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Litter, plastic sheets and rubbish. It's not necessarily an eco-disaster for all species!

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ABSTRACT

Human hard rubbish in the form of old building materials, sheets of iron and the like have long been known as habitat for reptiles in particular (Hoser 1996).

This paper details use of plastic sheets as a refuge and habitat for multiple species of frogs in Victoria, Australia, including as a potential springboard for range expansions.

INTRODUCTION

While doing field-work across Victoria in the years 2021-2022, I had cause to search for reptiles and frogs on private properties in numerous parts of the State.

In three separate situations frogs were found sheltering within piles of dumped plastic bags or sheeting.

This paper details the three relevant finds and implications of them.

MATERIALS AND METHODS

Myself and Daniel Mannix of the Victorian Dog Training Academy have been training dogs to avoid snakes (Snake Avoidance, Australian registered trademark, TM No. 1869367).

Details at http://www.dogsnakeavoidancetraining.com.au (as of 1 Dec 2022).

This is commonly done on private farming properties in rural parts of the State of Victoria, Australia.

It is routine for owners of the properties to ask me to do a sweep of the property to remove snakes near homes and buildings and/or to inspect the place to assess likelihood of snake encounters and possible steps to remove favourable habitat for snakes near dwellings.

In the process, I survey for other fauna, including small reptiles and frogs, noting that some were until recently undescribed in this State, with several new species of frog and reptile from Victoria named for the first time as recently as 2020-2022 (e.g. Hoser 2020a-c, 2022a-c), some of those species first being flagged as new to science, directly from observations made in field surveys as just outlined.

The surveying is done opportunistically by way of (usually) lifting bits of hard cover looking for hiding animals or less often by direct observation of specimens in the open.

In terms of this paper, three instances of frogs hiding amongst plastic sheeting is given.

The first case was in March 2021, and the second two in November 2022.

RESULTS

On 8 March 2021, at a farm at 1143 Kinglake-Glenburn Road, Glenburn, in the Murrundindi Shire, Victoria, I lifted a mass of black plastic garbage bags which in turn contained other materials. Within this mass were two *Geocrinia victoriana* (Boulenger, 1888), being a male and female (not together, but presumed to be a pair, as no others were found, both were adult and they were found within 30 cm of each other). On the west side of the pile of debris was an old caravan that had been there for years and the east side was bare ground and exposed to the morning to midday sun.

The thermal position of the mass meant it got the morning warmth from the sun, but was shaded in the warmest part of the day and afternoon.

Furthermore the plastic mass had bodies of water in the folds. Noting the tiny size of adult *Geocrinia victoriana* it is likely that in the absence of this water in the plastic masses that the frogs could not have survived here. They did appear to need the high humidity immediately adjacent in the same cracks or crevices.

A search of other parts of the farm property failed to yield any other frogs. There was no other plastic garbage bags or anything else that held water as such on the property. The only habitat apparently suitable for the frogs at that time and place was the man-made rubbish.

The weather that day was dry, cool, windy and partly cloudy at the relevant times.

In the mid-morning of 1 November 2022, I stopped on the side of the Great Ocean Road at Johanna, Victoria, 3238 (in the western Otway Ranges) and searched among a large amount of roadside rubbish.

Included was several masses of thick black plastic sheeting that was folded over itself. Inside these sheets were found two adult *Crinia* (*Ranidella*) *signifera* Girard, 1853. The two frogs were found separately in two sheet masses and were 1 male and 1 female. Due to the distance apart, they were not presumed to be

a pair.

No frogs were found under other cover. The sheets of plastic these frogs were found within also contained substantial amounts of standing water within the folds. The weather that day was cool, mainly cloudy and dry.

On the same date, in the early afternoon, at a property at 3430 Great Ocean Road, Glenaire, I lifted a disused blow-up plastic baby pool in a ditch. Within the folds of plastic was sheltering an adult *Limnodynastes cameronganti* Hoser, 2020. Like the two previous cases, there was standing pools of water within the folds of the plastic approximately where this frog was sheltering. The rest of the nearby parts of the property was dry. A nearby farm dam had no obvious daytime hiding spots for frogs.

No other frogs were located on that property that day.

The weather was as for the morning, although later that day (at the time we left the property at about 4.30 PM) torrential rain hit the area.

DISCUSSION

In all three preceding cases, frogs were found hiding in plastic sheeting of some form that held standing water and gave frogs a safe and hydrated hiding place. In the wild state such places are uncommon except near water bodies like dams and the like. However farm dams and the like often lack stones, logs or other cover that are part submerged in water and allow frogs to hide in moist places by day.

For larger frogs, it may be possible to survive extended periods in dry places. However this luxury is not available to tiny species such those within the genera *Geocrinia* Blake, 1973 or *Crinia* Tschudi, 1838.

In these cases the disused plastic bags that were dumped as rubbish or the disused plastic sheets were probably the only potentially available habitat for these species in the relevant places and times.

Geocrinia sensu lato (as defined by Hoser 2020c) is a genus comprising species with constrained distributions and appear constrained by regions of dryness or aridity.

Use of man-made rubbish in the form of plastic bags, sheets and the like that hold rainwater in folds may well allow these species to survive and expand in areas they previously would not have survived in.

As a result, man-made rubbish in the form of plastic garbage bags, plastic sheeting and the like could be a boon for tiny frog species within the genera *Geocrinia*, *Crinia* and other morphologically similar tiny frogs.

The moan of environmentalists that plastics take many years to break up and decompose may in fact be an aid to the short to medium term survival of some populations of frogs within these genera.

Besides enabling frogs the ability to physically invade places they would otherwise not be able to survive in, transportation by people of plastic sheeting with frogs contained within the sheets may be a means by which frogs can be translocated hundreds of kilometres to places they would otherwise never get to.

This could mean in the future species from one part of Australia could become feral and invasive in another.

In the short to medium term, government wildlife departments should be spending some of their money issuing adverts and regular warnings of the potential perils of inadvertently translocating frogs, including within plastic sheeting.

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CONFLICT OF INTEREST

None.