SWIFFT State Wide Integrated Flora and Fauna Teams

SWIFFT Video conference notes 19 April 2012
Introduced Predators (Red Fox and Feral Cat)

SWIFFT meeting notes are a summary of the video conference and not intended to be a definitive record of presentations made and issues discussed.

KEY POINTS SUMMARY

A strategic plan should be developed for all fox control operations.

For the protection / restoration of native mammals fox control must be broad scale and ongoing with a bait density greater than fox density.

The impacts of feral cats needs to be looked at much broader than impacts of killing or eating individual prey but more at a population level via predation.

A new product for baiting feral cats without harming native species should be available within the next few years.

Feral cats occur across all habitats in Australia and at this time strategic management is the only option for feral cat control.

Maremma dogs have been used in Italy for hundreds of years to guard livestock – they have proven to be an effective means of guarding penguins at Middle Island, Warrnambool.

There is an urgent need to set up large scale trials involving the release of Tasmanian Devils into areas on the mainland where they once occurred.

The second video conference for 2012 had a theme on Introduced Predators (Red Fox and Feral Cat). A total of 122 participants were connected across 21 locations; Mt Gambier, Hamilton, Colac, Warrnambool, Ararat, Horsham, Heywood, Ballarat, Bendigo, Benalla, Echuca, Wodonga, Mildura, Geelong, Traralgon, Leongatha, Bairnsdale, Orbost, Box Hill, Sydney University and Nicholson Street Melbourne.

Those attending included participants from;
Educational: University of Melbourne, University of Ballarat, Bendigo TAFE.

Local Government: Glenelg Shire, Warrnambool City Council, Wyndham City Council.

Field Naturalist Clubs: Ballarat, Ararat, Geelong, Hamilton, Portland.

Community Conservation Groups: Kowree Farm Tree Group, Friends of Eastern Otways, Geelong Environment Network, Ballarat Environment Network, Barwon Coast Committee, Ararat Landcare, Nelson Coastcare, Friends of Shorebirds, West Coast Landcare.

Conservation Organisations: Barwon Coast Committee, South Eastern Natural Resource Management Board (S.A.), Nature Glenelg Trust, Trust for Nature, Windamarra Aboriginal Corp., Parks Victoria, Dept. Primary Industries Victoria and Dept. of Sustainability and Environment biodiversity staff across 17 locations. Also at Mt Gambier staff from the Dept. of Environment and Natural Resources South Australia.

Industry related: Dairy farmer, Alcoa Pt Danger, Central Highlands Water, Enviro. Works, Brett Lane Associates, Ecology Australia, Pest Controller.

SPEAKER SUMMARIES

Red Fox research - monitoring, impacts and control - *Alan Robley, Senior Research Scientist, Manager of Predator Management – Invasive species, Department of Sustainability and Environment, Arthur Rylah Institute, Heidelberg, Victoria.*

Alan said foxes are wide spread, fecund, highly mobile and a generalist predator that can rapidly recolonise a wide range of habitats – your worst nightmare.

Family structure and home range of foxes

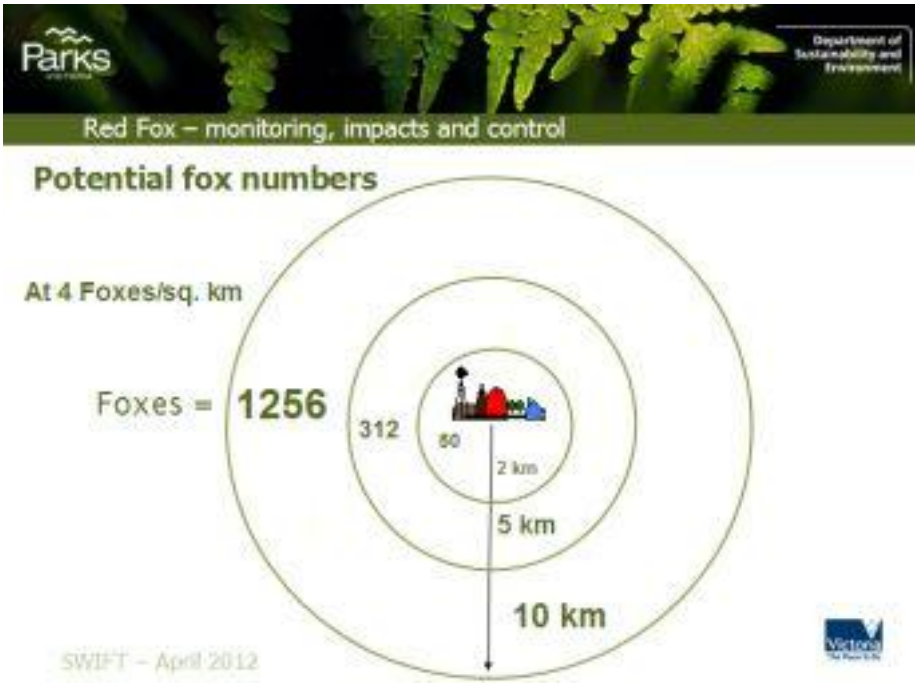
- Foxes live in family groups of 4 to 5 animals consisting of a dominant male and female and may include 1 to 3 sub-dominant males or females.
- Fox family groups occupy well-defined home ranges.
- Home ranges vary in size depending on feed availability and suitable habitat.
- Foxes in rural landscapes require two weeks to cover their entire territory.
- Adult foxes may make 10 to 15 km excursions outside their territories in search of food.

Alan spoke about the difference in home range for different parts of the Australian landscape with rural areas having the largest home range.

Habitat	Home Range km^2
Temperate Agricultural (Victoria)	3.3 – 11.0
Temperate Agricultural (NSW)	1.0 – 19.0
Forests (Victoria)	5.0 – 8.0
Alpine (New South Wales)	1.6 – 10.0
Farmland/Woodland (W.A.)	3.4

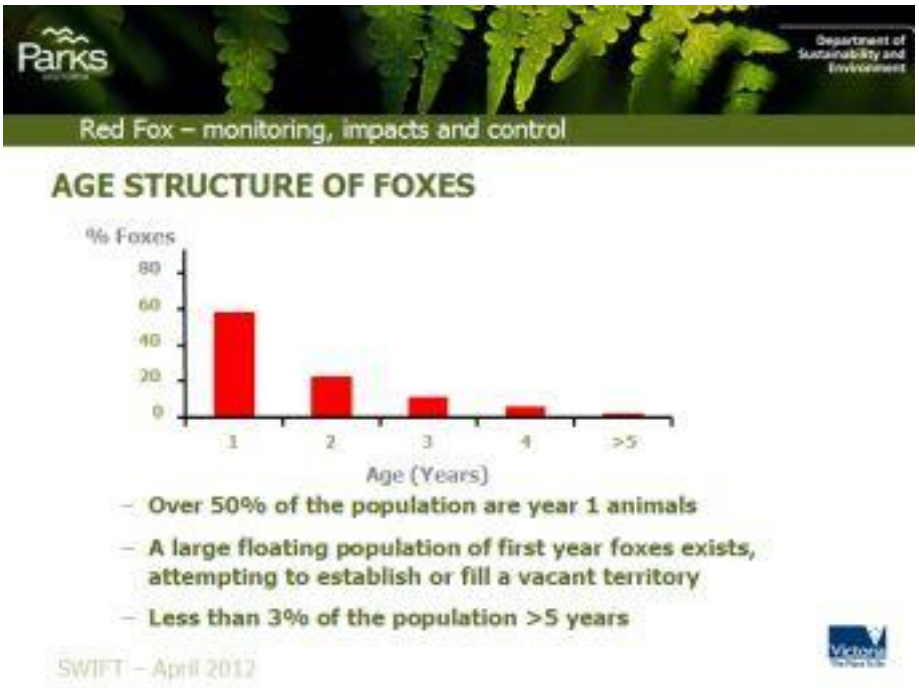
Fox density and movement

Alan pointed out there is a variation in fox density according to their environment. He felt a reasonable average is 3 - 4 foxes per km^2 in temperate grazing lands. The density can be half this in semi arid areas and very high in Melbourne with 14 -16 foxes /km^2.

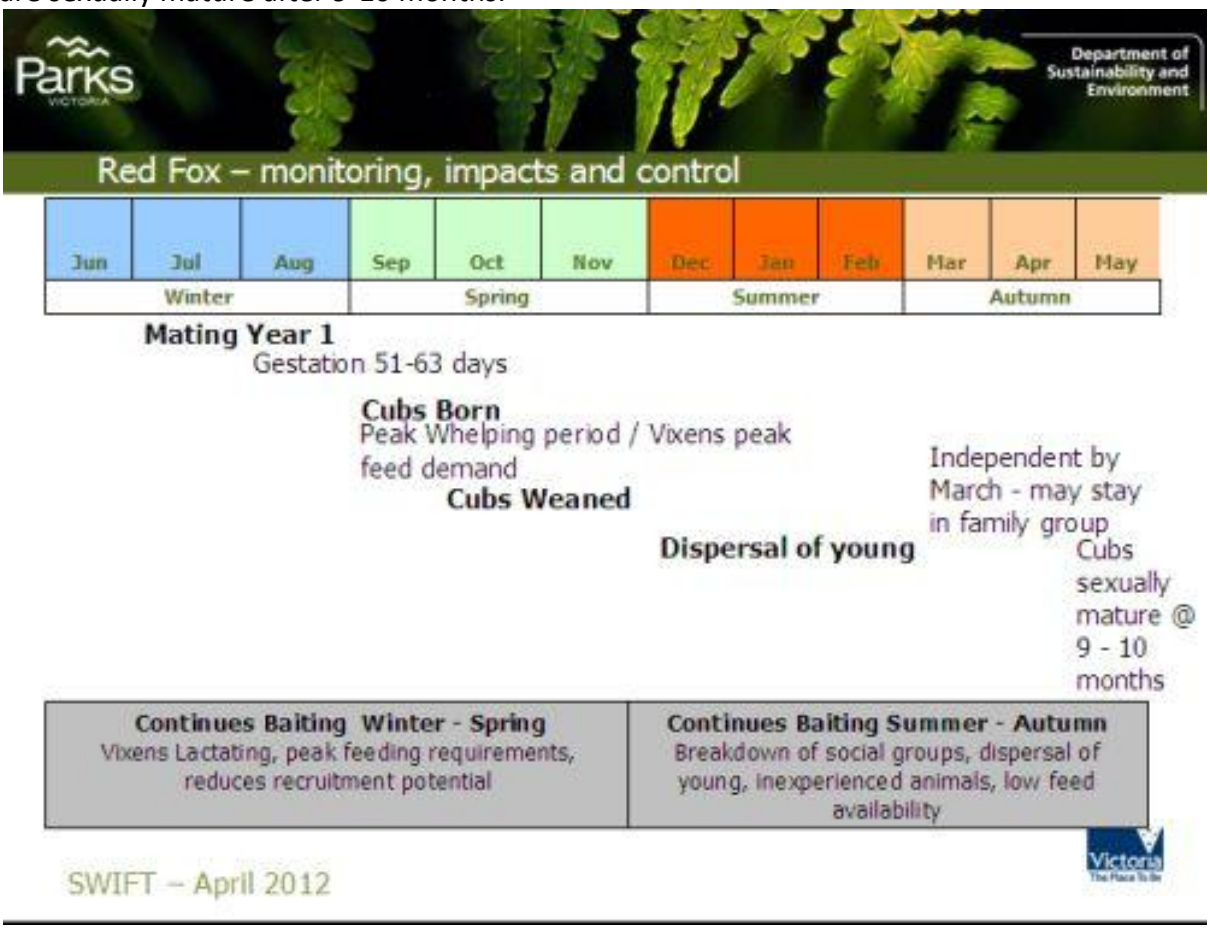


Fox density can be calculated based on an average of 4 foxes per km^2 in a rural environment. Within a 2 km radius there could be 50 foxes, within a 10 km radius the population could be as high as 1256 foxes.

About 60% of the fox population is comprised of first year animals. Many of these foxes are mobile and looking for somewhere to live. Alan spoke about studies from Australia which found they are capable of moving 11 km from the natal area to find a new home range which could be achieved in about 24 hours.



Alan discussed the seasonal breeding and development of foxes. Winter is the mating season, spring is the season when cubs are born and weaned, dispersal of young occurs over summer and by autumn the young are independent and established in family groups. Cubs are sexually mature after 9-10 months.



Alan discussed the seasonal impact of baiting which can disrupt the various stages of development but in essence he felt there is no time of the year when it is not a good time to bait, i.e. continuous baiting could take place right throughout the year.

Fox Control Principals

Alan spoke about the need to take a strategic approach in developing a fox control strategy. It is important to:

- Define the problem: determine if foxes are the key problem or are there other issues.
- Develop a plan: include measurable objectives e.g. reduce decline of one or more native species or increase the numbers of particular species. Management options need to be linked to objectives.
- Implement the plan: take a strategic approach - sustained control, targeted control or one-off control. Alan felt the only practical option for protection of most native species is sustained control.
- Monitor and evaluate programme: this includes both operational monitoring ($ and resources etc.) and performance monitoring using performance indicators i.e. increase in native species x.

Resource managers need to consider that it may take many years to measure a response and that foxes are not the only limiting factor. Monitoring of non treated areas as a control can be valuable in determining program effectiveness.

Sustained Control - Management Strategy

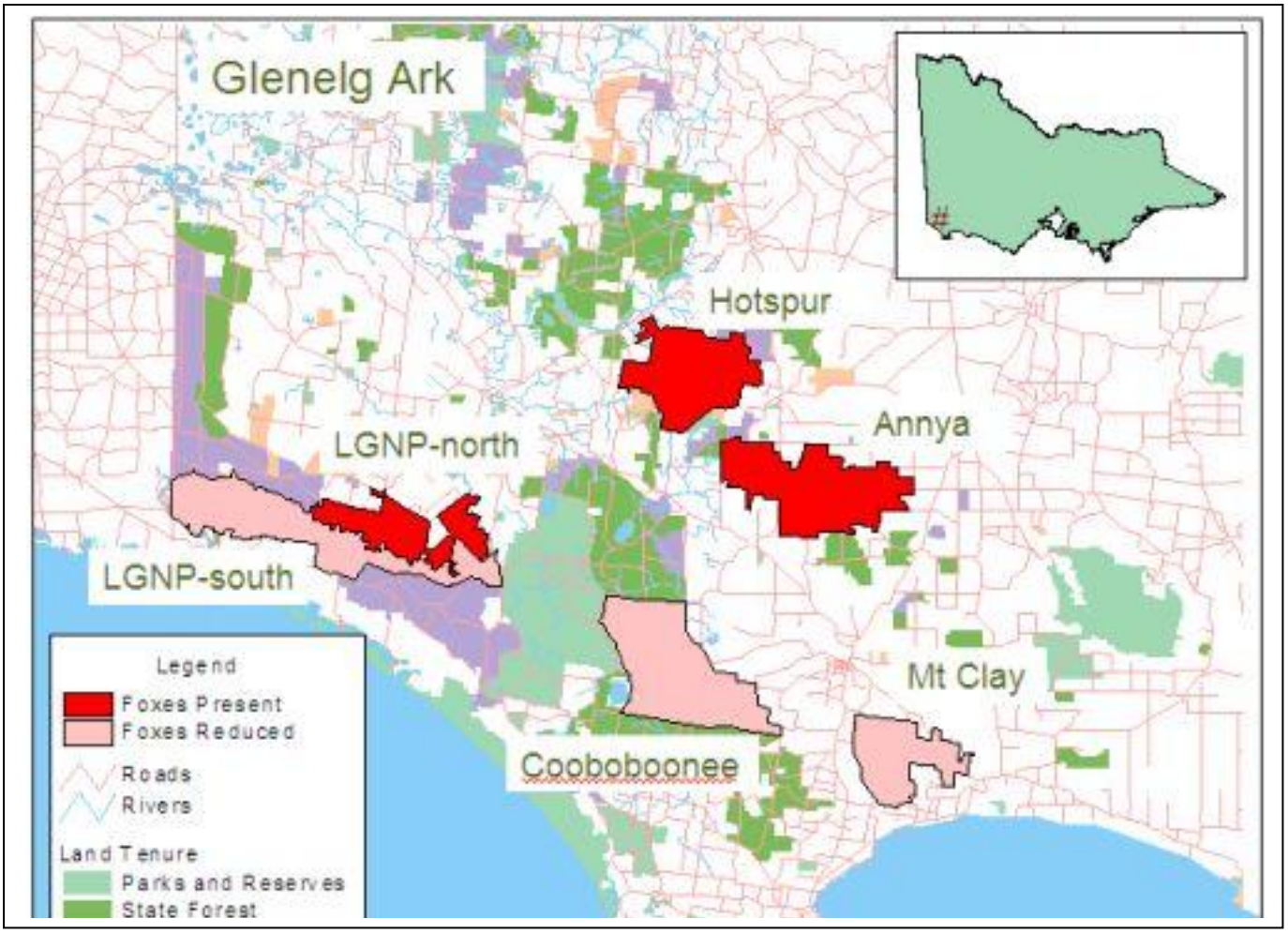
Choose appropriate techniques and integrate into a management strategy, considering:

- Conservation status of species.
- Potential for applying control to have maximum effect.
- Resources available.
- Nature, size and location of management units.
- Non-target issues.
- Presence of other pest animal species, e.g. feral cats and rabbits.

Glenelg Ark

Alan spoke about the Glenelg Ark fox control program which has been running since 2005. This project has the following objectives:

- To achieve a measurable and sustained reduction in foxes within the project area.
- To demonstrate success through monitoring a positive change in long-nosed potoroos, southern brown bandicoots and brush-tailed possums.



The project entails a sustained control program with fortnightly bait replacement since 2005. Funding for an initial 4 years has been rolled over for a further four years. Demonstrating the success of the program has helped secure ongoing funding. The project has included developing methods and indices to measure changes in status of selected native species. Alan stressed that annual reporting to the funding body and stakeholders is important.

Alan spoke about how the project incorporates three areas of control and three areas of baiting treatment (see map).

Monitoring the results of the baiting program has two phases:

- Demonstrating the impact of the initial knockdown of the fox population; and
- Monitoring the sustained control of reduced fox populations using bait take.
- Sand plot activity monitoring is used but is likely to be discontinued, with a move towards use of digital cameras to monitor foxes and feral cats.

Monitoring for the presence of target native species is conducted annually at 40 stations in each of the six monitoring areas. Each station has 9 hair tubes in a grid covering ~1.5 ha. Tapes are replaced daily over a 4 day period (repeated survey).

Alan spoke about a reduction in the index of fox abundance in the treated areas compared with the non treated area. He is also seeing positive signs of the target species abundance (long-nosed potoroos, southern brown bandicoots and brush-tailed possums) in the treated

areas compared with non treated areas for which it is inferred the fox control is having a positive outcome for the target native species.

Points from questions

- There is no operational benefit in free feeding prior to baiting.
- The minimum scale for effective fox control is around 10,000 ha
- Overall, the Glenelg Ark project is considered a success when comparing treated areas and non treated areas. The challenge is to convert the program from short term funding to on-going funding.
- Reintroduction of the Tasmanian Devil could provide a means of creating circumstances for a more natural control of introduced predators.

Contact: Alan Robley, Arthur Rylah Institute, 03 4508600
Glenelg Ark

Feral cat ecology and monitoring *- Prof. Chris Dickman, Chair in Terrestrial Ecology, School of Biological Sciences, The University of Sydney.*

Chris said the problems with feral cats are similar to that of foxes in that they are very wide spread and are an almost intractable predator.

The definition of a feral cat includes free-living cats with minimal or no reliance on humans; populations are self-perpetuating (Moodie 1995). Chris said domestic and 'stray' cats have a potential for contribution to feral cat populations. Feral cats are ubiquitous, they occur across all habitats in Australia.

Impacts of feral cats

Direct impacts: the impacts of feral cats needs to be looked at much broader than impacts of killing or eating individual prey but more at a population level via predation. Chris said there is strong evidence that impacts from predation on populations are greatest on small mammals (<220 g), but larger species (e.g. quolls) are not immune; ground-active birds, small reptiles (<50 g) and frogs can form part of the diet of cats.

Indirect impacts: the transmission of disease e.g. toxoplasmosis (parasite of the blood) and sparganosis (tape worm) are carried by cats as the definitive host and can be transmitted to secondary hosts such as mammals, birds and frogs. Other indirect impacts are exploitation competition where cats and native carnivores compete for the same prey, and sub-lethal effects where animals restrict their feeding or reproductive activities when they know cats are around.

Prey selection

Chris spoke about how individual cats in some populations can focus on particular types of prey (see table). In some populations there may be individual cats which focus on catching rodents, others may be specialists in hunting and killing birds or rabbits. The removal of specialist hunters is important when reducing cat numbers to benefit a particular native species.

Management: cats as individuals

		% successful attacks on:			
Cat	*N*	Rodent	Rabbit	Bird	Lizard
1	11	100		0	50
2	7	100		50	0
3	8	100		50	50
4	5	33			100
5	14			100	50
6	12		83	0	
7	4	50		50	
8	10	50	50		

Dickman (2009)

Cats as interactants

Chris spoke about research work conducted in Sydney which looked at interactions between cats – black rats and tree nesting birds (eastern yellow robins). There are interactions between black rats and robins competing for similar food and a more direct relationship where the rats are eating the robins. When cats are introduced into the equation and prey on the rats there can be a positive benefit for the robins by alleviating competition with the black rat or alleviating predation from the black rat. This illustrates how in certain situations cats might be playing a role in reducing other predator/competitor species.

Cats are found in all habitats across Australia and it is impossible (at present) to control them everywhere, therefore a strategic approach is necessary to identify optimal times and places to direct management efforts.

Identifying values to protect

Cat are not regarded as a significant threat to primary producers like foxes so most of the management will be towards protecting high priority threatened native species. Protecting all potential native prey and ecological processes is also an important objective.

Management: where/when to intervene?

In most instances feral cats are a direct problem rather than an interactant so it is necessary to determine where and when to intervene. Chris spoke about a decision tree approach in which a range of species at risk from feral cats are identified at a local or broader bioregional scale. These would usually comprise species found in more open areas and species such as small ground dwelling mammals, ground nesting birds, reptiles etc. They are likely to be at more risk if nocturnal and are already restricted in their range.

Steps in identifying areas for management intervention

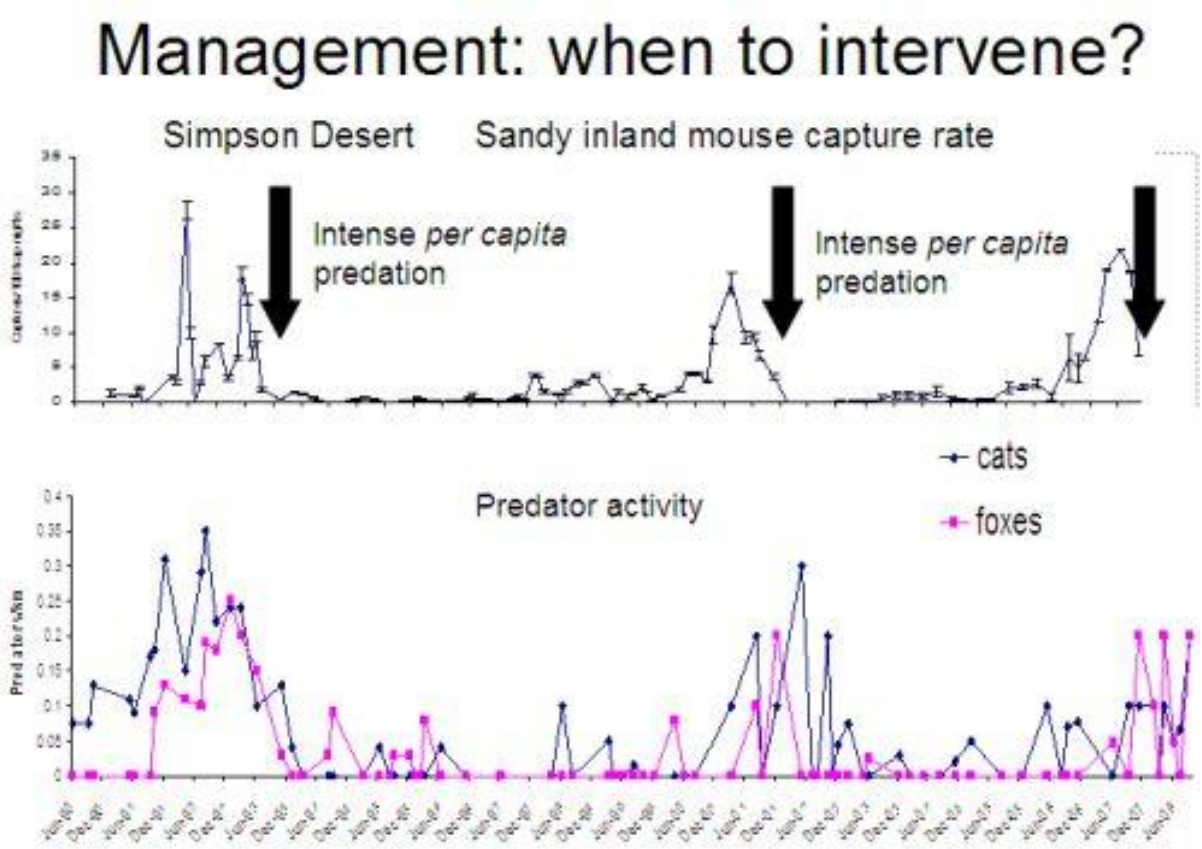
- identify species at most risk using vulnerability analysis
- identify sites/regions where most such species occur
- assess strategic potential to intervene (e.g. are sites accessible, can outcomes of intervention be monitored, what are the non-target impacts, and when should management be focused?)

Chris spoke about a report from the Department of Environment Water Heritage and the Arts 2010 which shows a bioregional analysis of priority sites where there are large numbers of species at risk from feral cat predation.
See:

- Feral cat impacted sites (pdf 643 KB)
- Feral cats

Chris also felt that in order to take a strategic approach in identifying the highest priority areas it was important for locally based managers to undertake a management intervention analysis of high priority species and risks form feral cat predation in their own areas.

When to intervene: Chris spoke about findings from a study in the Simpson Desert over the last 20 years (see below) in which it was found that when species respond through increased population after heavy rainfall years so do the numbers of predators. By the time the populations of native species begin to crash the predator numbers are at their highest. This is the time when there is the strongest per capita predation on the native species and an important time to reduce the impact of predators.



Management options

- Exclusion fencing: used on very high value assets, it is effective but very costly and applicable to small areas. It can be useful for fencing off stray or feral cat hot spots (e.g. rubbish dumps).
- Shooting: locally effective but very labour-intensive.
- Trapping: cages, leg-holds, soft nets; very labour-intensive, also habitat specific and easier to trap near towns than in remote areas where cats are more suspicious of anything new.
- Immunocontraception: could have too many problems.
- Trap-neuter-return: too many problems?
- Disease: could have too many problems
- 'Biodiversity regulators' (dingoes, guardian dogs): could have too many problems
- Poison baiting (e.g. 1080, PAPP, HCN): great potential, but welfare and non-target issues. Use of hard shelled delivery vehicles, toxin tunnels, remote cameras could provide a way forward.

Chris acknowledged many students and other research collaborators, especially Tony Buckmaster, Liz Denny, Aaron Greenville, Billie Lazenby, Mike Letnic, Robyn Molsher, Bobby Tamayo. Also the ARC, DEWHA, IA CRC for financial assistance.

Moodie, E. (1995). The potential for biological control of feral cats in Australia. Report to ANCA, Canberra

Points from questions

- In arid areas there is evidence that dingos suppress the activities and abundance of foxes which has an indirect positive effect on small prey. The suppressant effect on feral cats is less strong where there are trees for cats to climb and escape the dingos.
- Interactions between cats, dingos and foxes can be quite complex and influenced by the structural complexity of the habitat.
- Feral cats can limit the number of juvenile rabbits; there could be scope to use cats which specialise in hunting rabbits to control rabbits at specific sites but this would need further research.
- Development of new generation baiting products has been used successfully on trials in Western Australia. Baits must be on the ground as cats won't dig them up.

Contact: Prof. Chris Dickman, The University of Sydney

Development of the Curiosity[R] feral cat *bait*

Michael Johnston – Senior Scientist, Wildlife Ecology, Department of Sustainability and Environment, Arthur Rylah Institute for Environmental Research, Victoria

Michael said this is a collaborative project between the Australian Government (Department of Environment, Water, Heritage and the Arts) which provides the majority of funding, the Victorian Government (Department of Sustainability and Environment), the Western Australian Government (Department of Environment and Conservation) and Private sector (Scientec Research Pty Ltd).

Michael reiterated points made by Chris Dickman that feral cats are known to impact on a wide range of native species. In addition, they may also compete for the same food resources as native predators such as quolls and phascogales. They can transmit diseases or parasites which affect the health of native species.

Bandicoots form part the diet of feral cats. Image courtesy of DEC – Western Australia

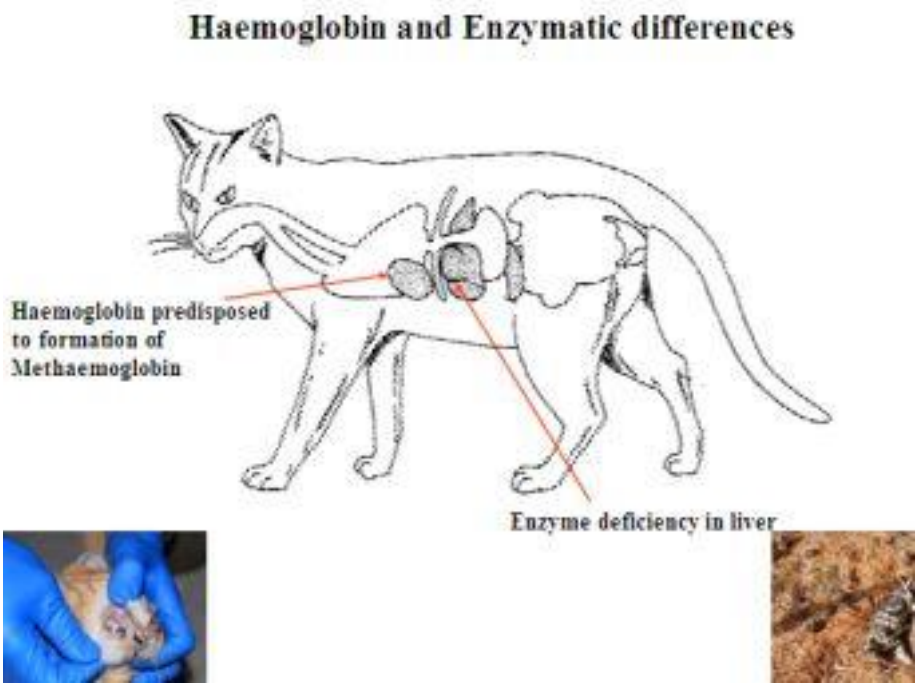
Feral cat control methods

Current control methods tend to rely on various types of traps and shooting, these methods vary in their efficiency and control is generally restricted to small areas. In Western Australia, predator proof fencing in conjunction with baiting has been successfully used as part of threatened species recovery programs.

Michael said new target specific, humane and cost-efficient techniques are needed if feral cat populations are to be managed cost-effectively over large areas.

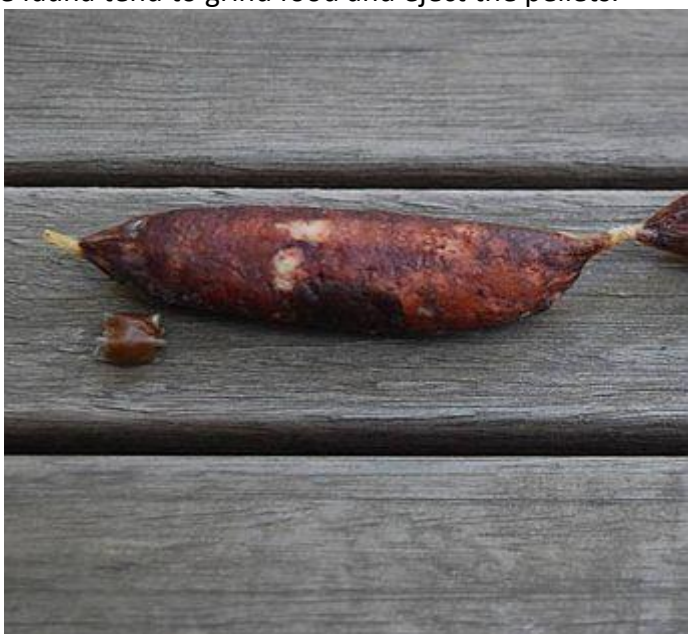
Baiting: Baiting is a common technique used for the control of foxes and wild dogs. Both species readily exhume poison baits, which are buried to reduce the risk of exposure to non-target species. However, feral cats do not easily locate and consume buried baits; therefore the use of any surface bait for feral cats must be undertaken in a way that does not result in poisoning of non target species. In order to overcome non target poisoning there has been considerable development of a highly specific toxicant and bait delivery method.

Exploiting a weak link in the physiology of cats: Michael explained that research has found cats are susceptible to a condition called methaemoglobinemia which prevents the transportation of oxygen throughout the blood stream. Cats are deficient against two key enzymes in the liver which protects other species from this condition. A compound, known as para-aminopropiophenone (PAPP) was identified as a potent and target-specific means of inducing rapid methaemoglobinemia in the cat thereby inducing a state of drowsiness, sleep and humane death.



Cats are susceptible to a condition called methaemoglobinemia which prevents the transportation of oxygen throughout the blood stream.

Research has been conducted to determine the dosage of (PAPP) required to induce death and to develop a means of ingestion which is not readily taken by native fauna. This work has built on knowledge that cats do not chew their food and can readily swallow pellets whereas most native fauna tend to grind food and eject the pellets.



Bait with Hard Shell Delivery System (HSDS) containing toxicant. Cats do not chew their food and can readily swallow pellets which are concealed in the bait.

Field trials

Michael spoke about 7 field trials which have been conducted since 2008 to measure the uptake of baits on feral cats and non-target native fauna across different habitats in Australia. Non-target species feeding behaviour trials have tested 22 species to date. These field trials are part of the field study required for APVMA registration. Michael elaborated on results from the Victorian studies conducted on French Island N.P. and Wilson's Promontory N.P. which involved monitoring the uptake of baits on a number of captured cats which had collars fitted and released into the wild. On French Island 6 of 8 (75%) collared cats died following consumption of bait. At Wilsons Promontory 4 of 8 collared cats died following baiting, however the bait efficiency was reduced due to heavy rainfall.

Field efficacy studies have been planned for the Pilbara in 2012.

Future activities

Michael said further studies (environmental toxicology, human safety etc) are required by regulating agencies. Approval has to be obtained for registration as 'Agricultural Chemical' before the product is released for use. A licensed manufacturer will also need to be appointed.

Michael spoke about deficiencies in current Victorian legislation which do not adequately recognise the issues related to feral cats and a need for their management.

Points from questions

- Research on alternative poisoning systems was discussed, in particular research on development of a delivery system where poison gel is applied to the back of a cats neck. This utilises the cats preening behaviour to ingest the poison, a behaviour which is not carried out by native fauna. Although effective, this control method might not be applicable for broad scale control over large remote areas.
- The uptake of Curiosity^{R} feral cat bait by foxes has been recorded and trials so far indicate it is likely to have a lethal outcome for foxes.
- It might take 2-3 years before the Curiosity^R feral cat bait has gone through all the regulatory approvals and is available for use.

Contact: Michael Johnston: Arthur Rylah Institute 03 4508600

Middle Island Maremma project - *David Williams, Biodiversity Officer, Department of Sustainability and Environment, Heywood and Kate McInnes, Warrnambool City Council*

David said Maremma dogs have been used in Italy for hundreds of years to guard livestock. Maremmas can be trained by introducing the species to be protected when the dogs are between 6 to 18 weeks old. He said the concept of using the Maremma to protect native species is a new concept. Maremmas are particularly suited to protecting small areas and are currently being used at two sites to protect coastal seabird breeding colonies; Middle Island, Warrnambool (Penguins) and Pt Danger, Portland (Australian Gannets).

Foxes decimated the Middle Island Penguin colony to between 2001 to 2005.

David explained that the Middle Island penguin colony has been under predation by foxes for many years but suffered a significant decline several years ago. The population fell from between 500 to 1000 breeding adults in 2001 to less than 10 penguins by 2005. This decline occurred despite efforts to control foxes at Middle Island by trapping, shooting and den fumigation.

The concept of using Maremma dogs to guard the penguin colony first came from a local who had been using Maremmas to guard poultry. The Warrnambool City Council established a steering committee and David ran a 4 week trial using Maremmas which began in 2006 with excellent results. The project has been extended several times as it is now proven that when Maremma dogs are present fox predation on penguins is prevented. Warrnambool City Council has been running the project for the last two years.

David said one of the main problems has been to prevent the dogs from wandering outside the desired control area. A virtual perimeter fencing system has been developed where the dog is fitted with a special collar that alerts the dog when it reaches a buried perimeter wire. This system has been working quite well but is still not as good as a visual perimeter fence.

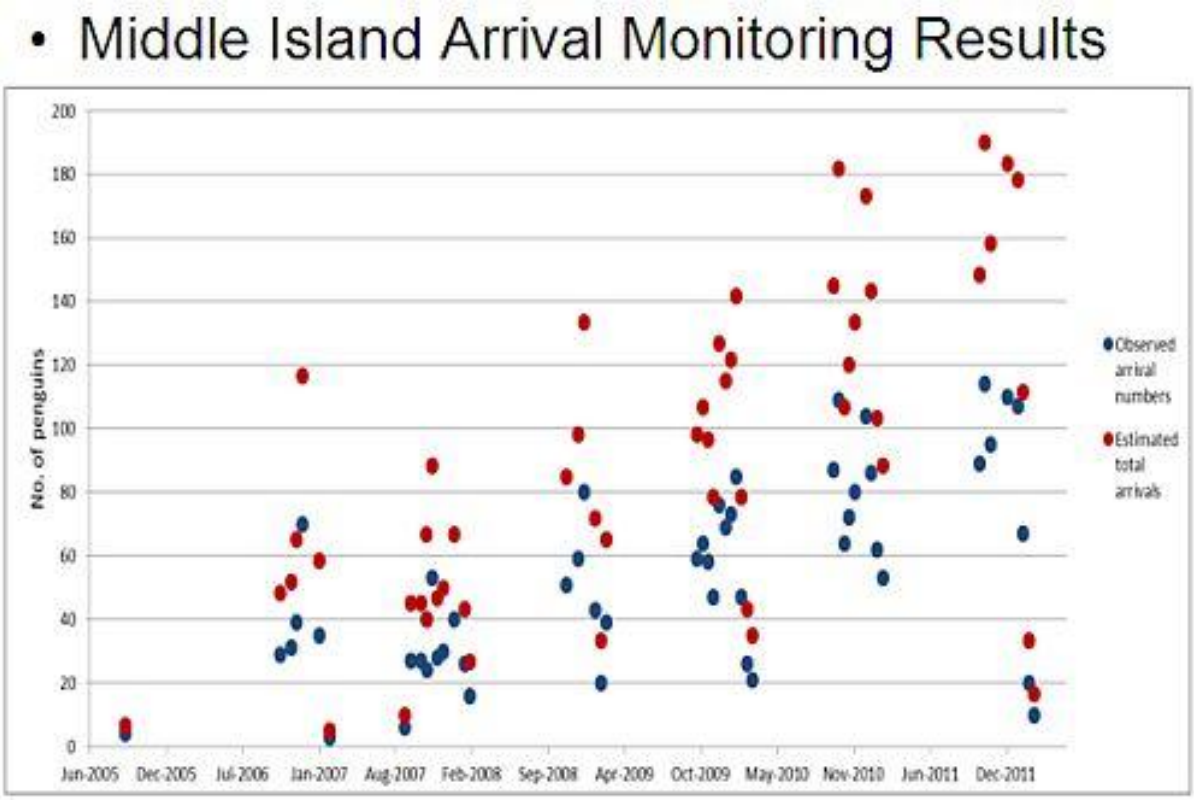
Kate said from a council perspective the project has been very successful. A robust monitoring program initially conducted by David and since carried out through the Warrnambool Coastcare Landcare Group has assisted greatly in quantifying results and conveying the positive results to council and the community.

There are still a number of challenges;

- ensure the project is sustainable into the future through on-going funding.
- managing the dogs.
- keeping the community engaged and managing community access to the island.
- ensuring on-going monitoring through volunteer involvement.

Monitoring

Chris from the Warrnambool Coastcare Landcare Group spoke about monitoring; in 2010/11 49 burrows were monitored, in 2011/12 60 burrows were monitored. Chris said the monitored penguin population is now 119 birds which is about 60% of the population on the island. This is a significant increase from the 10 birds in 2005. This breeding season there were 30 chicks monitored. Most nests had 2 eggs and there have been 2 breeding cycles. Many of the birds are now microchiped.



Arrival of Penguins at Middle Island - increases have been observed since commencement of the Maremma dog trials in 2006 (Blue dots = observed, Red dots = estimated numbers).

Interaction with fauna

David spoke about the interaction between Maremmas and other native fauna. He felt that with training and assimilation to the area there has been no negative impacts on other native species. The only non target problem he encountered involved using dogs that were not pure bred. It is important to only use pure bred Maremmas; there have been no problems with these.
David acknowledged the tremendous contribution from volunteers who have undertaken monitoring and helped to measure the project's success.

On guard protecting penguins at Middle Island from fox predation.

Points from questions

- There have been some recorded negative impacts with swamp wallabies at the Pt Danger site. The dogs don't actually attack the wallabies but can bail them up causing stress. Fencing wallabies out of the breeding colony will alleviate this issue.
- The dogs have a habit of picking up any dead animals and depositing them at a given point but these are animals that are already dead and can give the wrong impression to onlookers.
- It is important to imprint the dog when they are young with as many native species as possible within the range where they will guard.
- Observations indicate no behavioural changes to the movement of penguins around the island since the dogs have been present.
- Other fox control methods have been used in the past at Middle Is. but they were not effective enough to stop the attacks on penguins, whereas the Maremma dogs have been effective in revival of the penguin population.
- The Warrnambool City Council has been a major supporter of the project with on-going funding. It is important to market the success of the project to the community in knowing the penguins on Middle Island are being protected.

General discussion summary

- Large integrated projects such as the Glenelg Ark which harness support from a variety of land managers and community groups is an effective means of achieving funding which is necessary to ensure programs remain on-going.
- M44 injectors are a mechanical device for delivering a toxin to foxes when they exert an upward pull on a bait lever. They are used by NSW Parks and Wildlife and National Registration is being sought. A multi shot device is being developed for repeated use.
- The current method of using buried fox baits can impact on Quolls. The impact is more pronounced where quoll numbers are already low and where their habitat is more restricted.
- More education is needed to inform the community about feral cats and that feral cat control is not domestic cat control.
- Baiting in semi rural areas, particularly along the coastal areas is a problem due to the proximity of residences but there is no easy answer with baiting as unless more baits are put out than there are foxes then the success of such a control program is doubtful.
- Feral Cat density tends to be increasing in parts of Tasmania where the Tasmanian Devil is becoming scarcer.
- There is an urgent need to set up large scale trials involving the release of Tasmanian Devils into areas where they once occurred on the mainland. This could provide security for this species as well as studying their role in reducing populations of feral cats and foxes.

More SWIFFT video conference notes on a range of topics.

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