

1080 Poison - sodium monofluoroacetate
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Abstract: Control of one pest species may permit increases in abundance of other pests, thereby reducing the overall net benefit from pest control. We provide evidence that control of introduced possums (*Trichosurus vulpecula*) may increase ship rat (*Rattus rattus*) abundance in some New Zealand native forests. Ship rat abundance in a podocarp–hardwood forest was assessed using simple interference indices over 14 years (1990–2004) that included two aerial possum-poisoning operations (1994, 2000). Ship rat demography and rat and possum diet were measured from June 2001 to June 2003 when the rat population was increasing after the 2000 poisoning. Mean ship rat abundance indices increased nearly fivefold after possum control and remained high for up to 6 years after the 1994 poisoning.

Although seeds and fruit dominated the diet of rats driving population recovery after control (74.0% of total diet by dry weight), rat fecundity was instead closely correlated with the proportional consumption of invertebrates ($r = 0.91$). Juvenile survival was correlated with proportional seed consumption ($r = 0.75$), while adult survival was correlated with combined seed and invertebrate consumption ($r = 0.83$). Adult rats ate more seeds and fewer invertebrates than juvenile rats. Seeds and fruit also dominated possum diet (52.2% of total diet).

Rats ate significant quantities of invertebrates (23.3% of diet) while possums ate very little (1.1% of diet). The foliage of woody plants was a major item in possum diet (33.0%) but was not eaten at all by rats. Several items in the 'other foods' group were common to both possum and rat diets: herbaceous foliage

Stoats shifted between eating rats and birds, depending upon the abundance of rats. Thus successful rat-poisoning operations resulted in higher bird consumption than unsuccessful ones. Combining the numerical and functional responses of stoats into a 'bird predation index'

showed that stoats are likely to have the greatest effect on birds after successful 1080 poison operations.

Any benefits to the species under protection gained from reduced predation by rodents may be offset by increased predation by the rodent predators themselves. Mustelids demonstrate diet switching as a functional response to changes in the abundance of their primary prey (Erlinge 1975; Dunn 1977; Tapper 1979; Jarvinen 1985).

Because mustelids are unlikely to sample cereal-based baits (Richardson 1995; E. B. Spurr pers. comm.), they are not at risk from direct poisoning in rodent/possum operations.

Poisoning may also have more complex effects on the forest community. This is demonstrated in this study by the potential impact on lagomorphs and alternative prey of ferrets. Other species are also at risk either directly from poison bait consumption or by secondary poisoning (Godfrey 1985; Spurr 1994; Eason & Spurr 1995).

Site	Operation	Poison	Bird predation index	
			Oct–Mar	Apr–Sep
Mapara	1989–90	None	0.77	–
	1990–91	1080*	7.18	0.84
	1991–92	1080	0.60	0.96
	1992–93	1080	0.54	0.96
	1993–94	Talon*	1.63	0.50
	1994–95	Talon*	4.19	–
Kaharoa	1991–92	Pindone*	4.41	–
	1992–93	1080*	6.58	–

* Successful poison operation