

Control of feral cats at Shire rubbish tips to assist with the protection of the red-tailed phascogale

Final report to SWCC, June 2013

Project # SUS2.ECO.03.010



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by

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Cover plate: One night's catch of feral cats at the Shire of Wagin rubbish tip.
Photo credit: Danielle Perrie, WWLZ.

Summary

Wildlife Research and Management was engaged by South West Catchments Council to survey for the endangered red-tailed phascogale (*Phascogale calura*) and to assist with the conservation of phascogale by targeted cat control at Shire rubbish tips. This report details that portion of the project relating to the control of feral cats at Shire rubbish tips.

The phascogale is a small, semi-arboreal, insectivorous marsupial that superficially resembles a squirrel. It is regarded as threatened at national and state levels, due to a very substantial contraction in its range over the past 150 years. Its current range entirely overlaps areas used intensively for agriculture and this activity may inadvertently threaten the species. It is most abundant in a narrow north-south band from Brookton to Katanning in south-west Western Australia.

Feral cats are known predators of red-tailed phascogale and listed as a key threatening process for phascogale (Department of the Environment, Water, Heritage and the Arts 2008a). Feral cats were trapped at nine rubbish tips (Cuballing, Dudinin, Dumbleyung, Harrismith, Kulin, Town of Narrogin, Tincurren, Wagin, and Wickepin) in six Shires. Rubbish tips varied from small local tips with an estimated annual weight of refuse of about 100 tonnes to a major regional tip with annual receivables of >9000 tonnes. The presence of feral cats at tip sites was regarded as a sign of poor management by a waste management consultant suggesting a failure to regularly cover waste material.

Houses within 1 km of tip sites were canvassed before trapping for feral cats. All residents canvassed were positive about the proposed control actions. Several commented on problems associated with feral cats. Several other residents reported feeding of stray cats. It was common for residents to have domestic cats that were not collared and/or not micro-chipped.

One hundred and thirty seven cats were removed from eight tip sites. No domestic cats were encountered (i.e. no cats were collared or micro-chipped and all displayed wild behaviour). Thirty one cats were removed from the Narrogin tip (including 13 removed by DEC in March). Wagin, a comparatively large tip by volume of rubbish, and Kukerin, a much smaller tip, generated 25 and 26 cats respectively. Fifteen to sixteen cats were removed from each of Wickepin, Cuballing and Dumbleyung tip sites. Three and five cats were removed from Tincurren and Harrismith respectively. No cats were removed from Dudinin, consistent with the closure and restoration and recent trapping of this site.

Few captures were made on the last few nights of trapping at each tip site, suggesting that few if any cats remained at the end of the trapping period, typically of eight nights.

Cats caught were largely adult and had a slight female bias. This suggests a high reproductive output and export of young cats to the surrounding town and landscape. Cats

had a mix of coat colours that suggested a high input of recently domestic cats. This is consistent with reports of unwanted kittens being dumped at tip sites.

The capture rate at Harrismith tip site in 2013 was markedly less than in 2012, suggesting that cats aren't immediately replaced by new immigrants at tip sites following removal. This suggests that ongoing cat control at rubbish tips may not be an onerous task.

Cats may play a role in controlling rats at rubbish tips, so control of cats should be accompanied by implementation of rat control. Secure metal or plastic bait stations are available from local suppliers for a unit cost of about \$25 (plastic) to \$30 (metal).

Recommendations

1. Shires should improve management of tip sites by:
 - a. implementing a regular trapping program for feral cats (twice annually @10 trap nights or until no further cats caught). Staff or contractors undertaking such work should, at minimum, should be aware of the issues discussed in the procedures and practise document given at Appendix I;
 - b. implementing a rat control program using commercially available rat bait stations; and
 - c. improved management of food waste by either more regular covering or by storing in cat-proof bins and/or diverting to a regional waste disposal sites;
2. Shires should be proactive in implementing the provisions of the WA Cat Act 2011 that come into force in November 2013. This might include subsidising sterilisation clinics at local towns, particularly if there is no resident veterinary practice.
3. Shires should publicise the link between better cat management and nature conservation outcomes, reduction of nuisance, and better health outcomes for both humans, native fauna and resident domestic and feral cats.

Scope of work

1. Feral cat activities

- a. Review requirements under the various Acts and protocols.
- b. Consult with seven Shires regarding trapping at their nine rubbish tips.
- c. Consult with seven Shires regarding instruction of their staff in the humane and safe use of traps and disposal of captured feral cats.
- d. Undertake preliminary inspection of nine rubbish tips and ascertain what houses are within 1 km. Prepare flyer for distribution. Door-knock houses and discuss issues regarding cat trapping. Establish whether they have domestic cats and, if so, whether collared.
- e. Trap at nine rubbish tips for 80 trap nights per site (eight nights @ 10 traps per night).
- f. Provide instruction for Shire staff as required.
- g. Collate data and prepare report.

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Introduction

The cat *Felis catus* was introduced into Australia by early European settlers. Wild or feral populations became established in the Narrogin area by about 1850 and established throughout mainland Australia by the 1890s (Abbott 2002). Its spread across Australia was assisted by the prior spread of the European rabbit *Oryctolagus cuniculus*. Feral cats became established throughout Australia from multiple releases where ever Europeans settled. Feral cats are now widespread across almost all habitats and populations are self-perpetuating. Estimates put the population of domestic cats in Australia at approximately 3 million and the population of feral cats at 18 million (Pimentel *et al.* 2001; McLeod 2004).

Feral cats are solitary predators (lacking the co-operative hunting behaviour of many canid species) and typically hunt by ambush. This comprises concealment, stalking and sudden attack (Turner and Meister 1988; Denny 2008).

Mammals are typically the major constituent of the diet of feral cats, with rabbits, rodents, and native mammals (where available) prominent (e.g. Jones and Coman 1981; Martin *et al.* 1996, Paltridge *et al.* 1997). Reptiles, birds and invertebrates become more important in arid Australia (Paltridge *et al.* 1997). Native mammals recorded in the diet of cats include bandicoots, native rodents, dasyurids, possums, gliders, and small wallabies (Denny 2008). Local declines of native mammals attributable to feral cats include Allied Rock-wallaby *Petrogale assimilis* (Spencer 1991), rufous hare-wallabies *Lagorchestes hirsutus* (Gibson *et al.* 1994), and bridled nail-tail wallaby *Onychogalea fraenata* (Horsup and Evans 1993). With such larger prey species, feral cats typically focus on the newly independent young. Feral cats have also been implicated in the failure of reintroductions on the brush-tailed phascogale *Phascogale tapoatafa* (Soderquist 1995), numbat *Mymecombius fasciatus* (Friend and Thomas 1995), brush-tailed bettong or woylie *Bettongia penicillata* (Priddel and Wheeler 2004) and western barred bandicoot *Peremeles bougainville* (Short 2007).

Feral cats are known to scavenge for human food scraps and to feed on carrion. They can build up enormous populations – up to 2000 km⁻² - around such reliable food sources (Liberg and Sandell 1988; Izawa *et al.* 1991). Colonies of feral cats in Australia may build up at artificially rich food sources such as rubbish tips (Denny *et al.* 2002). Here cats form structured social groups based on matrilineal lines, where females recruit their own female kittens and exclude other females from the food source.

Female cats can produce two, occasionally three, litters of kittens per year. Litters are typically produced in spring and late summer. A typical litter size is four kittens (generally between 2 and 7). Kittens are fully weaned at about 2 months of age, but typically remain with the mother for 5-7 months (Dickman 1993).

Feral cats display sexual dimorphism with males being heavier, with longer bodies, legs and tails and broader longer heads than females. In a sample of 306 cats from Shark Bay, males had a maximum weight of 6.1 kg and females of 5.0 kg (Short and Turner 2005). Only 3.1% of females were heavier than 4.5 kg as compared with 25% of males. Feral cats have been recorded to 8.2 kg in size (Dickman 1993).

Cats may be controlled by trapping, poisoning, or shooting (Short *et al.* 2002; Short and Turner 2005, DEWHA 2008b). Cats that scavenge at rubbish tips or around human settlements are relatively easy to control using cage traps (Short *et al.* 2005). Short *et al.* (2005) captured such cats at the rate of 9.4 cats per 100 trap nights (94 captures in 1001 trap nights). This is about 20 times the capture success of feral cats caught using the same method in the bush away from human-derived food sources.

Predation by feral cats is listed as a Key Threatening Process under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act 1999). Of those species on the EPBC Act threatened species list, feral cats are considered a threat to 35 species of birds, 36 mammals, 7 reptiles and 3 amphibians (DEWHA 2008b). The red-tailed phascogale *Phascogale calura* is one of the mammal species considered at risk (DEWHA 2008a).

The red-tailed phascogale *Phascogale calura* is a small semi-arboreal and insectivorous dasyurid that now persists only in the far south-west of Western Australia (Bradley *et al.* 2008; Short and Hide 2012). It is listed as 'endangered' under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999, as 'fauna that is rare or likely to become extinct' under the Wildlife Conservation Act in Western Australia, and as 'near threatened' by the IUCN Red List of Threatened Species. The species once occurred across much of inland Australia, but is now limited to a small area in the southern wheatbelt of Western Australia. Its remaining core range is a narrow band from Brookton south to Woodanilling centred on wandoo *Eucalyptus wandoo* - rock-she-oak *Allocasuarina huegeliana* habitat.

Domestic cats are known predators of phascogale (Gould 1863; Short and Hide 2012), and so it is likely they are also vulnerable to predation by feral cats and foxes. However, the scale of impact is unknown. Foxes *Vulpes vulpes* are widespread and abundant in habitat used by phascogale. Feral cats are also present throughout farming areas, but their abundance relative to foxes is unknown.

Scope item: Feral cat activities

a) Review requirements under the various Acts and protocols.

There are a number of Acts and protocols that are relevant to the control of feral cats at rubbish tips in rural Shires and regional towns in Western Australia. These include:

- Western Australia Animal Welfare Act 2002.
- Proposal for Domestic Cat Control Legislation Decision Paper January 2011.
- Western Australia Cat Act 2011.
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) and associated support documents.
- Sharp, T. and Saunders, G. (2004). CAT002 Trapping of feral cats using cage traps.
- Sharp, T. and Saunders, G. (2012). Model code of practice for the humane control of feral cats (CATCOP – revised 03 September 2012).

The Animal Welfare Act prohibits cruelty to, or other inhumane or improper treatment of animals. This is a very general act to ensure the proper and humane care and management of animals “in accordance with generally accepted standards”. It is focused on “unnecessary harm”. However, a defence under the act is that an act was done while “attempting to kill pests in a manner that is generally accepted as usual and reasonable for killing pests of the kind the person was attempting to kill”.

An overarching objective of the Cat Act 2011 is to reduce the number of stray (unowned) cats in Western Australia. One intention is to reduce the impact of stray cats on the natural environment and wildlife. Another is to reduce the nuisance caused by cats and to reduce the number of cats living in poor conditions and in poor health.

The Cat Act provides for mandatory identification of cats by microchip or collar, registration and sterilisation. It is hoped that this will reduce the number of unwanted cats being bred and allow for cats found in public places to be seized and then rehomed or disposed of.

The decision paper defines a number of ‘sub-populations’ of cats: the two most relevant here being ‘Unowned/stray’ (has no identifiable owner or home, but lives in close proximity to humans and may be accustomed to their presence” and ‘Feral’ (lives and reproduces in the wild and survives by hunting and scavenging).

Cats at rubbish tips can be defined as ‘feral’ according to these definitions. The decision paper was of the view that large populations of stray or feral cats of poor health and living conditions and with a high death rate (such as populations at rubbish tips) might be construed as inconsistent with the objectives of the Animal Welfare Act 2002.

Section 49 the new Cat Act states an authorised person “may cause a cat to be destroyed in a humane manner – a) if the person believes on reasonable grounds that the cat - (i) is feral, diseased, or dangerous; and (ii) has caused or given, or is likely to cause of give, serious injury, or serious illness to a person, another animal, or itself.” An authorised person is someone (Section 48) “a local government may, appoint persons or classes of persons to be authorised for the purposes of performing particular functions under the Act.”

In contrast to this is Section 27 that relates to “seizing cats”. Authorised person can seize a cat in any public place if they suspect on reasonable grounds that it is subject to an offence against the Act. If “seized” the cat must be returned to its owner or impounded in a cat management facility. If the identity of the cat is unknown then the operator of the cat management facility “must make every reasonable attempt to identify the owner of the cat, including, where possible, by scanning the cat.”

Section 34 deals with “unidentified and unclaimed cats”. If the owner of the cat can’t be established within three working days then the operator of the facility may “cause the cat to be destroyed in a humane manner”. But if the operator of the cat management facility “believes on reasonable grounds that the cat is “feral, diseased or dangerous” and “has caused or given, or is likely to cause or give, serious injury, or serious illness, to a person, another animal or itself” then the cat may be destroyed in a humane manner immediately.

Hence, an authorised person who has reasonable grounds for believing a cat is feral (i.e. showing aggressive behaviour in the trap, uncollared and unchipped) and that the cat is likely to cause that person or an animal (such as a phascogale) serious harm then the authorised person has grounds to destroy it immediately or to take it to a cat management facility and then have it destroyed.

The full provisions of the Cat Act (including the sections cited above) come into force on 1st November 2013.

Predation by feral cats is listed as a key threatening process under the Federal Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Of those species on the EPBC Act threatened species list, feral cats are considered a threat to 35 species of birds, 36 mammals, 7 reptiles and 3 amphibians. The red-tailed phascogale is considered a listed threatened species that may be adversely affected by feral cats

<http://www.environment.gov.au/biodiversity/threatened/publications/tap/pubs/tap-cat-report.pdf>).

After reviewing the various requirements under the Acts and protocols we developed the notes given at Appendix 2 to assist staff to be across all issues and to be able to provide advice and assistance to Shire staff when requested. This covers animal welfare, OH&S, and the specific skills required and issues to be considered in a control operation by trapping.

b) Consult with seven Shires regarding trapping at their nine rubbish tips.

The CEOs of six Shires were contacted to inform them of the proposed activity and to seek permission to trap on Shire land. Details of the CEOs and approval dates are given in Table 1. All agreed to the control activities.

Table 1: Shires contacted for approval to control feral cats at their rubbish tips.

Shire	Contact CEO	Approval date
Wagin	Len Calneggia	8 th April 2013
Dumbleyung	Henry Van Der Ende	15 th March 2013
Cuballing	Eva Haydon	7 th March 2013
Town of Narrogin	Brian Robinson	22 nd April 2013
Wickepin	Mark Hook	6 th March 2013
Kulin	Greg Hadlow	12 th April, 2013

c) Consult with seven Shires regarding instruction of their staff in the humane and safe use of traps and disposal of captured feral cats.

The CEOs or their representatives of five Shires were contacted to invite their staff to participate in an information session related to control of feral cat at rubbish tips. Details of the CEOs/ representative and approval dates are given in Table 2.

Table 2: Shires contacted for approval to provide training to their staff in the control feral cats at their rubbish tips.

Shire	Contact CEO	Approval and date
Wagin	Peter Webster	31 st May 2013
Dumbleyung	Calvin Shotter (representative)	17 th June 2013
Cuballing	Eva Haydon	7 th June 2013
Town of Narrogin	Brian Robinson	Permission not given
Wickepin	Mark Hook	7 th June 2013
Kulin	Greg Hadlow	Not contacted

The position of the Town of Narrogin was that they were taking all necessary steps to be fully prepared prior to the legislation taking effect, which included training of their officers through CY O'Connor TAFE, purchase of a microchip reader, modification of the existing pound so that it can be used for cats and dogs, and preparation of a policy/procedure on its implementation (B. Robinson, pers. com. 11th April 2013).

d) Undertake preliminary inspection of nine rubbish tips and ascertain what houses are within 1 km. Prepare flyer for distribution. Door-knock houses and discuss issues regarding cat trapping. Establish whether they have domestic cats and, if so, whether collared.

Nine rubbish tips (landfill sites) were spread across six Shire or Town sites (Figure 1). The volume of rubbish going through each site varied considerably (see Table 3). Two of the nine tip sites, Wagin and Tincurrin, have been recommended for closure due to their location in environmentally sensitive areas (Bowman and Associates 2008). It has been suggested that the tip site at Wagin, which is located close to surface water bodies, be closed and replaced with a waste transfer station. The current tip site at Narrogin was considered to be too close to residences and therefore not sustainable over the long term.

Only one of the tip sites – Narrogin – was regarded at that time as having a track record of good landfill management and compliance (Bowman and Associates 2008). There was evidence of burning of waste and the presence of feral cats (a result of waste not being covered) at numerous tip sites inspected by the waste management consultant. Better planning (a landfill procedures document) was recommended to address vermin issues at several tip sites (Dumbleyung and Wagin).

Table 3: Data on the size of the rubbish tips (landfill sites) in five of the six Shire and Town sites and local population size (data from Shire websites and from Bowman and Associates 2008).

Shire	Landfill site	Shire population	Estimated annual tonnage
Narrogin (T)	Narrogin	4357	9007
Narrogin (S)		897	
Wagin	Wagin	1848	3626
Dumbleyung	Dumbleyung	605	1144
	Kukerin		142
Cuballing	Cuballing	890	1227
Wickepin	Wickepin	750	915
	Tincurrin		98
	Harrismith		98
Total		9347	16257

The management program to control feral cats at town rubbish tips was publicised to residents living within one kilometre of the tip site. This was done by a door knock and/or distribution of a flyer to their letter box. This ensured they were aware of proposed trapping and gave them the opportunity to ensure their domestic cats were not at risk.

There were no houses within one kilometre of rubbish tips at Dumbleyung, Kukerin, and Wickepin. There were four houses within one kilometre of the tip site at Harrismith, four

houses and the local primary school within one kilometre of the tip site at Tincurrin, six houses within one kilometre of the tip site on the outskirts of Wagin, eight houses within one kilometre of the former tip site at Dudinin in the Kulin shire, 13 houses within one kilometre of the tip site at Cuballing, and about 124 houses, farmlets and/or businesses within a 1 km radius of the tip site on the outskirts of Narrogin.

Cat collars were offered to local residents if they were concerned about the safety of their uncollared cats. Five collars were dispensed to owners in Narrogin.

In Cuballing only one resident of 11 visited had cats (an additional four residents weren't home at the time of the door knock). This resident had two collared cats. Two residents complained of having feral cats in their yard and of feral cats eating native birds. Another fed two stray cats.

In Harrismith three residents were visited. Two of the three had cats. One resident had three cats, all uncollared (a black/white, tabby and a ginger). The other resident had an uncollared Siamese cat.

In Tincurrin, six residents were visited. Only one had a cat – a Siamese tabby with a collar.

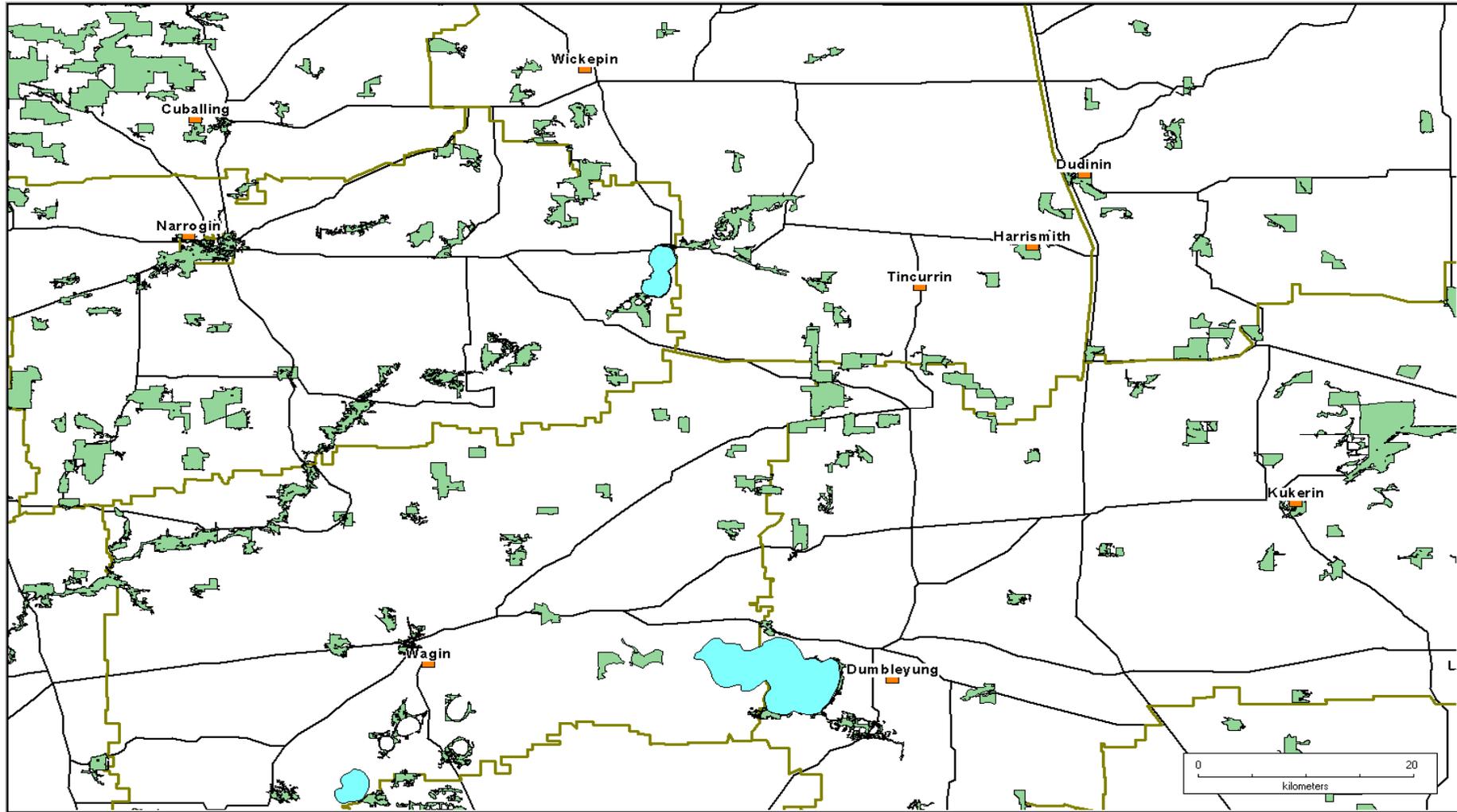
In Wagin, 7 houses were visited. Three houses had nobody home. None of the other four residents had cats.

In Dudinin, 5 houses were visited. Three residents had cats. One was a grey tabby (collared and chipped) and another was a collared tabby. The third resident had a "few cats, not all collared".

In Narrogin, many residents weren't home so a leaflet was left in their letterbox. Of those who were home, ten had cats, with six of these 10 residents having more than one (either two or three) cat. Only three residents (30%) reported their cats to be desexed and only two (20%) reported their cats as collared. Only one resident reported that their cats were confined (to a fenced enclosure). Cats had highly variable colours (tabby with white front, ginger and black, black, grey/brown, ginger, tabby, grey tabby).

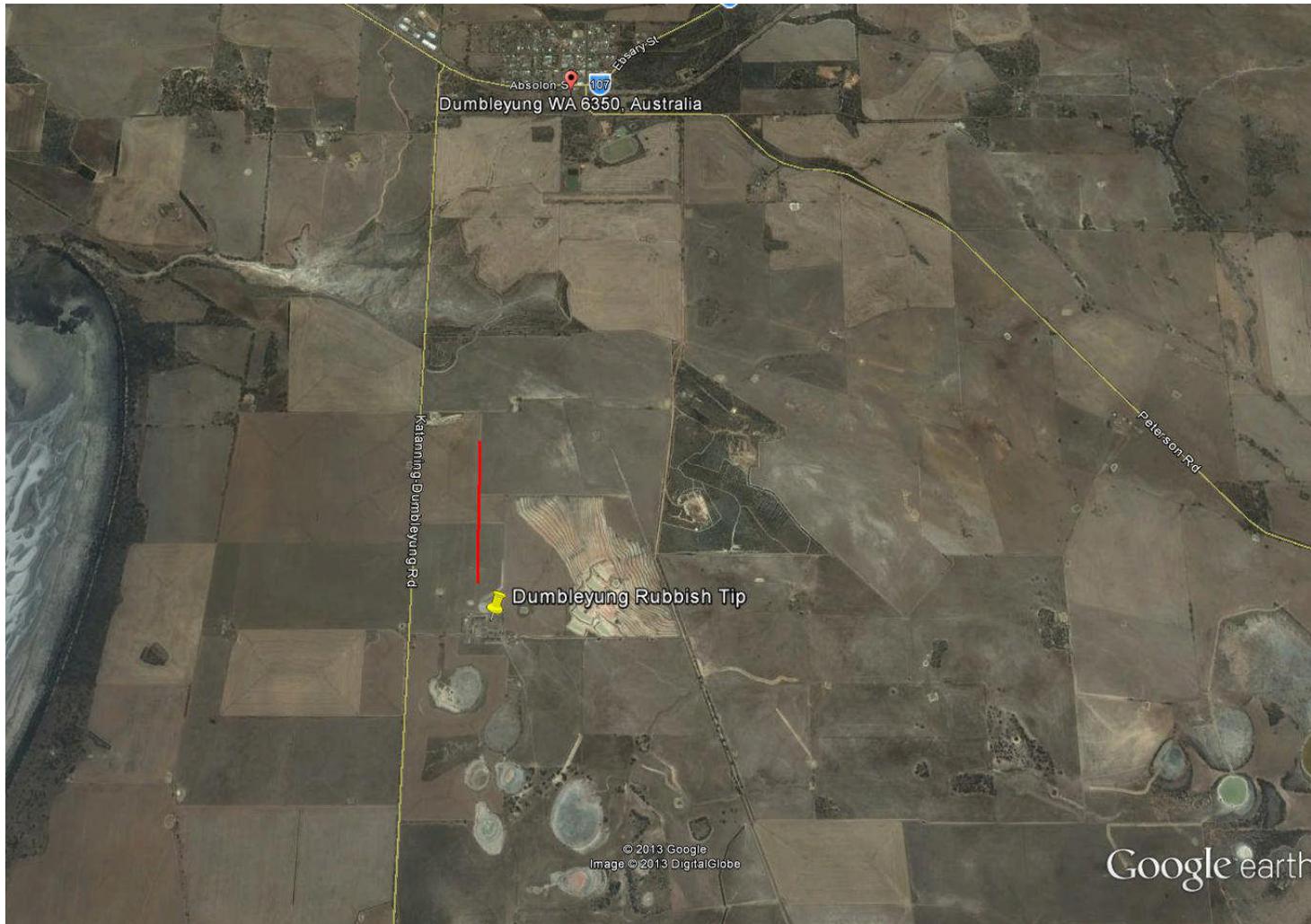
Three residents of Narrogin reported a previous sighting of a phascogale at their house or property.

Figure 1: The location of Shire rubbish tips trapped for feral cats during this study.



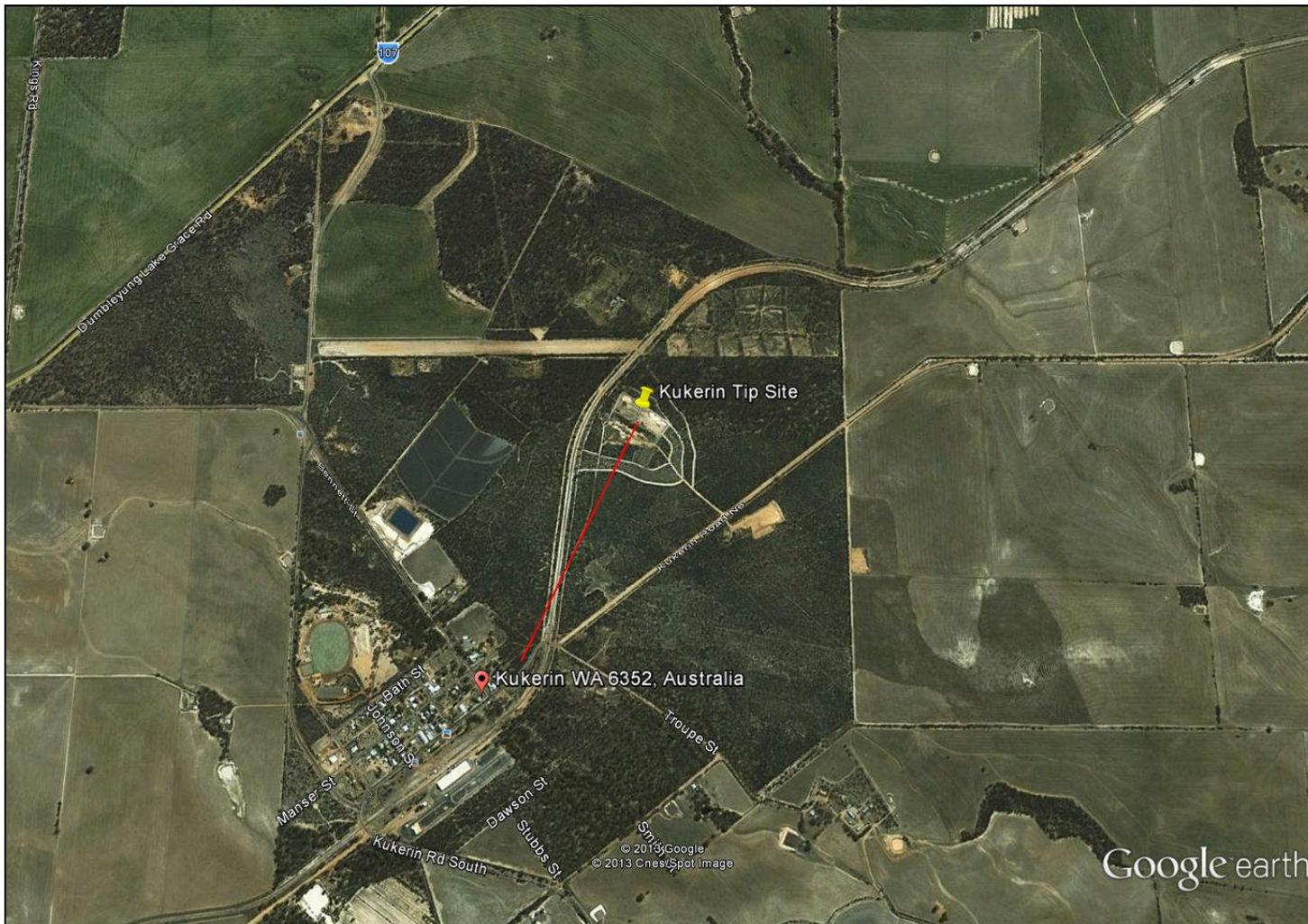
DUMBLEYUNG TIP SITE

The Dumbleyung Rubbish Tip is about 4.5 km south of the town of Dumbleyung. There are no houses within a 1 km radius of the tip. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image.



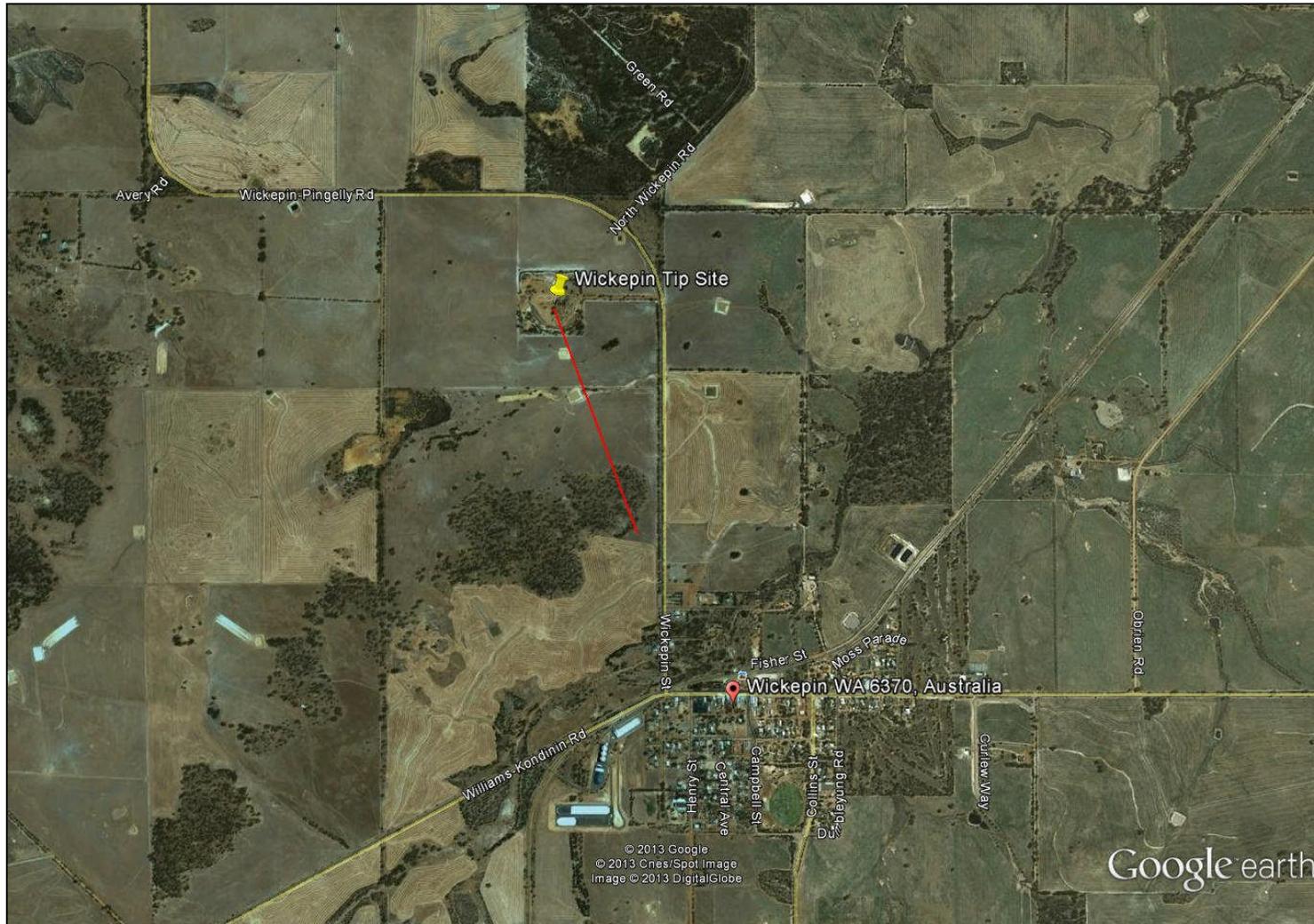
KUKERIN TIP SITE

The Kukerin Tip Site is approximately 1.5 km north-east of the town of Kukerin. The closest houses are just over 1 km from the tip site. Hence, there are no houses within 1 km of the tip site. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image.



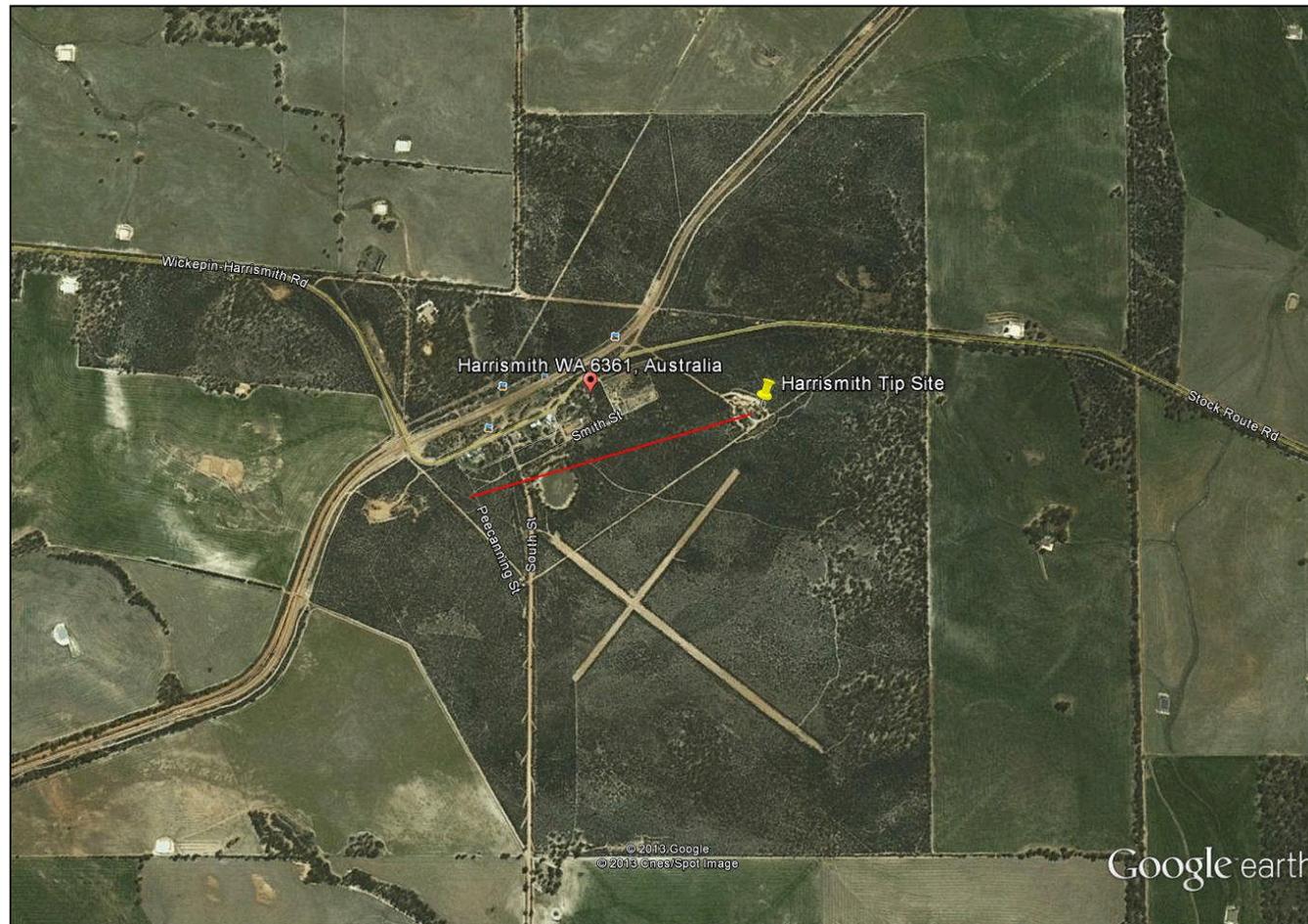
WICKEPIN TIP SITE

The Wickepin Tip Site is approximately 1.8 km NNW of the town of Wickepin. The closest houses are 1.4 km from the tip site. Hence, there are no houses within 1 km of the tip site. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image.



HARRISMITH TIP SITE

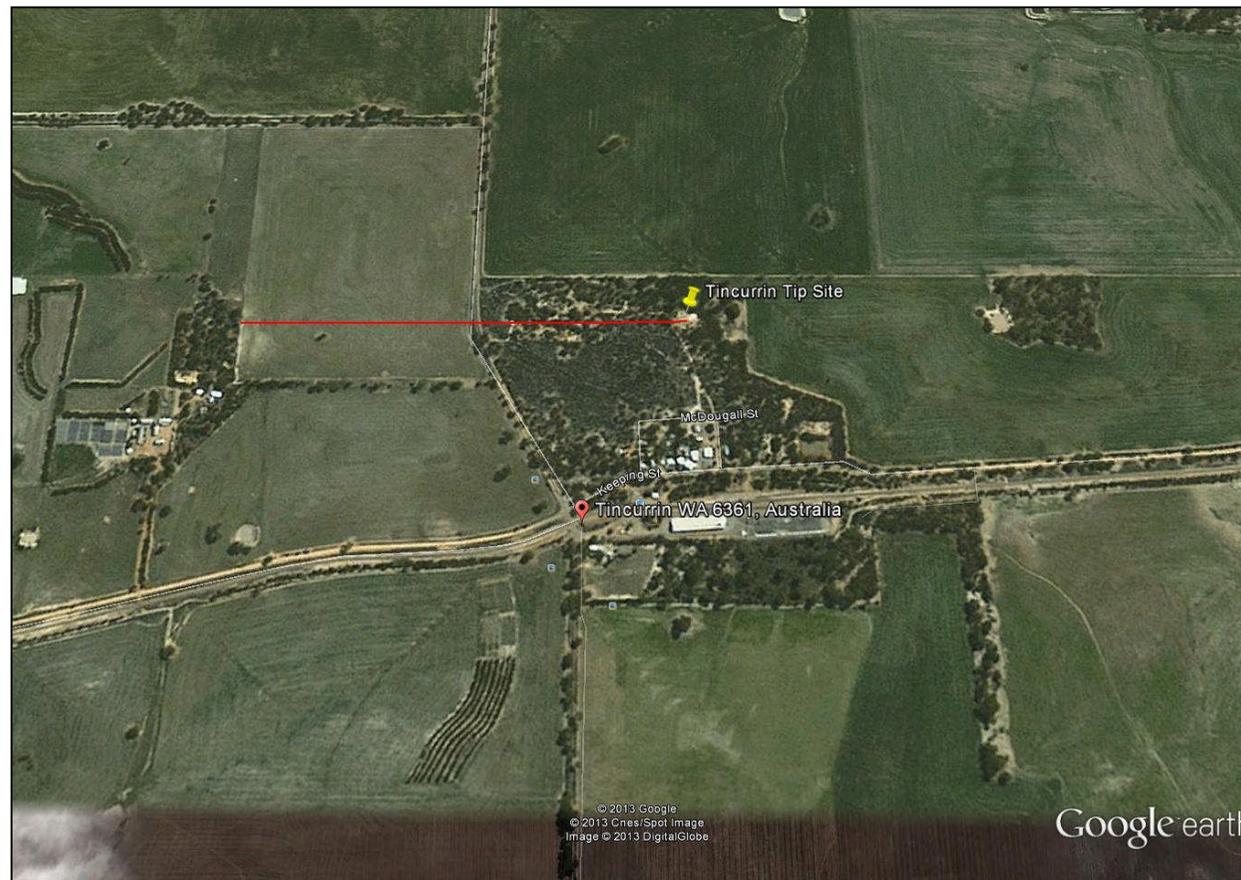
The Harrismith Tip Site is approximately 0.7 km east of the town of Harrismith. The closest houses are 0.6 km from the tip site. There are four houses and/or businesses within 1 km of the tip site. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image. The feral cat control program at the rubbish tip has been promoted by door-knocking each house and/or business, providing a flyer, and by placing a notice in the hotel (0.7 km from the tip site).



TINCURRIN TIP SITE

The Tincurrin Tip Site is approximately 0.35 km north of the town of Tincurrin. The closest houses are 0.3 km from the tip site. There appear to be four houses and/or businesses within the town area, less than 1 km from the tip site. There is also a school within 1 km of the tip site and a farm house at about 1 km from the tip site. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image.

The feral cat control program at the rubbish tip will be promoted by door-knocking each house and/or business in the town, door-knocking the farm house, and by contacting the school.



WAGIN TIP SITE

The Wagin Rubbish Tip is about 2.5 km SSE of the town of Wagin. There are six houses within a 1 km radius of the tip. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image. The houses on the Great Southern Highway (4), Lake Street (1), and Una Street (1) will be door-knocked.



CUBALLING TIP SITE

The Cuballing Rubbish Tip is about 1.8 km north-west of the town of Cuballing. The closest house is about 600 m away to the east. There are about 13 houses within a 1 km radius of the tip. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image. The houses on Beeston Street (6), Cross Street (3), and Dungog Street (4) will be door-knocked.



NARROGIN TIP SITE

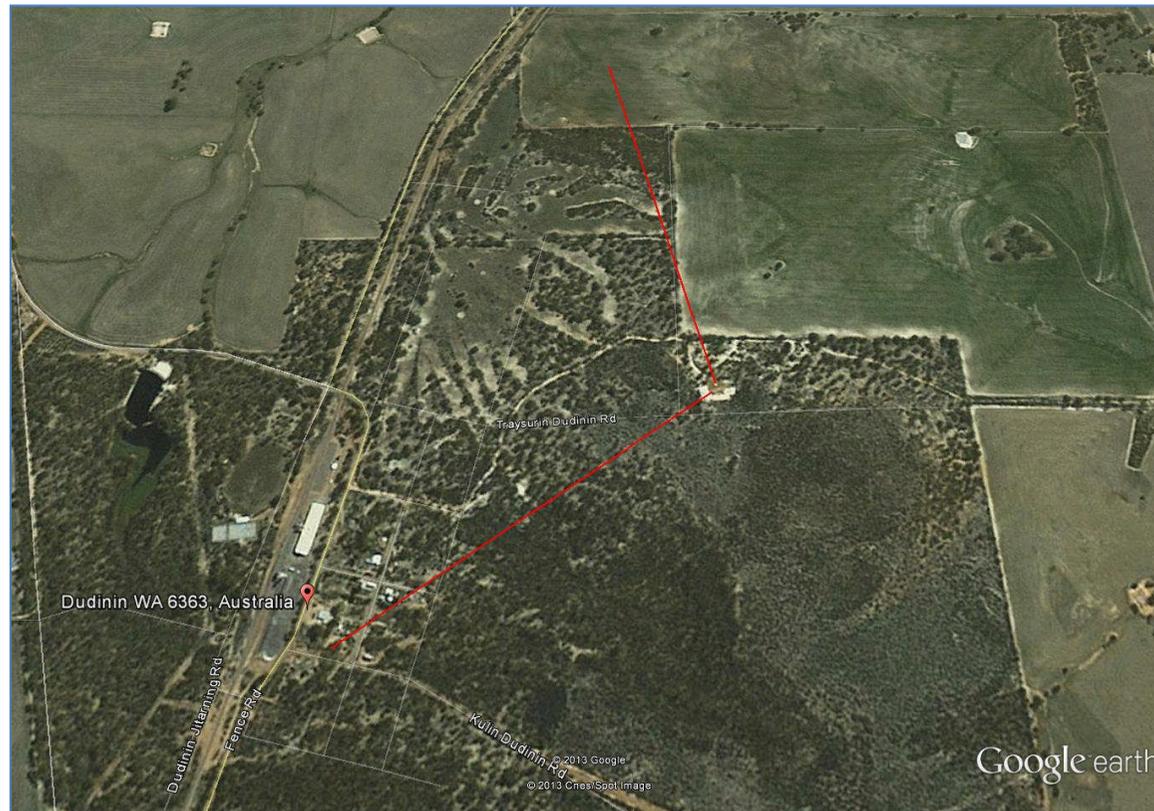
The Narrogin Rubbish Tip is about 2.5 km north-west of the town of Narrogin. It is immediately surrounded by small farmlets and, at a greater distance to the south-east, by suburban blocks. There are about 124 houses, farmlets and/or businesses within a 1 km radius of the tip. The image below shows the relative position of town and tip. The red lines indicate a distance of 1 km on the image. The farmlets and/or businesses will be door-knocked in the area bounded by Fleay Road, Narrakine Road, Clayton Road, Lefroy Road, George Street, and Weise Road. The suburban blocks to the south-east of the tip site in the area bounded by Clayton Road, Lefroy Street, Lock Street and Floyed Road will have an information pamphlet placed in their letter box. The latter houses are > 700 m from the tip site and separated from it by farmlets.



DUDININ TIP SITE

The Dudinin Rubbish Tip is about 0.8 km north-east of the town of Dudinin. It is in the Shire of Kulin. The CEO of the Kulin Shire reports that they have closed the Dudinin tip site – they just have a trailer where rubbish is dumped and then taken to the Kulin transfer station on a regular basis. Here it is stored in big red bins before transfer to the tip proper at Bendering further north.

We may trap this site if we have spare time when based in Harrismith. There are about 8 houses within a 1 km radius of the tip. The image below shows the relative position of town and tip. The red line indicates a distance of 1 km on the image. The houses will be door-knocked to establish who if anybody has domestic cats and if they are collared and micro-chipped.



a. Trap at nine rubbish tips for 80 trap nights per site (eight nights @ 10 traps per night).

Trapping for feral cats was conducted at nine shire rubbish tips, extending from Narrogin Town Site rubbish tip in the west to the Kukerin tip site in the east (see Figure 1). Typically, 10 cage traps were set for eight nights. Trapping was conducted over two blocks, often separated by several weeks. All field work was carried out by Leon Rakai and John Ingram. Data for the number of trap nights at each tip site, the number of cats caught, and the number of non-target species are given in Table 4. One hundred and thirty seven cats were removed from eight tip sites. No domestic cats were detected i.e. no cats had collars or microchips and no cats exhibited tame behaviour consistent with being a pet cat.

Table 4: The number of feral cats caught at nine tip sites across six Shires in March to June 2013.

Location	Number of trap nights	Number of cats caught	Cats per 100 trap nights	Other species caught
Wagin	80	26	32.5	1 Silver Gull
Kukerin	80	25	31.3	0
Narrogin#	120	31	25.8	0
Wickepin	80	16	20.0	0
Cuballing	80	16	20.0	1 Red Fox
Dumbleyung	82	15	18.3	1 Red Fox
Harrismith*	80	5	6.25	0
Tincurran	80	3	3.8	0
Dudinin^	40	0	0.0	1 Australian Raven
Total or mean	722	137	19.0	4

* an additional 19 cats caught in July/August 2012.

includes 40 trap nights by DEC in March 2013 which caught 13 cats.

^ tip site closed and rehabilitated in 2012.

A local Dudinin resident who works for the Shire of Kulin and manages their rubbish transfer station, is reported to have removed some 10 cats in and around the town of Dudinin within recent times. Another local resident is reported also to have trapped a number of cats recently within Dudinin. These captures, and the closure and rehabilitation of the tip site and replacement with a sealed trailer, would account for the lack of cats caught at this tip site during this study.

One hundred and thirty seven feral cats and two foxes were caught in 722 trap nights (19.0 per 100 trap nights for feral cats). There was a slight female bias in trapped cats (66 female to 59 males). One male fox (5.25 kg) was caught at Dumbleyung; one female fox (4.5 kg) was caught at Cuballing.

Cumulative captures at all tip sites appeared to reach a plateau within the 80 trap nights trapped (Figure 2), suggesting there were few if any remaining cats at each site at the end of trapping.

The largest male cat caught was 6.2 kg (caught at Dumbleyung); the largest female was 4.45 kg (also caught at Dumbleyung). This compares to a maximum 6.1 kg for a male and 5.0 kg for a female from a sample of 313 cats from Shark Bay (Short and Turner 2005). The mean weight of all cats caught during this project was 3.08 kg ($n = 125$). This compares to a mean weight of cats at Shark Bay of 3.04 kg.

The majority of female cats caught at tip sites were adult (73%) (Table 5). In contrast, adult males made up just 40% of the male population. Sub-adults of both gender made up 39.4% of the captured population (Table 12). Only four kittens were caught (3.1%), all from the Wagin tip. Only two females were reported as lactating, both also at Wagin tip site. The low proportion of kittens is not surprising as trapping was conducted in late autumn and early winter, whereas the major breeding season for feral cats is summer and early autumn.

The female bias and the high number of adults in the female population suggest a very high reproductive potential.

Table 5: Weight distribution of cats caught at tip sites (kittens ≤ 1.0 kg; sub adults >1.0 to ≤ 2.5 kg; adult females > 2.5 kg and adult males > 3.8 kg).

Weight class	Gender		Total
	Male	Female	
Kitten	3	1	4
Subadult	33	17	50
Adult	24	49	73
Total	60	67	127

Table 6 provides a breakdown of coat colour of cats caught at the rubbish tips. Most cats were grey/black or black/grey tabby ($48/125 = 38.4\%$), followed by solid black cats ($22/125 = 17.6\%$), and ginger cats ($12/125 = 9.6\%$). However, a lot of cats had some white in their coat ($19/125 = 15.2\%$) indicating a recent domestic origin or considerable past interbreeding with domestic cats (Plate 1). Only two long-haired cats were reported in captures (one at Dumbleyung and one at Kukerin).

The great variety of coat colours and mixing of colours is in contrast to that found in a sample of 313 cats caught at Heirisson Prong, Shark Bay (Short and Turner 2005). Here the majority were tabby ($228/313 = 73\%$) followed by black ($58/313 = 18.5\%$), ginger ($25/313 = 8\%$) and tortoiseshell ($2/313$). Few if any of these cats had white markings.

Plate 1: Tabby cat with white underbelly.



Plate 2: Ginger cat and typical tabby in left-most traps.



There are reports by Shire staff and local residents of people dumping litters of unwanted kittens at rubbish tips. The coat colour of cats caught at rubbish tips suggests a large and ongoing input of domestic cats to the population. Hence cat populations at the tip sites are likely to largely result from town cats rather than being derived from wild populations of feral cats from surrounding farm and bushland. Hence tip sites are likely to be a net exporter of feral cats to the surrounding landscape.

Capture of cats at Tincurrin tip site was substantially lower than most other tips. Tincurrin was only a small pit with little food waste and with not as much apparent use as other tip sites. Other larger tips service hotels and businesses with food waste. Also, there is no scrap metal pile at this tip so there is less shelter for cats.

Similarly, the number of cats caught at Harrismith this year was far less than last year (Figure 3). In large part, this may be due to improved management of this tip. The hotel now uses closed top bins for food waste and this material is apparently now sent to Kukerin rather than to the local tip site. Hence, the amount of food scraps available in the tip is likely to be far less.

Table 6: Colour patterns of cats caught at rubbish tips.

Colour combinations	Classic tabby	Mackerel tabby	Solid	Mottled	Tortoiseshell	Spotted/Mackerel tabby	Total
Grey/black or black/grey	7	23					30
Grey/black/brown or grey/black/tan	7	11					18
Grey brown		3				1	4
Black			22				22
Black with some white			8				8
Black with dark tan			1				1
Ginger	4	8					12
Ginger with white	3						3
Ginger with other colours	1	2					3
Brown/black, black/brown or brown/black/white	3	6					9
Grey	1			1			2
Grey/white		3					3
Grey/ginger		1					1
Grey/black/white		3					3
White with some black or grey			2				2
Other			1		2	1	4
Total	26	60	34	1	2	2	125

Figure 2: Cumulative numbers of feral cat caught at eight Shire rubbish tips. The graph for Narrogin excludes the 13 cats caught by DEC in March 2013.

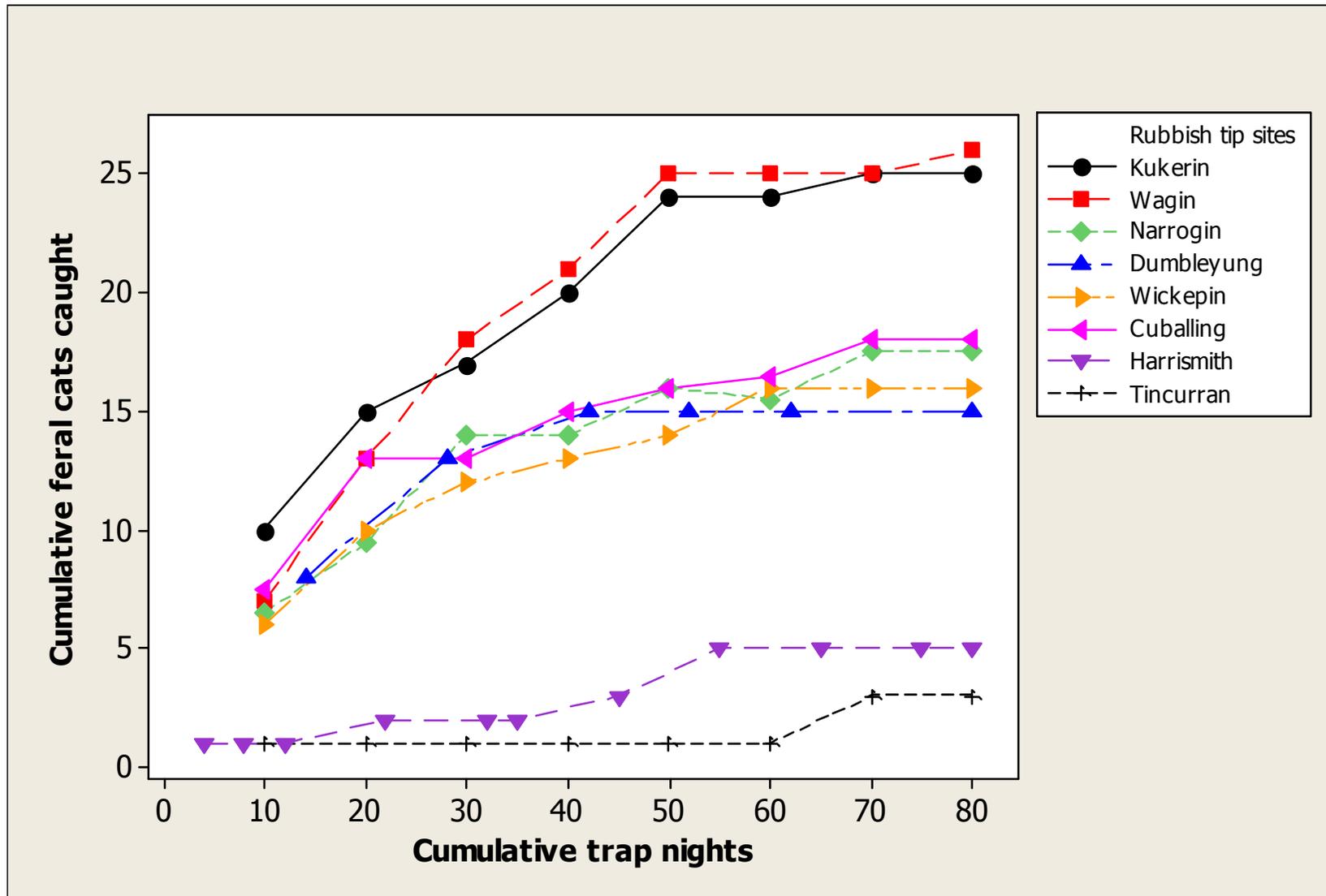
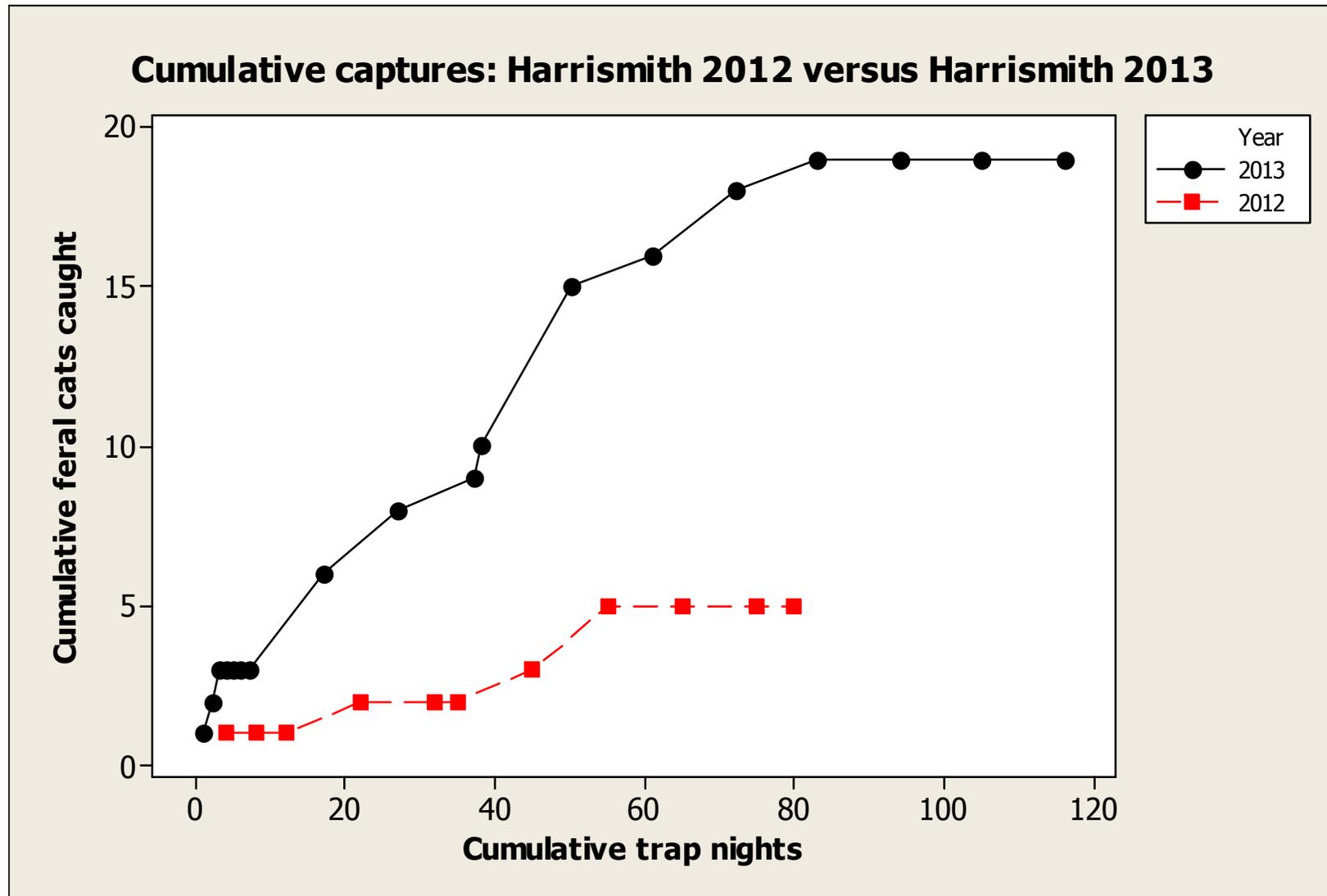


Figure 3: Cumulative numbers of feral cat caught at Harrismith rubbish tip in 2013 versus 2012 showing an apparent residual impact of trapping. A detailed description of the trapping in 2012 is given in Short and Rakai (2012).



e) Provide instruction for Shire staff as required.

The Town of Narrogin declined our offer of training as their staff were undertaking training at CY O'Connor TAFE at Northam and believed their staff understood their LGA responsibilities under the Cat Act 2011.

Instruction was provided to staff at the Wickepin and Cuballing Shires in the week of June 9th. This included Wickepin works staff at Wickepin (11th June) and the works manager and the works supervisor in the Shire of Cuballing (12th June).

Seven Shire staff attended an information session at Dumbleyung tip site on Tuesday 18th June. An attempt was made to set up a meeting with Wagin Shire staff but this was not successful.

Plate 3: Early morning information session at Dumbleyung rubbish tip.



Discussion

One hundred and thirty seven cats were caught in 772 trap nights across nine rubbish tips over a 4-month period in late autumn and early winter. As many as 31 cats were caught at one tip site. No cats were caught at the former Dudinin tip site – now closed rehabilitated. Only 5 cats were caught at the Harrismith site compared with 19 the previous season.

The trap success in 2013 across all sites was 19 cats per 100 trap nights. This compares with 16.4 cats per 100 trap nights at Harrismith in 2012. Both results were far higher than the 9.4 per 100 trap nights recorded by Short *et al.* (2005) at Shark Bay for scavenging cats caught at a rubbish tip and around buildings and the 13.7 cats per 100 trap nights for cats caught at a rubbish tip at Oberon, NSW (Denny *et al.* 2002).

Captured cats averaged 3.08 kg with a maximum of 6.2 kg for males and 4.45 kg for females.

The presence of a wide mixture of coat colours, including white markings suggest a largely domestic origin for the tip populations rather than immigration from entirely wild populations. Cats from more isolated sites typically have less of such characteristics and are more typically uniform tabby and uniform black.

There were no non-target species caught. The most likely native non-target species would be brushtail possum (*Trichosurus vulpecula*) and the introduced black rat *Rattus rattus*. Feral cats may play a role in excluding rats from these tip sites and consideration should be given to implementing rat control. Rat bait stations are available at local suppliers (Plate 4).

Wilson *et al.* (1994) studied the feral cat populations at four rubbish tips on the NSW/ACT border near Canberra: two in rural settings and two on the outskirts of the city. Populations varied from 22 – 35 cats at each tip. This translated to an approximate density of between 19 and 90 cats per square kilometre. Following a cull of about 85% of cats at one site (Mugga Lane Rubbish Dump, east Canberra), it took 6 months for numbers to return to 70% of starting density. Recovery in numbers was attributed to both natural population increase and immigration.

Denny *et al.* (2002) studies a population of feral cats at the Oberon rubbish tip (approximately 200 km west of Sydney, NSW) over a period of two years. Twenty six cats were captured at the tip, and a further 12 in surrounding areas to 40 km away. In all, 20 cats were black or black with white spotting, 11 were tabby, 5 were orange, one was blue and white, and one was tri-coloured. The population at the tip was dominated by males (18 male and 8 female). Twelve were adult at first capture, 7 were sub-adults and 9 were juveniles. Cats bred from July through to April, and possibly throughout the year.

Plate 4: A secure lockable and weather-proof bait station for rats. This model is available from Bunnings for about \$30. Heavy duty plastic equivalents are available from Elders in Narrogin for about \$25.



Observations of marked individuals gave minimum movements of 2.5 km (an adult male initially marked at the tip and subsequently found as a road kill), 3 km (a male shot at this distance from where it was marked), and 4 km (an adult male captured 4 km from the rubbish tip and subsequently seen at the tip). Genetic analysis indicated a female-kin group of three, with these females contributing maternal alleles to more than 70% of juveniles and sub-adults. No outside females were detected during this study. In contrast adult males occasionally visited the sites and some arrived as adults and established themselves as long-term residents.

Studies of feral cats in semi-arid New South Wales have shown that feral cats are highly mobile, especially during periods of food shortage (Newsome 1991). Newsome reported movements of 8 to 48 km during drought, with one extreme example of a movement by a male of 200 km.

While it is often stated that cats prefer living food items, feral cats are known to feed on carrion and other non-living food resources. For example, Paltridge *et al.* (1997) reported feral cats consuming carrion from dingo kills near watering points during drought in central

Australia. Izawa *et al.* (1991) reported a density of 31 cats per hectare scavenging at rubbish tips and provisioning sites at Nagasaki, Japan.

Dickman (1996) identified eight regional areas across Australia where extant native species were most at risk from predation by feral cats – one of these was southwest Western Australia (Warren, Jarrah Forest, Swan Coastal Plain, Esperance Plains, Mallee and Avon Wheatbelt bioregions).

In addition to direct predation on native fauna, cats have been implicated in the spread of toxoplasmosis and sarcosporidiosis (McLeod 2004). The protozoan disease organism, *Toxoplasma gondii*, is able to infect a range of marsupial and other mammalian hosts, including humans (Jones 1989). Dickman (1996) suggested that significant or sustained damage to Australia's fauna from toxoplasmosis may have already occurred historically, and the extent of impact can now only be guessed at.

A study of cats at rubbish tips in New South Wales and the Australian Capital Territory found that the majority of cats were suffering from some form of disease (Wilson *et al.* 1994). There was a high prevalence of upper respiratory tract viral disease, gingivitis and feline immunodeficiency virus. It was suggested that these cats were reservoirs of disease for wildlife, livestock, humans, and domestic cats. *Toxoplasma gondii* was found in 6% of sampled cats, the helminths *Spirometra erinacei* and *Ancylostoma tubaeformae* in 38% and 49% respectively. The latter two species are known to cause infections in humans (Wilson *et al.* 1994). Feline immunodeficiency virus was present in 45% of adult males and 17% of adult females examined. This virus was commonest in adult males and was likely spread by biting – adult males are more likely to be involved in fighting with both other wild and nearby domestic cats.

Given the difficulties of controlling feral cats across the landscape, the approach of keeping strong control of cats at rubbish dumps is a feasible and constructive approach. These are likely to be critical source sites, creating a surplus of offspring to move out into the wider landscape. Where feral cats are controlled at rubbish tips management actions should be guided by codes of practice and standard operating procedures (SOPs) for the humane capture, handling and destruction of feral animals. The *Model code of practice for the humane control of feral cats* (Sharp and Saunders 2004a) provides information and recommendations to vertebrate pest managers responsible for the control of feral cats, including advice on how to choose the most humane, target-specific, cost-effective and efficacious control techniques. There is a specific SOP for trapping of feral cats with cage traps (Sharp and Saunders 2004b).

In addition to the control of feral cats at rubbish dumps it may be more can be done to promote responsible ownership of domestic cats through education and legislation. State, territory and local governments already support initiatives aimed at encouraging responsible pet ownership, including the development of appropriate legislation, education

and awareness programs, and management plans to address local problems and prevent the transition of cats from domestic to stray to feral.

The new WA Cat Act comes into force in its entirety in November 2013. Our canvassing of residents living in proximity to tip sites in Narrogin and surrounding towns, albeit a small sample, suggest that there is support by residents for control of stray and feral cat. It also suggests that many domestic cats are not desexed and not collared, micro-chipped or otherwise identified. Hence, the starting point for compliance with the new provisions of the Cat Act by cat owners appear to be low. It appears that there is scope for locally promoting the new provisions of the Act and encouraging and facilitating compliance.

Acknowledgements

Our special thanks to Julie Palmer of SWCC in Narrogin for initiating this project and for her ongoing support and interest. Our thanks to local government staff for permission to access rubbish tips and to provide information to staff on the control of feral cats to facilitate phascogale conservation. We thank all the local landowners and the Department of Environment and Conservation for permission to access their land to trap for phascogale. We thank those landowners who provided information on past sightings of phascogale in and around the Ecobridge area in response to local publicity. Finally we thank Cara Badger for her support in and around the Dumbleyung area.

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Appendix I – Trapping and removal of feral cats in town tips – procedures and practice

The following notes are a supplement to a practical demonstration of skills and requirements.

Legislative requirements, OH&S, animal welfare, public risk and duty of care

- Firearms licence and knowledge of safe handling procedures;
- Animal welfare – no cruelty, quiet and calm, quick and efficient;
- Choose site of trapping and shooting to ensure no risk to public safety;
- Ensure permission to trap at particular site is obtained;
- Hearing and eye protection, gloves, work clothes, boots and first aid kit;
- Emergency plan and effective means of communication in an emergency.

Common sense and consideration

Cats evoke strong emotions in different people – don't assume everyone thinks about them the way you do. Be careful who you let watch your control activities. Be careful how you describe your control activities to others. Avoid anyone photographing your control activities. Be considerate of other people's views.

Trapping

Signage and notification – consider how the public should be informed prior to trapping so that they can ensure their domestic cats are protected; security of traps.

Appropriate trap type – secure, wire-mesh cage traps, covered, activated by a treadle.

Timing and frequency of trapping – set in late afternoon; check in early morning; monitored daily due to risk of suffering from exposure, dehydration, starvation and/or shock; keep closed during the day to minimise non-target captures e.g. crows; avoid extreme weather; if trapping in summer and autumn and catching lactating females, then continue trapping at the site until all dependant kittens are likely to have been caught.

Location of traps – away from public eye, vehicles, disturbance, and placed on level ground in open area so that cat can walk entirely around the trap; set widely in areas of food waste and areas of shelter such as car bodies, etc.

Bait type – cat food or other soft, fresh meat or fish-based food.

Animal identification – cats are established as either feral or domestic based on presence/absence of collar and demeanour in the trap (wildness, hissing and aggression taken to be signs of a feral cat) and coat colour (long-haired or non-tabby coat types might be considered more likely to be domestic). Feral cats may have increased overall muscle development around the head, neck and shoulders. Diagnosis should be confirmed if possible by scanning for a pit tag, particularly if there are any doubts (this requires a PIT tag reader).

Animal handling –All animals handled calmly and quietly with particular attention to humane practice. Be aware that trapped feral cats can be dangerous to handle. Use appropriate protective equipment. If animals are to be transported, then should be in a secured cage (electrical tie to ensure door remains closed), suitably covered to provide shelter and reduce visual disturbance. Do not transport in an enclosed car boot.

Non-target species - non-target species should be released at point of capture or, if domestic, taken to animal shelter or pound (to be re-united with owner if micro-chipped or tagged). Be aware of location and contact details for nearest animal shelter, local veterinarian, and local wildlife carers in case of injury to non-target species.

Data management – data on target and non-target captures recorded as appropriate; report any incidences such as harm to non-target species.

Removal of feral cats

Consider options for removal of trapped cats – Are there any options to humane euthanasia? What is the preferred option for euthanasia (shooting in trap away from urban/residential areas, take to a veterinarian to be put down, other)?

Public safety

- Consider locking site while shooting or otherwise regulating or monitoring visitation by the general public during shooting (look-out; display a tip temporarily closed sign or a “do not pass this point - shooting in progress” warning sign;

Euthanasia by shooting

Assess the scope of the job / prepare for the job

- Be aware of shot placement relative to anatomy of feral cat;
- Appropriate firearm (.22 or .22 magnum rimfire) and ammunition (hollow or soft-point), suitably maintained and stored;
- Appropriate hearing and eye protection;
- Quiet and remote location where unlikely to be disturbed, preferably at a time where minimal use by the public; preferably a locked site to control entry.
- Be aware of potential hazards (nearby houses, roads, etc).

Shoot animals

- Personal protective gear is used in accordance with OHS standards and statutory requirements;
- Firearm is carried safely with muzzle pointing in safe direction;
- Firearm is loaded, discharged and unloaded safely;
- Any other people present should stand well behind the shooter;
- A head shot is taken calmly and quietly, waiting for animal to settle. The cat should be stationary when the shot is taken. The shot should be taken at close range, with the rifle muzzle 3-5 cm away from the head. The point of aim is the

forehead at the intersection of two imaginary lines from base of left ear to right eye and base of right ear to left eye;

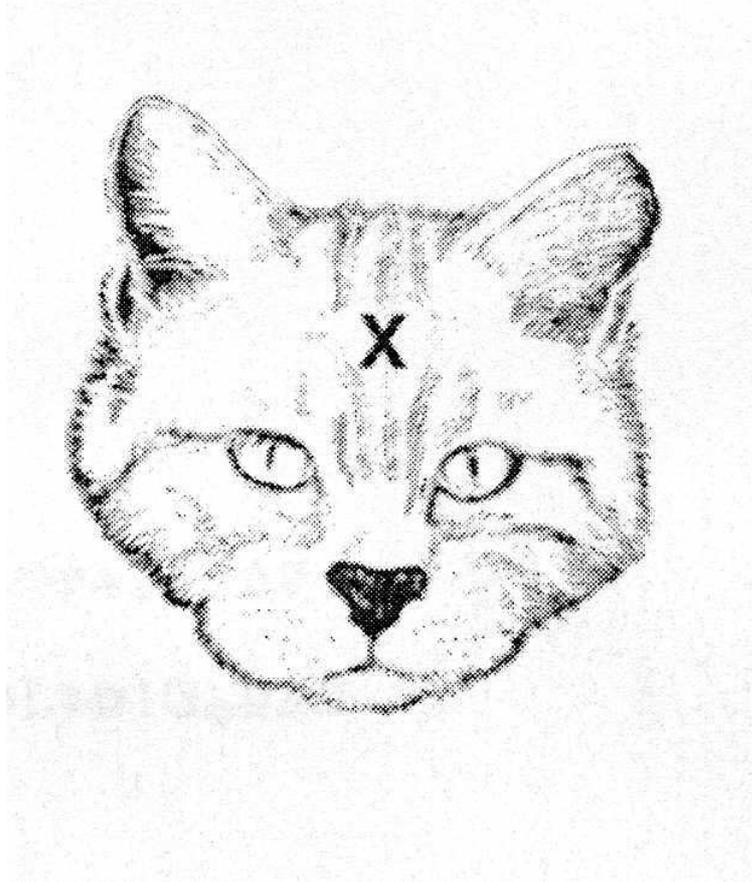


Figure 1: Point of aim for frontal head shot (sourced from Sharp and Saunders 2004).

- Each animal is killed using a minimum of shots, preferably a single shot;
- Each target animal is assessed as dead before moving to another animal.
Methods for such assessment include:
 - Eye reflex (absence of 'blink' when the eye touched);
 - Chest movement (absence of rhythmic, respiratory movement);
 - Loss of colour from the mucous membranes (no capillary refill if pressure is applied);
 - A fixed, glazed expression in the eyes (the cornea loses its clear, moist appearance and becomes opaque, dry and wrinkled).
- Target animals that have not been killed cleanly should be destroyed quickly in a humane manner by immediately taking a second shot.

Post-shoot

- Firearm and ammunition stored in accordance with statutory requirements;
- Carcasses are measured, as required (gender, body weight, or subjective assessment of whether kitten, sub-adult or adult (bearing in mind the sexual dimorphism between males and females));
- Carcasses are then disposed of by deep burying. Carcasses should be buried to a depth not likely to be dug up by other scavenging animals. Appropriate hygiene should be used when handling carcasses as they may carry diseases such as toxoplasmosis, ringworm and sarcosporidiosis that can affect both humans and other animals. Wash hands after handling all carcasses.

Key references

All are available on the web.

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Appendix II – Example of notice to residents within one kilometre of tip sites.

Cat control at the Wagin Rubbish Tip

Feral cats are being controlled at the Wagin tip site. This is for the benefit of the endangered Red-tailed Phascogale – a small squirrel-like marsupial – that occurs in your local area. Red-tailed Phascogale are known to be very susceptible to predation from feral cats and foxes. They are also taken regularly by domestic cats – many community records of this species are from domestic cats bringing them home.



Feral cats have been observed to be very abundant at most local rubbish tips. They will be caught in cage traps over the next few months and subsequently humanely disposed of.

Please ensure that if you have a domestic cat that it is wearing a collar so that, if it should be caught, it can be returned to you unharmed.

This work is being funded by South West Catchments Council in cooperation with the Shire of Wagin and surrounding Shires. It is being carried out by Wildlife Research and Management. For further information on local control contact Leon on 0428294274



Appendix III – Publicity relating to project

Narrogin Observer
Wednesday, May 29, 2013

Observer News 5



Red-tailed phascogales can be identified by their long chestnut coloured tails.

Protectors cull cats

■ **Marc Simojoki**

More than 100 feral cats have been trapped and destroyed in the past month as part of a push to protect the red-tailed phascogale.

Red-tailed phascogales can be identified by their long chestnut coloured tails, capped off with a black brush on the end.

These tiny marsupials, unique to the Southern Wheatbelt and no bigger than a mouse, are listed in WA under the Wildlife Conservation Act as rare fauna that is likely to become extinct.

The South West Catchments Council has been working with

the Town of Narrogin and shires of Narrogin, Wickpin, Dumbleyung/Kukerin, Wagin, Kulin and Cuballing to manage the feral cat populations at shire-managed tips.

SWCC project manager Julie Palmer said the cull would make a big difference in the long term, but ultimately removal of the cats would be replaced by new kittens being born or new cats being dumped.

“It needs to be taken up on a wider scale in the long term but more agencies and the public are starting to become aware of the massive impact of feral cats on local wildlife,” she said.

“The West Australian Cat Act is coming into full force in November this year so that will certainly encourage people to start doing more.”

Under the act, cats will be required to be registered, tagged, microchipped, sterilised and people would need to be a registered breeder to breed cats.

The cat trapping is part of the Ecobridge Project, which sees the SWCC working with land managers to restore linkages between fragmented patches of remaining native vegetation within the broadacre agricultural region.

4 WAGIN ARGUS Thursday, May 23, 2013

NEWS

Program targets feral cats

A TRAPPING program is underway at the Wagin Refuse Site to control feral cats in a major program targeting areas with populations of the endangered red tailed phascogale, a small meat-eating marsupial.

The Eco-Bridge Project, funded by the federal government's Caring for Our Country and the state government is being delivered by the Southwest Catchments Council.

It includes contracting Wildlife Research and Management to trap a minimum of seven shire-managed tip sites, including the areas of Wagin, Pingelly, Harris Smith, Dumbleyung, Cuballing, Wikepin and Kukerin.

So far the program has been highly successful trapping more than 90 feral cats at the tips.

A phascogale trapping program involving 20 remnant blocks between Toolibin Lake, Tarin Rock and Dongolocking has also been a great success catching 78 animals previously un-trapped.

This indicates a higher-than-expected population to the north east of the range and well-known areas of Wagin and Dryandra.

Wildlife Research and Management said the community feedback had been supportive of the project and action to manage feral cat populations had been welcomed.

Southwest Catchments Council is working closely with local groups and local government to support a responsible and targeted approach to feral cat control.

It is designed to complement the Cat Act 2011 due to come into effect in November.

Feral cats pose a massive increasing threat to the viability of survival for a large range of native local species including the endangered red tailed phascogale and other marsupial mammals, frogs, birds and lizards.



Camera trap: The local Landcare group is trying to capture footage of the elusive red tailed phascogale at a number of nest box sites using the latest technology in animal monitoring. Leon of Wildlife Research and Management installs an infrared sensor camera.



Gotcha: On the first night of trapping in Wagin, 10 traps were set with seven catching feral cats. Tips have proven to be a haven for feral cat populations who mate and breed with unsterilised domestic cats and scavenge on domestic waste.

Wagin Woodmilling Landcare Zone (\$9589) to support the establishment of vegetation corridors in the north west of the Wagin Shire with the aim of establishing 3.7 kilometres in length and 5.5 hectares of connecting corridor.

"We are looking at four sites in the Wagin Shire that are clear linkages across the landscape, seedlings have been tried in these sites with limited success and so this year we are running a trial for direct seeding," zone manager Danielle Perric said.

"This is building on many years of work by farmers and landholders as we have really embraced the red tailed phascogale as a local icon species."

"This year, under another program, we are also looking to place more than 150 nest boxes on private land in Wagin and Woodanilling as there is a lack of natural hollows in the wild."

"This supports us to be phascogale friendly towns and farms."

The recently introduced WA legislation will be administered by local government staff, and requires all domestic cats to be registered, tagged and micro-chipped.

All domestic cats must be sterilised unless formally approved for breeding purposes or health reasons.

For more information contact your Local Government Authority.

In addition to feral pest control the Eco-Bridge program has approved funding for the