USE OF 1080 FOR RABBIT AND FOX CONTROL - MANAGEMENT TO MINIMISE HARMFUL EFFECTS ON NON-TARGET SPECIES.

NOTE: Presentations to the workshop and general discussions were conducted on an informal basis. None of the information contained in the presentations may be cited without the permission of the designated discussion leader.

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USE OF 1080 FOR RABBIT AND FOX CONTROL - MANAGEMENT TO MINIMISE HARMFUL EFFECTS ON NON-TARGET SPECIES

1080 baiting is widely used to control rabbits, and to a lesser extent, foxes. These baiting programmes may have harmful effects on native, non-target species. A workshop to discuss management methods of minimising these effects was held at Narrogin on September 2, 1986.

Workshop participants were :-

Mr A. Adrain, APB, Katanning Regional Officer

Mr Kenneth Atkins, CALM, Narrogin District Manager

Mr Frank Batini, CALM, Branch Manager, Environmental Protection

Mr Rob Brazell, CALM, Reserves Officer, Narrogin District

Mr Dan Donald, APB, Narrogin Regional Officer

Mr Steve Gorton, CALM, District Forester, Narrogin District

Mr Malcolm Graham, CALM, Reserves Officer, Katanning District

Dr Dennis King, APB, Research Officer

Dr Jack Kinnear, CALM, Research Officer

Mr Keiran McNamara, CALM, Scientific Adviser

Dr Tony Oliver, APB, Principal Research Officer

Mr Greg Power, APB, Cunderdin Regional Officer

Mr Laurie Twigg, recently completed PhD

Mr Ken Wallace, CALM, Wheatbelt Regional Manager

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A. INTRODUCTION (Ken Wallace)

1080 oat trails are routinely used to control rabbits on Nature Reserves and other wildlife conservation areas. This means of control is convenient and has advantages over other forms of control, such as ripping, because little or no damage to vegetation occurs. In more recent years 1080 has also been used in meat baits, particularly by Jack Kinnear's group, to control foxes. As everyone at this workshop is aware, foxes are one of several agents blamed for the population decline in a range of native fauna, particularly medium-sized species. Strychnine baits have also been used occasionally to bait foxes on Nature Reserves.

On the basis of current trends, baiting of both foxes and rabbits in wildlife conservation areas will increase. This is particularly so in the Wheatbelt Region given two points:-

1. There are many Nature Reserves (643) in the Region, and most of these are surrounded by cleared farmland. As the interface between pasture and bush may provide habitat favourable to rabbits, rabbit control is very important both from a wildlife conservation and our neighbours viewpoints. And of course control measures are legally required under the Agriculture and Related Resources Protection Act.

2. We have a variety of fauna in the Region which are demonstrably at risk from foxes - for example Rock Wallabies (Petrogale lateralis) and Numbats (Myrmecobius fasciatus).

As a consequence of these two factors, use of baiting can be expected to increase, perhaps dramatically, within the Region.

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While baiting is an effective and useful means of control, the danger to native, non-target species must be taken into consideration. This group includes species which are rare or of restricted distribution such as the Red-tailed Wambenger (Phascogale calura). Obviously those of us managing wildlife conservation areas have a responsibility to ensure that control programmes have no detrimental, long-term effects on populations of native fauna. This informal workshop was arranged with that objective in mind.

During the workshop the major issues to be addressed are:-

1. which non-target species are at risk, and under what circumstances?
2. what management strategies will minimise the risk to non-target species and protect habitats vulnerable to rabbit damage?
3. which topics require further research?

Hopefully, some of these questions will be answered today.

Before introducing our first discussion topic I will list what I believe to be the five broad strategies available to avoid the harmful effects of poison trails on non-target species. These are:-

1. Don't use poison baits.
2. Avoid baiting in habitats which contain species at risk.
3. Knowing behaviour of species at risk, devise techniques (e.g. dyed baits) which will prevent poisoning of non-target species.
4. Adjust dosage in baits to a level which protects non-target, but not target species.
5. Don't bait small reserves which contain species at risk, and bait only the boundaries of larger reserves.

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B. INTERPRETATION OF LD 50s FOR MANAGEMENT PURPOSES, AND WILDLIFE SPECIES AT RISK (Dr Dennis King)

In his presentation, Dr Dennis King discussed information presently available and raised a number of issues. Points included the following:-

- About ten years research has now been carried out on LD 50s for 1080. It has been found that 1080 is particularly toxic to canids and felids with, comparatively speaking, a fairly good margin of tolerance in the native fauna. Generally native fauna have developed some resistance to 1080 where native fluoroacetate-bearing plants are common (Figure 1), i.e. south-western Australia. In most cases studied, species in south-western Australia are far more tolerant to 1080 than their conspecifics in south-eastern Australia (e.g. Brush-tailed Possum).

- Some of the LD 50s for W.A. species (Appendix 1, pages 8 to 10) are based on very few animals, and there may be great variability between separated populations of the same species. In many cases this may be explained by differing exposures to fluoroacetate-bearing plants. Instances are also known where resistance to 1080 is markedly variable between populations. While these and other factors require that LD 50s be interpreted cautiously, most native fauna within the wheatbelt should have been exposed to fluoroacetate-bearing plants and therefore have developed some resistance to 1080. Consequently many animals in the wheatbelt should not be at risk from either 1080 oat trails or meat baits.

- Over the next 12-18 months the APB will be reviewing baiting programmes and a number of practices may be changed. These include:-
  (a) dosage levels in individual baits; and
  (b) ratios of poisoned to normal oat grains.
  Any changes along these lines will be aimed at decreasing the risks to non-target species.

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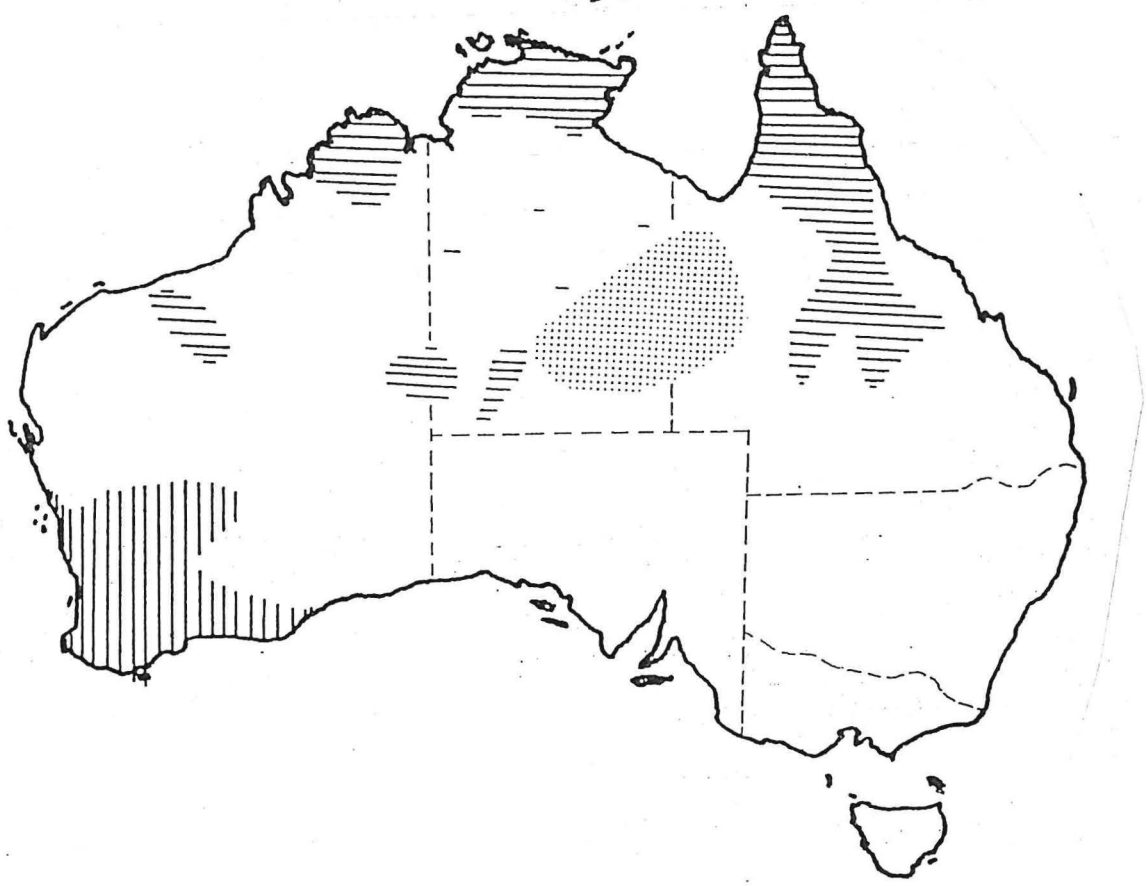

Figure 1: Distribution of fluoroacetate-bearing vegetation in Australia.

Vertical lines: 33 toxic species of Gastrolobium and Oxylobium

Horizontal lines: Gastrolobium grandiflorum

Stippled area: Acacia georginae

Thirty-three of the 35 species in Australia known to produce fluoroacetate are confined to the lower south west of Western Australia and these species may contain between 100 and 2650mg fluoroacetate kg^{-1} air dried sample (Aplin 1971). Air dried samples of G. grandiflorum (McEwan 1964) and A. georginae (Oelrichs and McEwan 1962) may contain up to 185 and 25mg fluoroacetate kg^{-1}, respectively.

Species of Oxylobium are known to occur in Victoria and New South Wales, but none has been demonstrated to contain fluoroacetate, and there have been no confirmed reports implicating them in the poisoning of domestic livestock.

Distribution after: Aplin (1971; and pers. comm.)
Bell et al (1955)
Everist (1947)
Jessop (1981)
R.W. Johnson (pers. comm.)
B. Maslin (pers. comm.)

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LD 50s are affected greatly by ambient temperature.

An LD 50 for the native rodent Pseudomys occidentalis was raised as of management interest in the wheatbelt.

APPENDIX 1

W.A. SPECIES TESTED

Species	Approx. LD.50 (mg/kg)	Mean wt. (g)
Bettongia penicillata	> 100.0	1300
B. lesueur	10 to 20	≈1300
Lagostrophus fasciatus	> 100	2100
Lagorchestes conspicillatus	> 3.0	4500
Setonix brachyurus	≈10 to 50	3600
Macropus rufus	~ 5.0	66000
M. fuliginosus	~ 40.0	53500
M. irma	5.0 to 10.0	8000
M. eugenii	2-5 to 10 E	7500
M. agilis	~ 0.2	19000
M. robustus	≈ 2.0	46500
Petrogale lateralis	> 0.5	5100
P. rothschildi	> 2.0	5250
Trichosurus vulpecula	> 100.0 E	≈2500
T. arnhemensis	> 6.7	1600
Pseudocheirus peregrinus	≈2.0	1100
Cercartetus concinnus	> 10.0	13
Dasyurus hallucatus	≈ 7.5	650
D. geoffroi	7.5	1300
Phascogale calura	15.0	60
Antechinus flavipes	≈ 10-12.5 EU	56
Sminthopsis ooldea	> 3.0 LLL	11
S. hirtipes	> 4.0 LLL	16
Ningaui ridei	2.0 to 3.0 LLL	13
N. timealeyi	≈ 2.0	9.4
Isoodon obesulus	20.0 EU	850

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It has been shown that factory baits are preferred to meat baits by small native rodents and dasyurids. Conversely, target species prefer fresh meat baits. With respect to dingo baiting programmes, it is proposed to use fresh meat baits (400g) which are larger than those currently used. This, combined with placing baits away from water courses, should protect most/all non-target species at risk.

As it is difficult to make factory baits larger than 6-9g, fresh meat baits provide a better option for making baits too large for small native rodents and dasyurids.

- Future research needs include:-
  (a) LD 50s on species such as the Mallee Fowl and Echidnas, noting that the latter eat eggs in captivity and may therefore be at risk from baited eggs;
  (b) LD 50s on passerine birds - however such research is difficult; and
  (c) field food intake of animals as well as laboratory rates. Currently ingestion rates are based on the latter, and these may differ from field rates.

Discussion

Next LD 50 testing programme will begin in October, CALM should let research group know of species we're interested in. Even if CALM can supply animals, this may or may not fit in with the current programme. Should note that for species with a body weight greater than 35g, susceptibility can be assessed using the citrate method and only about 6 animals are needed; for smaller species about 20 animals or more are needed.

While it is possible to divide native species at risk into "yes", "no" and "maybe" categories, more research is needed.

More amphibians may be tested for tolerance to 1080.

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INTRODUCED PEST SPECIES

Species	Approx. L.50 (mg/kg)	Mean wt. (g)
Oryctolagus cuniculus Rabbit	0.46	2000
Sus scrofa Pig	M 1.00	115000
Canis familiaris Dog	M 0.11	19400
Vulpes vulpes Fox	≈ 0.13	8300
Felis catus Cat	M 0.40	6200
Rattus rattus Rat	M 0.76	280
Rattus norvegicus	M 0.22 to 0.50	320
Mus musculus House mouse?	12.8	25

M = done by McIlroy

E = Values also obtained for this species in southeast

EU = Eastern values obtained by us

LLL = lowest lethal level

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C. BAITING TO PROTECT WILDLIFE (Dr Jack Kinnear)

Following notes are taken from Dr Kinnear's talk.

Fundamental Objectives of Conservation

- Help species maintain populations
  1. Failure to do so will lead to extinction.
  2. May have profound consequences as loss of species leads to a loss of ecosystem services, e.g. loss of trees may lead to increased salinity and erosion.

- For a population to be ecologically robust, it must possess the following properties:-
  1. An "adequate" age structure.
  2. Genetic variability.
  3. Population number must be equal to, or greater than, the minimum viable population number.

Factors Affecting Populations

- Fragmentation
  1. Wheatbelt reserve system consists of vegetation remnants.
  2. Island biogeography theories provide some basis for predicting effects of fragmentation, but more research is needed.

- Loss of ecosystem services; must be able to recognize losses and potential losses of services.

- Disservice Factors
  1. Intrinsic - climate, fire, flood, cyclones, drought. Presumably native species are adapted to these natural factors, but are now less capable of coping with them given the following extrinsic factors:

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2. Extrinsic - direct and indirect caused by man; for example fire, exotic species, agriculture. Need to examine problems arising from extrinsic factors - perhaps these problems are the most pressing and have been under-rated in the past.

Role of Research

- Identify species and populations at risk.
- Determine causes.
- Devise/recommend remedies (if feasible).
- Interact with management.

Role of Management in Maintenance of Populations

- Provide
  1. Service substitution where natural ecosystem services lost.
  2. Protection from a disservice - counter, negate, nullify.

- Management is in the Business of Ecosystem Welfare
  1. Subsidies required, e.g. to control exotic species.
  2. Restore ecosystem services, if possible.
  3. Replace subsidies through biological control.

A Species at Risk - Case History of the Rock Wallaby in the Wheatbelt

- Six remnant populations in the south west, once widespread.
- Some recent populations have become extinct.
- Other recent populations in decline.

- Research revealed
  1. Population fit and healthy, drought resistant.
  2. Reproductive level high.
  3. Adult survival high.
  4. Population small and static.

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- Therefore Unknown Source of Mortality - Predation?
  Circumstantial evidence implicated fox predation.
  Fox predation hypothesis put to test:-
  a. Two Rock Wallaby populations - fox subject to control measures.
  b. Three Rock Wallaby populations - no fox control.
     No fox control on Sales Rock, Tutakin and Querekin; fox control on Mt. Caroline and Nangeen. Results shown in Figure 2.

From Figure 2 it can be seen that there is a strong link between fox control and recovery in population numbers of Rock Wallabies.

During work at Nangeen a number of bait types were trialled. Some APB baits were not taken by foxes at Nangeen, but eggs and meat baits were found to be satisfactory. Eggs, being water-proof, are very good for baiting during winter.

Crows taking egg baits is no greater problem than is the case with meat baits.

At Mt Caroline Nature Reserve one poisoned egg every 50 metres, laid once a month on the perimeter firebreak, resulted in an increase in Rock Wallaby numbers.

There is evidence from the Nangeen work that about two Euros were killed by 1080 oat baits. While Western Grey Kangaroos did not appear to be affected by 1080 oats trails, evidence from track counts confirms the popular belief that APB rabbit control kills foxes (Figure 3b). Figure 3a shows that "one shot" baiting for rabbits is quite effective, with a 70-80% reduction in track counts for rabbits. Effects on non-target species (mainly birds) not known and deserves study.

Future Research

- Bait preferences.
- Baiting frequency.
- Optimization of control procedures.

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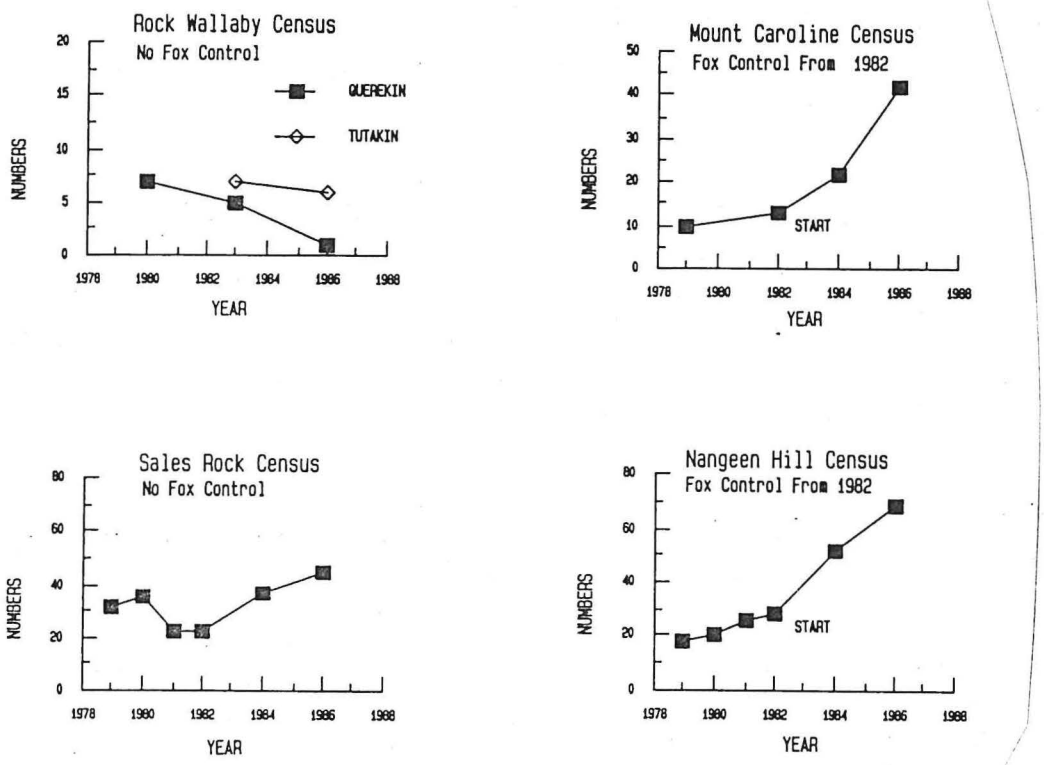

Figure 2: Rock Wallaby Census Data in Relation to Fox Control.

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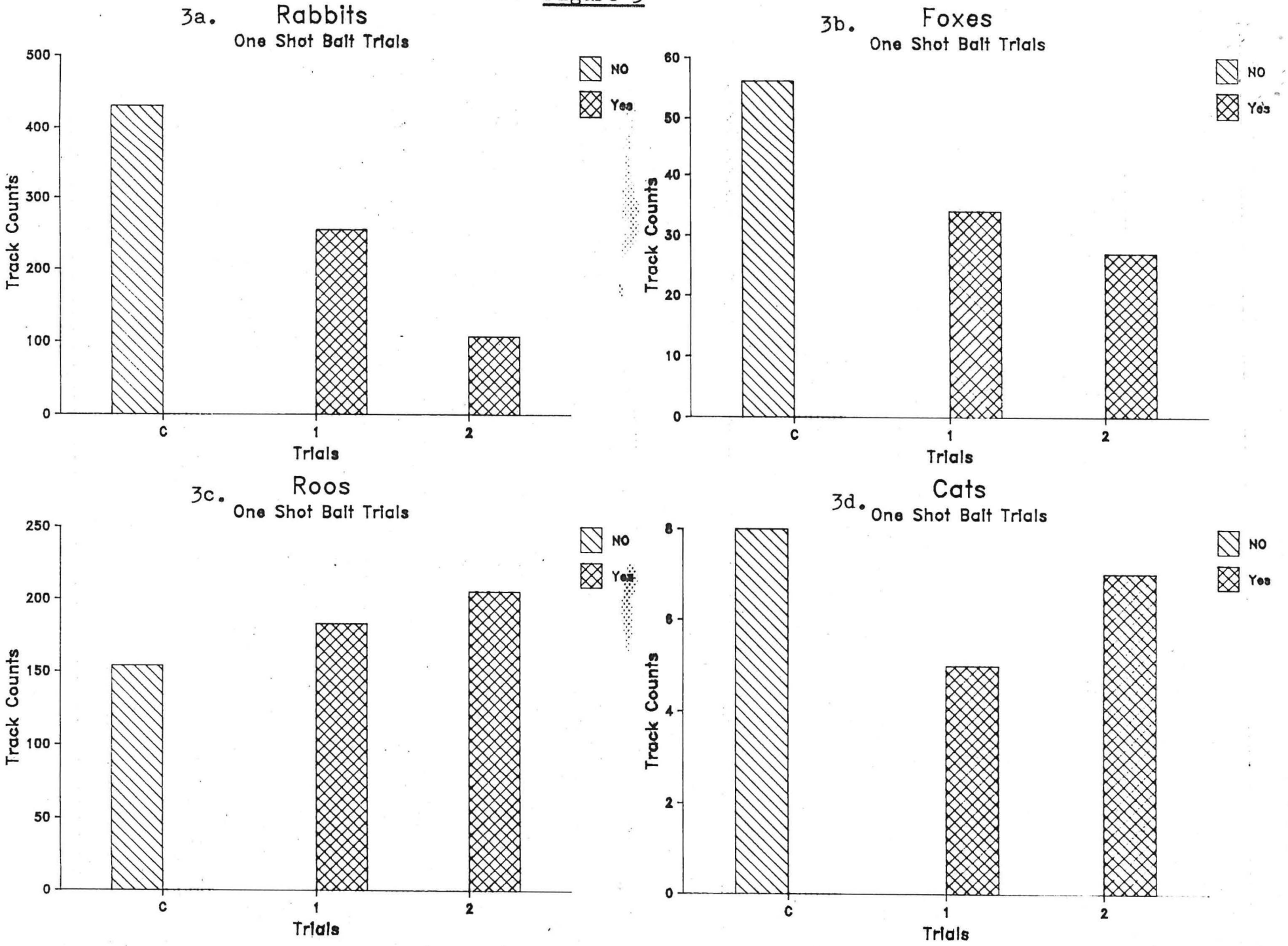
Figure 3


3a. Rabbits
One Shot Bait Trials
Track Counts
500
400
300
200
100
0
C
1
2
Trials
NO
Yes
3b. Foxes
One Shot Bait Trials
Track Counts
60
50
40
30
20
10
0
C
1
2
Trials
NO
Yes
3c. Roos
One Shot Bait Trials
Track Counts
250
200
150
100
50
0
C
1
2
Trials
NO
Yes
3d. Cats
One Shot Bait Trials
Track Counts
8
6
4
2
0
C
1
2
Trials
NO
Yes

- The area problem
  National Parks.
- Biological Control Lobby - national level.
  Biological control is possibly the only long-term answer to cost-effective control of exotic species such as the rabbit and fox. Genetic engineering and other advances in science and technology increase the probability of finding, or making, appropriate pathogens.

Discussion

Jack Kinnear's study is the only direct research evidence that fox predation may have a significant effect on the population dynamics of native fauna. However further evidence for this effect is very strong, or at the least, suggestive. Such evidence includes:-

(a) inverse relationship between presence/absence of native fauna and presence/absence of foxes on islands;
(b) Ph D work of Dr Alex Baynes;
(c) historic evidence from Shire of Albany linking appearance of foxes and decline of native mammals; and
(d) Dr Per Christensen's Ph D work.

It was stressed that one implication of Jack Kinnear's work is that large-scale fox baiting programmes will be required, at least on selected wildlife conservation areas. This will place a significant resource burden on managers if implemented.

Research has shown that rogue foxes, rather than all foxes, cause most problems with lamb predation. Perhaps this also applies to fox predation on native fauna. No-one could suggest a means of identifying rogue animals.

D. HABITATS AT RISK FROM RABBITS (Kenneth Atkins)

Declared animals may cause habitat degradation in the Wheatbelt Region, but in most cases this is minor (eg. foxes), or localized (eg. pigs and goats), and thus is not considered to be placing habitats at risk.

Habitat degradation by rabbit activity however can be to such a degree as to place certain habitats at risk. This can occur in several ways: by direct site destruction and clearing due to burrow/warren construction; by herbivory in the form of grazing native plants, grazing regeneration, and digging up roots; and by promoting weed invasion, either by opening the canopy and disturbing the soil, or by the introduction of seeds in faeces.

Habitats which may be seriously degraded by rabbit activity are by definition those habitats in which rabbits are most frequently found. This is largely controlled by soil type, with the more friable soils suiting burrow construction. Large rabbit populations in the wheatbelt are found associated with the alluvial/colluvial soils of river, streams or lakes systems; the granitic soils around granite outcrops; the yellow, grey etc. sands of some types of kwongan; and some friable soils in the lower landscape, in particular the york gum-jam communities.

While the york gum-jam and other lowland woodland communities have the potential for serious degradation by rabbit activity, in practice this is not realised. The lack of understorey shrubby species in the natural vegetation community means that vegetation destruction is not so obvious, with the annual weed cover providing winter and spring forage. The open and relatively flat nature of these areas, and their close proximity to cleared farmland arising from the preferential farmland development of these communities also assist control measures which prevent serious degradation occurring.

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Similarly the areas of kwongan vegetation do not appear to have widespread degradation. Whilst warrens cause localized damage, they tend to be isolated. It is not known why this is so, but the soil depth and scattered arrangement of these communities may be contributing factors.

One example where habitat degradation in a yellow sand area is placing that habitat at risk is a population of the rare Banksia cuneata in the Brookton Shire. Rabbit activity is not causing direct degradation, but the soil disturbances are allowing veldt grass invasion which, if not controlled, will affect regeneration and cause a fire hazard.

Granite outcrops and their associated vegetation offer ideal situations for rabbits. The soils are suited to burrow construction while the rocky areas provide further cover. The vegetation immediately surrounding the rocks is usually quite dense offering concealment, while the annual and ephemeral vegetation on the granite rocks provide a food source.

Habitat degradation in relation to granite rocks is caused by direct grazing and the introduction of weed species through faeces and ground disturbance. The invasion of weeds is obvious, but the effect of grazing is harder to quantify since most granite rocks are affected by rabbits and therefore there is no control for comparisons. This is an avenue for research using simple exclusion areas.

One instance where rabbit effects has been noted is at Lake Hurlstone Nature Reserve in Kulin Shire where the rare, bulbous, Drosera graniticola was reported to have been dug up, possibly by Japanese horticulturalists. An inspection revealed that this was in fact rabbit activity with, I gather, the rabbit diggings resembling weathered trowel marks. Thus this population of rare plants was under threat from rabbits, and it can only be assumed that this has occurred elsewhere and in relation to other species.

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Of the habitats with potential for serious degradation the lakes systems seem most at risk. These areas often form long chains and are relatively inaccessible, making control difficult. The deep sands and open vegetation of these areas favours warren construction, and hence habitat destruction.

A major problem associated with rabbits in these areas is plant regeneration. Natural rehabilitation of areas affected by salt relies on seed regeneration of more salt resistant species or varieties. Rabbit grazing can severely retard this regeneration. A compounding problem is that these habitats are often restricted to narrow fringes about the rivers or lakes and therefore the rabbit activity is concentrated.

So, what can be done to prevent the degradation of these habitats by rabbits? You are familiar with rabbit control techniques, and so there is no need to go over them here. What I will do is outline some of the problems encountered, and possible management options.

Environmentally sound biological control is ideal, but with myxamatosis losing its effect, and the rabbit flea being unsuited to the drier areas, there does not appear to be any effective biological control available. I would be happy for any comment or update on this.

Warren destruction is an effective means of reducing rabbit populations. To destroy the warrens by conventional means, such as ripping, also causes localized site destruction. This is especially important in sandy heath areas where the centre of the warren is bare, but individual burrows extend out into the existing vegetation. To effectively rip these warrens the fringe vegetation must also be affected.

Warren ripping can also only be undertaken where there is access for the appropriate machinery. This precludes such work in many lowland, water-affected areas and granite outcrops.

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Even where access is possible, track construction may cause site disturbance and/or result in subsequent public or illegal usage. All factors which can further deteriorate the reserve.

Other methods of warren destruction are therefore sought. One possibility which we are keen to trial is the use of explosives. It is envisaged that the charge will be set to blow downwards and thus collapse the warren, rather than blowing it up. This will then, hopefully, have the least effect on the vegetation about the warren, while killing rabbits, disrupting breeding, and destroying the warrens, with less access problems. To date I only know of this technique being used in open paddocks, but I would be interested in any comments.

The laying of 1080 oats is a well proven rabbit control method. As was mentioned earlier however, access is a major problem with the two habitats deemed to be most at risk - the lakes and the granite outcrops. Where access has been forced, as has been observed on some of the granite outcrops in the Westonia Shire, site degradation has occurred on these fragile habitats, and so it can be questioned as to whether access of this nature should be allowed. However the rabbits still need to be treated.

An alternative means of spreading the oats might be by hand, but I think everyone here will agree that this is impractical. Because of this problem, it was with some interest that I heard of the aerial baiting programme being trialled at Lake Mollerin.

Aerial baiting appears to overcome many of the problems associated with rabbit control on the extensive areas of salt lakes and inaccessible granite outcrops. It will allow widespread coverage and will not result in physical habit disturbance. I would therefore appreciate a comment by those present on this trial operation and your views on its application on a wider scale.

The use of aerial baiting does, however, pose new problems for reserve management. In the past, baiting of these larger areas has been limited to around the perimeter and along major roads. Thus core areas have been maintained that have not been baited.

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What is required, I feel, is a faunal survey of these core areas and comparison of them with the periphery of reserves, and to assess the susceptibility of species to such baiting. On granite outcrops, for example, Pseudomys occidentalis may be found, and could be endangered by widespread baiting of these areas.

Discussion

Discussion centred on biological control, an issue which was raised by both Jack Kinnear and Ken Atkins.

Currently CSIRO is researching new strains of myxomatosis, but no other control agents are being examined. While research in areas such as genetic engineering may provide the technology to develop biological control agents for foxes and rabbits, this is unlikely to occur within the next 20 years given:-

(a) the lack of economic pressure for such developments, i.e. the agricultural industry has adequate control measures already; and
(b) the detailed, and therefore lengthy, degree of testing necessary before biological control agents can be released.

There was disagreement over whether or not biological control agents would be developed within 20 years, and the general feeling was that such developments would not occur.

It was pointed out that CALM responds positively when asked to verbally support biological control and that funds may be allocated for research in the longer term.

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E. ACTS AND REGULATIONS (Keiran McNamara)

Legislation pertaining to CALM's role largely is found in the Conservation and Land Management Act and the Agriculture and Related Resources Protection Act. CALM has an obligation to undertake control activities under the latter Act, however the Department's approval is required for any control activities within Nature Reserves, National Parks and State Forest.

Discussion

There is still a possibility that anti-1080 sentiment in the U.S. may spread to Australia. The relationship between 1080 and the native, south-western fauna needs to be clearly explained to the public and "conservation groups". Agriculture memos were suggested as a vehicle for getting information to the rural community.

Use of 1080 for baiting by other than APB staff is problematic even though it is permitted under the Act. APB policy is that 1080 should only be used by APB officers in the south-west.

The need to review the control category of the rabbit was raised.

A committee consisting of government bodies involved in land management was proposed - suggested objective of this committee was to provide a concerted approach to declared animals on government land. However, it was pointed out that APB Zone groups perform this function. The need to strengthen liaison between regional officers of CALM and the APB was emphasized.

Need for representative of CALM on the Agriculture Protection Board was raised.

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F. GENERAL DISCUSSION

1. Alternatives to Use of 1080

(a) Use of explosives to destroy warrens: is an effective method, but elaborate and expensive compared with other methods. NSW Department of Agriculture have written an article on use of explosives.

(b) Use of fumigants: information by Oliver and Blackshaw (1979, Australian Wildlife Research 6: 39-55) on fumigants still up-to-date.

(c) "Tar-baby" Technique: may be useful in specific habitats, further information through APB.

(d) Myxomatosis: effective in many areas, should be noted that some people have been spreading stick-fast fleas from rabbits rather than European fleas. Essential that identity of fleas is checked. There would be value in spreading more European fleas.

(e) New Methods of Biological Control: discussed previously, no obvious developments in this area.

(f) Warren Ripping: suitable when habitat damage negligible.

(g) Habitat Manipulation: for example use prescribed fire to remove vegetation cover for rabbits living on surface. Could be useful technique in specific instances, and is currently used, e.g. where heaps of vegetation left from firebreak construction.

(h) Fence areas being damaged by rabbits: e.g. small plots of rare flora.

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Baiting, including secondary poisoning, is the only method of fox control apart from shooting. Given the effectiveness of rabbit baiting, use of 1080 oat trails will continue on wildlife conservation areas, often in conjunction with one or more of (a)-(h) above.

2. Management Strategies to Minimise Effects of 1080 on Non-Target Species

(a) Don't use poison baits, i.e. use one of the alternatives listed above.

(b) Avoid baiting in habitats which contain species at risk, e.g. no meat baits should be laid in Sheoak (Allocasuarina huegeliana) habitat where the Red-tailed Wambenger (Phascogale calura) may occur.

(c) Knowing behaviour of species at risk and target species, devise baiting techniques which protect species at risk. Examples include:

(i) timing of baiting to avoid periods when non-target species are feeding;

(ii) present baits which pest species like, non-target species don't, e.g. use fresh meat baits rather than factory baits; and

(iii) put baits in a position where they can't be seen or eaten by non-target species, e.g. birds' sense of smell is less well-developed than that of foxes, therefore put baits under low vegetation where they can't be seen by birds.

(d) Adjust dosage in baits, or ratio of poisoned/unpoisoned grain in the case of oat trails, to a level which protects non-target but not pest species. (Bait ratios are being examined by the APB.)

(e) Don't bait small reserves which contain species at risk, and bait only the boundary of larger reserves.

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It was generally agreed that strategies and control methods used will be selected to fit particular situations.

3. General Points

A feasibility study of aerial baiting for rabbits is being conducted by the APB. By this technique oats are spread at the rate of 20 kg/km with a swathe width of about 5 metres and grain concentrated within the central 2 metres. Bait used is one-shot 1080 with 1% of grains being poisoned. Approximately 5 poisoned oat grains are laid for every 1 metre length of swathe. Project due to finish in February 1987, and results so far are encouraging. This technique may prove suitable for Nature Reserves which include extensive salt lakes, and also for granite rock areas. There doesn't seem to be any evidence of broadcast oats reproducing and invading bushland areas. However, if the technique were to be used on Nature Reserves, then oats uncontaminated by weed seeds would be essential.

Use of bait stations and free-feeding/baiting strategies may lead to more effective control.

There is no evidence that 1080-resistant rabbits will occur, and they are most unlikely to occur given the high dosage level in poisoned oats.

Although research into which fauna will eat baits, and under what circumstances, is important, such research is labour intensive and therefore very expensive.

The chronic effect of 1080 on some animals should not be overlooked. Chronic effects include suppression of reproduction and are potentially very damaging.

Lists of non-target species most at risk from 1080 baits would greatly assist management and selection of species for testing.

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A priority list of fauna most at risk from foxes is required to enable effective allocation of resources. Overall funding priorities must also be closely considered.