

Management Plan for the Commercial Harvest and Export of
Brushtail Possums *in Tasmania*



2010 - 2015

**Management Plan for the Commercial Harvest and Export of
Brush-tail Possums in Tasmania**

1st July 2010 – 1st July 2015

Wildlife Management Branch
Department of Primary Industries, Parks, Water and Environment
Tasmania

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Summary

The Tasmanian Department of Primary Industries, Parks, Water and Environment (DPIPWE) is responsible for the sustainable management and protection of the State's natural and cultural assets for the benefit of Tasmanian communities and the economy. This includes the management of native wildlife populations under the *Nature Conservation Act 2002* and its associated Regulations.

Common brushtail possums (*Trichosurus vulpecula*) are wild-harvested in Tasmania for commercial purposes or controlled where they are causing damage to crops. The commercial industry produces a variety of products, however these can only be exported overseas if the possums are taken under the conditions of a management plan approved under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Accordingly, the following management plan has been developed by the Wildlife Management Branch (WMB) of DPIPWE for the commercial harvest of the Tasmanian population of the common brushtail possum. The management plan outlines the management regime already in place and has been written to demonstrate how it also meets the requirements of the EPBC Act for the purpose of commercial export.

While the plan has been developed exclusively for the management of the commercial harvest, information on the non-commercial cull is also included to demonstrate that it is regulated and the overall impact of this cull on possum populations is taken into account in setting the commercial quota.

The management plan aims to ensure the ecological sustainability of commercial brushtail possum harvesting in Tasmania. This will be achieved by regularly monitoring regional population trends and following an adaptive strategy by adopting an appropriate management response to any observed trends. In facilitating overseas export of possum products this plan aims to provide an additional option for utilising possums already taken in Tasmania and to ensure the development and application of best-practice animal welfare standards in the management of the Tasmanian commercial possum harvest.

The brushtail possum is listed as partly protected wildlife under the *Wildlife Regulations 1999* of the *Nature Conservation Act 2002*. As such, they may be taken only under the authority of a permit or licence issued for commercial use, crop protection or other approved purposes.

This management plan relates to the commercial harvesting of brushtail possums that occurs under Commercial Brushtail Possum permits. This is an ongoing enterprise in Tasmania, however it is anticipated that this plan will facilitate growth and development of the commercial industry. Commercial harvesting permits impose conditions that provide for effective control and accountability of the harvest. The non-commercial culling of brushtail possums for crop protection is not managed under this plan, however the number of possums taken non-commercially is taken into account in the management of the commercial harvest.

Holders of commercial permits are permitted to sell possum products only to authorised skin dealers, meat processors or their agents. All skin dealers and meat processors must have the appropriate licence or permit. Permits are required to export skins and meat out of Tasmania.

Holders of commercial permits and skin dealers/meat processors are required to provide information on the number of possums taken, and possum carcasses sold, bought and processed. Monthly returns of take by commercial permit holders are used to monitor the harvest.

Regional brushtail possum population trends are monitored annually using standard spotlight survey counts modified to include line transect sampling. Results of these surveys are used to assess the impact of harvesting as well as other environmental and human influences on possum populations in a series of regions covering Tasmania and are used in determining management responses. Departmental officers will actively enforce the requirements of this management plan.

Each year, a quota report outlining the quota for the upcoming Quota Year (July 1 – 31 June) will be provided to the relevant federal authority, the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), one month prior to the start of that Quota Year. An additional annual report will be provided to DSEWPC 4 months after the conclusion of the previous Quota Year that provides up-to-date statistics on take and details management actions undertaken during that previous Quota Year.

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1	Brushtail Possum Management Regions and Survey Routes
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4	Code of Practice for Use of 1080 Poison for Browsing Animal Control
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6	Monthly Record Sheet for Brushtail Possums Taken and Sold
7	Spotlight Survey Protocol
8	Code of Practice for the Capture, Handling, Transport and Slaughter of Brushtail Possums
9	Code of Practice for the Trapping and Destruction of Wallabies and Brushtail Possums in Tasmania for Crop-Protection and Commercial Purposes

1 INTRODUCTION

This management plan has been developed to outline the management activities of the Tasmanian commercial brushtail possum harvest and has been written to satisfy the requirements of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) for the purposes of export. It has also taken into account the relevant parts of the agreement entered into at Whitemark in 2002 between the Australian Government Department of the Environment and Heritage (now the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC)), the Tasmanian Department of Primary Industries, Parks, Water and Environment (DPIPWE) and the Tasmanian Conservation Trust/Humane Society International concerning requirements for survey methodologies, management strategies and reporting.

This management plan differs from the agreement at Whitemark in that it utilises different trigger points/management responses than those set out in the agreement. The trigger points/management responses are different because changes to the management plan made it impossible to utilise those set out in the agreement. However, the trigger points in the management plan have been developed in such a way as to obtain a similar result.

The agreement also required DPIPWE to set regional quotas and to consider the use of the Tasmanian Bioregionalisation system in setting the regional boundaries. DPIPWE has considered the use of bioregions, but has decided not to use bioregions as it is not practical. As can be seen in Figure 1, the boundaries of the five mainland Tasmanian management regions frequently correlate with IBRA bioregion boundaries. Appendix I describes the landscape, land-use history, and historical possum density of each region.

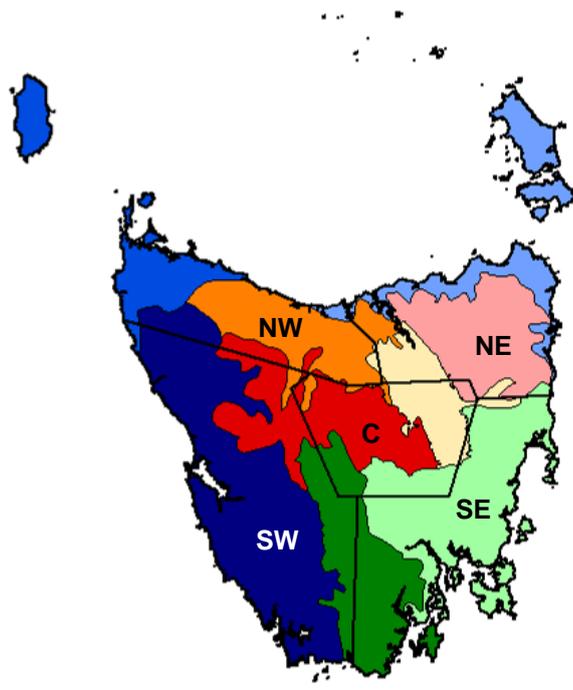


Figure 1: Correlation of Interim Biogeographic Regionalisation of Australia (IBRA) Bioregions (colour) and Regional Plan Areas (black boundaries). C: Central Region, NW: North West Region, NE: North East Region, SW: South West Region, SE: South East Region.

While the management regions have not significantly changed from previous management plans there have been minor changes to the boundaries. Compromises were made to allow management regions to closely reflect IBRA bioregions while allowing efficient and effective quota management and reporting by including related large take properties within one region rather than dividing them. This has facilitated more accurate report of take within each region.

Although this management plan is limited to the commercial harvest it takes into account the impact of the non-commercial harvest on a sustainable commercial take. Currently DPIPWE is experiencing a significant delay in its ability to report on the non-commercial harvest (see section 6.1). The inability to track the non-commercial harvest on a timely basis has been taken into account through the setting of conservative quotas (see section 7) and DPIPWE is developing a new database that should enable timelier reporting of the non-commercial harvest.

This management plan applies to the common brushtail possum (*Trichosurus vulpecula*) in the state of Tasmania. The species is an arboreal marsupial that occurs widely over much of Australia. It is abundant and widespread throughout Tasmania, including the larger offshore islands. The highest possum densities are found in bush habitats adjacent to cleared pasture and crops.

Changes to the Tasmanian environment resulting from European settlement, in particular the clearing of native vegetation for agriculture and the subsequent mosaic of bush, pastures and crops, has resulted in possum populations increasing to levels where their impacts on agricultural production and the environment need to be controlled.

Under Schedule 4 of the *Wildlife Regulations 1999* of the *Nature Conservation Act 2002*, the brushtail possum is classified as partly protected wildlife, and as such may be subject to a declared open season during which they may be taken by licensed hunters. The Regulations also allow this species to be taken under permit for crop protection purposes. The skins and meat of this species may be traded commercially.

Commercial utilisation of possums forms the basis of this management plan. The management plan provides the opportunity for further development of the existing possum product industry while presenting an alternative to the use of 1080 (sodium monofluoroacetate) poison to control possum damage. Moreover, the export of commercial possum products from Australia requires Australian Government approval of this management plan under the EPBC Act. Such approval will allow access to overseas markets for possum fur, skins and meat, for which there is little demand in the domestic market.

This management plan places brushtail possum management in Tasmania onto a scientific basis to ensure the species' conservation by regular regionally-based population monitoring and the adoption of appropriate management responses for the species based on monitoring results. Appropriate procedures will be put in place to control the harvest and a system of permits is used to target harvesting activities in specific areas requiring protection from possum browsing.

The management plan will be effective until 1 July 2015. It replaces all previous management plans for brushtail possums in Tasmania. It is expected that over the life of this management plan, DPIPWE will continue to improve its monitoring and reporting of information under this plan.

2 BACKGROUND INFORMATION

2.1 Distribution and Habitat

The common brushtail possum (*Trichosurus vulpecula*, Kerr), is the most familiar and abundant of the Australian possums. The species is highly adaptable to a wide range of natural and human environments, and has the widest distribution of any Australian marsupial (How, 1983; Kerle, 1984). A number of sub-species of common brushtail possum (subsequently referred to as the brushtail possum or possum) are currently recognised, one of which, *Trichosurus vulpecula fuliginosus*, is confined to Tasmania (How, 1983). With slight male-biased sexual dimorphism, the Tasmanian subspecies is the largest (Kerle *et al.*, 1991); individual males can attain body weights in excess of 4.3 kg (Erin Flynn Uni. of Tas., unpublished data.). Several distinct colour morphs are known (Kerle *et al.*, 1991).

The preferred habitat of brushtail possums is eucalypt forest or woodland. This habitat provides the species with hollows in trees and/or fallen limbs and trunks for nest sites and day-time refugia. It also supplies them with the eucalypt and acacia leaves, grasses and forbs upon which their diet is mainly based (Statham, 1984). Possums are most abundant where a mosaic of pasture and eucalypt forest or woodland occurs (Johnson, 1977) and are often considered a pest in regenerating forest where they can occur at higher densities than in more mature forest (Hocking 1981). The species is largely absent from the extensive buttongrass plains in Southwest Tasmania and occurs at low density in temperate rainforest (Hocking and Guiler, 1983; How, 1983; Hocking 1990; Rounsevell *et al.*, 1991; Munks *et al.*, 2004).

As an arboreal marsupial the brushtail possum occurs in most areas where there are trees. Rainforested areas are unsuitable as brushtail possum habitat however and, excluding these areas, it is estimated that there is approximately 4,221,000 hectares of high rainfall and low rainfall eucalypt forest and woodland that are suitable for brushtail possums. This amounts to approximately 66% of the total land area of Tasmania. There is some evidence to suggest that density of brushtail possums may increase in areas disturbed by fire or logging (Hocking, 1981; Driessen *et al.*, 1990).

2.2 Habits and Diet

The brushtail possum is predominantly a generalist herbivore (How, 1983; Fitzgerald, 1984; Statham, 1984; Cowan and Moeed, 1987) and a night's feeding bout will involve a mix of diets to maximise intake but minimise consumption of any one plant toxin (Wiggins *et al.*, 2003). The diet of the brushtail possum consists of a variety of leaves, particularly of *Eucalyptus* *sp.*, supplemented by fruits, buds, bark, and clover or other pasture plants (How, 1983; Kerle, 1984). Studies in Tasmanian forests have revealed that *T. v. fuliginosus* is primarily a ground feeder and the diet may differ according to habitat type and season (Fitzgerald, 1984; Statham, 1984). In wet forests, leaves of myrtle beech (*Nothofagus cunninghamii*) ferns and grasses are eaten, with the myrtle beech leaves forming the greater percentage of the diet. This remains relatively constant throughout the year. In dry sclerophyll forests, where grasses, herbs, and eucalypt and acacia leaves are eaten, the major food consumed differs seasonally. In spring and summer grasses and herbs are the predominant foods, while in autumn the

proportion of eucalypt and acacia leaves consumed increases, with these foods generally comprising the greater portion of the diet in late autumn and winter (Fitzgerald, 1984; Statham, 1984, 1992).

Brushtail possums are primarily nocturnal. Marked peaks in feeding activity occur at sunset, late at night and in the early morning (Johnson, 1977). Individuals emerge to feed in the evening. During the day possums will preferentially rest in dens in tree hollows and hollow logs when available (Cawthen, 2007; Koch, 2007), however individuals have also been observed sheltering in rock crevices, rabbit warrens, dense undergrowth or crevices in buildings (Statham, 1987; Munks *et al.*, 2004). The species is more numerous where grassy clearings adjoin shelter vegetation (Statham, 1983).

Adult possums are largely solitary, sleeping in separate dens and living in territories in which adult animals generally avoid direct contact with each other by way of scent-marking branches and other objects within their territory (Winter, 1976). In Tasmania, multiple possums have been found to share dens where they are in short supply (Statham, 1992). Depending on habitat type and resource availability, adult possums occupy relatively stable home-ranges of 0.35 to 12.9 ha, with males occupying larger home-ranges that overlap those of several females (Statham and Statham, 1997; Ball *et al.*, 2005; Harper, 2005). Specific territories within these home-ranges are not actively defended by individuals (Winter 1976; Green, 1984).

2.3 Reproductive Biology

Brushtail possums have a polygynous mating system, with males being promiscuous (Sarre *et al.*, 2000; Taylor *et al.*, 2000; Ji *et al.*, 2001). A female may mate with multiple males during oestrus (Winter, 1976). Births have been recorded in all months of the year, however most populations of the brushtail possum have a major autumn and minor spring breeding season (Pilton and Sharman, 1962; Meredith *et al.*, 1969; How, 1983). In Tasmania, most births occur between the beginning of April and the end of June, with 65% of all births taking place in May (Hocking, 1981). Hocking (1981) also found that the mean birth-date varied between areas; possums in those areas most recently burnt exhibit an earlier mean birth-date than those where fire had not occurred for over 8-16 years. Over 80% of females breed annually and in some populations 50% may produce young in both seasons (How, 1983; Ramsey *et al.*, 2002). This has predominately been observed in newly colonised habitat or where the number of animals has been artificially reduced by hunting or eradication programs (Tyndale-Biscoe, 1955; Kean, 1967; Hocking, 1981; Cowan, 1992, 1993).

Females can begin to reproduce when about one year old (How, 1983). This is true for newly colonised habitat (or where possum numbers have been artificially reduced) and in bushland regenerating following fire (Hocking, 1981; Cowan, 1993). In forests of later successional stage, and those where possum numbers are limited by food resources, Tyndale-Biscoe (1955), Gilmore (1969) and Hocking (1981), found that females begin reproducing at two to three years of age. Possum populations in New Zealand responded to human-induced reductions in density with a higher proportion of females breeding, higher survival rate of young, and less seasonal fluctuation in body condition (Ji *et al.*, 2004).

Female possums are polyoestrus and produce a single offspring following a gestation of 17-18 days. The altricial young attaches to one of two teats in the well developed pouch, and develops rapidly during the four to five months spent in the pouch. A

further one to two months are spent suckling and riding on the mothers back before weaning is completed (Pilton and Sharman, 1962; Jolly, 1981; How, 1983; Watts, 1993). The sex-ratio of pouch young was biased towards males in wet forest habitats studied by Hocking (1981) in Tasmania, although this situation is reversed in the adult population. Brushtail possums can also exhibit adaptive biases in offspring sex-ratio in response to local conditions (Johnson and Ritchie, 2002). Brushtail possums generally exhibit high philopatry and male-biased dispersal (Efford, 1998; Ji *et al.*, 2001; Stow *et al.*, 2006).

2.4 Mortality Factors

Survival of dependent young is high in brushtail possums (Dunnet, 1964; How, 1972a, 1972b; Hocking, 1981), but a sharp increase in mortality occurs when juveniles of both sexes disperse from the natal area (How, 1972b, 1983; Hocking, 1981). Dispersing males range further than females and have a higher mortality rate generally resulting in a female bias in the adult population (Hocking, 1981; How, 1983; Green, 1984; James, 1984; Efford, 1998). Juvenile mortality is higher in high-density populations, possibly due to an inability of individuals to establish in already fully utilised habitat (How, 1972a; Hocking, 1981). Hocking (1981) also found that recruitment to possum populations favoured males in early successional habitat and females in older habitat. This may indicate that brushtail possum populations are regulated by density-dependant factors (Cowan, 1993).

Brushtail possums are prey for a number of species in Tasmania, most notably Tasmanian devils (*Sarcophilus harrisii*) and spotted-tailed quolls (*Dasyurus maculatus*), for which brushtail possums can make up to 14.6% of the biomass of an adult quoll's diet (Jones and Barmuta, 2000). Nevertheless, the proportion of possums consumed as a result of active predation, as opposed to scavenging, is unknown, and the major cause of death of adult possums in Tasmania appears to be starvation in the form of winter food shortage (Hocking, 1981). Large numbers are also killed each year by collisions with vehicles (Mooney and Johnson, 1979). Human predation through harvesting and crop protection culling undoubtedly influences the dynamics of possum populations, but under a sustainable management strategy this practice should only remove that portion of the population that is replaced by increased survival of young animals (Caughley, 1977).

Although introduced brushtail possums in New Zealand are known to be infected with the microbial agents of leptospirosis and tuberculosis, which can also infect grazing livestock and humans, their Australian counterparts are not considered to be an important host or reservoir for these infectious diseases (Presidente, 1984; O'Callaghan and Moore, 1986).

Exudative dermatitis is a common condition observed in brushtail possums in the tropics, but is seen only rarely in Tasmania. In severe cases the condition can be fatal. It is evident that stress plays a big part in the epidemiology of this disease; however the main stressor appears to be high population density and the associated increase in territorial and competitive disputes, particularly between sub-adult males (Vogelnest and Woods, 2008). As such, any form of population control that reduces population density is unlikely to exacerbate any problem.

It is probable that a proportion of Tasmanian brushtail possums are intermediate hosts for *Toxoplasma gondii*, the causative agent of the disease toxoplasmosis, particularly in

those areas where possums cohabit with people and their pets (felids are the definitive host), increasing the possibility of transmission. Infection can prove fatal in captive and free-ranging populations (Eymann *et al.*, 2006).

The pathogenic significance of many brushtail possum endoparasites is unknown although some heavy nematode infections can be pathogenic (Presidente, 1984). Ectoparasites including ticks, mites, and fleas have been noted from Tasmanian possums, but without any apparent association between parasite load and condition, they are not regarded as significant agents of mortality (Hocking, 1981; O'Callaghan and Moore, 1986).

From growing amounts of hard evidence, it is apparent that the European red fox (*Vulpes vulpes*) is present in low numbers in Tasmania. The red fox is recognised nationally as a Key Threatening Process to native mammals under the EPBC Act. Native Australian fauna did not evolve with the fox and hence have few or no fox-specific predation avoidance strategies. Although possums are generally considered an arboreal species, a considerable proportion of their diet can include pasture species (see section 2.5) indicating possums do spend a significant amount of time foraging in areas where they can be preyed upon by red foxes. Indeed, brushtail possums comprise at least 5% of fox diet in parts of New South Wales (Roberts *et al.*, 2006).

2.5 Crop Damage caused by Brushtail Possums

Pastoral land and agricultural and forestry crops provide many herbivorous wildlife species with a ready food supply, and damage to crops from inflated populations of browsers is often substantial (Bulinski and McArthur, 1999). Various authors have reported on the use of pasture by brushtail possums (Quinn, 1968; Harvie, 1973; Jolly, 1976; Spurr and Jolly, 1981; Green and Coleman, 1981, 1986). Harvie (1973) found that pasture species formed about 30% of the diet during spring on sheep stations in New Zealand.

Crop damage by possums has not been accurately quantified in Australia, and can be difficult to isolate from that caused by other grazers, however Bulinski and McArthur (2003) found that the scat deposition rate of brushtail possums in plantations was positively correlated to large-scale seedling damage and was the best explanatory variable for variation in damage between sites. Studies in Tasmania suggest that grazing by native animals, including wallabies as well as possums, can reduce dry matter yield of improved pasture by up to 94% while that of native pasture can be reduced by 48% (Statham & Rayner, 1995). Similarly, Cleland *et al.*, (1997) estimated that crop damage by native browsing animals, including wallabies and possums, cost Tasmanian farmers over \$20 million per year. In Tasmania, crop-protection permits are issued to control possums causing damage to pasture, plantation seedlings and other crops such as poppies and fruit trees.

Damage caused by possums decreases plantation productivity by reducing seedling growth rates, reducing seedling survival and changing the form of seedlings such that tree quality is reduced (Coleman *et al.*, 1997). There is also evidence that shows brushtail possums have a comparatively strong tendency to feed on the main Tasmanian plantation species, *Eucalyptus nitens* and *E. globulus* (McArthur *et al.*, 2000; Scott *et al.*, 2002).

Since its introduction from Australia in the mid-19th century the brushtail possum has markedly changed the composition of some New Zealand forests (Kean, 1951; Fitzgerald, 1984). In Australia the species has evolved with the native flora and Fitzgerald (1984) suggests that Tasmanian plants are better adapted to possum browsing than many of those in New Zealand.

Even so, in some areas possums have been identified as having a negative impact on native forest in Tasmania, generally through defoliation of food trees. Damage was thought to be restricted to areas of regenerating forest and to seedlings (Gilbert, 1961; Cremer, 1969; Hocking, 1981), however evidence suggests that brushtail possums are contributing to "dieback" in mature eucalypts in the Tasmanian midlands where tree cover on pastoral land is often minimal (Statham, 1992). Statham (1984) found that should severe defoliation occur in autumn or winter it generally resulted in death of the tree (or seedling), while at other times the tree can recover.

Diet analyses show that possums feed on the pollen cones, leaves and bark of pine species, including *Pinus radiata*. This damage increases with proximity to native forest, the age of the pine tree, and during the winter months when other preferred foods are less available (Barnett *et al.*, 1977; Forestry Commission Tasmania, 1982; Statham, 1983, 1984, 1992). Damage results from animals feeding on the "growth tips" and bark of trees, the latter being the most serious as it can result in ring-barking and subsequent death of the tree (Statham, 1983, 1984, 1992).

2.6 Harvest methods and uses

The harvest of brushtail possums in Tasmania for commercial purposes is an ongoing industry. Brushtail possums can be taken under permit for commercial purposes either by spotlight shooting, trapping and destroying on site, or trapping for transport and slaughter by a licensed processor. The use of snares or steel-jawed traps is specifically prohibited under the *Animal Welfare Act 1993*. Permit conditions and controls for commercial harvest are outlined in section 7.

Possums taken for commercial purposes are commonly used for meat (human or pet consumption), skin and/or fur products. A proportion of commercially-harvested possums taken during years covered by previous management plans have been exported overseas during the last 10 years, however the number of permits issued by DPIPWVE to export possum products has declined to zero in 2008 and 2009. Since 1998, DPIPWVE has issued permits to export 292,432 kg of whole possum carcasses or meat, 2,262 kg of possum fur and 10,561 skins.

Possums can be taken under permit for crop protection purposes by shooting, live-trapping and shooting, or by 1080 poison baiting. The non-commercial take is not managed under this plan and possums taken under crop protection permit may not enter the commercial market.

2.7 State-wide history of commercial harvesting and non-commercial culling

The commercial hunting of brushtail possums in Tasmania is an ongoing industry, however the size of the harvest has declined in recent years. From 1976 to 1981, it is estimated that commercial hunters took over 250,000 brushtail possums each year in Tasmania. From 1987 declining skin prices resulted in a marked reduction in the trade

of possum skins and, with it, a decline in the size of the commercial harvest. Since 1989 estimates of the number of animals taken each year by commercial hunters have not exceeded 65,000 and the annual state-wide harvest has averaged less than 5,500 during the past five years. This decline in the skin harvest has been only partly offset by growth in the possum carcass trade that has developed since 1995. Commercial harvest is currently limited to four of the management regions of mainland Tasmania; no commercial harvest of possums has been undertaken in the South West Region.

Annual quotas were applied in Tasmania for the number of individual brushtail possums allowed to enter the commercial trade from 1983. The state-wide quota remained constant at 250,000 animals a year, until the expiry of the previous management plan in 2004. The estimated commercial possum harvest reached this quota on only one occasion in 1987.

In 1995, the quota remained at 250,000 but was expanded to also include all possums taken under commercial or crop protection permits (including 1080 poisoning). The total *reported* take approached this figure only once in 1997-98, however not all holders of crop protection permits submit a return and the *estimated* crop protection take (based on percentage of permit returns) exceeded the quota on five occasions (1996-97 to 2000-01; figure 2).

Analyses by the Department showed a bias in non-returns towards no or very low take numbers (Greg Hocking, pers. comm). Because of this, DPIPWE believes that extrapolating total take for non-returns from the average or median of permit returns typically over-states total take. Nevertheless, it is still highly likely that the quota was exceeded in these years, probably due to a decline in the commercial harvest and an associated increase in possum density in the preceding years. Section 7 of this plan outlines procedures that are in place to ensure that the annual commercial harvest remains within allocated quotas. The annual crop protection take is not managed under this plan.

Total *estimated* take has been used in figures showing crop protection take in this plan to illustrate a maximum likely take over the last decade. Estimated take is derived from the average reported take per returned property permit multiplied by the total number of property permits issued in each financial year. For the 10 years from 1998-99 to 2007-08, estimated take under crop protection permits in Tasmania has averaged 274,000 possums per year (average permit return rate 66%). Measures will be developed by the WMB to increase the permit return rate.

1080 poison baits have been used widely in Tasmania since the 1960's to control damage to crops by browsing animals including wallabies and brushtail possums. Since 2000, the amount of 1080 used for browsing animal control has declined in line with Tasmanian Government policy to phase-out the use of 1080 poison for native browsing animal control by 2015 (see section 6.2). Due to the difficulty in recovering animals killed by 1080, data on 1080 take is either unavailable or inaccurate; the amount of 1080 used is instead reported.

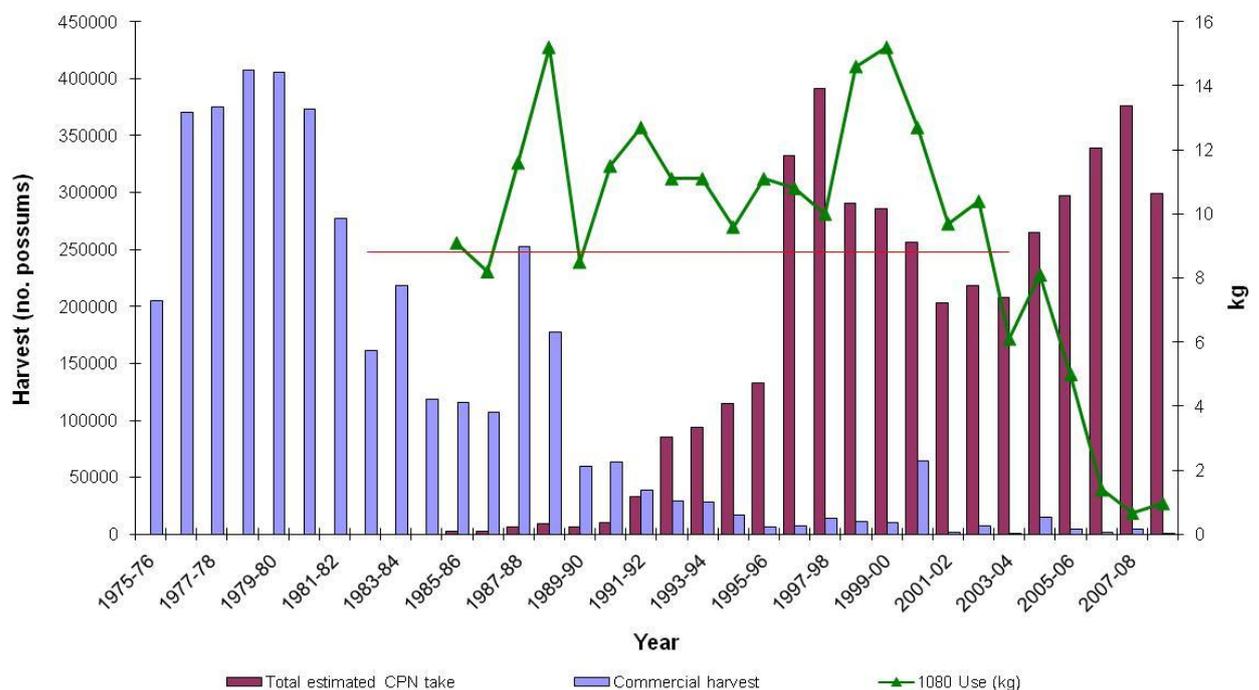
Trends in the past commercial brushtail possum harvest, non-commercial brushtail possum harvest and I080 use in Tasmania are shown in Figure 2.

Figure 2: Trends in estimates of commercial and non-commercial (crop protection) take of brushtail possums and I080 usage in Tasmania since 1975. Crop protection (CPN) take is shown as total *estimated* take based on average take from returned permits from 1996-97 onwards (average permit return 66%). Reference line indicates annual quota of 250,000 possums, in place 1983-2004.

2.8 Regional History of Population and Take

2.8.1 Population Monitoring Methods & Data Interpretation

Trends in population densities of brushtail possums have been monitored on mainland Tasmania since 1975 using a system of standardised roadside spotlight survey counts performed annually across the 5 management regions. Originally, 42 routes were



established around the state, however following a major review, the number of surveys was increased to 132 in 1985. A further 41 survey routes have been added to the Mainland Tasmania data-set since then. There are now 173 survey routes on Mainland Tasmania* (Appendix I). The standardised surveys were modified in 2002 to include line-transect sampling (a form of distance sampling) in an effort to improve survey precision and assist in minimising observer variation and seasonal differences in detection probability. This is consistent with the methods recommended and agreed to at Whitemark in 2002 (see Introduction). All 173 mainland transects are used in calculating estimates of density since 2002.

Historical data on population trends collected prior to the introduction of line-transect sampling have been converted to densities using conversion factors for each region

* For completeness, there are a further eight survey routes on Flinders Island and ten survey routes on King Island. There are also six survey routes which have been surveyed annually in the Lake St Clair area since 1992. These last six routes are not used in any DPIPVVE analysis, as they have not conformed to the required survey methodology.

derived from surveys completed in 2002-2004. In order to allow for long term trends to be examined without bias from the introduction of new survey routes, only those 132 routes surveyed since 1985 (42 for data prior to 1985) are used in calculating a historical density index. Although the conversion factors were calculated using data from all 173 transects, the historical density estimates correlate exactly with the traditional measure of Encounter Index (number of animals observed/length of transects) results using the unbiased 132 transects ($R^2=1$). As management decisions are based on possum density estimates, the Density Index is used in this management plan to illustrate population trends. Given the smaller sample size and the fact distance sampling methodology was not used, results from estimates of historical data may not be directly comparable to the 2002 data onwards, however it does give a good indication of trends in possum density over time.

This method will not however overcome the likely bias associated with sampling from roads and estimates should therefore be regarded as a more repeatable *index* of population density rather than an estimate of total population size. The results from the surveys may be used to assess relative changes in the density of brushtail possums.

Trends in the density indices of brushtail possums in each management region, along with reported take, can be seen in sections 2.7.2 – 2.7.6. Only take data from 1997 onwards is shown, as take was not assigned to regions prior to this. The three-year trend in population density is also shown for each region, as this, rather than year-to-year changes, will trigger any management changes and reduce the influence of large single-year fluctuations (see section 7.4.2).

2.8.2 Central Region

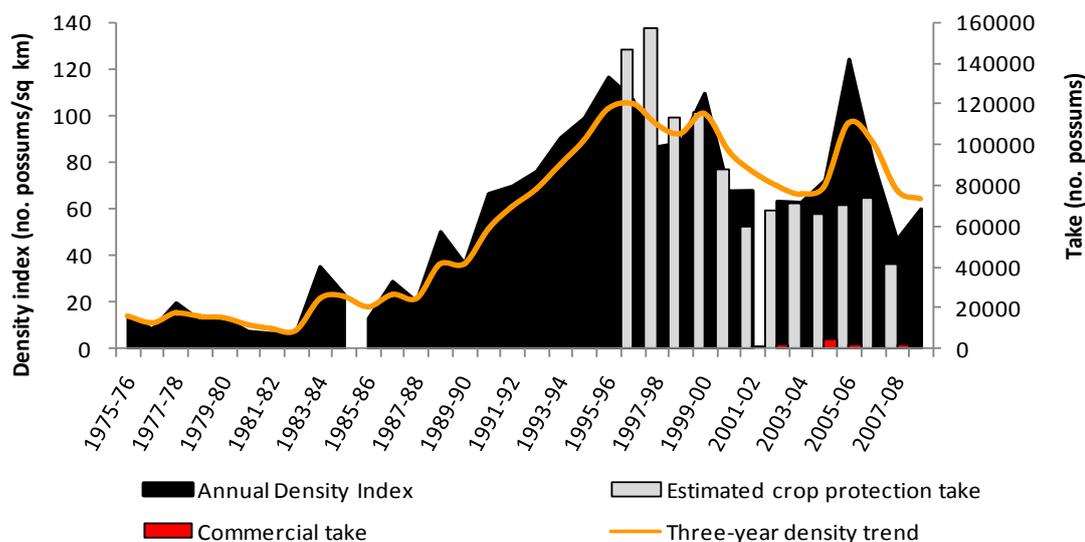


Figure 3: Central Region historical and current Density Index (1975-1984: 9 survey routes, 1985-2001: 26 survey routes, 2002- : 33 survey routes), three-year density trend, total estimated crop protection (average permit return for last 10 years: 69%) and commercial take.

As can be seen in Figure 3, the Density Index for possums in the Central Region has risen significantly through the late 1980's and early 1990's. This correlates to anecdotal and state-wide data that indicate that after the end of the fur trade in the early 1980's the possum population significantly increased. The Density Index for the Central Region has ranged from 47 to 125 possums/km² since it was calculated in 2002-03.

Figure 3 also shows the annual total estimated crop protection take for the last decade from the Central Region. The reported average annual take over this period has been just over 60,000 possums, but has ranged from between 31,000 and 108,000 possums. Estimated take in the Central region has ranged from 55,000 to 157,000 possums and has generally declined since 1997.

Commercial harvest numbers have averaged less than 2,000 per year during the last five years. 1080 usage in the central region has represented only 7% of the total poisonings* since 1997, and has been fairly constant in terms of site usage. An average of 53 poisonings has occurred per year, with 36% in State forest, 43% in private forest and the remainder in agriculture.

* The number of poisonings refers to the number of properties or forest coupes for which a 1080 permit was granted. It is recognised that the use of 1080 varies between sites, especially between farming and forestry, but the amount of 1080 used is not recorded at this regional scale, so this proxy has been used.

2.8.3 South East Region

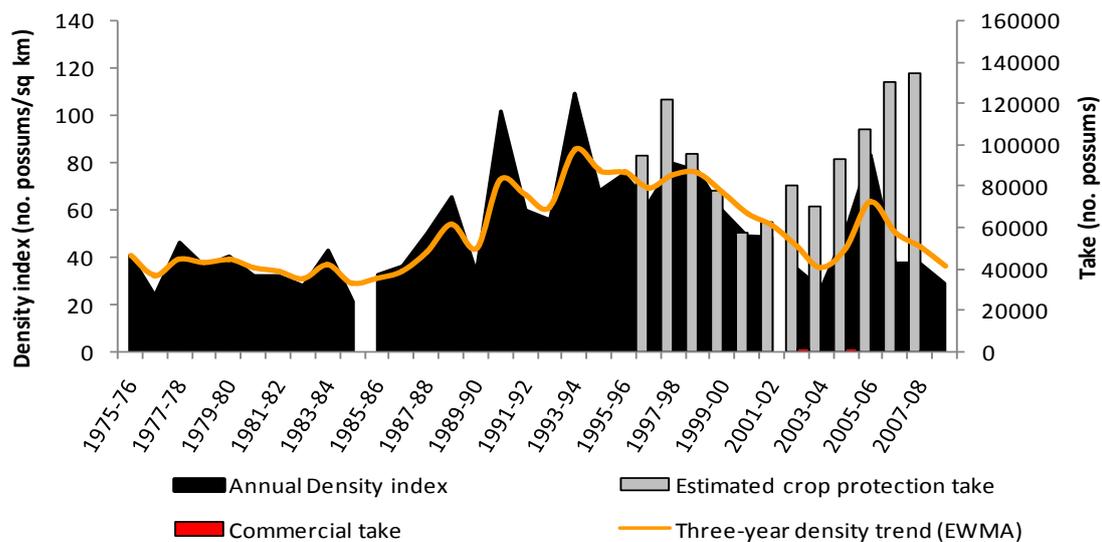


Figure 4: South East Region historical and current Density Index (1975-1984: 15 survey routes, 1985-1988: 30, 1989-2008: 35-45 survey routes), three-year density trend, total estimated crop protection (average permit return for last 10 years: 77%) and commercial take.

Figure 4 shows that through the period of the late 1970's and early 1980's the population Density Index for the South East Region was relatively stable with an average 30.8 possums per km². The population density index increased through the next decade, peaking at 109 per km² in 1993, before once again declining to 27 per km² in 2003. The density estimates from 1990 and 1993 are substantially higher than all other years. These peaks did not correspond with any regional drought event that may have caused possums to concentrate near roadsides, and may simply be due to unexplained higher detection probabilities during the survey nights for that year. Applying a three-year moving average to the data (see section 7.4.2) decreases the influence of these peaks on the overall density pattern over time.

Average estimated non-commercial take in the South East Region since 1997 has been around 94,000 possums per year, though there has been significant variation from year to year, seemingly in line with shifts in population density.

By comparison, the average commercial harvest during the last five years has been less than 1,000 animals per year. 1080 usage in the South East region has represented only 14% of the total poison operations* since 1997, and has been fairly constant in terms of site usage.

* The number of poison operations refers to the number of properties or forest coupes for which a 1080 permit was granted. It is recognised that the use of 1080 between sites varies, especially between farming and forestry operations, but the amount of 1080 used is not recorded at this regional scale, so this proxy has been used.

2.8.4 North East Region

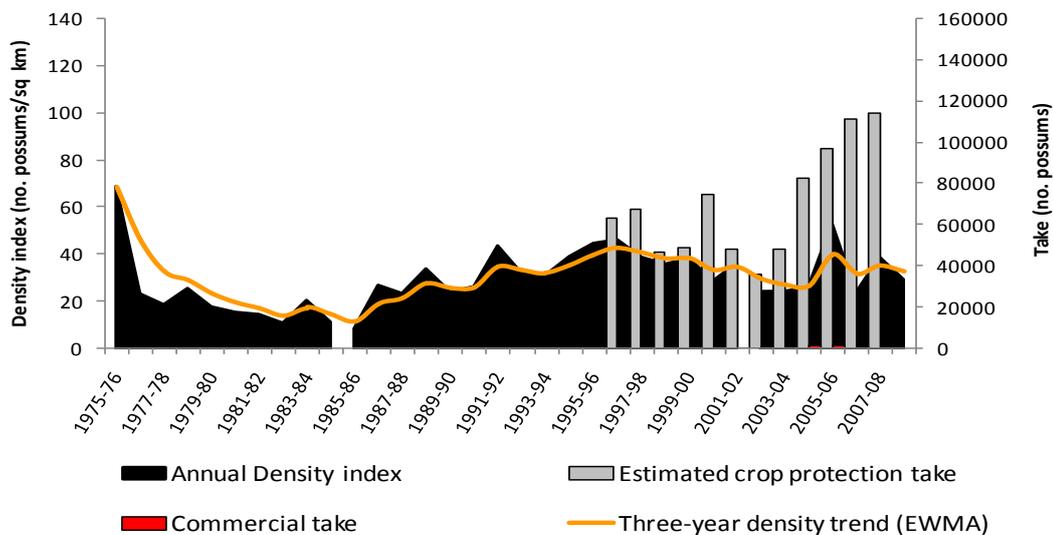


Figure 5: North East Region historical and current Density Index (1975-1984: 14 survey routes, 1985-2008: 50-60 survey routes), three-year density trend, total estimated crop protection (average permit return for last 10 years: 53%) and commercial take.

The overall density levels shown in Figure 5 for the North East Region are significantly lower, and have been much more stable, than those in the Central and South East regions, although the same general patterns can be seen.

There were lower population levels from the mid-1970's to mid 1980's with an average 21 possums per km². Population levels increased up until the mid 1990's, and then, except with an apparent rise in 2005, have declined gradually over the last decade averaging 34 per km².

Annual non-commercial take figures approximately parallel trends in population density. From 1997, the average estimated non-commercial take has been around 70,000 possums per year. The recent increase in the non-commercial take is almost certainly due to the significant decline in the 1080 usage, effectively transferring a large but unknown take into the known crop protection take from shooting.

The average annual commercial harvest has been estimated at less than 1,000 during the last five years.

The North East Region has the second highest usage of 1080 in the State, with 34% of poison operations since 1997 occurring in this region.

2.8.5 North West Region

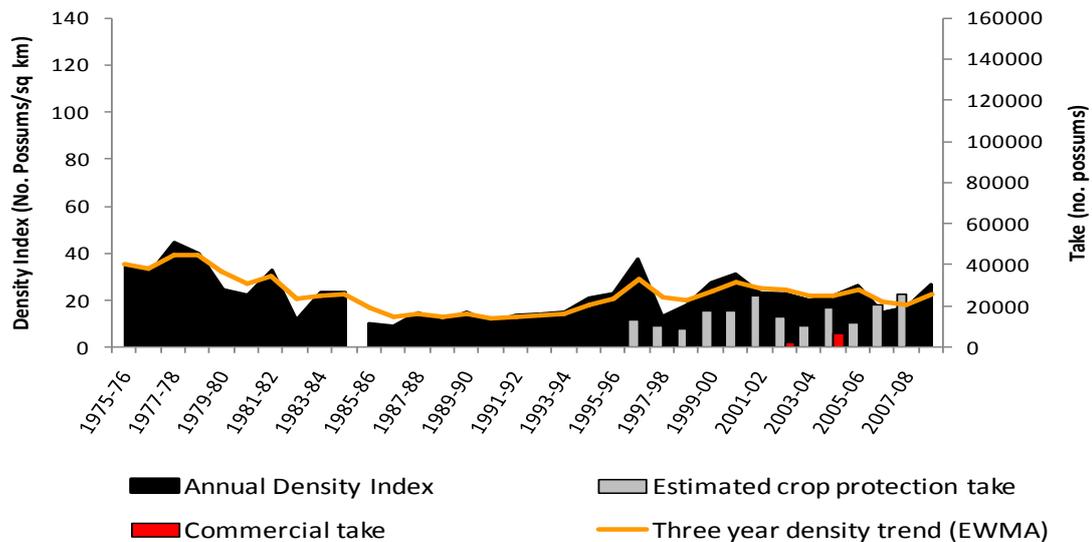


Figure 6: North West Region historical and current Density Index (1975-1984: 9 survey routes, 1985-2008: 26-30 survey routes), three-year density trend, total estimated crop protection (average permit return for last 10 years: 53%) and commercial take.

As shown in Figure 6, the North West Region has the lowest population density levels and harvest levels of any of the four main regions. Unlike the other regions, populations actually declined throughout the late 1970's to mid 1980's (although these estimates are based on quite a small number of survey routes). Population levels then appear to have slowly increased up until the present day.

The average estimated non-commercial take for the period 1997 to 2008 has been around 16,000 possums per year, with the lowest reported harvest of 4,200 in 1998 and the highest level of 16,400 in 2007.

The annual commercial take has been estimated as being less than 2,000 possums during the last five years.

For the period 1997 onwards, 45% of all 1080 poison operations in the State occurred in the North West region.

2.8.6 South West Region

There are no long-term population density index survey sites in the South West Region, with the 12 current survey routes only established in 1991-92. Density estimates for the period 2002 to 2008 (using strip transect estimation) range from 20 to 72 (average 40.8) possums per km².

No commercial harvesting has been undertaken in the South West Region of Tasmania, and future commercial take is considered unlikely due to the majority of the region consisting of inaccessible terrain, mostly reserved for conservation purposes.

Since 1997, non-commercial crop protection take has been estimated at less than 1,000 possums per year, with between 100 and 400 possums taken in 1997, 1999, 2004 and 2005. No crop protection permits to take brushtail possums have been issued in the South West Region since 2006.

There has been a very small amount of I080 usage in this region since 1997, totalling less than 1% of the State usage. Virtually all use has been for public or private forestry. No permits to use I080 have been issued in this region since 2004-05.

3 AIM AND OBJECTIVES OF THE MANAGEMENT PLAN

The aim of the management plan is:

- **To manage brushtail possum populations on a regional basis to ensure their conservation across their existing geographical range.**

The objectives of this management plan for brushtail possums in Tasmania are as follows:

- **To manage brushtail possums for a sustainable commercial harvest in those management regions where harvesting occurs, while ensuring the regional conservation of brushtail possum populations across Tasmania.**
- **To ensure the development and application of best practice animal welfare standards in the management of brushtail possums;**
- **To ensure that the impact of brushtail possums taken non-commercially are adequately taken into account in the management of the commercial harvest;**
- **To ensure that brushtail possum habitat is adequately represented in reserves;**
- **To promote effective communication of the brushtail possum conservation and management program throughout the community; and**
- **To ensure that the requirements of this management plan are complied with.**

4 LEGISLATIVE FRAMEWORK

4.1 Tasmania

Management of brushtail possums in Tasmania is administered by the WMB under the *Nature Conservation Act 2002* and the *Wildlife Regulations 1999*. Under Schedule 4 of the *Wildlife Regulations 1999* brushtail possum are classified as partly protected wildlife throughout Tasmania, including offshore islands. Currently, brushtail possums may be taken under the authority of a permit on properties where they are causing crop damage, or for other approved purposes. Permits may specify conditions with which the holder of the permit must comply.

Under this management plan commercial harvesting of possums will occur under the authority of permits issued under Regulation 13 of the *Wildlife Regulations 1999*. In order for commercial harvesting of brushtail possums to be carried out the commercial operator must hold a Commercial Brushtail Possum Hunting Permit, which allows the harvesting of brushtail possums for commercial purposes including the sale of products. Permits for the export of brushtail possum products from Tasmania may be issued in accordance with Regulation 11 of the *Wildlife Regulations 1999*.

In addition, non-commercial culling of brushtail possums occurs under Crop Protection Permits issued under Regulation 13 of the *Wildlife Regulations 1999*, where brushtail possums are shot or poisoned but not used commercially. This culling is not directly managed under this plan, as products of these animals cannot enter the commercial trade. However, the impact of the non-commercial harvest is considered in the management of the commercial harvest under this plan.

The *Animal Welfare Act 1993* requires that animals are treated humanely, cruelty to animals is prevented and community awareness about the welfare of animals is promoted (see section 9).

Commercial brushtail possum hunters are only permitted to sell brushtail possum products to a Game Meat Processing Establishment (human consumption) or a Pet Food Works licensed under the *Meat Hygiene Act 1985* or a skin dealer licensed under the *Nature Conservation Act 2002*.

4.2 Commonwealth

This management plan has been developed to satisfy the requirements for approval under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), thereby allowing products of brushtail possums from Tasmania to be exported to overseas markets. Considered secure in Tasmania and listed as 'of Least Concern' on the International Union for Conservation of Nature (IUCN) Red List for Threatened Species (IUCN, 2008), the common brushtail possum is not listed under the EPBC Act or the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

As the brushtail possum is not a listed threatened species, the commercial export of wild-harvested possum products is an *Eligible Commercial Purpose Export* (export allowed for commercial purposes) under Section 303FJ of the EPBC Act if exported in

accordance with a *Wildlife Trade Operation* approved under Section 303FN or *Wildlife Trade Management Plan* approved under Section 303FO of the Act. The Minister may issue a permit allowing the overseas export of possum products if satisfied with the requirements of section 303DG of the Act.

5 CONSERVATION OF BRUSHTAIL POSSUMS IN TASMANIA

Aim:

- To manage brushtail possum populations on a regional basis to ensure their conservation across their existing geographical range.

Conservation of brushtail possums across Tasmania is a central aim of this management plan. Management actions derived from this management plan must not be detrimental to the long-term conservation and viability of regional brushtail possum populations in Tasmania.

The conservation status of brushtail possums in Tasmania is currently regarded as secure. The species has a large and widespread population occupying a range of natural habitats across Tasmania, including the larger islands. Land clearance and pasture development for agriculture, as well as clear felling and regeneration of forests, has in the past resulted in an overall increase in brushtail possum abundance in Tasmania.

Estimates of possum density indices in the four currently commercially harvested management regions over the previous 34 years are shown in Figure 7 below. As can be seen from this figure, during this period of monitoring the density index across these regions has been in the lower end of the range (10-50 possums per km²) for 70% of the survey years. During this period the population has been considered secure and healthy.

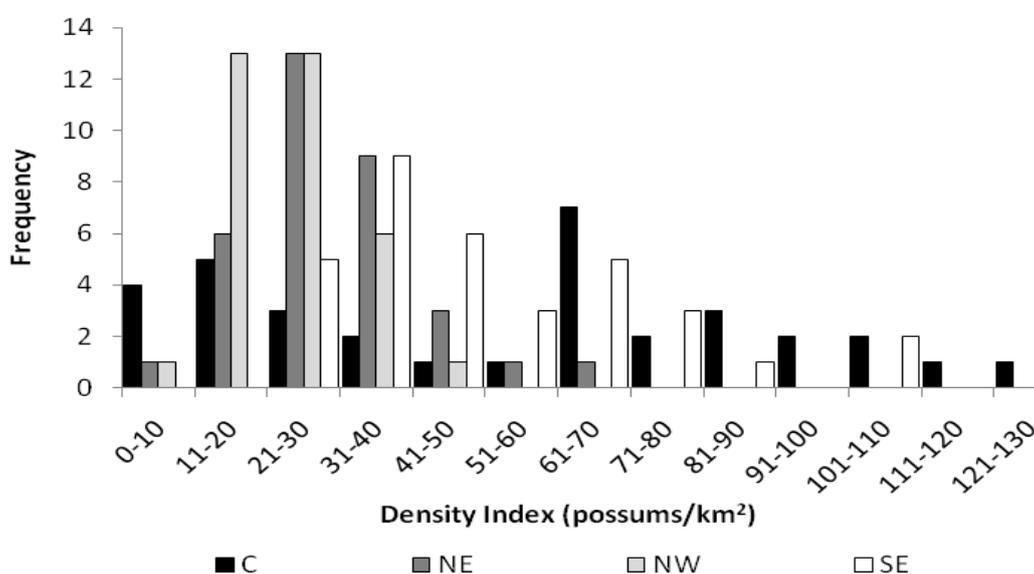


Figure 7: Frequency of yearly Density Indices (possums per km²) recorded for the four commercially harvested management regions in Tasmania (1975-76 to 2008-09). Note: Density Indices prior to 2002 are estimates based on extrapolation of count data using conversion factors rather than from surveys using distance sampling methods (see section 7.6).

5.1 Reservation of Brushtail Possum Habitat

Objective:

- **To ensure that brushtail possum habitat is adequately represented in reserves.**

Brushtail possums are wholly protected on land reserved as State Reserve, National Park or other conservation reserve under the *National Parks and Reserves Management Act 2002*. Over 30% of the land-area of Tasmania is contained in State Reserves, National Parks or other conservation reserves (Figure 8) and much of this area is suitable brushtail possum habitat. The distribution of reserves covers all management regions. In addition, much of the population outside of reserves is indirectly protected from harvesting by difficult terrain, dense bush or lack of access for hunters. There are also large populations of brushtail possums in many suburban areas of Tasmania.

Under this management plan, harvesting or culling of brushtail possums in Tasmania will be undertaken only on or adjacent to land used for primary production; i.e. land used for the production of crops (including plantation timber) and/or pasture.

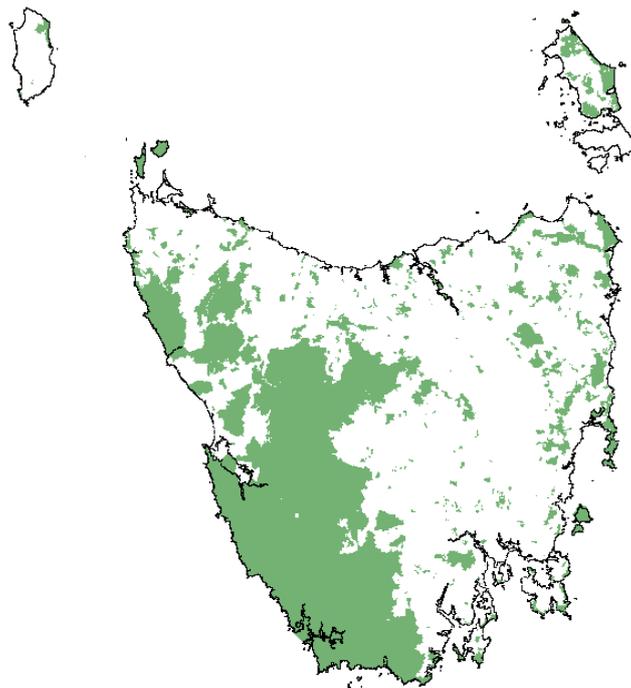


Figure 8: Extent of reserved land (shaded green) in Tasmania managed under the *National Parks and Reserves Management Act 2002*. Note: there is no current commercial brushtail possum harvest on Tasmanian offshore islands, including King or Flinders Islands.

Key Actions:

- **Maintain the current reserve system on public land; and**
- **Encourage the establishment of private reserves that protect the habitat of brushtail possums.**

Performance measures:

- ***Brushtail possums are not elevated to a higher conservation status due to factors attributed to the commercial harvest;***
- ***Management is modified should the conservation status or distribution of brushtail possums in Tasmania change through factors not attributable to the commercial harvest; and***
- ***The system of reserves and National Parks in Tasmania where brushtail possums cannot be harvested continues to be identified and managed as an important refuge for this commercially harvested species.***

6 NON-COMMERCIAL CULLING OF POSSUMS

Objective:

- **To ensure that the impact of brushtail possums taken non-commercially are adequately taken into account in the management of the commercial harvest.**

This management plan is directed at the commercial harvesting of possums in Tasmania. However, in managing the commercial harvest it is recognised that the management of brushtail possums for crop protection purposes may impact on the sustainability of the commercial harvest and therefore must be taken into account when managing the commercial harvest.

The management practices relating to the non-commercial take described in this section are included for the purpose of placing the commercial harvest in context. As such, they may be subject to change during the life of this plan. DSEWPC will be notified of any changes that may impact on the management of the commercial harvest.

6.1 Management of Crop Protection Activities

The need to protect crops from brushtail possums remains high. Prior to the late 1980s, commercial harvesting satisfied much of this need. However, a decline in the commercial harvest (Figure 2) due to reduced demand for the products was associated with a marked increase in possum numbers and a corresponding increase in the number of non-commercial crop protection permits issued and the size of the non-commercial take. It should be noted that since surveys began in Tasmania in 1975, possums have always been considered overabundant and a need for crop protection has been apparent.

Under the *Wildlife Regulations 1999* brushtail possums may be culled non-commercially, under permits issued by the WMB (see Appendices 2 & 3), on properties where they are causing crop damage. Crop protection permits are issued for a period from 1 to 12 months and specify the property and method of control. The majority of permits issued specify that possums may be taken by shooting at night with the aid of a spotlight. The number of permits issued for the use of 1080 poison baits to control damage by wallabies and brushtail possums have continued to decrease for many years. In 2008-09 only 64 permits were issued, with a total state-wide use of 0.97 kg. This represents a 94% reduction in use compared to the 15.2 kg used in 1999/00 when the Tasmania Together benchmark figure for phasing out 1080 by 2015 was set (see section 6.2). This is well in advance of the goal of a 75% reduction in 1080 usage by 2010 outlined in the Tasmania Together targets. A small number of permits, primarily for forestry operations, allow possums to be taken by live trapping and subsequently shot, while approximately 120 permits per year allow possums, principally those living in suburban areas, to be live-trapped and relocated.

Land-holders are not permitted to sell brushtail possums or their products taken under a non-commercial crop protection permit. As a result these animals are not counted against the commercial quota covered by this plan.

Permits issued for crop protection require that a return is submitted to WMB within 30 days of expiry. Returns provide WMB with details of the number of brushtail possums taken by shooting or, in the case of permits to poison using 1080, the number of brushtail possum carcasses recovered. However, a number of permit holders require a reminder before they submit their returns. Currently permit holders are reminded to submit their returns when they apply for a renewal as permits are not renewed unless the applicant has returned all previous permits with the information required. Therefore, there is a lag in reporting non-commercial harvest statistics as many landholders only apply for permits once a year. The WMB is developing a database which will enable reminder letters to be sent to permit holders requesting them to submit their returns which should improve the timeliness of reporting non-commercial harvesting statistics. It is anticipated that this database will be developed within the first 3 years of this plan.

Statistics are maintained by the WMB on the number of crop protection permits issued and the number of brushtail possums reported as taken by shooting, or carcasses recovered following use of 1080 poison, under these permits. The WMB holds actual permits for two years but the maintenance of records is ongoing. Permit data is available from 1997 to the present. Each year, the WMB will inform DSEWPC of the estimated non-commercial take when reporting on the commercial take managed under this plan.

Reported numbers of brushtail possums taken during recent years by shooting under crop protection permit and lethal trapping are given in Table I. Total estimated take is calculated by determining the average reported take per property return multiplied by the total number of property permits issued (see Section 2.6).

Table I: State-wide estimates of the number of brushtail possums taken by non-commercial shooting under crop protection (CPN) permit in Tasmania.

Year	Number of property permits	Reported take	Total estimated CPN take	% returns
1996-97	1,851	157,492	332,025	47.43%
1997-98	1,845	223,798	391,381	57.18%
1998-99	1,605	179,570	290,827	61.74%
1999-00	1,662	166,160	285,582	58.18%
2000-01	1,689	138,347	256,778	53.88%
2001-02	1,648	118,217	202,939	58.25%
2002-03	1,644	137,631	218,614	62.96%
2003-04	1,530	135,522	207,421	65.34%
2004-05	1,573	173,753	264,839	65.61%
2005-06	1,574	215,656	296,716	72.68%
2006-07	1,689	282,173	339,936	83.01%
2007-08	1,974	288,049	376,064	76.60%
2008-09*	1,676	216,951	299,514	72.43%

* Preliminary results only (June 2010).

6.2 Use of 1080 poison

As a last resort, where shooting is attempted but found to be ineffective, DPIPWE may allow the laying of 1080 poison baits to control wallaby and brushtail possum damage. This poisoning consists of the laying of 1080 contained in cereal- or carrot-based bait. The WMB of DPIPWE is responsible for issuing permits to use 1080 poison for control of wallabies and possums. The Wild Animal Management Section of DPIPWE provides the poison for this purpose and maintains detailed records on 1080 use.

A Code of Practice for Use of 1080 Poison for Native Browsing Animal Management (Appendix 4) has been developed and defines the circumstances considered appropriate for the use of 1080 to control native browsing wildlife under Tasmanian conditions. Compliance with the Code is a requirement for the issuing of a crop protection permit to use 1080 (see Appendix 3).

Permits to use 1080 baits for crop protection purposes will be issued only if an officer authorised under the *Nature Conservation Act 2002* is satisfied that there is an unacceptable risk to the crop or pasture, that use of 1080 baits does not pose an unacceptable risk to a population of non-target species and that alternative control measures have been adequately considered and implemented as far as practicable. It is Tasmanian Government policy to phase out the use of 1080 poison for native browsing animal control by 2015.

The total number of possums killed by 1080 is difficult to quantify. Many animals taking 1080 poison baits are known to die in bush-cover up to several hundred metres from a bait line making their carcasses difficult to locate. Any kill estimates are based on crop protection permit returns detailing the number of carcasses located and are therefore most likely to be lower than the actual kill.

With 1080 usage declining (Table 2) in line with State Government policy to reduce its usage, harvest levels are increasing to compensate for the reduction in possum control provided by 1080, effectively transferring the unknown take of 1080 poisoning into the known take by shooting. As such, WMB will provide details on the amount of 1080 used in Tasmania to DSEWPC, so that this may be taken into account when considering annual quotas under this plan.

Table 2: State-wide 1080 usage for crop protection purposes by industry sector 1999-00 to 2008-09 in Tasmania.

Year	Total usage (kg)	State Forest	Private Forest	Agriculture
1999/00	15.2	3.9	4.8	6.4
2000/01	12.7	3.5	4.6	4.5
2001/02	9.7	3.3	2.7	3.6
2002/03	10.4	2.4	3.1	4.8
2003/04	6.1	1.4	2.2	2.5
2004/05	8.1	1.6	2.8	3.7
2005/06	5.0	0.7	2.9	1.4
2006/07	1.4	0.0	0.7	0.7
2007-08	0.7	0.0	0.4	0.3
2008-09	1.0	0.0	0.7	0.3

Key Actions

- ***Provide details in the annual quota report to DSEWPC on the expected non-commercial take of brushtail possums and trends in the use of 1080 poison, indicating how these factors are taken into account in the setting of the forthcoming commercial quota;***
- ***Maintain statistics on the number of brushtail possums reported as taken/recovered under crop protection permit; and***
- ***Provide details in the annual report to DSEWPC on the numbers of brushtail possums shot non-commercially and the amount of 1080 poison used during the previous quota year.***

Performance measures

- ***Records are entered into a database system in a timely manner and analysed quarterly; and***
- ***At least 70% of take returns from expired crop protection permits are entered within four months of the end of the financial year. If the percentage drops below 70% then additional steps will be undertaken to correct the situation.***

7 MANAGEMENT STRATEGIES

Objective:

- **To manage brushtail possums for a sustainable commercial harvest in all management regions, while ensuring the regional conservation of brushtail possum populations across Tasmania.**

7.1 Control of the Commercial Brushtail Possum Harvest

Hunters wishing to harvest brushtail possums in Tasmania for commercial purposes must apply to the WMB for a commercial brushtail possum hunting permit (Appendix 5). These permits allow the use of either shooting or live-trapping to take brushtail possums during the 12-month period from 1 January to 31 December each year and to sell products, including skins and meat of these possums, to licensed skin dealers and licensed game meat premises respectively. A fee of \$22.00 is currently charged for issuing a commercial permit. Although permits are valid for a full calendar year from the approval date, the annual quota is set and reported on over a financial year (1 July to 30 June).

A commercial brushtail possum permit allows the holder to take brushtail possums only on those public and private lands used for primary production and for which the landholder's written approval has been obtained. Brushtail possums cannot be taken from land reserved for conservation purposes.

Holders of commercial brushtail possum permits are restricted to taking possums in the wild by using a rifle and spotlight, or by live-trapping using an approved cage or fabric trap and subsequent shooting on site, or trapping for live transport and slaughter by a licensed meat processor. Live-trapping must be undertaken in accordance with the appropriate Code of Practice (Appendix 8 and 9). Currently, live-trapping is seen as a less attractive option for commercial harvesting of brushtail possums as shooting is inherently a more efficient method of take with this species.

All holders of commercial permits to take brushtail possums are required to provide monthly returns of the number of brushtail possums taken, the region from which they were taken and the number of skins or carcasses sold (Appendix 6).

Every three months, monthly returns of the take by commercial permit holders are used to provide an estimate of the total commercial take of brushtail possums in each region during the quarter. This information is used to monitor the rate at which the approved annual quota is being filled.

Officers authorised under the *Nature Conservation Act 2002* undertake periodic patrols of properties on which hunting takes place to ensure that all brushtail possum hunting is occurring in accordance with the *Wildlife Regulations 1999*. These patrols include all areas where brushtail possum hunting may potentially occur and involve requiring hunters to provide evidence that they are appropriately authorised to hunt brushtail possums and that they are adhering to all permit conditions.

Key Actions

- **Issue commercial brushtail possum hunting permits to hunters wishing to hunt possums for commercial purposes in accordance with the requirements of the management plan;**
- **Maintain quarterly statistics on the number of brushtail possums harvested regionally by commercial brushtail possum hunting permit holders; and**
- **Undertake periodic inspections to ensure that hunters are complying with requirements.**

Performance measures

- **The extent of hunter compliance with brushtail possum harvesting and licensing requirements is measured at or near 100%.**

7.2 Control of the Trade in Brushtail Possum Products

All dealers in brushtail possum skins and processors of brushtail possum meat must be authorised to do so by the appropriate licence or permit. Skin dealers require a Fauna Dealers Skins Licence (Appendix 5). Meat processors are required to be licensed under the *Meat Hygiene Act 1985* and, if they are slaughtering possums on their premises, must also have a commercial brushtail possum permit for processors (Appendix 5).

Meat processors must keep records of all brushtail possums received together with the name and permit number of the person from whom they were received and details of the number of possums processed and/or sold. Not later than the 14th day of each month the processor must provide WMB with monthly returns of brushtail possums received and processed and/or sold, together with a royalty of \$0.35 per animal processed and/or sold.

All slaughter of live trapped brushtail possums by licensed processors must be conducted in accordance with the Code of Practice for the Capture, Handling, Transport and Slaughter of Brushtail Possums (*Trichosurus vulpecula*) – November 2000, approved under the *Animal Welfare Act 1993*.

Skin dealers are required, as a condition of their licence, to supply the WMB with monthly returns detailing all transactions in possum skins. Details are to include the quantity of skins traded, and the name and permit number of the hunter from whom purchased. All skins retained by dealers for trading must be presented for royalty payment and stamped within 28 days of purchase or prior to export from Tasmania, whichever is sooner.

Commercial brushtail possum hunters are only permitted to sell brushtail possum products to a Game Meat Processing Establishment (human consumption) or a Pet Food Works licensed under the *Meat Hygiene Act 1985* or a skin dealer licensed under the *Nature Conservation Act 2002*. Details of each sale must be recorded on the hunter's permit return. All holders of commercial brushtail possum hunting permits are required to provide monthly returns of the number of animals shot, and skins and/or carcasses sold.

All export meat processing will occur under Australian Quarantine and Inspection Service (AQIS) supervision.

A permit is required from the WMB to export brushtail possum products out of Tasmania. Similarly, a permit is required from the WMB in order for an export permit to be issued by DSEWPC. A DSEWPC permit is generally required for the export of wildlife products out of Australia. A Tasmanian permit is issued only when the WMB is satisfied that the brushtail possum products were legally taken and processed.

Officers authorised under the *Nature Conservation Act 2002* or the *Meat Hygiene Act 1985* periodically inspect all premises licensed to deal/process possums products and check records to ensure that all brushtail possum products were taken in accordance with this management plan.

Key Actions

- ***Ensure that all dealers in brushtail possum skins and processors of brushtail possum meat have the appropriate licence or permit;***
- ***Issue export permits for brushtail possum skins to be exported out of Tasmania and for brushtail possum meat to be exported out of Australia;***
- ***Maintain statistics on the number of brushtail possum skins traded by licensed skin dealers and the number of brushtail possums processed by licensed meat processors; and***
- ***Undertake periodic inspections of licensed dealers and processors, as well as exports of brushtail possum products to ensure compliance with requirements.***

Performance measures

- ***At least two periodic inspections, to ensure compliance, of each licensed dealer and processor per annum;***
- ***The extent of compliance with brushtail possum processing and trading requirements is measured at or near 100%; and***
- ***Focus of compliance efforts on areas in which past breaches have been recorded.***

7.3 Adaptive Management Strategy

This management plan will employ an adaptive management strategy in determining management practices aimed at ensuring the conservation of brushtail possum populations regionally across Tasmania.

Adaptive management involves regularly monitoring or assessing the outcomes of current management practices and using the results of monitoring to better inform and refine future management practices. This strategy is well suited for use in the management of natural systems, such as management of brushtail possum populations, that are inherently complex and for which the community has varied and often conflicting expectations.

Under this strategy, the following aspects of brushtail possum management in Tasmania will be monitored on a regional basis:

- ***The size of the brushtail possum take;***
- ***The regional usage of 1080;***
- ***Trends in regional brushtail possum population densities;***
- ***The need for crop protection;***
- ***Seasonal conditions;***
- ***Current land use practice and trends in land use; and***
- ***The proportion of habitat and population not subject to culling.***

Management practices will be reviewed based on this information. Significant changes in the regional *population density index* for brushtail possums will trigger a change in management. A significant change of density warranting management change will be based on a three-year density trend (see section 7.4.2).

7.4 Determination of Quota Levels & Associated Management

Possum population trends have been monitored throughout Tasmania to varying degrees (refer to section 7.6 for a description of methodology used in monitoring) since the mid 1970`s. During this period possum populations in all regions of the Tasmanian mainland have undergone major fluctuations in density/encounter index.

Significant numbers were taken by the commercial sector early in this period until the mid 1980`s when there was a significant decline in commercial harvest of possums due to a decline in demand for possum products. Within 5 years of the decline in commercial harvest the demand for crop protection permits rose significantly, demonstrating the considerable need for crop protection by primary industries and the fact that a large commercial industry can indeed provide a level of crop protection.

Combined crop protection and commercial take in all regions over the period monitored has shown to be sustainable in all regions at current and historical levels (see Table 3).

Table 3: Summary of historical take, 1080 usage and possum population density in each of the four commercially harvested management regions in Tasmania. COM = commercial; CPN = crop protection.

Region	10-year estimated mean combined take (COM & CPN)	1080 usage	Density
Central	<p>Annual Non-commercial take since 1997-98 88,500</p> <p>Commercial take <1000 possums/ year</p> <p>Combined take ~90,000</p>	7% of total poisoning's since 1997.	<p>1975 to 1985 average calculated density index was 14.5 possums per km².</p> <p>1995 - peaked at 117 possums/km². Low of 7 possums/km² in 1982).</p> <p>Past 10 years (1999-00 – 2008-09) density index has averaged 76 possums per km² (10 year mean of 3-year exponentially weighted moving average is 78.4/km²).</p>
South East	<p>Annual Non-commercial take since 1997-98 94,000</p> <p>Commercial take <1000 possums/ year</p> <p>Combined take ~95,000</p>	14% of total poisoning's since 1997.	<p>1970's – early 1980's stable density of around 30.08 possums/km².</p> <p>Peak in 1993 of 110 possums/km². Declined to 27 possums/km² in 2003.</p> <p>Past 10 years (1999-00 – 2008-09) density index has averaged 46 possums per km² (10 year mean of 3-year exponentially weighted moving average is 50.0/km²).</p>
North East	<p>Mean annual crop protection take since 1997-98 70,500.</p> <p>Commercial < 7,000</p> <p>Combined take ~77,000</p>	34% of total poisoning's since 1997.	<p>Mid 1970's – mid 1980's mean density – 21 possums/km².</p> <p>Peak in 1975 of 69 possums/ km². Low of 9 possums/ km² in 1985.</p> <p>Past 10 years (1999-00 – 2008-09) density index has averaged 32 possums per km² (10 year mean of 3-year exponentially weighted moving average is 32.9/km²).</p>
North West	<p>1997-98 – 2007-08 mean take of 16,500 for crop protection and fewer than 1,000 for commercial take.</p> <p>Combined take ~17,000</p> <p>- Population increasing at this rate.</p>	45% of total poisoning's since 1997.	<p>Lowest regional population density.</p> <p>Peak in 1977 of 44 possums/ km². Low of 9 possums/ km² in 1986.</p> <p>Past 10 years (1999-00 – 2008-09) density index has averaged 23 possums per km² (10 year mean of 3-year exponentially weighted moving average is 22.9/km²).</p>

7.4.1 Quota Setting Under This Plan

Commercial quotas will be determined annually for the maximum number of brushtail possums that may be commercially harvested in each region during the annual quota period (1 July – 30 June) as described in this section.

Non-commercial harvesting and crop protection culling, including that from 1080, will be monitored, but are not considered part of the commercial quota and the management of these forms of mortality is outside the scope of this plan.

Regional commercial quotas will be determined in accordance with this management plan. Quotas will act as a safeguard against over-exploitation of the species and are set at levels that have been repeatedly shown to be unlikely to lead to a long-term decline of the species that would threaten its secure conservation status.

Although population surveys during the period of high commercial take prior to the mid 1980's were not as comprehensive as they are now, there is no evidence of a state-wide annual take of approximately 350,000 having any significant detrimental effect on possum populations in Tasmania.

Management plans for the commercial harvest of kangaroos on mainland Australia set annual quotas as a percentage of the estimated *population size*, however difficulties associated with surveying for possums in Tasmania require that the commercial quotas outlined in this plan are instead based on an index of *population density*. At no point have any levels of historical harvest been shown to have a negative impact on regional possum populations (see figures 3-6); as such the WMB have established quotas based on regional estimates of *maximum* annual historical take (crop-protection and commercial) as examples of harvest levels that can be considered sustainable.

Density index trigger points for initiating management changes in each management region are outlined in Table 4. The commercial quotas are based on the estimated maximum total take (crop protection and commercial) and mean 3-year exponentially weighted moving average density (see 8.2.1) from the last 10 years in each management region. In developing these trigger points, a conservative quota of 25% of the regional 10-year maximum take has been allocated to the commercial sector at the 10-year mean density level (to the nearest 5/km²) in each region and a sliding linear scale determined from this point.

For example:

In the **Central Management Region**:

Maximum annual take in last decade: **116,000** possums.

Mean 3-year EWMA density index for last decade: **78.4 possums/km²**.

Therefore, at a density of **80/km²**, the commercial quota = 116,000 × 0.25 = **29,000**.

The sliding scale is linear; i.e. at half this density (**40/km²**), the commercial quota is halved (**14,500**) and at double this density, the commercial quota is doubled, etc.

It is anticipated that the commercial industry will expand under this management plan and the non-commercial take decrease correspondingly. Accordingly, the level of 25% of the total expected take is seen as a conservative commercial quota.

At densities of 20/km² or below (desired density is 10-20/km²), commercial permits in that region may be restricted to properties holding crop-protection permits. Should the

density level in a management region fall below 10 possums/km², the WMB will conduct property inspections for all properties in that region on which commercial hunters wish to take possums. These inspections will determine whether that property has a legitimate crop protection need before a commercial permit to take possums on that property will be granted. DSEWPC will be notified should commercial hunting permits be issued within a region that has a possum density below 10/km².

Where the density is above the levels at which crop damage is unacceptable in a management region (>20/km²), the intention is to drive possum populations down*. Where the density is below that desired (<10km²), the intention is to allow populations to recover. Where the density is at a sustainable long-term level (10-20/km²), the intention is to maintain populations in the prescribed range.

It should be noted that these trigger points assume that the annual crop protection take for specific possum population densities will be consistent with previous levels. Crop protection take is not managed under this Plan and is based on the crop-protection needs of the landholder. There is therefore a possibility, however unlikely, that future crop protection take may exceed previous levels. This would not however influence the setting of a commercial quota unless density levels observed during annual spotlight surveys indicated an associated unacceptable level of decline in possum density.

* The intention to drive possum populations down applies to situations where there is a need for crop protection from high possum densities. Where populations are at densities greater than 20/km² but are having no impact on agricultural activities there is no intention and likely to be no need to decrease possum numbers.

Tables 4a, b, c & d: Commercial quotas to be allocated to each management region based specific possum densities#. Densities listed refer to the 3-year exponentially weighted moving average density. Shaded rows show the likely annual quotas for each region based on long-term average densities.

a. Central Region 10-year maximum take = 116,000 10-year average density = 78.4/km ²	
Density (possums/km ²)	Commercial quota
≥100	36,250
95	34,438
90	32,625
85	30,813
80	29,000
75	27,188
70	25,375
65	23,563
60	21,750
55	19,938
50	18,125
45	16,313
40	14,500
35	12,688
30	10,875
25	9,063
20*	7,250
15*	5,438
<10*	Up to 3,625
5	0
0	0

b. South East Region 10-year maximum take = 135,000 10-year average density = 50.0/km ²	
Density (possums/km ²)	Commercial quota
≥100	67,500
95	64,125
90	60,750
85	57,375
80	54,000
75	50,625
70	47,250
65	43,875
60	40,500
55	37,125
50	33,750
45	30,375
40	27,000
35	23,625
30	20,250
25	16,875
20*	13,500
15*	10,125
<10*	Up to 6,750
5	0
0	0

c. North East Region 10-year maximum take = 114,000 10-year average density = 32.9/km ²	
Density (possums/km ²)	Commercial quota
≥100	95,000
95	90,250
90	85,500
85	80,750
80	76,000
75	71,250
70	66,500
65	61,750
60	57,000
55	52,250
50	47,500
45	42,750
40	38,000
35	33,250
30	28,500
25	23,750
20*	19,000
15*	14,250
<10*	Up to 9,500
5	0
0	0

d. North West Region 10-year maximum take = 26,000 10-year average density = 22.9/km ²	
Density (possums/km ²)	Commercial quota
≥100	32,500
95	30,875
90	29,250
85	27,625
80	26,000
75	24,375
70	22,750
65	21,125
60	19,500
55	17,875
50	16,250
45	14,625
40	13,000
35	11,375
30	9,750
25	8,125
20*	6,500
15*	4,875
<10*	Up to 3,250
5	0
0	0

Tabled quotas show a sliding density scale in 5/km² increments as a simple guide. Actual quotas are set using the exact density estimate.

* Commercial take may be restricted to properties covered by existing crop protection permits.

7.4.2 Application for three-year density trend in establishing quotas

Survey data has in past years fluctuated significantly from year to year as demonstrated by Figure 9. There are numerous explanations as to why we can get sudden variations in density estimates. These can include changes in observers, differences in observer skill, subtle differences in weather conditions or as in the case of the 2005 data, observers not strictly adhering to the methodology outlined in the spotlight manual (increased training is now provided to ensure survey methodology is adhered to).

To ensure that management decisions in establishing quotas do not overreact to apparent changes from year to year, a moving average using a window of data from three consecutive years will be applied to the time-series of density indices from each region. This is a commonly used technique to reduce individual survey bias on long-term population patterns (e.g. Hawkins *et al.* 2006), providing a more realistic estimate of the true population trend (e.g. Figure 9). As sensible management should respond to population trends (i.e. decline or increase) rather than year-to-year fluctuations, quotas will be allocated on the basis of the three year moving average.

A three-year exponentially weighted moving average (EWMA) has been applied to the density index time-series that gives more weight to the current survey result in its estimate of annual density. The sequence of EWMA values are formed in the manner shown in the box below.

Rationale behind calculation of a 3-year exponentially weighted moving average (EWMA) possum density for any window of three years:

$$z_{\text{year1}} = y_{\text{year1}}$$

$$z_{\text{year2}} = p \cdot y_{\text{year2}} + (1-p) \cdot z_{\text{year1}}$$

$$\text{3-year EWMA } (z_{\text{year3}}) = p \cdot y_{\text{year3}} + (1-p) \cdot z_{\text{year2}}$$

Where: z = moving average

y = density index observed during spotlight survey

p = constant between 0 and 1 (The parameter p is the weighting given to the current observed density index. The higher the value of p the more influence given to the current observation).

A p-value of 0.5 has been used when applying the EWMA to regional data (i.e. the current density index contributes 50% towards the EWMA, the previous two years contribute 25% each) as this best fits the observed pattern.

If there is a sudden and real decline in possum numbers, this methodology may result in a lag between an actual significant decline and its observation (and subsequent triggering of appropriate management actions), however using the EWMA to set annual quotas is inherently sensitive to this as it gives greater influence to the current survey result. In addition, actual possum densities are more likely to be higher than those observed during roadside surveys.

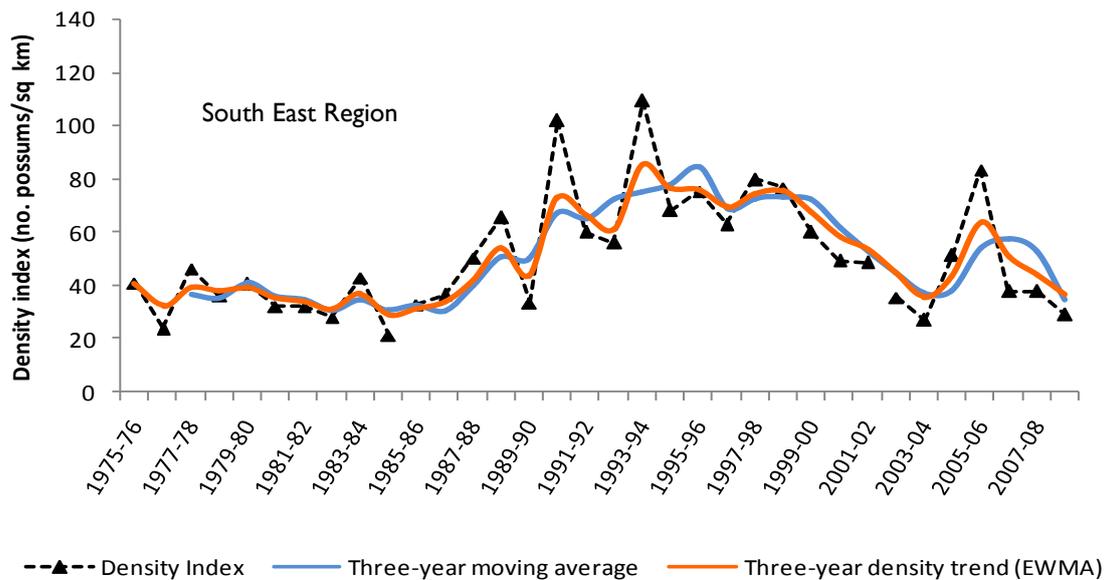


Figure 9: Example of the effect of applying a 3-year exponentially weighted moving average (EWMA) to brushtail possum density index data. Blue line shows a standard 3-year moving average for comparison.

7.4.3 Quota Management

Processors and skin dealers will be informed of the regional quotas at the beginning of the new quota year. No individual quotas for processors/skin dealers will be set. The WMB will instead monitor the total regional take and set appropriate controls should the commercial take approach approved quotas.

Under Section 29 of the *Nature Conservation Act 2002* the WMB can apply the following management responses as required to minimise unwanted impacts on accepted land uses through commercial harvesting or for the purpose of limiting the harvest of brushtail possums either across Tasmania or at a regional level:

- ***Increase/decrease commercial quotas (commercial quotas can only be increased if the increase meets the requirements for special quotas set out in section 7.4.4);***
- ***Apply quotas on individual licences;***
- ***Restrict the number of commercial hunting licences available for issue;***
- ***Limit commercial harvest to properties covered by crop protection permits;***
- ***Limit the number of animals to be taken under crop protection permits;***
- ***Issue permits to take brushtail possum only after on-site property inspections; and/or***
- ***Cancel all commercial hunting licences.***

7.4.4 Special Quotas

Should the commercial quota within a management region be approached before the end of the quota year, the WMB reserves the option of issuing 'special quotas', small additional property-specific commercial quotas, for properties in that region that can demonstrate a clear crop protection problem. The sole purpose of special quotas is to provide for commercial utilisation of possums that would be killed and left in the field under the normal non-commercial licensing system. Any special quotas would therefore minimise the number of possums shot under non-commercial licenses. A special quota can only be considered when the commercial quota for a particular management region has been approached.

When considering issuing a special quota, officers from the WMB will inspect a property to determine the level of crop damage and the density of brushtail possums. Given that these surveys will cover a substantial proportion of a single property, an estimate of possum population size, rather than density index, will be determined. Should there be a significant crop protection issue, the WMB would set a commercial quota of 20% of the estimated possum population on that property, allowed to be taken on that property only. Details on the issuing of any additional property-based quotas will be provided in the annual report to DSEWPC.

In addition, it is anticipated that if the commercial possum industry grows as a result of this management plan, the non-commercial take will decrease accordingly. The commercial quota is based on the historical average non-commercial take as it is unknown how much the non-commercial take will decrease. However, should the non-commercial take in a region demonstrate a substantial reduction during the life of the plan, the WMB reserves the option of increasing the commercial quota in that region correspondingly. DSEWPC will be notified should this occur.

Key Actions:

- ***Monitor regional brushtail possum populations and set annual regional commercial quotas in accordance with this management plan; and***
- ***Should the commercial quota within a region be approached, the WMB will assess the viability of issuing property-based special quotas within that region.***

Performance Measures:

- ***Annual regional commercial quotas are set in accordance with the provisions of this management plan;***
- ***DSEWPC is advised of the commercial harvest quotas for the following financial year by 1 June; and***
- ***Special commercial quotas are set and utilised in accordance with the provisions of this management plan and DSEWPC is notified if and when any special quotas are issued.***

7.5 Monitoring of Brushtail Possum Take

The following sources of information are used to monitor the number of brushtail possums taken in Tasmania each year:

- **Returns from holders of commercial permits to shoot and/or trap brushtail possums;**
- **Returns from holders of non-commercial crop protection permits; and**
- **Returns from skin dealers and meat processors.**

All holders of commercial permits to shoot and/or trap brushtail possums in Tasmania are required as a condition of their permit to make monthly returns of the number of animals taken and the number of skins or carcasses sold. These returns are to be forwarded to the WMB within 14 days of the end of each month.

Holders of crop protection permits are required to return their permit within 30 days of expiry with details of the number of brushtail possums taken. In the case of 1080 poison permits, this will be the number of brushtail possums found.

Skin dealers and meat processors are required to make monthly returns of their transactions no later than the 14th day of each month. Details include the number of skins/carcasses processed and the name and permit number of the hunter from whom the carcasses were purchased.

The WMB keeps records of the returns from all permit holders of the number of brushtail possums taken. The annual commercial harvest will be monitored and when the harvest approaches the quota limit, the actions set out in section 7.4 will be undertaken.

The WMB will maintain records of the number of skins and carcasses exported out of Tasmania.

Key Actions

- **Collect accurate data on the number of brushtail possums taken in each region under this management plan for brushtail possums in Tasmania; and**
- **Maintain record keeping.**

Performance measures

- **Records entered into database system and analysed quarterly, with monthly analysis carried out once quotas are approached within 85%;**
- **Maintain an up-to-date database to inform quota management as required; and**
- **The annual number of commercially-harvested possums is within the allocated commercial quota issued for that quota year.**

7.6 Monitoring of Regional Brushtail Possum Populations

Monitoring of trends in regional brushtail possum populations is undertaken through a system of standardised spotlight survey counts performed annually on mainland Tasmania. The standardised surveys are carried out in accordance with the method set out in the *Tasmanian Spotlight Survey Manual* (Appendix 7) and modified to include line-transect sampling in an effort to improve survey precision and assist in minimising observer variation and seasonal differences.

Line transect sampling involves an observer moving along a transect line; in this case the survey route, recording perpendicular distances to detected objects. Objects away from the line will often go undetected, but those on or near the line are assumed to be seen with certainty. The sample of detection distances allows a detection function to be modelled and the proportion of objects detected in a strip transect (i.e. detection probability) to be estimated. An estimate of brushtail possum density in the vicinity of transect lines can then be calculated.

The WMB recognises that this method will not however overcome the likely bias associated with sampling from roads, however it is likely that, if anything, this bias produces an underestimate of true population density, as possums in those areas not surveyed (e.g. reserved areas) are not subject to any harvest pressures. The direction of bias is, however, unimportant and estimates should be regarded as a repeatable *index* of population density rather than an estimate of total population size. Historical data on population trends within each region, collected prior to the introduction of line-transect sampling in 2002, has been converted to densities using conversion factors derived from surveys undertaken during 2002-04 (Figures 2-5). These conversion factors may be refined over time as more data is collected.

There are currently 173 standard 10 km spotlight survey routes on mainland Tasmania (Appendix 7), some of which have been monitored for 30 years. The standard spotlight survey routes are surveyed once a year between November and December and quotas are set annually in June based on data from the previous surveys. From 2010, the WMB aims to change the annual survey timing to April/May. To enable comparison of the April/May data with historical data, the November/December surveys will also be carried out for at least three more years to allow development of a correction factor to apply to April/May data. The spotlight survey manual (Appendix 7) will be updated to accommodate these changes and the new version supplied to DSEWPC. Quotas will be set using results from November/December surveys until accurate correction factors are developed.

The results of the spotlight surveys will be used to assess changes in regional densities of brushtail possums and will be presented in the quota report. The trends in density will be used to assess the impact of harvesting on brushtail possum populations in Tasmania and in determining appropriate management responses.

Reviews of survey method, such as frequency of monitoring and monitoring protocols, may be conducted in the future and the spotlight survey manual updated accordingly. The WMB plan to add additional spotlight transects in 2010 in an effort to include some areas that are not currently surveyed, in particular those in north-west Tasmania. These new areas will also include locations where harvesting does not occur. Full details of survey techniques and monitoring results will be reported in the quota report document and full report submitted annually to DSEWPC. Annual population density

indices and associated quotas will also be available to stakeholders and the general public via the DSEWPC website. Detailed monitoring results will be posted on the DPIPWE website.

7.6.1 Indirect population monitoring

In addition to monitoring the density index of possums in Tasmania, harvesters are required to provide information on the sex of possums taken under commercial permit as a secondary measure of sustainable harvest activity. It is unlikely that there will be a significant bias in the sex-ratio of harvested possums, as behaviour and morphology differs little between the sexes; however this data will provide a check to ensure that harvest practices do not alter basic demographic parameters that may, in time, compromise population integrity.

7.6.2 New Commercial Management Regions

Should there be future demand to commercially harvest brushtail possums for export from within a currently unharvested management region (e.g. the South West region, or even King or Flinders Islands) DPIPWE will need to assess the region to ensure the following criteria are met before licences are issued to commercially harvest possums from within that region:

- ***It could be demonstrated that a commercial harvest of brushtail possums within the new region could be sustainable at some level; and***
- ***A commercial harvest from within the new region would have positive outcomes for crop protection, or would utilise animals that would otherwise be taken for crop protection purposes.***

If these criteria were met, quotas would be set for the new region as for the four currently harvested regions, i.e. based on maximum levels of previous *crop protection* take from within that region. Density-based management trigger points would be set as for the other regions and quotas set annually using density estimates obtained from spotlight surveys that are already undertaken in the unharvested regions regardless of whether they currently support a commercial possum harvest.

Key Actions

- ***Undertake annual surveys of regional possum populations in areas subject to culling or harvesting;***
- ***Collate and analyse survey results to determine trends in populations to inform quota setting;***
- ***Monitor population trends in a manner that allows setting of appropriate harvest quotas and adoption of management practices that ensure the conservation of brushtail possums in Tasmania;***
- ***Review survey techniques regularly and update practices where necessary. DSEWPC to be notified of any changes to monitoring protocol;***

- ***Information on the sex-ratio of commercially harvested possums is collected and analysed for significant change; and***
- ***Any new management zones will be added in accordance with conditions stipulated in this management plan.***

Performance measures:

- ***Population surveys are conducted in accordance with the management plan and between November and February or April and May each quota year throughout the life of this plan;***
- ***Population trends determined and monitored;***
- ***Sudden or acute changes in the sex ration of harvested possums, as ascertained from permit returns, are investigated to determine where practicable the cause of the change; and***
- ***Monitoring results published in the annual quota report to DSEWPC.***

8 ANIMAL WELFARE

Objective:

- **To ensure the development and application of best practice animal welfare standards in the management of brushtail possums in Tasmania.**

All efforts will be made to ensure that the management actions covered by this management plan are humane and minimise animal suffering. All standards and practices will be regularly reviewed by the Tasmanian Animal Welfare Advisory Committee (AWAC), an independent committee with representatives including veterinary specialists and animal welfare organisations, as new information becomes available.

The prevention of cruelty to animals, including brushtail possums, and the promotion of animal welfare are provided for by the *Animal Welfare Act 1993*. Section 8 of the Act makes it an offence to inflict unreasonable or unjustifiable pain or suffering to an animal. Section 12 of the Act prohibits the use of leghold traps or snares, whilst the *Wildlife Regulations 1999* require that, except under permit from the Secretary of DPIPW, a person may not take brushtail possums with chemicals, poisons, bows and arrows or spears. Permits are not issued allowing the taking of brushtail possums with bows, arrows or spears.

The *Animal Welfare Act 1993* also provides for the development of Animal Welfare Standards. A Code of Practice for Capture, Handling, Transport and Slaughter of Brush-tail Possums (*Trichosurus vulpecula*) – November 2000 (Appendix 8) has been developed and approved under Section 44 of the *Animal Welfare Act 1993*. This standard defines what is considered current best practice in the capture, handling, transport and slaughter of brushtail possums under Tasmanian conditions and compliance is a condition for a Permit to Live Trap and Transport Brushtail Possums (Appendix 5). All possums captured for transport and slaughter must be taken in accordance with this Code or any subsequent codes that may replace that document.

An instant and humane death, achieved through a brain-shot, is a condition of a Commercial Hunting permit. The humane destruction of any pouch-young is a condition of spotlight shooting and trapping permits and is covered by the Code of Practice for the Trapping and Destruction of Wallabies and Brushtail Possums in Tasmania for Crop-Protection and Commercial Purposes – November 2009, compliance with which is a permit condition when live-trapping possums for on-site destruction (Appendix 9). A Code of Practice for the humane shooting of brushtail possums will be developed within the first year of this management plan.

Persons harvesting for meat must be accredited in accordance with the provisions of the *Meat Hygiene Act 1985*, and the Australian Standard for the Hygienic Production of Wild Game Meat for Human Consumption. All commercial shooters must complete the Certificate II in Meat Processing (Game Meat Hunters and Shooters) course provided by the Tasmanian Skills Institute before a permit can be issued allowing them to take brushtail possums with the purpose of selling the wild game animal carcass to a licensed game meat establishment or pet food works. This accreditation fulfils the training requirements of the Standard. Accredited shooters within the game meat industry will

be reassessed at least once annually as part of the auditing of Licensed Wild Game Meat Premises. There is currently no accreditation required for shooters supplying carcasses for skins, however the WMB will establish an accreditation process for skin-only shooters within the first year of this plan.

Key Actions

- ***Enforce the requirements of the Animal Welfare "Code of Practice for Capture, Handling, Transport and Slaughter of Brush-tail Possums" in Tasmania and the conditions of Commercial Possum Hunting Permits;***
- ***Require accreditation of all commercial shooters supplying game meat carcasses that includes a field-based assessment of competence in harvesting, followed by a re-assessment of competence for game meat harvesters at least once annually; and***
- ***Develop an accreditation process for skin-only shooters within the first year of this plan.***

Performance measures

- ***The extent of compliance with the requirements of all Commercial Brushtail Possum Hunting Permits determined through compliance activities and is at or near 100%;***
- ***All shooters operating under a Commercial Brushtail Possum Hunting Permit and selling carcasses for meat processing are accredited for competence in shooting; and***
- ***A Code of Practice for the humane shooting of brushtail possums for commercial or crop-protection in Tasmania is developed within the first year of this plan.***

9 COMPLIANCE AND ENFORCEMENT

Objective:

- **To ensure that all requirements of this management plan are complied with.**

The management of brushtail possums is provided for under the *Wildlife Regulations 1999* and the *Nature Conservation Act 2002*. The Regulations prescribe the species as partly protected wildlife and regulate the taking of brushtail possums and the subsequent disposal of their products. Animal welfare matters are covered by conditions on the licence and the Animal Welfare "Code of Practice for Capture, Handling, Transport and Slaughter of Brush-tail Possums" in Tasmania (Appendix 8).

The *Wildlife Regulations 1999* are enforced by specialist Wildlife Enforcement Officers who operate across Tasmania. These officers are assisted in this task by field-based officers of the Parks and Wildlife Service who are authorised to undertake enforcement activities under Section 8 of the *Nature Conservation Act 2002*. The *Animal Welfare Act 1993* is primarily policed by inspectors of the Food Safety Branch and wildlife enforcement officers of the WMB of DPIPW, the Royal Society for the Prevention of Cruelty to Animals, Tasmania Police, and the Parks and Wildlife Service.

Key Actions

- ***Investigating non-compliance with the requirements of this management plan is included as part of regular and frequent patrols on properties on which commercial, crop protection and recreational hunting takes place; and***
- ***Food Safety Branch to inspect all premises licensed to deal in brushtail possum products at least once annually (meat processors biannual; pet food works annual) and check records to ensure all possum carcasses have been taken and processed as required under this management plan.***

Performance measures

- ***Details on the number of staff and the proportion of their time spent on compliance activities are recorded in the annual report to DSEWPC;***
- ***All human consumption and pet food premises inspected by the Food Safety Branch at least once annually;***
- ***Instances of non-compliance with the requirements of the management plan are monitored and acted upon. A decrease over time might indicate improved self-regulation of industry; and***
- ***Reports of unlicensed activities and activities in breach of licence conditions are investigated to the fullest extent possible, and where sufficient evidence is available offenders are issued with a Corrective Action Request or prosecuted as appropriate.***

10 COMMUNITY AWARENESS

Objective:

- **To promote effective communication of brushtail possum conservation and management programs throughout the community.**

In order to effectively manage for the conservation of brushtail possum in Tasmania it is essential that all aspects of this management plan are understood and accepted by the community. The best outcomes can be achieved if the community as a whole understands both the need for brushtail possum conservation and the need for crop protection and how the two goals can be achieved.

To this end, the management of brushtail possums will be a matter of on-going consideration by the Game Management Liaison Committee (GMLC) and AWAC. The GMLC was established in 2001 as a conduit for game management issues between the Tasmanian Minister for Primary Industries and Water and relevant stakeholders. Meetings are held quarterly. Current members (November 2009) of the GMLC represent DPIPW, the Tasmanian Farmers and Graziers Association, Tasmanian Field and Game Association, Sporting Shooters of Australia, Forestry Tasmania, Tasmanian Deer Advisory Committee, Field and Game Australia and the North West Hounds Association. Members of the GMLC and AWAC will regularly review the management strategy for brushtail possums in Tasmania. Any reviews or management changes will involve consultation with DSEWPC and wherever possible with Tasmanian conservation organisations including the Tasmanian Conservation Trust.

In addition, the community will be kept informed of and have input into the brushtail possum management strategy via the DPIPW website.

Key Actions

- ***Game Management Liaison Committee to regularly review the brushtail possum management strategy;***
- ***Maintain information on brushtail possum management on the DPIPW website as a point of access for the general public; and***
- ***Liaise with Tasmanian conservation organisations.***

Performance measures

- ***Landholders, commercial possum industry members, interested groups, government and the public have adequate opportunity to comment on possum management in Tasmania through placement of monitoring results and quotas on the DPIPW and DSEWPC websites; and***
- ***Publicly available information on possum management is distributed to interested parties as soon as practicable after such a request.***

11 REPORTING AND REVIEW

11.1 Annual Quota Report

The WMB will provide to DSEWPC an annual quota report at least 1 month prior to the commencement of the Quota Year (July 1 – June 30) that will include details of the following:

- ***The extent of reserved land in Tasmania, noting any losses or additions;***
- ***The results of population monitoring;***
- ***A summary of seasonal climatic conditions;***
- ***Preliminary statistics on numbers of brushtail possums taken in the non-commercial harvest;***
- ***Preliminary statistics on the amount of 1080 used and number of brushtail possum carcasses recovered following any poison operations;***
- ***The size of the allocated commercial quota for brushtail possums, set in accordance with section 7.4 of this plan;***
- ***Preliminary statistics on numbers of brushtail possums harvested within the current allocated commercial quota; and***
- ***Preliminary statistics on the international or domestic export of brushtail possum products.***

11.2 Annual Report

In addition, the WMB will provide to DSEWPC a second annual report no later than 4 months following the end of the Quota Year that will summarise details of the preceding Quota Year including:

- ***Details on the number of staff and the proportion of their time spent on compliance activities;***
- ***Instances of non-compliance with the requirements of the management plan;***
- ***Penalties imposed for non-compliance;***
- ***An update of operation against performance measures;***
- ***Final statistics on numbers of brushtail possums taken in the non-commercial harvest;***

- ***Final statistics on the amount of 1080 used and number of brushtail possum carcasses recovered following any poison operations;***
- ***Final statistics on numbers of brushtail possums harvested within the allocated commercial quota; and***
- ***Final statistics on the export of brushtail possum products.***

Performance measures

- ***An annual quota report is provided to DSEWPC by 1 June; and***
- ***An annual report is provided to DSEWPC by 31 October.***

11.3 Review

A review of the Management Plan for the Commercial Harvest and Export of Brushtail Possums in Tasmania 2010-2015 will commence no later than 12 months prior to the expiry of this plan in order to assess the success of this plan in achieving its goals. The review will be conducted with the aim of improving on the current plan in the development of subsequent plans.

The review will assess this management plan by evaluating its success in meeting its stated performance measures. Staff from the WMB will implement the review process. The results of this review will be presented to DSEWPC and placed on the DPIPWE website.

Performance measures

- ***A review of this Plan has commenced by 1 July 2014.***

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