APVMA Reconsideration of anticoagulant rodenticide approvals and registrations

Submission by Dr Boyd Wykes on behalf of the Rodenticide Action Group, Margaret River

Preamble

The Rodenticide Action Group Margaret River Region forwarded a detailed submission on 11 June 2020 to the APVMA for a review of anticoagulant rodenticide use. We understood that was to be the basis for decisions on regulation. We take as read that earlier document is included in this submission to what we understand to be an exercise in gaining a more detailed evidential basis for responding to advocacy in the majority of submissions for stricter regulation ('Summary of submissions to the public consultation on use patterns for anticoagulant rodenticide products', APVMA September 2020, Section 3.1 'Considerations').

We are a community group conducting a campaign to protect wildlife from SGAR poisoning based on the extensive evidence elsewhere, and increasingly in Australia, that these potent, long-lasting chemicals are harming a wide range of wildlife through primary and secondary pathways. As a citizen scientist with a professional background in wildlife conservation and environmental management, I lead our group's citizen science research on the little known Masked Owl of south-west Western Australia. We are collaborating with Dr Rob Davis, Senior Lecturer, School of Science, Edith Cowan University and his associates including Dr Michael Lohr. The APVMA will be well aware of the published work by these pioneering scientists on rodenticide threat to Australian wildlife. We presume that they have also made submissions to this review that cover more recent as yet unpublished investigations.

The additional contribution that I can make to this call for evidential submissions regarding rodenticide regulation is to highlight the susceptibility to secondary poisoning of the Masked Owl of SW WA, for which introduced rodents associated with human habitation are the primary prey. The following is a summary of relevant aspects of a five-year study, for which research papers presenting results are *in prep*.

A case study: rodenticide threat to the Masked Owl in SW WA

Background

The Masked Owl *Tyto novaehollandiae* is a little known yet largest owl of southern Western Australia. The species is a carnivore of the forested periphery of the Australian mainland and Tasmania, with additional island subspecies and derived species to the north. They favour open forest and woodland, hunting in ecotones of natural openings and clearings, while roosting and nesting in forest and waterways where there is dense foliage and tree hollows (Higgins 1999).

The nominate subspecies *T.n. novaehollandiae* has an eastern Australian range that extends south from southeast Queensland to Victoria and South Australia, and a southwest Western Australian (SW WA) population. Debus (1993), supported by Kavanagh (1996), considered the Masked Owl to be arguably the least-known Australian owl species, classified across its range as potentially threatened and 'rare' or 'insufficiently known'. He considered that the southern subspecies *T.n.novaehollandiae* of eastern and southern Australia requires particular attention as a basis for conservation management because it is restricted to the most severely disturbed parts of the country where it faces threats associated with high human populations and continued clearing of dry forests and woodlands for agriculture. Debus (2002) singled out rodenticides, especially brodifacoum, as another major threatening process for all Australasian owls.

More recent research has shed some light on the natural history and status of *T.n.novaehollandiae* in eastern mainland Australia but the SW WA population remains poorly studied with a Priority 3 status on the WA Threatened and Priority Fauna list (species in urgent need of further survey that are known from one or a few locations, or comparatively well-known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.)

The only published understanding of the status of the Masked Owl in SW WA is from a preliminary study based on call playback conducted at 70 sites along a north-south line through the forested southwest during spring 1999 and autumn 2000 (Liddelow et al. 2002). A total of 15 Masked Owls were detected. Even less is known about the SW WA population's natural history. For example, little to no information was available to Johnstone and Storr (1998) or Higgins (1999) about nesting, breeding and diet, with nothing substantive published since.

Diet of the Masked Owl in SW WA

In April 2017 resident Masked Owls were discovered on the peri-urban outskirts of the Margaret River coastal township of SW WA. In the following five years, through an ongoing study by myself assisted by a small group of citizen scientists, detailed natural history data has been obtained on a mosaic of seven resident, breeding pairs. This includes the first understanding of the diet of the Masked Owl in SW WA, such information being vital for determining conservation status and management requirements. Discovery of Masked Owl roosts in tree canopies has provided opportunity to collect regurgitated pellets of the undigested fur and bones of prey for adults and dependant immatures. The following table summarises the pellet content of 512 pellets from five breeding sites, containing bones of 1072 prey individual prey.

Site	Site S 2017-20 fledgling roosts	Site E 2017-20 fledgling roosts	Site J 2018-20 adult F roosts	Site J 2019-20 fledgling roosts	Site K 2019-20 adult M & F roosts	total
pellets #	58	29	172	43	210	512
prey items #	107	53	334	92	486	1072
						average
Black Rat % *Rattus rattus*	54	55	38	61	39	49
House Mouse % *Mus musculus*	25	26	55	15	45	33
Rabbit % *Oryctolagus cuniculus*	9	9	6	6	7	7
WR Possum % *Pseudocheirus occidentalis*	2	4	1	6	2	3

Phascogale % *Phascogale tapoatafa*	2	4		4	1	2
Mardo % *Antechinus flavipes*					0.5	
Dunnart % *Sminthopsis griseoventor*	5				5	2
Bird %	4	2		9	0.5	3

In total, over 80 per cent of Masked Owl prey in the vicinity of Margaret River are introduced rats and mice.

Rodenticide threat to SW WA Masked Owls

When Mike Lohr (2018) revealed the extent of Boobook exposure to rodenticides in SW WA in the context of disturbing indications that a wide range of Australian wildlife was likely subject to the same impacts as documented elsewhere (Lohr and Davis 2018), we recognised from our emerging data on Masked Owl diet that this largest and least known of our night birds was at great risk. Analysis of the livers of four Masked Owl corpses provided to the ECU team, found high to lethal levels of SGARs in all birds, which included both road-kills and birds found in a debilitated state (Lohr and Davis, unpublished data). Ironically, a charismatic apex predator that has adapted to human modification of the landscape by switching from native species to helping to control an introduced pest, has been shown to be at extremely high risk of suffering toxicity and death from secondary poisoning from rodenticide intake.

The small liver analysis sample on which we are basing this submission to the APVMA review is a consequence of a deficiency in funding for such research. A further eight Masked Owl liver samples are in store at ECU for which there is no capacity for analysis. Dr Davis has informed us (*pers. comm.* 5/1/2022) that there is no longer any WA-based capacity for rodenticide testing. There is access to analysis at a Canberra facility, but only for major research projects as distinct from small and opportunistic sampling runs, and at a cost of around $250/sample.

We have recently been approached by Felicity Bradshaw, a local veterinarian with an interest in wildlife, suggesting analysis of a quenda bandicoot (*Isoodon obesculus*) that haemorrhaged to death, likely from direct ingestion of rodenticide. The advice from Dr Davis was that as much as such confirmation is needed for this susceptible species, there is no capacity to do such studies.

Impact of rodenticide toxicity on SW WA Masked Owls

Many submissions to the APVMA review will include research on sub-lethal and lethal exposure of predators to anticoagulant rodenticides, more recently including research in Australia (Pay *et al*., 2021). However, we have much less understanding of the impacts of this widespread, increasing exposure at the individual and particularly the population/conservation levels. This difficulty is most clearly articulated by Mooney (2017) with respect to the Tasmanian Masked Owl *T.n.castanops,* despite intensive research having been conducted on this endangered subspecies.

Similarly, there is little direct evidence available as yet to substantiate the likelihood that high rodenticide exposure in SW WA Masked Owls is having a significant impact at the population level of this Priority listed species. The following table summarises what we know to date about breeding success of pairs in the vicinity of Margaret River.

Masked Owl breeding records for Margaret River region 2017-2022

A: monitored, absent/inactive ; C: pre-nesting courtship; B: female brooding eggs/chicks; D: dependent immature; I: immature, likely reached independence

Pair	2017-18	2018-19	2019-20	2020-21	2021-22
E	2D, 2I	2D, 1I	4B, 4D, 2I	C	C, 2B, 2D, 2I
S	2D, 2I	A	2D, 2I	A	A
G		2D, 2I	A	C, 2B, 2D, 1I	A
J		C, 2B, 2D, 1I	C, 2B, 2D, 2I		
K			C, 3B, 2D, 1I	A	C, B, 2D
C			2D, 1I	A	C
R				2D, 2I	A

These first documented breeding records for SW WA indicate that clutch size is small – generally one or two emergent chicks - relative to a much larger capacity of the species (Debus 1993). In many cases fewer than this achieve independence. We have only been able to access one nest hollow, in which the corpse of a well-developed chick was retrieved. This was after two siblings had fledged, only one of which reached independence, which is often proving to be the case. A concerning revelation is evidence that most pairs do not breed every year. However, this may be a characteristic of the southern Australian Masked Owl (Kavanagh 1996) including for a population with a diet of native prey in habitat away from human habitation (Kavanagh and Murray 1996). Regardless, this low breeding output indicates a higher vulnerability of the species to rodenticides and other threatening processes.

Discussion

I wish to further express frustration that despite mounting evidence of SGAR impacts on wildlife elsewhere, there has been little to no directed government funding in Australia to determine whether SGARs are having the same impacts here, which is logically the case. The most appropriate legal mechanism would be for manufacturers of products under the control of the APVMA (such as SGARs) to prove that their products are not harmful, as we understand the case to be in California. If instead the approach in Australia is for government to accept this responsibility, the APVMA review provides an opportunity to recommend that appropriate funding for such targeted research be provided by government.

In particular, more research is required to investigate the extent and means by which SGARs are infiltrating food chains well beyond the more obvious links of direct access by terrestrial, nocturnal wildlife to baits and secondary intake by nocturnal predators such as the Masked Owl, Tasmanian Devil and Quolls.

We anticipated that the Masked Owl as a nocturnal rodent predator would be a prime candidate for secondary poisoning.

However, the Powerful Owl has been found to have high rodenticide exposure despite its primary prey not being rodents. In this case, the pathway is likely to be accidental or deliberate poisoning of possums (Cooke *et al* 2022).

The Boobook, with its high invertebrate intake, would seem to be less at risk but evidence is emerging that invertebrates have high potential to pass on rodenticides because they can readily access bait stations and are themselves not affected by anticoagulants (R Davis and colleagues, *pers. comm*).

Diurnal predators and scavengers of target and non-target species are at risk because rodents that eat baits take days to die, in which time they are easy prey when seeking out water in the day as well as night, and often die where accessible to scavengers (Mooney 2017). This pathway does not seem to be widely understood, including by pest controllers, based on our experience and in submissions to the earlier APVMA review.

Furthermore, some diurnal predators for which rodents are not a key prey species are subject to high levels of rodenticide toxicity, such as the endangered Tasmanian Wedge-tailed Eagle (Pay *et al* 2021).

Another insidious pathway is via reptiles (Lettoof *et al* 2020), which in themselves can tolerate relatively high levels of rodenticide intake but as such can become 'toxic time bombs' through eating baits and invertebrates that feed on baits, as well as on live and dead rodents and other rodenticide-loaded vertebrates.. For example Kings Skinks in SW WA have been shown by R. Davis and colleagues (*pers, comm*.) to readily and regularly access commercial outdoor bait stations.

Another source of frustration to our community, most likely also related to funding/resourcing capacity, is the inordinately protracted time-frame being taken for the APVMA to review regulation of rodenticides. The impacts of SGARs on wildlife elsewhere in the world were well known when the APVMA announced a review in 2020. The APVMA is taking five years from then to complete its review in July 2025, after which further time will elapse to implement any changes. Last year the Ministry of Environment and Climate Change in British Columbia announced a new Rodenticide Action Plan which includes an 18-month ban on the sale and use of SGARs while a review of the science is conducted. This application of the precautionary principle is also warranted in Australia given the potential harm to wildlife over the five year period that the APVMA is undertaking a review.

In deciding on what means are needed for effective reduction of risk to wildlife from SGARs, I urge the APVMA to take heed of what has and has not been effective elsewhere.

The experience in California is that a ban on consumer sales in 2014 was found to have not protected wildlife from SGAR poisoning. Due to continued heavy use by commercial operators, a California Department of Pesticide Regulation analysis of 11 wildlife studies determined that anticoagulant rodenticides were continuing to poison a wide range of animals, including mountain lions, bobcats, hawks and endangered wildlife such as Pacific fishers, spotted owls and San Joaquin kit foxes. Accordingly, increased restrictions on use of SGARs were enacted in 2021 through the Californian Ecosystems Protection Act.

The British experience is that changes in anticoagulant rodenticide 'authorisations' combined with an industry-led 'stewardship scheme' introduced in 2016 have yet to make any significant improvement. There had been no change in the proportion of barn owls with detectable liver residues between the baseline years of 2006 to 2012 and analysis undertaken in 2018 (Shore *et al*. 2019). Britain may well have taken insufficiently decisive measures through changes to regulation and stewardship measures, as found in California. However, the commitment in the British stewardship scheme to monitor outcomes is to be commended. This involves five elements:

- A periodic survey on the knowledge, attitudes and practices of all professional rodenticide users in order to observe changes over time. A baseline survey had been conducted in advance of regime implementation and a follow-up study was done in 2017.
- The breeding success at 130 selected barn owl nest sites located across five regions of the UK to be monitored to determine year on year fluctuations in nest productivity. This is to examine certain barn owl breeding parameters in the presence of the SGAR residues found in the UK barn owl population.
- An annual report of data concerning vertebrate pesticides used in the UK.
- A review of the current state of knowledge of the distribution, severity and practical implications of anticoagulant resistance in UK rodents.
- SGAR residues in the livers of barn owls from across Britain monitored annually to determine whether there has been any change in exposure in this wildlife sentinel. The barn owl is used for exposure monitoring as it is considered a sentinel for species that are generalist predators of small mammals in rural areas. The specific work reported for 2018 was the measurement of liver SGAR residues in 100 barn owls that died in locations across Britain.

We commend this approach to the APVMA and suggest the Boobook as an appropriate sentinel species for Australia, based on widespread occurrence in populated landscapes, ready access to specimens for analysis and susceptibility to rodenticide intake (Lohr (2018). A program to monitor Boobook nesting success would be appropriate in conjunction with monitoring of exposure as an indicator of impact of SGAR toxicity in this sentinel species.

Recommendations

1. An immediate overall ban on the sale and use of SGARs while this review of the science is conducted, with use only through specific approval.
2. Learn from the Californian experience that half-way measures are insufficient and place a total ban on use of Second Generation Anticoagulant Rodenticides (SGARs) - unless approved by the APVMA for specific exceptional circumstances such as eradication of rodents on conservation important islands.
3. At the least,
    - SGARs should be removed from retail sale to the public by listing as Schedule 7 poisons, and

  - Strict requirements be placed on use by commercially trained and accredited operators.
4. Allocation of funding for research to determine levels and impacts of exposure to SGARs in Australian wildlife and the pathways by which this is occurring, with a commitment by the APVMA to take regulatory action where warranted by the findings.
5. Encouragement for an industry funded stewardship scheme as established in Britain - including a monitoring program for a sentinel species, for which the Boobook is a leading candidate (Lohr 2018).

If not totally banned, we in the Rodenticide Action Group of Margaret River and other community groups across the country will need to continue to continue to raise awareness and educate at the local level (Harris 2021). However, if the APVMA takes decisive action and the pest control industry engages through a stewardship program, our task will be far less daunting and demoralising.

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