AN ASSESSMENT OF THE THREAT TO VERTEBRATE FAUNA OF UN-CAPPED DRILL HOLES IN THE RAVENSTHORPE RANGE.

A pilot project for THE MINES DEPARTMENT OF WESTERN AUSTRALIA.

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INTRODUCTION.

This project arose from local concern about the perceived threat to fauna of un-capped drill holes for geological exploration in the Ravensthorpe Range. Additionally, since pit trapping became a widespread technique of wildlife survey in W.A. in the early 1970s, there has been speculation among wildlife biologists whether drill holes could be functioning as pit traps. This speculation is appropriate because of the very effectiveness of pit-trapping and the fact that a wide range of vertebrates ie mammals, reptiles and frogs are frequently trapped, and birds and even bats are occasionally trapped. A previous fauna survey Chapman and Newbey (1988), using pit-trapping in the Range, identified two mammal species gazetted rare and endangered, Pseudomys occidentalis and P. shortridgei, Anon (1983), which were considered potentially threatened by drill holes.

METHODS.

Drill holes were vacuumed out with cordless Makita Hand Vac 11 vacuum cleaners. Thirty two mm external diameter 'Harditube' electrical conduit was used as extensions. This system was tested on dry, dis-articulated bones of mammals Pseudomys albocinereus, P. occidentalis, P. shortridgei, Sminthopsis granulipes, S. griseoventer, Rattus fuscipes and Cercartetus concinnus. These bones could be vacuumed vertically 8.0 metres.

In the field a 10 - 15 second 'suck' yielded 4.5 to 47.0, mean 31.7 $\pm$ 13.5g of damp to dry earth with or without bones, hair or scales or live fauna. If any of these were recovered in the first recovery then a second or third was done. The heaviest gravel particle recovered weighed 8.5g. In practice, due to difficulty experienced in joining and recovering extensions few holes deeper than 4.5 m were vacuumed.

Mr Colin Bennett, formerly geologist in charge for Pickands - Mather International (P M I) accompanied me in the field and advised me of places and times of his companies exploration in the Ravensthorpe Range. A. Baynes identified mammal bones. Field time occupied six days in September and October 1987.

RESULTS.

Four separate areas were examined :-

a) Mt Chester to Mt Desmond.
b) 'Mosaic' area, Jerdacuttup River.
c) Bandalup Hill.
d) Mt Short.

a) In the Mt Chester - Mt Desmond area extensive exploration with grid lines and percussion drilled holes was undertaken in late 1984, early 1985. Of 165 holes examined 35 (21%) were too deep ie > 4.5m, 7 (4%) had water in them, and 5 (3%) had completely collapsed. Thus 118 holes 0.4 to 5.4, $\bar{x} = 3.3 \pm 1.4$m deep were vacuumed of which 29 (25%) yielded vertebrate remains or live fauna, as follows:-

	REMAINS	ALIVE.
MAMMALS	15	0
FROGS	4	8
REPTILES	0	1

Note that the 'remains' data refer to samples, not necessarily individuals. The mammals Tarsipes rostratus (15 individuals) and Cercartetus concinnus (3 indiv.) were identified from bone material.

The frogs Psendophryne guentheri, Limnodynastes dorsalis, Ranidella psendinsignifera, Heleioporus albopunctatus and the reptile Hemiergis peronii were recovered alive.

b) In the 'mosaic' area PMI augered soil sample holes to a maximum depth of 1.0m on a grid pattern in 1971 - 72. All these holes had collapsed, and could not be located.

c) The Bandalup Hill area was percussion and diamond drilled in 1968 - 69. Only few holes could be located, one was > 30.0m deep, two; 2.3m, 2.1m deep yielded NIL.

d) In the Mt Short area a grid line which was drilled circa 1971-73. had 35 holes. of these 16 (48%) had completely collapsed, 14 (40%) were too deep (5.3 to 30.0m) 5 were vacuumed, 4 with a NIL result, one yielded frog bones.

DISCUSSION.

The results of this pilot trial indicate that the small vertebrate species do indeed fall into un-capped drill holes; however the rate of capture appears very low compared to pit traps (even those set without a drift fence). For example, if the 118 holes vacuumed at Mt Chester - Mt Desmond are treated as pit traps set for a 3 year period resulting in 129, 210 pit trap / nights, (ie 118 x 365 x 3) the capture rate for Tarsipes rostratus is 0.0116 animal per 100 trapnights. This compares with a figure of 5.97, Tarsipes per 100 trapnights for pit traps set without a drift fence in Fitzgerald River National Park, (Chapman, 1987).

In the Ravensthorpe Range at least, two opposing situations apply. Recent drill holes have a very low rate of accumulation explained perhaps by the reluctance of small fauna to venture into the open spaces resulting from the grid line. By the time the grid line has re- grown to provide cover, ca 10 - 15 years, ca 50% of the holes have completely collapsed. Indeed the major difficulty of this trial was finding sufficient older holes (>10, ≤20 years) which had not collapsed.

identification of bone material indicated only the presence of Tarsipes rostratus and Cercartetus concinnus; the former outnumbered the latter by 5:1. This result, and the apparent lack of other mammals particularly rodents, is explained by the fact that Tarsipes is unusual among mammals in being practically clawless; its climbing ability is dependent upon grasping with opposable thumb and toe. This disparity led to the hypothesis which could be experimentally tested that small fully clawed mammals were climbing out of drill holes. Live specimens of the mammals Rattus fuscipes and Pseudomys occidentalis were placed at the bottom of a drill hole only 1.1m deep, 10cm in diameter with relatively smooth sides. In less than five minutes in both cases these animals climbed out.

The extremely low rate of capture for old drill holes at Mt Short should be interpreted with caution because of the possibility of sub-surface collapse obscuring and sealing in any accumulated remains. THIS FACTOR IS OBVIOUSLY A MAJOR DEFICIENCY IN THIS TRIAL AND SUGGESTS THESE ENTIRE DATA MAY UNDERSTATE THE REAL RATE OF FAUNA ACCUMULATION.

CONCLUSION.

This pilot study indicates that a wide variety of small vertebrate species do indeed fall into geological drill holes in the Ravensthorpe Range. Frogs are most susceptible; some mammals are capable of climbing out of drill holes. The overall rate of capture is very low; for example pit traps set without a drift fence are approximately 600x as likely as geological drill holes to trap Tarsipes rostratus.

It should be borne in mind that these results may not apply elsewhere in different situations. For example, drill holes with a casing cut off flush with ground level would show a very different result. I don't believe that these results exonerate miners from their responsibility to plug drill holes. If this is done at the time of installation it would not add substantially to the cost of the operation.

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