



SOIL SEED BANK DYNAMICS IN TRANSFERRED TOPSOIL

EVALUATING RESTORATION POTENTIALS

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October 2012

Acknowledgements

Thanks to my supervisors Dr. Joe Fontaine and Prof. Neal Enright for all the advice and support given over the last year. I would also like to thank the members of the Murdoch University, Terrestrial Ecology Research Group (TERG) for their valuable assistance and guidance, especially Willa Veber and Dr. Philip Ladd, as well as the Murdoch University Environmental Science Association (MUEEnSA) for helping find enthusiastic volunteer field assistants. I wish to thank the Department of Environment and Conservation (DEC) for providing technical and financial assistance in addition to information and resources that were vital to this projects success. Finally I would like to thank the Environmental Weeds Action Network (EWAN) for awarding me a scholarship to help me complete this valuable research.

DECLARATION

I declare that this thesis is my own original work and has not been submitted for any other unit for academic credit.

William Michael Fowler

ABSTRACT

Global change, increasing human population growth and urbanisation represent increasing pressures on biodiversity and ecosystem function. It is now widely recognised that conservation of existing natural fragments will not be sufficient to maintain extant biodiversity or meet conservation goals. Thus there is a major and rapidly expanding need for the practice of ecological restoration whereby degraded lands are managed to increase and maintain indigenous species.

A soil seed bank germination experiment was conducted over a period of 13 weeks. This aimed to evaluate restoration values of topsoil transfer, by investigating soil seed bank similarity to standing vegetation, and exploring mechanisms to improve restoration outcomes on the Swan Coastal Plain, Western Australia. This was experimentally designed to make comparisons between the soil seed bank pre and post-transfer, an aspect of topsoil transfer that has not been looked at previously. In addition sampling was conducted at two depths, with treated (smoke and heat) and non-treated trials. This study examined the similarity of the soil seed bank to standing vegetation, the effect of soil transfer, and the influence of soil spreading depth and fire related germination cues.

Seventy-three per cent of germinants were found in the top 5 cm of natural (pre-transfer), soil transfer leading to mixing (no depth effect) and a reduction in germinant densities (-2472.00 germinants m⁻²). Treatment with germination cues (heat and smoke in concert) increased germinant densities by 1537.80 germinants m⁻², however no increase in transferred soils was observed. Native annuals dominated species composition of transferred soils, contributing 68% of observed richness, with woody species only accounting for 9% overall. The similarity of the soil seed bank to the standing vegetation ranged from 15% to 19%, the higher similarity found when treatment was used. Overall topsoil transfer is a useful tool for restoration; however it must be used in conjunction with other methods, such as planting and direct seeding, to return a representative set of species to a site.

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