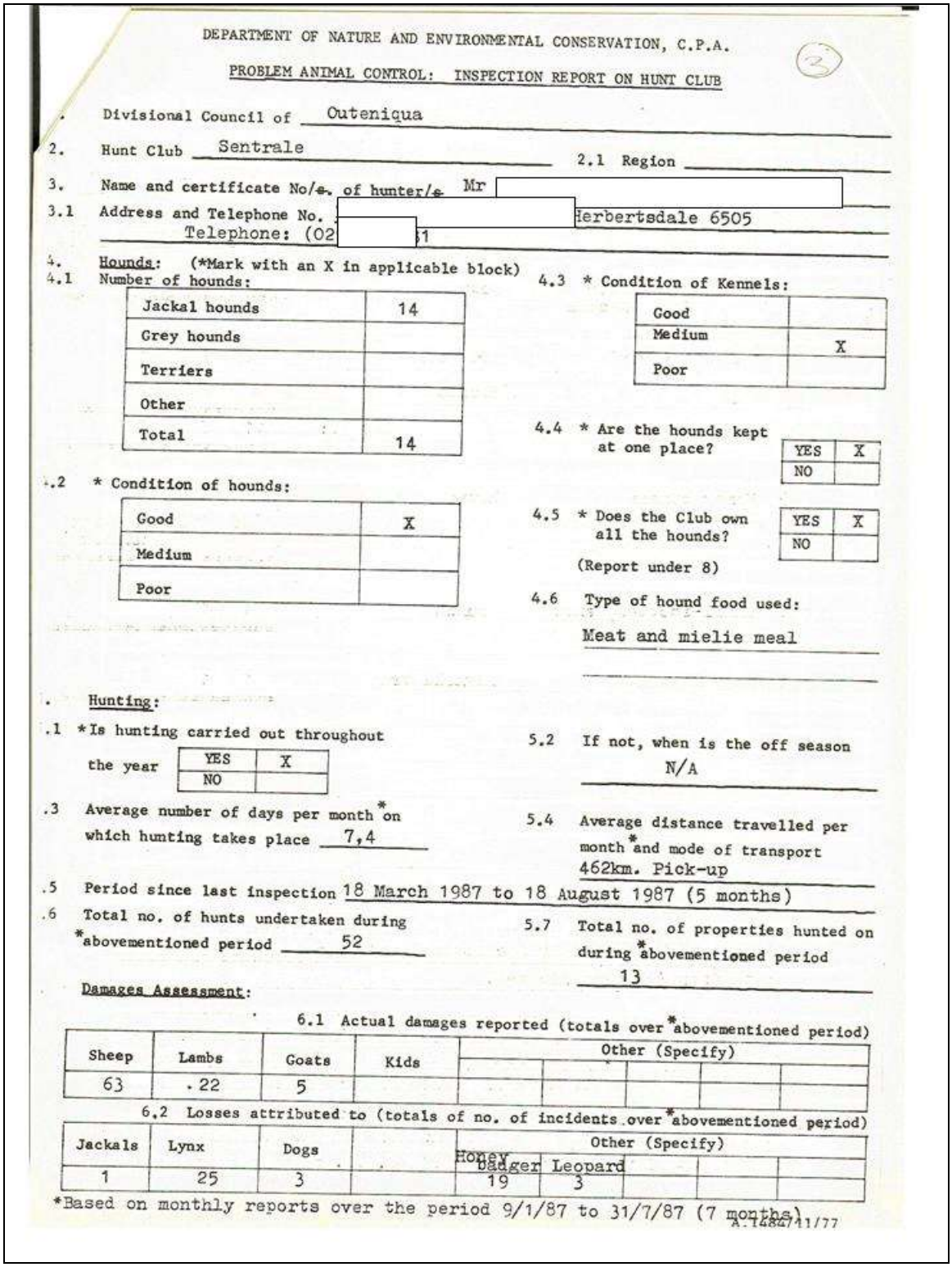
in the monthly hunt reports. It would seem that the kilometres travelled during a month were used as primary basis for remunerating the problem animal hunters.

According to official documents retrieved, a survey of the subsidised problem animal control clubs was conducted by the Department of Nature and Environmental Conservation (undated). Information showed that the Cooper Jagklub was established by, and formed part of, the Voëlvlei Farmers' Association. This Association paid the problem animal hunter from membership fees levied from the members of the problem animal control club. In the case of the Mosselbaai Sentrale Jagklub further payments to the hunter were also made from donations received from the farmers.

The aim of the problem animal control clubs was quite clear: according to the Constitution of the Mosselbaai Sentrale Jagklub (undated), the aim of the club was to control the problem animals black-backed jackal *Canis mesomelas*, caracal *Caracal caracal*, and vagrant dogs *Canis familiaris* (as listed in Ordinance No. 26 of 1957) in Wards 8 to 12 of the Divisional Council. No comparable information is available for the Cooper Jagklub.

The official documents retrieved confirmed the substantial government involvement and control in the predator control activities of the hunt clubs and the hunters. Regular inspections of the facilities provided by the problem animal hunter for the hounds and assessments of the problem animal hunter's efforts were conducted by officials of each Divisional Council. These inspections were taken seriously and are well documented in quarterly inspection reports as shown in Figures 2.7.1 to 2.7.3 respectively for a three-page report. The reader is again reminded that names of persons and farms are masked in the reproduced copies of the original documents to maintain confidentiality.

The Divisional Council officials commented in these quarterly inspection reports on unsatisfactory compliance by problem animal hunters or problem animal control clubs, which resulted in subsidies being withheld by the government.



DEPARTMENT OF NATURE AND ENVIRONMENTAL CONSERVATION, C.P.A.

PROBLEM ANIMAL CONTROL: INSPECTION REPORT ON HUNT CLUB

(3)

1. Divisional Council of Outeniqua

2. Hunt Club Sentrale 2.1 Region

3. Name and certificate No/~~s~~ of hunter/~~s~~ Mr

3.1 Address and Telephone No. Herbertsdale 6505

Telephone: (02 1

4. Hounds: (*Mark with an X in applicable block)

4.1 Number of hounds:

Jackal hounds	14
Grey hounds	
Terriers	
Other	
Total	14

4.2 * Condition of hounds:

Good	X
Medium	
Poor	

4.3 * Condition of Kennels:

Good	
Medium	X
Poor	

4.4 * Are the hounds kept at one place?

YES	X
NO	

4.5 * Does the Club own all the hounds?

YES	X
NO	

(Report under 8)

4.6 Type of hound food used:

Meat and mielie meal

5. Hunting:

5.1 *Is hunting carried out throughout the year

YES	X
NO	

5.2 If not, when is the off season

N/A

5.3 Average number of days per month* on which hunting takes place 7,4

5.4 Average distance travelled per month* and mode of transport

462km. Pick-up

5.5 Period since last inspection 18 March 1987 to 18 August 1987 (5 months)

5.6 Total no. of hunts undertaken during *abovementioned period 52

5.7 Total no. of properties hunted on during *abovementioned period

13

6. Damages Assessment:

6.1 Actual damages reported (totals over *abovementioned period)

Sheep	Lambs	Goats	Kids	Other (Specify)				
63	22	5						

6.2 Losses attributed to (totals of no. of incidents over *abovementioned period)

Jackals	Lynx	Dogs		Other (Specify)				
				Honey badger	Leopard			
1	25	3		19	3			

*Based on monthly reports over the period 9/1/87 to 31/7/87 (7 months)

A.1484/11/77

Figure 2.7.1 Page 1 (of 3) of a quarterly inspection report, Mosselbaai Sentrale Jagklub.

Animals killed during control operations:

7.1

Species	Method used	No.	Sex		Skulls
			M	F	
1) Aardwolf	Hounds	1	(Sex unknown)		
2) Bat-eared Fox	Hounds	10	1 (Remaining 9 - sex unknown)		
3) Cape Fox (Silver jackal)	Hounds	1	1		
4) Caracal (Lynx)	a)Trap cage	2	1	1	
	b)Hounds	9	5	4	
	Totals:	11	6	5	
5) Honey badger	Hounds	3		2	
		(Remaining 1 - sex unknown)			
6) Small-spotted genet	Hounds	1	1		
7) Vagrant dog	Leghold trap	1	1		

.

General Remarks and Recommendations:

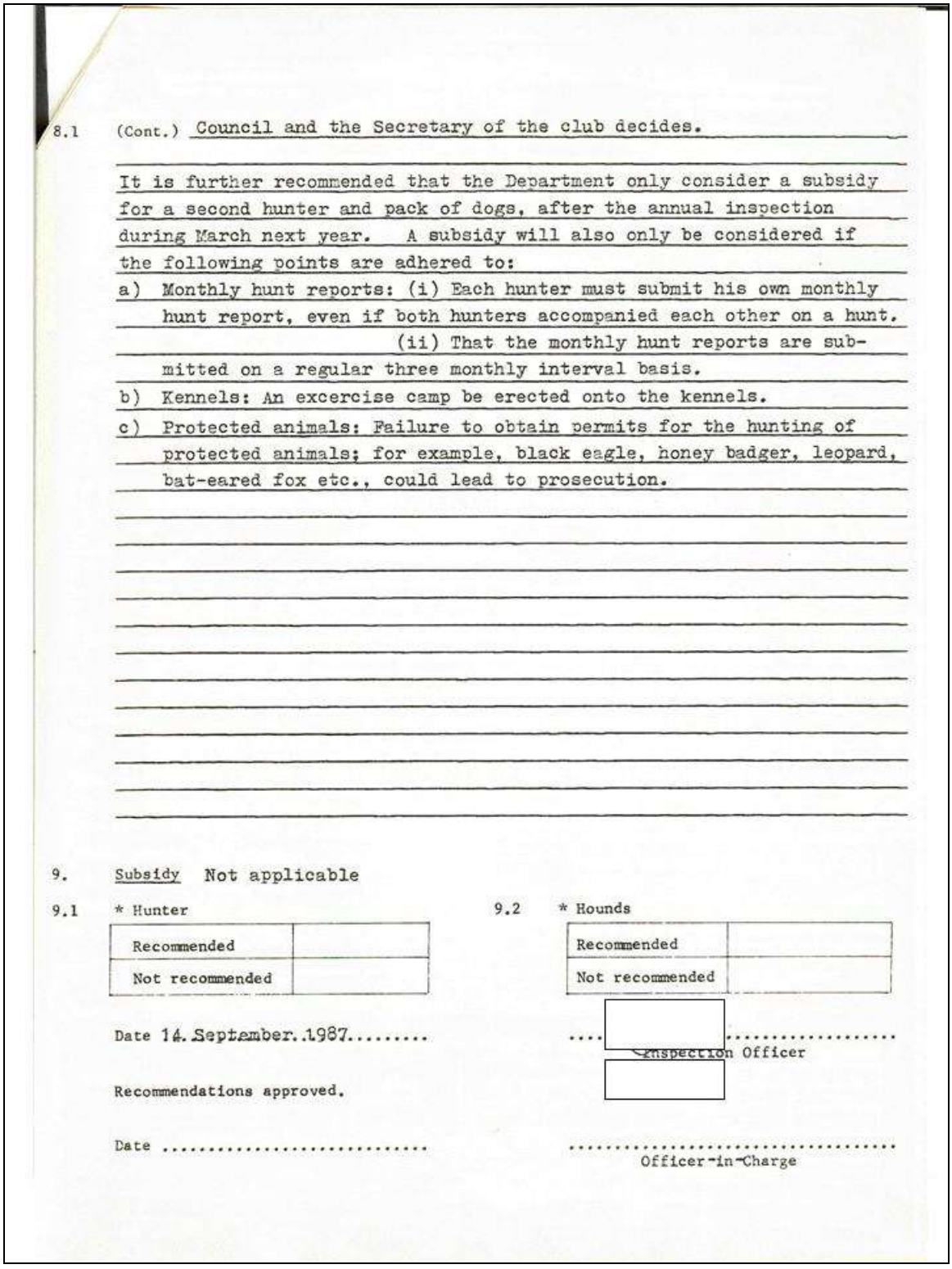
(If any re-organisation is recommended, a full motivation must be given)

.1 The second hunter is Mr [ ] (no certificate).

The Sentrale hunt club's area is a relatively large, as indicated on the attached map. The club is of the opinion that due to the large area which has to be covered, a second hunter is needed.

It is recommended that a second hunter and pack of dogs be appointed by the Outeniqua Divisional Council w.i.f. the date the Divisional

Figure 2.7.2 Page 2 (of 3) of a quarterly inspection report, Mosselbaai Sentrale Jagklub.



8.1 (Cont.) Council and the Secretary of the club decides.

It is further recommended that the Department only consider a subsidy for a second hunter and pack of dogs, after the annual inspection during March next year. A subsidy will also only be considered if the following points are adhered to:

a) Monthly hunt reports: (i) Each hunter must submit his own monthly hunt report, even if both hunters accompanied each other on a hunt.
(ii) That the monthly hunt reports are submitted on a regular three monthly interval basis.

b) Kennels: An excercise camp be erected onto the kennels.

c) Protected animals: Failure to obtain permits for the hunting of protected animals; for example, black eagle, honey badger, leopard, bat-eared fox etc., could lead to prosecution.

9. Subsidy Not applicable

9.1 * Hunter

Recommended	
Not recommended	

9.2 * Hounds

Recommended	
Not recommended	

Date 14. September. 1987.....

.....
Inspection Officer

Recommendations approved.

Date .....

.....
Officer-in-Charge

Figure 2.7.3 Page 3 (of 3) of a quarterly inspection report, Mosselbaai Sentrale Jagklub.

The official who conducted the inspection and produced the quarterly report made some recommendations to his superiors. He also recommended that payment of a subsidy for a second hunter and pack of dogs by the Department should be considered after the annual inspection the next year. Continued payment of subsidy should also only be considered after adherence to specific points listed in the quarterly report.

Unfortunately, no records could be obtained of the evaluation and feedback from within the official hierarchy on the content of the report and especially the comments made by the official who conducted the quarterly inspection.

2.2.2 Software

The software and procedures described here were used to capture the data and analyse it accordingly. The following software was created specifically for this study under the auspices of ALPRU to link the data to the ArcGIS environment.

2.2.2.1 ALPRU Predator Database

A total of 136 monthly hunt reports were available for the Cooper Jagklub and 155 monthly hunt reports for the Mosselbaai Sentrale Jagklub. The handwritten data recorded in each of these monthly hunt reports were captured in an electronic database created specifically for this purpose, namely the ALPRU Predator Database. A flow chart containing copies of the different input screens illustrating the process of data input and output is provided in Figure 2.8.1 to Figure 2.8.6. The ALPRU Predator Database contains 2 527 individual records reflecting on both predation and predator control activities, each identified by a unique reference number. For each individual record the following information was logged in the database with the aid of an input screen (Figure 2.8.1):

- Name of the farm.
- Two coordinates (longitude and latitude, in decimal format) of the farm.
- Animal species suspected of causing the damage to livestock.
- Livestock losses (i.e. how many sheep, cattle, goats, poultry or game were killed), also specifying the sex and age (adults or juvenile) of livestock killed.
- Date of each predator control operation.
- Name of the hunter responsible for predator control.

- Hunt club to which the problem animal hunter belongs.
- Control method used by the problem animal hunter for the suspected damage causing predator.
- Was the hunt successful (i.e. animal suspected of causing the damage was killed) or not successful (i.e. animal suspected of causing the damage could not be found, escaped, or a non-target animal was killed).
- Age, sex and stomach contents of the animal killed.

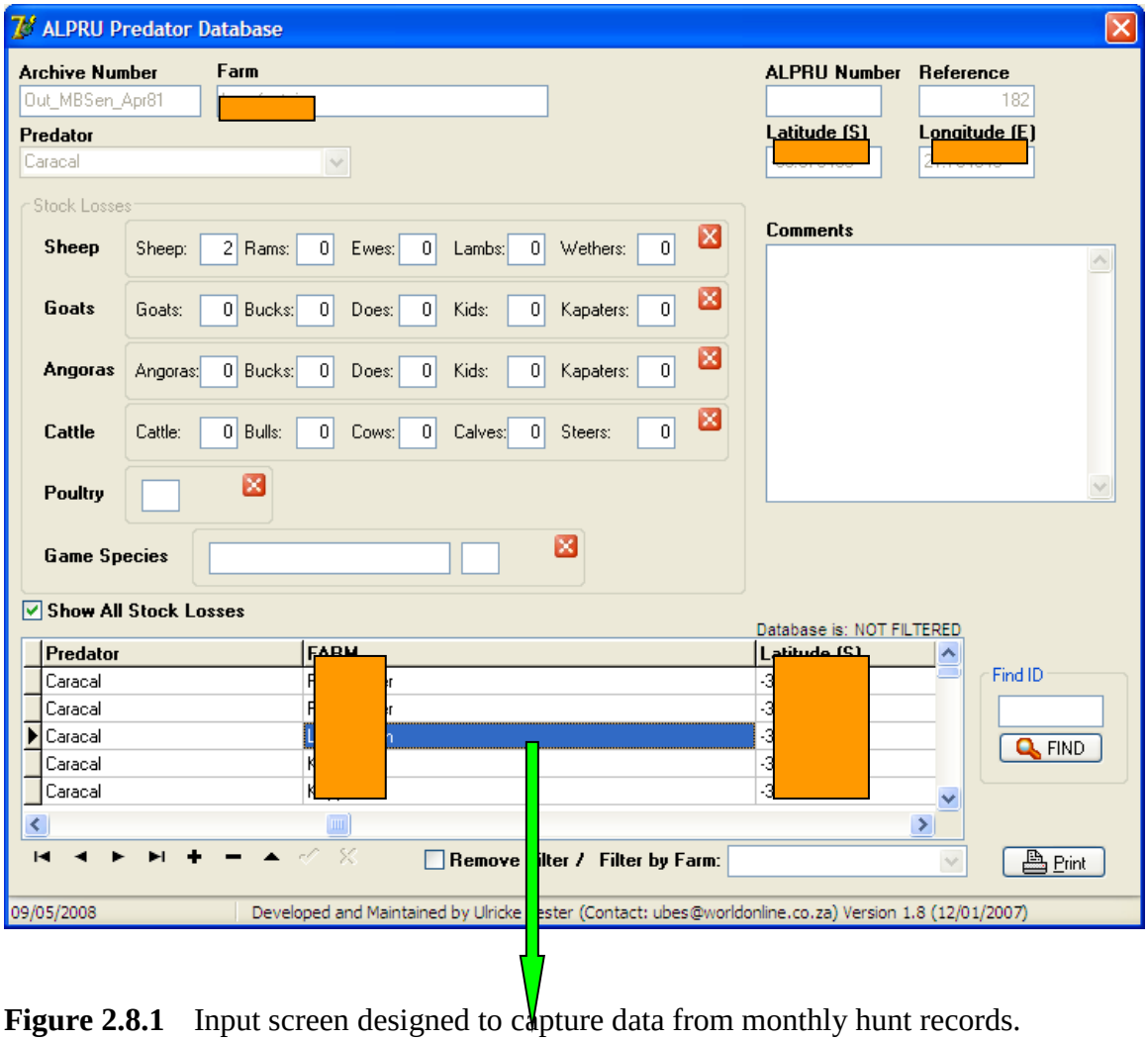


Figure 2.8.1 Input screen designed to capture data from monthly hunt records.

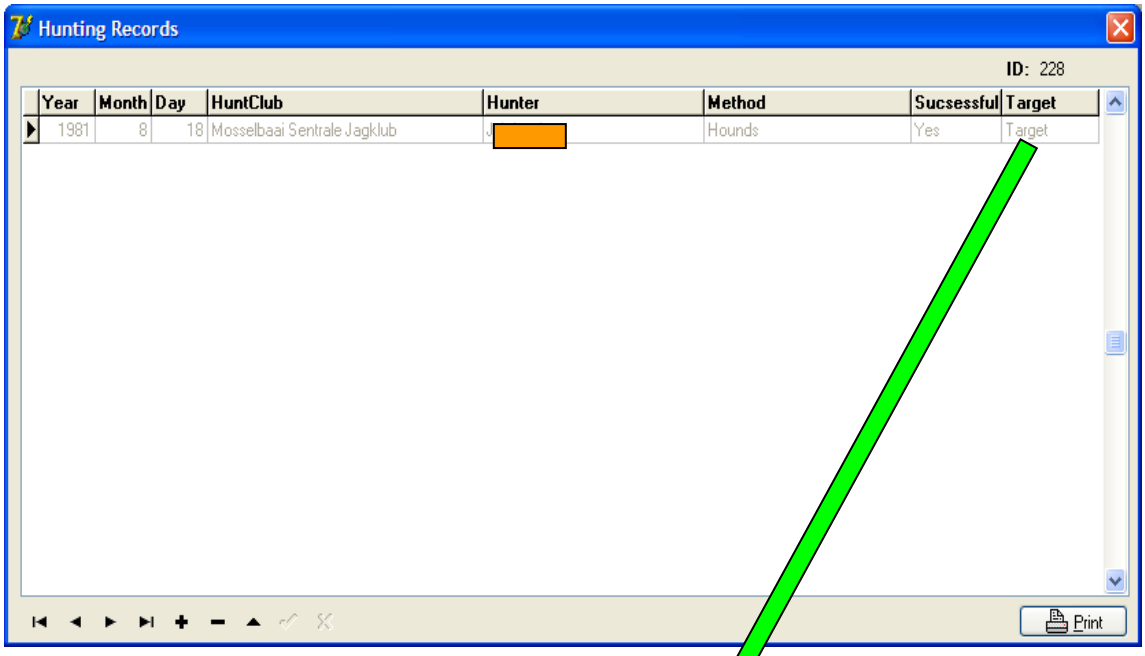


Figure 2.8.2 Input screen for Hunting Records.

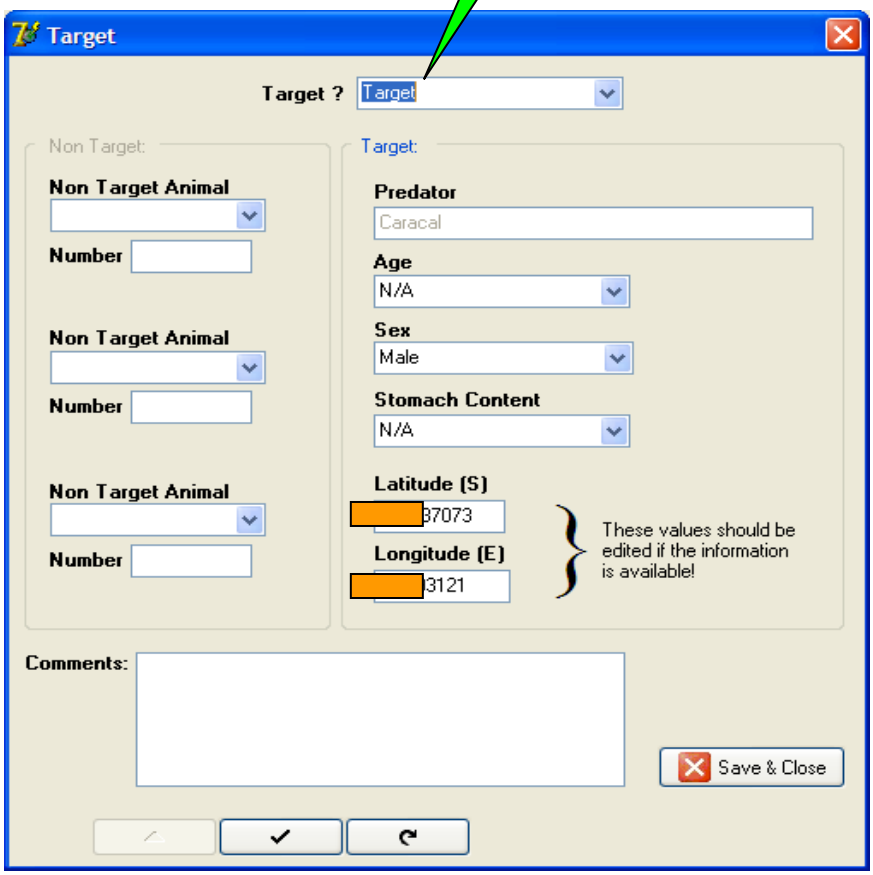


Figure 2.8.3 Input screen regarding Target animals (killed during hunting activities).

Each monthly report was allocated a unique archive number in the database, e.g. Out_MBSen_Apr81 for the monthly report containing records for April 1981 from the Mosselbaai Sentrale Jagklub. Accordingly, the records of predation and predator control activities recorded on each monthly report were thus also assigned the relevant unique archive number.

Without negating the value that the old hunt records may have had in predator control, the design or format of the forms (Figure 2.6) on which records of hunts were submitted, was clearly only intended to report on a monthly basis the number of livestock mortalities reported by farmers and the number of predators killed. From these monthly hunt reports specific information regarding the number of predators killed and the distances travelled during the hunting operations were used to compensate the problem animal hunters.

At this point it should be noted that the records contained in the monthly hunt reports lack important information regarding the predators that were killed. For example, none of the monthly hunt reports documented the stomach content of the predators killed; provision for this information has been made in the ALPRU Predator Database for future application. In most cases the sex of livestock killed by predators was also not specified for the relevant records on the monthly hunt reports.

A major challenge was posed in positively identifying each specific farm listed in the monthly hunt reports. In conceptualising this study, it was realised that GIS technology was required for an in-depth analysis of the large number of monthly hunt reports generated by the two problem animal control clubs. GIS technology depends on geographical positioning; hence positive identification of every site (farm) was specifically required to evaluate the large volume of items recorded in the database relating to predation and predator control activities on a large number of farms.

The process of identifying every farm by the farm name and the farm number from conventional geographical maps (scale: 1:50 000) was difficult and time consuming. Electronic maps, as well as more recent geographical maps, were compared and cross-referenced to the original or older (outdated) geographical maps. This backdating was necessary because many of the original farms have been subdivided over the years into smaller units, each with a different name. In spite of these efforts, some farms could still not be identified, while others could only be

identified to a lesser degree of certainty. It was also difficult to identify specific farms by using the owners' names, because between the middle 1990s and 2006 a substantial body of information was lost, because official records were not kept updated.

2.2.2.2 Predatordatabase Export

The next step in the process of analysing the data was to electronically export by means of software, namely Predatordatabase Export. The data contained in the Predator Database were exported to the Queries programme in order to apply specific queries or filters to the database to extract valuable information (Tables 2.8.4 and 2.8.5). This information was converted into *.dbf files and used to configure maps in ArcGIS.

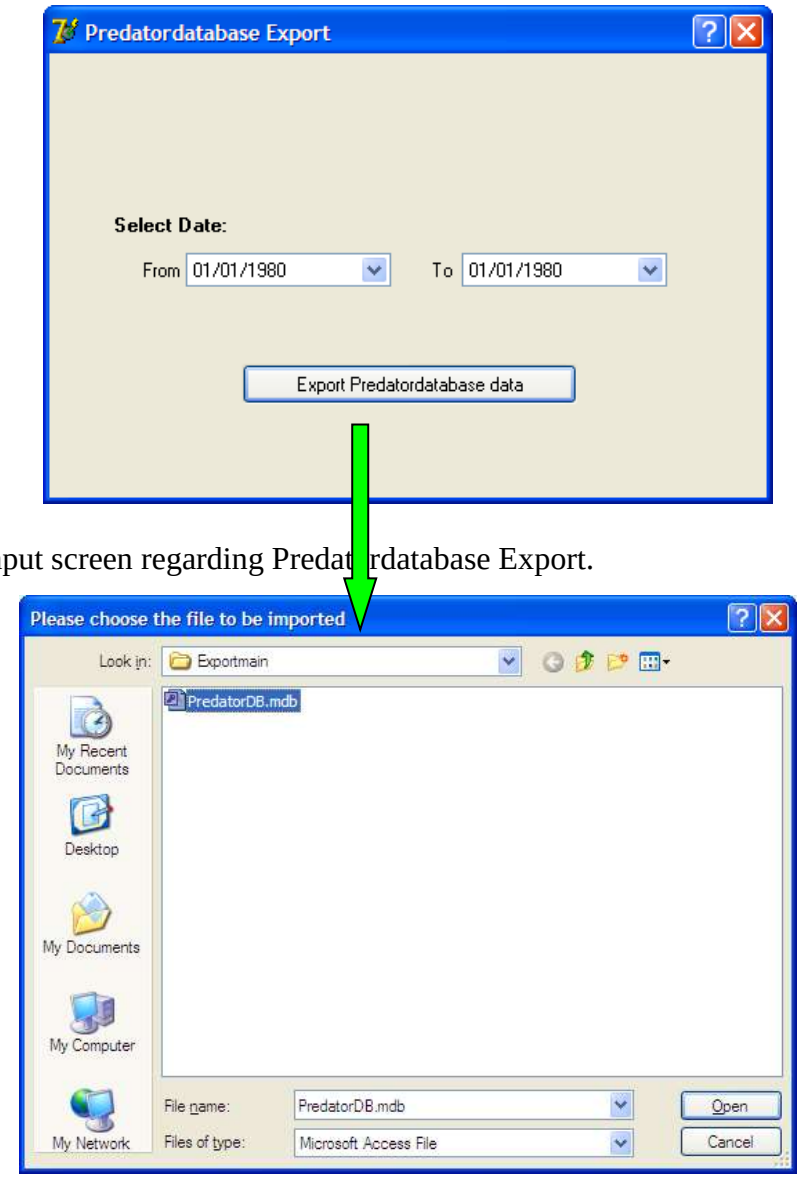


Figure 2.8.4 Input screen regarding Predat rdatabase Export.

Figure 2.8.5 Input screen regarding Predatordatabase Export.

2.2.2.3 Queries

Data from the **ALPRU Predator Database** were exported to the **Queries** programme.

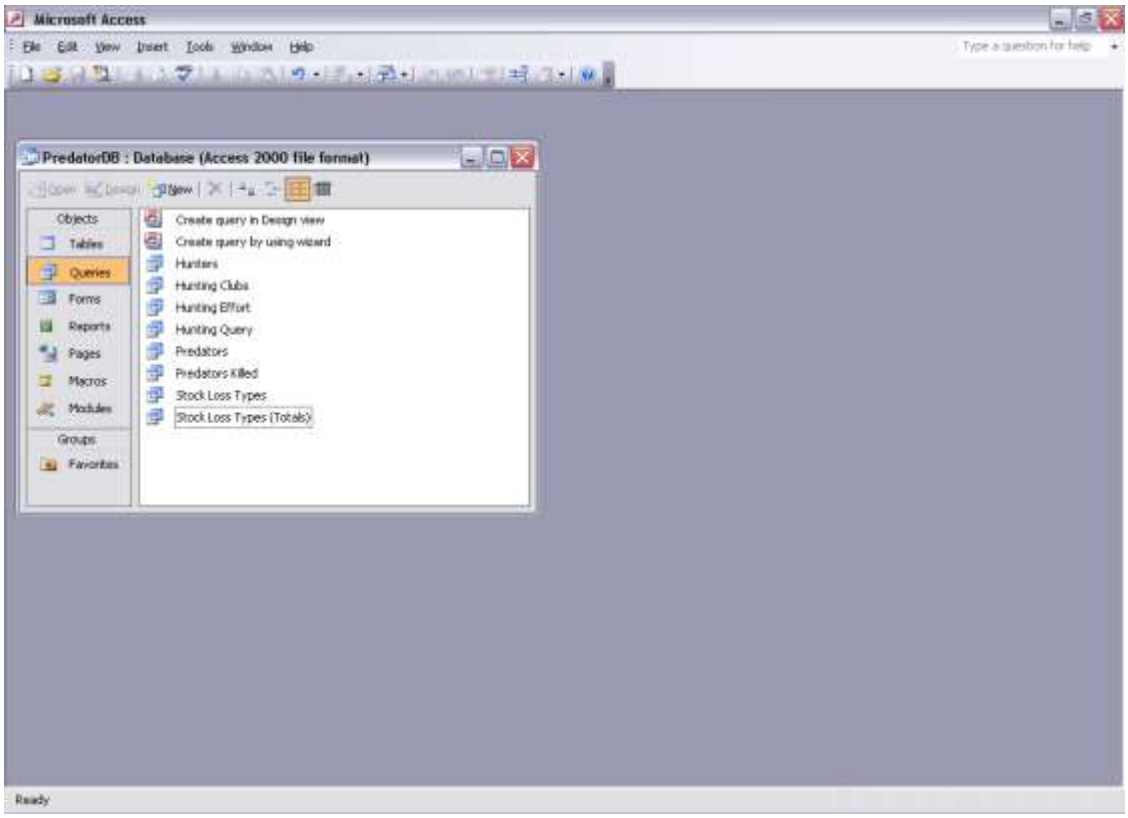


Figure 2.8.6 Input screen regarding Queries.

2.2.2.4 ArcGIS

In this final step of the process, a number of GIS maps were generated, showing the predation on a monthly basis in the geographic area of each hunt club. Similarly the corresponding maps were generated for predators killed. By creating queries or filters, data conforming to certain criteria could be grouped together. Thus, it was possible, for example, to group the incidents of predation (or the predators killed) in January 1987, February 1987, or March 1987 separately. The results of the analysis are presented and discussed in the next chapter.

3. Results and Discussion

3.1 Monthly hunt reports from the Cooper Jagklub and the Mosselbaai Sentrale Jagklub

Monthly hunt reports for the Cooper Jagklub and the Mosselbaai Sentrale Jagklub are available from October 1976, as shown in Tables 3.1 and 3.2 respectively. However, the datasets are incomplete because monthly hunt reports for some months are missing. In the case of the Cooper Jagklub (Table 3.1) the last available monthly hunt report retrieved is for March 1988 and for the Mosselbaai Sentrale Jagklub (Table 3.2), the last report retrieved is for May 1992.

It is important to note that these monthly hunt reports constitute the only existing records of the two problem animal control clubs available for this study from the Mossel Bay district. Therefore, in the absence of information to the contrary, the available results and information are discussed in this context and conclusions drawn accordingly.

Table 3.1 Monthly hunt reports for the Cooper Jagklub (October 1976 to March 1988); blanks represent the months for which no hunt reports are available

	Month											
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976										X	X	X
1977	X	X	X	X	X	X	X	X	X	X	X	X
1978	X	X	X	X	X	X	X	X	X	X	X	X
1979	X	X	X	X	X	X	X	X	X	X	X	
1980	X	X	X	X	X	X	X	X	X	X	X	X
1981	X	X	X	X	X	X	X	X	X	X	X	X
1982	X	X	X	X	X	X	X	X	X	X	X	X
1983	X	X	X		X	X	X	X	X	X	X	X
1984	X	X	X	X	X	X	X	X	X	X	X	X
1985	X	X	X	X	X	X	X	X	X	X	X	X
1986	X	X	X	X	X	X	X	X	X	X	X	X
1987	X	X	X	X	X	X	X	X	X	X	X	X
1988	X	X	X									

The monthly hunt reports for the Cooper Jagklub were almost continuous for the period October 1976 to March 1988, except for two months (December 1979 and April 1983) that were missing (Table 3.1).

Table 3.2 Monthly hunt reports for the Mosselbaai Sentrale Jagklub (October 1976 to May 1992); blanks represent the months for which no hunt reports are available

Year	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976										X	X	X
1977	X		X	X	X	X	X	X	X	X	X	X
1978	X	X	X	X	X	X	X	X	X	X	X	X
1979	X	X	X	X	X	X	X	X	X	X	X	
1980		X	X	X	X	X	X	X	X	X	X	X
1981		X	X	X	X	X	X	X	X	X	X	X
1982	X	X	X	X	X	X	X	X	X	X	X	X
1983			X	X	X	X	X	X	X	X	X	X
1984	X	X	X	X	X	X	X	X	X	X	X	
1985	X		X	X	X	X	X	X	X	X	X	X
1986	X	X	X	X	X	X						
1987	X	X	X		X	X	X	X	X	X	X	
1988		X	X	X	X	X	X	X	X	X	X	X
1989				X	X	X	X		X	X	X	
1990	X	X	X	X	X	X	X	X	X			
1991				X	X	X	X	X	X	X		
1992				X	X							

For the Mosselbaai Sentrale Jagklub (Table 3.2) many more monthly hunt reports were missing than for the Cooper Jagklub (Table 3.1). From October 1976 to June 1986 (Table 3.2) eight monthly hunt reports were missing. In January 1987 a new problem animal hunter (designated as PAH 3) was appointed by the Mosselbaai Sentrale Jagklub. Therefore, the absence of monthly hunt reports for the period July to December 1986 may be ascribed to the fact that the problem animal hunter previously employed (designated as PAH 2) had already vacated his post in July 1986 and no monthly reports were submitted during this period. A total of 46 monthly hunt reports were retrieved for the period January 1987 to May 1992, while 19 monthly hunt reports were missing.

Each monthly hunt report contains data as described previously (see section 2.2). In brief, it was possible to capture electronically the handwritten data contained in each monthly hunt record. This dataset was used to create maps allowing all the data from a specific period (be it a year or a month) to be viewed together in one map. This process greatly simplified analysis of the data and subsequent interpretation of results.

The focus of the present study was on reports concerning small stock losses caused by caracal and black-backed jackal and the killing of these two predator species during control operations. Therefore, although the maps and tables presented in this chapter include incidences where other predators were involved, such data were not analysed and interpreted in detail.

The monthly hunt reports listed 132 farms on which predation were reported. Several factors obscured the identification of farms:

- The geographic maps contain the names and/or numbers of only certain farms.
- A considerable number of farms have been subdivided into smaller units, each with a different name and number.
- Several farms within the study area appeared to have the same name.
- The monthly hunt records in the database contain only the farm name and the name of the owner, with no other information such as farm number.

It was thus possible to positively identify 61 of the 132 farms, while another 43 farms were identified to a lesser degree of certainty because of the factors mentioned previously. Twenty eight (28) of the farms named in the monthly hunt reports could not be identified and, therefore, the associated records for the relevant data could also not be analysed and shown on maps. However, these cases were in the minority. Only 88 of the 2 585 records in the database (or a mere 0.03%) could not be analysed and interpreted with the aid of maps and were ignored.

Longitudinal and latitudinal coordinates were logged for each of the farms that could be identified (see section 2.3.1). The two coordinates were used as the necessary links to identify and display the basic data from historical monthly hunt reports in the GIS environment.

It was thus possible to analyse 2 497 records from the total data sets for the two problem animal control clubs (or hunt clubs). For an overview, the data of the Cooper Jagklub and the Mosselbaai Sentrale Jagklub were pooled and used to generate two maps for the period 1976 to 1992 respectively, showing the geographic and spatial distribution of:

- the activities relating to reports of predation on livestock (Figure 3.1)
- the predators killed during the predator control operations (Figure 3.2).

It is important to note that the size or the diameter of the circles presented in Figure 3.1 and Figure 3.2 relates to the number of livestock predated (Figure 3.1) or predators killed (Figure

3.2). Some of the circles in these figures overlap because of the close proximity of coordinates of farms where incidents were reported.

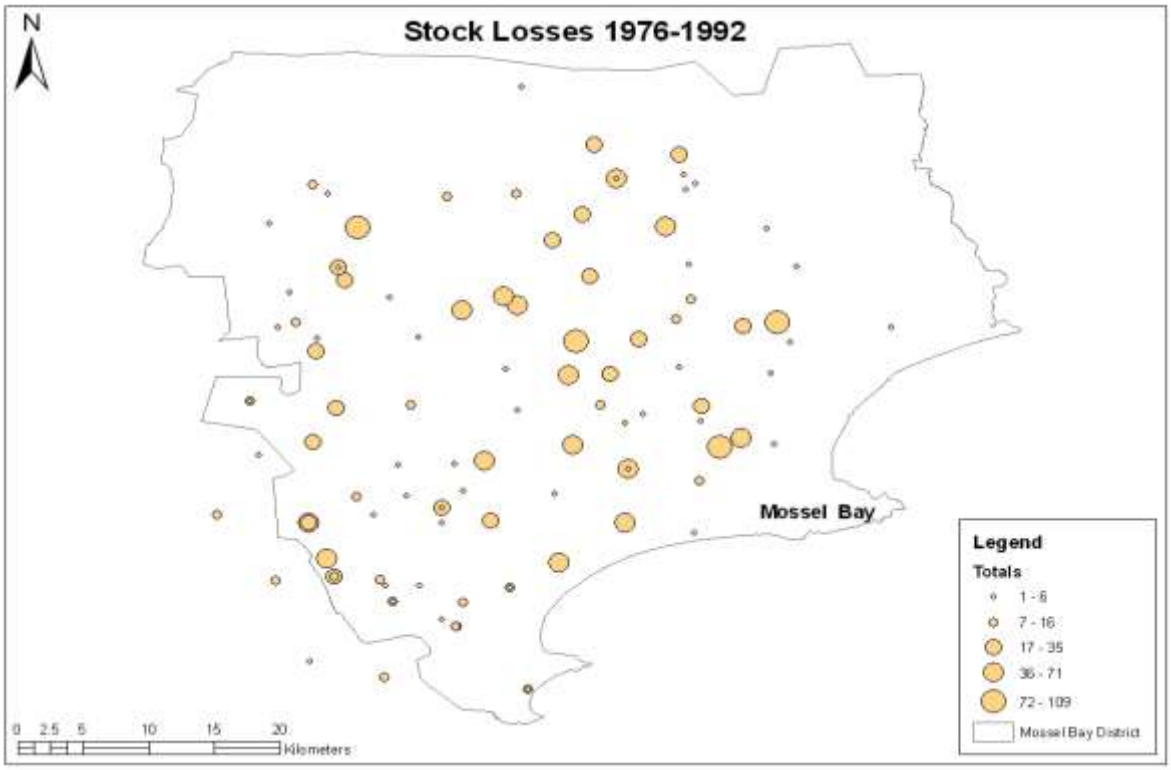


Figure 3.1 Stock losses due to predation reported by the Cooper Jagklub and the Mosselbaai Sentrale Jagklub in the Mossel Bay district, 1976 to 1992.

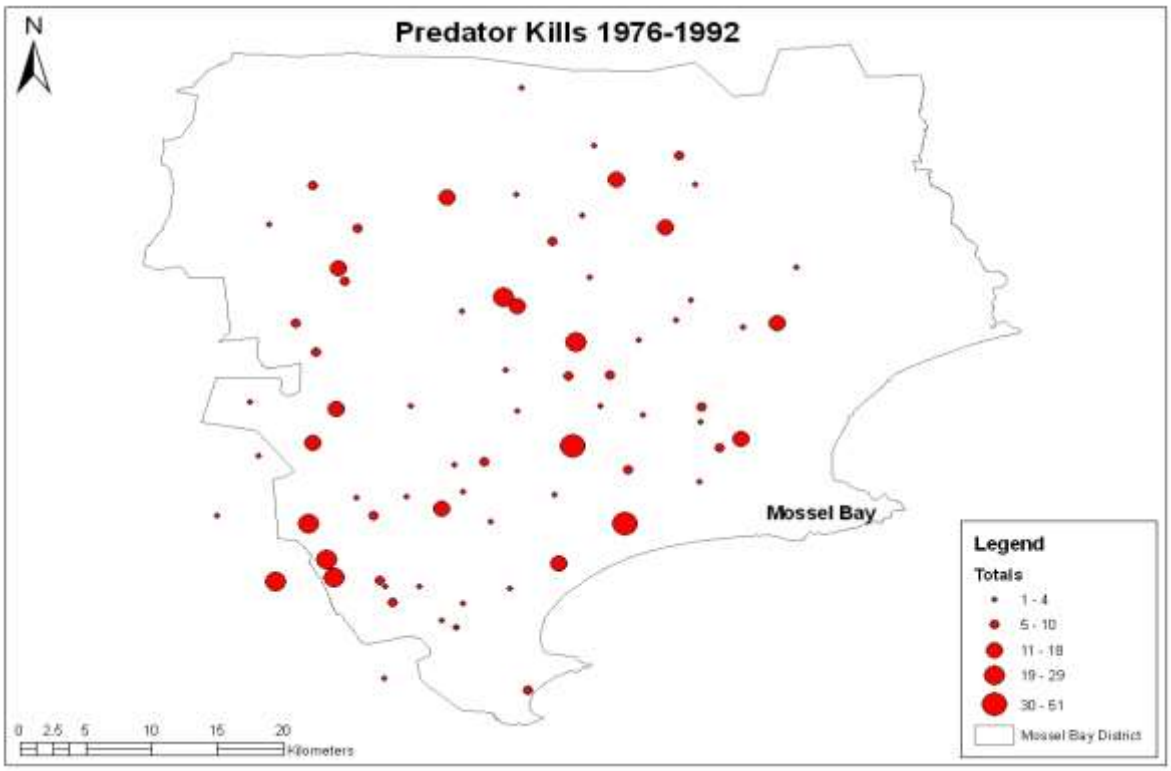


Figure 3.2 Predators killed in control operations conducted by the Cooper Jagklub and the Mosselbaai Sentrale Jagklub in the Mossel Bay district, 1976 to 1992.

With regard to predation and predator control activities, the following areas in the Mossel Bay district are notably absent, as shown in Figure 3.1 and 3.2: the north-western corner of the district, extending along the northern and eastern borders of the district, and the along the coast to the southernmost tip of the district. The absence of activities in these areas can be explained as follows:

- Mountainous terrain such as that found in the extreme northern and north-western parts of the district is not suitable for hunting, which may be the reason for hunt clubs not operating there.
- Urban areas cover most of the coastline, and therefore the problem animal control clubs did not operate there.
- The borders of the area in which the Mosselbaai Sentrale Jagklub operated were also not clear and neither were those of the adjacent hunt clubs. It is thus also possible that the area along the eastern border of the district fell outside the borders of the Mosselbaai Sentrale Jagklub.

The two presentations show the extensive scale of predation on livestock and predators killed in the study area. Each incident recorded on a farm is linked to exactly the same two arbitrary coordinates (linked to the farm name but which may not have been the exact spot where the incident occurred). The data used in the presentations also cover fairly long timeframes. Thus, it is not possible to detect cause and result in terms of predation and predators killed.

The next step was to analyse the data on a yearly basis for the total study period. Thus, a total of 32 maps were generated from the datasets, namely two maps each per year for the period 1976 to 1992; these maps are presented in **Appendix 1**. Even at this yearly scale of analysis it was still not possible to differentiate between cause and results in terms of predation and predators killed. Therefore, it was decided to limit the number of years for further analysis of the data at a monthly interval.

3.2 Monthly hunt reports for the period 1985 to 1987

Based on the previous discussion, a limited selection was made of the three years as detailed below.

Visual evaluation of the maps showed that the highest incidences of predation were reported by both the problem animal control clubs during 1986 and 1987. No monthly hunt reports were

retrieved for the Cooper Jagklub after March 1988 (Table 3.1). Therefore, it was decided to add the preceding year, namely 1985, thus providing a range of three consecutive years in the analysis, namely 1985 to 1987. Furthermore, since there are no monthly hunt reports available for the Mosselbaai Sentrale Jagklub for July to December 1986, comparing the maps generated for this year with those of 1985 (more complete dataset), clearly illustrates the effects of a lack of data on the results, and since different hunters were operating in the Mosselbaai Sentrale Jagklub during 1987, the differences in competence of different hunters could be illustrated.

A total of 72 maps were generated for the period 1985 to 1987 and are presented as Figures 3.3 to 3.74. The 72 figures are consistently presented in pairs, the first figure presenting the situation regarding stock losses reported during a specific month and year, followed by a second figure showing the results regarding predators killed for the same month. Each pair of figures is followed by two or three accompanying tables containing the relevant data. The figures reflect the data obtained from both problem animal control clubs, namely the Cooper Jagklub and the Mosselbaai Sentrale Jagklub. However, where appropriate, the data in the tables do differentiate between the two hunt clubs.

The attention of the reader is specifically drawn to the format in which these figures and data are presented: it is more practical and meaningful to present these 72 figures and the accompanying tables continuous as a block in the text before specific discussions are presented, starting from page 108.

With regard to the contents of Tables 3.3 to 3.108, the reader should take note of the following general comments:

- Farms that could not be identified are indicated with an asterisk (*).
- The software created to analyse the data was designed to generate a unique farm number (Farm Nr.) for every farm. Thus, confidentiality was maintained with regard to farms and individuals to whom the farms belonged during the period covered by this study and especially their descendents, as well as current owners.
- The hunters were designated as PAH 1, PAH 2, etc. to maintain confidentiality.
- A blank in the “predators killed” tables indicates no data available.
- In the “hunting activities” tables, practice hunts with hounds could not be included. Therefore, blanks associated with hunts in which hounds were used, indicate either that the hunt was a practice hunt, or that it was not specified in the hunt report whether the hunt was a follow-up hunt or a practice hunt.

- In the “hunting activities” tables, blanks associated with cage traps and gin traps indicate incidences where the hunter went out either to set the device, to renew the bait or to reset the device.

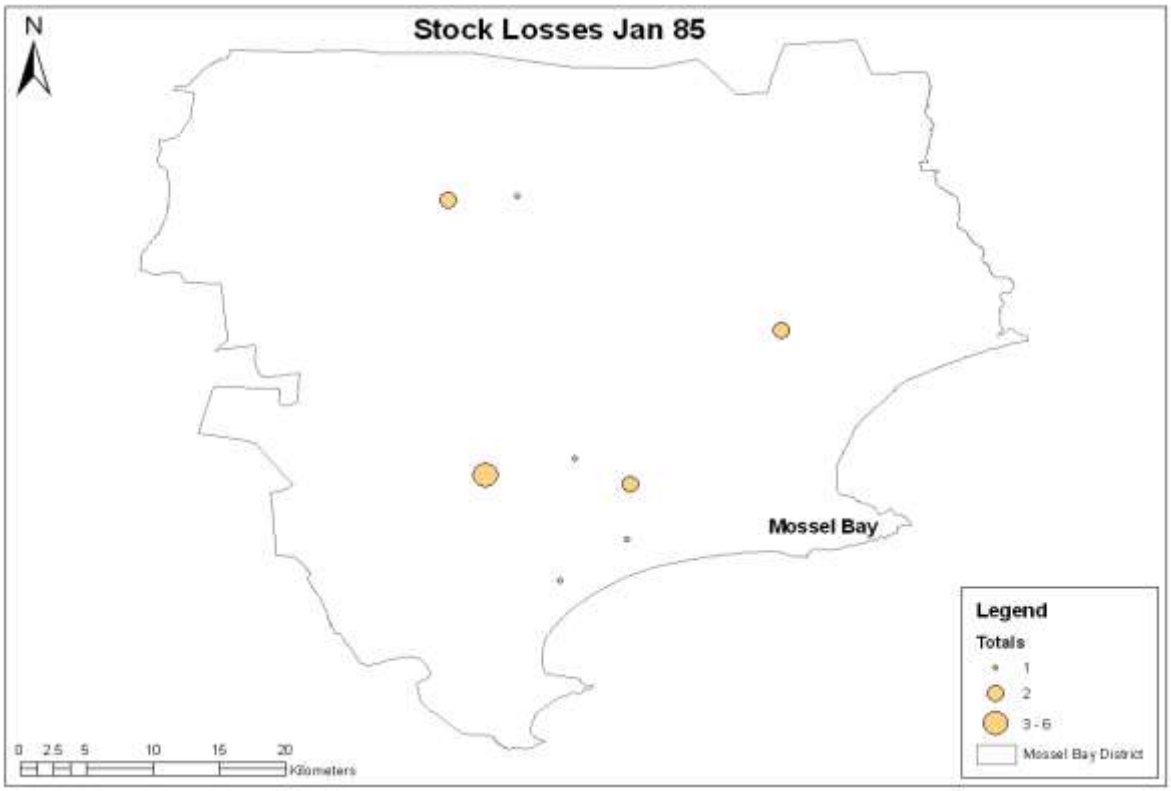


Figure 3.3 Stock losses due to predation reported for January 1985.

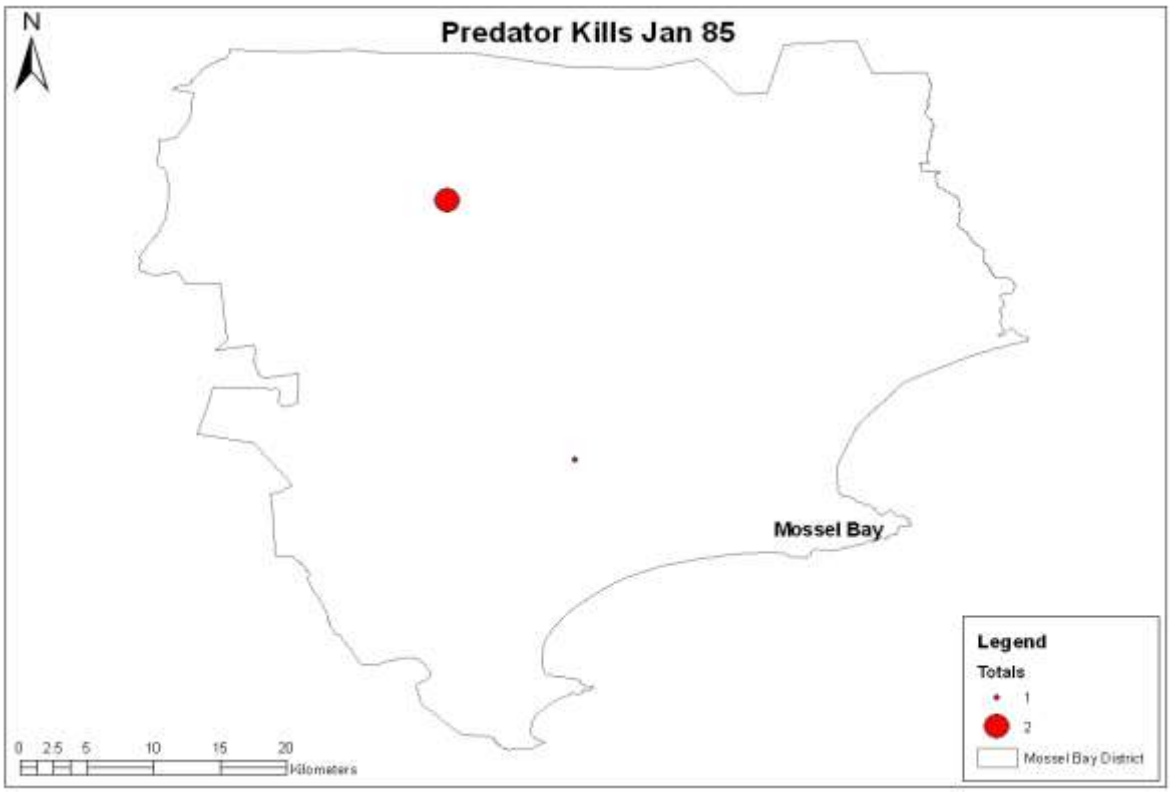


Figure 3.4 Predators killed in control operations reported for January 1985.

Table 3.3 Stock losses reported during January 1985

Farm Nr.	Sheep	Lamb	Dates
5	2	0	1985/01/03
31	0	1	1985/01/22
33	1	0	1985/01/26
63	1	0	1985/01/15
82	2	0	1985/01/20
92	1	0	1985/01/25
103	1	0	1985/01/08
103	0	1	1985/01/18
104	6	0	1985/01/25

Table 3.4 Predators killed in January 1985

Farm Nr.	Predator	Sex	Dates
92	Caracal	Male	1985/01/25
103	Honey Badger	Female	1985/01/09
103	Caracal	Male	1985/01/19

Table 3.5 Hunting activities of both problem animal control clubs in January 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Cage		1985/01/03
5	Cooper	PH 1	Cage	No	1985/01/05
25	Cooper	PH 1	Cage	No	1985/01/11
25	Cooper	PH 1	Cage	No	1985/01/24
31	Cooper	PH 1	Trap		1985/01/22
33	MBSen	PH 2	Hounds	No	1985/01/26
63	Cooper	PH 1	Cage		1985/01/15
82	MBSen	PH 2	Hounds	No	1985/01/20
82	MBSen	PH 2	Hounds	No	1985/01/21
92	Cooper	PH 1	Trap	Yes	1985/01/25
103	Cooper	PH 1	Cage		1985/01/08
103	Cooper	PH 1	Cage	Yes	1985/01/09
103	Cooper	PH 1	Cage		1985/01/18
103	Cooper	PH 1	Cage	Yes	1985/01/19
104	Cooper	PH 1	Cage		1985/01/25

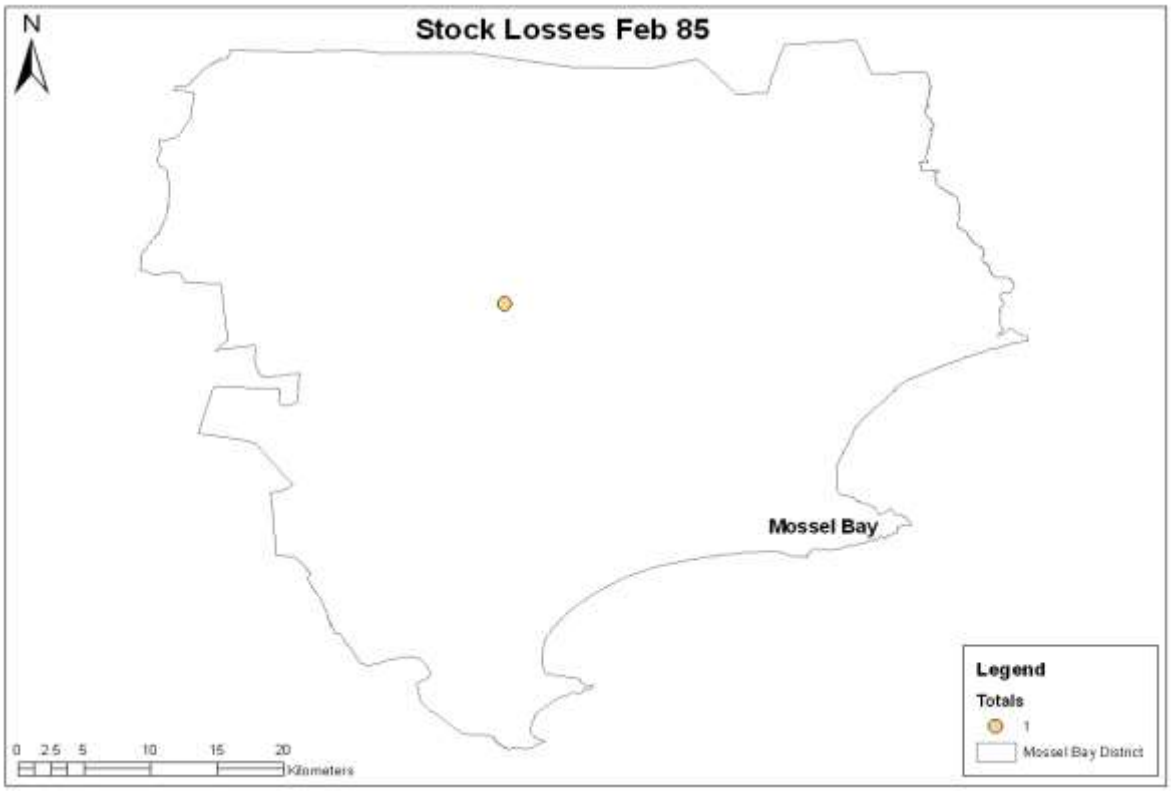


Figure 3.5 Stock losses due to predation reported for February 1985.

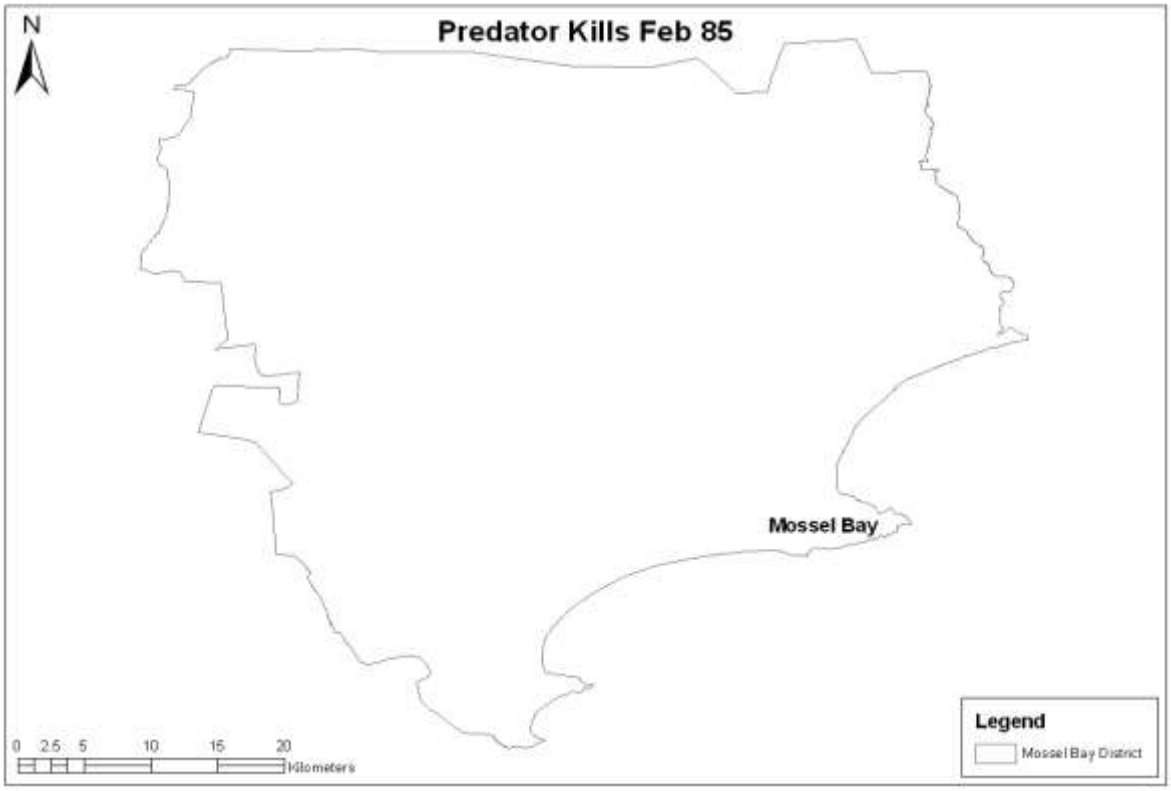


Figure 3.6 Predators killed in control operations reported for February 1985.

Table 3.6 Stock losses reported in February 1985

Farm Nr.	Sheep	Lambs	Dates
134	1	0	1985/02/12

Table 3.7 Hunting activities of both problem animal control clubs in February 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
25	Cooper	PH 1	Cage	No	1985/02/27
31	Cooper	PH 1	Cage	No	1985/02/04
31	Cooper	PH 1	Hounds	No	1985/02/15
63	Cooper	PH 1	Hounds	No	1985/02/20
116	Cooper	PH 1	Hounds		1985/02/06
134	Cooper	PH 1	Hounds		1985/02/12
134	Cooper	PH 1	Hounds	No	1985/02/21
134	Cooper	PH 1	Hounds	No	1985/02/25

Note:

No predators were killed by either of the two problem animal control clubs in February 1985. Therefore, a null map (Figure 3.6) and no report or data table are presented for **Predator Kills Feb 1985**.

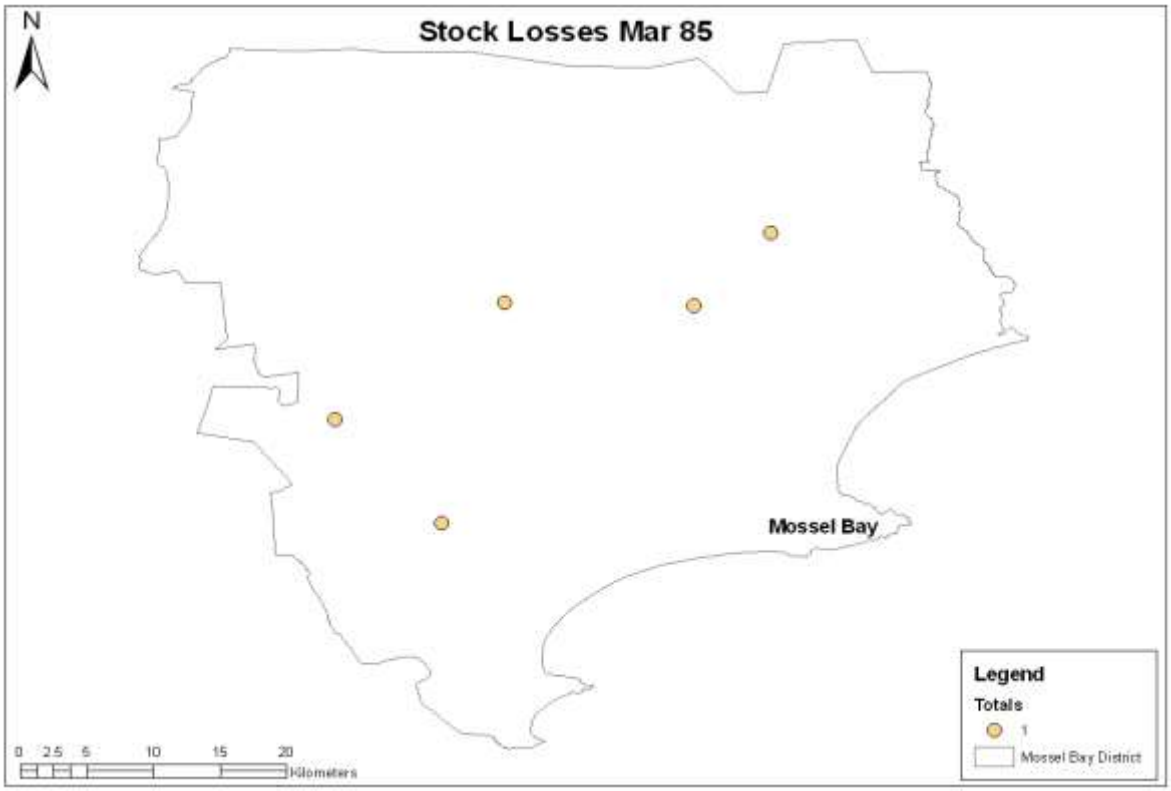


Figure 3.7 Stock losses due to predation reported for March 1985.

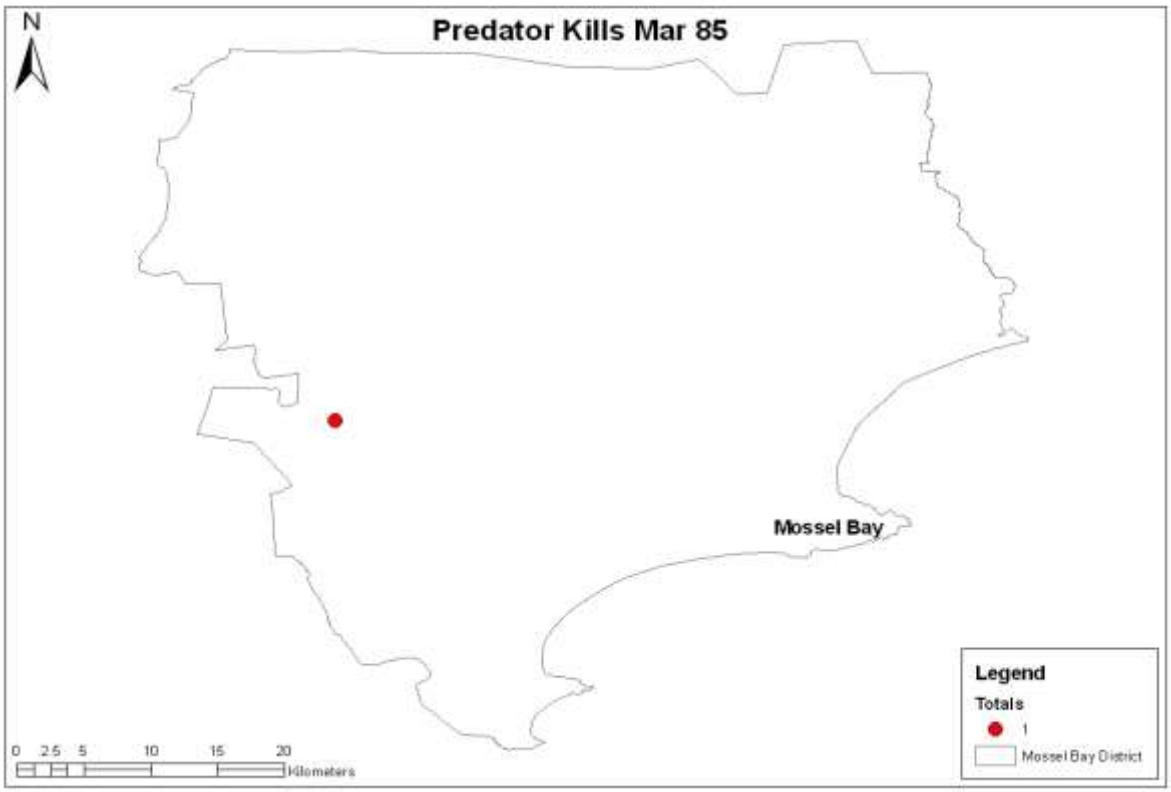


Figure 3.8 Predators killed in control operations reported for March 1985.

Table 3.8 Stock losses reported in March 1985

Farm Nr.	Sheep	Lamb	Dates
75	0	1	1985/03/27
82	0	1	1985/03/18
113	0	1	1985/03/21
130	0	1	1985/03/12
134	1	0	1985/03/06

Table 3.9 Predators killed in March 1985

Farm Nr.	Predator	Sex	Dates
75	Caracal	Male	1985/03/27

Table 3.10 Hunting activities of both problem animal control clubs in March 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
25	Cooper	PH 1	Cage	No	1985/03/08
31	Cooper	PH 1	Cage	No	1985/03/05
31	Cooper	PH 1	Hounds	No	1985/03/22
53	Cooper	PH 1	Hounds		1985/03/25
58	MBSen	PH 2	Hounds		1985/03/20
75	Cooper	PH 1	Cage	Yes	1985/03/27
82	MBSen	PH 2	Hounds	No	1985/03/18
113	MBSen	PH 2	Hounds	No	1985/03/21
130	Cooper	PH 1	Trap		1985/03/12
130	Cooper	PH 1	Hounds	No	1985/03/13
130	Cooper	PH 1	Cage		1985/03/14
134	MBSen	PH 2	Hounds	No	1985/03/06
134	MBSen	PH 2	Hounds	No	1985/03/07
134	Cooper	PH 1	Cage		1985/03/11

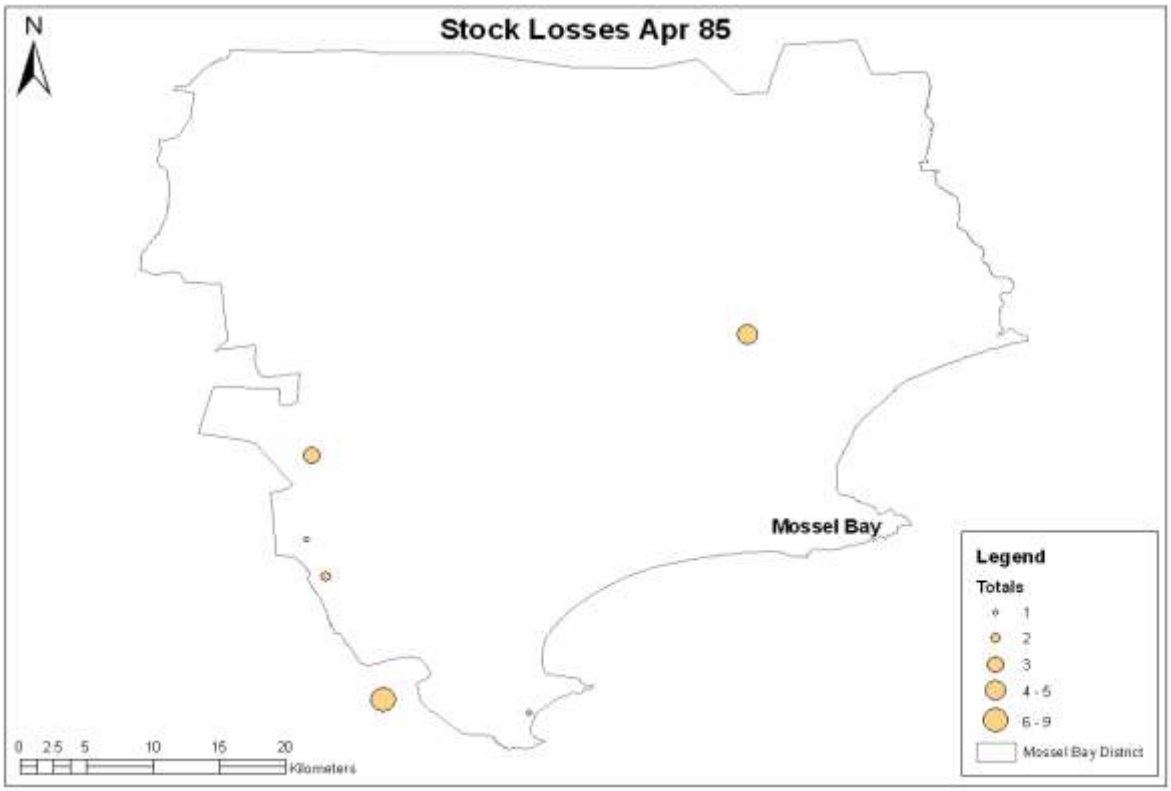


Figure 3.9 Stock losses due to predation reported for April 1985.

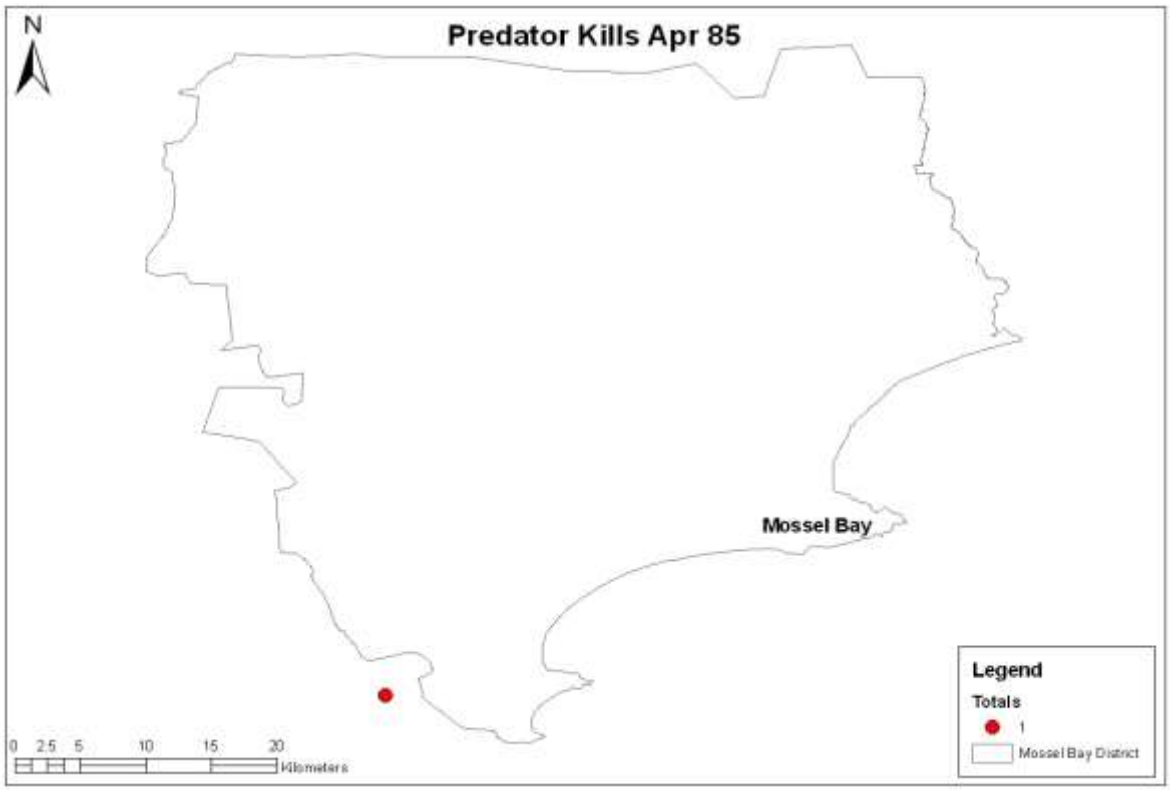


Figure 3.10 Predators killed in control operations reported for April 1985.

Table 3.11 Stock losses reported in April 1985

Farm Nr.	Sheep	Lamb	Angora	Dates
10	0	2	0	1985/04/15
10	0	1	0	1985/04/26
22	0	5	0	1985/04/23
39	0	0	1	1985/04/22
74	0	9	0	1985/04/09
80	0	1	0	1985/04/23
116	1	0	0	1985/04/20
116	1	0	0	1985/04/24

Table 3.12 Predators killed in April 1985

Farm Nr.	Predator	Sex	Date
74	Caracal	Female	1985/04/10

Table 3.13 Hunting activities of both problem animal control clubs in March 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Cage		1985/04/15
10	Cooper	PH 1	Hounds	No	1985/04/26
10	Cooper	PH 1	Hounds	No	1985/04/29
22	MBSen	PH 2	Hounds	No	1985/04/23
22	MBSen	PH 2	Hounds	No	1985/04/24
39	MBSen	PH 2	Hounds	No	1985/04/22
63	Cooper	PH 1	Hounds		1985/04/02
74	Cooper	PH 1	Trap		1985/04/09
74	Cooper	PH 1	Trap	Yes	1985/04/10
80	Cooper	PH 1	Hounds	No	1985/04/23
116	Cooper	PH 1	Hounds	No	1985/04/17
116	Cooper	PH 1	Hounds	No	1985/04/20
116	Cooper	PH 1	Cage		1985/04/20
116	Cooper	PH 1	Cage		1985/04/24
130	Cooper	PH 1	Cage	No	1985/04/03

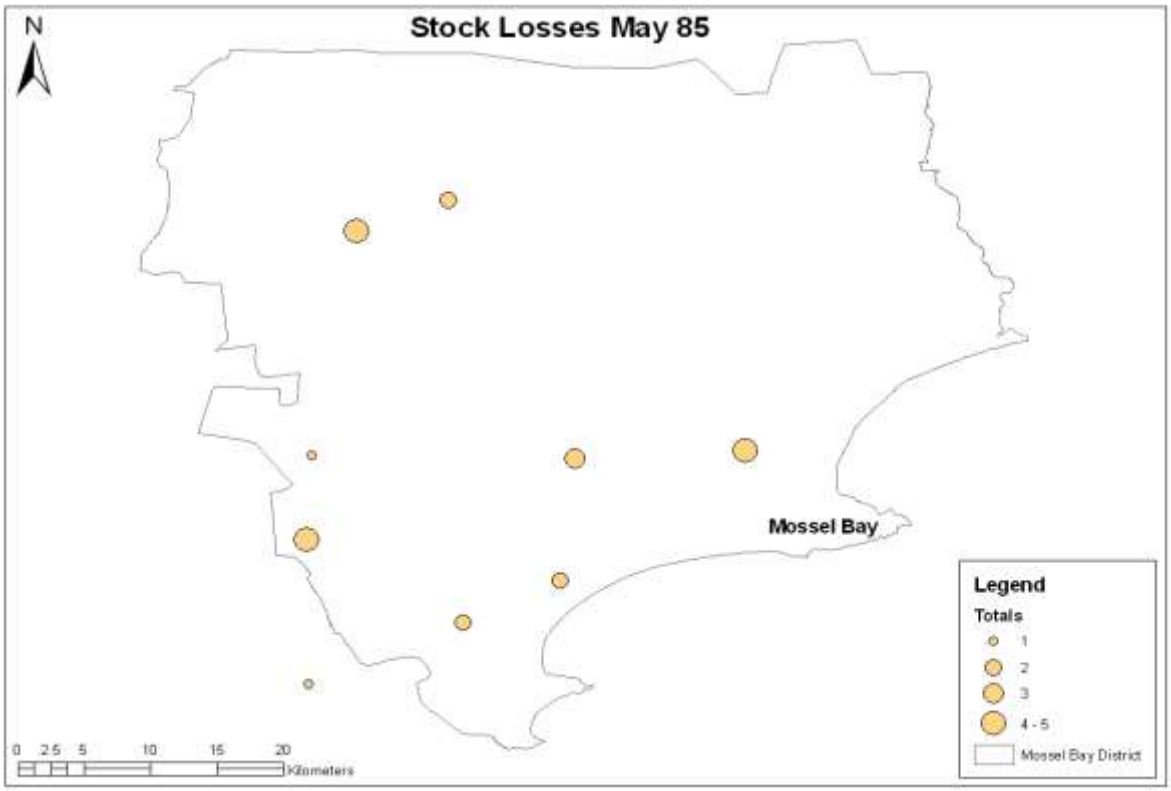


Figure 3.11 Stock losses due to predation reported for May 1985.

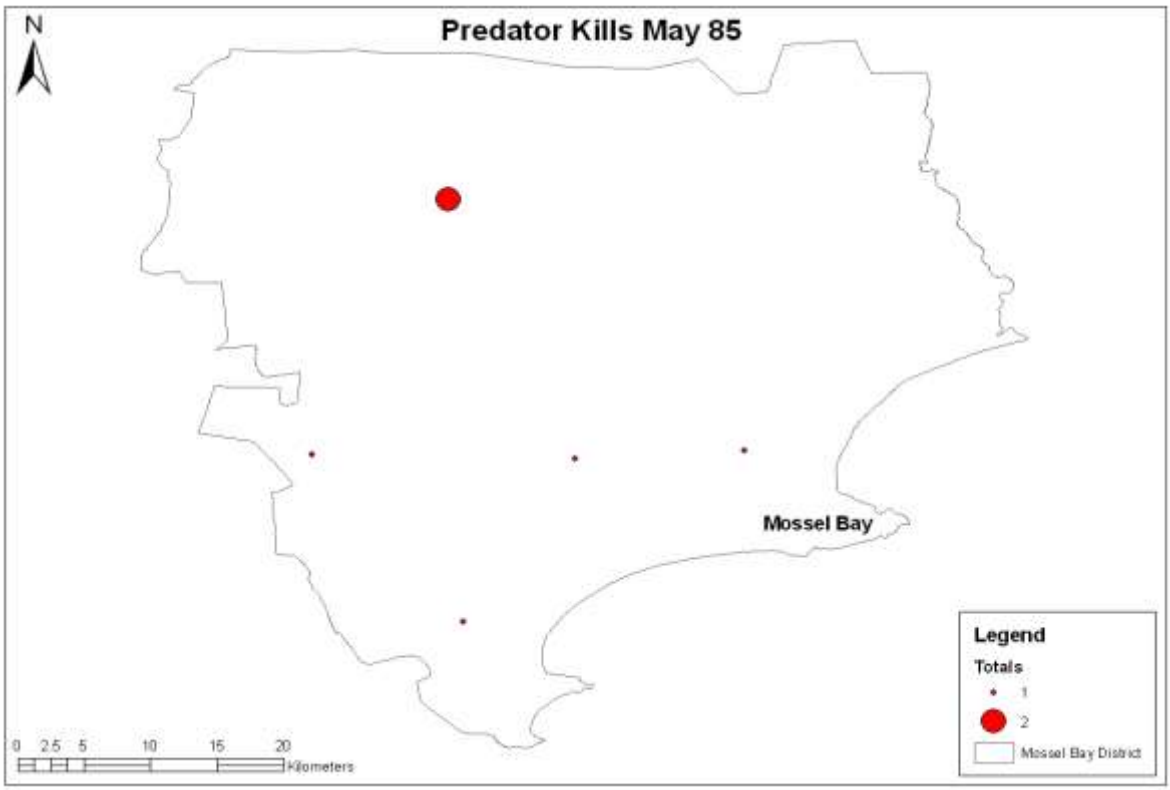


Figure 3.12 Predators killed in control operations reported for May 1985.

Table 3.14 Stock losses reported in May 1985

Farm Nr.	Sheep	Lamb	Dates
10	0	1	1985/05/06
39	0	4	1985/05/29
#54	0	0	1985/05/18
63	2	0	1985/05/07
64	3	0	1985/05/23
64	1	0	1985/05/30
69	0	5	1985/05/15
92	0	1	1985/05/10
92	0	2	1985/05/21
103	0	1	1985/05/09
103	0	1	1985/05/28
120	2	0	1985/05/14

#Not a small stock loss but poultry was lost due to predation by otter.

Table 3.15 Predators killed in May 1985

Farm Nr.	Predator	Sex	Dates
10	Caracal	Male	1985/05/06
64	Caracal	Male	1985/05/23
92	Caracal	Male	1985/05/21
103	Caracal	Male	1985/05/09
103	Caracal	Male	1985/05/28
120	Vagrant dog	Female	1985/05/15

Table 3.16 Hunting activities of both problem animal control clubs in May 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	Yes	1985/05/02
10	Cooper	PH 1	Hounds	No	1985/05/13
31	Cooper	PH 1	Cage	No	1985/05/17
31	Cooper	PH 1	Hounds		1985/05/24
39	MBSen	PH 2	Hounds	No	1985/05/29
53	Cooper	PH 1	Hounds		1985/05/30
54	Cooper	PH 1	Cage		1985/05/18
63	Cooper	PH 1	Cage		1985/05/07
64	MBSen	PH 2	Hounds	Yes	1985/05/23
64	MBSen	PH 2	Hounds	No	1985/05/30
69	MBSen	PH 2	Hounds	No	1985/05/15
69	MBSen	PH 2	Hounds	No	1985/05/22
92	Cooper	PH 1	Hounds	No	1985/05/10
92	Cooper	PH 1	Cage	Yes	1985/05/21
103	Cooper	PH 1	Cage	Yes	1985/05/09
103	Cooper	PH 1	Cage	Yes	1985/05/28
120	Cooper	PH 1	Cage		1985/05/14
120	Cooper	PH 1	Hunt Rifle	Yes	1985/05/15

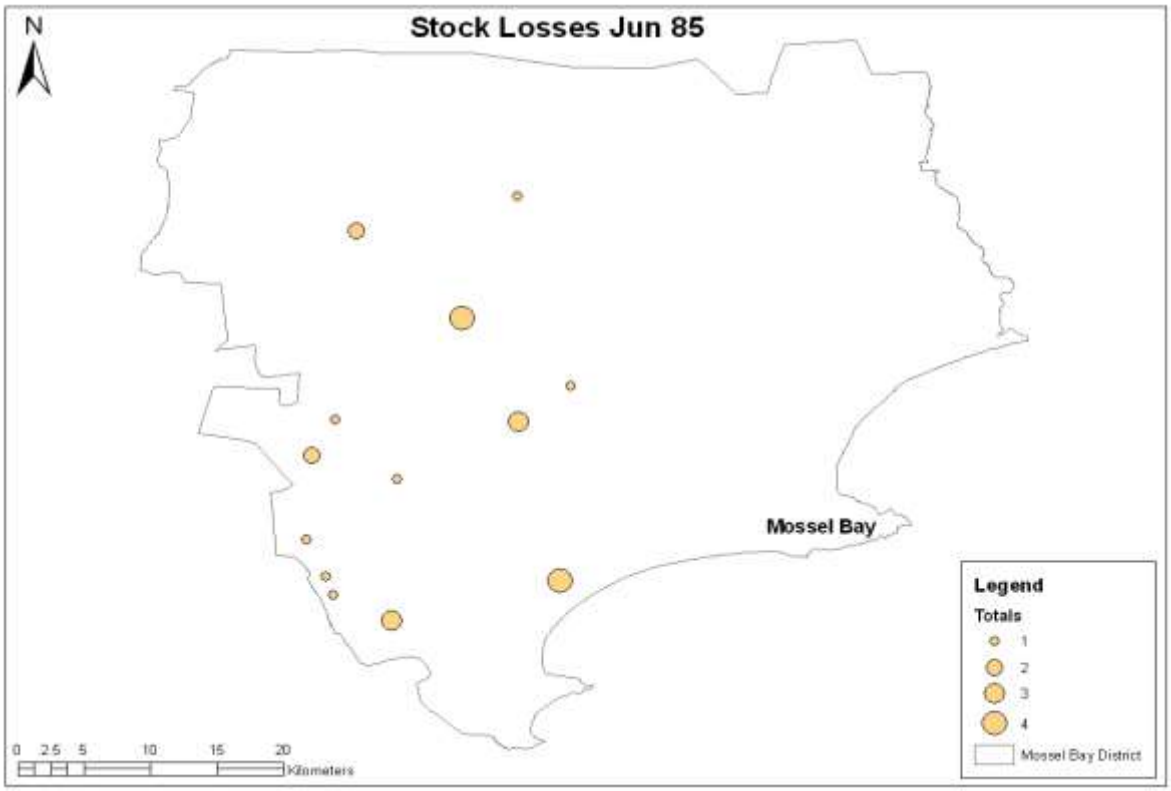


Figure 3.13 Stock losses due to predation reported for June 1985.

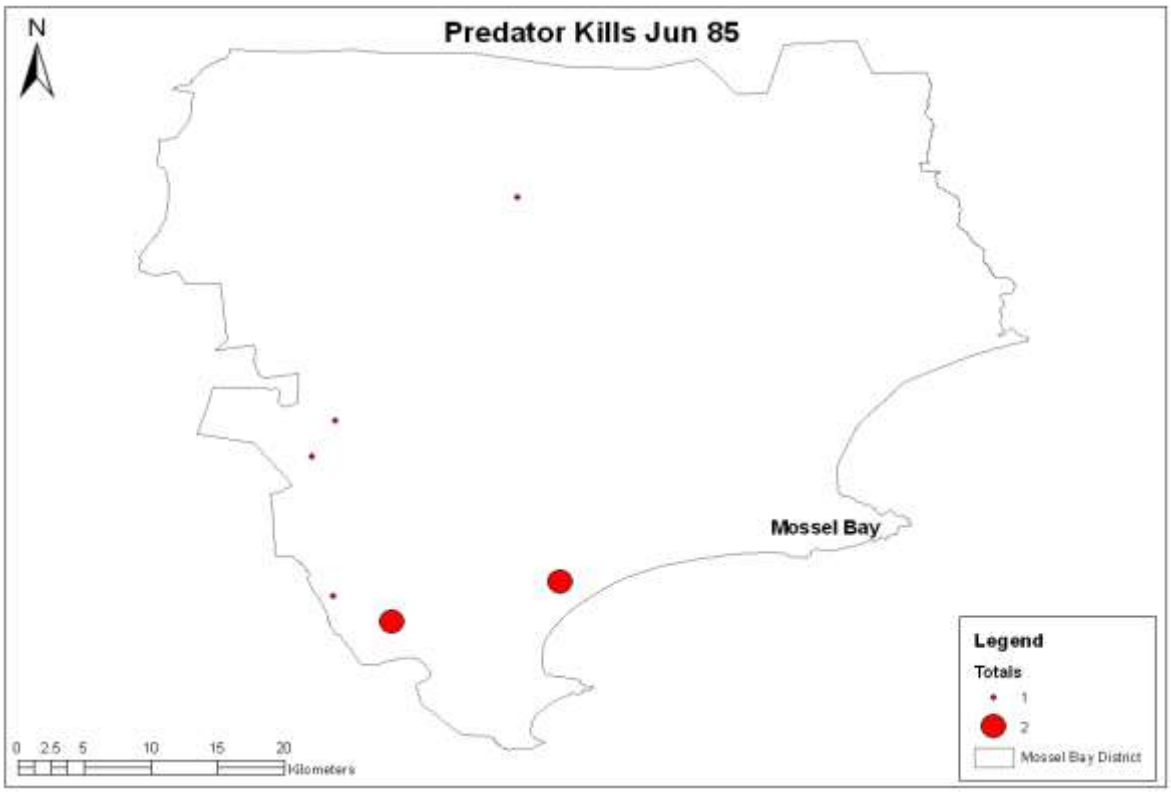


Figure 3.14 Predators killed in control operations reported for June 1985.

Table 3.17 Stock losses reported in June 1985

Farm Nr.	Sheep	Lamb	Angora	Dates
10	0	2	0	1985/06/17
#25	0	0	0	1985/06/22
30	0	1	0	1985/06/04
33	0	1	0	1985/06/28
39	0	0	1	1985/06/03
51	0	2	0	1985/06/17
51	0	2	0	1985/06/28
63	1	0	0	1985/06/08
63	1	0	0	1985/06/10
63	0	1	0	1985/06/13
63	0	1	0	1985/06/14
69	0	2	0	1985/06/02
75	1	0	0	1985/06/21
116	0	1	0	1985/06/03
121	2	0	0	1985/06/19
121	0	0	0	1985/06/20
121	1	0	0	1985/06/25
135	0	3	0	1985/06/16
#137	0	0	0	1985/06/29

#Not small stock losses. Farm Nr. 25: a grysbok was reported to have been killed by caracal. Farm Nr. 137: a calf was reported lost due to predation by otter.

Table 3.18 Predators killed in June 1985

Farm Nr.	Predator	Sex	Dates
10	Otter	Male	1985/06/17
25	Caracal	Female	1985/06/22
33	Caracal	Female	1985/06/28
63	Caracal	Male	1985/06/10
63	Caracal	Female	1985/06/14
75	Caracal	Male	1985/06/21
121	Water Mongoose	Male	1985/06/20
121	Honey Badger	Female	1985/06/25

Table 3.19 Hunting activities of both problem animal control clubs in June 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Cage	Yes	1985/06/17
25	Cooper	PH 1	Trap	Yes	1985/06/22
30	MBSen	PH 2	Hounds	No	1985/06/04
31	Cooper	PH 1	Cage	No	1985/06/06
31	Cooper	PH 1	Hounds		1985/06/12
33	Cooper	PH 1	Hounds	Yes	1985/06/28
39	MBSen	PH 2	Hounds	No	1985/06/03
51	MBSen	PH 2	Hounds	No	1985/06/17
51	MBSen	PH 2	Hounds	No	1985/06/28
51	MBSen	PH 2	Hounds	No	1985/06/29
63	Cooper	PH 1	Hounds	No	1985/06/08
63	Cooper	PH 1	Hounds	Yes	1985/06/10
63	Cooper	PH 1	Hounds	No	1985/06/13
63	Cooper	PH 1	Hounds	Yes	1985/06/14
69	MBSen	PH 2	Hounds	No	1985/06/02
69	MBSen	PH 2	Hounds	No	1985/06/08
75	Cooper	PH 1	Hounds	Yes	1985/06/21
116	Cooper	PH 1	Hounds	No	1985/06/03
121	Cooper	PH 1	Cage		1985/06/19
121	Cooper	PH 1	Hounds	Yes	1985/06/20
121	Cooper	PH 1	Cage	Yes	1985/06/25
135	MBSen	PH 2	Hounds	No	1985/06/16
135	MBSen	PH 2	Hounds	No	1985/06/18
137	Cooper	PH 1	Hounds	No	1985/06/29

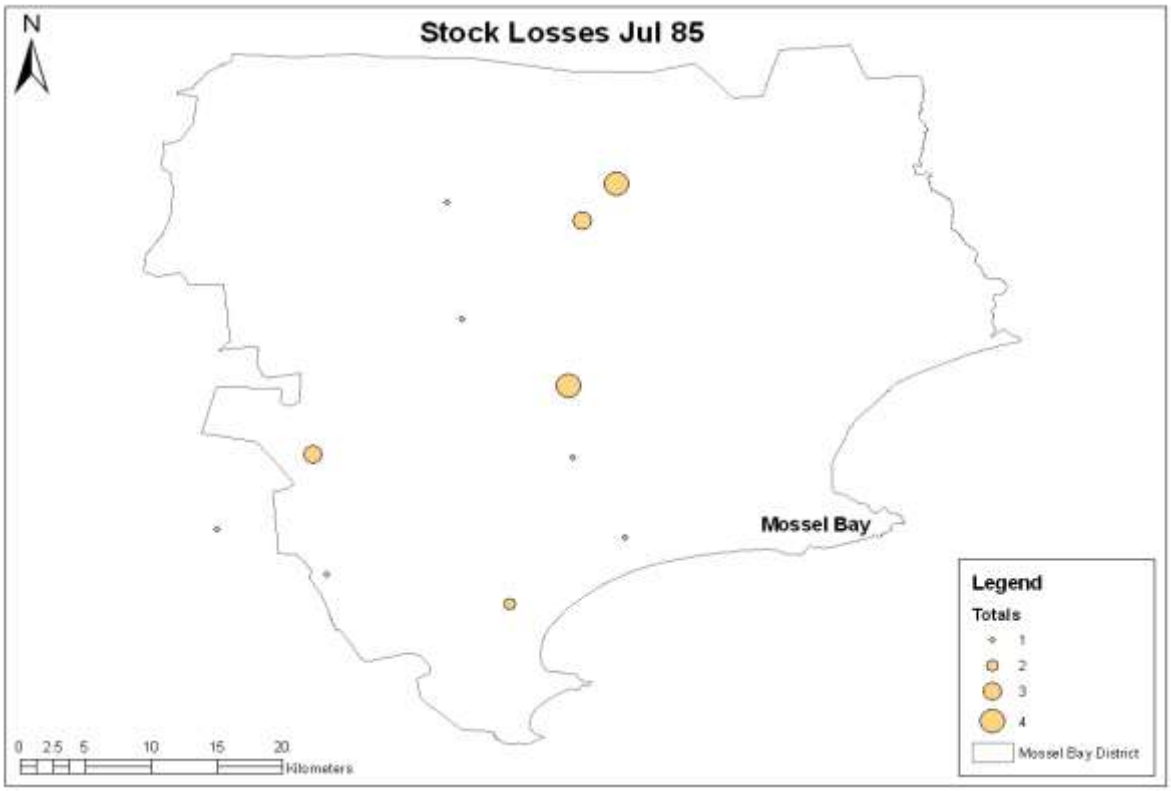


Figure 3.15 Stock losses due to predation reported for July 1985.

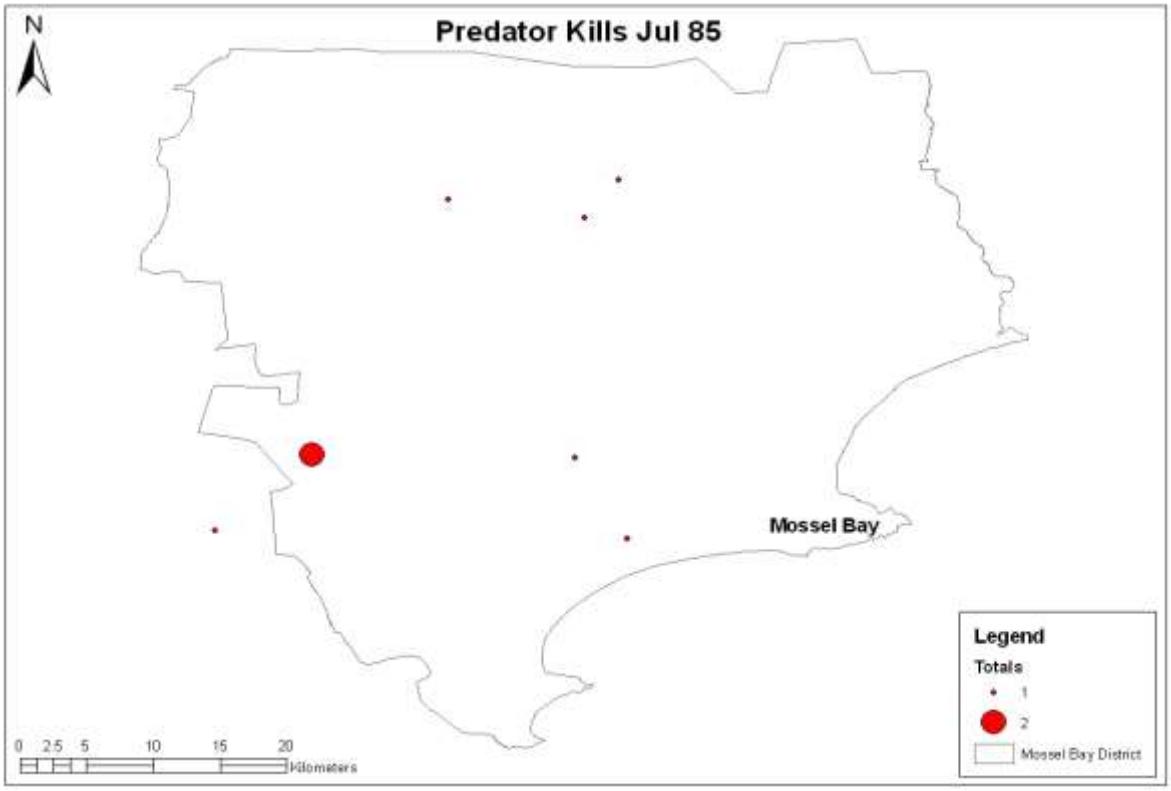


Figure 3.16 Predators killed in control operations reported for July 1985.

Table 3.20 Stock losses reported in July 1985

Farm Nr..	Sheep	Lamb	Dates
10	0	2	1985/07/01
10	1	0	1985/07/02
21	0	2	1985/07/23
30	0	1	1985/07/09
30	0	3	1985/07/24
31	0	1	1985/07/22
45	2	0	1985/07/01
45	1	0	1985/07/03
51	0	1	1985/07/12
*60	0	2	1985/07/02
67	0	4	1985/07/10
92	0	1	1985/07/30
103	1	0	1985/07/16
116	0	1	1985/07/31
127	0	1	1985/07/12

*Farm Nr. 60 could not be identified and is not illustrated in the map.

Table 3.21 Predators killed in July 1985

Farm Nr.	Predator	Sex	Dates
10	Caracal	Male	1985/07/01
10	Caracal	Female	1985/07/01
31	Caracal	Male	1985/07/22
45	Caracal	Female	1985/07/01
67	Caracal	Male	1985/07/11
92	Caracal	Female	1985/07/30
103	Caracal	Male	1985/07/16
127	Caracal	Female	1985/07/12

Table 3.22 Hunting activities of both problem animal control clubs in July 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	Yes	1985/07/01
10	Cooper	PH 1	Hounds	Yes	1985/07/01
10	Cooper	PH 1	Cage		1985/07/02
21	Cooper	PH 1	Hounds	No	1985/07/23
21	Cooper	PH 1	Hounds	No	1985/07/24
30	MBSen	PH 2	Hounds	No	1985/07/09
30	MBSen	PH 2	Hounds	No	1985/07/24
30	MBSen	PH 2	Hounds	No	1985/07/25
31	Cooper	PH 1	Hounds		1985/07/05
31	Cooper	PH 1	Hounds	Yes	1985/07/22
45	MBSen	PH 2	Hounds	Yes	1985/07/01
45	MBSen	PH 2	Hounds	No	1985/07/03
51	MBSen	PH 2	Hounds	No	1985/07/12
*60	MBSen	PH 2	Hounds	No	1985/07/02
67	MBSen	PH 2	Hounds	No	1985/07/10
67	MBSen	PH 2	Hounds	Yes	1985/07/11
80	Cooper	PH 1	Hounds	No	1985/07/26
92	Cooper	PH 1	Hounds	Yes	1985/07/30
103	Cooper	PH 1	Cage	Yes	1985/07/16
116	Cooper	PH 1	Hounds	No	1985/07/31
127	Cooper	PH 1	Trap	Yes	1985/07/12

*Farm Nr. 60 could not be identified and is not illustrated in the map.

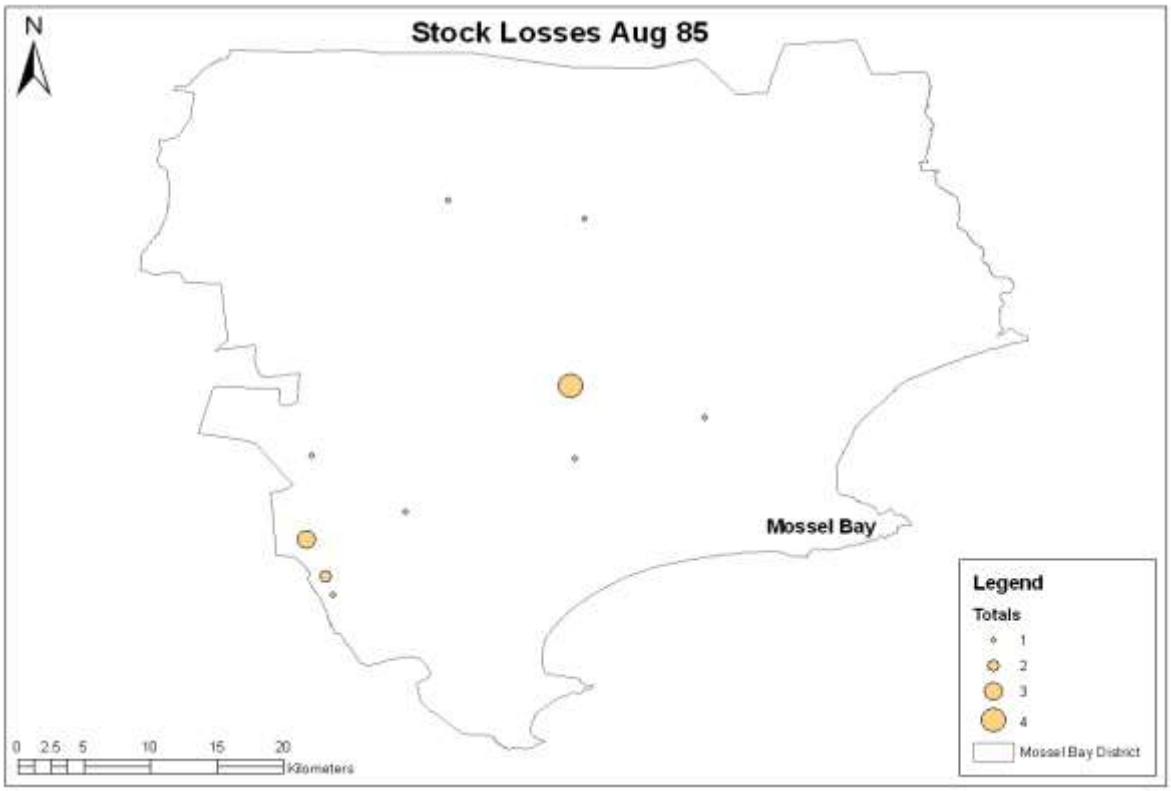


Figure 3.17 Stock losses due to predation reported for August 1985.

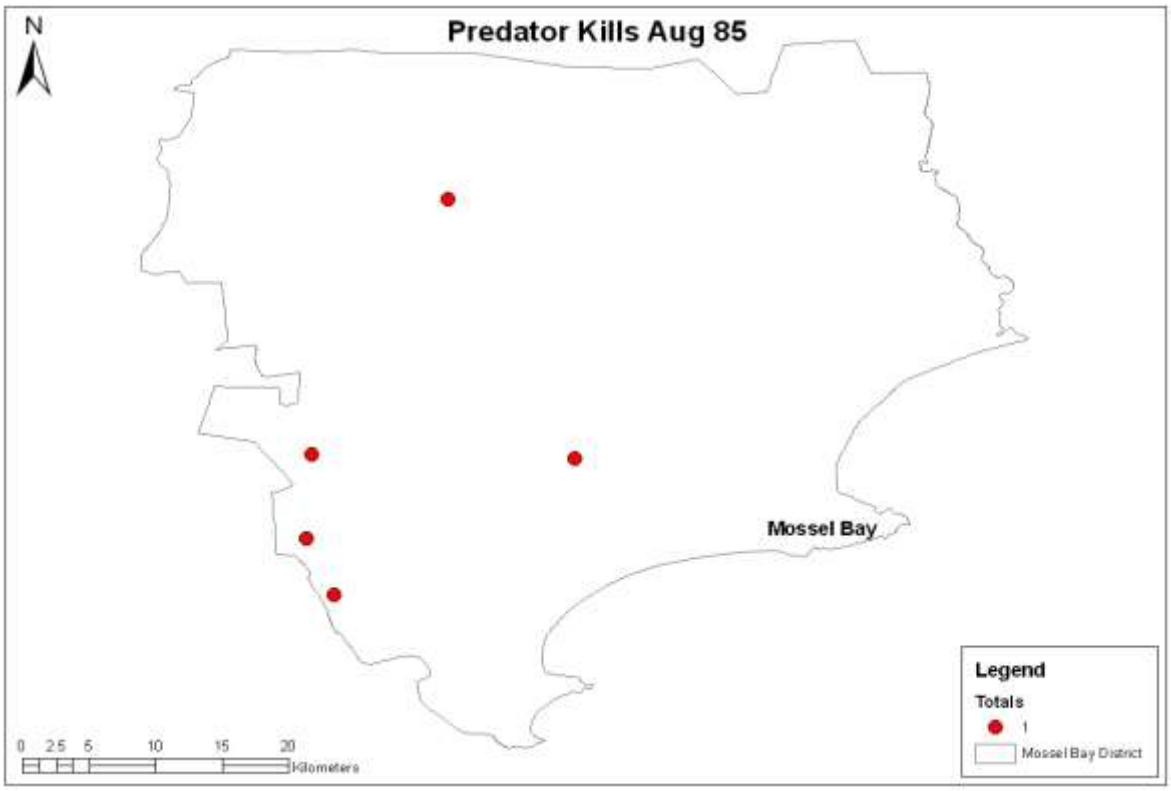


Figure 3.18 Predators killed in control operations reported for August 1985.

Table 3.23 Stock losses reported in August 1985

Farm Nr.	Sheep	Lamb	Dates
10	0	1	1985/08/15
25	0	1	1985/08/08
30	0	3	1985/08/06
30	0	1	1985/08/31
39	0	3	1985/08/09
45	0	1	1985/08/02
92	0	1	1985/08/13
101	0	1	1985/08/20
103	1	0	1985/08/05
116	0	1	1985/08/02
116	1	0	1985/08/03
126	0	1	1985/08/27

Table 3.24 Predators killed in August 1985

Farm Nr.	Predator	Sex	Dates
10	Caracal	Male	1985/08/15
25	Caracal	Male	1985/08/08
39	Caracal	Female	1985/08/09
92	Caracal	Female	1985/08/13
103	Honey Badger	Male	1985/08/05

Table 3.25 Hunting activities of both problem animal control clubs in August 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	Yes	1985/08/15
25	Cooper	PH 1	Cage	Yes	1985/08/08
30	MBSen	PH 2	Hounds	No	1985/08/06
30	MBSen	PH 2	Hounds	No	1985/08/07
30	MBSen	PH 2	Hounds	No	1985/08/08
30	MBSen	PH 2	Hounds	No	1985/08/31
39	MBSen	PH 2	Cage	Yes	1985/08/09
45	MBSen	PH 2	Hounds	No	1985/08/02
45	MBSen	PH 2	Hounds	No	1985/08/05
92	Cooper	PH 1	Hounds	Yes	1985/08/13
101	Cooper	PH 1	Hounds	No	1985/08/20
103	Cooper	PH 1	Cage	Yes	1985/08/05
116	Cooper	PH 1	Hounds	No	1985/08/02
116	Cooper	PH 1	Cage		1985/08/03
126	MBSen	PH 2	Hounds	No	1985/08/27

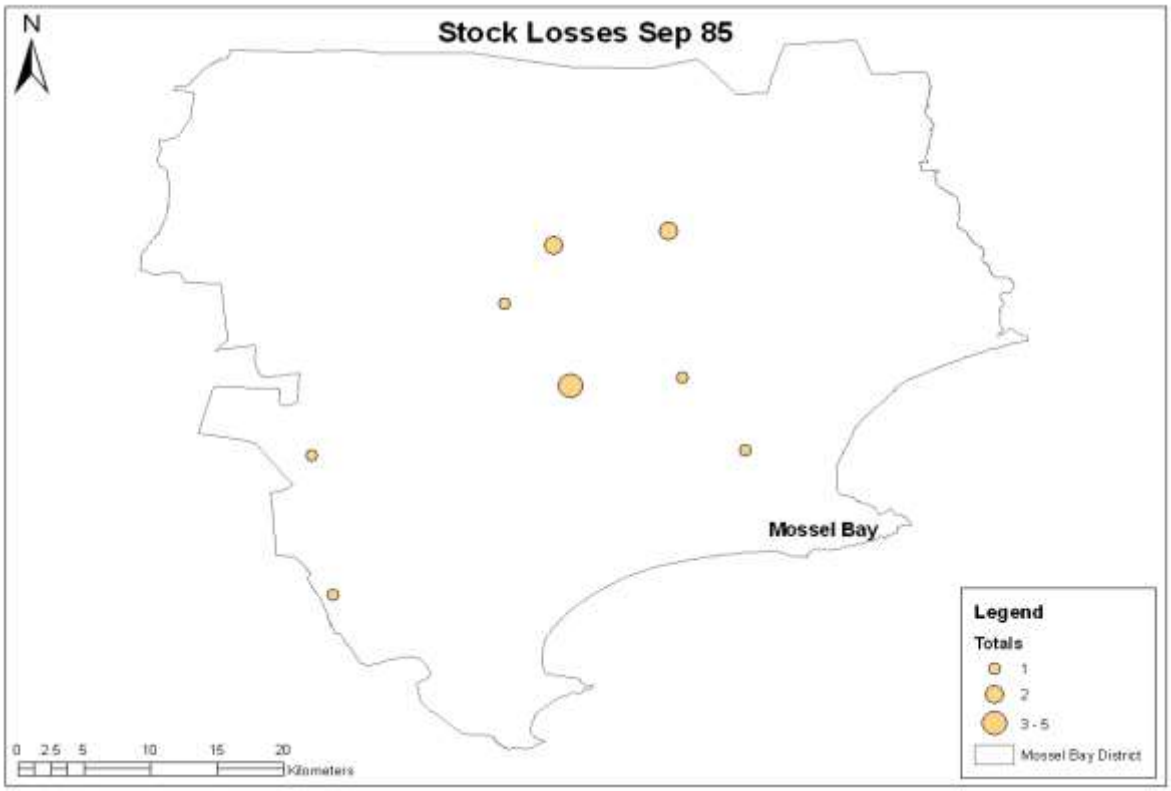


Figure 3.19 Stock losses due to predation reported for September 1985.

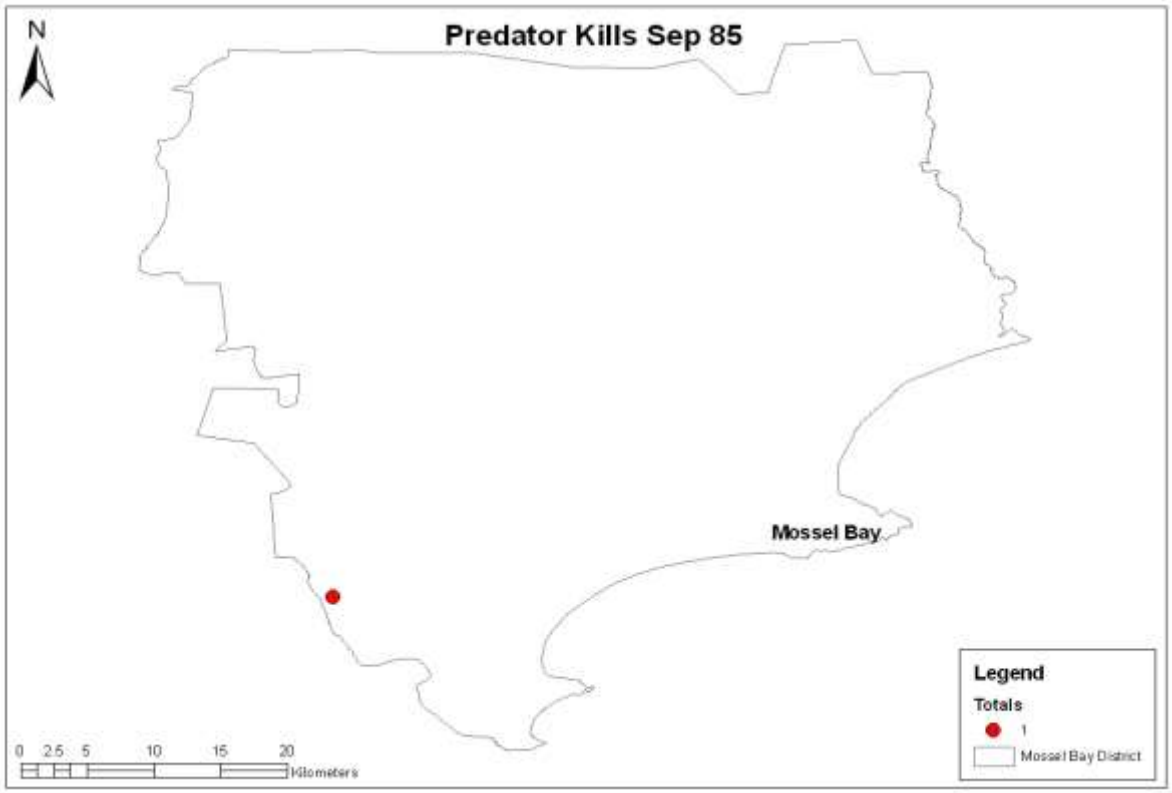


Figure 3.20 Predators killed in control operations reported for September 1985.

Table 3.26 Stock losses reported in September 1985

Farm Nr.	Sheep	Lamb	Dates
10	0	1	1985/09/01
*25	0	0	1985/09/10
30	0	2	1985/09/02
30	0	3	1985/09/10
46	0	1	1985/09/11
62	2	0	1985/09/03
64	1	0	1985/09/23
91	0	1	1985/09/04
91	0	1	1985/09/21
134	1	0	1985/09/14

* No damage to small livestock was experienced, but poultry was lost due to depredation by mongoose.

Table 3.27 Predators killed in September 1985

Farm Nr.	Predator	Sex	Dates
25	Mongoose	Male	1985/09/10

Table 3.28 Hunting activities of both problem animal control clubs in September 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Trap	No	1985/09/02
10	Cooper	PH 1	Cage		1985/09/12
25	Cooper	PH 1	Cage	Yes	1985/09/10
30	MBSen	PH 2	Hounds	No	1985/09/02
30	MBSen	PH 2	Hounds	No	1985/09/05
30	MBSen	PH 2	Hounds	No	1985/09/06
30	MBSen	PH 2	Hounds	No	1985/09/07
30	MBSen	PH 2	Hounds	No	1985/09/09
30	MBSen	PH 2	Hounds	No	1985/09/10
31	Cooper	PH 1	Cage		1985/09/25
46	MBSen	PH 2	Hounds	No	1985/09/11
46	MBSen	PH 2	Hounds	No	1985/09/12
62	MBSen	PH 2	Hounds	No	1985/09/03
63	Cooper	PH 1	Hounds		1985/09/26
64	MBSen	PH 2	Hounds	No	1985/09/23
64	MBSen	PH 2	Hounds	No	1985/09/24
91	MBSen	PH 2	Hounds	No	1985/09/04
91	MBSen	PH 2	Hounds	No	1985/09/21
116	Cooper	PH 1	Cage	No	1985/09/05
116	Cooper	PH 1	Hounds	No	1985/09/17
134	Cooper	PH 1	Cage		1985/09/14

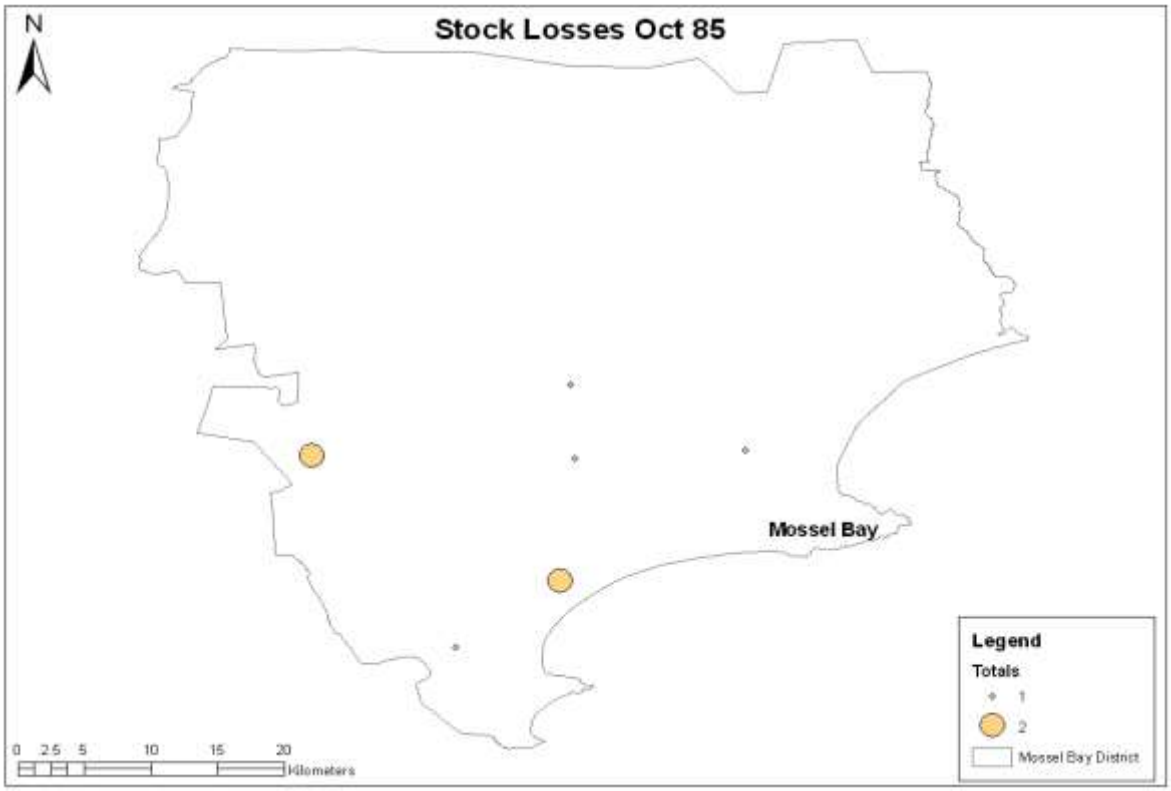


Figure 3.21 Stock losses due to predation reported for October 1985.

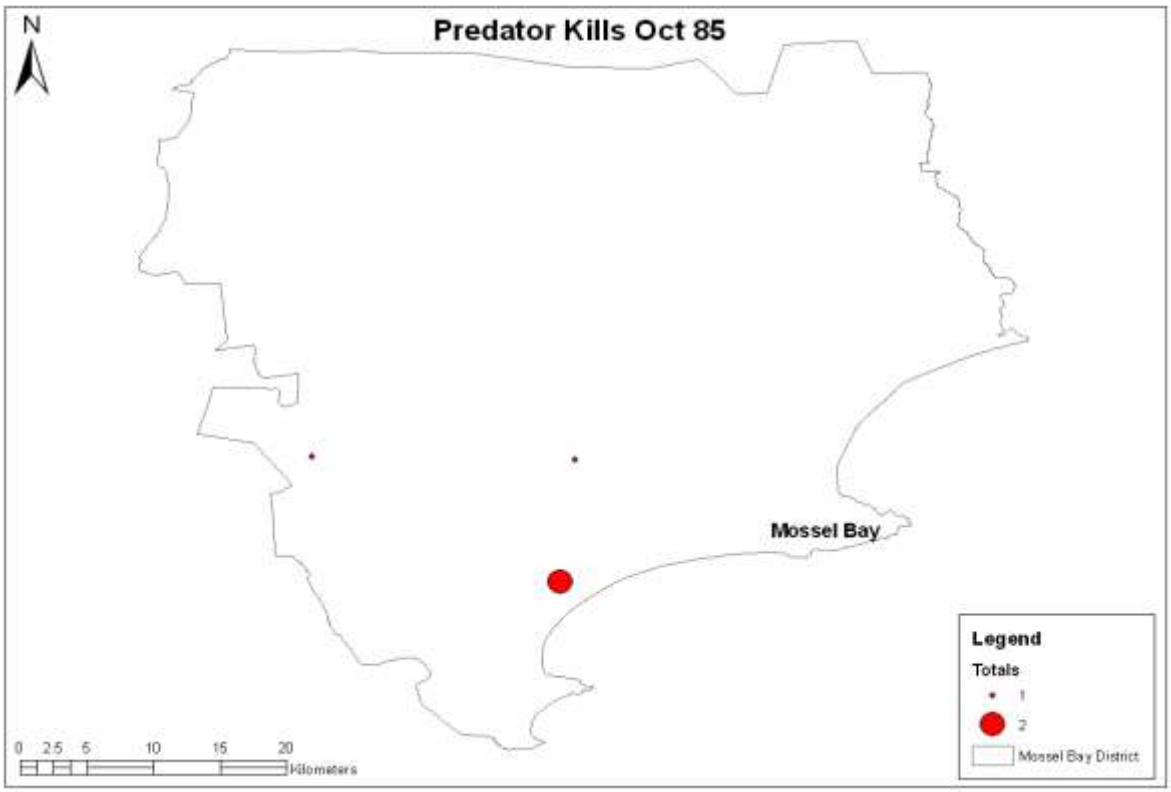


Figure 3.22 Predators killed in control operations reported for October 1985.

Table 3.29 Stock losses reported in October 1985

Farm Nr.	Sheep	Lamb	Dates
10	1	0	1985/10/02
10	0	1	1985/10/25
30	0	1	1985/10/02
63	0	1	1985/10/19
63	0	1	1985/10/21
64	1	0	1985/10/17
87	0	1	1985/10/14
92	0	1	1985/10/11

Table 3.30 Predators killed in October 1985

Farm Nr.	Predator	Sex	Dates
10	Caracal	Female	1985/10/26
63	Caracal	Female	1985/10/19
63	Caracal	Female	1985/10/22
92	Caracal	Male	1985/10/11

Table 3.31 Hunting activities of both problem animal control clubs in October 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	No	1985/10/02
10	Cooper	PH 1	Cage		1985/10/03
10	Cooper	PH 1	Cage	No	1985/10/18
10	Cooper	PH 1	Hounds	No	1985/10/25
10	Cooper	PH 1	Hounds	Yes	1985/10/26
15	Cooper	PH 1	Hounds		1985/10/29
25	Cooper	PH 1	Cage	No	1985/10/24
30	MBSen	PH 2	Hounds	No	1985/10/02
30	MBSen	PH 2	Hounds	No	1985/10/03
31	Cooper	PH 1	Cage	No	1985/10/09
63	Cooper	PH 1	Cage	No	1985/10/15
63	Cooper	PH 1	Hounds	Yes	1985/10/19
63	Cooper	PH 1	Hounds	No	1985/10/21
63	Cooper	PH 1	Trap	Yes	1985/10/22
64	MBSen	PH 2	Hounds	No	1985/10/17
64	MBSen	PH 2	Hounds	No	1985/10/22
87	Cooper	PH 1			1985/10/14
92	Cooper	PH 1	Trap	Yes	1985/10/11

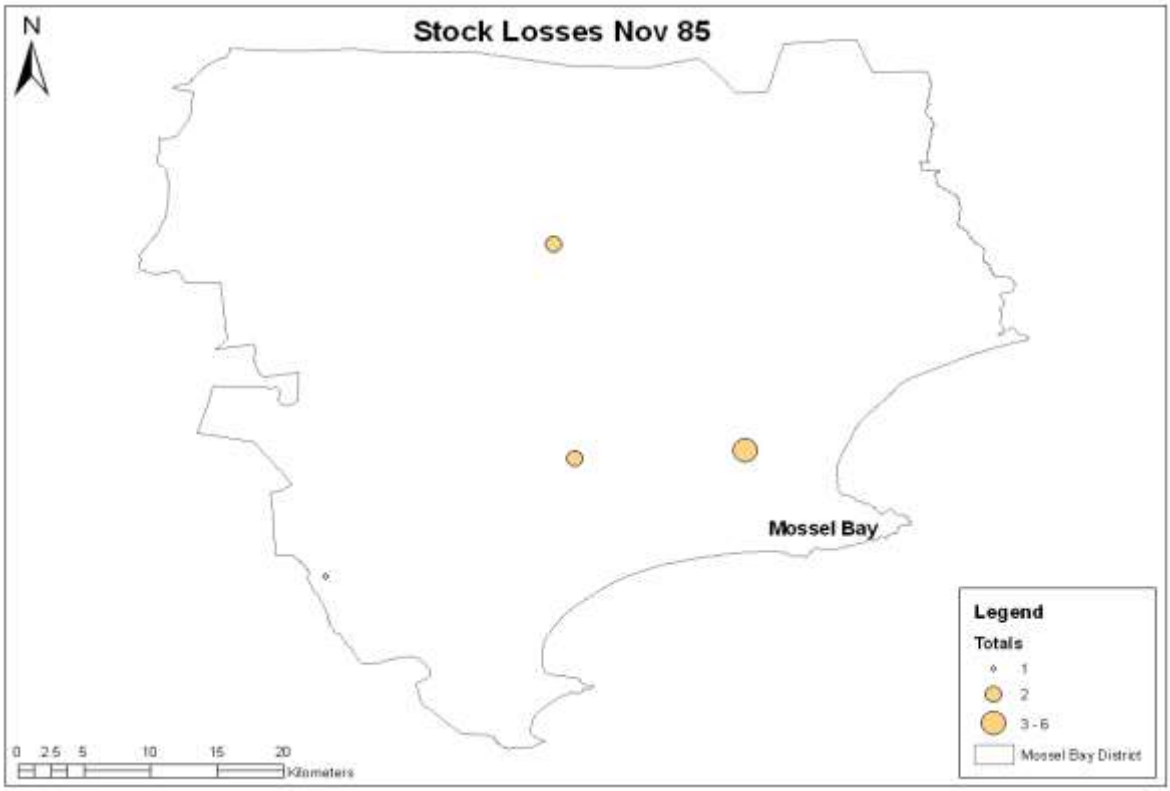


Figure 3.23 Stock losses due to predation reported for November 1985.

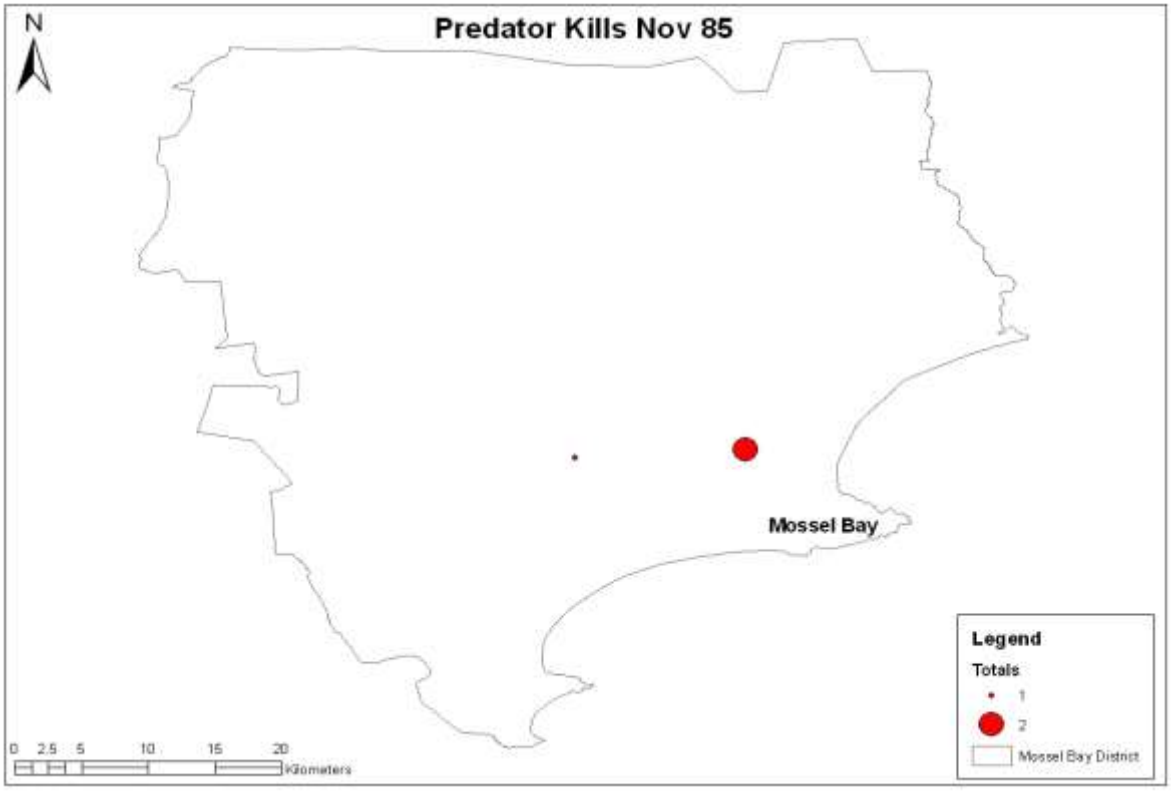


Figure 3.24 Predators killed in control operations reported for November 1985.

Table 3.32 Stock losses reported in November 1985

Farm Nr.	Sheep	Lamb	Dates
62	2	0	1985/11/20
64	0	1	1985/11/07
64	4	0	1985/11/11
64	0	1	1985/11/25
92	0	2	1985/11/25
116	1	0	1985/11/02

Table 3.33 Predators killed in November 1985

Farm Nr.	Predator	Sex	Dates
64	Caracal	Male	1985/11/07
64	Caracal	Male	1985/11/11
92	Caracal	Male	1985/11/26

Table 3.34 Hunting activities of both problem animal control clubs in November 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	No	1985/11/06
15	Cooper	PH 1	Hounds		1985/11/08
25	Cooper	PH 1	Cage	No	1985/11/15
31	Cooper	PH 1	Hounds	No	1985/11/19
62	MBSen	PH 2	Hounds	No	1985/11/20
62	MBSen	PH 2	Hounds	No	1985/11/26
63	Cooper	PH 1	Hounds	No	1985/11/20
64	MBSen	PH 2	Hounds	Yes	1985/11/07
64	MBSen	PH 2	Hounds	Yes	1985/11/11
64	MBSen	PH 2	Hounds	No	1985/11/25
92	Cooper	PH 1	Hounds	No	1985/11/11
92	Cooper	PH 1	Hounds	No	1985/11/25
92	Cooper	PH 1	Hounds	Yes	1985/11/26
116	Cooper	PH 1	Hounds	No	1985/11/02
116	Cooper	PH 1	Hounds	No	1985/11/04

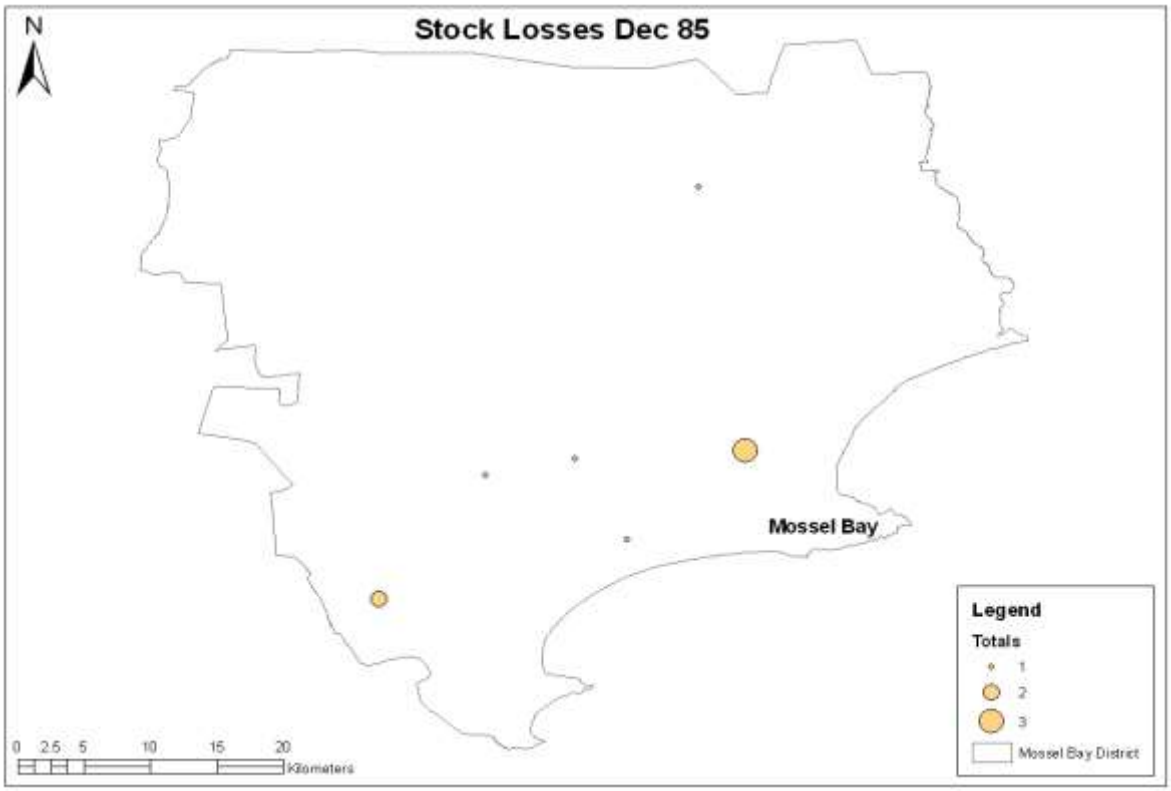


Figure 3.25 Stock losses due to predation reported for December 1985.

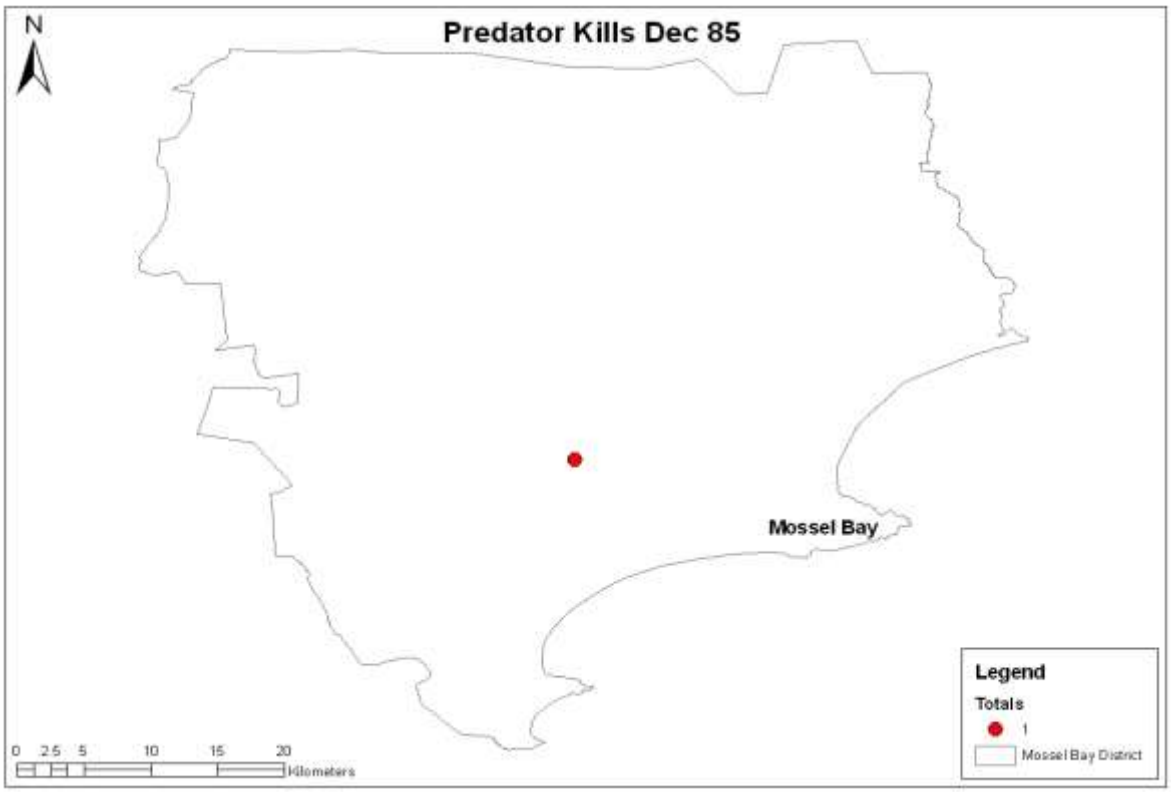


Figure 3.26 Predators killed in control operations reported for December 1985.

Table 3.35 Stock losses reported in December 1985

Farm Nr.	Sheep	Lamb	Dates
31	1	0	1985/12/03
64	0	1	1985/12/12
64	1	1	1985/12/13
92	0	1	1985/12/10
104	0	1	1985/12/24
107	0	1	1985/12/10
110	2	0	1985/12/13

Table 3.36 Predators killed in December 1985

Farm Nr.	Predator	Sex	Dates
92	Caracal	Female	1985/12/10

Table 3.37 Hunting activities of both problem animal control clubs in December 1985

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Cage	No	1985/12/27
15	Cooper	PH 1	Hounds		1985/12/30
31	Cooper	PH 1	Hounds	No	1985/12/03
63	Cooper	PH 1	Cage	No	1985/12/06
64	MBSen	PH 2	Hounds	No	1985/12/12
64	MBSen	PH 2	Hounds	No	1985/12/13
91	MBSen	PH 2	Hounds	No	1985/12/24
92	Cooper	PH 1	Hounds	Yes	1985/12/10
104	Cooper	PH 1	Hounds	No	1985/12/24
107	MBSen	PH 2	Hounds	No	1985/12/10
110	Cooper	PH 1	Hounds	No	1985/12/13
110	Cooper	PH 1	Cage		1985/12/17
116	Cooper	PH 1	Hounds	No	1985/12/28

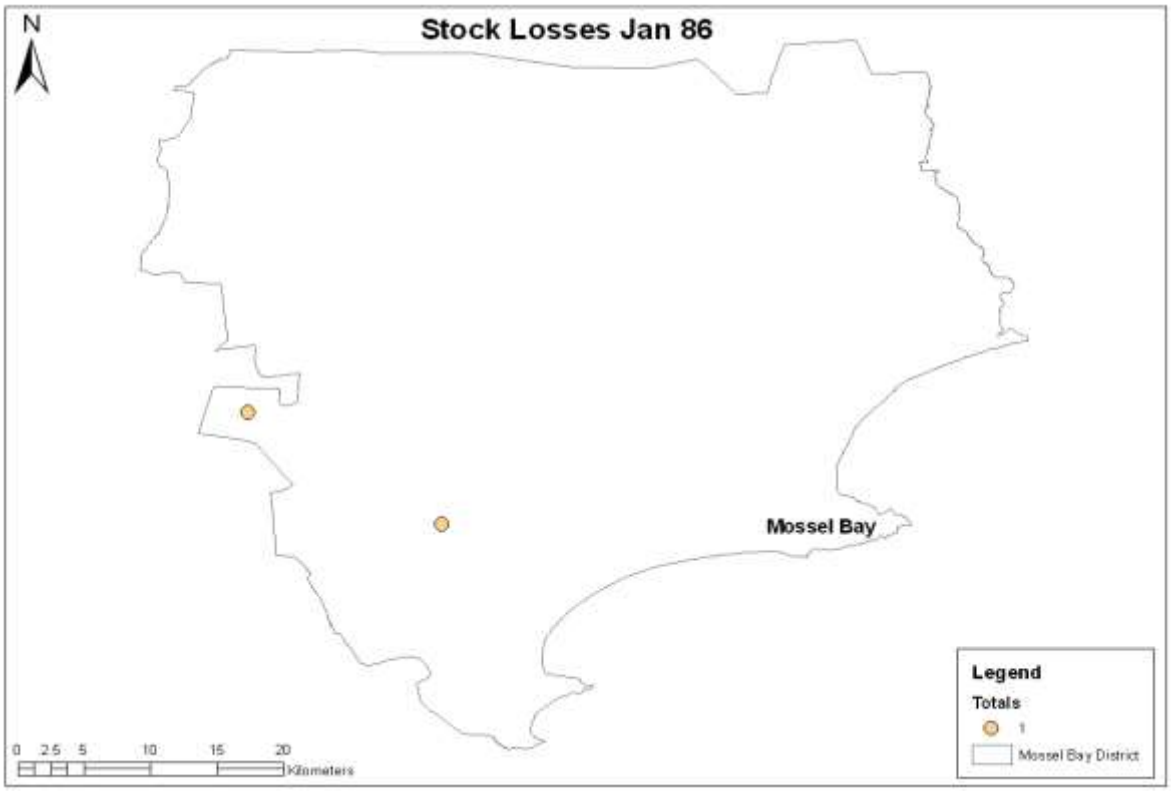


Figure 3.27 Stock losses due to predation reported for January 1986.

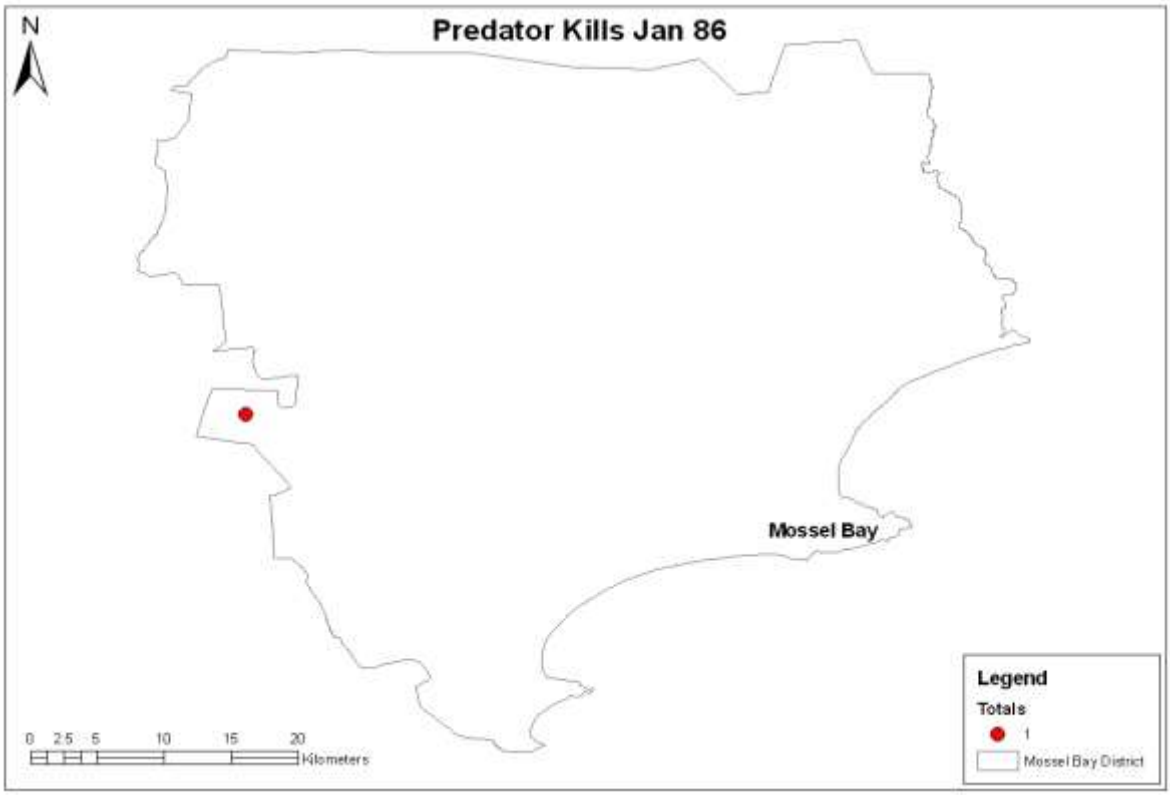


Figure 3.28 Predators killed in control operations reported for January 1986.

Table 3.38 Stock losses reported in January 1986

Farm Nr.	Sheep	Lamb	Dates
20	0	1	1986/01/13
132	0	1	1986/01/16

Table 3.39 Predators killed in January 1986

Farm Nr.	Predator	Sex	Dates
20	Caracal	Female	1986/01/13

Table 3.40 Hunting activities of both problem animal control clubs in January 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Cage	No	1986/01/03
15	Cooper	PH 1	Hounds		1986/01/15
20	Cooper	PH 1	Hounds	Yes	1986/01/13
67	MBSen	PH 2	Hounds	No	1986/01/28
110	Cooper	PH 1	Cage	No	1986/01/10
116	Cooper	PH 1	Hounds	No	1986/01/06
132	Cooper	PH 1	Hounds	No	1986/01/16
132	Cooper	PH 1	Trap		1986/01/17

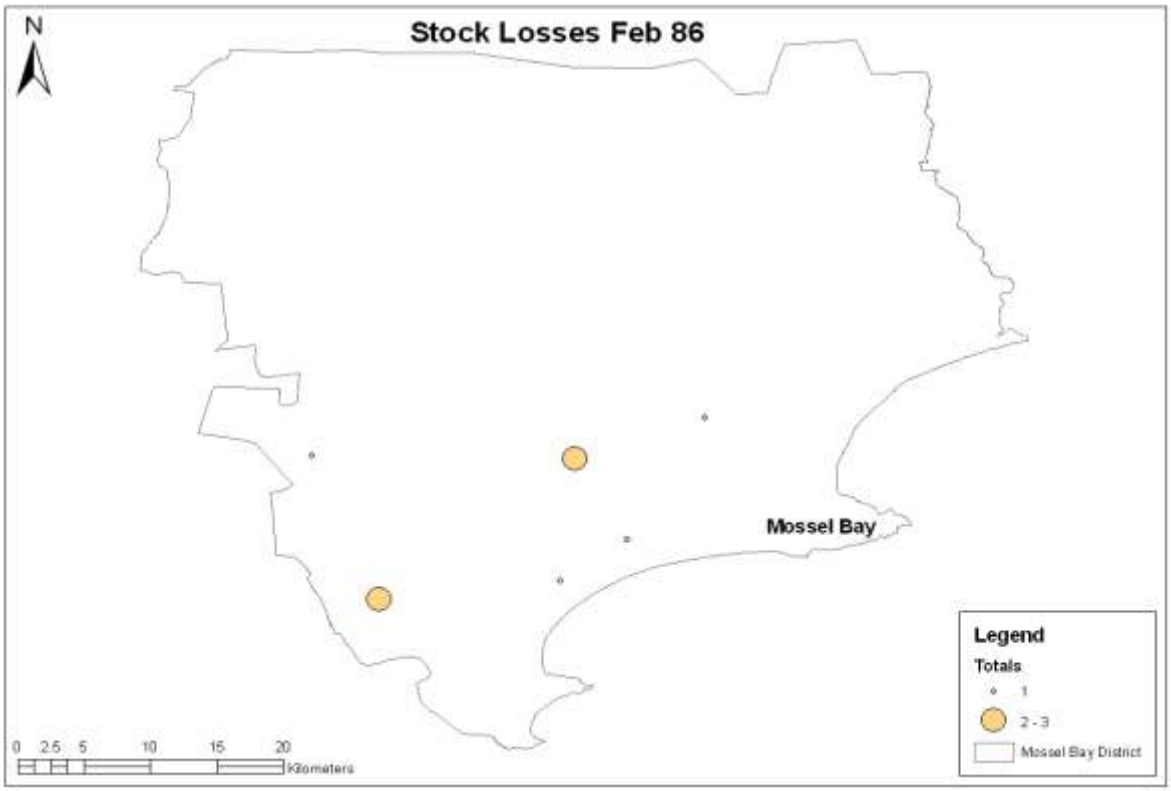


Figure 3.29 Stock losses due to predation reported for February 1986.

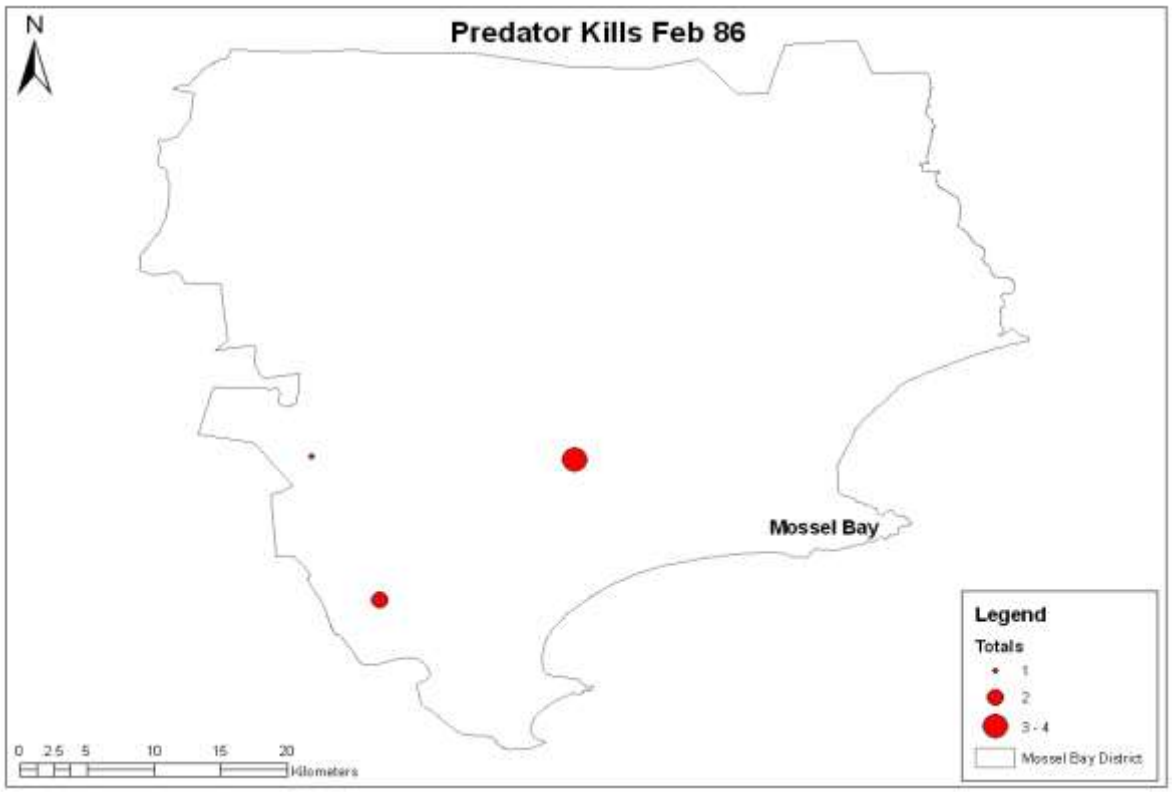


Figure 3.30 Predators killed in control operations reported for February 1986.

Table 3.41 Stock losses reported in February 1986

Farm Nr.	Sheep	Lamb	Dates
10	0	1	1986/02/14
31	1	0	1986/02/10
63	1	0	1986/02/26
92	0	1	1986/02/04
92	0	1	1986/02/08
92	0	1	1986/02/21
110	0	2	1986/02/18
110	0	1	1986/02/25
126	1	0	1986/02/14

Table 3.42 Predators killed in February 1986

Farm Nr.	Predator	Sex	Dates
10	Caracal	Female	1986/02/14
92	Caracal	Female	1986/02/04
92	Caracal	Female	1986/02/08
92	Caracal	Male	1986/02/08
92	Caracal	Male	1986/02/21
110	Caracal	Female	1986/02/18
110	Caracal	Female	1986/02/25

Table 3.43 Hunting activities of both problem animal control clubs in February 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Trap	Yes	1986/02/14
31	Cooper	PH 1	Cage		1986/02/10
63	Cooper	PH 1	Cage		1986/02/26
92	Cooper	PH 1	Hounds	Yes	1986/02/04
92	Cooper	PH 1	Hounds	Yes	1986/02/08
92	Cooper	PH 1	Hounds	Yes	1986/02/08
92	Cooper	PH 1	Hounds	Yes	1986/02/21
110	Cooper	PH 1	Trap	Yes	1986/02/18
110	Cooper	PH 1	Hounds	Yes	1986/02/25
126	MBSen	PH 2	Hounds	No	1986/02/14

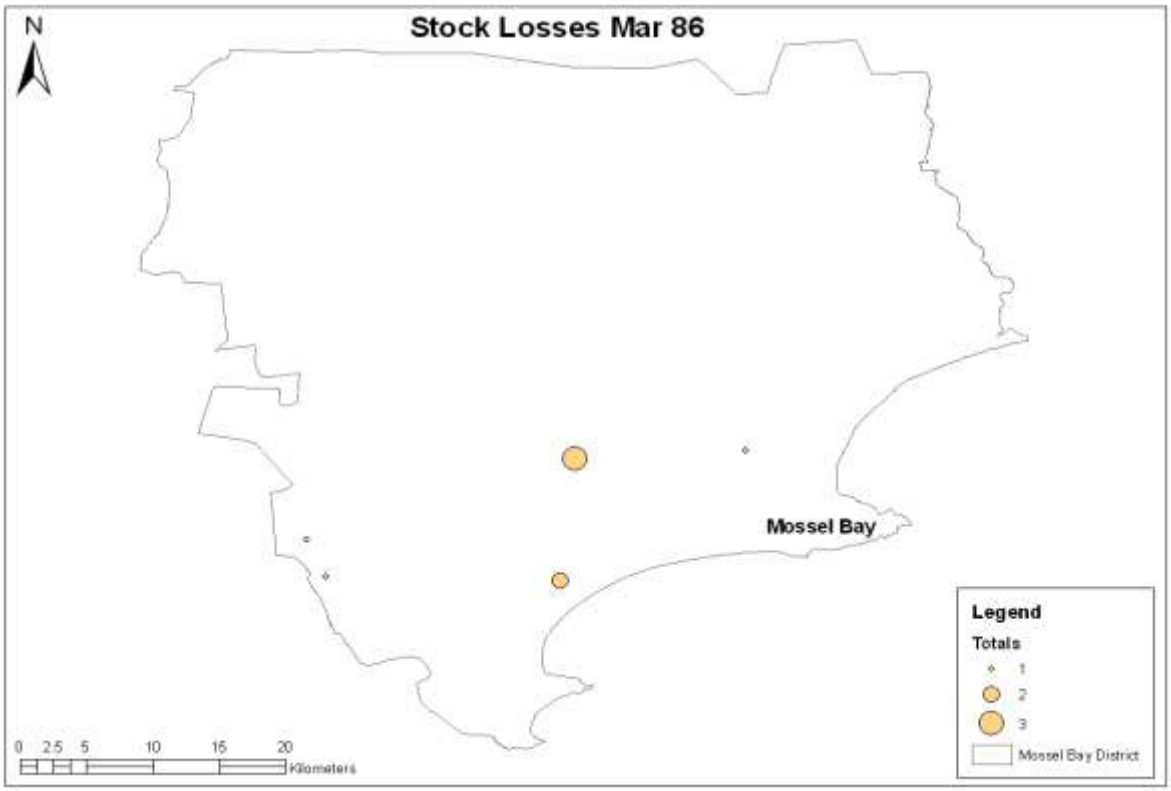


Figure 3.31 Stock losses due to predation reported for March 1986.

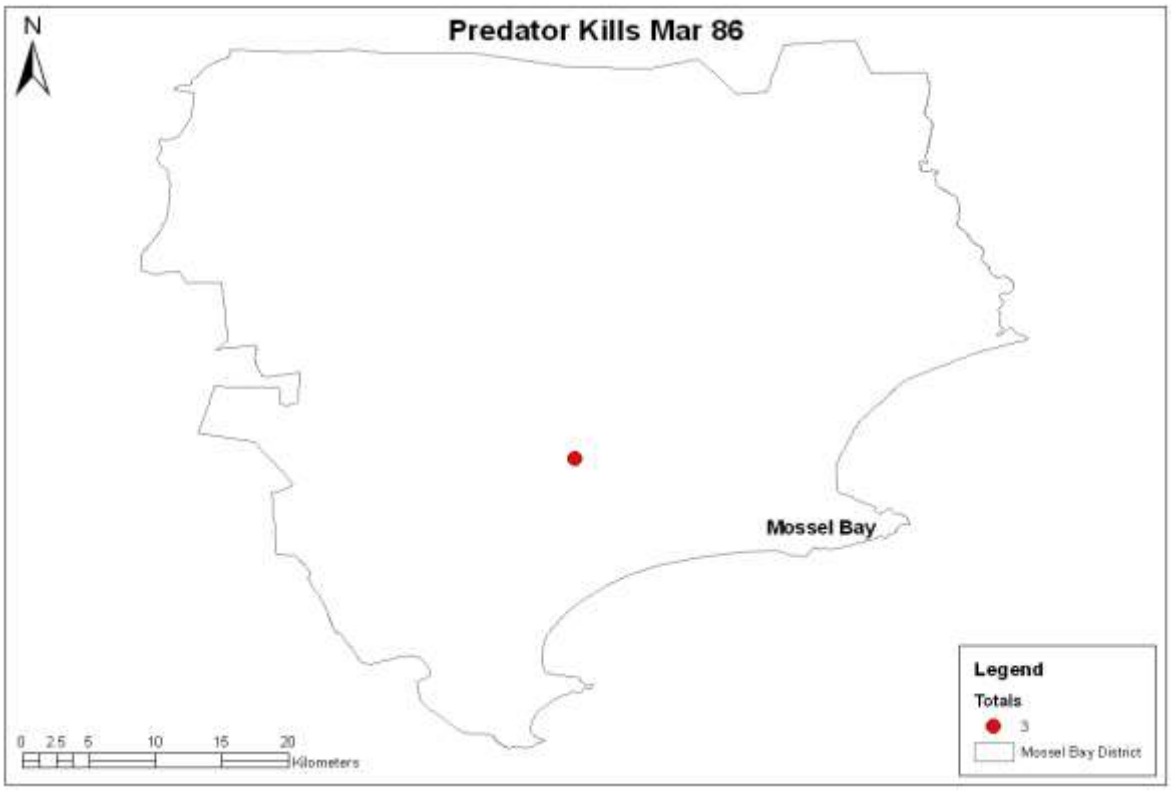


Figure 3.32 Predators killed in control operations reported for March 1986.

Table 3.44 Stock losses reported in March 1986

Farm Nr.	Sheep	Lamb	Dates
15	1	0	1986/03/24
63	0	2	1986/03/18
64	1	0	1986/03/25
92	0	1	1986/03/05
92	0	1	1986/03/13
92	0	1	1986/03/29
116	1	0	1986/03/27

Table 3.45 Predators killed in March 1986

Farm Nr.	Predator	Sex	Dates
92	Caracal	Male	1986/03/05
92	Caracal	Female	1986/03/13
92	Caracal	Male	1986/03/29

Table 3.46 Hunting activities of both problem animal control clubs in March 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
15	Cooper	PH 1	Hounds	No	1986/03/24
31	Cooper	PH 1	Cage	No	1986/03/20
63	Cooper	PH 1	Cage	No	1986/03/07
63	Cooper	PH 1	Cage	No	1986/03/11
63	Cooper	PH 1	Hounds	No	1986/03/18
64	MBSen	PH 2	Hounds	No	1986/03/25
67	MBSen	PH 2	Hounds	No	1986/03/22
92	Cooper	PH 1	Hounds	Yes	1986/03/05
92	Cooper	PH 1	Hounds	Yes	1986/03/13
92	Cooper	PH 1	Cage	Yes	1986/03/29
116	Cooper	PH 1	Cage	No	1986/03/27

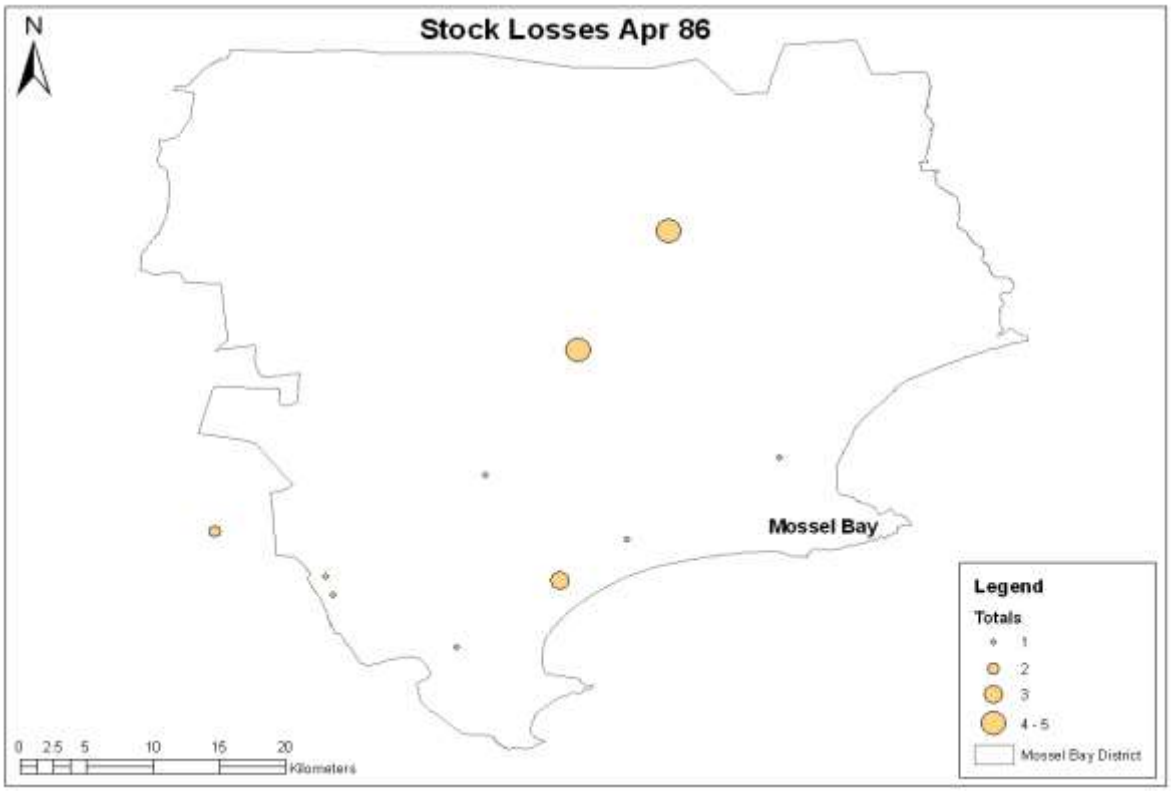


Figure 3.33 Stock losses due to predation reported for April 1986.

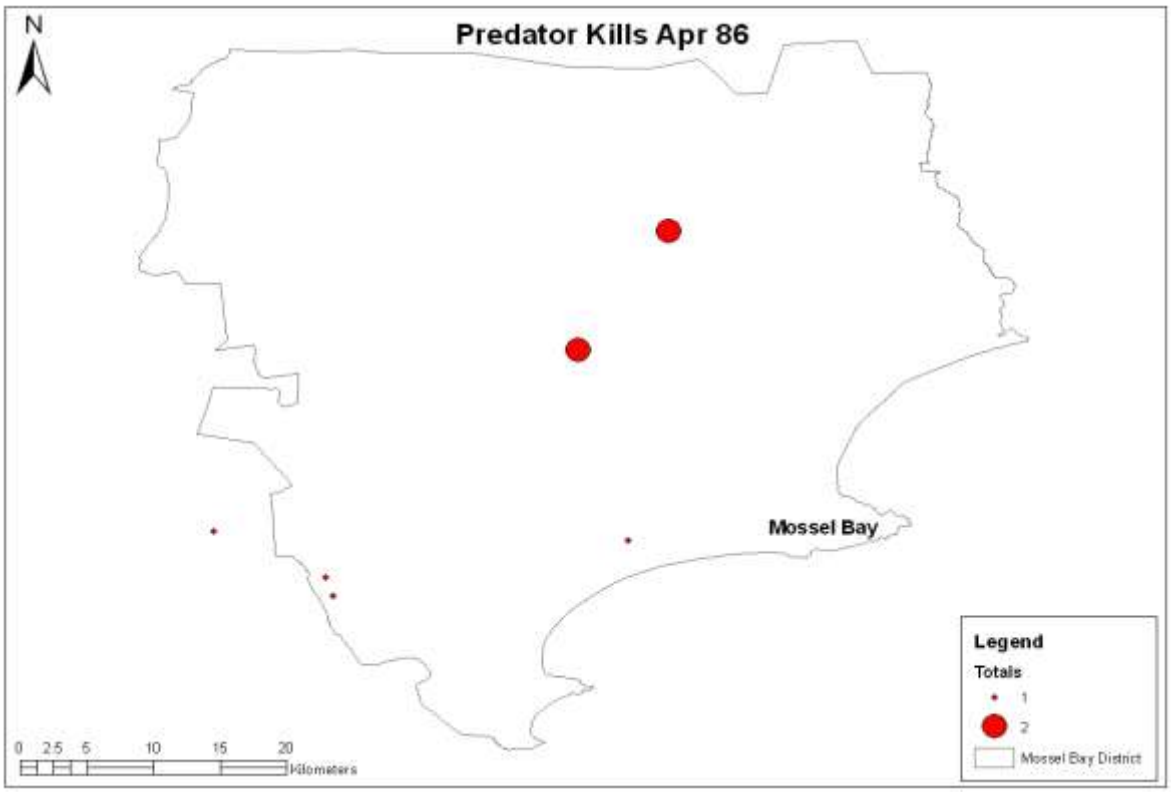


Figure 3.34 Predators killed in control operations reported for April 1986.

Table 3.47 Stock losses reported in April 1986

Farm Nr.	Sheep	Lamb	Dates
17	0	1	1986/04/08
25	0	1	1986/04/12
31	0	1	1986/04/04
47	1	0	1986/04/11
63	1	0	1986/04/02
63	1	0	1986/04/14
63	1	0	1986/04/25
66	0	5	1986/04/24
91	0	5	1986/04/29
104	0	1	1986/04/28
116	0	1	1986/04/19
122	1	0	1986/04/16
127	0	2	1986/04/30

Table 3.48 Predators killed in April 1986

Farm Nr.	Predator	Sex	Dates
25	Caracal	Male	1986/04/12
31	Caracal	Male	1986/04/04
66	Caracal	Female	1986/04/27
66	Caracal	Female	1986/04/28
91	Caracal	Female	1986/04/29
91	Caracal	Female	1986/04/29
116	Caracal	Male	1986/04/19
127	Caracal	Male	1986/04/30

Table 3.49 Hunting activities of both problem animal control clubs in April 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
17	Cooper	PH 1	Hounds	No	1986/04/08
25	Cooper	PH 1	Cage	Yes	1986/04/12
25	Cooper	PH 1	Hounds	No	1986/04/21
31	Cooper	PH 1	Cage	Yes	1986/04/04
31	Cooper	PH 1	Cage	No	1986/04/18
47	MBSen	PH 2	Hounds	No	1986/04/11
63	Cooper	PH 1	Cage		1986/04/02
63	Cooper	PH 1	Hounds	No	1986/04/14
63	Cooper	PH 1	Hounds	No	1986/04/25
66	MBSen	PH 2	Hounds	No	1986/04/24
66	MBSen	PH 2	Hounds	No	1986/04/25
66	MBSen	PH 2	Hounds	No	1986/04/26
66	MBSen	PH 2	Hounds	Yes	1986/04/27
66	MBSen	PH 2	Hounds	Yes	1986/04/28
91	MBSen	PH 2	Hounds	Yes	1986/04/29
91	MBSen	PH 2	Hounds	Yes	1986/04/29
104	Cooper	PH 1	Hounds	No	1986/04/28
116	Cooper	PH 1	Hounds	Yes	1986/04/19
116	Cooper	PH 1	Hounds	No	1986/04/23
122	Cooper	PH 1	Cage	No	1986/04/16
127	Cooper	PH 1	Trap	Yes	1986/04/30

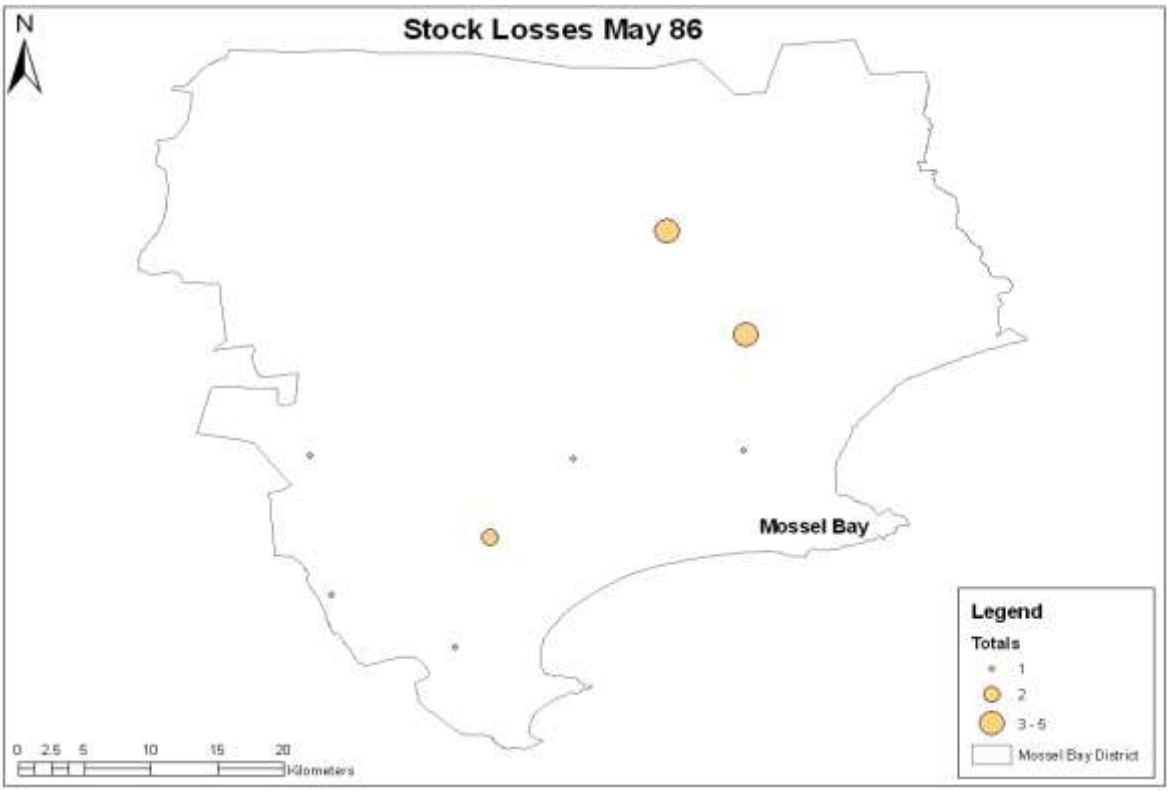


Figure 3.35 Stock losses due to predation reported for May 1986.

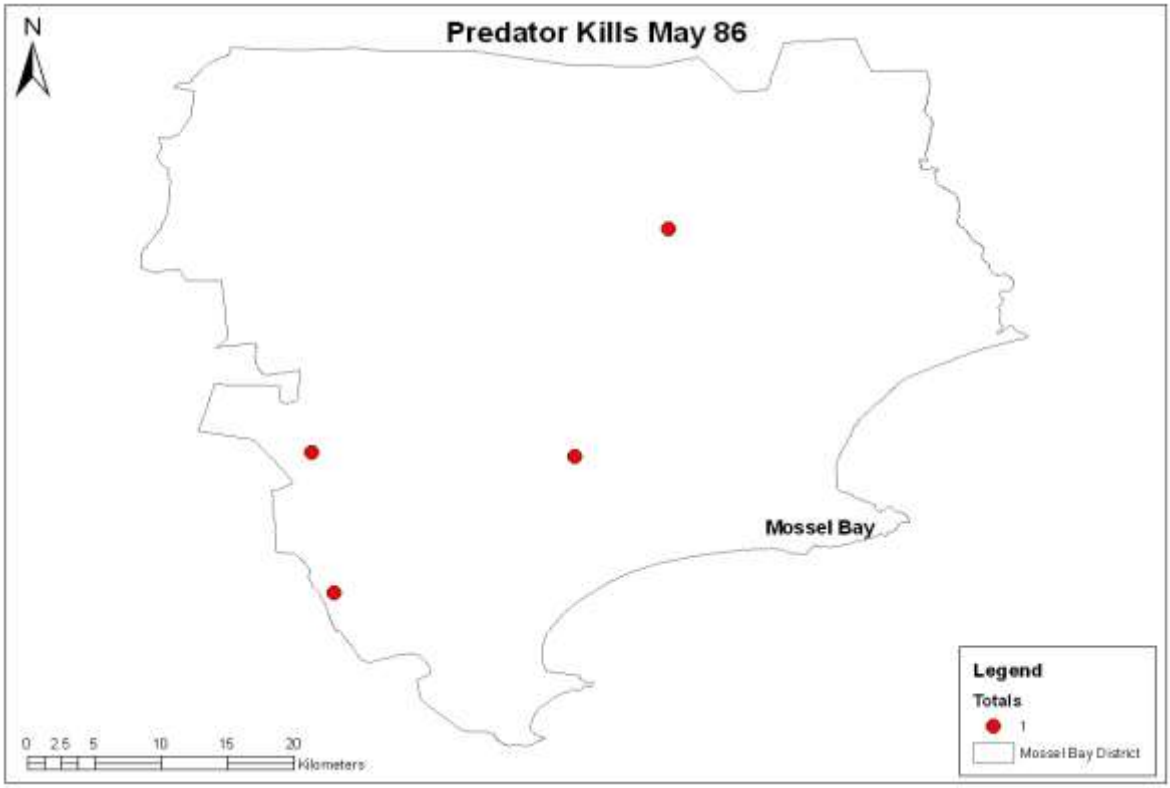


Figure 3.36 Predators killed in control operations reported for May 1986.

Table 3.50 Stock losses reported in May 1986

Farm Nr.	Sheep	Lamb	Dates
10	0	1	1986/05/05
17	0	1	1986/05/02
22	5	0	1986/05/31
25	0	1	1986/05/20
53	1	0	1986/05/07
53	1	0	1986/05/14
64	1	0	1986/05/16
91	1	0	1986/05/01
91	1	0	1986/05/20
91	0	1	1986/05/21
91	3	0	1986/05/28
92	0	1	1986/05/17

Table 3.51 Predators killed in May 1986

Farm Nr.	Predator	Sex	Dates
10	Caracal	Male	1986/05/05
25	Caracal	Female	1986/05/20
91	Caracal	Male	1986/05/28
92	Caracal	Female	1986/05/17

Table 3.52 Hunting activities of both problem animal control clubs in May 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	Yes	1986/05/05
17	Cooper	PH 1	Hounds	No	1986/05/02
17	Cooper	PH 1	Hounds	No	1986/05/10
22	MBSen	PH 2	Hounds	No	1986/05/31
25	Cooper	PH 1	Cage	No	1986/05/12
25	Cooper	PH 1	Cage	Yes	1986/05/20
53	Cooper	PH 1	Hounds	No	1986/05/07
53	Cooper	PH 1	Hounds	No	1986/05/08
53	Cooper	PH 1	Hounds	No	1986/05/14
53	Cooper	PH 1	Cage	No	1986/05/26
64	MBSen	PH 2	Hounds	No	1986/05/16
91	MBSen	PH 2	Hounds	No	1986/05/01
91	MBSen	PH 2	Hounds	No	1986/05/17
91	MBSen	PH 2	Hounds	No	1986/05/19
91	MBSen	PH 2	Hounds	No	1986/05/20
91	MBSen	PH 2	Hounds	No	1986/05/21
91	MBSen	PH 2	Hounds	Yes	1986/05/28
92	Cooper	PH 1	Hounds	Yes	1986/05/17
104	Cooper	PH 1	Cage	No	1986/05/22

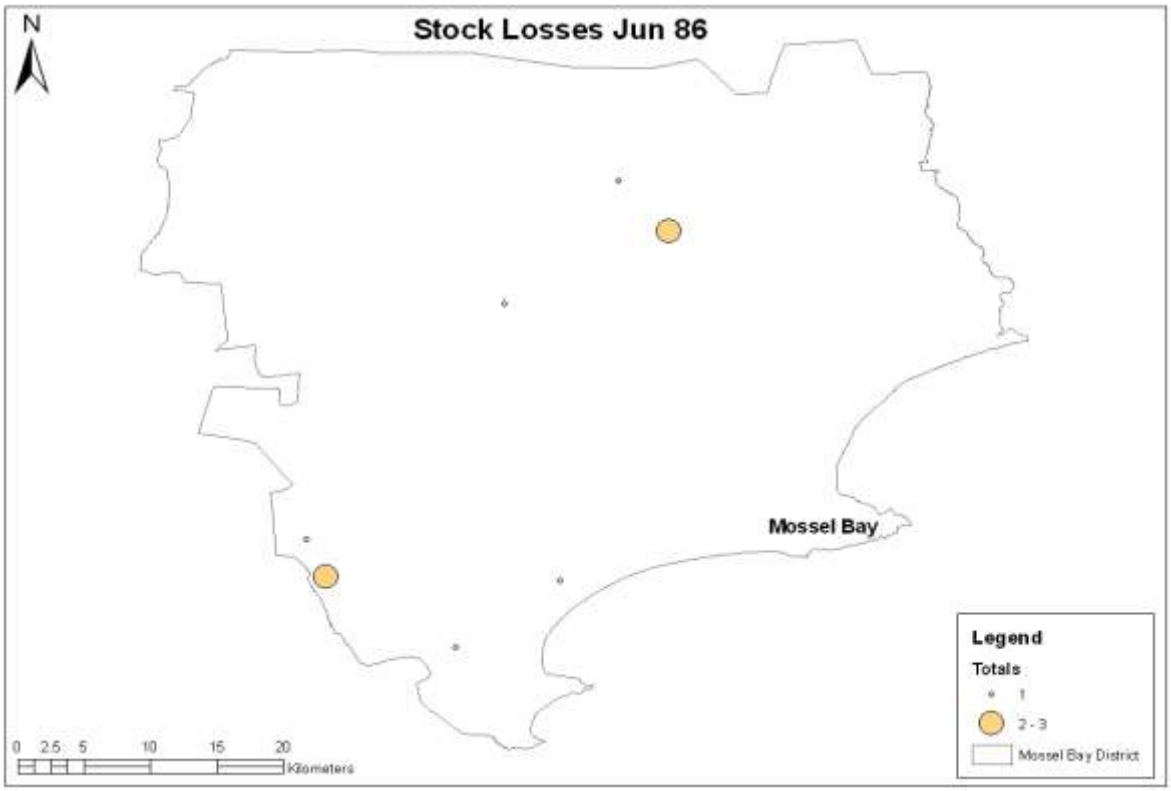


Figure 3.37 Stock losses due to predation reported for June 1986.

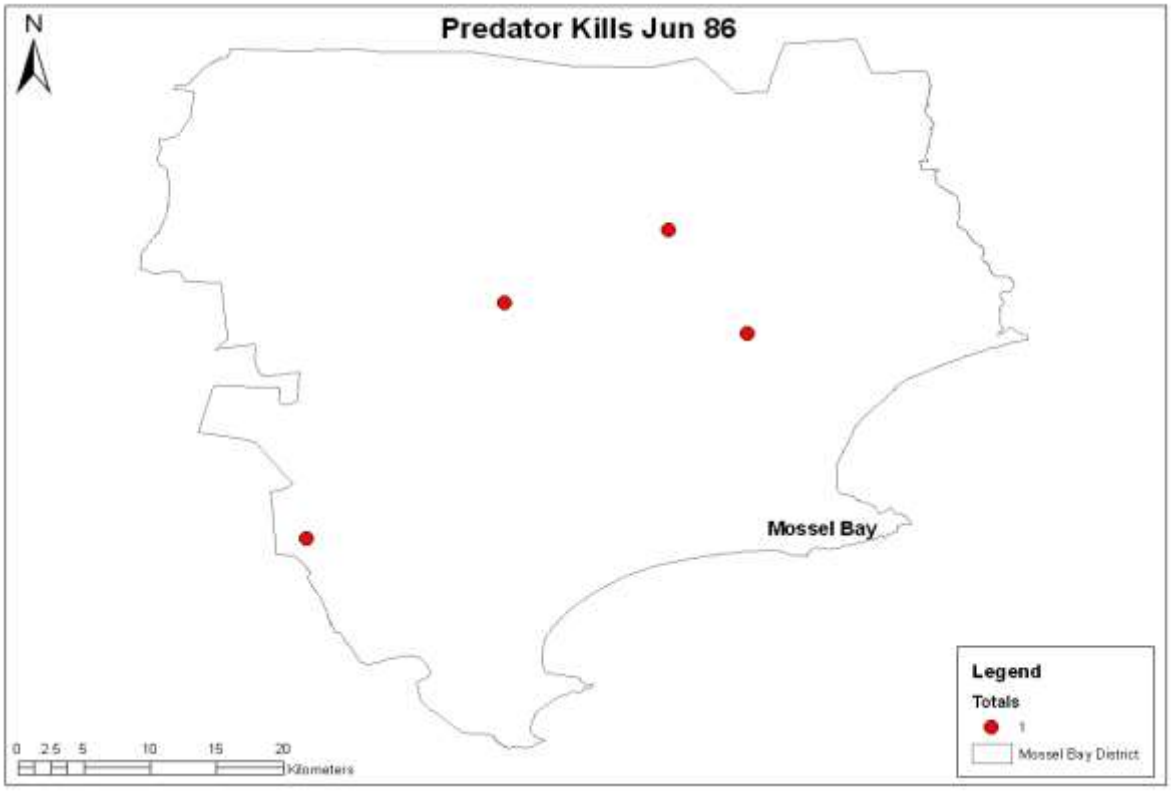


Figure 3.38 Predators killed in control operations reported for June 1986.

Table 3.53 Stock losses reported in June 1986

Farm Nr.	Sheep	Lamb	Dates
15	0	1	1986/06/24
63	0	1	1986/06/21
67	0	1	1986/06/14
87	0	1	1986/06/13
91	3	0	1986/06/06
116	0	1	1986/06/12
116	1	0	1986/06/14
116	0	1	1986/06/18
134	0	1	1986/06/16

Table 3.54 Predators killed in June 1986

Farm Nr.	Predator	Sex	Dates
15	Caracal	Male	1986/06/24
22	Caracal	Male	1986/06/01
91	Caracal	Male	1986/06/06
134	Caracal	Male	1986/06/16

Table 3.55 Hunting activities of both problem animal control clubs in June 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
15	Cooper	PH 1	Cage	No	1986/06/03
15	Cooper	PH 1	Cage	Yes	1986/06/24
22	MBSen	PH 2	Hounds	Yes	1986/06/01
31	Cooper	PH 1	Cage	No	1986/06/09
63	Cooper	PH 1	Hounds		1986/06/06
63	Cooper	PH 1	Hounds	No	1986/06/21
67	MBSen	PH 2	Hounds	No	1986/06/14
87	Cooper	PH 1	Hounds	No	1986/06/13
91	MBSen	PH 2	Hounds	Yes	1986/06/06
104	Cooper	PH 1	Cage	No	1986/06/11
116	Cooper	PH 1	Hounds		1986/06/04
116	Cooper	PH 1	Hounds	No	1986/06/12
116	Cooper	PH 1	Cage	No	1986/06/14
116	Cooper	PH 1	Hounds	No	1986/06/18
116	Cooper	PH 1	Hounds	No	1986/06/28
134	Cooper	PH 1	Cage	Yes	1986/06/16
135	MBSen	PH 2	Hounds	No	1986/06/12

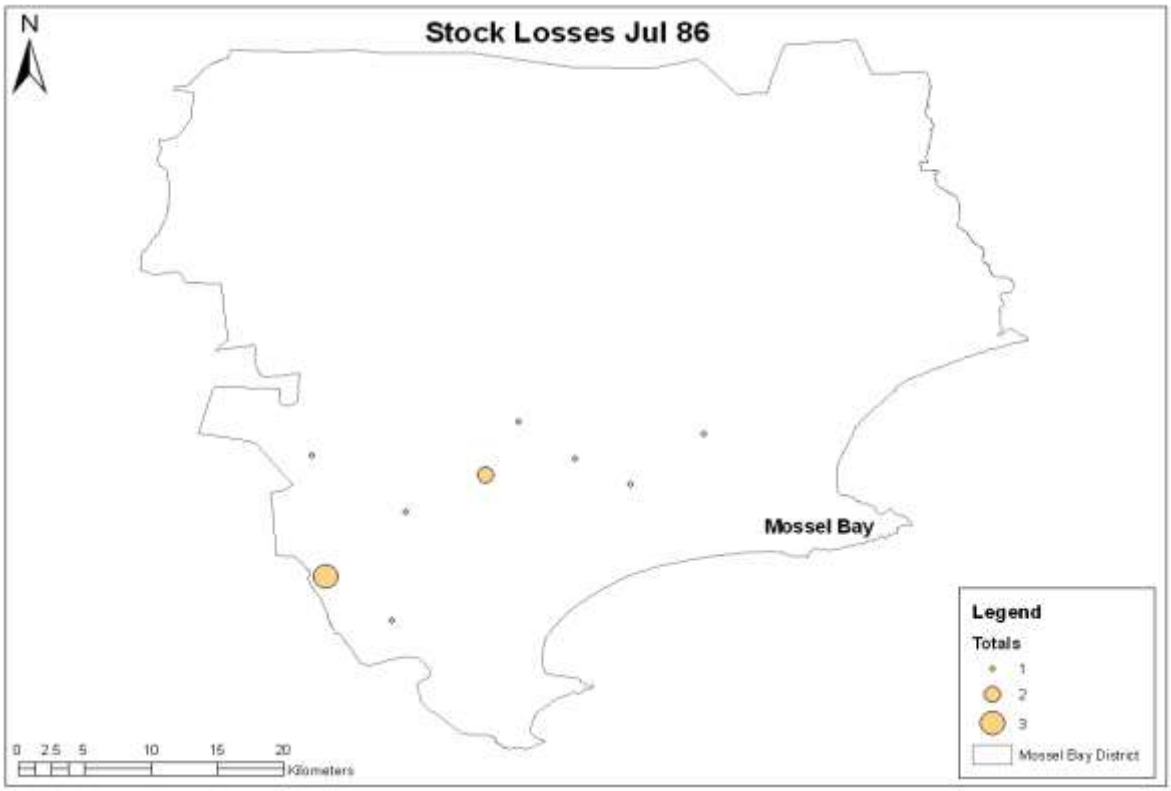


Figure 3.39 Stock losses due to predation reported for July 1986.

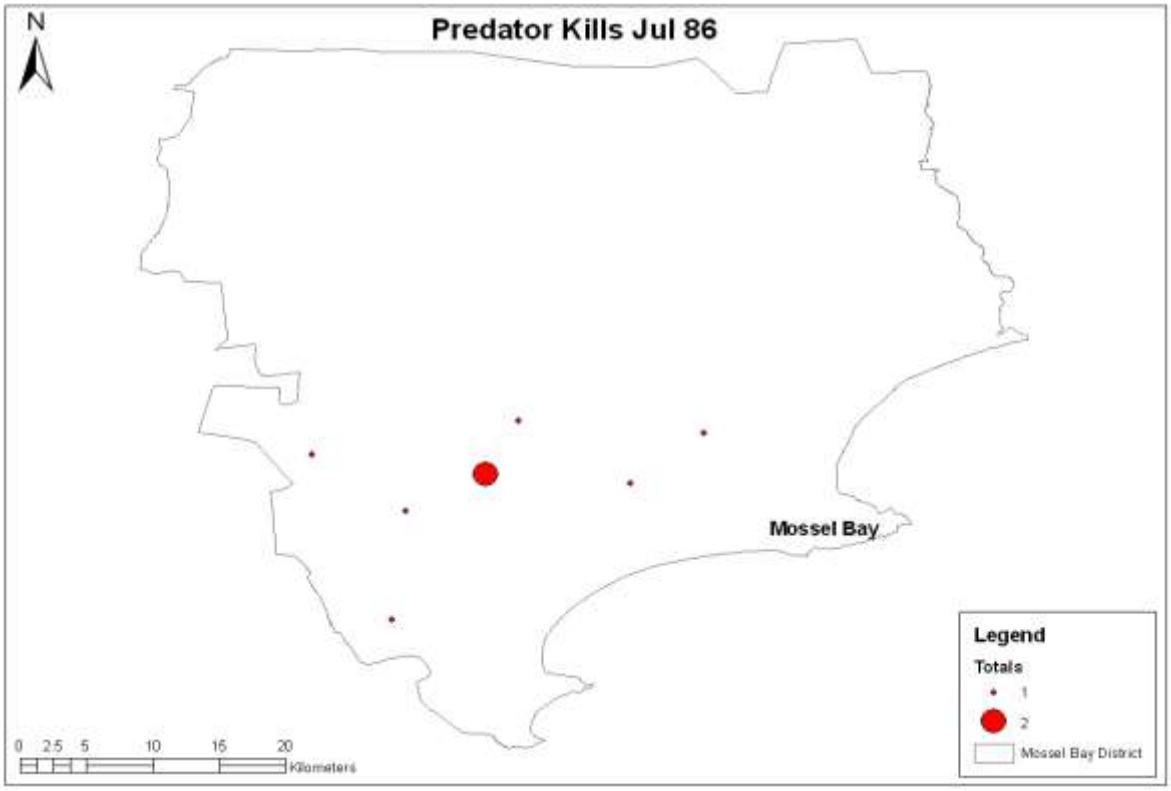


Figure 3.40 Predators killed in control operations reported for July 1986.

Table 3.56 Stock losses reported in July 1986

Farm Nr.	Sheep	Lamb	Dates
5	0	1	1986/07/03
10	0	1	1986/07/10
92	0	1	1986/07/16
101	1	0	1986/07/21
104	0	1	1986/07/11
104	0	1	1986/07/28
116	0	1	1986/07/02
116	0	1	1986/07/04
116	1	0	1986/07/14
121	0	1	1986/07/26
125	0	1	1986/07/05
135	1	0	1986/07/18

Table 3.57 Predators killed in July 1986

Farm Nr.	Predator	Sex	Dates
5	Caracal	Female	1986/07/03
10	Caracal	Female	1986/07/11
101	Honey Badger	Male	1986/07/21
104	Caracal	Female	1986/07/11
104	Caracal	Female	1986/07/28
121	Caracal	Female	1986/07/26
125	Caracal	Female	1986/07/05
135	Caracal	Male	1986/07/18

Table 3.58 Hunting activities of both problem animal control clubs in July 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Hounds	Yes	1986/07/03
10	Cooper	PH 1	Trap		1986/07/10
10	Cooper	PH 1	Trap	Yes	1986/07/11
25	Cooper	PH 1	Cage	No	1986/07/08
92	Cooper	PH 1	Hounds	No	1986/07/16
101	Cooper	PH 1	Hounds	Yes	1986/07/21
104	Cooper	PH 1	Hounds	Yes	1986/07/11
104	Cooper	PH 1	Hounds	Yes	1986/07/28
116	Cooper	PH 1	Hounds	No	1986/07/02
116	Cooper	PH 1	Hounds	No	1986/07/02
116	Cooper	PH 1	Hounds	No	1986/07/04
116	Cooper	PH 1	Hounds	No	1986/07/07
116	Cooper	PH 1	Hounds	No	1986/07/14
116	Cooper	PH 1	Cage	No	1986/07/15
121	Cooper	PH 1	Hounds	Yes	1986/07/26
125	Cooper	PH 1	Hounds	Yes	1986/07/05
135	Cooper	PH 1	Hounds	Yes	1986/07/18

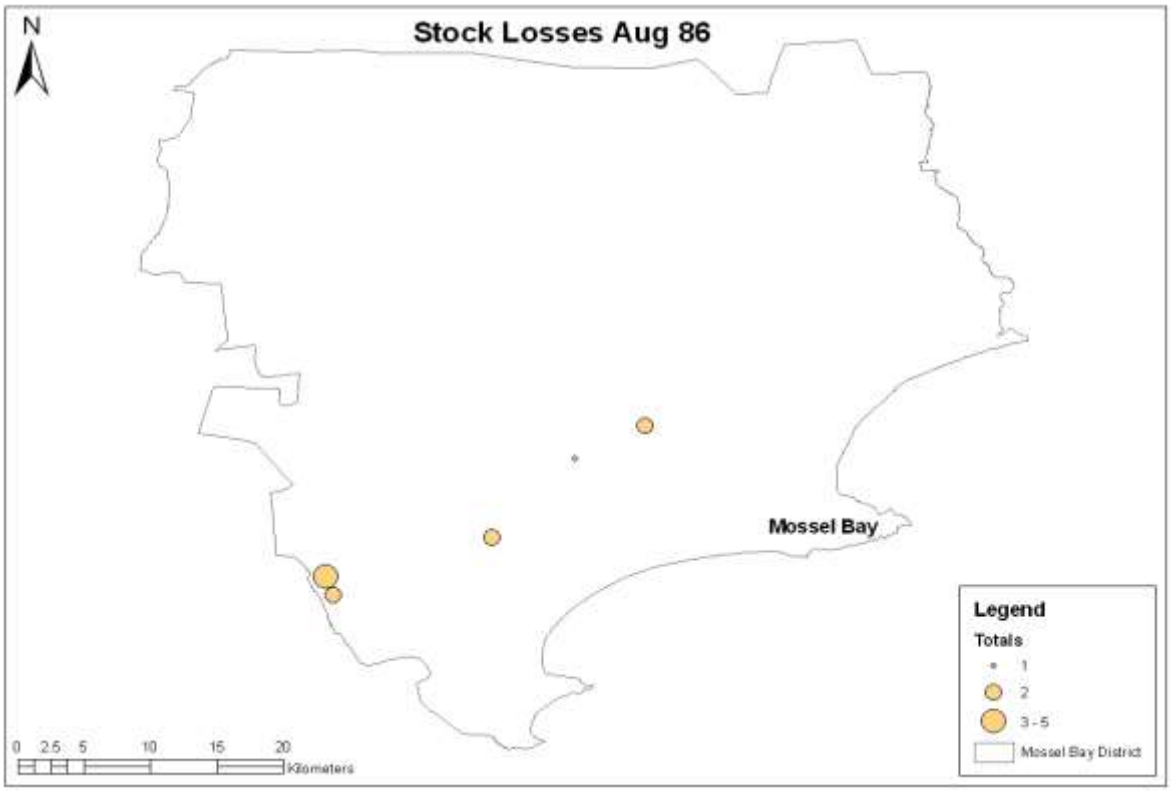


Figure 3.41 Stock losses due to predation reported for August 1986.

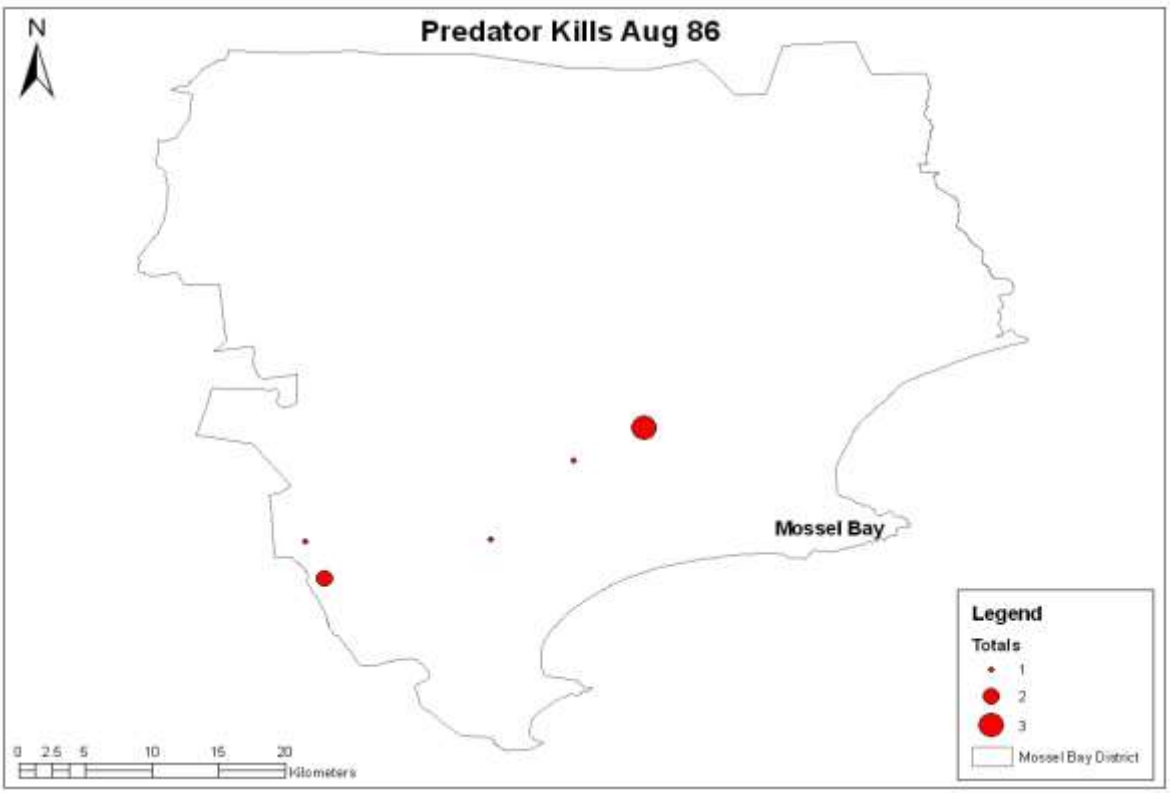


Figure 3.42 Predators killed in control operations reported for August 1986.

Table 3.59 Stock losses reported in August 1986

Farm Nr.	Sheep	Lamb	Dates
15	0	1	1986/08/01
36	0	1	1986/08/19
36	0	1	1986/08/21
53	0	1	1986/08/25
53	0	1	1986/08/28
92	0	1	1986/08/04
116	0	1	1986/08/07
116	0	1	1986/08/08
116	0	1	1986/08/12
116	0	1	1986/08/15
116	1	0	1986/08/22
122	0	1	1986/08/20
122	0	1	1986/08/30

Table 3.60 Predators killed in August 1986

Farm Nr.	Predator	Sex	Dates
15	Caracal	Male	1986/08/01
36	Caracal	Female	1986/08/19
36	Caracal	Male	1986/08/21
36	Caracal	Male	1986/08/21
53	Caracal	Male	1986/08/28
92	Caracal	Male	1986/08/04
116	Caracal	Female	1986/08/08
116	Caracal	Female	1986/08/12

Table 3.61 Hunting activities of both problem animal control clubs in August 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
15	Cooper	PH 1	Hounds	Yes	1986/08/01
25	Cooper	PH 1	Hounds	No	1986/08/14
36	Cooper	PH 1	Hounds	Yes	1986/08/19
36	Cooper	PH 1	Hounds	Yes	1986/08/21
36	Cooper	PH 1	Hounds	Yes	1986/08/21
53	Cooper	PH 1	Hounds	No	1986/08/25
53	Cooper	PH 1	Cage		1986/08/26
53	Cooper	PH 1	Hounds	Yes	1986/08/28
92	Cooper	PH 1	Hounds	Yes	1986/08/04
116	Cooper	PH 1	Hounds	No	1986/08/07
116	Cooper	PH 1	Hounds	Yes	1986/08/08
116	Cooper	PH 1	Hounds	Yes	1986/08/12
116	Cooper	PH 1	Hounds	No	1986/08/15
116	Cooper	PH 1	Hounds	No	1986/08/22
122	Cooper	PH 1	Hounds	No	1986/08/20
122	Cooper	PH 1	Hounds	No	1986/08/30

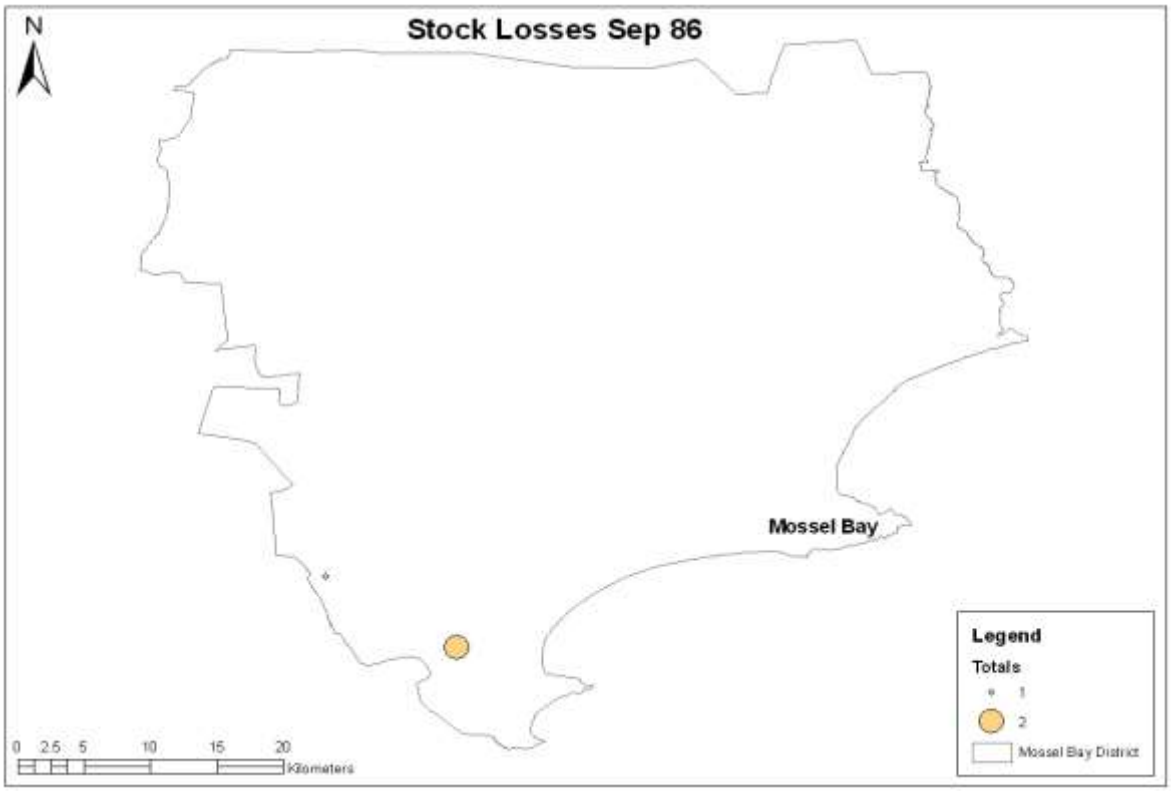


Figure 3.43 Stock losses due to predation reported for September 1986.

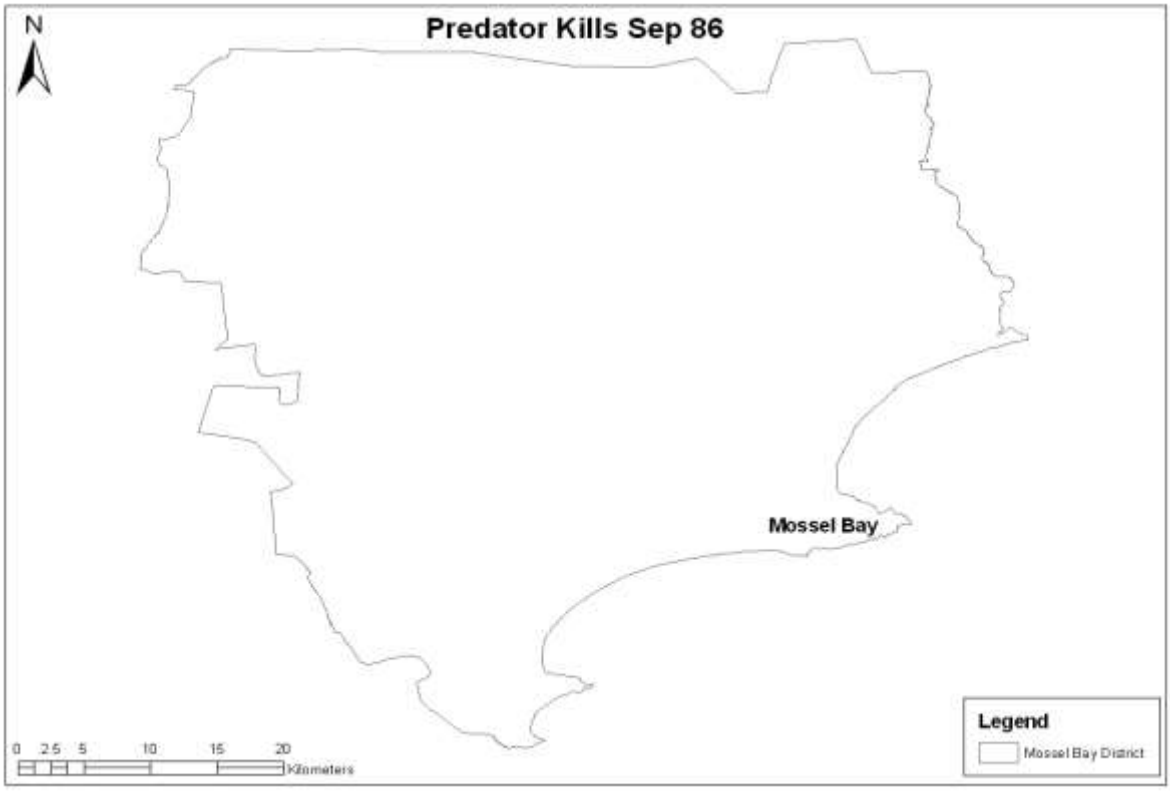


Figure 3.44 Predators killed in control operations reported for September 1986.

Table 3.62 Stock losses reported in September 1986

Farm Nr.	Sheep	Lamb	Dates
17	0	2	1986/09/09
116	1	0	1986/09/27

Table 3.63 Hunting activities of both problem animal control clubs in September 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds		1986/09/12
17	Cooper	PH 1	Hounds	No	1986/09/09
17	Cooper	PH 1	Hounds	No	1986/09/10
31	Cooper	PH 1	Hounds		1986/09/02
53	Cooper	PH 1	Cage	No	1986/09/04
63	Cooper	PH 1	Cage	No	1986/09/03
116	Cooper	PH 1	Hounds	No	1986/09/27

Note:

No predators were killed by either of the two problem animal control clubs in September 1986. Therefore, a null map (Figure 3.44) and no report or data table are presented for **Predator Kills Sep 1986**.

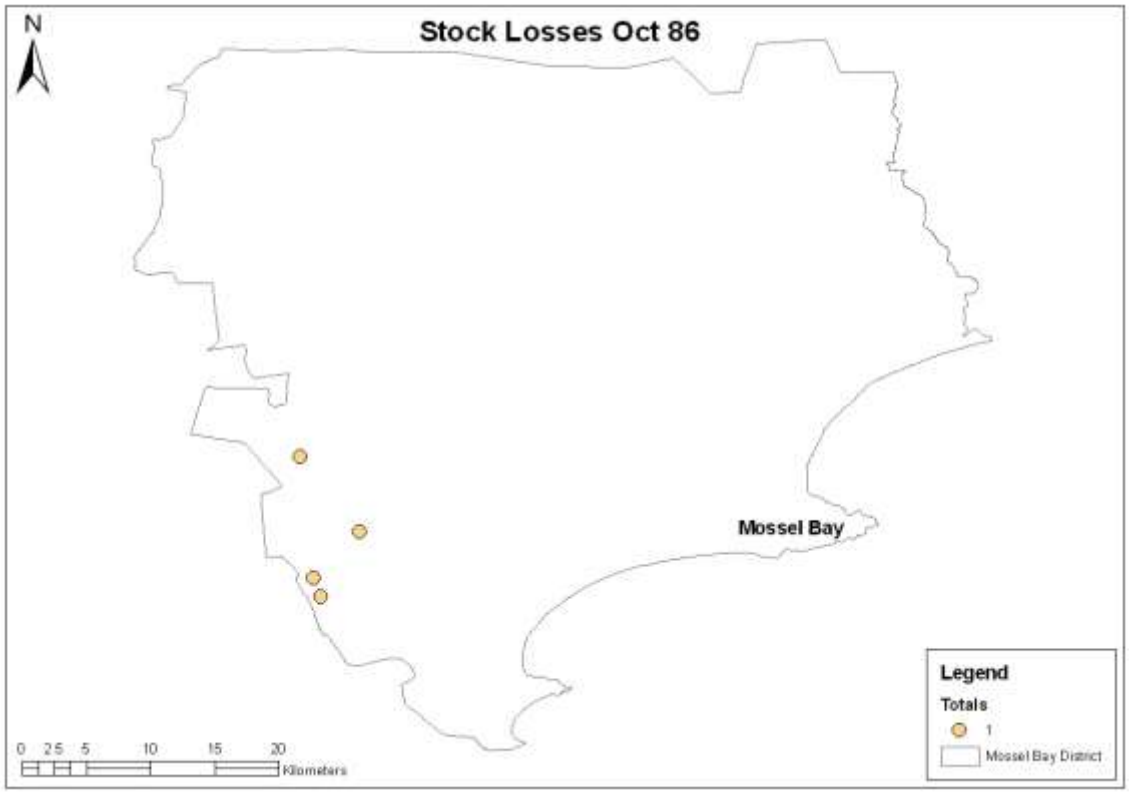


Figure 3.45 Stock losses due to predation reported for October 1986.

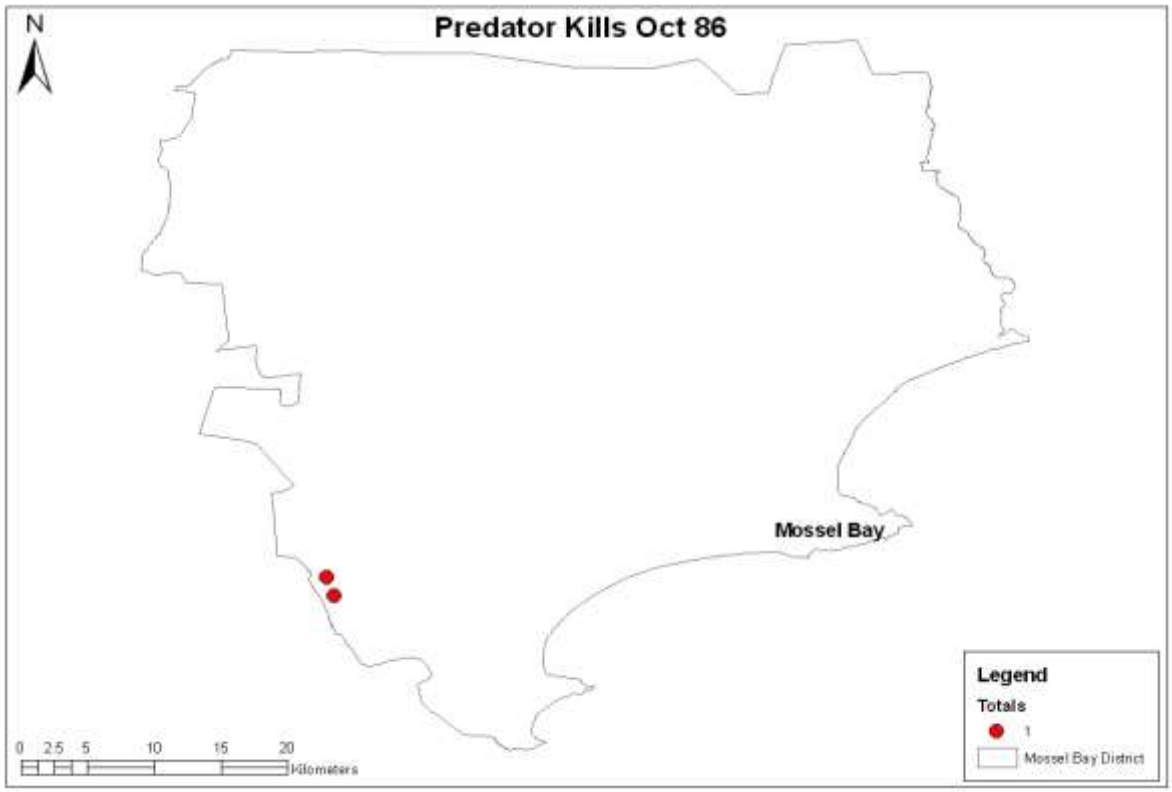


Figure 3.46 Predators killed in control operations reported for October 1986.

Table 3.64 Stock losses reported in October 1986

Farm Nr.	Sheep	Lamb	Dates
3	1	0	1986/10/13
10	1	0	1986/10/02
25	0	1	1986/10/18
*116	0	0	1986/10/06

* No small livestock losses were reported, but poultry was lost due to predation by mongoose.

Table 3.65 Predators killed in October 1986

Farm Nr.	Predator	Sex	Dates
25	Caracal	Male	1986/10/20
116	Mongoose	Male	1986/10/06

Table 3.66 Hunting activities of both problem animal control clubs in October 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
3	Cooper	PH 1	Hounds	No	1986/10/13
10	Cooper	PH 1	Hounds	No	1986/10/02
10	Cooper	PH 1	Cage	No	1986/10/16
15	Cooper	PH 1	Cage		1986/10/03
15	Cooper	PH 1	Cage	No	1986/10/15
25	Cooper	PH 1	Hounds	No	1986/10/18
25	Cooper	PH 1	Cage	Yes	1986/10/20
31	Cooper	PH 1	Cage	No	1986/10/08
31	Cooper	PH 1	Hounds		1986/10/28
53	Cooper	PH 1	Cage	No	1986/10/29
116	Cooper	PH 1	Trap	Yes	1986/10/06
116	Cooper	PH 1	Hounds		1986/10/22

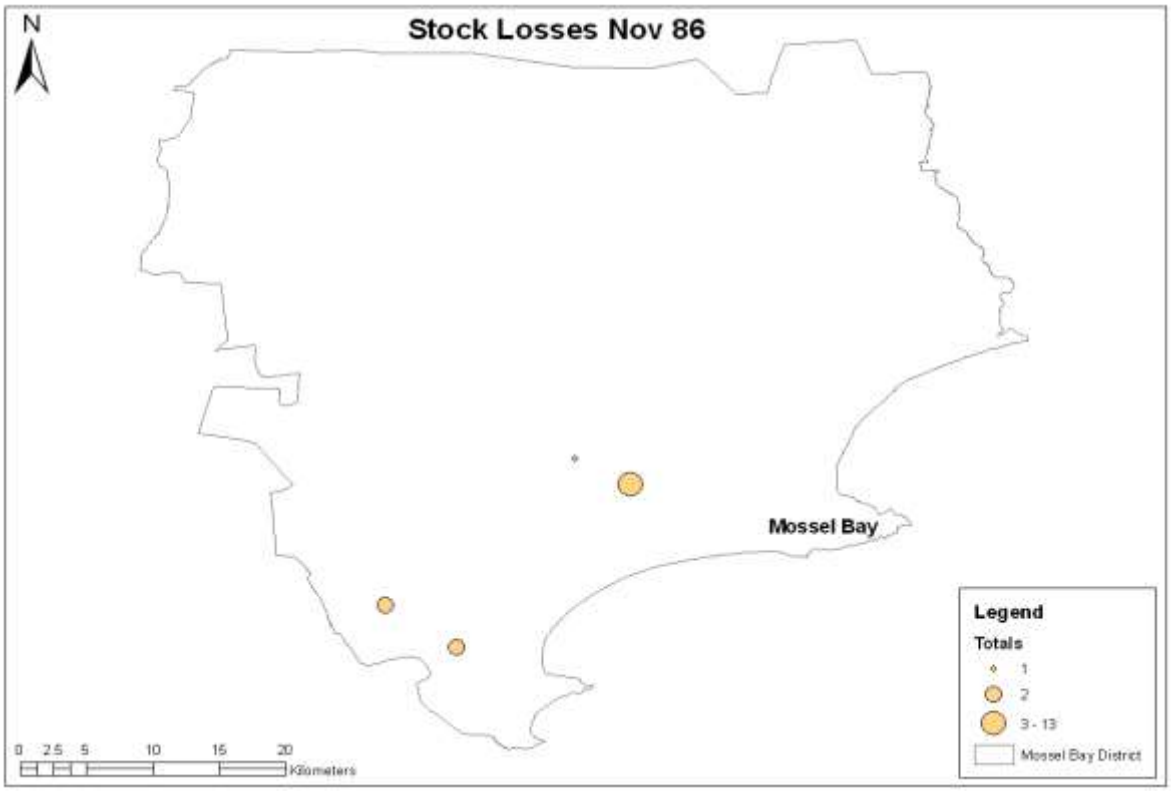


Figure 3.47 Stock losses due to predation reported for November 1986.

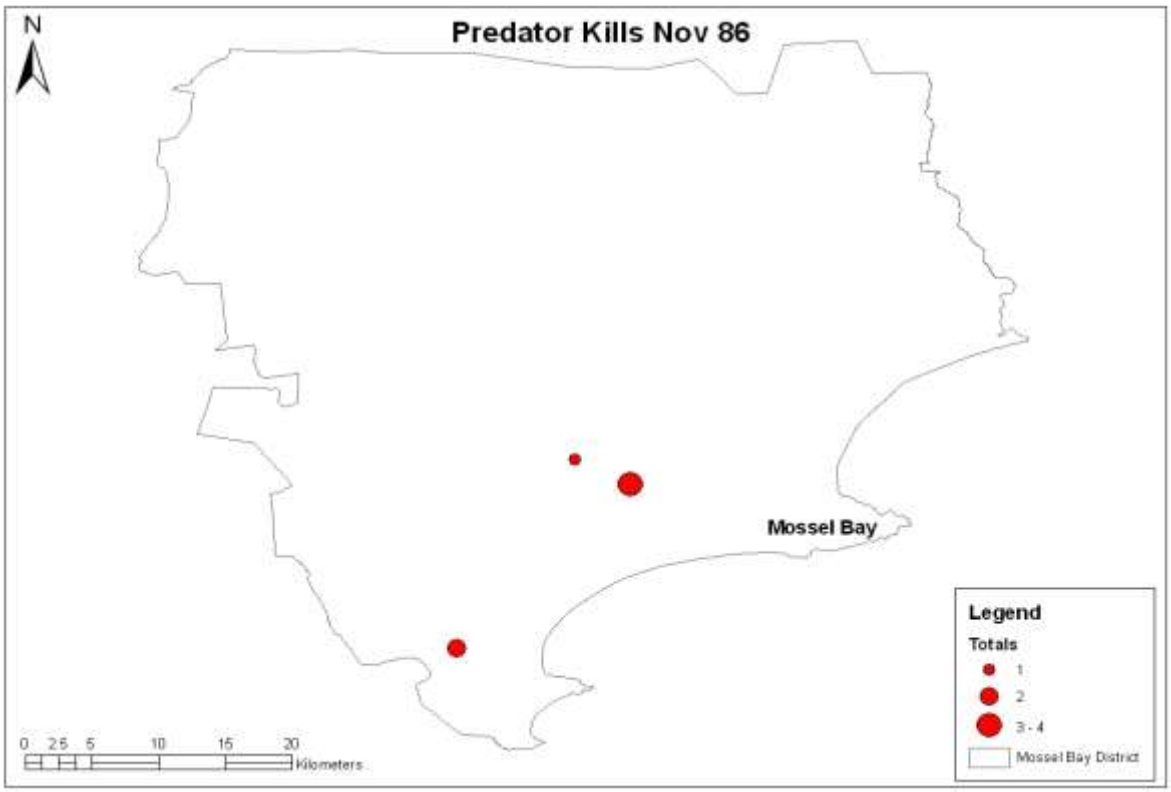


Figure 3.48 Predators killed in control operations reported for November 1986.

Table 3.67 Stock losses reported in November 1986

Farm Nr.	Sheep	Lamb	Dates
5	8	0	1986/11/22
5	5	0	1986/11/24
17	0	1	1986/11/03
17	0	1	1986/11/08
92	0	1	1986/11/29
115	1	0	1986/11/04
115	1	0	1986/11/05

Table 3.68 Predators killed in November 1986

Farm Nr.	Predator	Sex	Dates
5	Vagrant dog	Male	1986/11/24
5	Vagrant dog	Male	1986/11/24
5	Vagrant dog	Male	1986/11/24
5	Vagrant dog	Male	1986/11/24
17	Bat-eared Fox	Male	1986/11/08
17	Bat-eared Fox	Female	1986/11/08
92	Caracal	Male	1986/11/29

Table 3.69 Hunting activities of both problem animal control clubs in November 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Cage		1986/11/22
5	Cooper	PH 1	Hunt Rifle	Yes	1986/11/24
5	Cooper	PH 1	Hunt Rifle	Yes	1986/11/24
5	Cooper	PH 1	Hunt Rifle	Yes	1986/11/24
5	Cooper	PH 1	Hunt Rifle	Yes	1986/11/24
15	Cooper	PH 1	Hounds	No	1986/11/20
17	Cooper	PH 1	Hounds	No	1986/11/03
17	Cooper	PH 1	Hounds	Yes	1986/11/08
17	Cooper	PH 1	Hounds	Yes	1986/11/08
25	Cooper	PH 1	Cage	No	1986/11/14
31	Cooper	PH 1	Cage	No	1986/11/11
53	Cooper	PH 1	Hounds		1986/11/17
92	Cooper	PH 1	Hounds	Yes	1986/11/29
115	Cooper	PH 1	Hounds	No	1986/11/04
115	Cooper	PH 1	Cage		1986/11/05

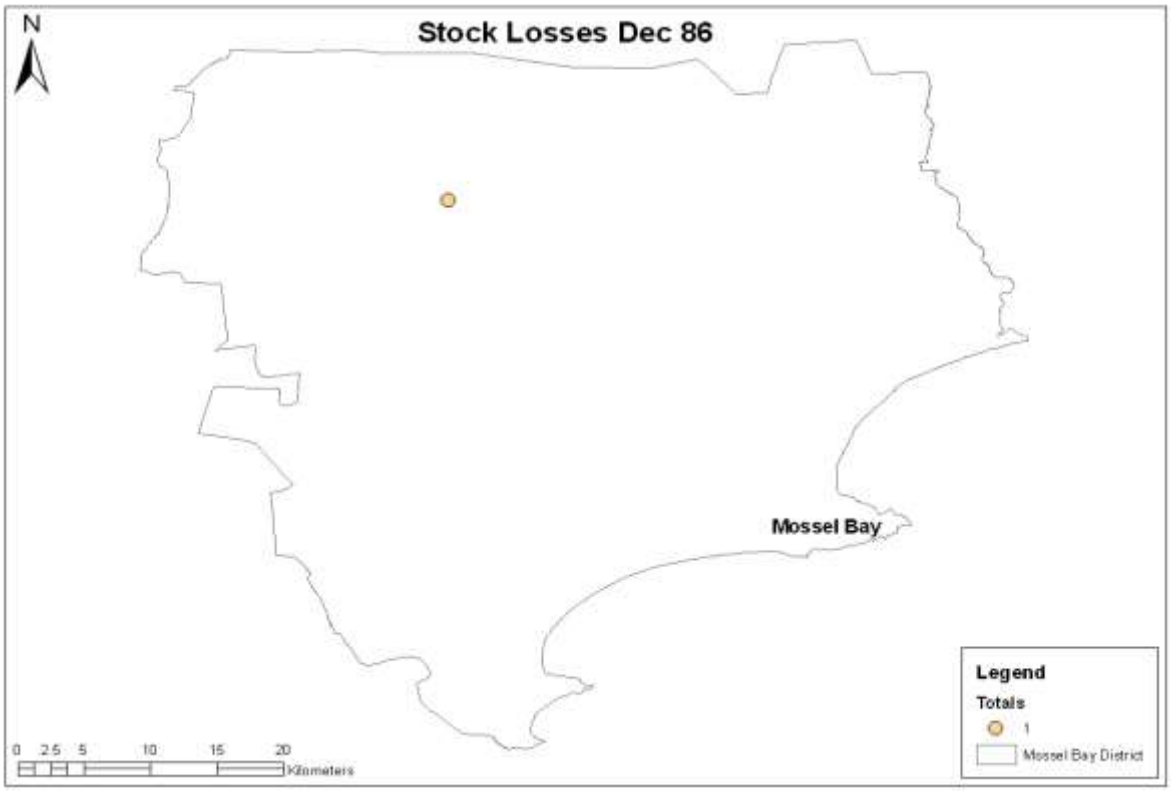


Figure 3.49 Stock losses due to predation reported for December 1986.

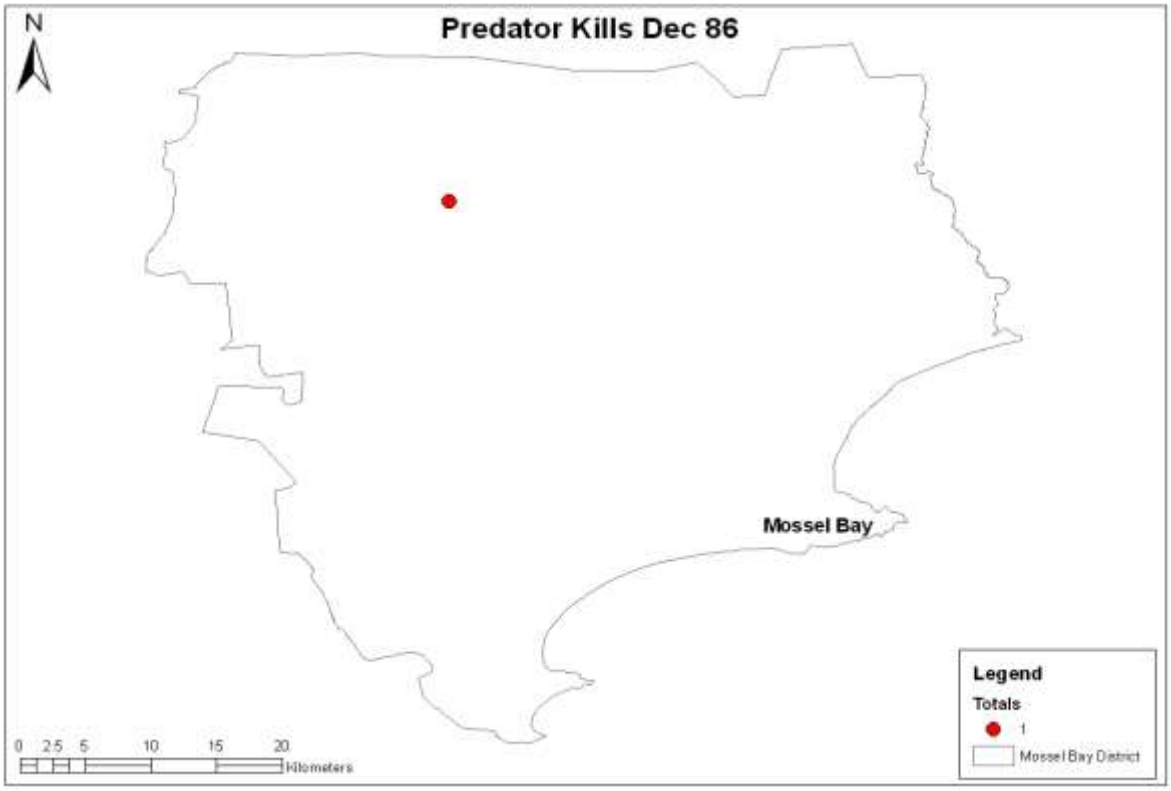


Figure 3.50 Predators killed in control operations reported for December 1986.

Table 3.70 Stock losses reported in December 1986

Farm Nr.	Sheep	Lamb	Dates
103	0	1	1986/12/23

Table 3.71 Predators killed in December 1986

Farm Nr.	Predator	Sex	Dates
103	Caracal	Female	1986/12/27

Table 3.72 Hunting activities of both problem animal control clubs in December 1986

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
15	Cooper	PH 1	Hounds		1986/12/06
31	Cooper	PH 1	Cage	No	1986/12/10
92	Cooper	PH 1	Hounds	No	1986/12/17
103	Cooper	PH 1	Hounds	No	1986/12/23
103	Cooper	PH 1	Cage	Yes	1986/12/27
115	Cooper	PH 1	Cage	No	1986/12/04
115	Cooper	PH 1	Cage	No	1986/12/30

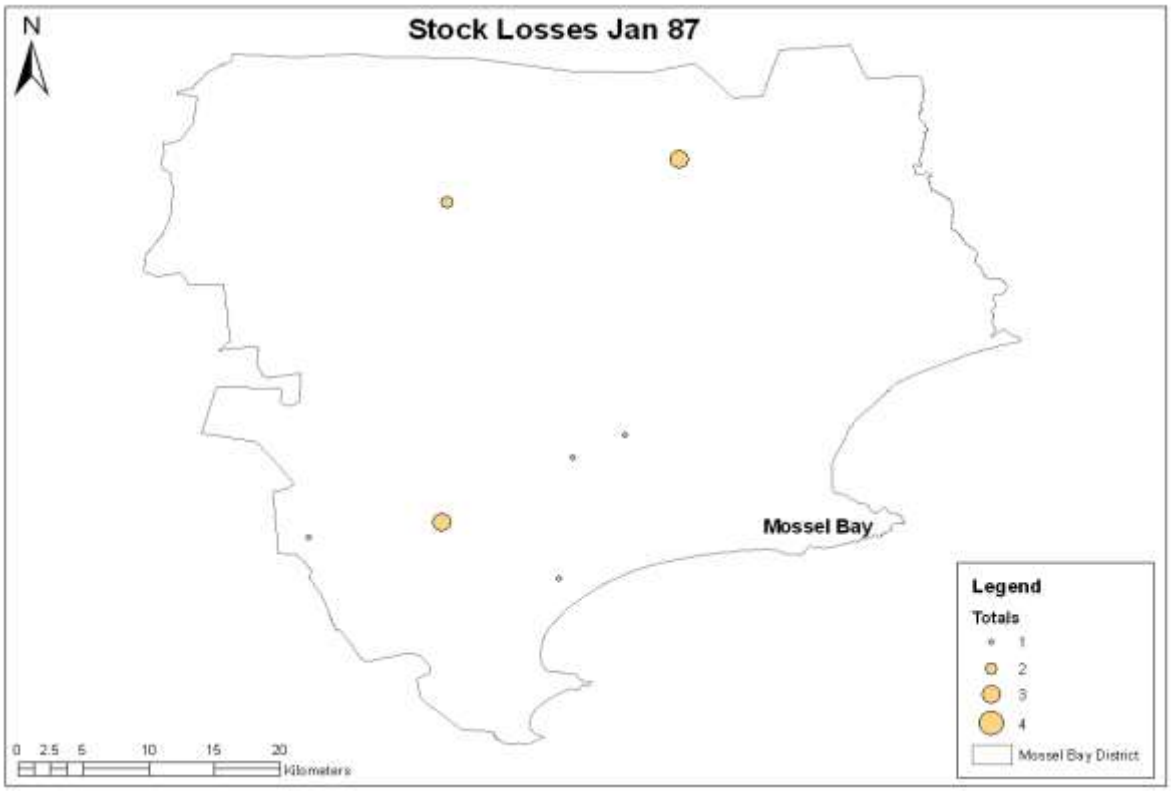


Figure 3.51 Stock losses due to predation reported for January 1987.

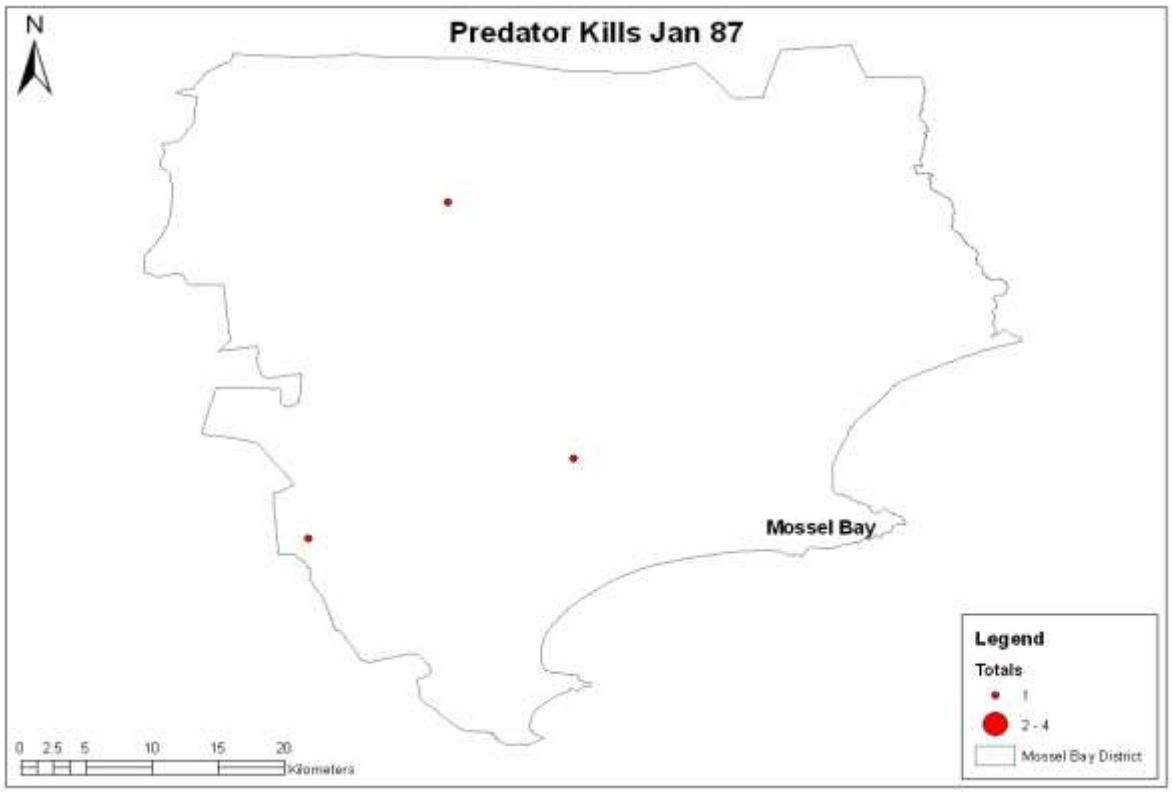


Figure 3.52 Predators killed in control operations reported for January 1987.

Table 3.73 Stock losses reported in January 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
*13	1	0	0	1987/01/13
13	0	2	0	1987/01/23
15	1	0	0	1987/01/23
35	0	1	0	1987/01/07
*60	3	0	0	1987/01/09
60	1	0	0	1987/01/26
63	0	1	0	1987/01/28
92	0	1	0	1987/01/27
103	0	1	0	1987/01/13
111	3	0	0	1987/01/30
132	0	0	1	1987/01/05
132	0	0	2	1987/01/18

*Farms which could not be identified and not shown in the map.

Table 3.74 Predators killed in January 1987

Farm Nr.	Predator	Sex	Dates
*13	Caracal	Female	1987/01/13
13	Caracal	Male	1987/01/23
15	Caracal	Male	1987/01/23
*60	Caracal	Female	1987/01/09
60	Caracal	Male	1987/01/26
92	Caracal	Female	1987/01/27
†103	Caracal	Male	1987/01/21
†132	Caracal	Female	1987/01/18

†**N**on-target animals killed.

*****Farms which could not be identified and not shown in the map.

Table 3.75 Hunting activities of both problem animal control clubs in January 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Cage	No	1987/01/09
13	MBSen	PH 4	Hounds	Yes	1987/01/13
13	MBSen	PH 4	Hounds	Yes	1987/01/23
15	Cooper	PH 1	Hounds	Yes	1987/01/23
35	Cooper	PH 1	Hounds	No	1987/01/07
35	Cooper	PH 1	Hounds	No	1987/01/08
60	MBSen	PH 4	Hounds	Yes	1987/01/09
60	MBSen	PH 4	Hounds	Yes	1987/01/26
63	Cooper	PH 1	Hounds	No	1987/01/28
92	Cooper	PH 1	Hounds	Yes	1987/01/27
103	Cooper	PH 1	Cage		1987/01/13
103	Cooper	PH 1	Cage	No	1987/01/21
111	MBSen	PH 4	Hounds	No	1987/01/30
111	MBSen	PH 4	Hounds	No	1987/01/31
132	Cooper	PH 1	Hounds	No	1987/01/05
132	Cooper	PH 1	Hounds	No	1987/01/06
132	Cooper	PH 1	Hounds	No	1987/01/12
132	Cooper	PH 1	Hounds	No	1987/01/18

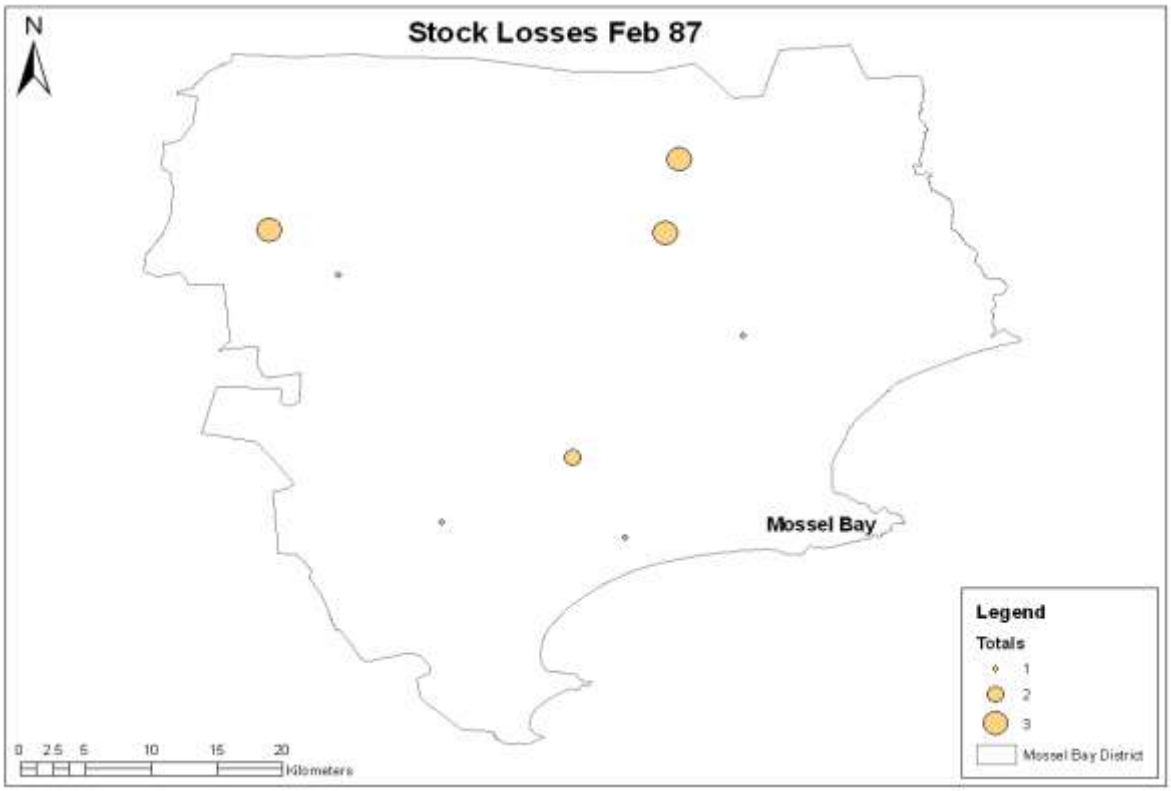


Figure 3.53 Stock losses due to predation reported for February 1987.

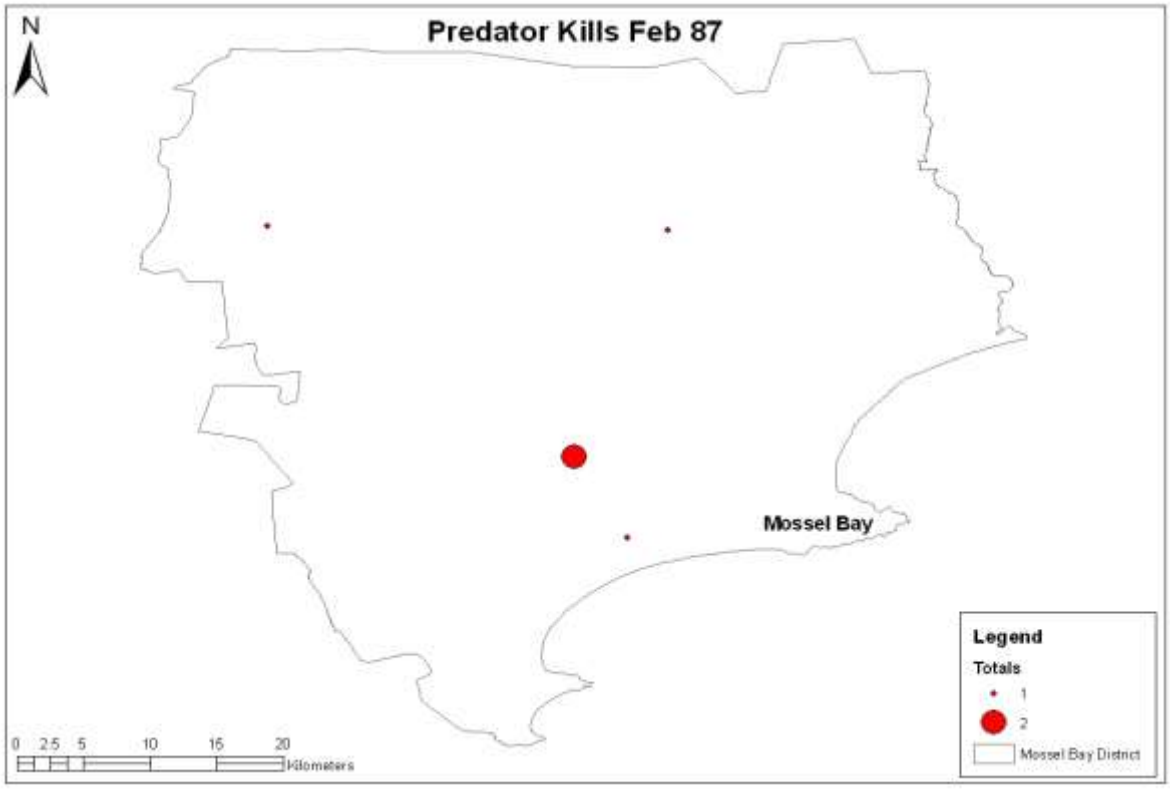


Figure 3.54 Predators killed in control operations reported for February 1987.

Table 3.76 Stock losses reported in February 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
*12	3	0	0	1987/02/27
22	1	0	0	1987/02/19
31	0	1	0	1987/02/23
48	0	0	1	1987/02/21
56	0	0	3	1987/02/23
91	3	0	0	1987/02/26
92	0	1	0	1987/02/17
92	0	1	0	1987/02/25
111	3	0	0	1987/02/03
132	0	0	1	1987/02/02

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.77 Predators killed in February 1987

Farm Nr.	Predator	Sex	Dates
31	Caracal	Female	1987/02/23
56	Vagrant dog	Male	1987/02/24
91	Caracal	Female	1987/02/26
92	Caracal	Female	1987/02/17
92	Caracal	Female	1987/02/25

Table 3.78 Hunting activities of both problem animal control clubs in February 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
12	MBSen	PH 4	Hounds	No	1987/02/27
15	Cooper	PH 1	Cage	No	1987/02/09
22	MBSen	PH 4	Hounds	No	1987/02/19
22	MBSen	PH 4	Hounds	No	1987/02/20
25	Cooper	PH 1	Cage		1987/02/13
31	Cooper	PH 1	Cage	Yes	1987/02/23
48	MBSen	PH 4	Cage	No	1987/02/21
56	MBSen	PH 4	Cage and trap	No	1987/02/23
56	MBSen	PH 4	Trap	Yes	1987/02/24
91	MBSen	PH 4	Hounds	Yes	1987/02/26
92	Cooper	PH 1	Hounds	Yes	1987/02/17
92	Cooper	PH 1	Hounds	Yes	1987/02/25
111	MBSen	PH 4	Hounds	No	1987/02/03
132	Cooper	PH 1	Hounds	No	1987/02/02
132	Cooper	PH 1	Trap	No	1987/02/03
132	Cooper	PH 1	Hounds	No	1987/02/19

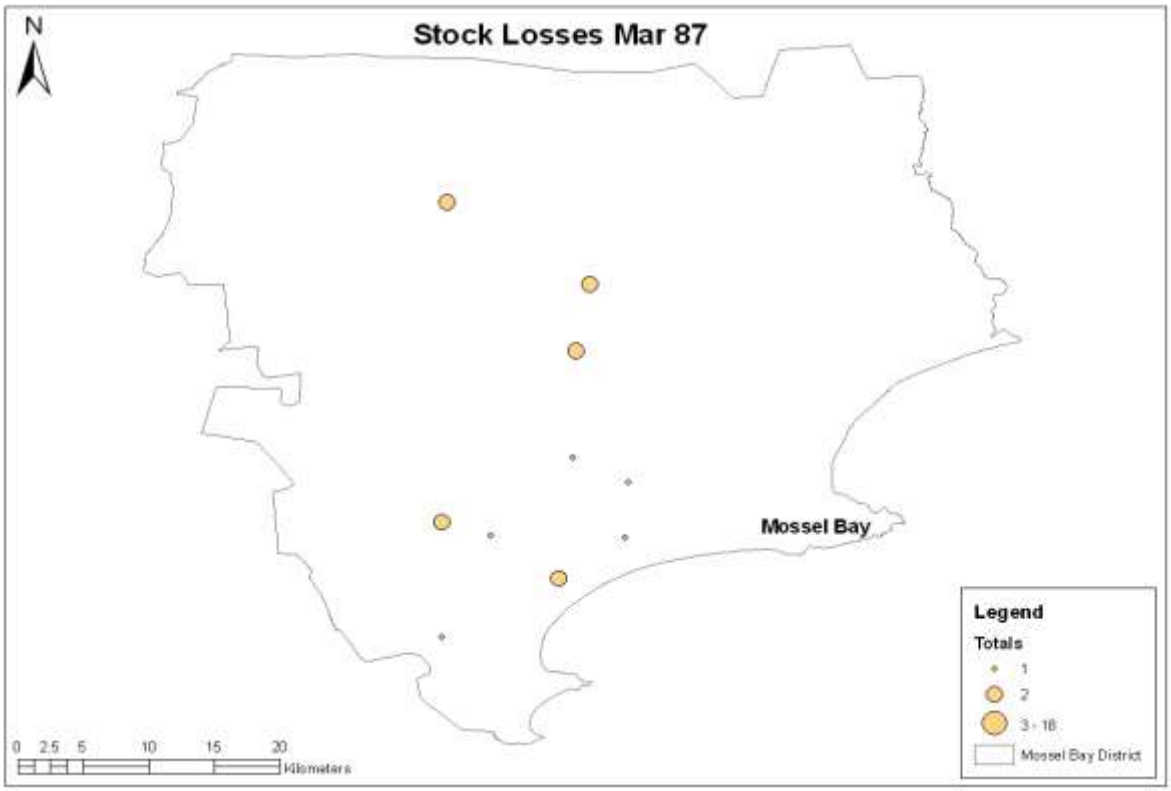


Figure 3.55 Stock losses due to predation reported for March 1987.

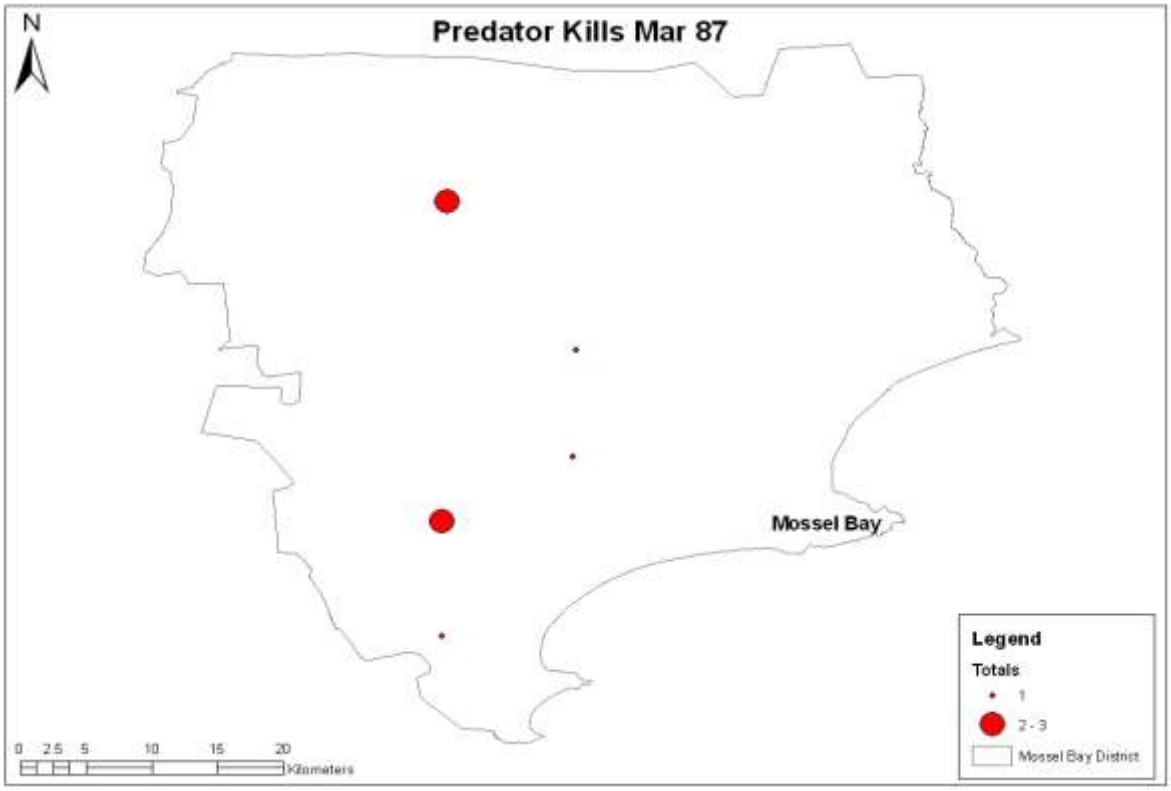


Figure 3.56 Predators killed in control operations reported for March 1987.

Table 3.79 Stock losses reported in March 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
5	0	1	0	1987/03/13
*12	2	0	0	1987/03/02
12	3	0	0	1987/03/06
12	1	0	0	1987/03/11
12	0	4	0	1987/03/16
12	0	7	0	1987/03/21
12	1	0	0	1987/03/27
31	1	0	0	1987/03/03
53	1	0	0	1987/03/05
63	0	2	0	1987/03/26
66	2	0	0	1987/03/13
78	0	0	1	1987/03/10
92	0	1	0	1987/03/18
103	0	1	0	1987/03/07
103	1	0	0	1987/03/23
105	0	2	0	1987/03/24
132	0	0	2	1987/03/20

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.80 Predators killed in March 1987

Farm Nr.	Predator	Sex	Dates
*12	Honey Badger		1987/03/27
66	Caracal	Male	1987/03/14
78	Caracal	Female	1987/03/11
92	Caracal	Female	1987/03/18
103	Caracal	Male	1987/03/07
103	Honey Badger	Female	1987/03/24
132	Caracal	Female	1987/03/20
132	Caracal	Male	1987/03/21
132	Caracal	Female	1987/03/21

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.81 Hunting activities for both problem animal control clubs in March 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Hounds	No	1987/03/13
5	Cooper	PH 1	Hounds	No	1987/03/16
12	MBSen	PH 4	Hounds	No	1987/03/02
12	MBSen	PH 4	Hounds	No	1987/03/06
12	MBSen	PH 4	Hounds	No	1987/03/07
12	MBSen	PH 4	Hounds	No	1987/03/11
12	MBSen	PH 4	Hounds	No	1987/03/16
12	MBSen	PH 4	Hounds	No	1987/03/21
12	MBSen	PH 4	Hounds	Yes	1987/03/27
31	Cooper	PH 1	Cage		1987/03/03
53	Cooper	PH 1	Cage		1987/03/05
63	Cooper	PH 1	Trap	No	1987/03/26
63	Cooper	PH 1	Hounds	No	1987/03/27
63	Cooper	PH 1	Hounds	No	1987/03/31
66	MBSen	PH 4	Hounds	No	1987/03/13
66	MBSen	PH 4	Hounds	Yes	1987/03/14
78	Cooper	PH 1	Hounds	No	1987/03/10
78	Cooper	PH 1	Trap	Yes	1987/03/11
80	Cooper	PH 1	Hounds	No	1987/03/30
92	Cooper	PH 1	Hounds	Yes	1987/03/18
103	Cooper	PH 1	Cage	Yes	1987/03/07
103	Cooper	PH 1	Cage	No	1987/03/23
103	Cooper	PH 1	Cage	Yes	1987/03/24
103	Cooper	PH 1	Cage	No	1987/03/25
105	MBSen	PH 4	Hounds	No	1987/03/24
132	Cooper	PH 1	Cage	No	1987/03/09
132	Cooper	PH 1	Trap	Yes	1987/03/20
132	Cooper	PH 1	Hounds	Yes	1987/03/21
132	Cooper	PH 1	Hounds	Yes	1987/03/21

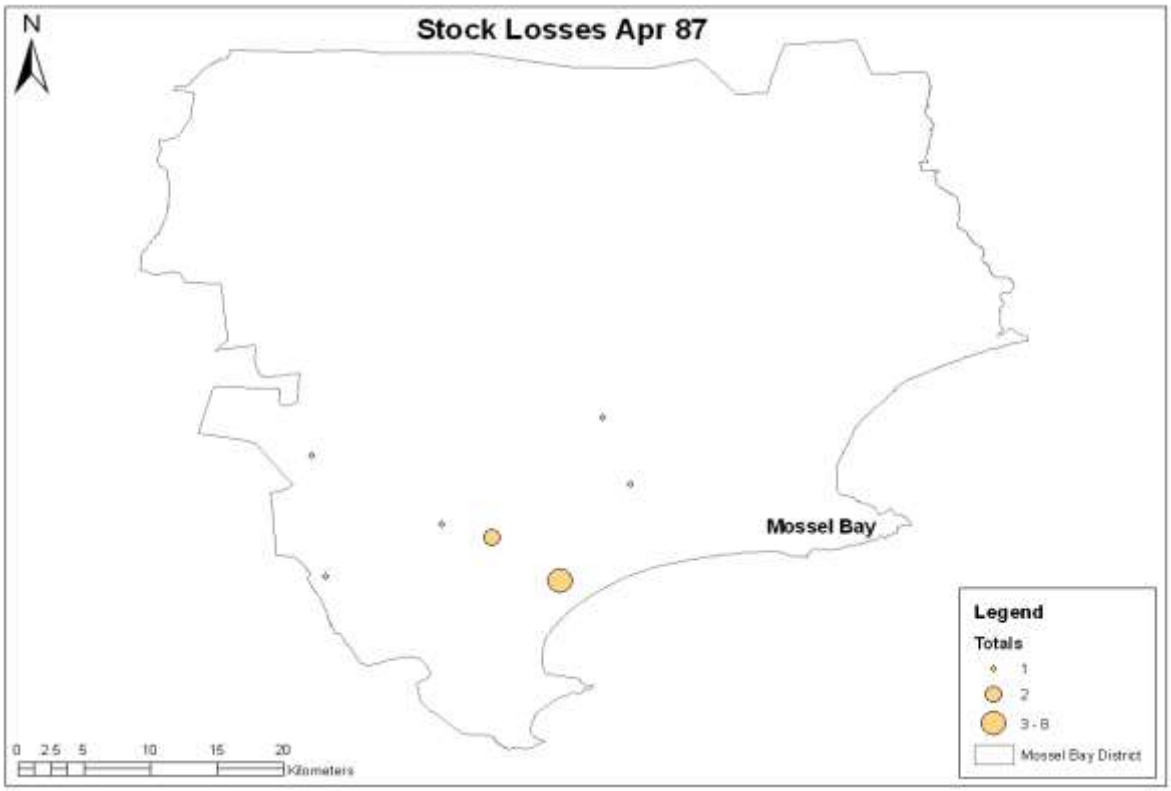


Figure 3.57 Stock losses due to predation reported for April 1987.

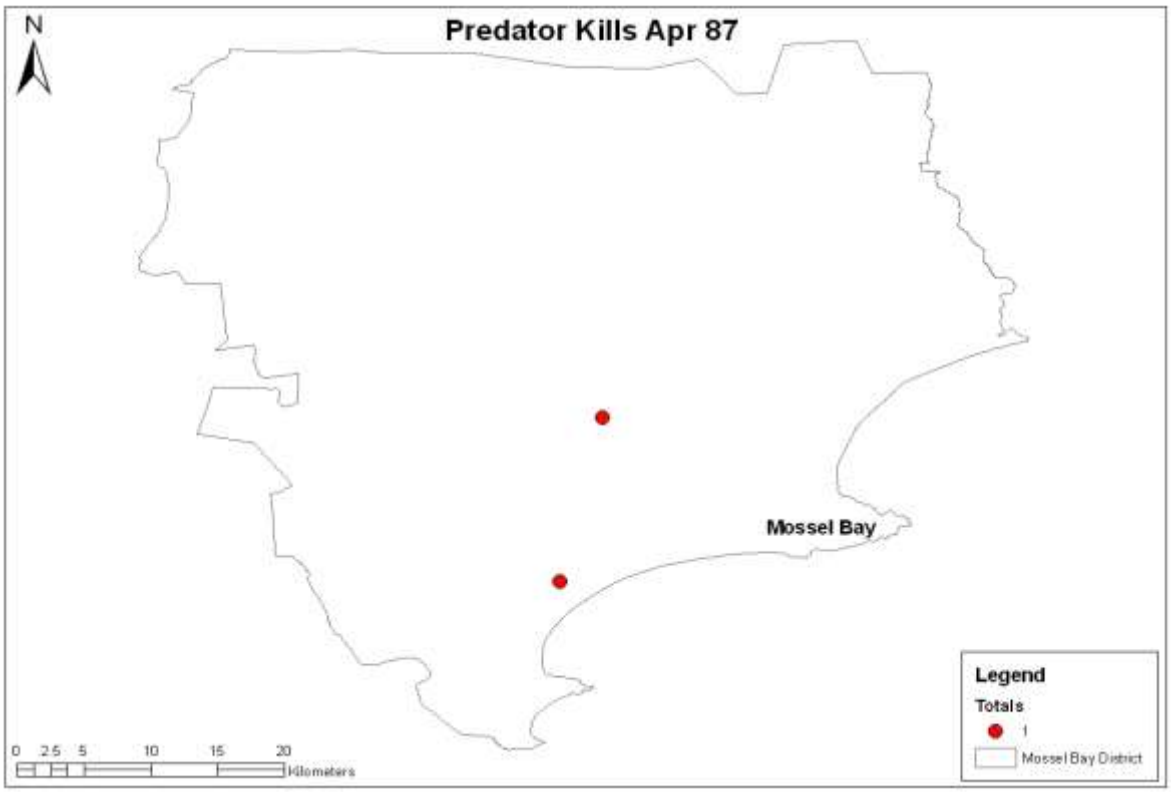


Figure 3.58 Predators killed in control operations reported for April 1987.

Table 3.82 Stock losses reported in April 1987

Farm Nr.	Sheep	Lamb	Dates
5	1	0	1987/04/18
10	0	1	1987/04/14
53	0	1	1987/04/24
53	1	0	1987/04/27
63	1	0	1987/04/09
63	0	6	1987/04/25
63	1	0	1987/04/30
72	0	1	1987/04/21
116	1	0	1987/04/22
132	1	0	1987/04/23

Table 3.83 Predators killed in April 1987

Farm Nr.	Predator	Sex	Dates
63	Caracal	Female	1987/04/25
72	Caracal	Female	1987/04/21

Table 3.84 Hunting activities of both problem animal control clubs in April 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Hounds	No	1987/04/18
5	Cooper	PH 1	Cage	No	1987/04/20
10	Cooper	PH 1	Hounds	No	1987/04/14
53	Cooper	PH 1	Hounds	No	1987/04/24
53	Cooper	PH 1	Cage	No	1987/04/27
63	Cooper	PH 1	Hounds	No	1987/04/09
63	Cooper	PH 1	Cage		1987/04/10
63	Cooper	PH 1	Hounds	No	1987/04/16
63	Cooper	PH 1	Hounds	Yes	1987/04/25
63	Cooper	PH 1	Cage	No	1987/04/30
72	Cooper	PH 1	Hounds	Yes	1987/04/21
80	Cooper	PH 1	Hounds	No	1987/04/07
116	Cooper	PH 1	Hounds	No	1987/04/22
116	Cooper	PH 1	Hounds	No	1987/04/29
132	Cooper	PH 1	Hounds	No	1987/04/03
132	Cooper	PH 1	Hounds	No	1987/04/23

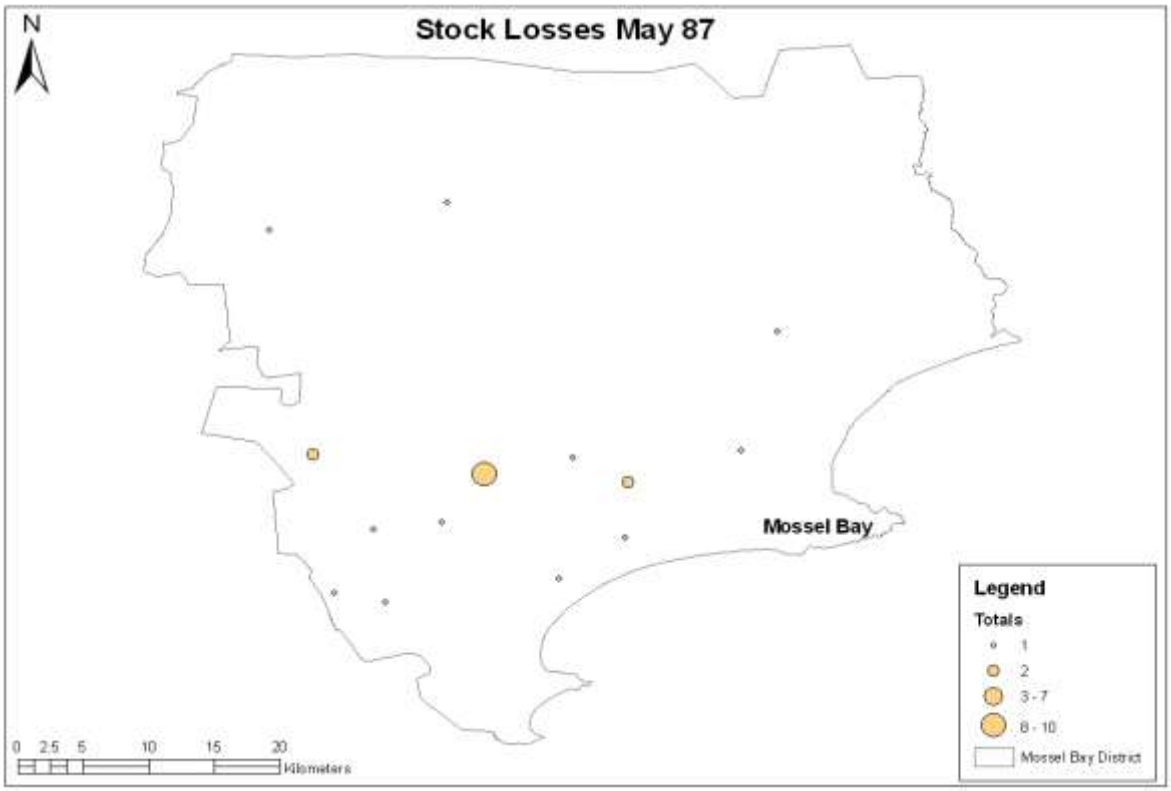


Figure 3.59 Stock losses due to predation reported for May 1987.

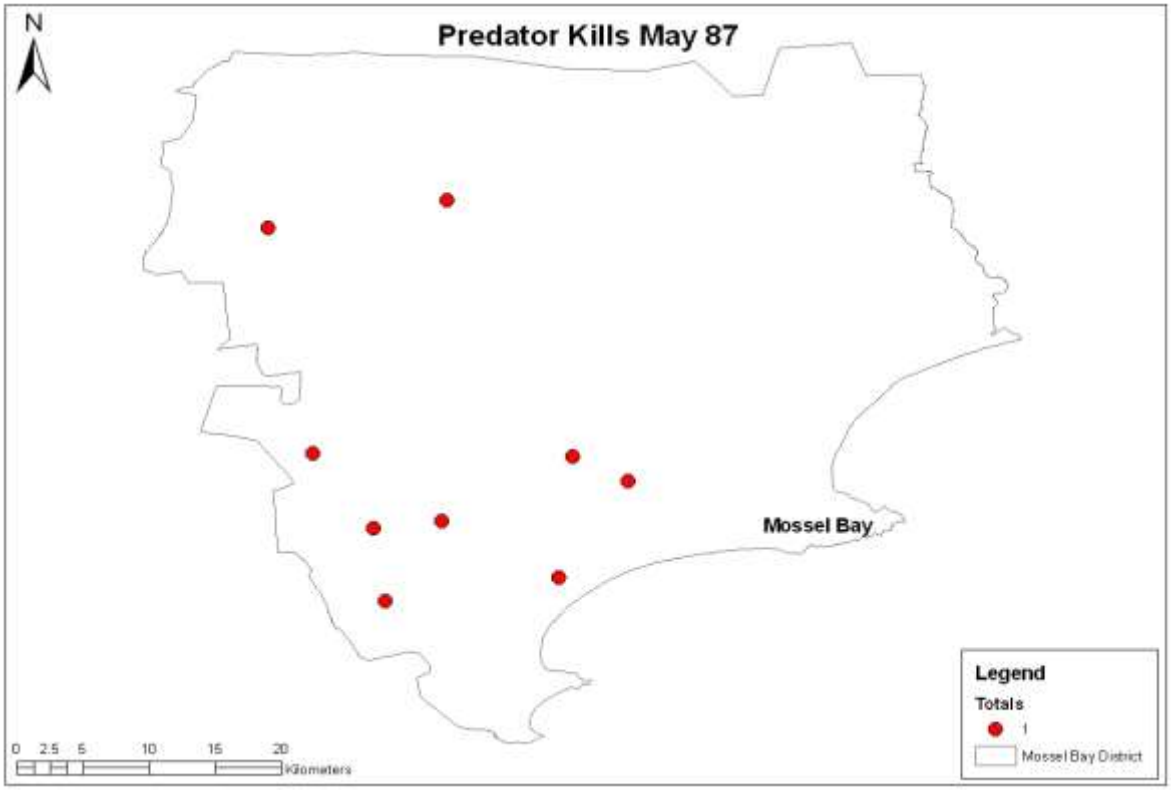


Figure 3.60 Predators killed in control operations reported for May 1987.

Table 3.85 Stock losses reported in May 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
5	0	2	0	1987/05/16
10	0	1	0	1987/05/13
10	0	1	0	1987/05/26
*12	2	0	0	1987/05/13
12	1	0	0	1987/05/15
12	1	0	0	1987/05/18
12	3	0	0	1987/05/23
25	1	0	0	1987/05/05
31	1	0	0	1987/05/08
56	0	0	1	1987/05/08
63	0	1	0	1987/05/25
64	1	0	0	1987/05/29
82	0	1	0	1987/05/30
92	0	1	0	1987/05/20
103	0	1	0	1987/05/02
104	9	0	0	1987/05/19
104	1	0	0	1987/05/22
115	0	1	0	1987/05/27
132	0	1	0	1987/05/11
133	0	1	0	1987/05/29

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.86 Predators killed in May 1987

Farm Nr.	Predator	Sex	Dates
5	Caracal	Female	1987/05/16
10	Caracal	Female	1987/05/13
*12	Honey Badger	Female	1987/05/23
56	Caracal	Male	1987/05/11
63	Caracal	Female	1987/05/25
92	Caracal	Female	1987/05/20
103	Caracal	Male	1987/05/02
115	Caracal	Female	1987/05/27
132	Caracal	Male	1987/05/11
133	Caracal	Female	1987/05/29

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.87 Hunting activities of both problem animal control clubs in May 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Hounds	Yes	1987/05/16
10	Cooper	PH 1	Hounds	Yes	1987/05/13
10	Cooper	PH 1	Hounds	No	1987/05/26
12	MBSen	PH 4	Hounds	No	1987/05/13
12	MBSen	PH 4	Hounds	No	1987/05/15
12	MBSen	PH 4	Hounds	No	1987/05/18
12	MBSen	PH 4	Hounds	Yes	1987/05/23
25	Cooper	PH 1	Cage	No	1987/05/05
31	Cooper	PH 1	Cage	No	1987/05/08
56	MBSen	PH 4	Hounds	No	1987/05/08
56	MBSen	PH 4	Cage	Yes	1987/05/11
63	Cooper	PH 1	Hounds	Yes	1987/05/25
64	MBSen	PH 4	Hounds	No	1987/05/29
82	MBSen	PH 4	Hounds	No	1987/05/30
92	Cooper	PH 1	Hounds	Yes	1987/05/20
103	Cooper	PH 1	Cage	Yes	1987/05/02
104	Cooper	PH 1	Hounds	No	1987/05/19
104	Cooper	PH 1	Hounds	No	1987/05/22
115	Cooper	PH 1	Cage	Yes	1987/05/27
132	Cooper	PH 1	Hounds	Yes	1987/05/11
133	Cooper	PH 1	Hounds	Yes	1987/05/29

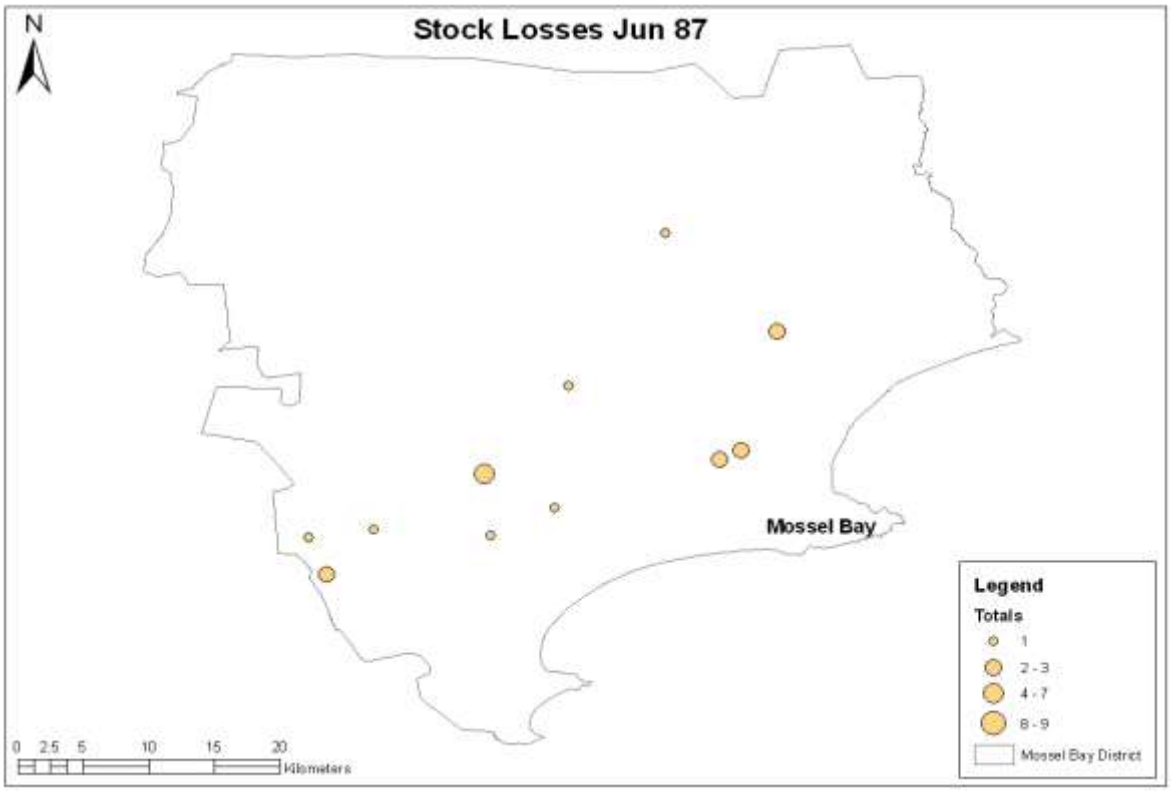


Figure 3.61 Stock losses due to predation reported for June 1987.

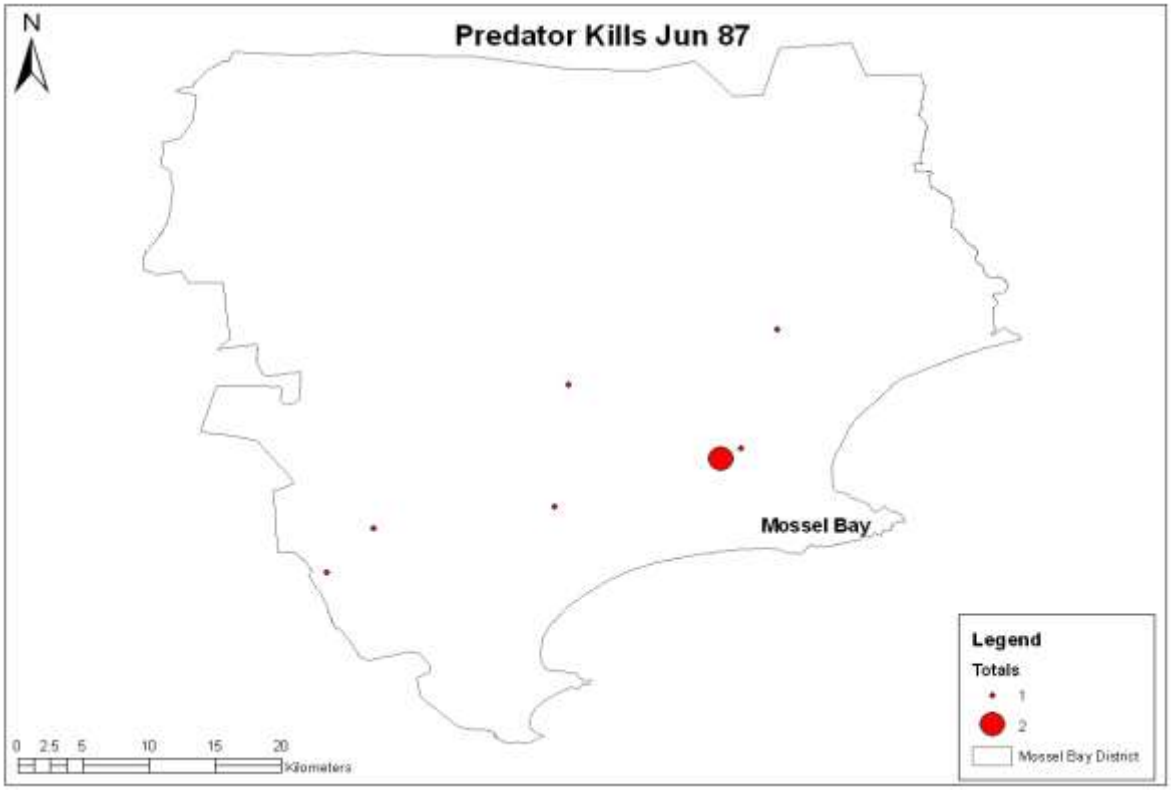


Figure 3.62 Predators killed in control operations reported for June 1987.

Table 3.88 Stock losses reported in June 1987

Farm Nr.	Sheep	Lamb	Dates
*12	3	0	1987/06/19
12	1	0	1987/06/20
12	1	0	1987/06/22
12	2	0	1987/06/26
12	0	2	1987/06/29
15	0	1	1987/06/18
#23	0	0	1987/06/12
30	0	1	1987/06/29
53	1	0	1987/06/16
61	0	1	1987/06/24
64	2	0	1987/06/12
64	1	0	1987/06/27
65	2	0	1987/06/23
65	1	0	1987/06/26
82	0	2	1987/06/03
82	0	1	1987/06/06
91	1	0	1987/06/15
104	7	0	1987/06/27
116	0	1	1987/06/01
116	1	0	1987/06/05
116	0	1	1987/06/28

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

#Farm Nr. 23 not a small stock loss, but poultry was lost due to predation by genet.

Table 3.89 Predators killed in June 1987

Farm Nr.	Predator	Sex	Dates
*12	Caracal	Female	1987/06/29
23	Genet	Male	1987/06/12
30	Caracal	Male	1987/06/29
61	Caracal	Male	1987/06/24
64	Caracal	Male	1987/06/27
65	Honey Badger	Male	1987/06/23
65	Honey Badger	Male	1987/06/26
82	Honey Badger	Female	1987/06/06
116	Caracal	Female	1987/06/28

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.90 Hunting activities of both problem animal control clubs in June 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds	No	1987/06/09
12	MBSen	PH 4	Hounds	No	1987/06/19
12	MBSen	PH 4	Hounds	No	1987/06/20
12	MBSen	PH 4	Hounds	No	1987/06/22
12	MBSen	PH 4	Trap	No	1987/06/26
12	MBSen	PH 4	Hounds	Yes	1987/06/29
15	Cooper	PH 1	Hounds	No	1987/06/03
15	Cooper	PH 1	Hounds	No	1987/06/18
23	Cooper	PH 1	Trap	Yes	1987/06/12
25	Cooper	PH 1	Cage	No	1987/06/20
30	MBSen	PH 4	Hounds	Yes	1987/06/29
31	Cooper	PH 1	Cage	No	1987/06/10
53	Cooper	PH 1	Hounds	No	1987/06/16
61	Cooper	PH 1	Hounds	Yes	1987/06/24
63	Cooper	PH 1	Hounds	No	1987/06/03
64	MBSen	PH 4	Hounds	No	1987/06/12
64	MBSen	PH 4	Hounds	Yes	1987/06/27
65	Cooper	PH 1	Trap	Yes	1987/06/23
65	Cooper	PH 1	Trap	Yes	1987/06/26
82	MBSen	PH 4	Hounds	No	1987/06/03
82	MBSen	PH 4	Hounds	Yes	1987/06/06
91	MBSen	PH 4	Hounds	No	1987/06/15
104	Cooper	PH 1	Hounds	No	1987/06/27
116	Cooper	PH 1	Hounds	No	1987/06/05
116	Cooper	PH 1	Cage		1987/06/06
116	Cooper	PH 1	Hounds	Yes	1987/06/28

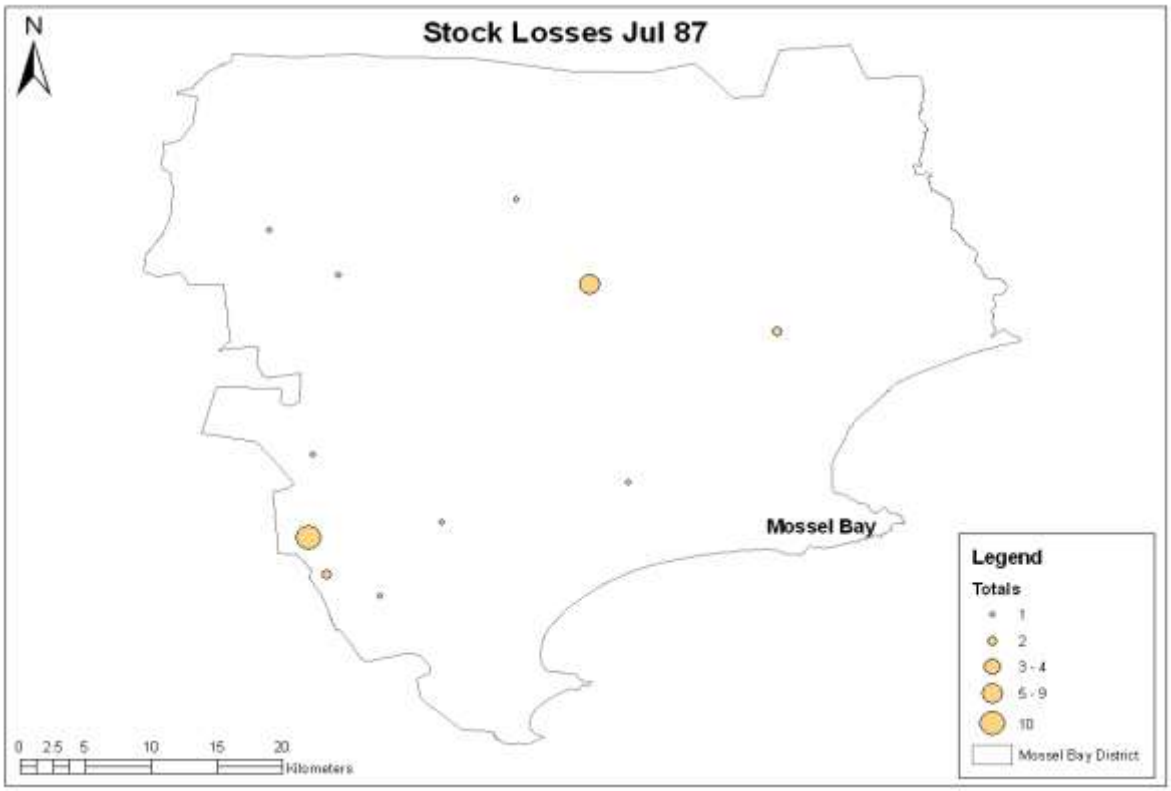


Figure 3.63 Stock losses due to predation reported for July 1987.

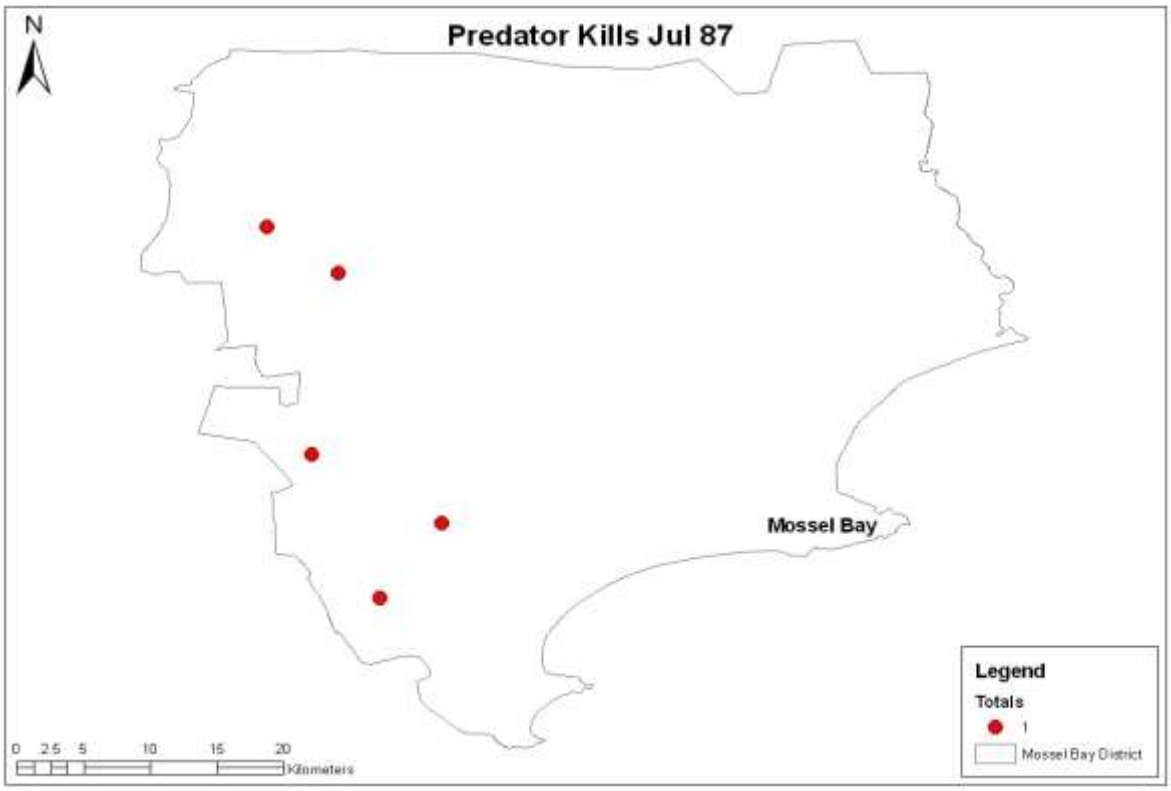


Figure 3.64 Predators killed in control operations reported for July 1987.

Table 3.91 Stock losses reported in July 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
3	0	0	1	1987/07/15
10	0	1	0	1987/07/16
*12	2	0	0	1987/07/06
12	1	0	0	1987/07/08
12	1	0	0	1987/07/09
15	0	6	0	1987/07/03
15	0	1	0	1987/07/06
15	0	3	0	1987/07/24
33	0	1	0	1987/07/13
48	1	0	0	1987/07/10
56	1	0	0	1987/07/02
82	1	0	0	1987/07/30
82	1	0	0	1987/07/31
105	7	0	0	1987/07/17
105	2	0	0	1987/07/20
110	0	1	0	1987/07/18
116	1	0	0	1987/07/09
116	1	0	0	1987/07/27
132	0	0	1	1987/07/21

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.92 Predators killed in July 1987

Farm Nr.	Predator	Sex	Dates
10	Caracal	Male	1987/07/16
48	Caracal	Female	1987/07/10
56	Caracal	Female	1987/07/02
110	Caracal	Male	1987/07/18
132	Caracal	Female	1987/07/21

Table 3.93 Hunting activities of both problem animal control clubs in July 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
5	Cooper	PH 1	Trap	No	1987/07/15
10	Cooper	PH 1	Trap	Yes	1987/07/16
10	Cooper	PH 1	Hounds	No	1987/07/31
12	MBSen	PH 4	Hounds	No	1987/07/06
12	MBSen	PH 4	Hounds	No	1987/07/08
12	MBSen	PH 4	Trap	No	1987/07/09
15	Cooper	PH 1	Trap	No	1987/07/06
15	Cooper	PH 1	Hounds	No	1987/07/24
33	Cooper	PH 1	Trap	No	1987/07/13
48	MBSen	PH 4	Hounds	Yes	1987/07/10
56	MBSen	PH 4	Cage	Yes	1987/07/02
82	MBSen	PH 4	Hounds	No	1987/07/30
82	MBSen	PH 4	Hounds	No	1987/07/31
105	MBSen	PH 4	Hounds	No	1987/07/17
105	MBSen	PH 4	Hounds	No	1987/07/20
110	Cooper	PH 1	Hounds	Yes	1987/07/18
116	Cooper	PH 1	Cage	No	1987/07/09
116	Cooper	PH 1	Hounds	No	1987/07/27
132	Cooper	PH 1	Hounds	Yes	1987/07/21

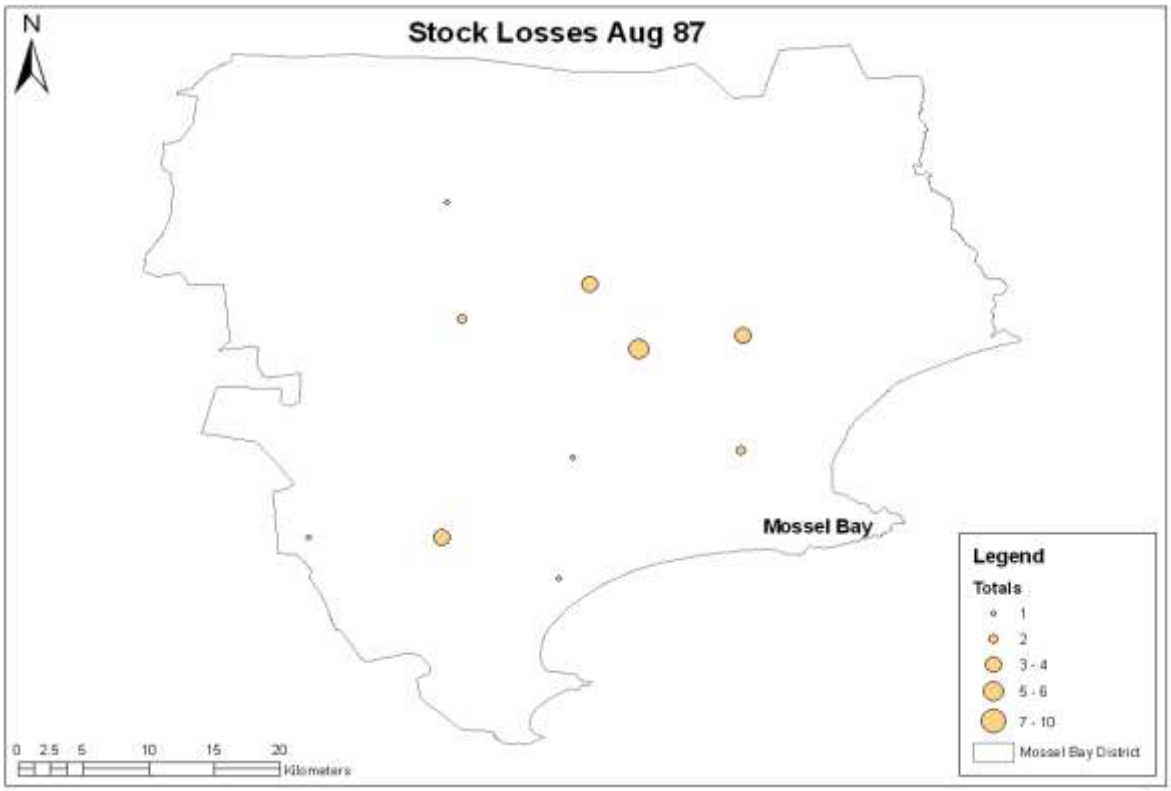


Figure 3.65 Stock losses due to predation reported for August 1987.

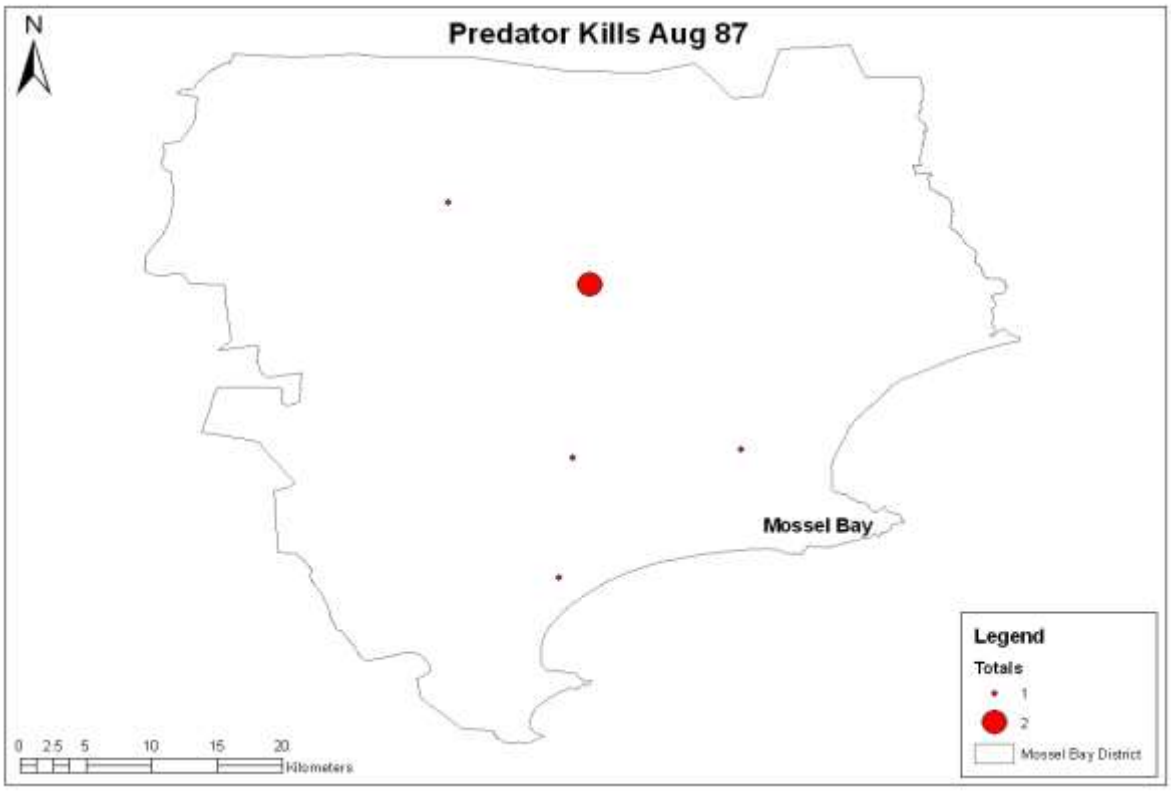


Figure 3.66 Predators killed in control operations reported for August 1987.

Table 3.94 Stock losses reported in August 1987

Farm Nr.	Sheep	Lamb	Dates
*12	0	3	1987/08/03
12	0	1	1987/08/04
12	0	2	1987/08/05
12	0	1	1987/08/06
12	0	3	1987/08/08
15	0	3	1987/08/05
15	0	1	1987/08/24
22	0	2	1987/08/21
22	0	1	1987/08/27
51	0	2	1987/08/14
63	0	1	1987/08/12
64	2	0	1987/08/28
92	0	1	1987/08/03
93	3	0	1987/08/24
93	1	0	1987/08/25
93	1	0	1987/08/26
93	1	0	1987/08/27
103	0	1	1987/08/17
105	4	0	1987/08/15

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.95 Predators killed in August 1987

Farm Nr.	Predator	Sex	Dates
*12	Cape Fox	Male	1987/08/04
12	Caracal	Female	1987/08/08
63	Caracal	Female	1987/08/12
64	Caracal	Female	1987/08/28
92	Caracal	Male	1987/08/03
103	Caracal	Male	1987/08/17
105	Vagrant dog	Male	1987/08/17
105	Vagrant dog	Female	1987/08/20

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.96 Hunting activities of both problem animal control clubs in August 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
12	MBSen	PH 4	Hounds	No	1987/08/03
12	MBSen	PH 4	Hounds	Yes	1987/08/04
12	MBSen	PH 4	Hounds	No	1987/08/05
12	MBSen	PH 4	Hounds	No	1987/08/06
12	MBSen	PH 4	Hounds	Yes	1987/08/08
15	Cooper	PH 1	Hounds	No	1987/08/03
15	Cooper	PH 1	Hounds	No	1987/08/05
15	Cooper	PH 1	Hounds	No	1987/08/24
15	Cooper	PH 1	Trap	No	1987/08/25
22	Cooper	PH 1	Hounds	No	1987/08/21
22	Cooper	PH 1	Hounds	No	1987/08/27
22	Cooper	PH 1	Hounds	No	1987/08/29
24	Cooper	PH 1	Hounds	No	1987/08/18
31	Cooper	PH 1	Hounds		1987/08/11
51	Cooper	PH 1	Hounds	No	1987/08/14
63	Cooper	PH 1	Hounds	Yes	1987/08/12
64	MBSen	PH 4	Hounds	Yes	1987/08/28
92	Cooper	PH 1	Hounds	Yes	1987/08/03
93	MBSen	PH 4	Hounds	No	1987/08/24
93	MBSen	PH 4	Hounds	No	1987/08/25
93	MBSen	PH 4	Hounds	No	1987/08/26
93	MBSen	PH 4	Hounds	No	1987/08/27
103	Cooper	PH 1	Cage	Yes	1987/08/17
105	MBSen	PH 4	Trap	No	1987/08/15
105	MBSen	PH 4	Trap	Yes	1987/08/17
105	MBSen	PH 4	Trap	Yes	1987/08/20

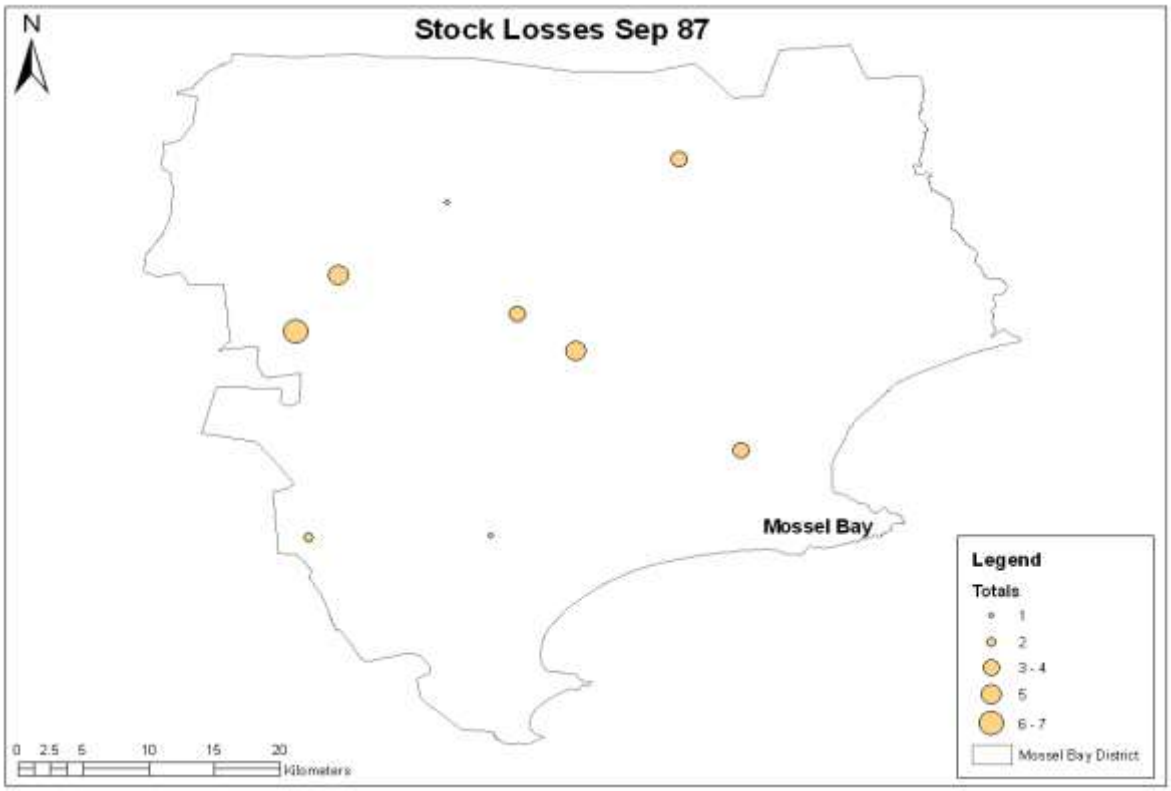


Figure 3.67 Stock losses due to predation reported for September 1987.

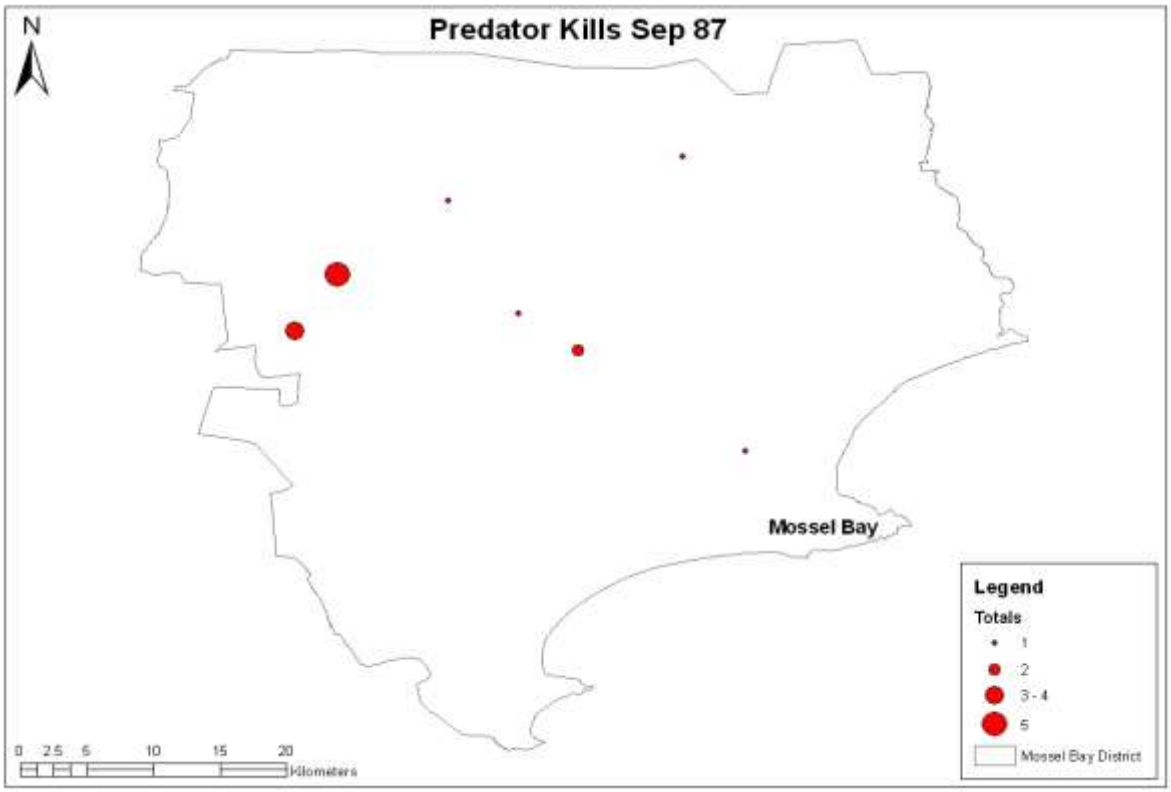


Figure 3.68 Predators killed in control operations reported for September 1987.

Table 3.97 Stock losses reported in September 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
15	0	1	0	1987/09/03
15	0	1	0	1987/09/16
48	2	0	0	1987/09/01
48	0	0	3	1987/09/14
53	1	0	0	1987/09/28
58	0	0	2	1987/09/09
58	0	0	1	1987/09/10
64	3	0	0	1987/09/11
64	1	0	0	1987/09/12
66	2	0	0	1987/09/04
66	1	0	0	1987/09/05
66	1	0	0	1987/09/06
66	1	0	0	1987/09/08
103	1	0	0	1987/09/07
111	4	0	0	1987/09/02
112	6	0	0	1987/09/17
112	1	0	0	1987/09/19
128	1	0	0	1987/09/15
128	1	0	0	1987/09/16

Table 3.98 Predators killed in September 1987

Farm Nr.	Predator	Sex	Dates
48	Vagrant dog	Male	1987/09/01
48	Vagrant dog	Female	1987/09/01
48	Vagrant dog	Female	1987/09/14
48	Vagrant dog	Female	1987/09/14
48	Vagrant dog	Male	1987/09/14
58	Caracal	Male	1987/09/10
64	Caracal	Female	1987/09/12
66	Caracal	Male	1987/09/05
66	Caracal	Female	1987/09/08
103	Honey Badger	Male	1987/09/07
111	Caracal	Male	1987/09/02
112	Vagrant dog	Female	1987/09/19
112	Vagrant dog	Female	1987/09/19
112	Vagrant dog	Male	1987/09/19
112	Vagrant dog	Male	1987/09/19

Table 3.99 Hunting activities of both problem clubs in September 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
15	Cooper	PH 1	Hounds	No	1987/09/16
15	Cooper	PH 1	Hounds	No	1987/09/17
31	Cooper	PH 1	Cage	No	1987/09/02
48	MBSen	PH 4	Hunt Rifle	Yes	1987/09/14
48	MBSen	PH 4	Hunt Rifle	Yes	1987/09/14
48	MBSen	PH 4	Hunt Rifle	Yes	1987/09/14
51	Cooper	PH 1	Hounds		1987/09/09
53	Cooper	PH 1	Hounds	No	1987/09/28
53	Cooper	PH 1	Cage	No	1987/09/29
58	MBSen	PH 4	Hounds	No	1987/09/09
58	MBSen	PH 4	Hounds	Yes	1987/09/10
63	Cooper	PH 1	Hounds	No	1987/09/11
64	MBSen	PH 4	Hounds	No	1987/09/11
64	MBSen	PH 4	Hounds	Yes	1987/09/12
66	MBSen	PH 4	Hounds	No	1987/09/04
66	MBSen	PH 4	Hounds	Yes	1987/09/05
66	MBSen	PH 4	Hounds	No	1987/09/06
66	MBSen	PH 4	Hounds	No	1987/09/07
66	MBSen	PH 4	Hounds	Yes	1987/09/08
103	Cooper	PH 1	Cage	Yes	1987/09/07
111	MBSen	PH 4	Hounds	Yes	1987/09/02
111	MBSen	PH 4	Hounds	No	1987/09/03
112	MBSen	PH 4	Hounds	No	1987/09/17
112	MBSen	PH 4	Hunt Rifle	Yes	1987/09/19
112	MBSen	PH 4	Hunt Rifle	Yes	1987/09/19
112	MBSen	PH 4	Hunt Rifle	Yes	1987/09/19
112	MBSen	PH 4	Hunt Rifle	Yes	1987/09/19
128	MBSen	PH 4	Hounds	No	1987/09/15
128	MBSen	PH 4	Hounds	No	1987/09/16

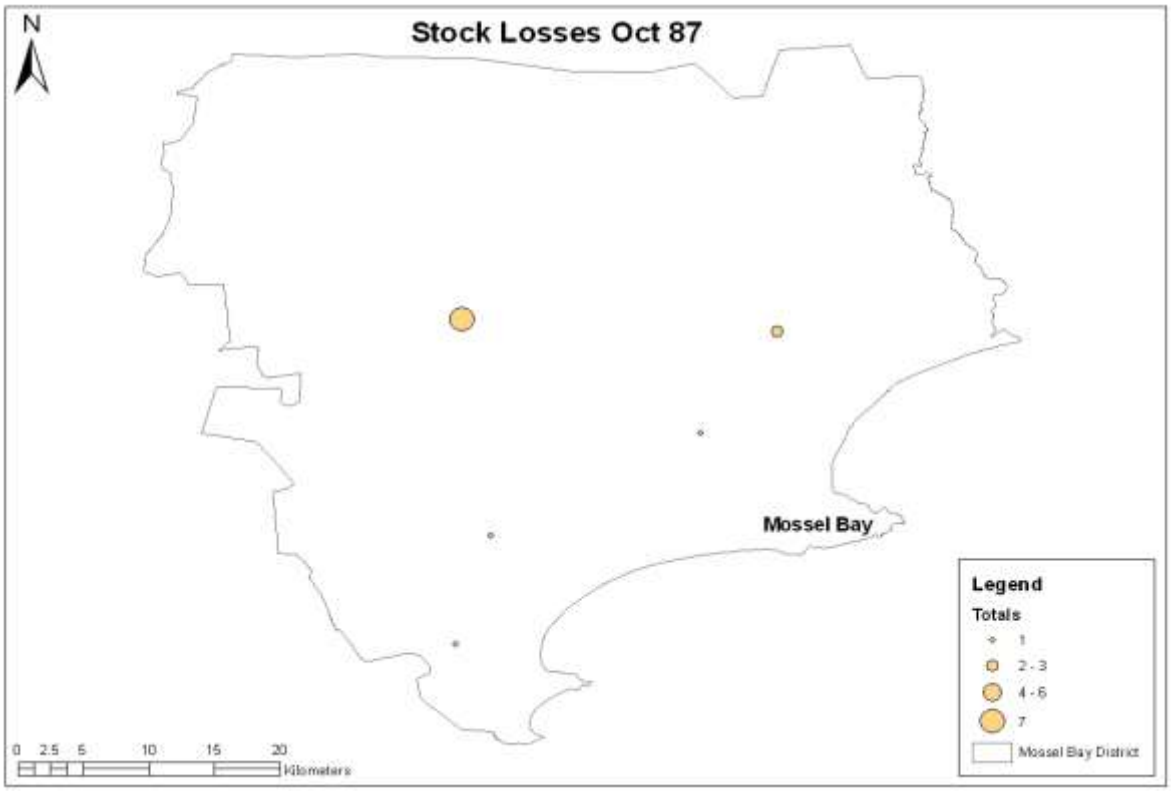


Figure 3.69 Stock losses due to predation reported for October 1987.

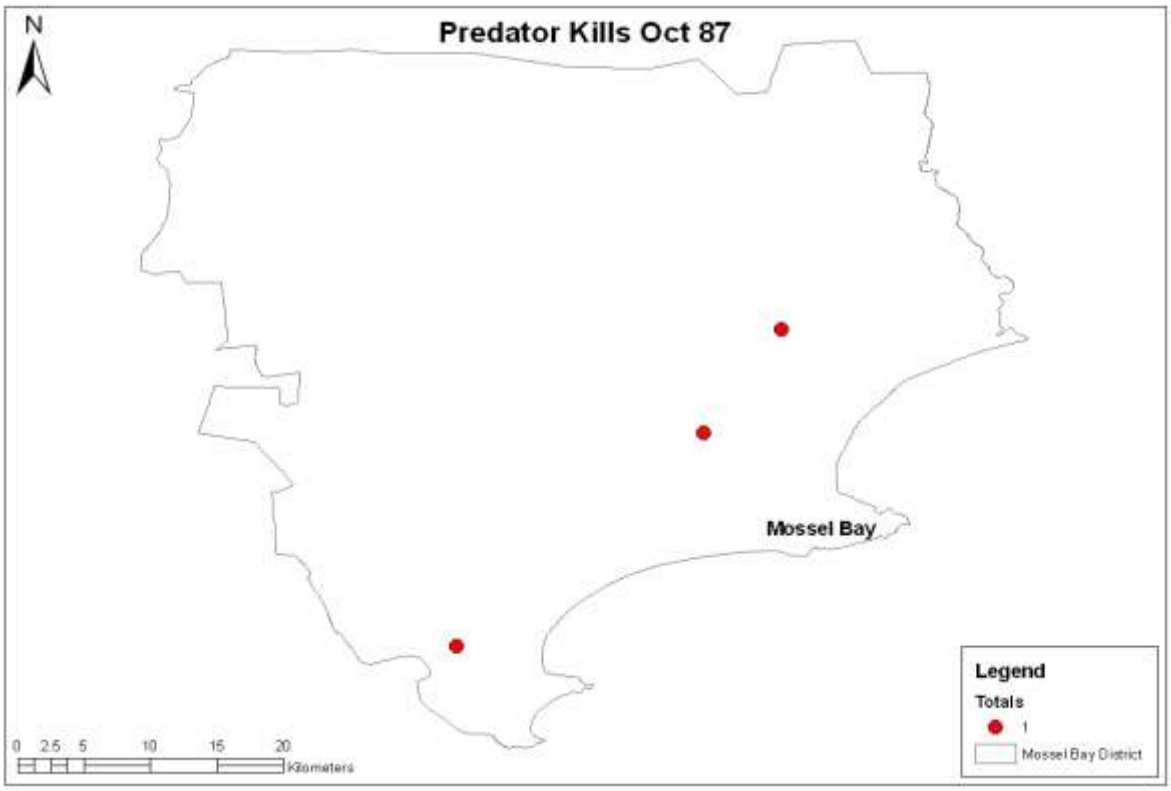


Figure 3.70 Predators killed in control operations reported for October 1987.

Table 3.100 Stock losses reported in October 1987

Farm Nr.	Sheep	Lamb	Dates
*12	2	0	1987/10/08
12	0	3	1987/10/09
12	1	0	1987/10/13
51	3	0	1987/10/14
51	1	0	1987/10/15
51	2	0	1987/10/17
51	1	0	1987/10/19
53	1	0	1987/10/01
82	1	0	1987/10/22
82	1	0	1987/10/23
82	1	0	1987/10/24
87	0	1	1987/10/06
125	0	1	1987/10/13

*Farm Nr. 12 could not be identified and is therefore not shown in the map.

Table 3.101 Predators killed in October 1987

Farm Nr.	Predator	Sex	Dates
82	Caracal		1987/10/24
87	Caracal	Male	1987/10/06
125	Caracal	Male	1987/10/13

Table 3.102 Hunting activities for both problem animal control clubs in October 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds		1987/10/20
12	MBSen	PH 4	Hounds	No	1987/10/08
12	MBSen	PH 4	Hounds	No	1987/10/09
12	MBSen	PH 4	Hounds	No	1987/10/13
15	Cooper	PH 1	Hounds	No	1987/10/15
25	Cooper	PH 1	Cage	No	1987/10/09
31	Cooper	PH 1	Cage		1987/10/26
51	MBSen	PH 4	Hounds	No	1987/10/14
51	MBSen	PH 4	Hounds	No	1987/10/15
51	MBSen	PH 4	Hounds	No	1987/10/17
51	MBSen	PH 4	Hounds	No	1987/10/19
53	Cooper	PH 1	Cage	No	1987/10/02
63	Cooper	PH 1	Hounds		1987/10/24
82	MBSen	PH 4	Hounds	No	1987/10/22
82	MBSen	PH 4	Hounds	No	1987/10/23
82	MBSen	PH 4	Hounds	Yes	1987/10/24
87	Cooper	PH 1	Cage	Yes	1987/10/06
116	Cooper	PH 1	Hounds		1987/10/28
125	Cooper	PH 1	Hounds	Yes	1987/10/13

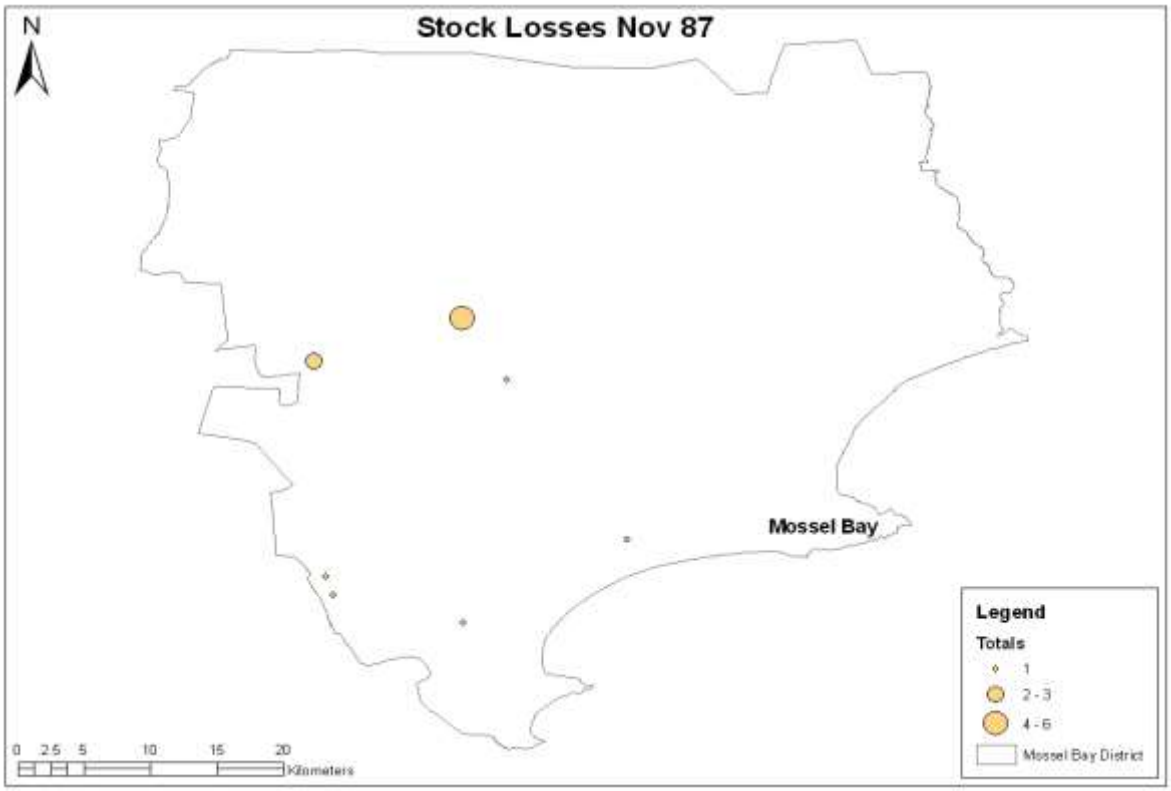


Figure 3.71 Stock losses due to predation reported for November 1987.

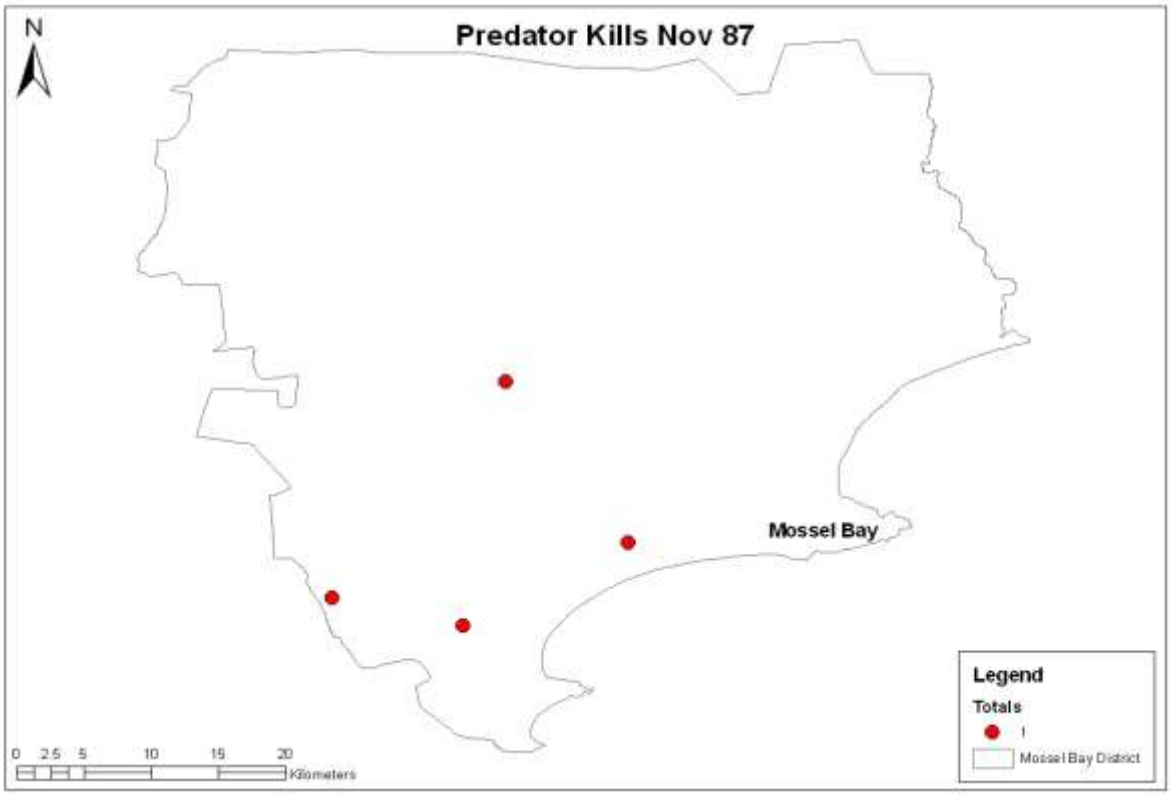


Figure 3.72 Predators killed in control operations reported for November 1987.

Table 3.103 Stock losses reported in November 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
25	0	1	0	1987/11/23
31	0	1	0	1987/11/27
32	1	0	0	1987/11/24
51	2	0	0	1987/11/16
51	0	1	0	1987/11/17
51	0	1	0	1987/11/18
51	1	0	0	1987/11/19
51	0	1	0	1987/11/21
102	0	0	3	1987/11/27
116	1	0	0	1987/11/09
120	0	1	0	1987/11/13

Table 3.104 Hunting activities of both problem animal control clubs in November 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
15	Cooper	PH 1	Hounds		1987/11/04
25	Cooper	PH 1	Hounds	Yes	1987/11/23
31	Cooper	PH 1	Hounds	Yes	1987/11/27
32	MBSen	PH 4	Hounds	Yes	1987/11/24
51	MBSen	PH 4	Hounds	No	1987/11/16
51	MBSen	PH 4	Hounds	No	1987/11/17
51	MBSen	PH 4	Hounds	No	1987/11/18
51	MBSen	PH 4	Hounds	No	1987/11/19
51	MBSen	PH 4	Hounds	No	1987/11/20
51	MBSen	PH 4	Hounds	No	1987/11/21
102	MBSen	PH 4	Hounds	No	1987/11/27
116	Cooper	PH 1	Hounds	No	1987/11/09
120	Cooper	PH 1	Cage	Yes	1987/11/13
132	Cooper	PH 1	Cage	No	1987/11/17

Table 3.105 Predators killed in November 1987

Farm Nr.	Predator	Sex	Dates
25	Caracal	Male	1987/11/23
31	Caracal	Male	1987/11/27
32	Caracal	Male	1987/11/24
120	Caracal	Female	1987/11/13

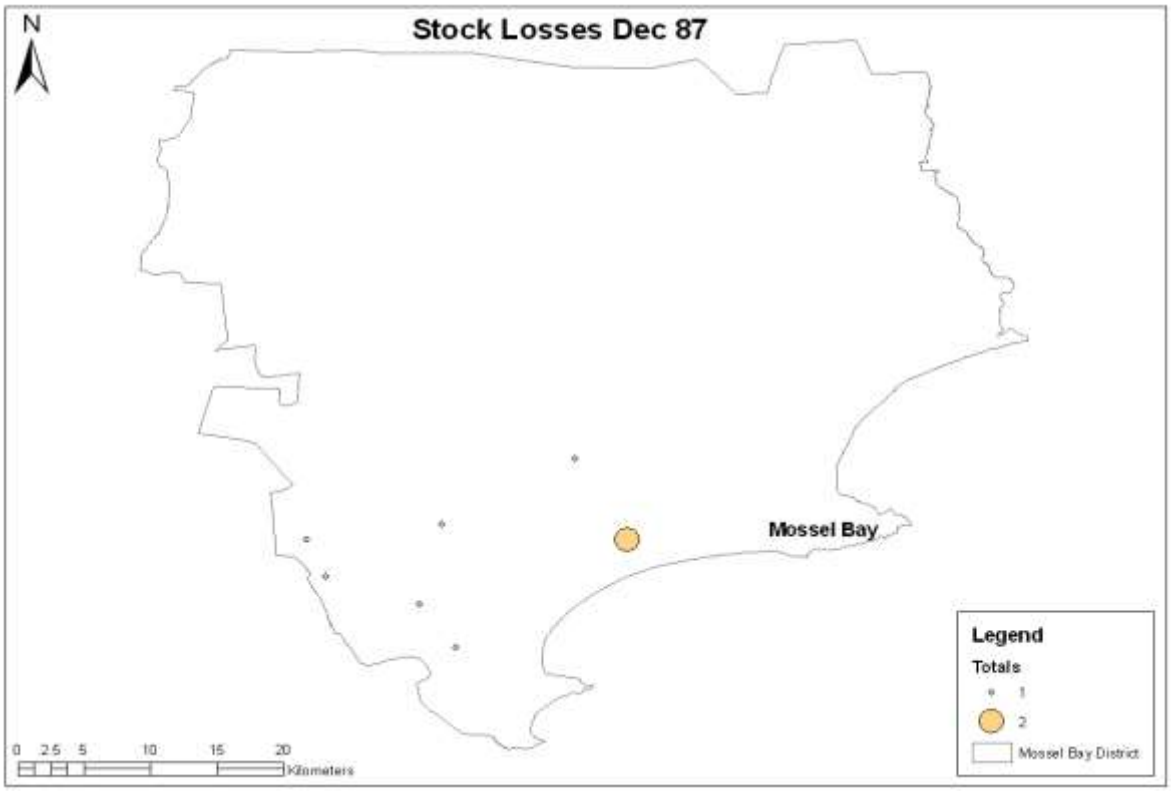


Figure 3.73 Stock losses due to predation reported for December 1987.

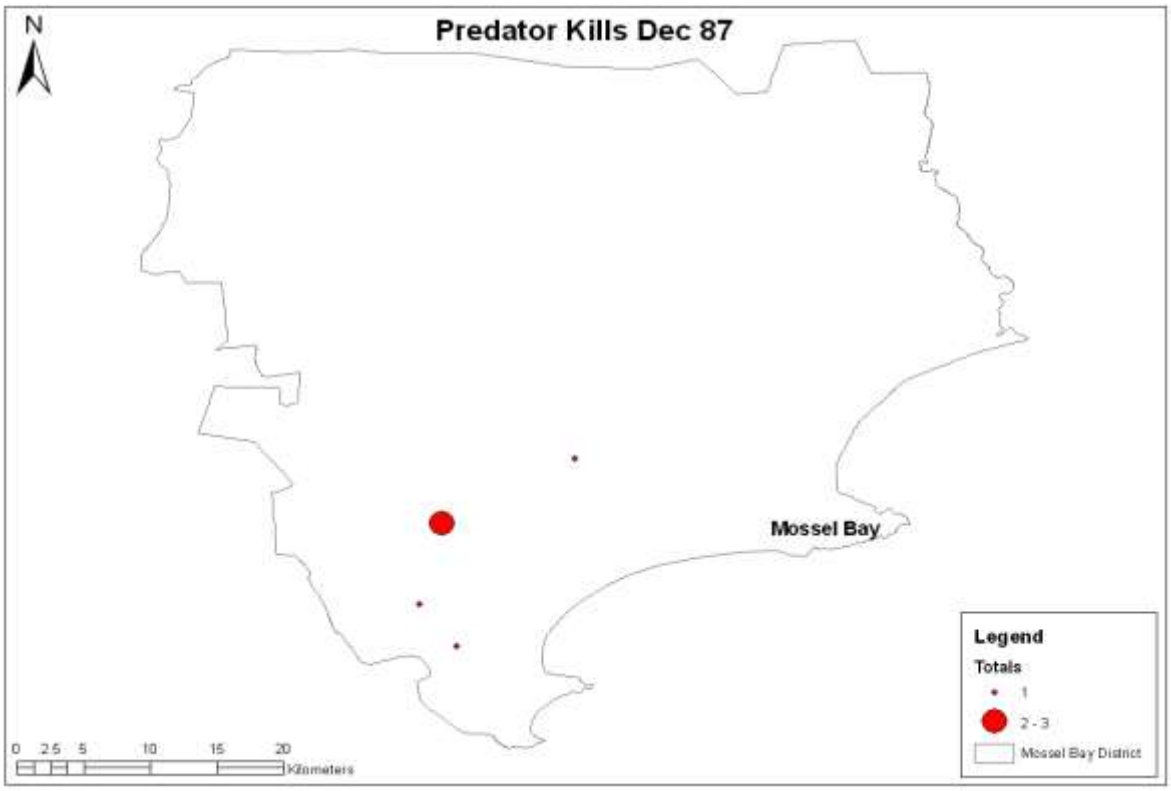


Figure 3.74 Predators killed in control operations reported for December 1987.

Table 3.106 Stock losses reported in December 1987

Farm Nr.	Sheep	Lamb	Goat	Dates
15	0	1	0	1987/12/26
31	2	0	0	1987/12/23
81	1	0	0	1987/12/18
87	0	0	1	1987/12/09
92	0	1	0	1987/12/21
97	0	0	1	1987/12/03
116	1	0	0	1987/12/15

Table 3.107 Hunting activities of both problem animal control clubs in December 1987

Farm Nr.	Hunt Club	Hunter	Method	Successful	Dates
10	Cooper	PH 1	Hounds		1987/12/14
15	Cooper	PH 1	Trap	No	1987/12/26
15	Cooper	PH 1	Hounds	No	1987/12/29
31	Cooper	PH 1	Trap	No	1987/12/23
81	Cooper	PH 1	Hounds	Yes	1987/12/18
81	Cooper	PH 1	Hounds	Yes	1987/12/18
81	Cooper	PH 1	Hounds	Yes	1987/12/18
87	Cooper	PH 1	Cage	Yes	1987/12/09
92	Cooper	PH 1	Hounds	Yes	1987/12/21
97	Cooper	PH 1	Cage	Yes	1987/12/03
116	Cooper	PH 1	Cage	No	1987/12/15

Table 3.108 Predators killed in December 1987

Farm Nr.	Predator	Sex	Dates
81	Caracal	Male	1987/12/18
81	Caracal	Male	1987/12/18
81	Caracal	Female	1987/12/18
87	Caracal	Male	1987/12/09
92	Caracal	Female	1987/12/21
97	Caracal	Male	1987/12/03

3.3 Stock losses

In this study the focus was only on losses reported for small livestock, namely sheep, goats (ostensibly Boer goats), and Angoras. Losses of poultry, game and the occasional calf were also reported, but these losses were small and caused by predators other than caracal and black-backed jackal. The other predators listed included mongoose, genets, African wild cats, otters, Cape foxes, vagrant dogs and honey badgers. The dataset showed that caracal was the predator species responsible for the most small livestock losses, which was also the finding in a study by Brand (1989). Black-backed jackals were responsible for a very small proportion of the total small livestock losses (22.63%) reported in the study area. Honey badgers were responsible for the second most cases of predation among small livestock. Although this study focused on the caracal and the black-backed jackal, those incidences where predators other than these two species were responsible for small livestock losses (and as a result killed in control operations) are also included in the maps and tables. These incidences were, however, not considered in detail and are therefore not discussed.

It is important to note the ability of this custom-built software to select specific data by means of appropriate filters (see 2.2.2.2 Queries) from a large dataset. For example, data pertaining to a specific hunt club(s), hunter(s), location(s), type(s) of stock losses, control method(s) or predator(s) killed can be filtered from the database, enabling rapid processing of the data for use in the GIS environment to produce appropriate maps.

3.3.1 Stock losses for the period 1976 to 1992

With the aid of the maps it was possible to show the geographic distribution of predator activities (i.e. stock losses due to predation) in the Mossel Bay district during the period from 1976 to 1992 (see **Appendix 1)**. These maps were not analysed in detail but are discussed briefly in this section to create a broader view over a longer timeframe.

Over the 16 years covered by this study the loss of 2 150 small livestock was reported by the Cooper Jagklub and the Mosselbaai Sentrale Jagklub as a result of predation. The number of stock losses reported each year showed relatively little variation, especially between 1978 and 1988 (Table 3.109). The smaller number of stock losses reported before 1978 and after 1988 can be attributed to missing data and the fact that only one hunt club was operating after 1988 (see Tables 3.1 and 3.2). The small number of livestock lost in 1992 can be attributed to the fact that

the monthly hunt reports for April and May 1992 were the last available data from the Mosselbaai Sentrale Jagklub, and it is suspected this club ceased to operate at that time. The demise of the hunt club may have been hastened because the subsidies paid by Government to the problem animal control clubs were phased out between 1988 and 1993 (Lensing, 1993). In the two years, 1980 and 1987, the reported stock losses increased drastically, peaking at 345 and 296 livestock losses respectively for these two years (Table 3.109).

Table 3.109 The annual small stock losses in the study area for the period 1976 to 1992

Year	Sheep		Goats		Angoras		Totals
	Adult	Lamb	Adult	Kid	Adult	Kid	
1976	0	14	0	0	0	0	14
1977	23	42	0	0	0	0	65
1978	22	95	3	1	1	0	122
1979	25	89	0	0	1	0	115
1980	177	166	2	0	0	0	345
1981	82	99	0	0	0	0	131
1982	28	98	1	0	1	0	128
1983	72	61	0	0	2	1	136
1984	37	117	1	0	0	0	155
1985	58	111	0	0	2	0	171
1986	50	71	0	0	0	0	121
1987	164	108	24	0	0	0	296
1988	116	23	10	6	0	0	155
1989	26	44	12	1	0	0	83
1990	8	38	1	0	0	0	47
1991	26	34	3	0	0	0	63
1992	0	3	0	0	0	0	3
Totals	**914**	**1213**	**57**	**8**	**7**	**1**	**2150**

The data in Table 3.109 show that the vast majority of predation reported for small stock was accounted for by sheep and lambs. Technically, young sheep remain lambs until the first permanent tooth (incisor) erupts, which may happen well past the age of 14 months (HO de Waal, 2008; personal communication). Thus, references to “lambs” in the monthly hunt reports may include fairly large but still immature, young sheep.

The focus of this study was on the caracal and black-backed jackal. Therefore, the data presented in Table 3.109 were separated to show the extent of small stock lost as a result of predation specifically by caracal (Table 3.110) and by black-backed jackal (Table 3.111).

Table 3.110 Annual small stock losses due to caracal predation in the study area, 1976 to 1992

Year	Sheep		Goats		Angoras	
	Adult	**Lamb**	**Adult**	**Kid**	**Adult**	**Kid**
1976	0	14	0	0	0	0
1977	11	42	0	0	0	0
1978	16	84	3	1	1	0
1979	19	84	0	0	1	0
1980	13	139	0	0	0	0
1981	14	88	0	0	0	0
1982	5	91	1	0	1	0
1983	22	56	0	0	2	1
1984	2	116	0	0	0	0
1985	20	93	0	0	2	0
1986	17	69	0	0	0	0
1987	64	82	17	0	0	0
1988	59	19	7	0	0	0
1989	15	28	0	0	0	0
1990	0	25	1	0	0	0
1991	2	34	3	0	0	0
1992	0	3	0	0	0	0
Totals	**279**	**1067**	**32**	**1**	**7**	**1**

According to the results presented in Table 3.110, the caracal predated predominantly on sheep (95.8% of the total predation on small livestock) and specifically more on lambs (75.9%). No comparable historic data is available for this livestock producing region (Mossel Bay district) on small stock numbers in general and the ratio in which the various small stock groups were taken could, therefore, not be interpreted as a preference for any specific group. All that can be said is that sheep is definitely the predominant small stock species in the area. Predation by caracal on goats and Angoras was only reported during some years and in low numbers (0.03% of the total).

Table 3.111 Incidences of small stock losses as a result of black-backed jackal predation in the study area, 1976 to 1992

Year	Sheep		Goats		Angoras	
	Adult	**Lamb**	**Adult**	**Kid**	**Adult**	**Kid**
1986	0	1	0	0	0	0
1987	0	9	0	0	0	0
1989	8	14	0	0	0	0
1991	26	34	3	0	0	0
Totals	**34**	**58**	**3**	**0**	**0**	**0**

The results in Table 3.111 show the few annual small stock losses attributed to black-backed jackal. At the onset of this study it was realised that caracal was the dominant predator in the study area (which corresponds with the findings of Stuart, 1981), but the real extent to which it overshadowed predation by black-backed jackal only became visible upon analysis of the data. Although the results are not shown in detail, the predation by honey badgers accounted for the second largest reported losses next to caracal (see Tables 3.3 to 3.108). In those few years during which the predation by black-backed jackal was recorded in the monthly hunt reports, it predated mostly on sheep (96.8%) and, as similar to the case with the caracal, specifically more on lambs (61.1%).

3.3.2 Stock losses for the period 1985 to 1987

The information contained in the monthly hunt reports suggest that lambing may have occurred more or less throughout the year in the study area. Once again, lack of detailed information in the monthly hunt reports (e.g. age of lambs) prevent specific conclusions to be drawn. As was pointed out previously, young sheep remain lambs until the first permanent tooth (incisor) erupts, which may happen well past the age of 14 months (HO de Waal, 2008; personal communication). References to “lambs” in the monthly hunt reports may, therefore, include fairly large but still immature young sheep. Although lambs were reported lost during all months of the year, the highest numbers of lambs lost were typically reported during from April to August. Some of the predation reported may have been attributed to mass killing by especially caracal. Van der Merwe (1953), Skinner (1979), Moolman (1984), and Bothma and Walker (1999) also recorded mass killing by these two predators.

Table 3.112 Total annual small livestock losses reported in the Mosselbaai Sentrale Jagklub (MBSen) and the Cooper Jagklub for the period 1985 to 1987

Year	MBSen	Cooper	Total
1985	85	86	171
1986	29	93	122
1987	170	126	296

Very few stock losses are shown in the maps of February 1985, July to December 1986, and April and December 1987 (Figures 3.76, 3.78 and 3.80) which can be attributed to the fact that no records are available for these months from the Mosselbaai Sentrale Jagklub. It means that there is uncertainty regarding the number of stock losses actually experienced in this area during these periods, but which were not or could not be reported. The lack of available monthly hunt reports from the Mosselbaai Sentrale Jagklub for July to December 1986 may also explain why considerably less stock losses were reported during this year in the area covered by this club (Table 3.112). It may also explain why the number is considerably smaller than that for 1985 in this club and why it is considerably smaller than that of the Cooper Jagklub during 1986.

During 1987 farmers in the Mossel Bay district experienced twice as many stock losses as the average number per year (Table 3.109). One possible explanation for this is the increased activity of honey badgers and vagrant dogs during this time, especially in the geographical area covered by the Mosselbaai Sentrale Jagklub. The predation by vagrant dogs was concentrated mainly near the town Herbertsdale in the north-west of the district (Figures 3.53 and 3.67). The increased number of stock losses recorded could also be ascribed to the fact that two problem animal hunters (Table 3.113) were operating in the Mosselbaai Sentrale Jagklub during this year; thus a larger area could be covered and the two hunters could respond to more reports of stock losses during this period.

In the area covered by the Mosselbaai Sentrale Jagklub during 1987, black-backed jackals were responsible for a number of stock losses (24 March 1987; Table 3.79; 3, 5 and 6 August 1987, Table 3.94). Unfortunately, it was not possible to indicate these incidences on the maps, because most of the damage caused by black-backed jackals occurred on one of the farms which could not be identified.

During 1987, goats also became prominent among the livestock reported to have been killed by predators, mainly caracal (Table 3.73, 3.76, 3.79, 3.85, 3.91, 3.97, 3.103 and 3.106). Most of these losses were reported for one specific farm (farm nr.132). Therefore, it is assumed that this farm was predominantly a goat farm.

From the respective Figures 3.3 to 3.74 for Stock Losses and Predator Kills (and the accompanying tables), it would appear that when animal damage control activities have been conducted on a specific farm, no small stock losses were reported for the following one to two months. Absence of reported predation on the farm or surrounding farms is not necessarily indicative of success. A few examples are the following:

- On Farm Nr. 10 no stock losses were reported after a predator kill on 06/05/85 (Figure 3.11, Table 3.14), until 17/06/85 (Figure 3.13, Table 3.17).
- Farm Nr. 92 did not experience any stock losses between 17/05/86 (Figure 3.35, Table 3.50), when a predator was killed, and 16/07/86 (Figure 3.39, Table 3.56).

From 1985 to 1987 there were also a number of farms on which stock losses were repeatedly reported, but no predators were killed. A few examples for farms on which this was often experienced are the following:

- Farm Nr. 30: From January to June 1985 no stock losses were reported. From June until October 1985 stock losses were repeatedly reported, while control efforts were unsuccessful (Tables 3.17 to 3.31). After the removal of a suspected damage causing caracal in October, no stock losses were reported on the farm for the period 1985 to 1987.
- Farm Nr. 104: From January to May 1987, no predator activity or control operations were reported. From May to June 1987 predation was reported, but hunting efforts were unsuccessful (Figures 3.59 to 3.62, Tables 3.85 to 3.90). After June 1987 predator activities ceased without any predators being killed.
- Farm Nr. 51: Numerous stock losses were experienced during August, October and November 1987, while subsequent control operations were unsuccessful (Figures 3.65 to 3.72, Tables 3.94 to 3.105).

During the three years 1985 to 1987 several incidences were also reported in which stock losses continued on certain farms after predators have been removed. In such cases it was not possible to determine the underlying causes (because of a lack of detailed information such as stomach contents of the predators killed). The success of these control operations could, therefore, not be established. Some farms that repeatedly experienced such instances are Farm Nr. 10 (during

1985), Farm Nr. 91 (during 1986) and Farm Nr. 12, Farm Nr. 31, Farm Nr. 92, Farm Nr. 103 and Farm Nr. 132 (during 1987).

Once again, due to the incomplete nature of the data as well as lack of detail in the monthly hunt reports, no definite conclusions could be drawn relating to the abovementioned trends in stock losses.

The following farms appeared most frequently in the monthly hunt reports, indicating that substantial predator activity was reported on these farms, namely: Farm Nr. 51, Farm Nr. 63, Farm Nr. 64, Farm Nr. 92, Farm Nr. 103 and Farm Nr. 116. The topography of these farms may in some cases have played a role in the higher reported incidents of predation, but due to a certain degree of uncertainty as to the precise location of some of the farms, no clear conclusions are drawn.

The monthly rainfall recorded by the Albertinia and the Cape St. Blaize (Mossel Bay) weather stations for 1985, 1986 and 1987 are presented in Figures 3.75, 3.77 and 3.79 respectively. As discussed previously, it was expected that the rainfall patterns for these two stations would correspond to a large degree although the actual precipitation may differ. It is safe to assume that these variations in rainfall were typical of the study area. No significant relationships were apparent between stock losses, predator kills and monthly rainfall patterns.

The monthly stock losses reported and the predators killed for 1985, 1986 and 1987 are illustrated in Figures 3.76, 3.78 and 3.80. As shown in Table 3.112 most predation was reported on an annual basis in 1987, followed by 1985 and then 1986. However, the patterns of monthly predation reported differed for the three respective years. In 1985, most predation was reported for the period April to July and then declining to October (Figure 3.76). In 1986 (Figure 3.78), most predation was reported for April and November with smaller numbers occurring from May to August. During 1987 (Figure 3.80), highest reports of predation were for March, May, June, July, August and September; predation reported for January, February, April, October and November were of the same magnitude.

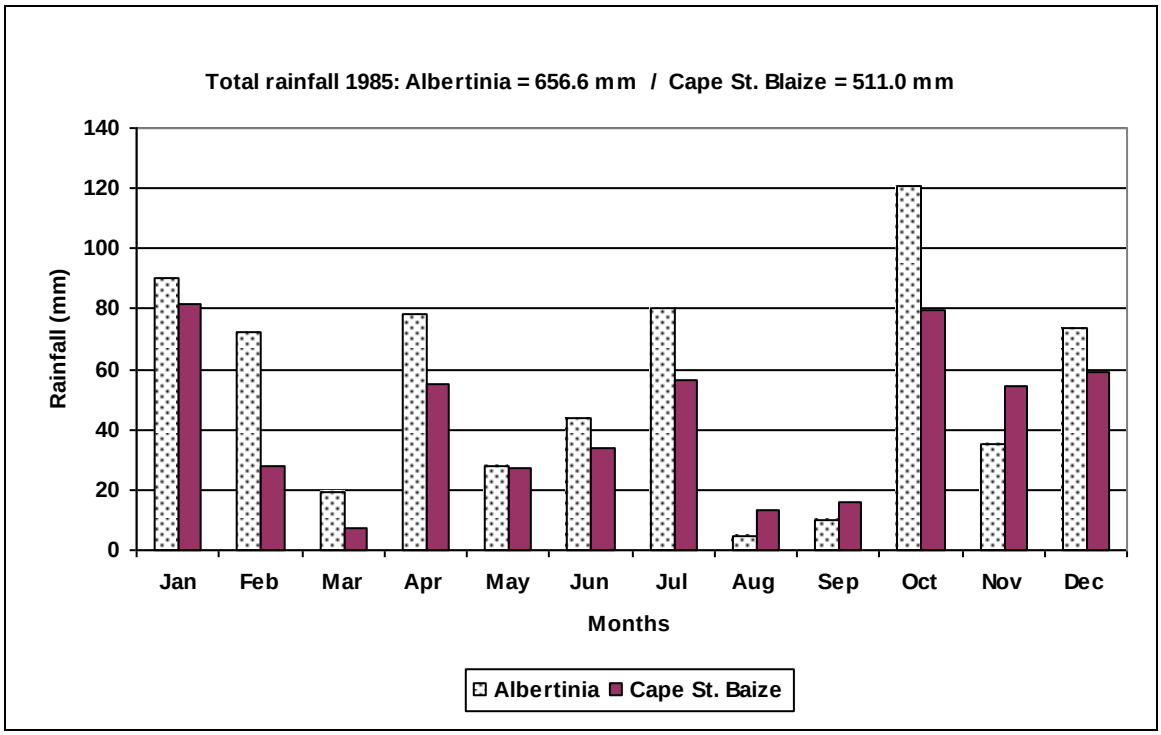


Figure 3.75 The monthly rainfall recorded by the Albertinia and the Cape St. Blaize (Mossel Bay) weather stations for 1985.

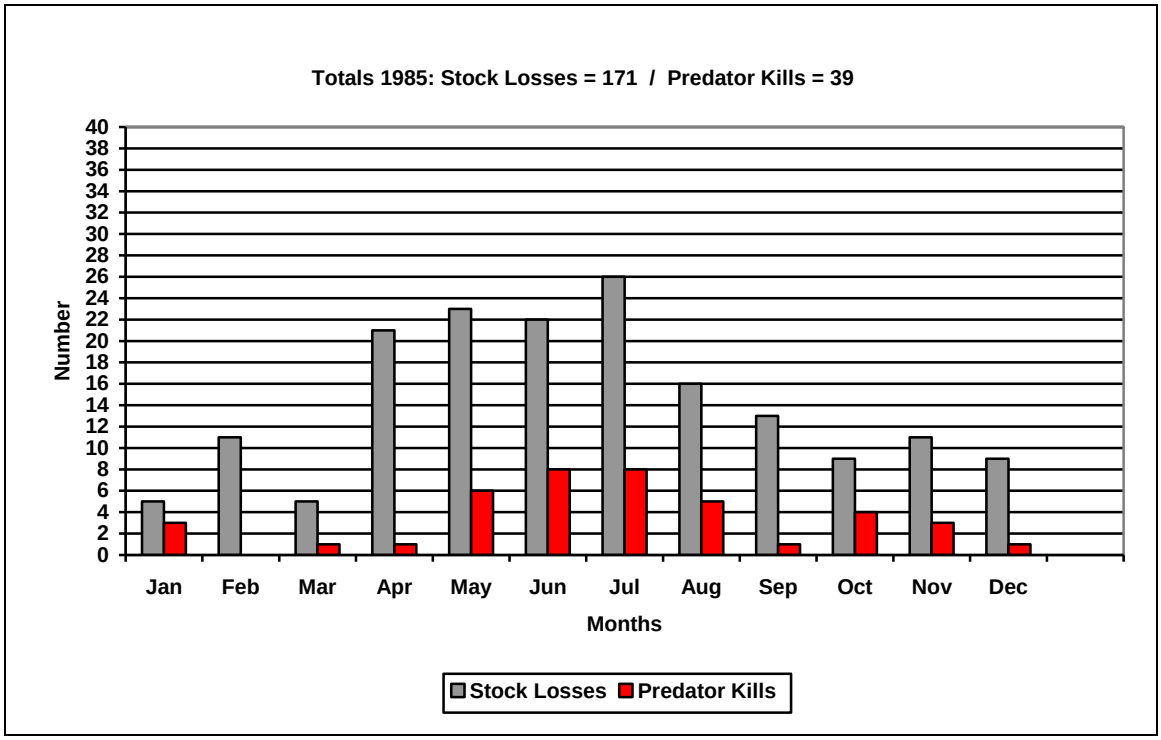


Figure 3.76 Total monthly small livestock losses and predator kills in the study area during 1985.

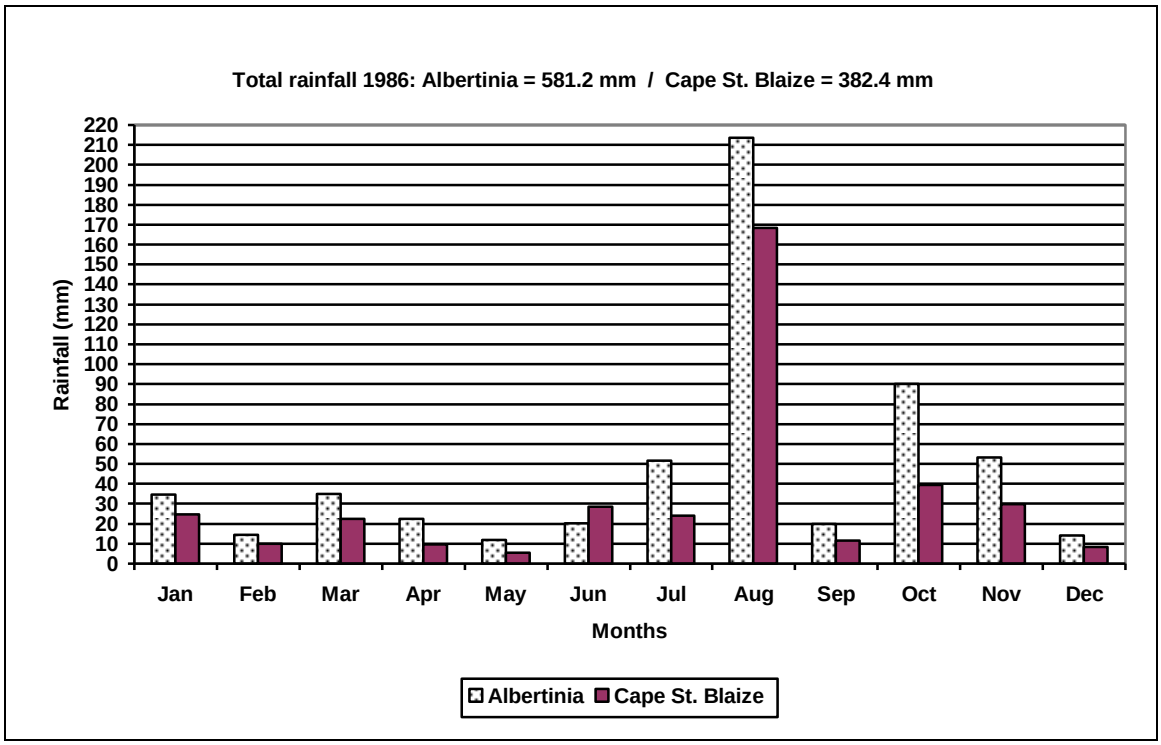


Figure 3.77 The monthly rainfall recorded by the Albertinia and the Cape St. Blaize (Mossel Bay) weather stations for 1986.

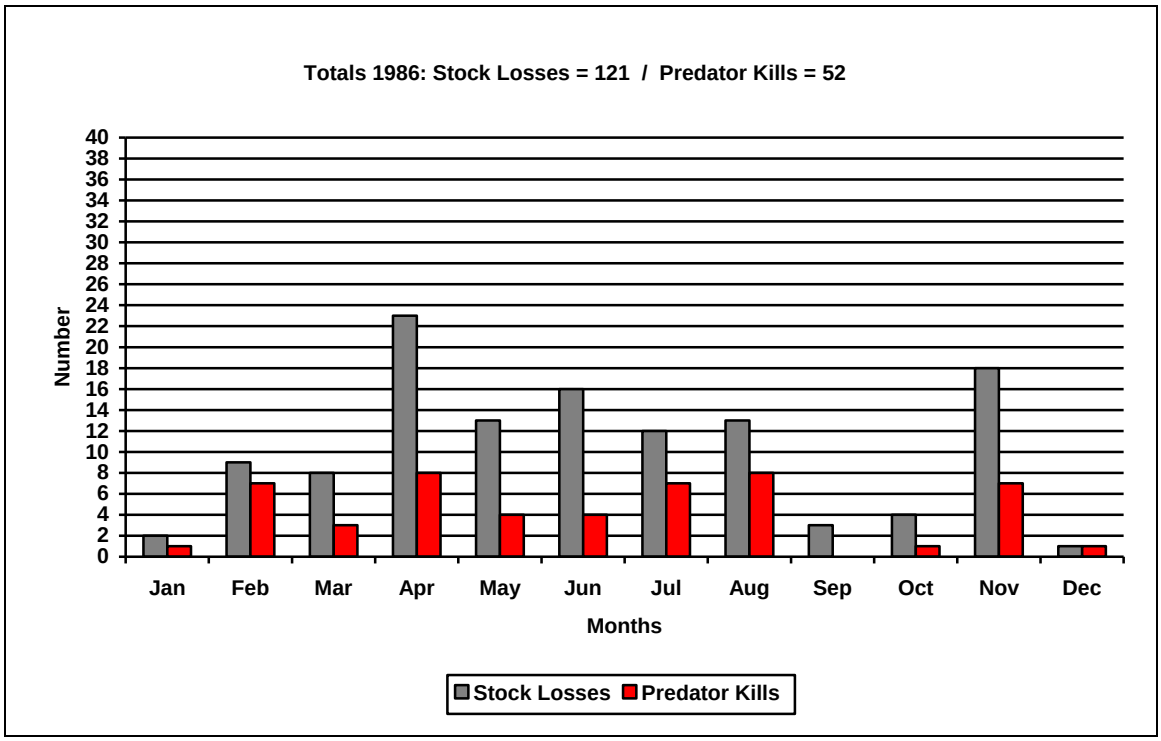


Figure 3.78 Total monthly small livestock losses and predator kills in the study area during 1985.

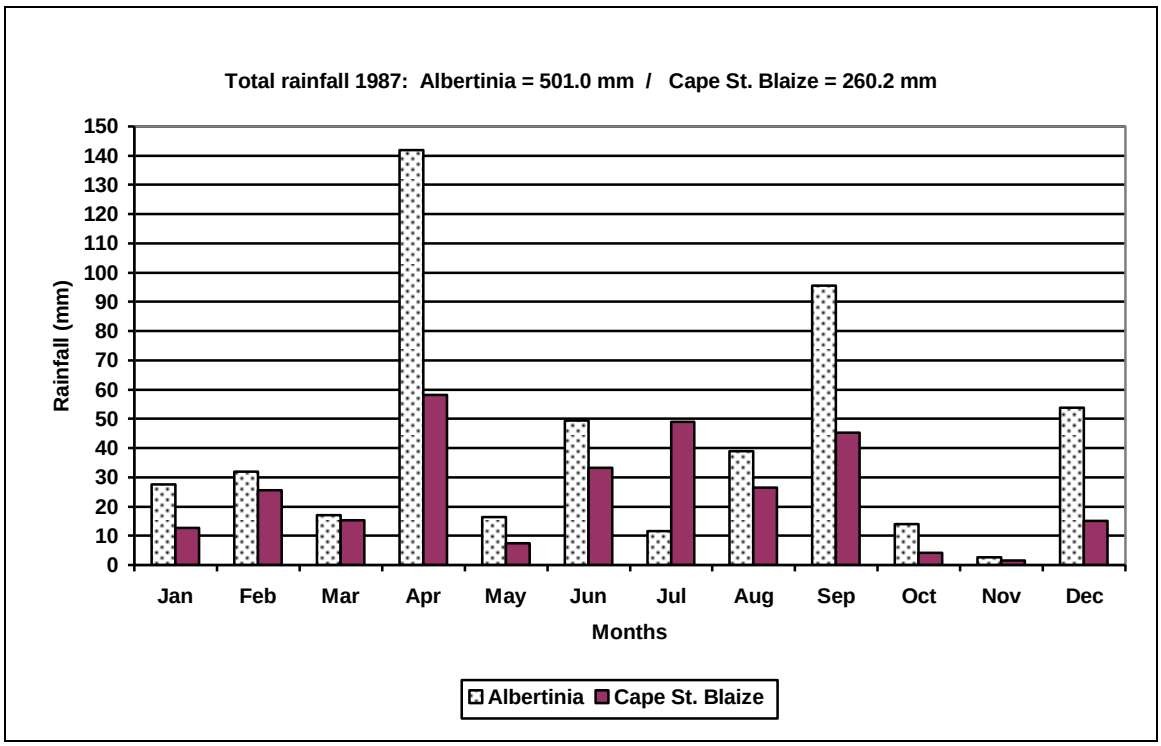


Figure 3.79 The monthly rainfall recorded by the Albertinia and the Cape St. Blaize (Mossel Bay) weather stations for 1987.

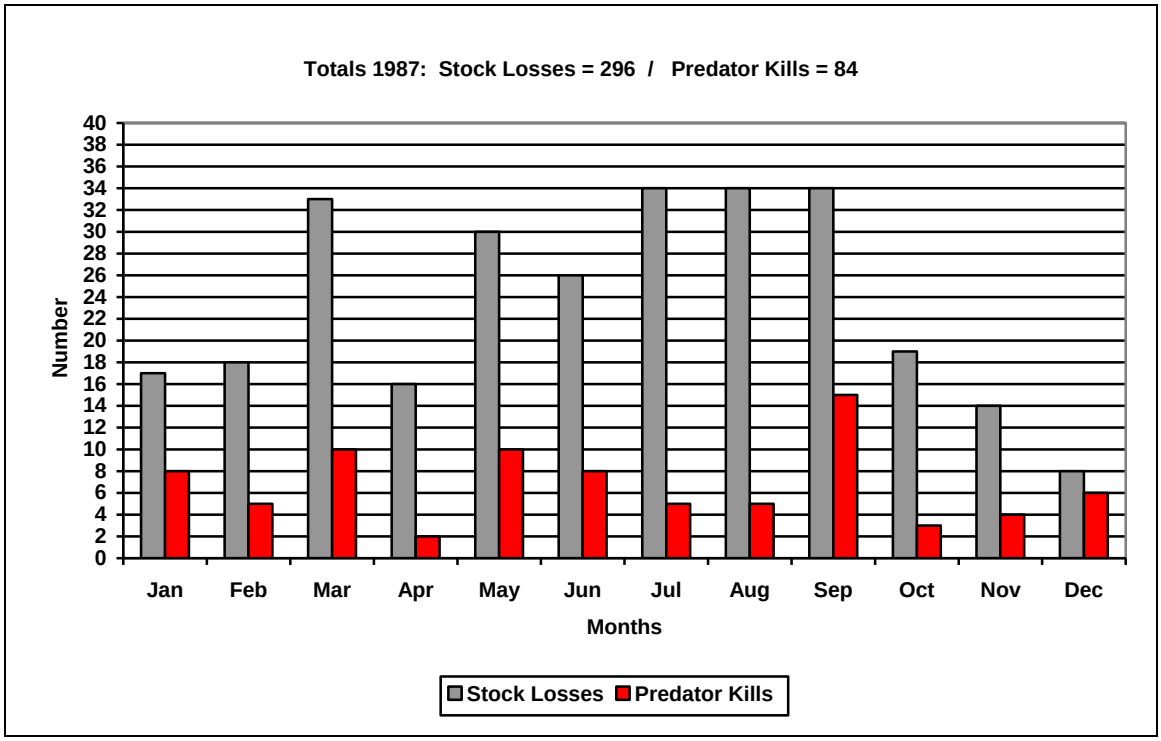


Figure 3.80 Total monthly small livestock losses and predator kills in the study area during 1985.

The number of predators killed annually steadily increased from 1985 to 1987 (Figures 3.76, 3.78 and 3.80). The number of predators killed during different months for the three years showed no discernible trend or pattern. Predators were killed every month, except for February 1985 (Figure 3.76) and September 1986 (Figure 3.80).

More lambs were killed than mature sheep during 1985 and 1986 (Figures 3.3 to 3.49; Tables 3.3 to 3.70), while more mature sheep and goats were killed by predators during 1987 (Figures 3.51 to 3.73; Tables 3.73 to 3.106). Lambs were reported lost as a result of predation throughout the year, during each of these three years, with a peak from March to August (see stock losses maps and tables – Figures 3.3 to 3.73; Tables 3.3 to 3.106). In 1985 and 1986, more lambs were killed by predators per month than sheep, except in January, February and November 1985 (Figures 3.3, 3.5, 3.23; Tables 3.3, 3.6, 3.32) and May, June, October and November 1986 (Figures 3.35, 3.37, 3.45, 3.47; Tables 3.50, 3.53, 3.64, 3,67). During 1987 more mature sheep and goats were killed each month by predators than lambs except in March, April and August (Figures 3.31, 3.33, 3.41; Tables 3.44, 3.47, 3.59).

3.4 Hunting Activities

3.4.1 Hunting activities for the period 1976 to 1992

The problem animal control clubs employed only one problem animal hunter (PAH) at a time. However, the Mosselbaai Sentrale Jagklub had two hunters (PAH 3 and PAH 4) operating at the same time from January 1987 to November 1987 (Table 3.113). According to an inspection report from the Mosselbaai Sentrale Jagklub (January to July 1987) contained in the dataset, the club was of the opinion that, due to the large area which has to be covered, a second hunter was needed. The club had to decide whether it was necessary for two hunters and thus had a trial period for PAH 4, after which they decided not to subsidise this hunter and an additional pack of hounds. No reason was given for this decision in the inspection report, but according to the dataset, it is possible that the performance of PAH 4 may have been unsatisfactory (see section 2.2 and Figure 2.7.3). The hunters employed by each of the problem animal control clubs and the duration of each hunter's involvement in the club is shown in Table 3.113.

Table 3.113 The periods during which each problem animal hunter (PAH) was involved in a problem animal hunt club

Hunt Club	Hunter	Period
Cooper	PAH 1	Oct 1976 – Mar 1988
MBSen	PAH 2	Oct 1976 – Jun 1986
	PAH 3	Jan 1987 – Jul 1989
	PAH 4	Jan 1987 – Nov 1987
	PAH 5	Sep 1989 – May 1992

The problem animal hunters sometimes went out in search of a suspected damage causing animal, weeks or even months after stock losses were reported, suggesting a non-selective nature in this approach. It is possible that in these cases the targeted damage causing animal could have been a non-territorial animal moving through the area. In such a case, selective hunting success declines with the passing of time. The findings of Avenant (1993) lend support to the assumptions that non-territorial animals tend to move quickly through an area in search for a place to establish its own territory, and/or try to avoid contact with territorial animals, and may take easy prey such as sheep and/or carcasses. Where follow-up hunts were conducted too long after the stock losses were reported, the chances of killing an animal that was not responsible for the damage therefore increases.

According to Stuart (1982) and Van der Merwe (1953), hunting with hound packs should be undertaken only when fresh scent can be picked up close to a freshly killed prey carcass, which was not always the case in this study. From the records it appears that the problem animal hunters sometimes went on a hunt following old spoor, or went looking for a predator more than a month after damage was reported, or simply went looking for a predator that was spotted on the farm and that may not have caused any damage. Also, in both the problem animal control clubs the control operations very often carried on even after the suspected damage causing animal was killed. Based on the lack of information recorded concerning stomach contents of the predators killed, there was uncertainty whether the animal killed was actually the targeted stock predator. Thus, the measure of selectivity of the control methods used by the problem animal hunters could not be established.

Considering the dates on the monthly hunt reports, the response of the problem animal hunters to damage reported was generally quick, usually acting within 24 hours after losses have been reported. However, there is uncertainty as to whether the hunter reacted on the same day or the next day in response to damage reported by a farmer. There is also uncertainty concerning how swift the farmers' response was to damage, namely the time it took for a farmer to realise the damage and then report the predation to the problem animal hunter.

Hunting effort on a yearly basis for the total study period was not investigated.

3.4.2 Hunting activities for the period 1985 to 1987

Two hunters were employed by the Mosselbaai Sentrale Jagklub during 1987. Because two hunters can respond to more reports of predator activity and also cover a larger area for problem animal control, it is expected that a problem animal hunt club would be able to practice more effective animal damage control. However, although 1987 is the year in which most predators were killed, the hunting success was relatively low. One possible reason for this is that, according to the hunter's comments in the hunting reports, it was too dry to hunt with hounds during the months of October and November. The fact that hunting success was low, even though two hunters were operating in the Mosselbaai Sentrale Jagklub was probably the reason for the problem animal control club not succeeding in obtaining subsidy for the second hunter.

Both hunt clubs mostly made use of hounds when following up reports on stock losses (Table 3.114), with a mean success rate of 27.1%. The mean success rate reported for cages was 46.1%; for gin traps 58%; and for hunt rifles 100%.

It appears that the Cooper Jagklub had a greater hunting success than the Mosselbaai Sentrale Jagklub. One reason for this could be the fact that the Mosselbaai Sentrale Jagklub primarily made use of hounds, only rarely making use of other methods such as cage traps and gin traps (Tables 3.28, 3.78, 3.87, 3.90, 3.93, 3.96, 3.99) while the Cooper Jagklub more regularly made use of methods other than hounds, such as cage traps, gin traps and hunt rifles. Another factor possibly contributing to the Cooper Jagklub's greater hunting success could be the fact that during the whole study period only one problem animal hunter operated in this problem animal control club.

Table 3.114 The number of hunting activities and different methods used for the period 1985 to 1987. Success rates as a percentage is indicated in parenthesis

Year	Method	MBSen	Cooper

		Total	Successful	Total	Successful
1985	Hounds	53	5(9.4%)	56	15(26.8%)
	Cage	1	1(100%)	48	12(25%)
	Gin trap	0	0	11	6(54.5%)
	Hunt rifle	0	0	1	1(100%)
	Practice	1	_	11	_
1986	Hounds	27	7(25.9%)	70	25(35.7%)
	Cage	0	0	45	8(17.8%)
	Gin trap	0	0	7	5(71.4%)
	Hunt rifle	0	0	1	1(100%)
	Practice	0	_	9	_
1987	Hounds	84	27(32.1%)	79	26(32.9%)
	Cage	6	3(50%)	37	14(37.8%)
	Gin trap	5	3(60%)	13	6(46.2%)
	Hunt rifle	2	2(100%)	0	0
	Practice	0	_	7	_

3.5 Predators killed

3.5.1 Predator kills for the period 1976 to 1992

Over the 16 year study period, a total of 649 predators were killed in the Mossel Bay district as a result of animal damage control operations, with an average of 2.2 predators killed per month. The largest number of predators killed was 1987, with a total of 97. The years in which least predators were killed, were 1979 and 1988, with a total of 27 predators killed each. These numbers include predators killed in response to predation on domestic animals other than small livestock. The numbers in Table 3.115, however include only those predators responsible for predation on small livestock. The details for 1987 are discussed later in this section.

Caracal was the main damage causing animal, followed by the honey badger, vagrant dogs, and the black-backed jackal (see Tables 3.109 to 3.111). No stock losses as a result of black-backed jackal depredation were reported, and no black-backed jackals killed in the Cooper region during this time. Although incidences of damage as a result of black-backed jackal predation were reported during 1987 (see section 3.3.2), 1989 and 1991 by the Mosselbaai Sentrale Jagklub, very few black-backed jackals were killed. The problem animal hunter responsible for control operations during this period gave the reason for this as "…it is very difficult to hunt black-backed jackal and the farms on which the damage has occurred are far from the place from which the hunter operates". These cases could not be illustrated on any of the maps, because the farms on which black-backed jackals were responsible for damage, are among those that could not be identified.

A quarterly inspection report for the Mosselbaai Sentrale Jagklub in 1979 commented that the club does not have cage traps, and that provisions have to be made for these because hounds cannot pick up spoor in dry periods. The fact that weather conditions were often too dry for the hounds to hunt in, and that the use of hounds was the only control method used by this club, could explain the low hunting success during 1979. The reason for the low hunting success in 1988 is unclear, but the fact that there are no records for the Cooper Jagklub after March 1988 (Mosselbaai Sentrale Jagklub is the only club operating in the Mossel Bay district from April to December), can at least in part explain the small number of predators killed.

Table 3.115 Predators killed in response to reported small livestock losses in the study area during 1976 to 1992

Year	Caracal	Black-backed jackal	Other	Total
1976	6	0	0	6
1977	30	0	0	30
1978	29	0	4	33
1979	25	0	2	27
1980	47	0	6	53
1981	47	0	12	59
1982	43	0	3	46
1983	37	0	15	52
1984	48	0	5	53
1985	33	0	6	39
1986	33	0	8	41
1987	66	0	18	84
1988	20	0	7	27
19989	18	2	14	34
1990	20	1	4	25
1991	10	0	2	12
1992	1	0	0	1
Total	**513**	**3**	**106**	**622**

3.5.2 Predator kills for the period 1985 to 1987

Most predators were killed in control operations in the period (May to July 1985; April, July and August 1986; and March, May, June and September 1987). The least predators were killed in early autumn, spring and early summer (February to April, September and December 1985; January, September, October and December 1986; and April, October and November).

Brand (1989) recorded very few black-backed jackals along the western and southern coastal regions of the Cape Province. This may explain the very small number of stock losses due to black-backed jackal predation in this area, and subsequently the very small number of black-backed jackals killed.

Drawing conclusions from the sex ratios of the caracal killed during the period 1985 to 1987 was difficult. There is no clear distinction in sex ratios for each year and also from one month to the

next (Tables 3.5 to 3.108). Therefore it was difficult to detect seasonality in terms of the different sexes killed during each of the three years. One reason for this may be the fact that the datasets are incomplete in terms of the hunt reports available. Most males were killed during May and November, while most females were killed during June and October. It does appear that February and April were the months in which more females were killed, while more males were killed in November 1985, 1986 as well as 1987. However, if the datasets were complete, the overall picture may have been different.

4. Conclusions and Recommendations

This study was successful in creating computer software (ALPRU Predator Database) to capture and analyse historical data on predator control activities. Original handwritten records were retrieved from official sources. The records were manually captured on the ALPRU Predator Database and then transformed during export to the ArcGIS environment. A large number of data tables and maps were generated for evaluation.

Historical data were used with a view to:

- Investigate whether it was possible to establish the measure of success of predator management practices used in the past.
- To test the capacity and performance of the computer software for further application as a tool in predator management.

The study focused on the monthly hunt reports of two problem animal control clubs in the Mossel Bay district of the erstwhile Cape Province, namely the Cooper Jagklub and the Mosselbaai Sentrale Jagklub. These monthly hunt reports of the two clubs were the most complete set of data retrieved by ALPRU and also covered a substantial period, namely from 1976 to 1992.

The software highlighted several important issues and shortcomings in the dataset, namely:

- The historical monthly hunt reports and especially the way in which the data were recorded, were never intended for further analysis.
- Positive identification of the specific locations of farms proved to be especially difficult and time-consuming.
- The data were incomplete regarding specific information which prevented definitive conclusions being drawn.
- The format in which data regarding predator control activities is recorded and reported needs to be improved.
- Despite the shortcomings in the dataset, the software proved very valuable in analysing major aspects of predation and predator control activities.

In more specific terms, the study showed that the computer programmes could filter out specific sets of data for separate analysis. In the present study only maps showing stock losses as a result of predation on the one hand, and predators killed in control operations on the other hand were analysed. It was possible to filter out these two different sets of data for the entire study period of 16 years. The datasets were also filtered out (by means of queries) for each year, as well as for each month in a specific year. This allows a view of the specific relationship between predator activity and animal damage control activity in a given area and over a certain period of time.

The computer programmes designed for the present study can serve as a management tool in analysing data concerning predator activity and animal damage control in any given area over time. Currently it provides for datasets to be broken up into any shorter period, for example three months (one season), weeks, or even days. The shorter timescales were not evaluated in the present study because of incomplete information in the records.

With the aid of the computer programmes, the following factors can be analysed separately for more in-depth studies on damage causing animals:

- different classes of different domestic animals killed by predators
- different classes of different predator species killed in animal damage control operations
- different animal damage control clubs, or selected groupings, or geographical areas
- different animal damage control operators (usually referred to as problem animal hunters)
- different methods used in animal damage control operations.

The monthly hunt reports used in the past by official animal damage control clubs were not very useful in creating a clear understanding of how animal damage and animal damage control activities influence each other. This may in part be ascribed to the inadequate design or format of the monthly hunt report for recording data and other relevant information.

It was clear from the present study that incomplete (regarding data) or incorrect (misspelling of farm names prevents positive identification of sites) monthly hunt reports distorts the clear picture that could otherwise have been created by the data. The official quarterly inspection

reports from the hunt clubs were useful as summaries of the hunting activities of a club and when properly executed may have prevented hunters from submitting incomplete or inadequate hunt reports. These reports by an independent official (supervisory capacity to the problem animal hunters) often helped in clarifying incomplete or inconsistent reporting by the hunters.

Recommendations

A thorough understanding of animal damage control activities in South Africa, as well as more studies using the ALPRU Predator Database to interpret the extent of present day animal damage, could help to identify shortcomings in animal damage management. Therefore, it may definitely assist in formulating more effective animal damage management strategies.

Cooperation from all role players and stakeholders are necessary to enhance the potential and output of this computer programme. The correct filling out of hunt reports, the updating of data and submission of subsequent inspection reports is of utmost importance to ensure data that can be analysed and the results portrayed for similar studies.

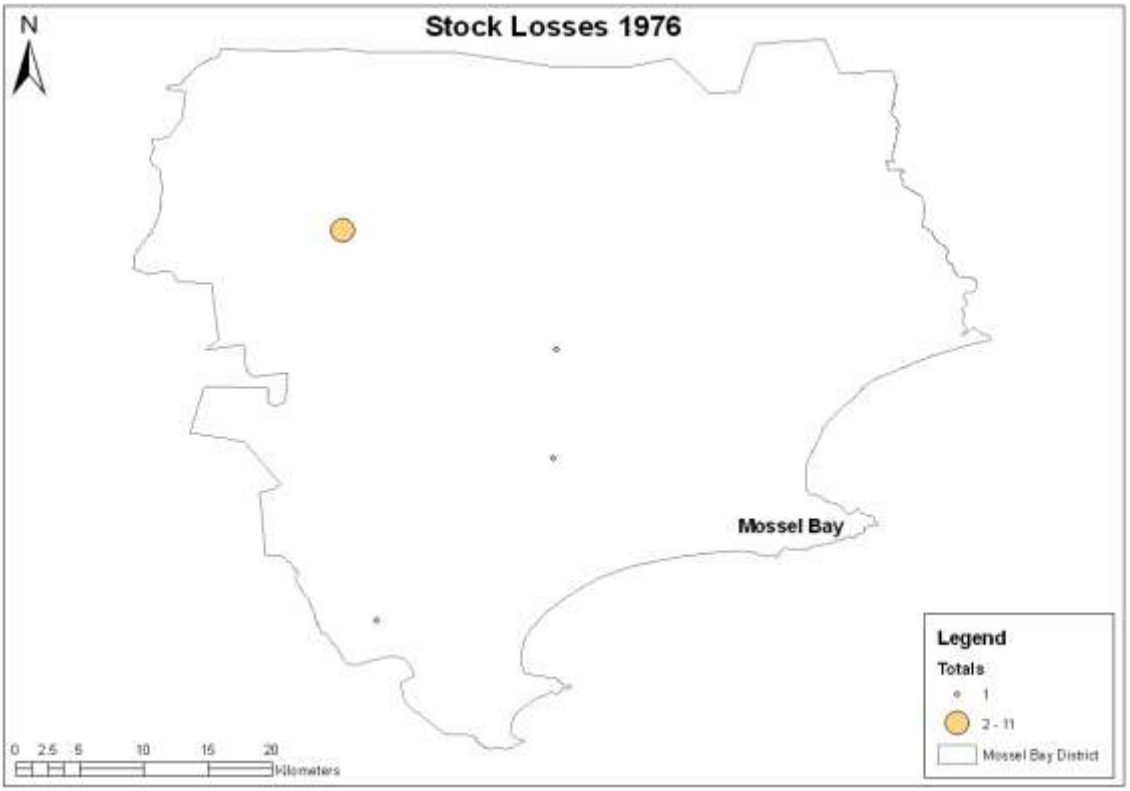
It is important that computer software such as this be utilised with current data sets to improve the fragmented and uncoordinated predator management activities in South Africa. It may assist in identifying best practices regarding methods and procedures of predator management with a view to reduce the impact of predation on the livestock industry.

Two formats to record Livestock Predation and Predator Control Activities are proposed. The basic information required is presented in Tables 4.1 and 4.2.

Appendix 1

This section contains maps created to show annual small livestock losses as a result of predation as well as the number of predators killed in subsequent animal damage control operations by the Cooper Jagklub (1976 – 1988) and the Mosselbaai Sentrale Jagklub (1976 – 1992).

These maps are discussed in brief in Chapter 3 (Results and Discussion).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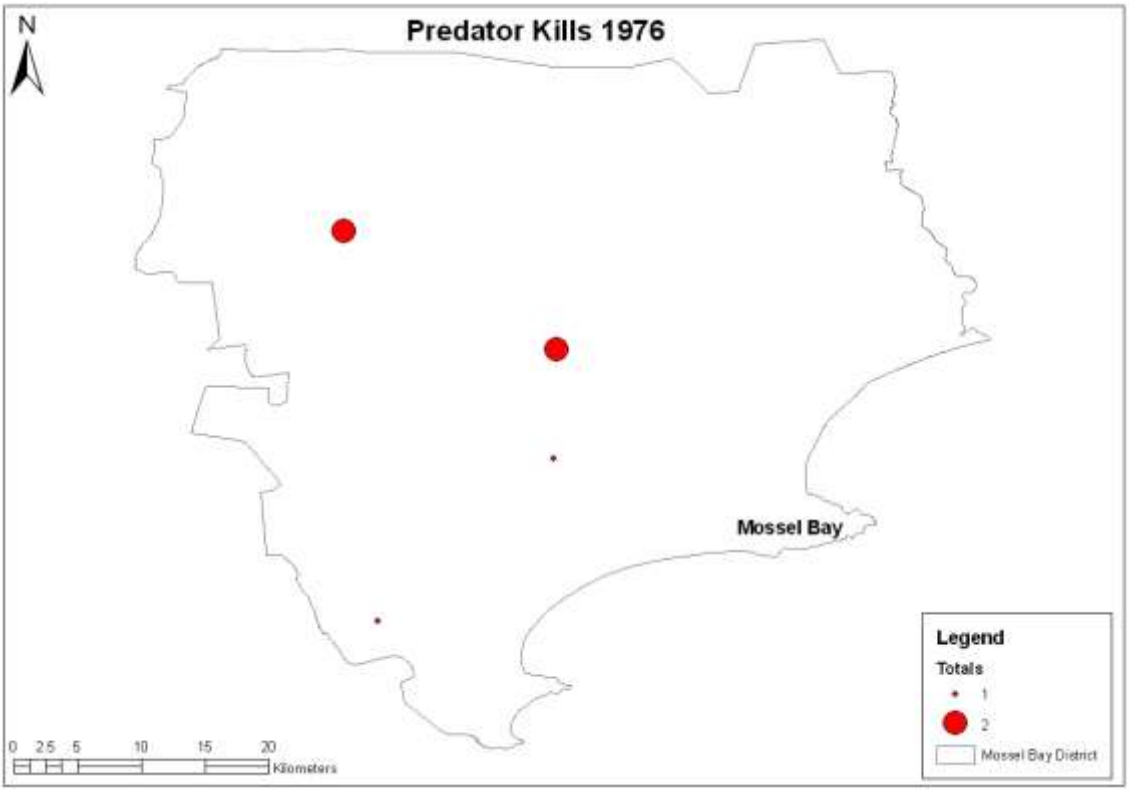
Kilometers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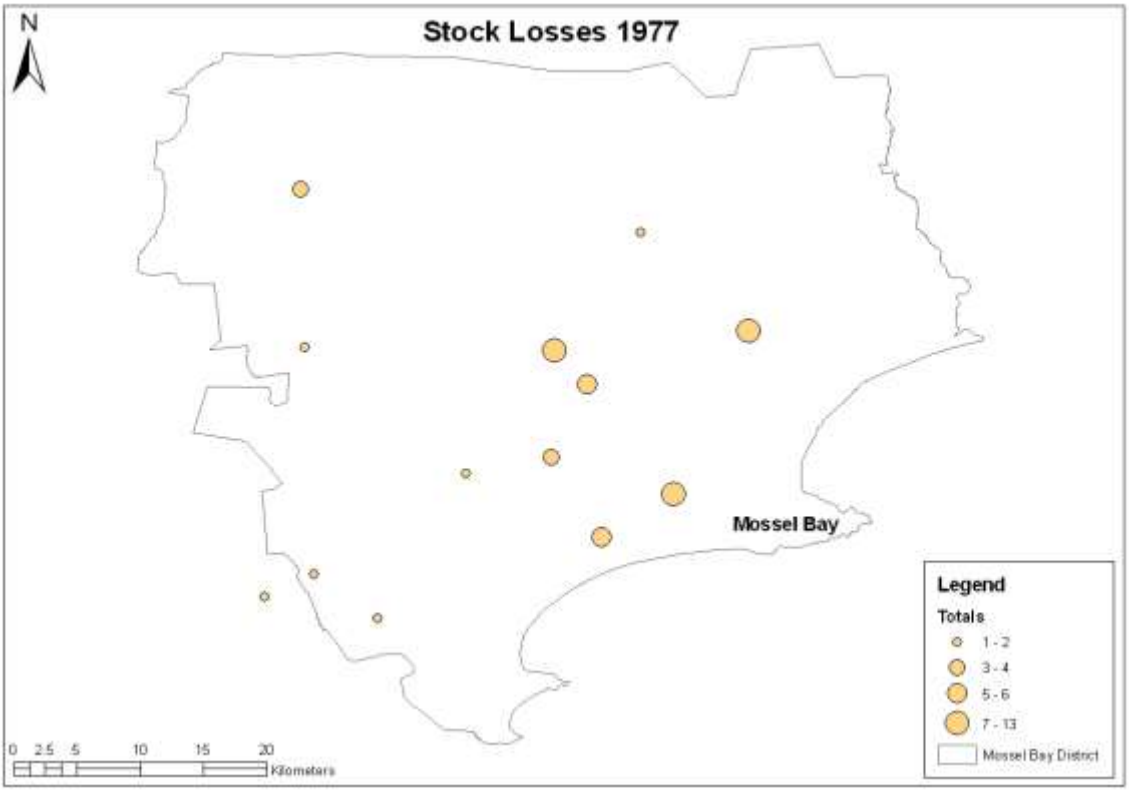
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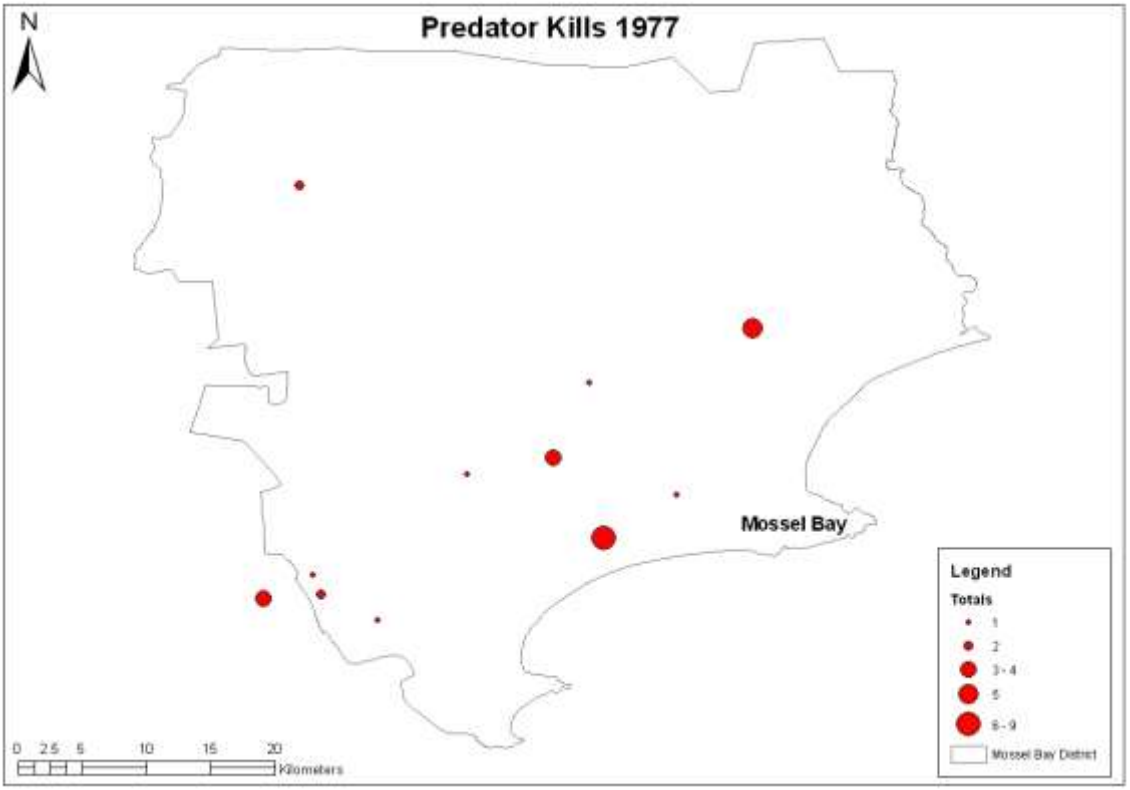
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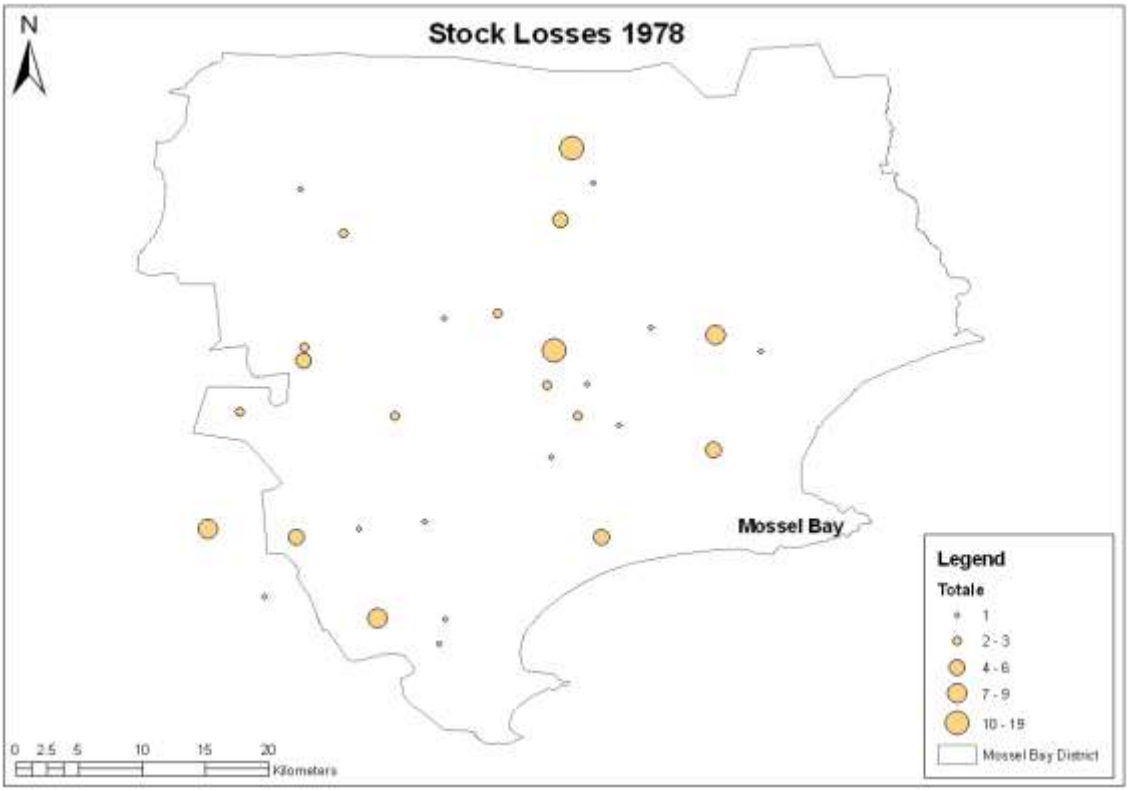
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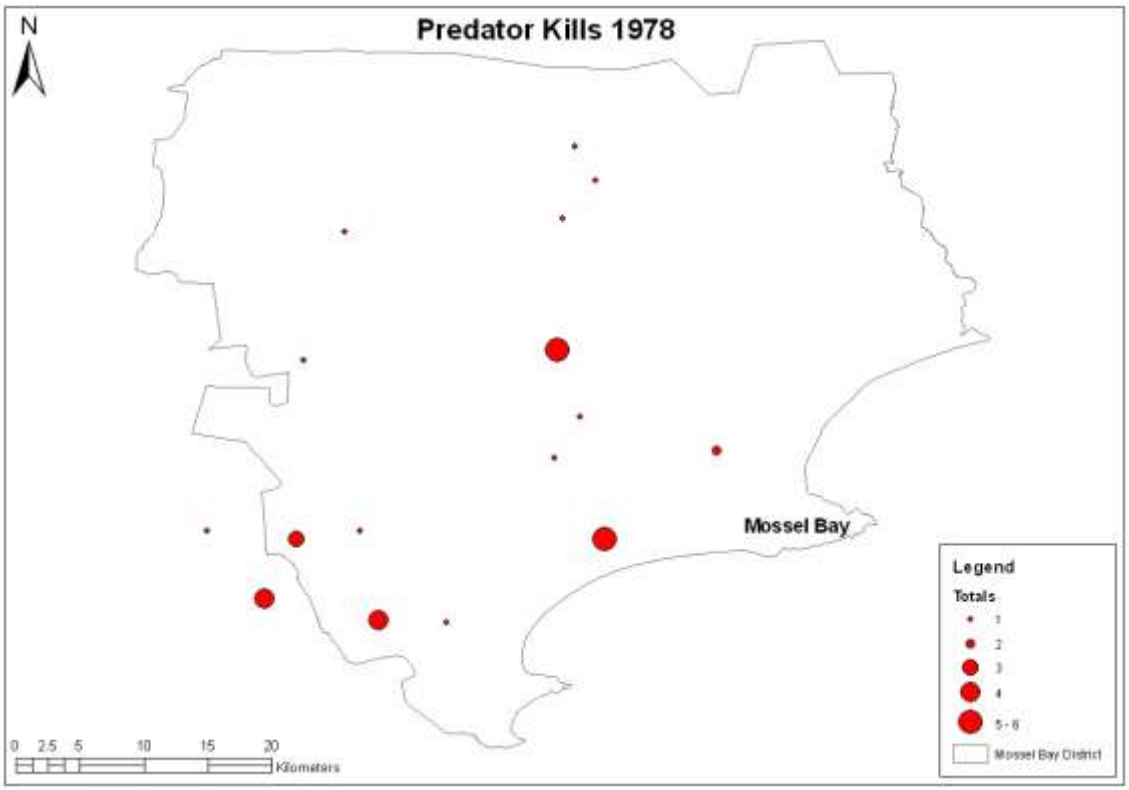
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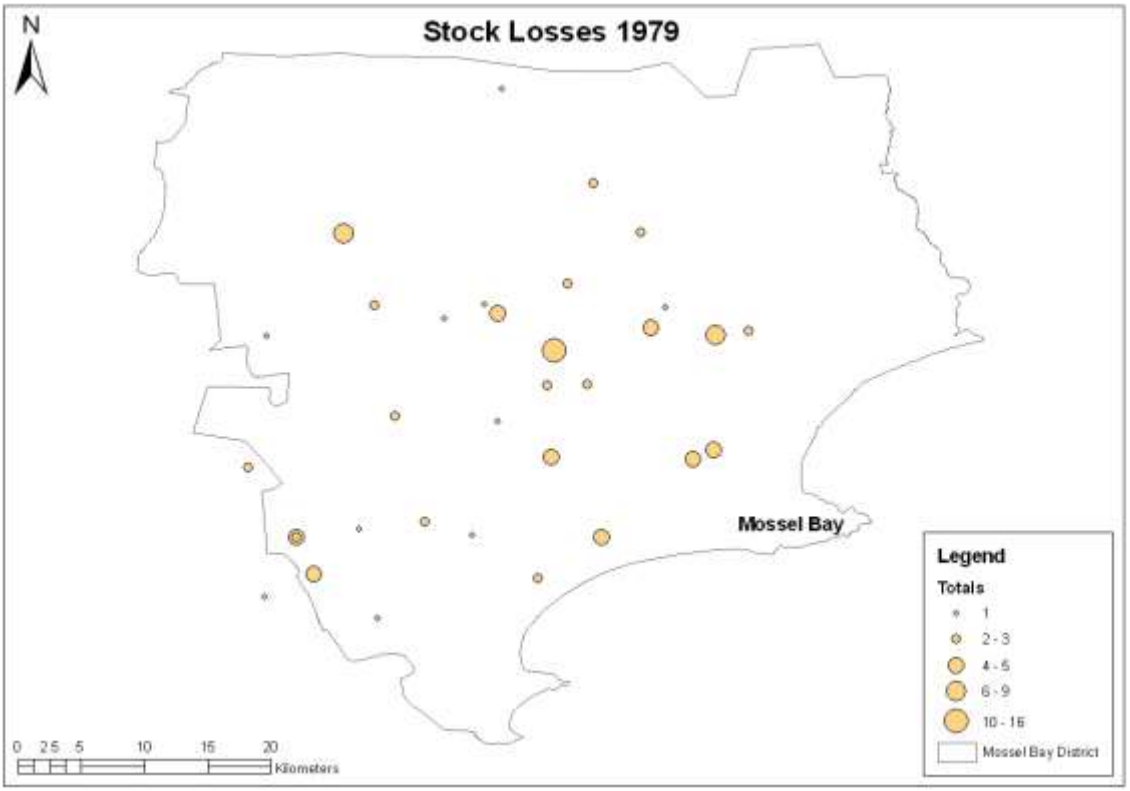
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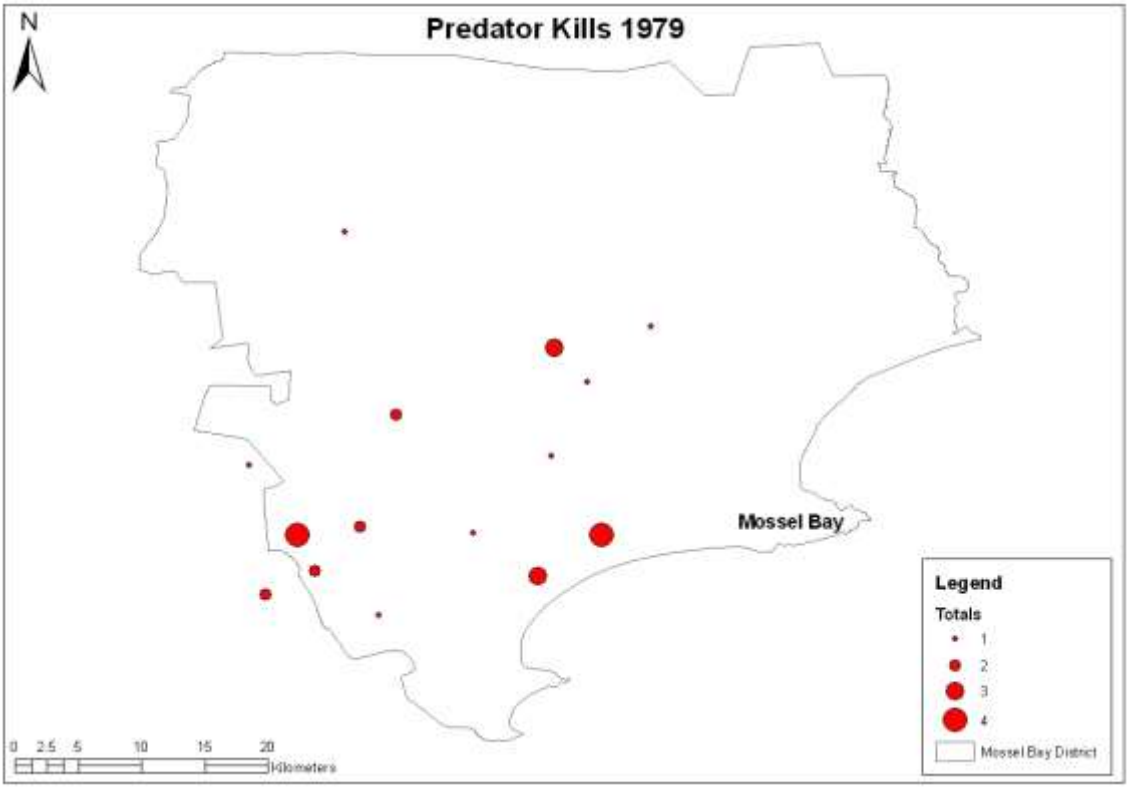
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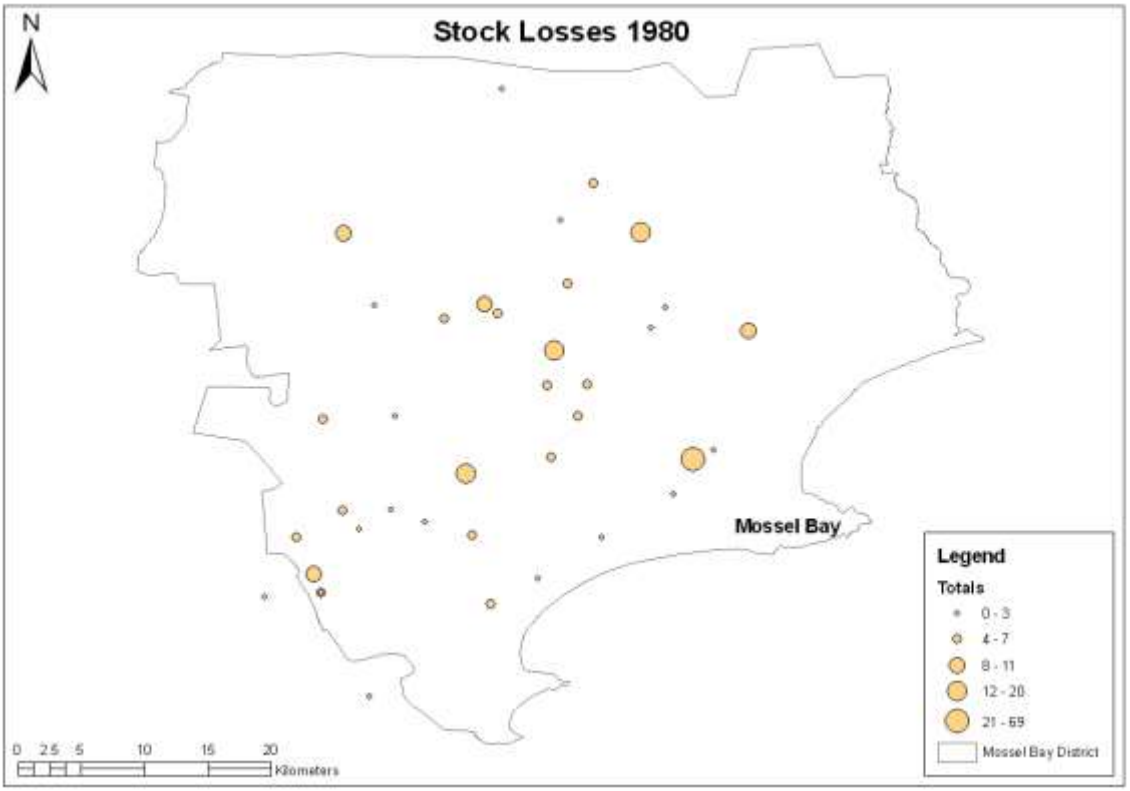
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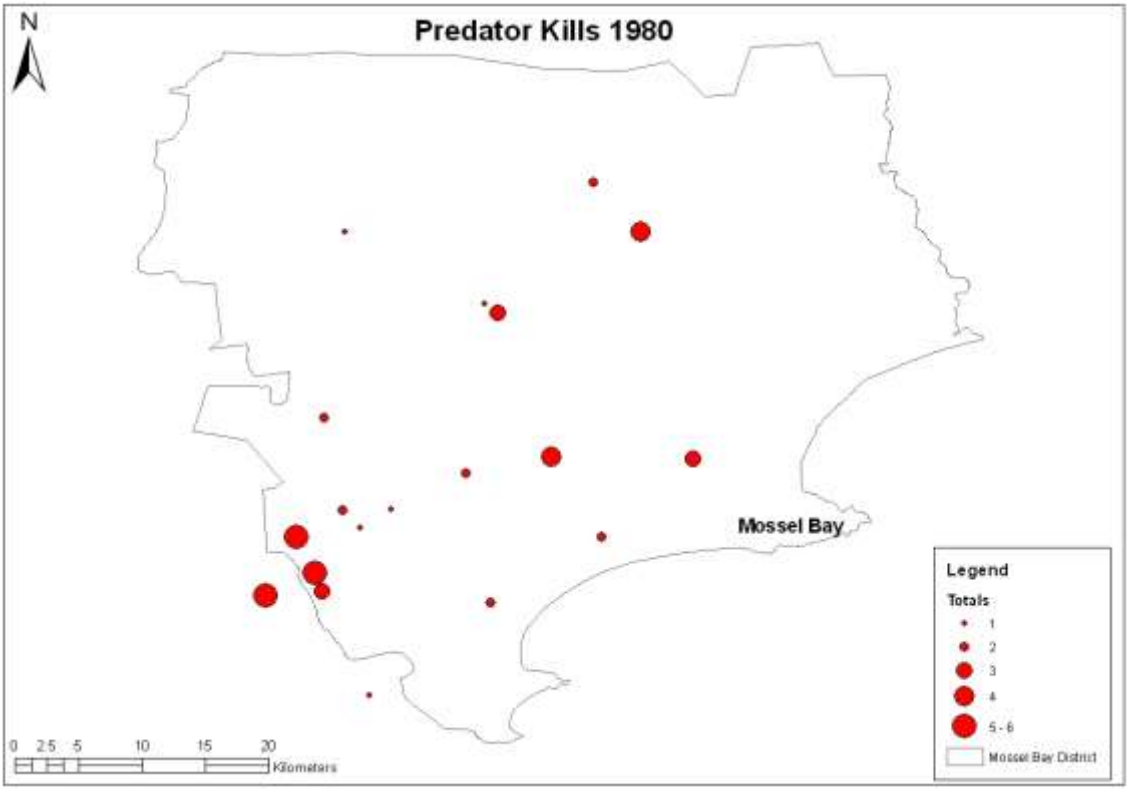
Kilometers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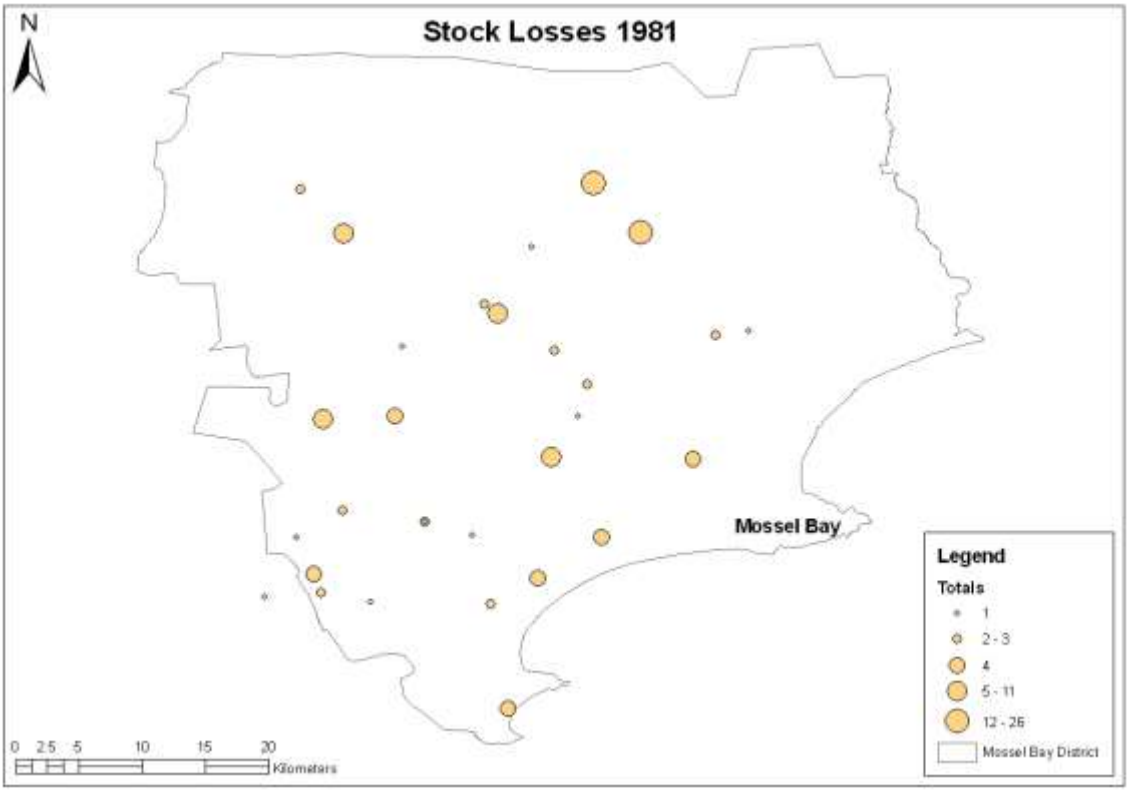
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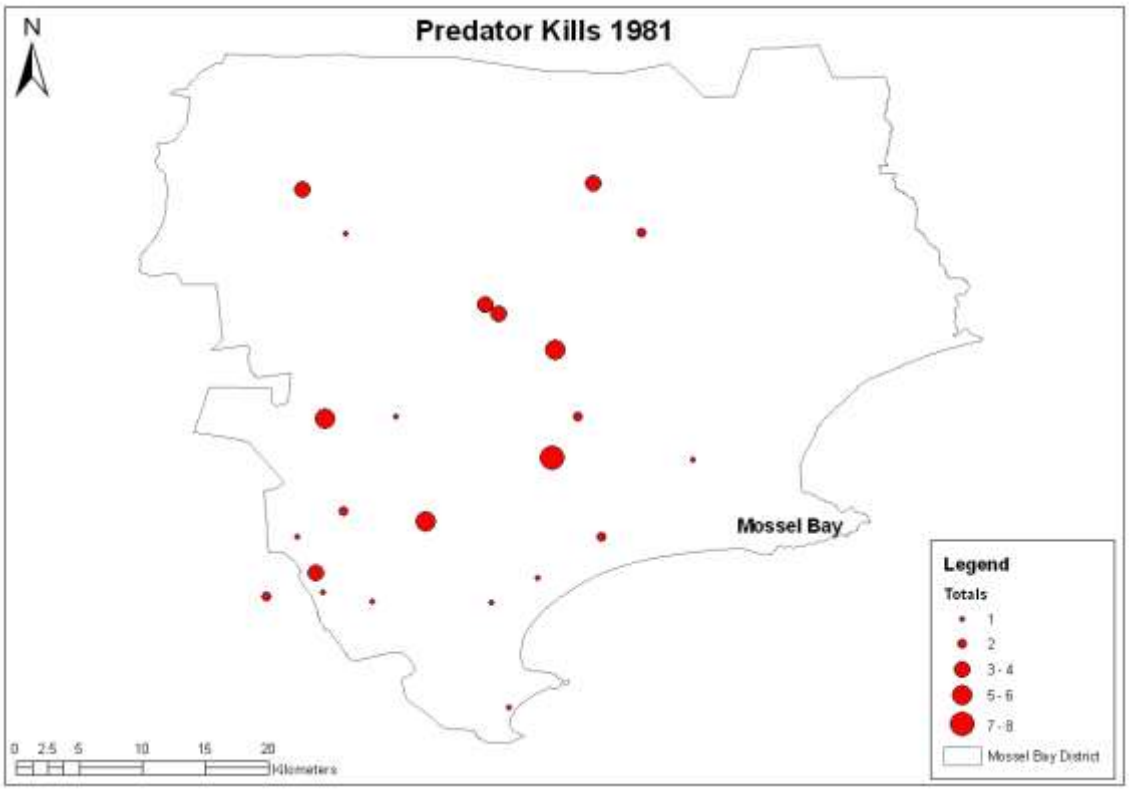
Kilometers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Predator Kills 1981
Mossel Bay
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Totals
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Mossel Bay District
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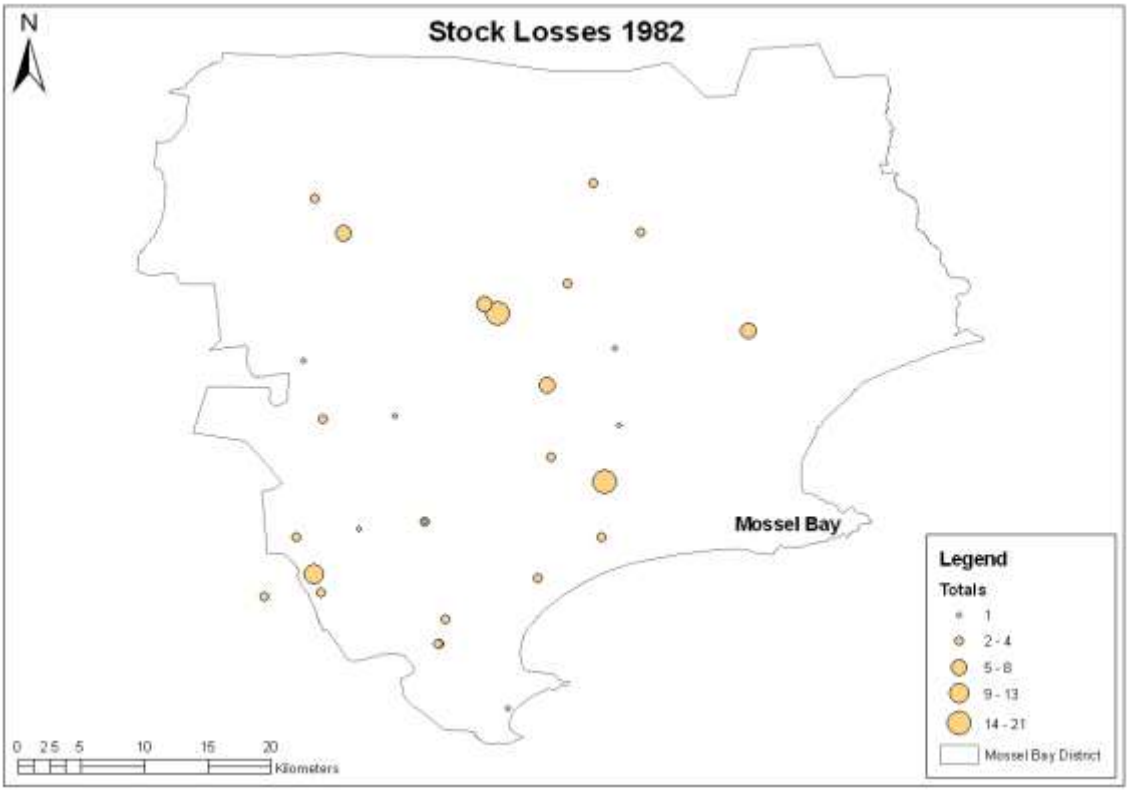
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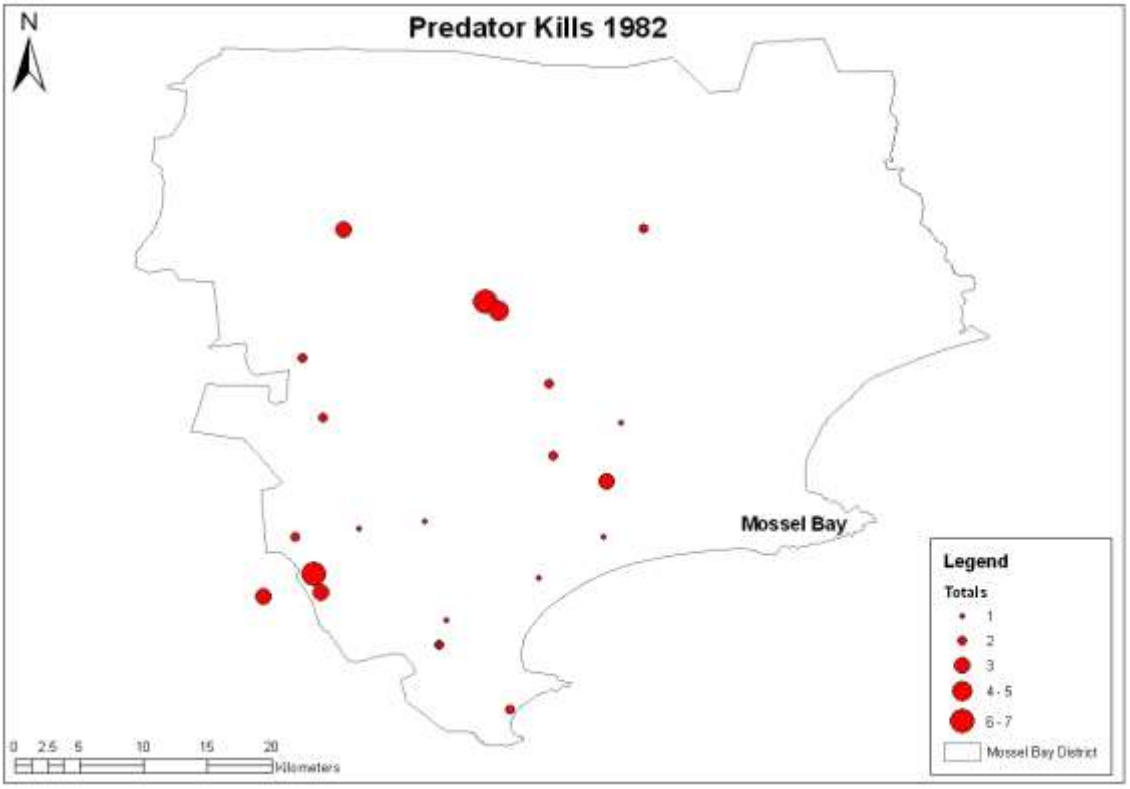
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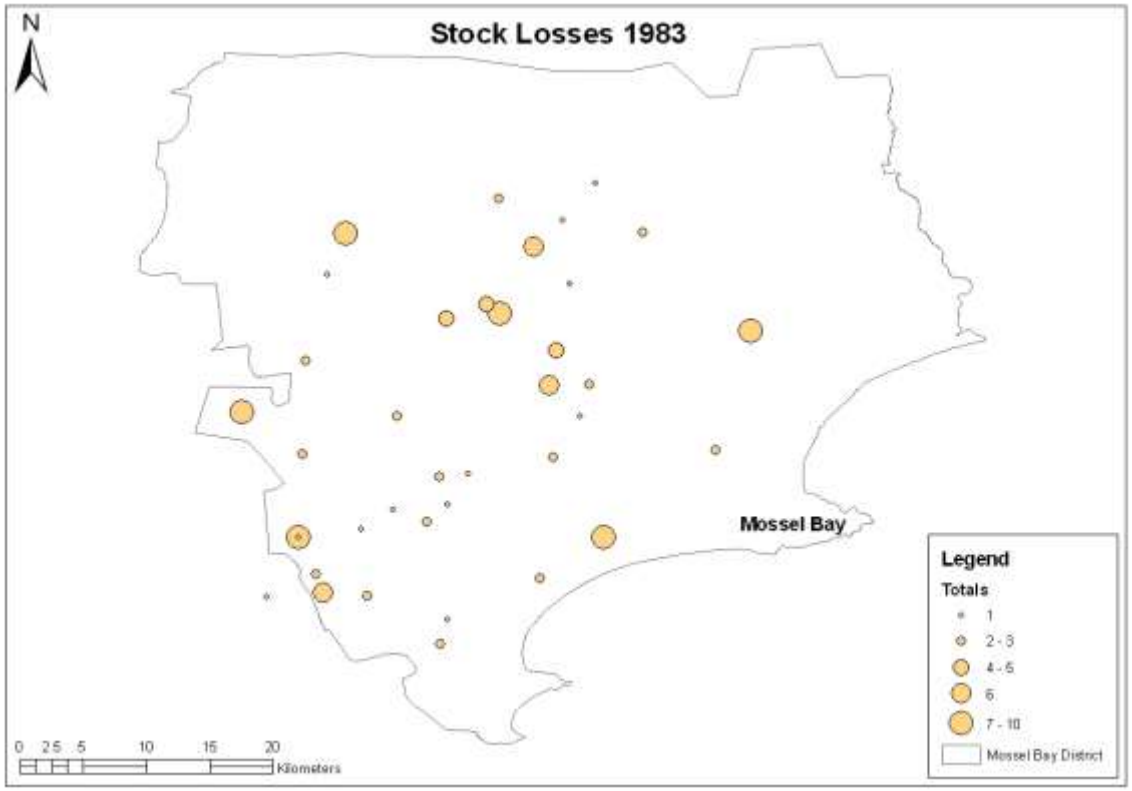
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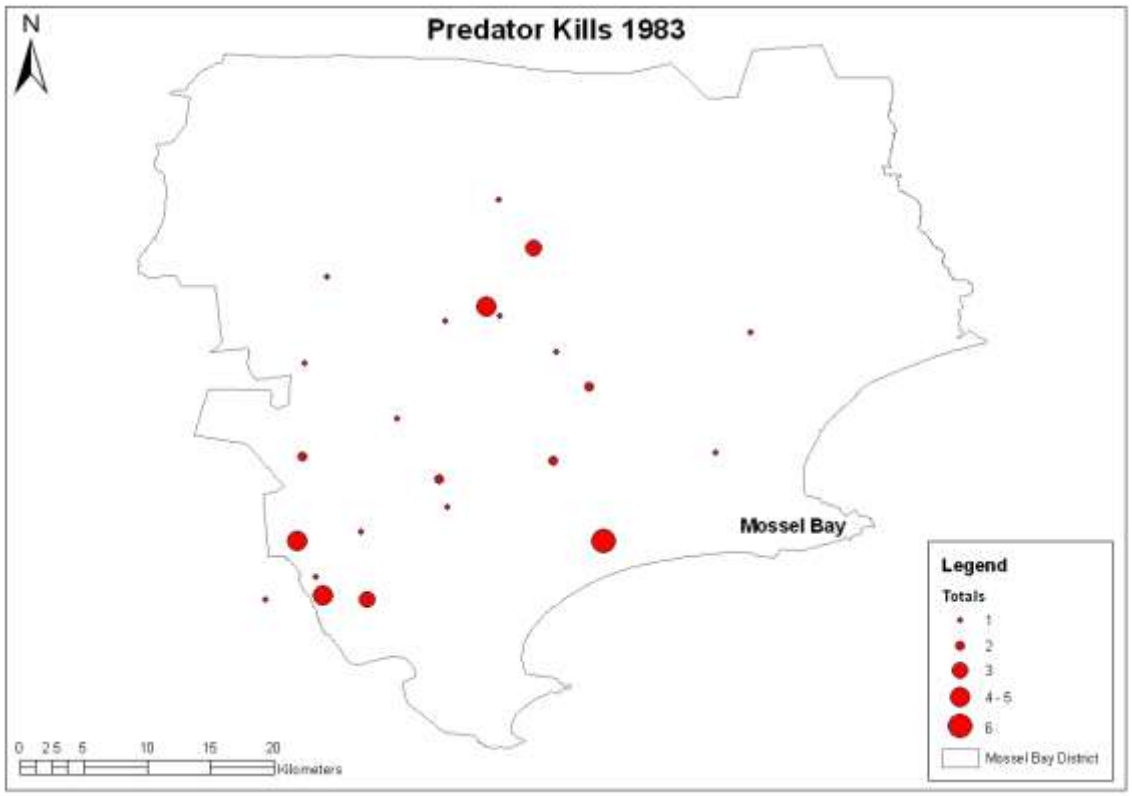
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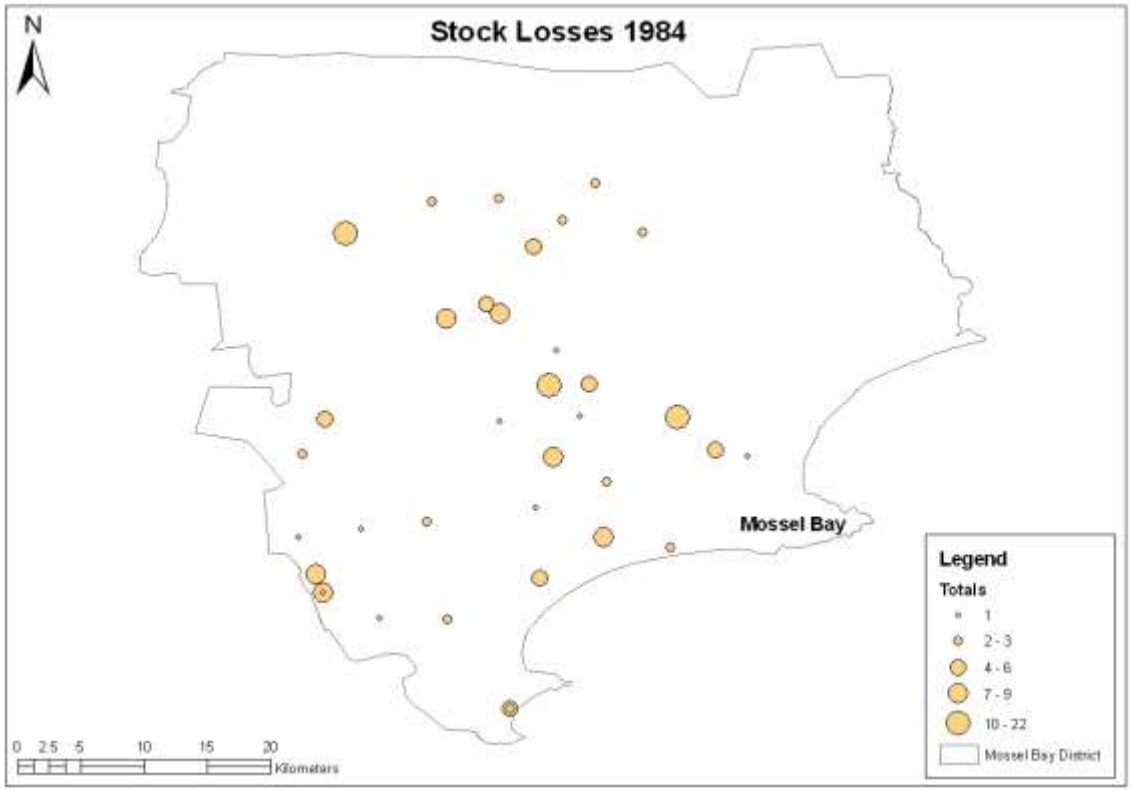
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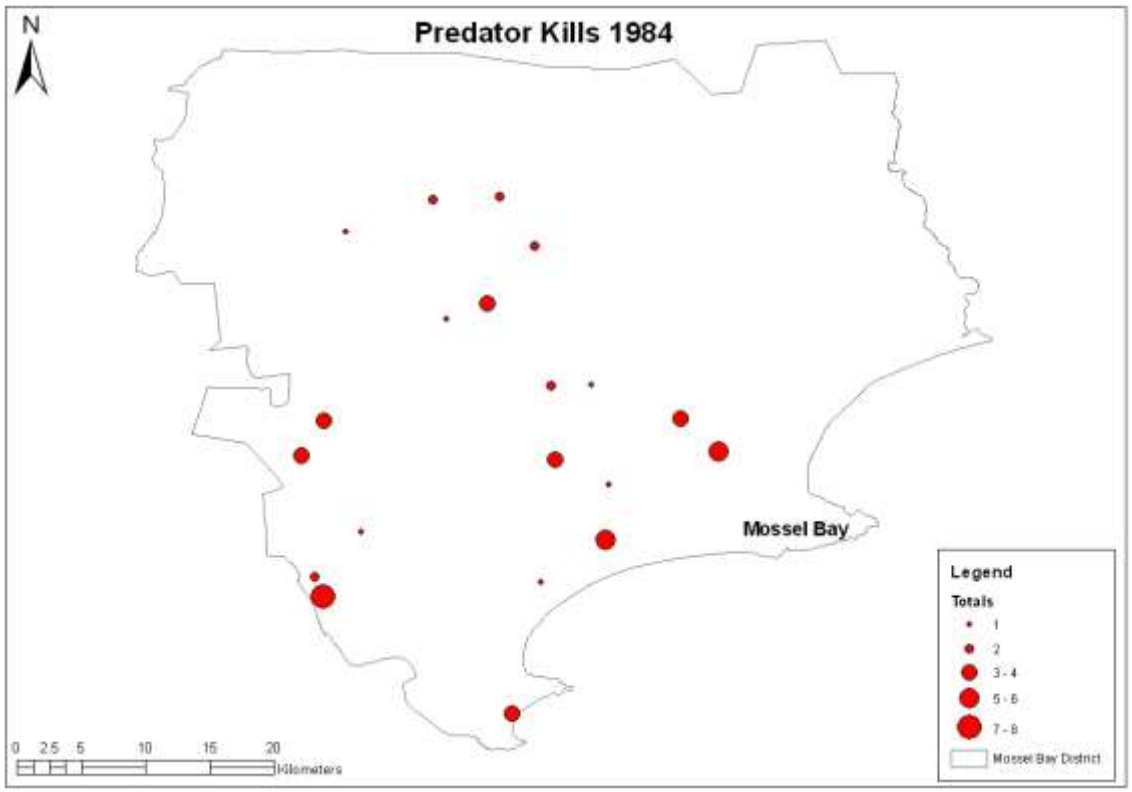
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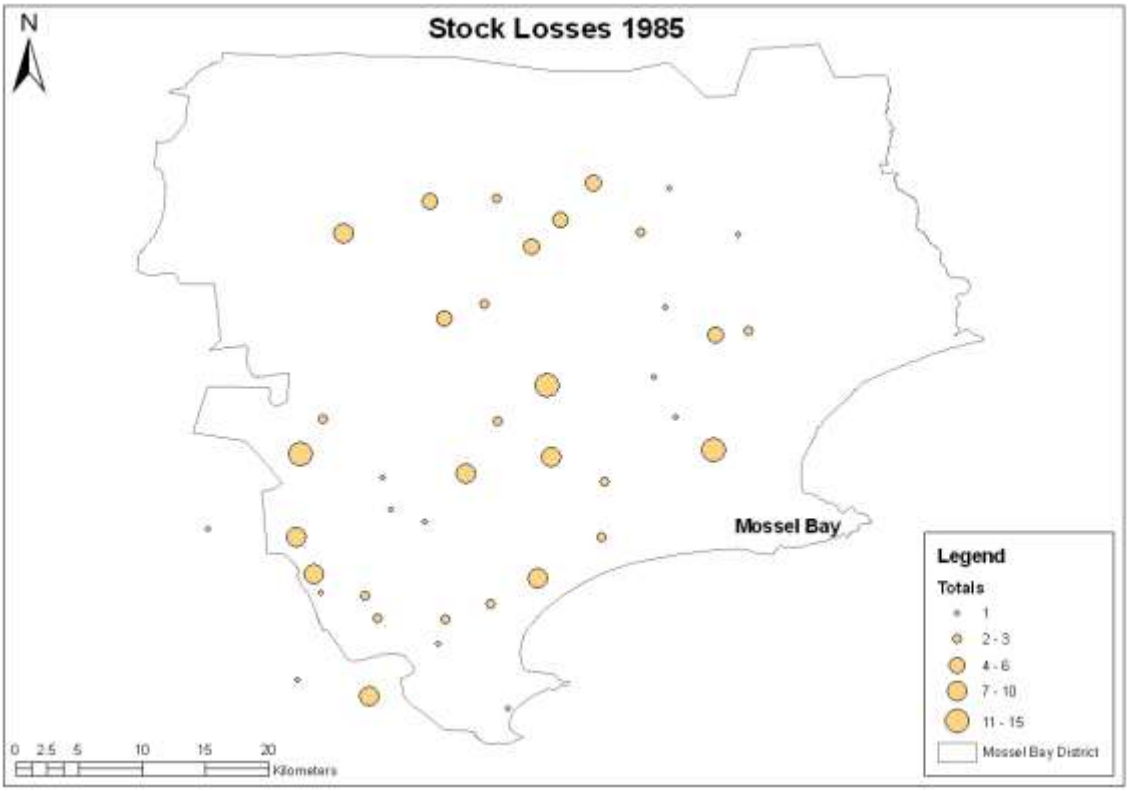
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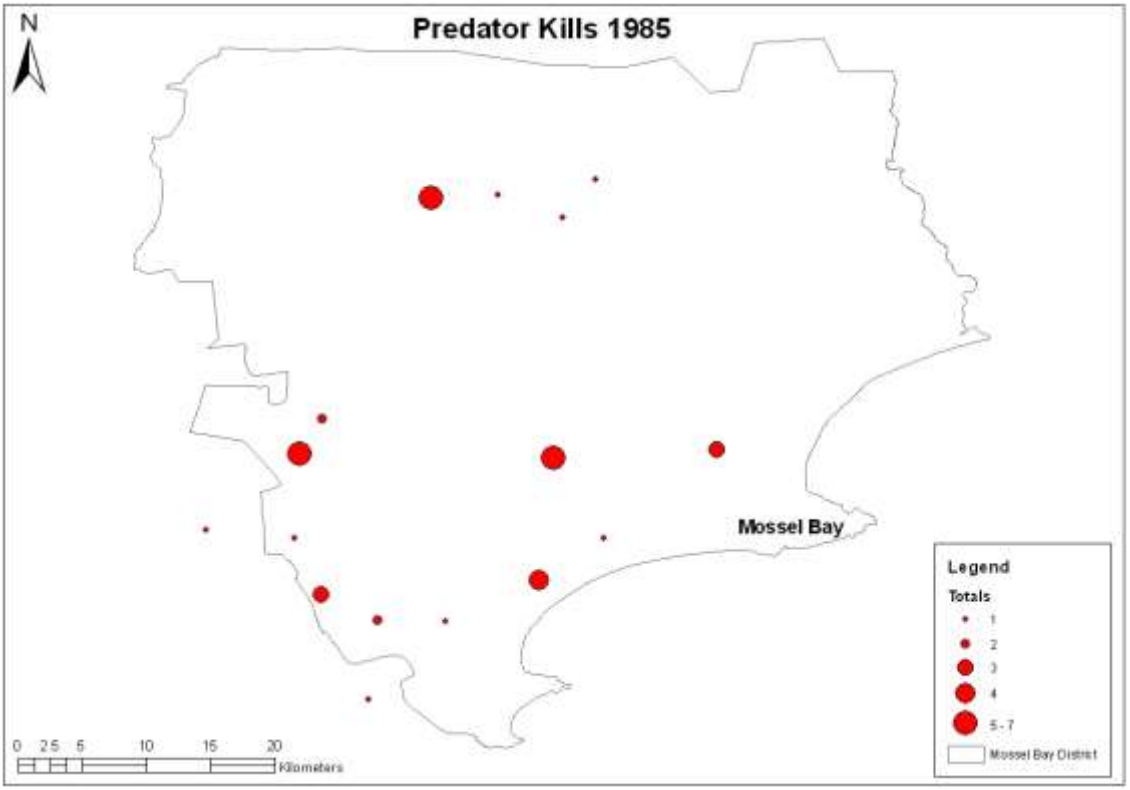
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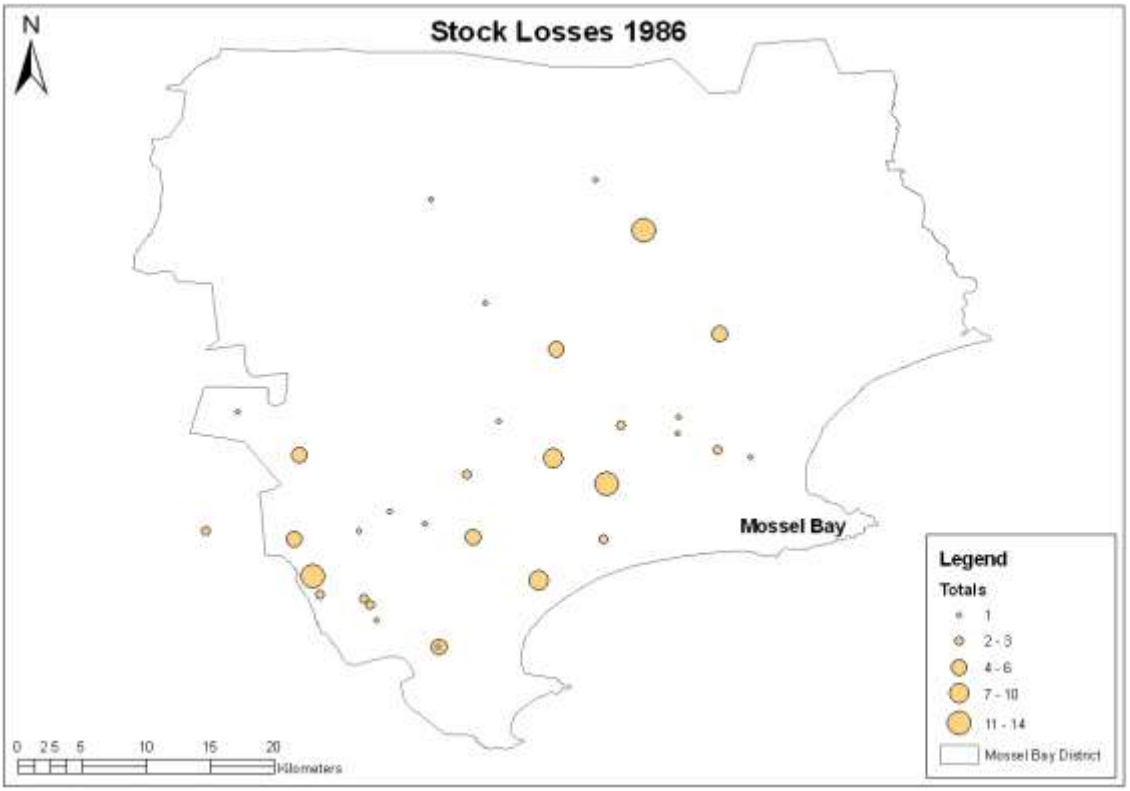
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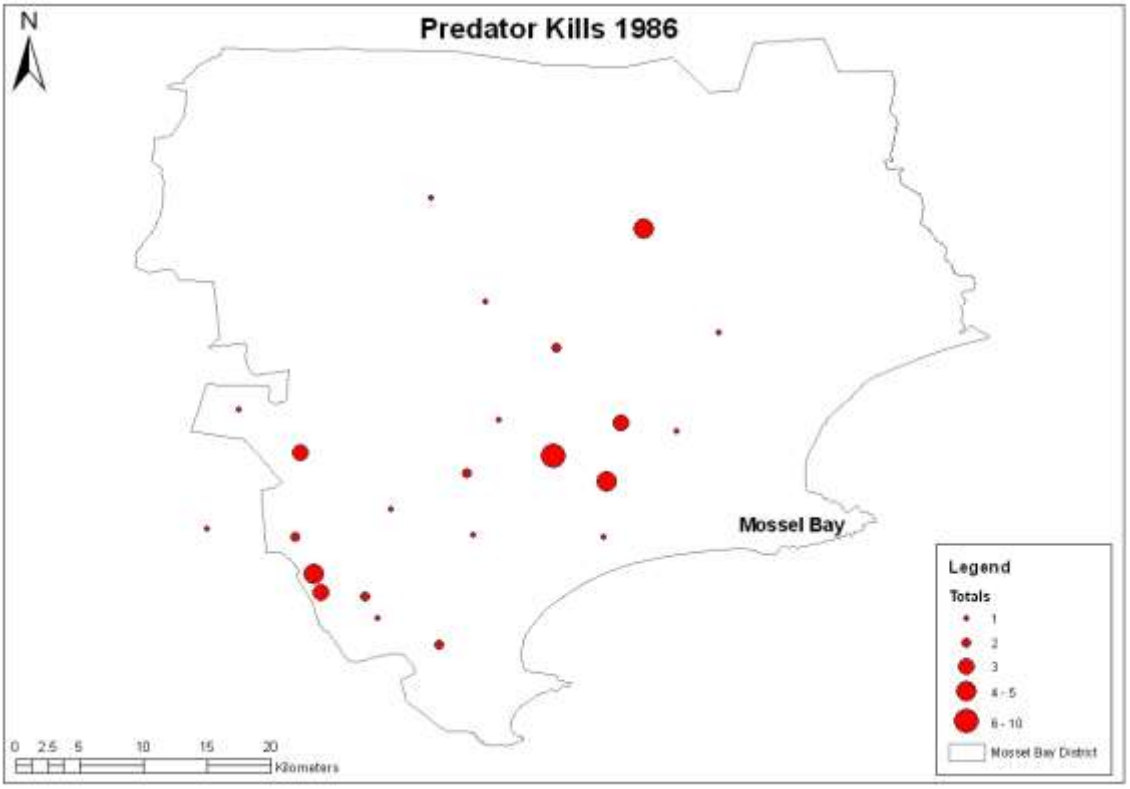
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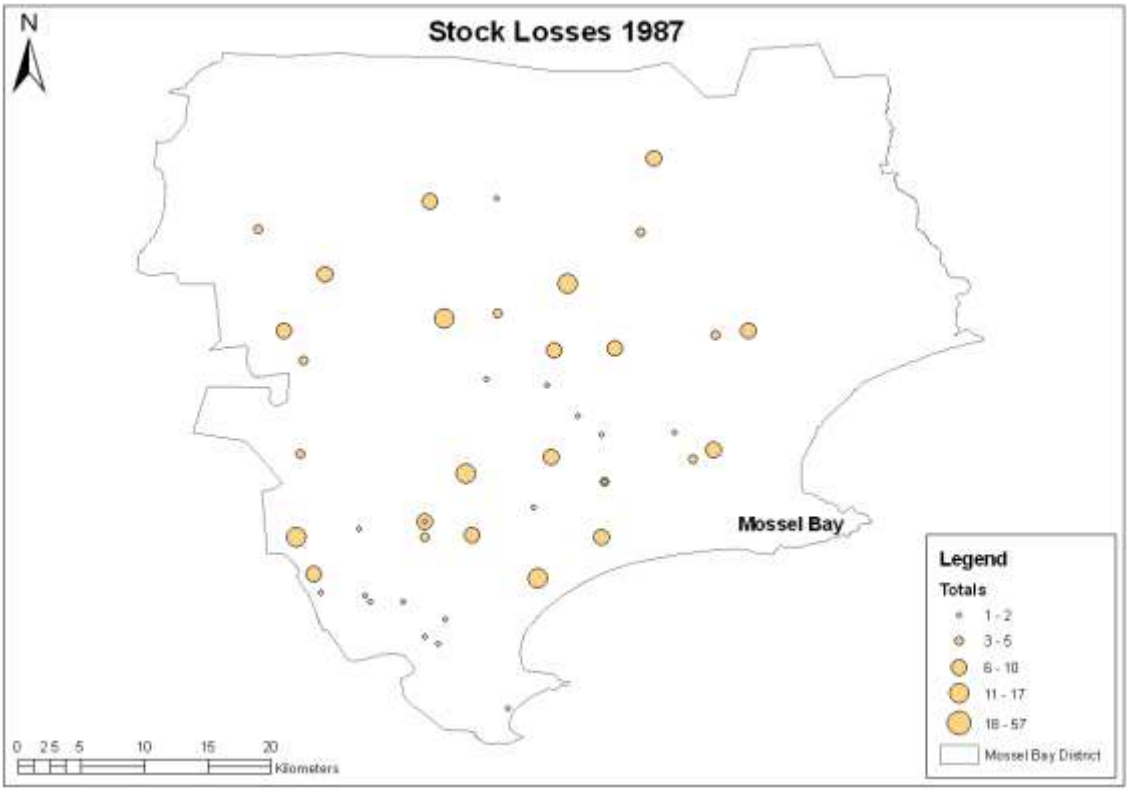
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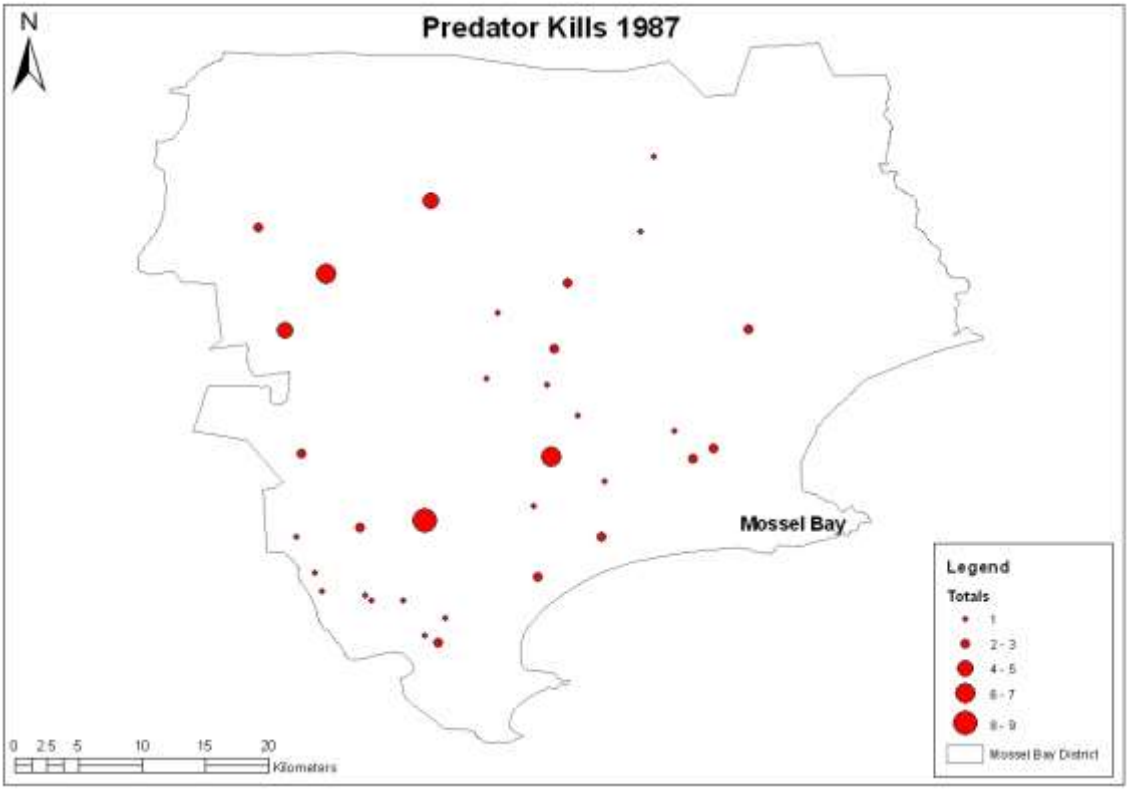
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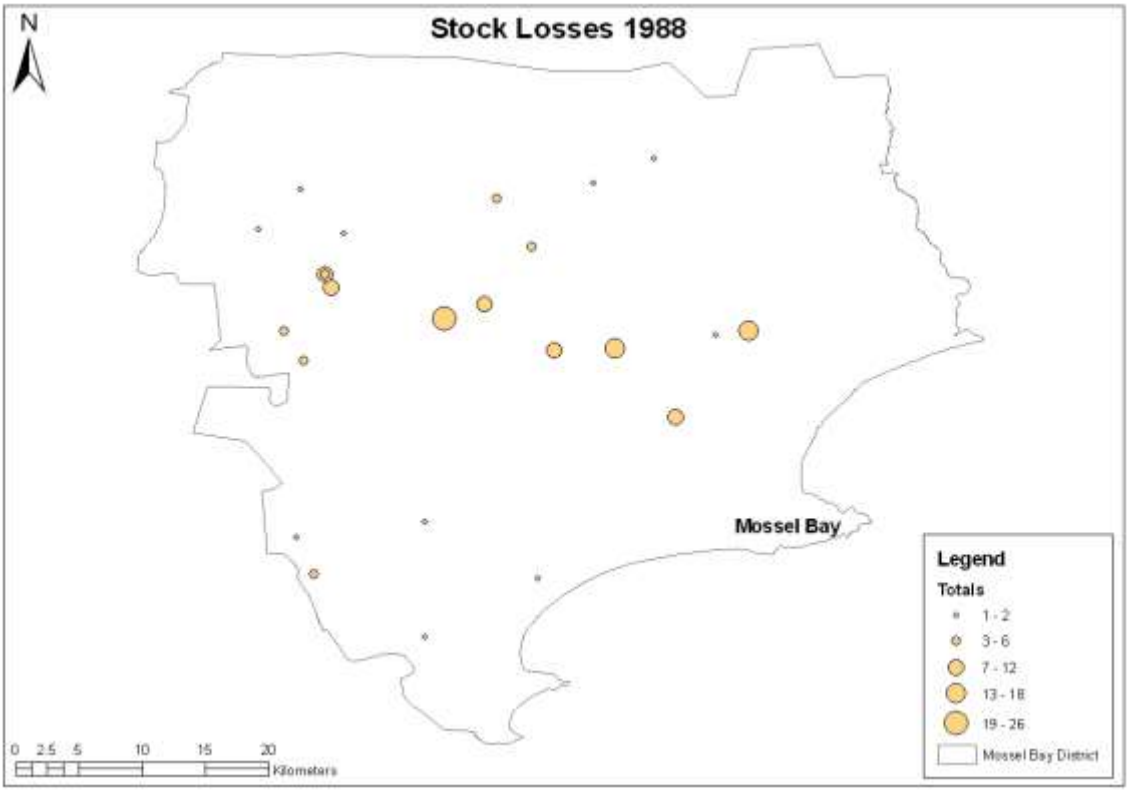
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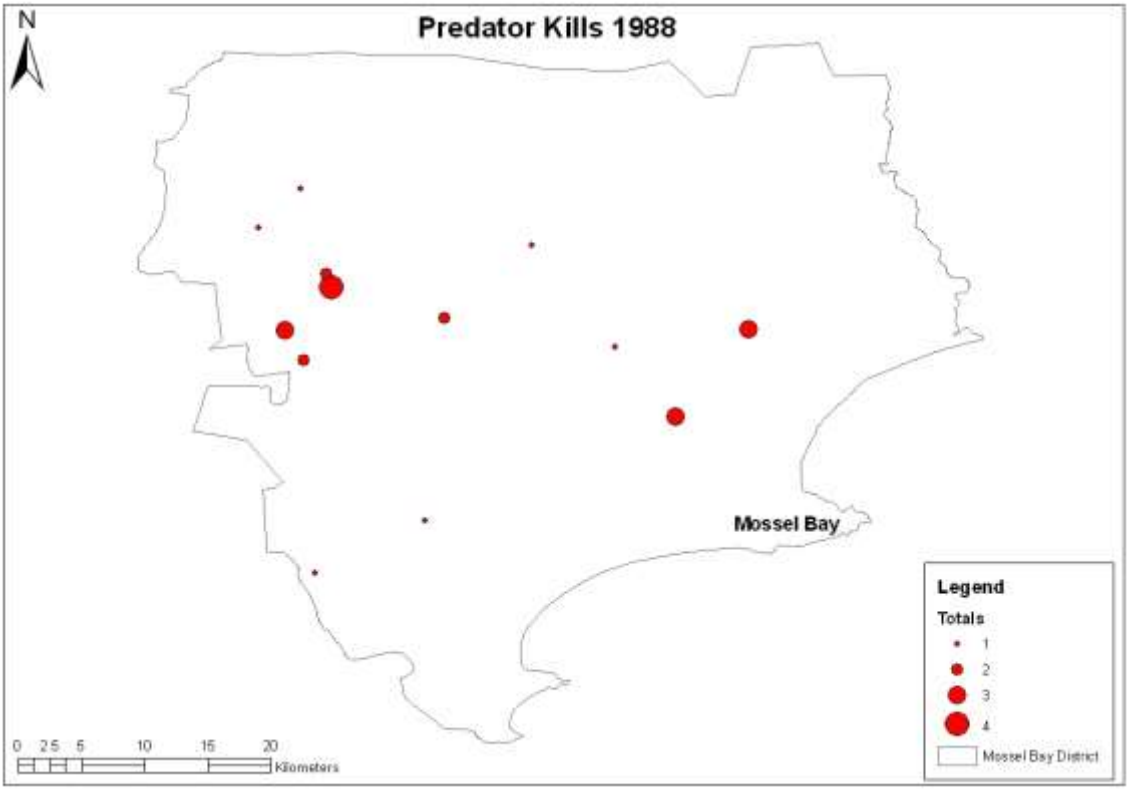
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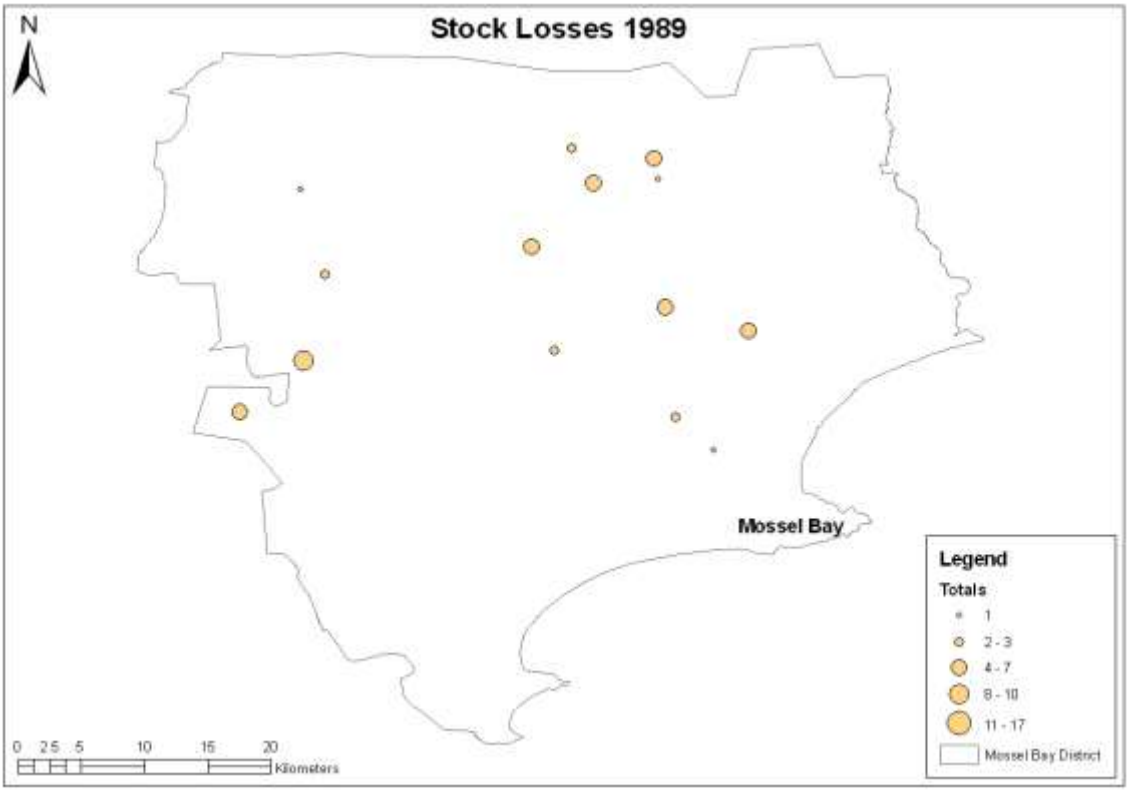
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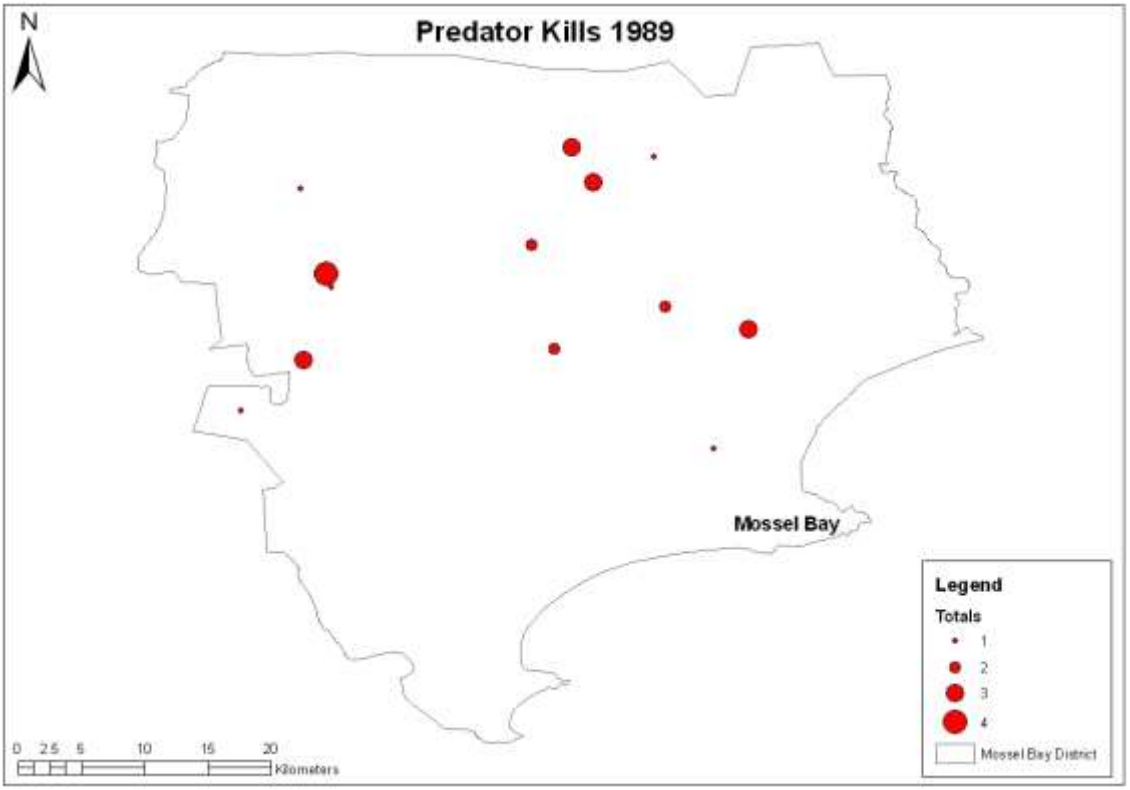
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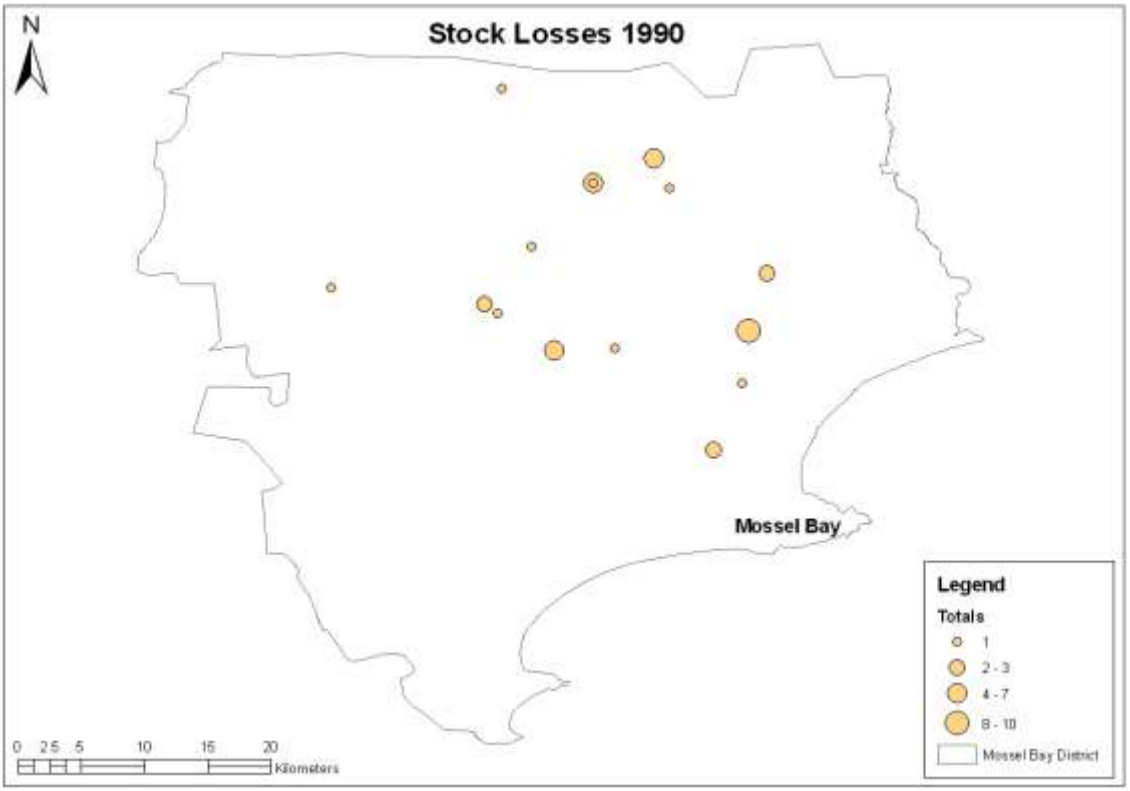
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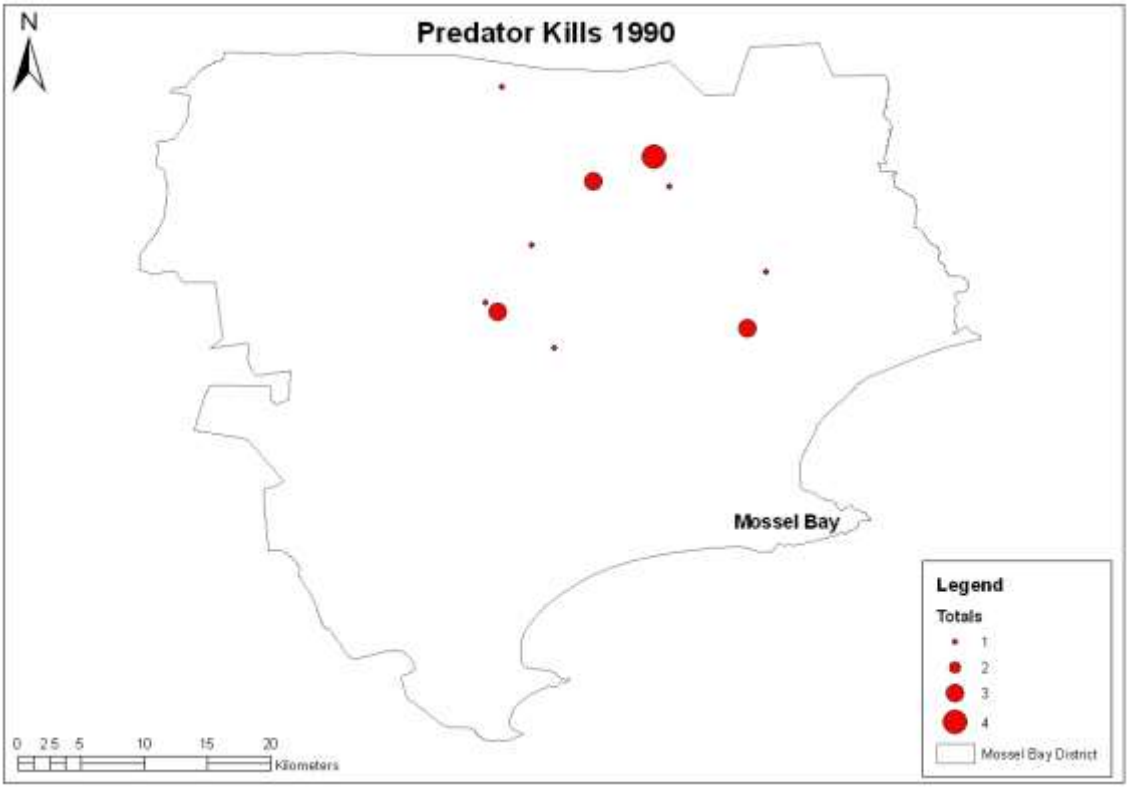
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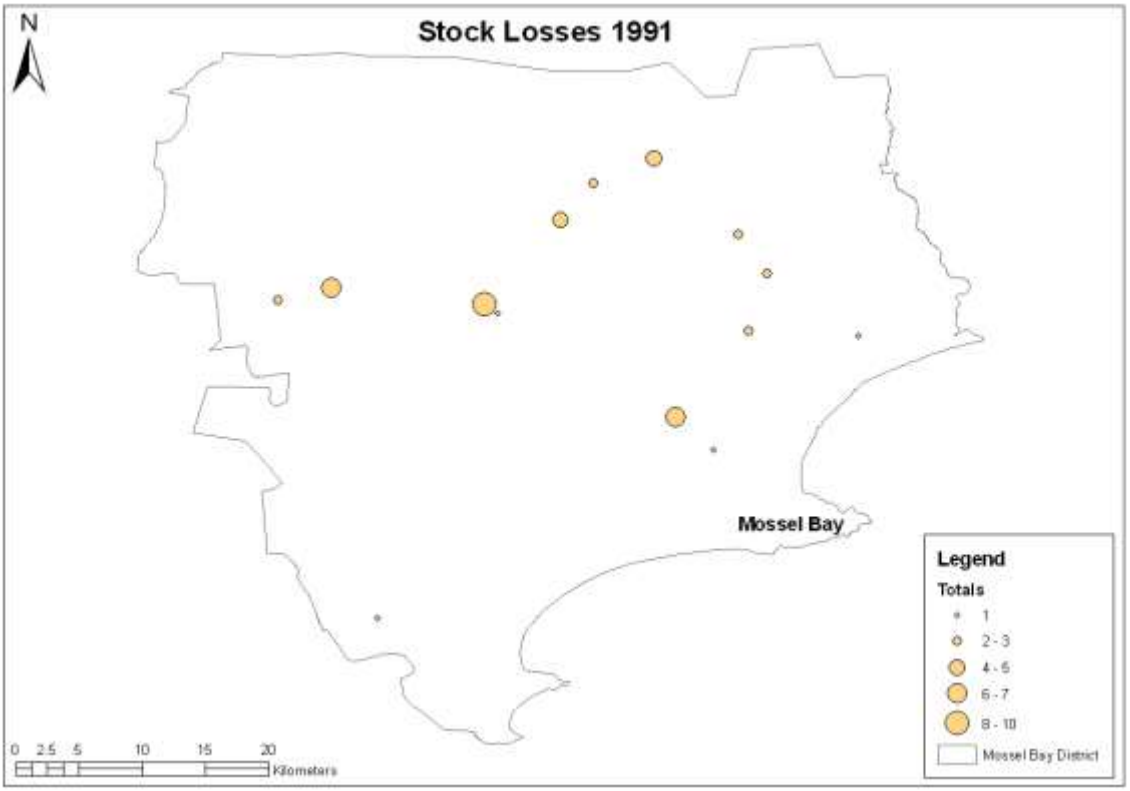
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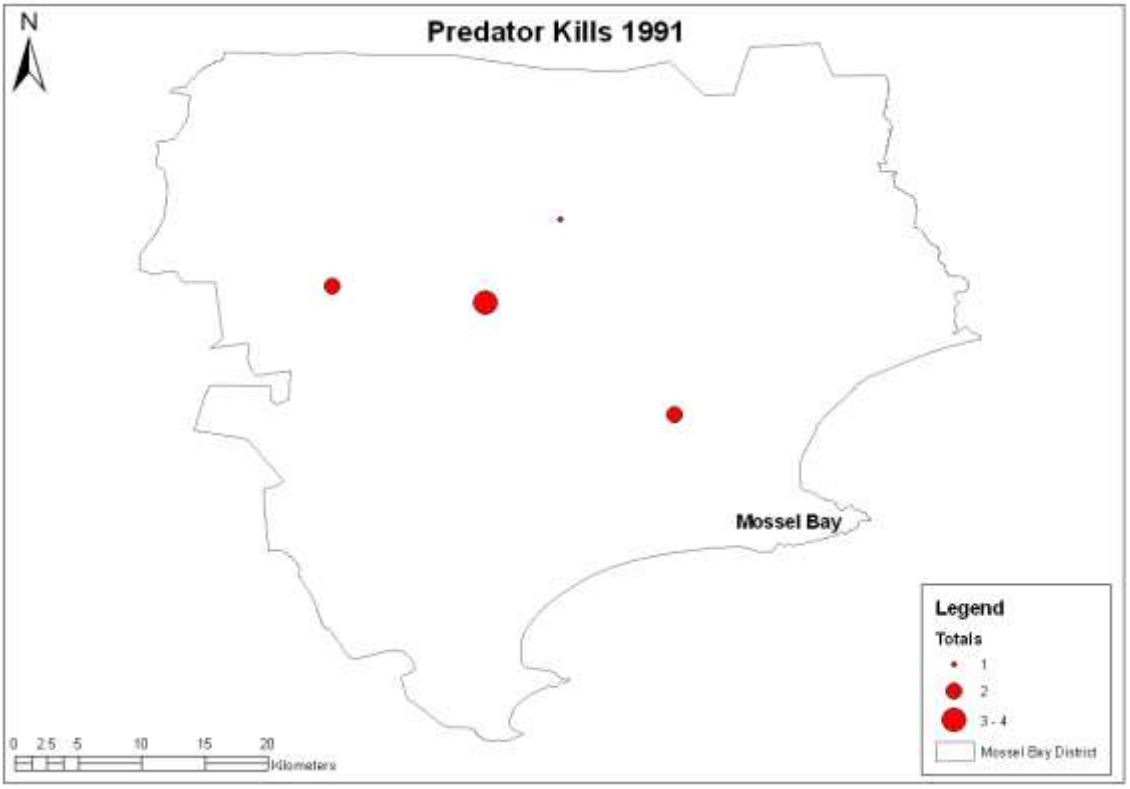
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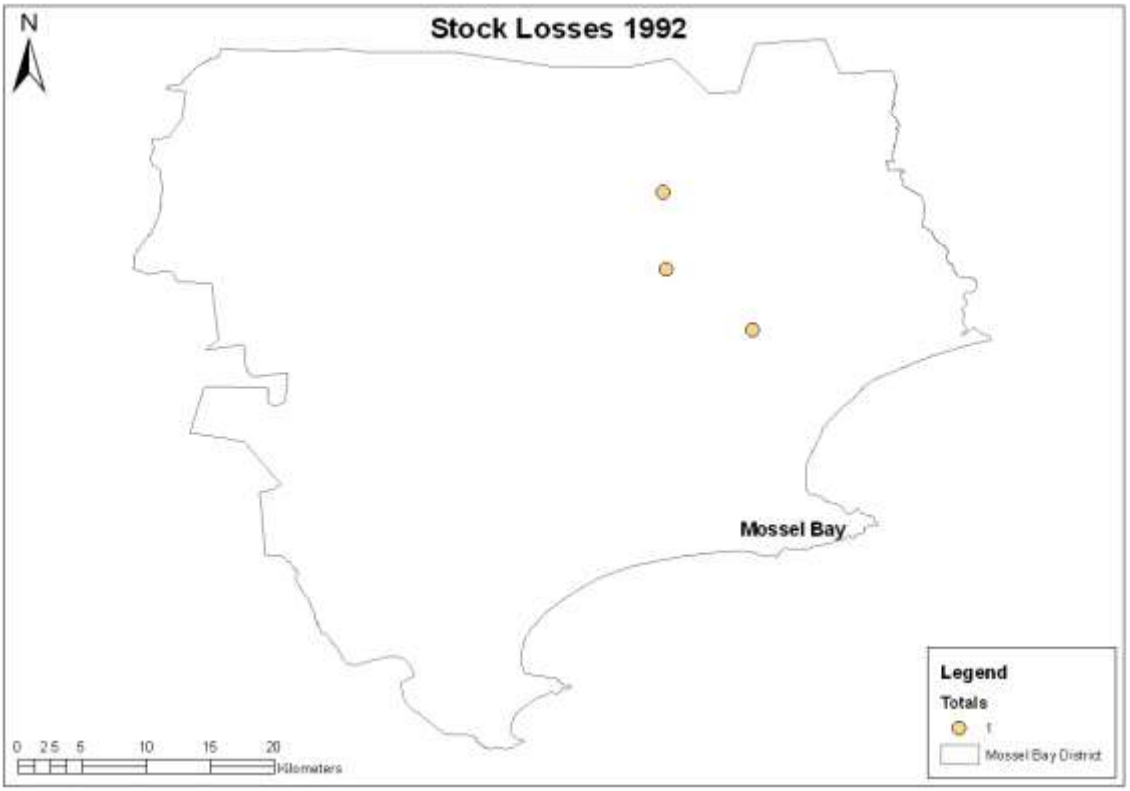
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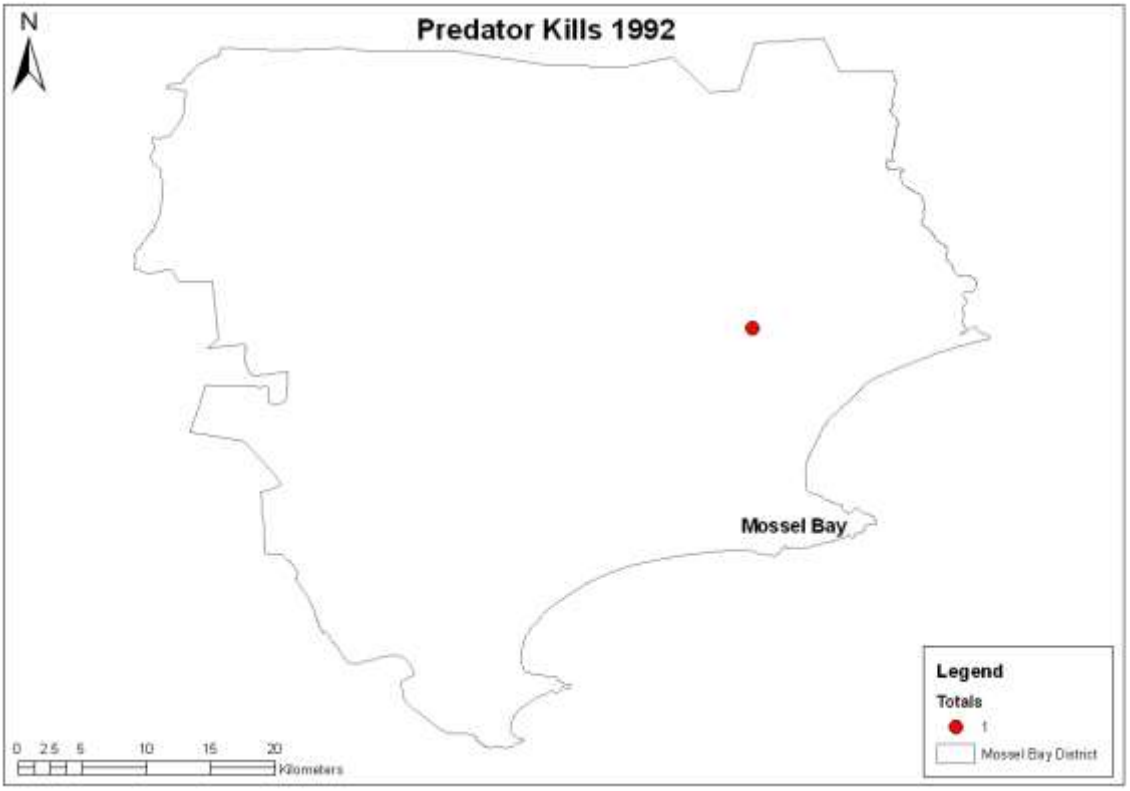
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