

**PROCEEDINGS OF THE AUSTRALIAN RANGELAND SOCIETY
BIENNIAL CONFERENCE**

Official publication of The Australian Rangeland Society

Copyright and Photocopying

© The Australian Rangeland Society 2012. All rights reserved.

For non-personal use, no part of this item may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior permission of the Australian Rangeland Society and of the author (or the organisation they work or have worked for). Permission of the Australian Rangeland Society for photocopying of articles for non-personal use may be obtained from the Secretary who can be contacted at the email address, rangelands.exec@gmail.com

For personal use, temporary copies necessary to browse this site on screen may be made and a single copy of an article may be downloaded or printed for research or personal use, but no changes are to be made to any of the material. This copyright notice is not to be removed from the front of the article.

All efforts have been made by the Australian Rangeland Society to contact the authors. If you believe your copyright has been breached please notify us immediately and we will remove the offending material from our website.

Form of Reference

The reference for this article should be in this general form;
Author family name, initials (year). Title. *In*: Proceedings of the nth Australian Rangeland Society Biennial Conference. Pages. (Australian Rangeland Society: Australia).

For example:

Anderson, L., van Klinken, R. D., and Shepherd, D. (2008). Aerially surveying Mesquite (*Prosopis* spp.) in the Pilbara. *In*: 'A Climate of Change in the Rangelands. Proceedings of the 15th Australian Rangeland Society Biennial Conference'. (Ed. D. Orr) 4 pages. (Australian Rangeland Society: Australia).

Disclaimer

The Australian Rangeland Society and Editors cannot be held responsible for errors or any consequences arising from the use of information obtained in this article or in the Proceedings of the Australian Rangeland Society Biennial Conferences. The views and opinions expressed do not necessarily reflect those of the Australian Rangeland Society and Editors, neither does the publication of advertisements constitute any endorsement by the Australian Rangeland Society and Editors of the products advertised.



The Australian Rangeland Society

VIVA: A DIGITAL IMAGING TECHNIQUE FOR REPEATED RECORDING OF PLANT POPULATIONS ON PERMANENT PLOTS

D.A.Roshier¹, S.J.Lee² and F.T.Boreland¹

¹NSW Agriculture, PO Box 459, Broken Hill, NSW. 2880

²40 The Avenue, Armidale, NSW. 2350

INTRODUCTION

Demographic approaches to understanding change in plant populations have been advocated by Austin (1981) and others. However, few studies of plant population dynamics in arid and semi-arid environments have involved large numbers of plants and data sets have often been inadequate (Gardiner and Norton 1983).

Photographic techniques have been used to increase scale and speed of data collection (Hacker 1978, Owens et al. 1985). However, these require manual transformation of individual elements in the photographic image onto charts or into Cartesian co-ordinates. This is time consuming and requires a second trip into the field to ground truth the data.

The VIVA system has been designed to collect serial data on individual plants from live video images of permanent plots but has the flexibility to collect data from photographs.

THE VIVA SYSTEM

VIVA (Video Imaging of Vegetation Attributes) is a menu-driven, PC-based program which records the position and attributes of individual plants. It operates in the Microsoft Windows 3.0 environment and has on-line help.

The system has three subroutines:

- the species subroutine, in which various descriptive data about the species to be measured are listed;
- the measurement subroutine, in which sites are described, quadrat co-ordinates entered, individuals located, individual plant attributes recorded, and previous samplings and individual plant attributes recalled;
- the plot routine, in which charts of the location and diameter of individual plants can be produced for particular species or dates on a particular plot.

A separate reports routine enables; individual records to be printed by site or date; site or sampling reports to be generated; subsets of data to be created; and data to be saved in a format suitable for importation into dBase IV.

OPERATIONAL PROCEDURE

Once set up over the plot to be charted the system displays a live video image of the plot and a cursor is displayed on the screen once site name, plot name and a code for the species to be sampled have been entered or selected from the menus. Four permanent markers on the plot are then located in the image and plants recorded at the previous sampling date are written to their correct screen co-ordinates with respect to the markers.

Individuals that were recorded on the previous sampling appear on the screen as a red square. Plants that were sampled at a previous sampling but not the one immediately prior to the current sampling appear as an open red box.

Once located with the cursor a new plant appears as a green square and attributes of that individual can be entered through a menu system. Age (seedling/juvenile/adult), phenological stage (vegetative/pre-flowering/flowering/fruitletting/post fruitletting/dry), sex (male/female/unknown), diameter, number of reproductive units and an estimate of percent utilisation can be recorded. If the plant has been sampled previously the

square changes colour from red to green once it has been selected and the previous values of the attributes being measured are recalled. These values can then easily be edited and saved to the current sampling.

DISCUSSION

The VIVA system is being used to study the population dynamics of four grasses and three shrubs in the chenopod shrublands of western New South Wales, Australia. Regular sampling of 120 4x3 metre permanent quadrats has produced serial data on over 13,000 individual plants.

The VIVA system has a number of advantages over the previous chart mapping, pantograph and photographic techniques. Compared to the photographic technique of Owens *et al.* (1985) it saves establishment time (3-5 minutes compared to 45 minutes), ground truthing (10-70 minutes per plot) and travel time. It also enables relevant demographic data to be collected as each individual plant is located. This is not possible with photographic techniques. The ability to display on the screen the location of previously sampled individuals for any specified time frame and recall their attributes is particularly useful for rhizomatous species.

The ability to recall previous data in the field during a sampling and to correct erroneous data easily is a major advantage of the VIVA system.

Although developed specifically for demographic studies in arid and semi-arid ecosystems the VIVA system can be used for any scale study in which individuals are identifiable on permanent plots. It will enable demographic approaches to understanding vegetation change to be undertaken at larger scales and in environments where previously logistic constraints had precluded such approaches.

ACKNOWLEDGMENTS

The development of this system owes much to the encouragement of our fellow scientists and co-workers. In particular Mr. Hans Lohri of Leica(Aust) Pty.Ltd., Mr.O.R.Southwood, Dr.D.G.Saville, Dr.G.W.King and Mr.J.W.A.Evans. The support of the Australian Wool Research and Development Corporation is gratefully acknowledged.

REFERENCES

- Austin, M.P. 1981 Permanent quadrats: An interface for theory and practice. *Vegetatio*. 46:1-10.
- Gardiner, H.G. and B.E. Norton 1983 Do traditional methods provide a reliable measure of range trend? p.618-622. In: J.F.Bell and T.Atterbury (eds) Proc. Int. Conf. on Renewable Resource Inventories for Monitoring Changes and Trends. August 15-19, 1983. Oregon State Univ., Corvallis.
- Hacker R.B. 1978 Use of large scale aerial photographs for ecological studies in a grazed, arid ecosystem. p 1895-1908. In: Proc. 12th Int. Symp. on Rem. Sens. of Environment. Environmental Res. Inst. of Mich. and Nat. Res. Manage. Centre, Phillipines.
- Owens, M.K. H.G.Gardiner and B.E. Norton 1985 A photographic technique for repeated mapping of rangeland plant populations in permanent plots. *J.Range Management*. 38(3):231-232.