PROGRAM THREE - ECOLOGY & SYSTEMS MODELLING

PROJECT 3.4 WEST - PREY RESPONSE TO 1080 BAITING OVER LARGE AREAS

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Funding Sources
- Alcoa of Australia
- Western Australian Department of Commerce and Trade
- VB CRC

Project Objectives
Detailed research progress is shown against the project milestones:
- Determine the level by which fox populations need to be reduced to allow native fauna populations to increase and be sustained.
- Set the target for the fox population density reduction required by fertility control or by a combination of fertility control and conventional lethal control.
- Determine appropriate 1080 baiting regimes for large tracts of conservation estate and multiple use forest.
- Assess the importance of other factors which influence native fauna populations, specifically the role of other predators, including feral cats. It will continue to provide, greater understanding of the interaction between foxes, feral cats and native predators.
- Determine whether fox predation is the major limiting factor to native fauna abundance within the northern jarrah forest.
- Continue to refine procedures for estimating fox density.
- Provide additional information on the distribution of the suite of native fauna within the northern jarrah forest, including threatened species such as the chuditch.

Summary
There have been major advances in fox control in Western Australia. These advances have been achieved through the use of poison baits containing Sodium monofluoroacetate or 1080. The use of 1080 for fox control has led to the recovery of several fauna species. The most dramatic of these have been the recovery of the woylie, or brush tailed bettong (*Bettongia penicillata*) and the numbat (*Myrmecobius fasciatus*).

Prior to fox control, woylie and numbat populations were known to be at low densities and were restricted to very few locations. The woylie occurred at only 3 sites - 2 small wheatbelt reserves (Dryandra and Tutanning) and 1 forested area in the southwest of WA (Perup). The numbat occurred only at Perup and Dryandra. Initial research demonstrated numbers of both species increased when fox density was reduced. In the presence of fox control, the woylie is now common at Dryandra, Tutanning and Perup; has been translocated to several other sites; has had its geographic range extended and has been removed from the list of threatened species.

Similarly, the numbat is now commonly recorded at Dryandra and Perup and has been successfully translocated to several other wheatbelt reserves and forest sites.

Other species known to be advantaged from 1080 baiting for fox control include the black-footed rock-wallaby, chuditch, western ringtail possum and the common brushtail possum.

Fox control management programs are now in place at numerous sites within Western Australia to protect these and other species. The programs are based on sound research which has shown that fox control, through the use of 1080, results in a positive fauna response. It has further resulted in the development of a dried meat bait (4.5mg of 1080, or Sodium monofluoroacetate, delivered in a 60g piece of meat in a form unpalatable to non target species such as native marsupials) and determined the appropriate baiting intensity of 5 baits/km^2 which is now adopted as the standard/best management practice.

Based on this work, large scale fox control (Operation Foxglove – the northern jarrah forest VB CRC/CALM fox ecology research project 3.4) began in Western Australia in 1993.

The northern jarrah forest research and control program (VB CRC Fox Ecology Project 3.4)
The project is the first large scale fox control program undertaken in Australia. It will determine the level by which fox populations need to be reduced to allow native fauna populations to increase and be sustained. This is an essential component in achieving biological control through immunocontraception and will set the target for the fox population density reduction required by fertility control or required by a combination of fertility control and conventional lethal control. The results will also determine appropriate 1080 baiting regimes for large tracts of conservation estate and multiple use forest.

The project draws on the knowledge gained from 1080 research and is using 4.5mg 1080 dried meat baits. Bait delivery is from the air and from vehicles at a baiting intensity of 5 baits/km^2 over a total baiting area of approximately 440,400 ha. The total study site is approximately 544,000ha with the following treatments and control:

- 2 baitings per year: 221,400ha.
- 4 baitings per year: 130,400ha.
- 6 baitings per year: 88,600ha.
- Unbaited control: 103,500ha.

Additional baits are vehicle delivered at the interface with agricultural land.

Native fauna populations and fox densities are monitored.

The woylie was considered an indicator species for the suite of medium sized mammal fauna and has been translocated to 19 sites.

320 woylies have been translocated since January 1995. Approximately 40% of these were fitted with movement sensitive mortality radio-collars. The project is the first in Australia to use this type of telemetry which enables mortality events to be detected rapidly and the cause of death determined. This is essential when determining the predator responsible i.e. differentiating between fox, cat, chuditch, raptor, python etc.

Results to date have shown significantly higher levels of predation at the interface of forest and agricultural land. The program has clearly identified that increased fox control measures are required at the interface with agricultural land. The findings are applicable to fox control, whether it be by lethal baiting and/or fertility control.

The interim results from fox density monitoring are the first to show a relationship between fox density reduction and fauna response. The results have shown that where the maximum level of fox density reduction has been achieved (i.e. a 50% reduction within the most frequently baited

area) it has been sufficient to result in a higher level of woylie survivorship within core areas of the forest, but insufficient at the interface of forest and agricultural land.
The northern jarrah forest work has also highlighted the importance of addressing other factors that influence native fauna populations, specifically the role of other predators including feral cats. It has provided a greater understanding of the interaction between foxes, feral cats and native predators.

Future Directions 1997-9
See Proposals F 1.1-4, F3.1-2

Project Strengths and Weaknesses
Strengths
ANCA (now Environment Australia) recently prepared a draft Threat Abatement Plan (TAP) for the fox. The TAP recognised that Commonwealth funding for fox control should be determined on the basis of meeting the following criteria:

- where fox predation presents a high degree of threat to the continued survival of endangered or threatened species;
- where there is a good potential for recovery of native populations under a regime of fox control; and
- where a large scale program of fox control would be an efficient an effective use of resources allocated to conservation.

The northern jarrah forest project meets all criteria.

The intensity of the monitoring program has provided data at a level not previously recorded. It has dispelled the myth that foxes are not present in the northern jarrah forest and confirmed that fox predation on native mammals is significant in this forest type.

Is fox predation the major limiting factor to native fauna abundance within the northern jarrah forest?
The radio-telemetry monitoring incorporates several components and was designed to determine the following:

- Differences in woylie survivorship between treatments;
- Differences in survivorship within treatments, specifically to determine if there was a difference in survivorship between core sites and sites at the interface with agricultural land;
- The most appropriate baiting regime for large tracts of multiple use forest; and
- The level by which fox density needs to be reduced to allow native fauna populations to increase and be sustained.

Interpreting increases in woylie survivorship as a response to fox density reduction alone relies on the premise that fox predation is the single most important factor contributing to survivorship. As this can't be assumed, the program is also determining the following:

- The predator responsible for woylie and brushtail possum deaths attributed to predation;
- The native fauna abundance at 43 trapping grids within the study area; and
- The importance of habitat/management related variables (eg floristics, structure, fire history etc).

Incorporating information on the predator responsible for deaths attributed to predation and analysis (ANOVA) of site specific habitat data, trapping data and radio-telemetry data will enable assessment of whether fox predation is the major limiting factor to native fauna abundance.

Interaction with other Research and Management Programs
The woylie translocations to the northern jarrah forest have extended the species' geographical range and are recognised as an important contribution to the species recovery.

Monitoring of the northern jarrah forest sites has also provided a wealth of data on distribution and abundance of the chuditch, *Dasyurus geoffroii*. The work complements chuditch monitoring elsewhere and has provided data acknowledged in the chuditch recovery plan. The fox control within the northern jarrah forest is acknowledged as contributing to the recovery of the chuditch and the woylie.

The northern jarrah forest 1080 baiting/fox density research complements and facilitates research on the western ringtail possum, *Pseudocheirus occidentalis*, and the mainland quokka, *Setonix brachyurus*.

The northern jarrah forest project was the precursor to, and is a major component of, Western Shield, CALM's recently expanded fox control and fauna recovery program.

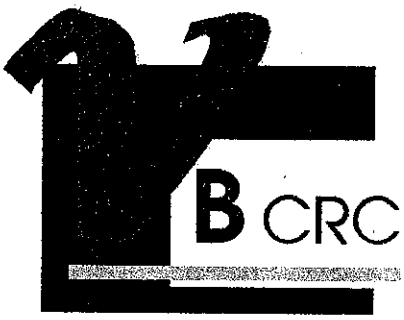
Additional Conservation Benefits
The scale of the project has resulted in conservation benefits. These include discovery of 3 new populations of the mainland quokka. Confirmation of the presence of these populations has extended the known range of the species on the mainland (publication now in preparation).
The large scale fox control program has facilitated the re-introduction/translocation of the western ringtail possum, *Pseudocheirus occidentalis*, to jarrah forest habitat from which it has become locally extinct.

Weaknesses
- The project has high operating costs (salaries, vehicles and radio telemetry equipment).
- Some subjectivity is necessary when interpreting deaths attributed to predation. When a mortality event is detected each retrieved carcass is thoroughly examined. Where possible, deaths thought to be a result of predation are attributed to a specific predator on the basis of the presence of particular features eg cached or partially cached carcasses, the component(s) of the carcass remaining etc.
- The issue of identifying the predator responsible is crucial to understanding the relationship between fox density reduction and fauna response. Less subjective methods are being pursued.
- Anecdotal accounts from arid areas of Western Australia indicate that cat numbers increase in the presence of fox control. This pattern has not been reported in forested areas or wheatbelt reserves in Western Australia where fox control has been undertaken. However, in these areas, control has been undertaken intensively and over small areas. No data exist on cat density in the presence of fox control over large areas. Within the northern jarrah forest many of the woylie deaths attributed to fox predation may be attributable to cat predation.
- Estimates of fox density rely heavily on an indirect technique (sandplotting) and have the potential to overestimate density/abundance. The technique (and others used to assess fox density/abundance) is continually being reviewed and refinements pursued.

Director's Comment
This is truly a major study of special significance to the CRC in that it is being undertaken jointly with CALM (WA), Environment Australia and Alcoa Ltd, the likely principal users of a fox fertility control bait in WA.

The experiment is of long term necessity and is only now beginning to yield field data on the level of fox control needed to protect existing native animal populations and allow re-introductions. The project will conclude in 1999.

COOPERATIVE RESEARCH CENTRE FOR BIOLOGICAL CONTROL OF VERTEBRATE PEST POPULATIONS



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FIFTH YEAR REVIEW