



Goulburn Broken Soil Health-Dung Beetle Project

A collaborative project of the Goulburn Murray Landcare Network
and the Upper Goulburn Landcare Network.



Australian Government
Department of Agriculture,
Fisheries and Forestry

Autumn 2008 - Project Update.

The Summer phase of our project has been very busy, so there's lots to report.

Colony releases

A total of 123 dung beetle starter colonies have been released in the Goulburn Broken Catchment since this project began in early 2006 (see map)! To the best of my knowledge, this is the largest coordinated release of dung beetles in Victoria's history. Community support for the project has been and remains large and unfailingly positive.

Since the beginning of the project demand from individual farmers for dung beetle colonies has been strong, in fact greater than our ability to supply. The project set out to ensure that all participants receive at least one starter colony during the life of the project and to share the starter colonies across the catchment in a way that acknowledges demand (from farmers/Landcare groups), risk (matching the available dung beetle species to climate; de-stocking; drenching) and opportunity (affordability; making contact with the farmer)). The highest priority districts were those with large numbers of cattle and where the starter colony releases would have the best chance of survival and establishment. Consequently, lower rainfall districts supporting relatively low numbers of cattle (eg Nagambie, Rushworth, Arcadia) have received few colonies, whilst higher rainfall regions with bigger herds (eg Strathbogie Ranges, Yea, Alexandra, Mansfield, Benalla, Tatong) have received the majority of releases.

Those districts of the Shepparton Irrigation Region where farmer-demand for dung beetles was strong did receive some starter colonies, but releases into the SIR were considered risky. Early in the project it was noticed that dung on many dairy farms was devoid of any sorts of beetles, including the widespread dung beetles *Taurus* and *Fulvus*. Even on farms that control stock parasites in a dung beetle-friendly manner and where *Taurus* and *Fulvus* should be plentiful, it was hard to find a single dung beetle. Clearly, something was happening that kept dung beetle populations in these areas low. Our concern was heightened when we discovered that dung beetles were also very scarce on a flood irrigated beef farm near Seymour, yet non-irrigated beef farms in the district had healthy dung beetle populations. See below for further discussion.

Once the project was underway and the near complete lack of dung beetles on irrigated dairy/beef farms became known, releases in non-irrigation districts were favoured.

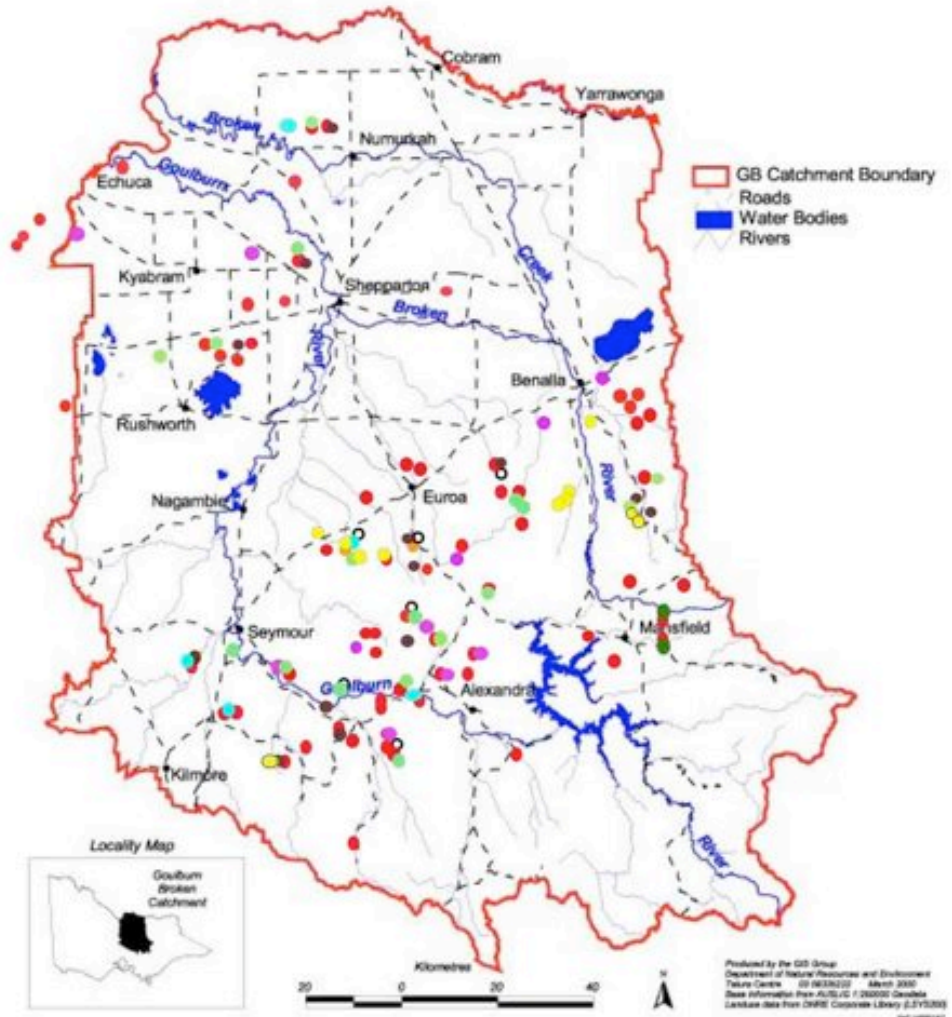
Since the previous project update, November 2007, 30 starter colonies have been released in the GBC, comprising five species and a new strain of an existing species.

Landcare Dung Beetle Releases in the GBCMA

**123 Starter Colonies from Feb. 2006 to March 2008
(and counting).**

Released Dung Beetle Species

- Bison – red
- Spiniger – purple
- Africanus – yellow
- Intermedius – aqua
- Gazella – brown
- Binodis – light green
- Taurus ‘gene pool’ – empty circle
- Aygalus – dark green
- Alexis – tan



Summer 07-08 Releases

Common Name	# Releases	Release Districts
Africaanus	10	Swanpool, Euroa, Longwood, Tatong, Benalla.
Taurus ‘gene pool’ strain	6	Yea, Ghin Ghin, Ruffy, Euroa, Strathbogie
Binodis	5	Strathbogie, Ruffy, Ghin Ghin, Yea
Spiniger	4	Bennalla, Warrenbayne, Strathbogie,
Intermedius	3	Broadford, Seymour, Creighton’s Creek
Alexis	2	Euroa, Creighton’s Creek
Total	30	

Dung Beetle Research

Two types of research are currently being conducted as part of this project.

Flood Irrigation

Given the year-round availability of vast quantities of high-quality dung, the near complete absence of dung beetles from irrigation farms in the Shepparton Irrigation Region has always been puzzling, particularly as near-by dryland properties often support healthy dung beetle populations. The most likely causes were considered to be flood irrigation, or widespread use of toxic drenches and other veterinary chemicals, or a combination of these factors.



To better understand the role that dung beetles can play on flood irrigated farms, the ability of the underground larvae of dung beetles to survive in flood-irrigated pasture is being investigated, with the survival of both summer- and winter-active dung beetle species being tested. Initial experiments, conducted on a flood irrigated beef farm at Seymour, suggest that the regular saturation of the soil (10 day watering cycle) dramatically reduces survival of dung beetle larvae. The experiments are continuing.

Effect of Dung Burial on Soil Health and Pasture Productivity

Whilst the beneficial impact of dung beetles on soil health and consequently on pasture seems obvious, there is little published and statistically valid information available. This experiment, conducted on 'unimproved' pasture at Merton, comprises a grid of rectangular plots located in a paddock that is part of a regular grazing rotation.



Each plot (containing three replicates- the cages in the photo, at right) was allocated to one of three treatments ('dung+beetles', 'dung only' and control), in order to compare soil and pasture responses. So, each of the three treatments had 18 replicates, giving a total of 54 sampling sites. The experiment has been running for just over 12 months and results are promising. Comprehensive soil testing will occur at the end of the experiment (Nov '08), but the first pasture-cut samples (estimating relative pasture productivity) have been taken and analyzed. The pasture at each of the 54 treatment sites was cut at ground level, bagged, dried and weighed. The data shows that pasture growing on 'dung+beetle' treatment plots has a significantly higher dry weight, than pasture grown on the 'dung only' treatment and that both these treatments grow more grass than the control (no dung). All differences are statistically significant (two-tailed Students t-test where $P \leq 0.05$ for each paired comparison).

Pasture-cut results - Year 1.

	Treatment		
	Dung+beetles	Dung only	Control
Number of plots	18	18	18
Mean dry wt (g)	148.24	122.95	90.96
SD (variation)	25.44	22.29	27.22
≡Kg/ha dry wt	5929.6	4918	3638.4

Exciting & alarming news

I first started identifying dung beetle species in the Goulburn Broken Catchment six years ago. Up until last Summer, 06/07, I had never found *Onitis aygulus* (right), which is a large (20-25mm long) summer-active dung beetle.



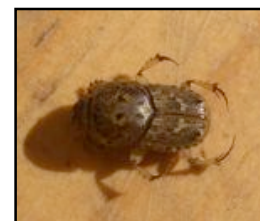
Since last Summer I've recorded *Aygulus* beetles at about ten localities in the catchment, including in the normally higher rainfall zone. Survey-effort has fluctuated over that time, but the frequency with which I'm now finding them, suggests the range and population size of this large dung beetle is increasing. This is really exciting!

A farmer near Benalla found lots of dug-up 'faecal shells' (right; the hardened dung 'shell' that protects the dung beetle larva while it is metamorphosing into an adult beetle) scattered around his paddocks. We concluded the culprits to be foxes. The holes were 10 to 15 cm deep and dug below old dung pads.



On one old dung pad was a fox-dropping full of *Aygulus* beetle parts. Upon digging below some of the pads I found some intact faecal shells, one of which had an adult *Aygulus* still in it. I also found *Aygulus* beetles in fresh dung pads in the paddock. So, some foxes have learned to use the beetle larvae as a food source, though they clearly only got some of them. What's certain is that *Aygulus* is now a regular component of dung beetle populations across much of the Goulburn Broken Catchment and it's starting to have a real impact on dung burial.

To finish on a positive note, I've found a species of dung beetle in the GB Catchment that I've never recorded before, *Euoniticellus pallipes* (right; summer-active). This 9-12mm long species closely resembles *E. fulvus*, which is wide-spread in the catchment. I've now found it at four sites (Warrenbayne, Seymour, Creightons Creek, Violet Town), so it looks as though we may have another dung beetle species working for us from now on.



May Field Day

Bison season is about to begin. Our annual field day at Stuart Cameron's farm 'Tinten', near Euroa, is on again – 7th May, 9.30 to 12 noon. This year we'll have more paddock demonstrations showing how amazingly effective dung beetles are, as well as guest speakers John Feehan, who you all know, and Cindy Edward, an integrated pest management specialist, to keep us informed and entertained.

Regards,

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