1080 Impacts on Invertebrate Populations: a Review and Response to Benfield (2011)

Sir

In the previous issue featuring articles about the use of 1080 for possum control, Benfield (2011) expressed concern about the impacts of aerial application of 1080 on non-target invertebrate populations (as distinct from impacts on individual invertebrates). He cited selected studies undertaken at least 15 years ago, but failed to present the findings of more recent research. Below I provide a brief summary of studies I am aware of published from 1994 onwrds.

Spurr (1994a presented the results of two pitfall trapping studies that might be considered replicates. The experimental design in both studies involved monitoring monthly for 1 year before and up to 6 months after aerial application of 1080, in poison and no-poison areas. Both studies showed no detectable impacts on the numbers of mites, amphipods, spiders, beetles, collembolans, millipedes, ants, snails, slugs, and weta collected in traps.

Lloyd (1997) counted the number of invertebrates feeding on non-toxic baits in poison and no-poison areas before and after aerial application of 1080. He found no detectable reduction in the total number of invertebrates feeding on non-toxic baits in the poison area compared with the no-poison area.

Sherley et al. (1999) counted the number of invertebrates feeding on both non-toxic and toxic baits. They found at least 187 different invertebrate taxa feeding on baits, but only a small proportion of baits had invertebrates on them at any time, with only a few individuals per bait. The number of invertebrates on baits declined when non-toxic baits were replaced with toxic baits (but it was not ascertained if this was from poisoning or poison aversion). Invertebrate numbers did not decline on non-toxic baits that were 20 cm or more from toxic baits (i.e. the impact of toxic baits on invertebrates was very localised).

Spurr & Drew (1999) recorded the number of invertebrates feeding on non-toxic baits by day and night. The study was smaller than that of Sherley et al. (1999) and they found fewer species feeding on baits but, as in the former study, only a small proportion of baits had invertebrates on them at any time, with only a few individuals per bait. Spurr & Drew (1999) concluded that the number of invertebrates on baits was a small proportion of the number likely to be present in the forest litter. On that basis, they predicted that aerial 1080-poisoning would be unlikely to have any long-term deleterious impacts on invertebrate populations, a prediction that could be tested by monitoring invertebrate populations.

Spurr & Berben (2004) monitored the impacts of hand-broadcast application (simulating aerial application) of 1080-baits on the numbers of invertebrates (including individually marked tree weta) that occupied artificial refuges (weta 'houses') in treatment and no-treatment plots. Counts of refuge occupants were made monthly for 12 months before and 4 months after bait application. There was no detectable impact on the numbers of tree weta, cave weta, slugs, spiders, and cockroaches occupying the refuges. In addition, there was no detectable change in numbers of individually marked tree weta that were seen after bait application.

Powlesland et al. (2005) also monitored invertebrate numbers in artificial refuges in treatment and no-treatment areas, for 1 year before and 2 years after an aerial 1080-poisoning operation. The numbers of tree weta, cave weta, cockroaches, spiders and harvestmen, and leaf-veined slugs occupying the refuges were not reduced by application of the poison.

Five of the six before and after studies reviewed above found 1080-poisoning had no detectable impact on invertebrate populations. One study (Sherley et al. 1999) found a localised impact (<20 cm around individual 1080-baits, which is equivalent to a total area of about 2–3 % of the forest floor, depending upon bait application rate). However, in 1080-poisoning operations, baits are distributed sparsely (equivalent to one 4-g bait per 8 m^2 at a bait application rate of 5 kg/ha), disappear rapidly from consumption by possums and rodents, and attract only a small proportion of invertebrates present in the litter (Sherley et al. 1999; Spurr & Drew 1999). There is no doubt that 1080 kills individual invertebrates that ingest it, but there is no published peer-reviewed evidence that 1080-poisoning operations for possum control have had any impact on invertebrate populations at a whole-forest scale.

In citing Spurr (1996), Benfield (2011) stated, "this study was not peer-reviewed." In fact, it was peer-reviewed by three external reviewers, as noted in the acknowledgements. Also, the design of the study was robust, with monitoring before and after treatment, in treatment and no-treatment areas. Analysis of the data included a power analysis and a repeated measures analysis of variance, not just a "minimal analysis of the results" as asserted by Benfield.

Several peer-reviewed publications, not referred to by Benfield (2011), summarise the impacts of aerial 1080-poisoning on invertebrate populations, including Spurr (1994b), Spurr & Powlesland (1997), Spurr (2000), and Eason et al. (2011). These provide useful information that should be considered in any objective assessment of the impacts of 1080 on invertebrate populations.

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