# Beetles in sand dunes – spiniflex or marram grass?

**Article** · January 2007

CITATIONS
0

READS
17

**2 authors**, including:

Margaret C Stanley
University of Auckland
**52** PUBLICATIONS **517** CITATIONS

SEE PROFILE

# Beetles in sand dunes – spinifex or marram grass?

Andrew La Cock[1] and Margaret C. Stanley[2]

[1]*Wanganui Intermediate School, 90 Dublin St, Wanganui*
[2] *Landcare Research, Private Bag 92170, Auckland*
*(stanleym@landcareresearch.co.nz)*

## Introduction

Active sand dunes have been reduced by 70% in New Zealand, and those remaining often bear little resemblance to their original state. Most are now threatened by coastal development and weed invasion (Hilton *et al*. 2000). Widespread invasion of exotic marram grass (*Ammophila arenaria*) throughout New Zealand has resulted in the replacement of native vegetation, such as spinifex (*Spinifex sericeus*), in many dune systems (Hilton *et al*. 2000).

When weeds invade indigenous ecosystems they can alter the structure and/or the floristics of the plant community (Standish *et al.* 2001; Williams *et al.* 2003), which can subsequently alter resource availability and the composition of animal communities. Animal biodiversity can decrease fairly rapidly as a result of weed invasion (Adair & Groves 1998).

As part of a science fair project at Wanganui Intermediate School (A. La Cock), a study was conducted to determine the type of invertebrates found in native spinifex dunes compared with those found in exotic marram grass dunes. We report here on the beetle specimens collected during this project. It was expected that the composition of beetle communities in marram grass dunes would be different from those in spinifex dunes, with marram beetle communities being less diverse and composed of more introduced beetle species.

## Methods

The study was carried out at Castlecliff Beach, Wanganui (39°56.367'S, 174°58.590'E) where there are both spinifex- and marram-dominated dunes. Pitfall traps constructed of cut-down plastic bottles (9cm diameter) were dug into the sand, with five traps in the marram dunes and five in the spinifex dunes. Monopropylene glycol (antifreeze) was added to the traps as preservative and hardboard (10 x 15 cm) was used as a pitfall trap cover on each trap to minimise flooding and disturbance by birds. Covers were secured to the ground with wire pegs, with a 10 – 20 mm gap between the sand and the cover. The 10 traps were set on 28 May 2006 and emptied after one week. The traps were reset for another week ending 11 June 2006, giving a total of 10 marram dune samples and 10 spinifex dune samples.

Of those insects trapped, only beetles were sorted and identified to species level. Trap samples from week one and week two were pooled for analyses. Beetle community composition was compared between marram and spinifex dune traps using the analysis of similarity (ANOSIM) routine in PRIMER (Clarke & Warwick 2001). Bray-Curtis similarity indices were calculated from square root transformed data and used in the ANOSIM analysis (Clarke & Warwick 2001).

## Results and Discussion

A total of 298 invertebrates were collected in the marram dune samples, compared with 176 invertebrates in the spinifex dune samples. In total, 43 and 40 beetle specimens were collected from the marram dune and spinifex dune traps respectively, over the 2-week sampling period (Table 1). These specimens consisted of only 8 beetle species in total, 5 species were found in the spinifex samples and 7 species were found in the marram samples (Table 1). Only one specimen (*Listronotus bonariensis*, Curculionidae) was an introduced species.

There was no significant difference in the species composition of beetle communities between spinifex dunes and marram dunes (Global R = -0.096, $P = 0.778$). The most common beetle in both vegetation types was *Loberus nitens* (Erotylidae), followed by *Cecyropa ?modesta* (Curculionidae). Three beetle species (*Mandalotus* sp., Curculionidae; *Actizeta ?fusca*, Tenebrionidae; *Zeadolopus* sp., Leiodidae) were found only in the marram samples. Only one species (a singleton of the introduced weevil *Listronotus bonariensis*) was found in the spinifex samples but not in the marram samples. Three specimens of *Brullea antarctica* (Carabidae) were found, with two in marram samples and one in spinifex. Although suspected to be fairly common (M-C Larivière & A. Larochelle, *personal communication*), this large carabid has rarely been collected in the Wanganui region.

**Table 1.** Numbers of beetles caught in marram dune and spinifex dune traps.

| Beetle species | Family | Abundance in marram samples | Abundance in spinifex samples |
|---|---|---|---|
| *Loberus nitens* (Sharp, 1876) | Erotylidae | 20 | 24 |
| *Cecyropa ?modesta* (Fabricius, 1781) | Curculionidae | 15 | 12 |
| *Zeadolopus* sp. | Leiodidae | 3 | 0 |
| *Brullea antarctica* Laporte de Castelnau, 1867 | Carabidae | 2 | 1 |
| *Lagrioida brouni* Pascoe, 1876 | Anthicidae | 1 | 2 |
| *Actizeta ?fusca* Watt, 1992 | Tenebrionidae | 1 | 0 |
| *Mandalotus* sp. | Curculionidae | 1 | 0 |
| *Listronotus bonariensis* (Kuschel, 1955) | Curculionidae | 0 | 1 |

While sampling effort in this study was low (10 marram and 10 spinifex dune samples), the beetle communities in marram and spinifex dunes were remarkably similar. The beetle community in marram dunes was not less diverse than the native spinifex dune community as predicted. This may be due to marram dunes being more densely vegetated than spinifex dunes, with greater amounts of litter deposited. Marram could offer better cover and food for beetles by way of fresh and decomposing plant material than spinifex. Almost all the beetle species (apart from the obviously predatory *B. antarctica*) were saprophagous or herbivorous (R. Leschen, *personal communication*). The study was also conducted in winter, which may account for the low number of beetle species collected.

Studies on the effect of weed invasion on invertebrate communities are scarce, and there is an opportunity for further research, with greater sampling effort, conducted in late spring/summer, to determine whether beetle communities are different between marram and spinifex sand dunes.

## Acknowledgements

Andrew La Cock would like to thank his family for their help with the project. Thanks also to Stephen Thorpe for providing identifications of the beetle species. Marie-Claude Larivière and André Larochelle provided advice on *Brullea antarctica* and Rich Leschen provided advice on beetle trophic groups. This project was supported by the Landcare Research IO 'Maintaining Threatened Rare Ecosystems' (FRST contract no. C09X0503, IO4).

## References

Adair RJ, Groves RH. 1998. *Impact of Environmental Weeds on Biodiversity: A Review and Development of a Methodology.* National Weeds Program, Environment Australia, Canberra, Australia. 51pp.

Clarke KR, Warwick RM. 2001. *Changes in marine communities: An approach to statistical analysis and interpretation* (2nd ed.). PRIMER-E, Plymouth, UK. 172pp.

Hilton, M, Macauley U, Henderson R. 2000. Inventory of New Zealand's active sand dunes. *Science for Conservation 157*. Department of Conservation, Wellington. 29pp.

Standish RJ, Robertson AW, Williams PA. 2001. The impact of an invasive weed *Tradescantia fluminensis* on native forest regeneration. *Journal of Applied Ecology* 38:1253–1263.

Williams PA, Winks C, Rijkse W. 2003. Forest processes in the presence of wild ginger (*Hedychium gardnerianum*). *New Zealand Journal of Ecology* 27:45–54.