

Appendix 1.

**IMPACT OF 1080 ON  
WETA POPULATIONS**

**INVESTIGATION NO: S5020/560  
CORPORATE OBJECTIVE NO:**

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**EXECUTIVE SUMMARY (FINAL)**

**INVESTIGATION NO: S5020/560  
CORPORATE OBJECTIVE:**

**INVESTIGATION TITLE:** Impact of 1080 on weta populations

**STUDY VENUE:** FRI, Rotorua

**INVESTIGATION LEADER:** John Hutcheson

**INVESTIGATION STATUS:** Completed

**CLIENT:** DOC

**INVESTIGATION SUMMARY:**

A project to investigate the susceptibility of weta to 1080 poison was conducted under the loop funding scheme for the Department of Conservation. Doc contributed 60% of costs.

Common tree weta were offered grain based 1080 treated possum baits. Baits were attractive to weta and caused lethal and sublethal poisoning. Sublethal poisoning disrupted diurnal rhythms making the weta active during daylight hours.

**OBJECTIVES:**

To see if common weta (Hemideina thoracica) were affected by grain based baits treated with 1080 compound as used in possum control operations.

**METHODS:**

Caged weta were offered 1080 treated pellets in addition to palatable foliage in the laboratory.

**RESULTS:**

Weta fed readily on both non-toxic and toxic baits while they were relatively dry.

When baits became wet they rapidly became infected with mould, and within two days they became unattractive to the animals.

All weta offered toxic baits initially suffered sublethal poisoning and had diurnal rhythms disrupted becoming active at all times rather than sheltering during the day.

50% of weta offered treated baits died. This included individuals which had a toxic pellet added to their drinking water. Sublethal poisoning also occurred indirectly from translocation of the toxin from water into foliage.

#### **CONCLUSIONS:**

1080 treated grain based pellets are attractive to weta and can cause both lethal and sublethal poisoning. Sublethal poisoning disrupts their behaviour causing them to become active during daylight hours. As reproduction and survival depend upon behavioural patterns compatible with others of their species and relevant to threats in their environment, it is inevitable that a larger proportion of the population than those individuals killed directly will be affected by poisoning operations.

#### **IMPLICATIONS/RECOMMENDATIONS**

Possum control operations spread 1080 treated pellets at densities sufficient for every member of a Stenopelmatidae (tree, ground, giant or tusked weta) population to be exposed to the poison. Where rare or localised weta populations are known to exist, aerially sown 1080 pellet operations should not be used. Because there are many other rare and localised invertebrates which may be at risk, consideration should be given to alternate methods of possum control wherever possible.

#### **INTRODUCTION**

Currently much possum control in NZ is effected through aerial application of grain based pellets treated with compound 1080 (sodium monoflouracetate). As this substance has been registered in the past as an insecticide (Rammell and Fleming 1978) concern has been expressed regarding its impact on invertebrate populations, and in particular on species of

the Stenopelmataidae. This family comprises what are commonly called true weta and comprises tree, ground, giant and tussock weta, including several of our better known protected invertebrates (Ramsay et al. 1988).

## BACKGROUND

Notman (1989) recently reviewed the effect of 1080 on invertebrates and related instances of invertebrate poisoning from the literature. These included: direct lethal poisoning from ingestion of the compound, indirect lethal poisoning of parasites feeding on poisoned mammals, indirect lethal poisoning of insects after feeding on sap containing a translocated solution of the toxin and behaviour modification after sublethal poisoning. The latter has been observed in cockroaches where normal response to predators was suppressed (McIntyre 1987) and in braconid wasps where egg production was disrupted (Smith and Grosch 1976).

## OBJECTIVES

To see if common weta (Hemideina thoracica) feed on, and are affected by grain based possum baits treated with 1080.

## METHODS

Specimens of the common weta (Hemideina thoracica) of varied age, collected from the Rotorua region were held for six weeks in the laboratory in ventilated cages containing peat floor covering, available water and retreats commensurate with the number of weta present. A variety of locally available foliage was offered in order to ascertain that which was most palatable to the animals. Fourteen were then housed individually in ventilated perspex cages (20cm x 12cm x 25cm) containing approx 3cm peat floor covering, and a 50cm x 50cm plastic container of water. The water container held a cutting of the most palatable foliage, and was uncovered allowing the weta access to the water. Cuttings were changed every 2-3 days. After the initial 6 week holding period individuals were divided into replicates of three trial components, viz:

1. A control group offered neither toxic nor non-toxic pellets.

2. Weta offered non-toxic dyed pellets.
3. Weta offered 1080 treated pellets.
  - (a) dry
  - (b) in water

Replicates were divided equally between sexes, and Wanganui No. 7, barley based pellet baits, comprising 0.08% compound 1080 by weight, that are in common usage for possum control were offered to the weta.

Trials were carried out in FRI rearing rooms at a relatively constant 21 degrees C, and 70% humidity from November 1989 to mid-January 1990.

## RESULTS

### COMPATIBILITY

It was found that if the weta were overcrowded and not compatible they fought over the most attractive retreats, even if there appeared to be an oversupply. Damaged individuals generally died later. Accordingly during the foliage palatability trials they were kept either as individuals or in groups that were found sheltering together.

### FOLIAGE PALATABILITY

Several foliage types from the area were offered to the weta in an effort to find that most attractive to the animals (Table 1.)

TABLE 1 - FOLIAGE PALATABILITY

Plant Name		Palatability (0=nil. 3=high)
	- <i>Coprosma x kirkii</i> (large prostrate var.)	3
pohutukawa	- <i>Metrosideros excelsa</i> Sol. ex Gaertn.	2
karamu	- <i>Coprosma robusta</i> Raul.	1
koromiko	- <i>Hebe stricta</i> (Benth) L.B. Moore	1
kohuhu	- <i>Pittosporum tenuifolium</i> Sol. ex Gaertn.	1
tarata	- <i>Pittosporum eugenoides</i> A. Cunn.	1
broadleaf	- <i>Griselinia littoralis</i> Raul.	1
five finger	- <i>Pseudopanax arboreus</i> (Murr.) Philipson	1
korokia	- <i>Corokia cotoneaster</i> Raul.	1
manuka	- <i>Leptospermum scoparium</i> J.R. & G Forst.	1
kahikatea	- <i>Podocarpus dacrydioides</i> A. Rich.	0
kauri	- <i>Agathis australis</i> Salisb.	0

The *Coprosma x kirkii* variety was included as food in the subsequent part of the trial, as it was assumed that baits would be competing with the most palatable food in the wetas' environment.

#### REACTION TO BAITS

While baits were relatively dry, weta fed on them readily. If the peat floor was carrying too much moisture however, mould quickly grew on the baits and they became unattractive to the weta within 2-3 days.

Of the eight weta that were offered toxic baits (Table 2) all had their diurnal rhythms disrupted within 2 days, becoming active rather than sheltering during daylight. This did not happen during the preliminary holding period, with the control group or with those that fed on non-toxic baits.

Four of the eight weta that were offered toxic baits died within two weeks. Where it could be estimated less than 0.05 of an average pellet was sufficient to cause death. These included two of four males, and two of four females. One of the females (T3) that died had the toxic pellet added to the water that the foliage was placed in. This was also her drinking water.

One male (T7) died after having a pellet added to his drinking water, and the female (T8) was sublethally poisoned after having a pellet added to the water that the foliage cutting was placed in. The poisoned water was covered and unavailable to the weta and alternative lean water was provided. Poisoning must have occurred through consumption foliage containing translocated toxin.

TABLE 2 - REACTIONS OF WETA TO BAITS

No.	Sex	Weight	Days*	Behaviour/ notes	
(a) Control group					
C	1	F	5.06g	-	healthy, normal behaviour
C	2	M	3.27g	-	healthy, normal behaviour
(b) Weta fed non-toxic baits					
N	1	F	3.95g	-	healthy, normal behaviour
N	2	F	2.00g	-	healthy, normal behaviour
N	3	M	5.30g	-	healthy, normal behaviour
N	4	M	1.02g	-	healthy, normal behaviour
(c) Weta fed toxic baits					
T	1	F	5.40g	5	died
T	2	F	1.93g	-	active at all times
T	3	F	4.24g	14	died (bait in foliage & drinking water)
T	4	M	2.25g	14	died
T	5	M	2.90g	-	active at all times
T	6	M	4.47g	-	active at all times
T	7	M	0.70g	7	Dead (bait in drinking water)
T	8	F	3.50g	-	Active at all times (bait in foliage water)

\* = Number of days between pellet being offered and death of weta

## CONCLUSIONS

Grain based pellets are attractive to weta and the 1080 in possum baits is poisonous to weta. Sublethal poisoning occurs and alters behavioural patterns.

Poison is available to weta directly from the baits and also from water that baits contaminate. Whether toxin could be translocated from contaminated water into foliage in the field is unknown, but may be possible.

If the poisoning operation is followed by wet weather, many of the baits may become unattractive to weta within 2-3 days.

As reproduction and survival depend upon behavioural patterns compatible with others of their species and relevant to threats in their environment, it is inevitable that a larger proportion of the population than those individuals killed directly will be affected by poisoning operations.

## IMPLICATIONS/RECOMMENDATIONS

Possum control operations spread 1080 treated pellets at densities sufficient for every member of a Stenopelmidae (tree ground, giant or tusked weta) population to be exposed to the poison. Where rare or localised weta populations are known to exist, aerially sown 1080 pellet operations should not be used. Because there are many other rare and localised invertebrates which may be at risk, consideration should be given to alternate methods of possum control wherever possible.

## REFERENCES

- Notman Peter (1989). A review of invertebrate poisoning by compound 1080. New Zealand Entomologist 12 67-71.
- Rammell, C.G.; Fleming P.A. (1978). Compound 1080. Properties and uses of sodium monofluoroacetate in NZ. Wellington, Animal Health Division. Ministry of Agriculture and Fisheries. NZ. 137pp.
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2711