

# A pest management information system in Victoria

D.W.A. Lane, J.V. Yugovic, G.D. Murphy and J.R. Backholer.

Keith Turnbull Research Institute, Land Protection Division, Department of Conservation, Forests and Lands, P.O. Box 48, Frankston, Victoria 3199, Australia

## Summary

The Pest Management Information System provides standardized data on pest plant and animal problems and their management by the Department of Conservation, Forests and Lands in Victoria. The micro-computer based system maintains information on the location and extent of infestations, details of affected sites, methods and resources used in treatment, and the effectiveness of control programs. The operation and applications of the system are discussed.

## Introduction

The Department of Conservation, Forests and Lands (CFL) undertakes pest plant and animal control to protect the production and conservation values of land in Victoria. Problem identification and management is undertaken by the 16 CFL regions, with policy, research and extension support from the Land Protection Division (LPD).

The overall pest control strategy of the department (CFL 1986; Government of Victoria 1987) is to:

1. Survey the occurrence of pest plants and animals;
2. Ensure a high level of pest control in priority areas;
3. Measure the effectiveness of control methods and management programs;
4. Minimize undesirable ecological effects;
5. Monitor potential pest species.

The Pest Management Information System (PMIS) was developed to help meet these objectives. The information system stores and transfers data between groups involved in policy, planning and operations at State and regional levels. Similar systems have been implemented by the Agriculture Protection Board of Western Australia (Sexton, pers. comm.) and the Division of Primary Industries in the Northern Territory (Schultz 1987).

Government involvement in pest control faces demands that control objectives be justified ecologically (Moore 1971; Quinlivan 1972; Amor and Twentymann 1974) and economically (Williams 1977; Auld *et al.* 1987; Pannell 1987). The PMIS is intended to facilitate the ecological and economic evaluation of programs.

## Description

The PMIS is a site-based system. A site specifies the location of an infestation, using suitable boundaries such as roads, rivers,

crown allotments or reserves. It may include all or part of an infestation. This flexibility allows a site to provide a practical unit for management. Data recorded relate to the infested area (not to the site as a whole), enabling valid descriptions of infestations and comparisons between species.

## Components

The pest management form (Figure 1) is used to record data. It has three sections: (i) the site report, which records the location, extent and characteristics of an infestation; (ii) the treatment report, which records treatment details, including the method and resources used; and (iii) the assessment report, which records the effectiveness of treatment. Not all sections are necessarily completed at one time.

The job form is used to prescribe work to be carried out, and to keep a record of work in the field. Information from the job form is not recorded in the computer database, however it contains details useful for completing the treatment report. Use of the job form is optional.

The computer database runs on IBM compatible microcomputers and is programmed in dBASE III PLUS. A copy of the relevant report is displayed on the screen to simplify data entry. The database has a search function and many standard reports. Further interrogation of the database is possible using dBASE commands or the dBASE ASSIST menu.

The pest plant overview records the distribution of widespread weeds where site reports do not record all infestations. Species are rated by infestation area, within land-tenure classes, in management units (usually parishes) used by the region. Overview information is presented in tabular or graphic form.

The manual (1988) describes the system and defines the procedures for its use.

## Data standards

Data standards are defined to provide accurate, useful and unambiguous descriptions of infestations and their management. Where possible data are quantified or recorded using standard codes. This reduces differences between recorders and simplifies data entry, retrieval and interpretation. The computer database displays the full text of some coded items, e.g. species are entered as codes, while common names appear in outputs. Pre-classification of data is minimized

to maintain its usefulness for diverse applications. The more important data standards are discussed below.

The Public Lands and Forests Division of CFL maintains codes for all vascular plants in Victoria, and these are used for recording pest plants. Codes for pest animals have been devised by LPD. Sites are allocated a 5-digit code which links site, treatment and assessment reports for data entry and retrieval. The combination of site code and species code uniquely identifies an infestation.

Site location is specified by the National Topographic Series map number and grid reference. This enables data to be related to other geographically based information such as land systems or administrative boundaries for data interpretation or planning.

Percentage cover is used to estimate the incidence of weeds rather than qualitative descriptions such as light, medium or dense. This is necessary when comparing weed impact or when monitoring the effectiveness of control programs. For pest animals, standard methods for assessing populations vary with species. Methods for spotlight transects and active warren counts are given in the manual.

The product name for pesticides specifies active constituents, formulation and proportions of mixtures. This simplifies recording, but complicates the retrieval of information on particular chemicals that are available in a range of products.

A standard project code is used on the treatment report. This enables details of resources used at a site or against a species to be linked to the departmental financial management system.

## Operation

The system is maintained on microcomputers by the 16 regions of the department. The Land Protection Division maintains a State-wide database which is to be updated annually from the regional databases.

The system is managed by the Pest Plant and Animal Planning Officer in each region. Reports are generally completed by Land Protection Officers or Park Rangers. Copies are retained by recorders, providing a reference where computer access is not available. Computer generated indexes are regularly provided to recorders to assist their management of forms. The operation of the system in terms of form use and flow is shown in Figure 2.

Site reports are made in anticipation of managing pest problems on public land, or as part of routine inspections of private land. For widespread species, site reports are not used to record every infestation, however, they collectively provide an inventory of problems caused by the species. Pest plant sites may be created following an overview of a species. Pest animal sites identify areas

where problems caused by the species are expected to recur. Only one site report is ever used to record an infestation.

Treatment reports are required for work undertaken by the department. A site can have any number of treatment reports over time. If only part of an infestation is treated, details in the treatment report apply to the treated area only. Where work is carried out on private land by the owner, to comply with the requirements of the department, a treatment report is not needed, although the site record should be updated.

Assessment reports are used to monitor

program effectiveness. For pest plants, the assessment is made 10-12 months after treatment, providing an indication of long-term change in the infestation and follow up work required. Pest animal populations are assessed immediately before and after treatment.

**Applications**

*Planning*

The system provides an informed basis for planning. Treatment history, policy guide-

lines or other considerations can be used to select sites for management. Infestation details assist in determining treatment methods, estimating resources required for management programs, and in the preparation of job prescriptions. Information on the location of problems assists with the integration of treatments.

*Monitoring*

Treatment effectiveness and the progress of control programs can be monitored since treatment and assessment reports relate specifically to treated areas. The labour and material costs per unit area (ha) can be calculated for each method. Cover estimates (plants) or abundance estimates (animals) quantify the results. Methods can therefore be compared on the basis of cost and effectiveness. Comparison of treatments at different sites or on different dates allows variation in the effectiveness of methods to be estimated. The treatment effect code on the plant assessment report indicates whether (i) non-treatment factors influenced plant cover; (ii) non-target damage occurred; or (iii) the target species was replaced by other weeds.

*Reporting*

The system provides most of the detail required for annual reports and servicing information requests. The database can be interrogated to provide a wide range of information as the need arises. Numerical calculations made from the data can be presented as tables, and these can be incorporated into documents using a word processor.

*Policy development*

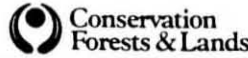
Management and policy development are interactive processes. Records of problems and their management, and predictions of future spread and impact, assist policy development. Policy guide-lines influence regional priorities in the identification and management of sites.

*Ecological assessments*

Site data contribute to an understanding of the ecology of pest species. Land-use categories, and vegetation categories (plants), indicate habitats in which infestations occur. Plant cover or animal population estimates indicate the suitability of habitat for a species. Interpretations can be extended using the departmental Geographic Information System, by which site-specific data can be overlaid on mapped information. This helps determine associations between infestations and physical or biological parameters. Care must be taken in making interpretations as site reports may not be a representative sample of widespread problems.

*Economic assessments*

The system contributes to economic as-



PEST MANAGEMENT FORM

Plant  Animal   
 Species code: 2952 Common name: BLACKBERRY  
 Site code: 12345 Site name: SCRUBBY CREEK RESERVE

SITE REPORT

Map reference: 7724 - 562 333 Site map (Y/N): N  
 Operations area: NORTH EAST Manag. unit: P. WANDER ALONG  
 Infested area (ha): 10 Land tenure: 2B Land use: 7  
 Property owner/manager: Telephone:

PEST PLANTS

PEST ANIMALS

Category: 3 Accessibility: 2  
 Pest plant cover (%): 50  
 Vegetation: 10, 11  
 Infestation beyond site (Y/N):

Frequency of problem (1-3):  
 Sign/activity (1-3):  
 Damage (specify):

Regional priority: 2 Recommendation: 1 Comments: SCATTERED PATCHES WITH LARGE AREAS ALONG THE CREEK, ACCESSIBLE FROM FIRE TRACK  
 Recorder: L.P. OFFICER Date: 01/04/87

TREATMENT REPORT

Project code: 7995051 N Entry work cash (C) or forced (F):  
 Treated area (ha): 5 Land tenure (treated area): 2B  
 Retreatment (Y/N): N Starting date of prior treatment:  
 Labour (nearest 0.5 days): 9 Aircraft charter (hrs):  
 Methods: SPOT SPRAYED 1:500 GARLON  
 Materials: Product Amount Unit  
 GARLON 480 20 L Vehicle: 350 (km) 140 (\$)  
 Plant: (hrs) (\$)  
 Starting date: 04/02/88 Completion date: 06/02/88  
 Recorder: L.P. OFFICER Comments: SOME SIGNS OF RUST ON YAMMERT LEAVES

ASSESSMENT REPORT

PEST PLANTS

PEST ANIMALS

Treatment starting date: 04/02/88  
 Cover before (treated area): 50  
 Cover after (treated area): 1  
 Treatment effects: BDR  
 Total infested area (ha): 10  
 Total pest plant cover (%): 25

Treatment starting date:  
 Method:  

Date	Count
Pre-treatment:	
Post-treatment:	

 % reduct.: Carcass nos:

Comments: SOME SMALL NATTLES AND EGGS KILLED, SOME THISTLES APPEARING IN TREATED AREAS  
 Recorder: L.P. OFFICER Assessment date: 20/12/88

Figure 1. Pest Management Form with sample data.

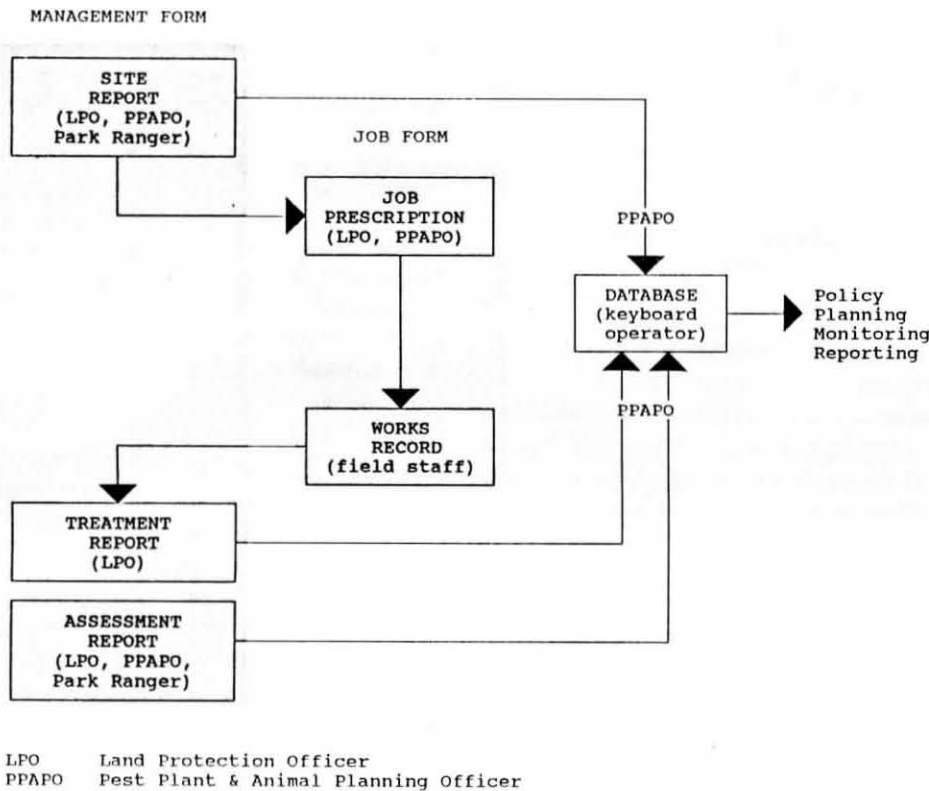


Figure 2. Operation of the information system in terms of form flow.

assessments of pest infestations and their management. For instance, biological control submissions require an economic assessment of a species and options for its control. Costs can be calculated from treatment report data. The extent and severity of infestations can be used to estimate losses if the relationship between pest incidence and production loss is known.

#### Potential pest species

An assessment of the pest potential of a species is a basis for proclamation. The combination of ecological and economic assessments can indicate the potential distribution of a species and the losses it could cause. For threats to conservation, an assessment of impact on conservation values is needed.

The system will show the extent of reported infestations in relation to areas considered at risk.

#### Status

The PMIS was released in October 1987. Acceptance and implementation of the system is a gradual process. It was operational in most regions by July 1988 but is not expected to be operational in all regions until 1989 or 1990.

Recorders have to be shown that data collection is worthwhile, and that the PMIS should replace recording systems they currently use (if any). Managers need to see that improved operational efficiency will justify the cost of running the system (data collection and entry, training etc.). Similar is-

sues were identified in the implementation of the Tasmanian Department of Agriculture's Property Information System (Fenn, 1988).

System support is provided by LPD. Software development is continuing and more standard outputs are being programmed as needs arise. Establishment of the system on the departmental PRIME mainframe computer network is under consideration. A microcomputer interface will be maintained.

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