A community-based weed detection network: developing a model for application in Australia

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Summary The National Weed Detection Project is an innovative national pilot project funded through the Cooperative Research Centre for Australian Weed Management and the National Heritage Trust, and is based at the Queensland Herbarium. The project draws on previous and new initiatives to test if a community-based weed detection network increases incursion preparedness. Through empowering and engaging the community, volunteers detect new incursions and provide reference points in the form of specimens that are submitted to state herbaria for taxonomic verification. These Weed Spotters have provided over 159 weed specimens from the two pilot regions where the model is being trialled.

Spotters are trained in weed collection techniques, and provide specimens to the regional coordinator. Coordinators filter specimens for incorporation into the Queensland Herbarium collection, and record localities onto a database. They follow a set procedure to report alert weeds, and are contributing to the development of baseline lists of weeds for each region. This network is improving our distributional and ecological data whilst providing early detection of new occurrences of weeds.

Keywords Weed detection network, NWDP, community-based, volunteers, weed spotters.

INTRODUCTION

Australia’s European history has seen the invasion of thousands of plants into agricultural areas and natural ecosystems. Some of these have been accidental; usually contaminants of imported crop or pasture. The majority have been deliberately introduced through the garden industry (Groves et al. 2005). Since the first fleet arrived in 1788 there has been a constant stream of utility and ornamental plants arriving in Australia. Groves et al. (2005) states that of the 2779 introduced plant species known to be established in the Australian environment, 1831 (or 66%) of these are escaped garden plants.

There has been considerable tightening of regulations to reduce accidental or intentional introductions of weeds to Australia. However the concern now and into the future is the weed potential of plants already present in Australian gardens and nurseries. Because of the demand for fashion from the gardening public, many relatively new and untested species of plants are being distributed through the Internet and mail services.

Weed potential is difficult to predict. The time from introduction, as a cultivated species, to a species becoming naturalised can vary from less than 20 years to as many as 300+ years for some woody ornamentals (Groves et al. 2005). How then do we detect these new and emerging weeds in their early stages to reduce the long term economic, social and environmental costs to Australia? Community-based weed detection networks are one of the tools that can be used in the early stages of invasive species management. This paper describes the National Weed Detection Project (NWDP). This innovative pilot project is a model for an Australia-wide community-based network for early detection of invasive plants. The network is a collaboration involving state and national herbaria, state and local weed agencies and existing established community groups.

COMMUNITY BASED WEED DETECTION NETWORK MODEL

The Cooperative Research Centre for Australian Weed Management (Weeds CRC) and the National Heritage Trust (NHT) are funding the National Weed Detection Project (NWDP) for a period of four years with the aim of testing a model for a community-based weed detection network.

Development of the model began in June 2004 and the network began operating in July 2005 with a Weeds CRC Regional Coordinator in place in two pilot regions of Queensland – Rockhampton and Townsville. Collaboration with existing community and government networks provided significant direction for the development of the model and this has been described in Morton (2005).

Figure 1 presents the model for the pilot. The steps in Figure 1 are described below.

1. Weed Spotters are people who volunteer or work in existing weed management networks, community based groups, and government agencies such as Society for Growing Native Plants, local Landcare or Coastcare groups and Local Government...
Pest Management Officers. Each Weed Spotter is trained in plant collection techniques, hygiene protocols and health and safety and are provided with resources to assist with collecting weed specimens. Weeds Spotters are asked to collect duplicate specimens of new and emerging weeds found in their region.

2. The specimens (collected in duplicate) are delivered (post/person) to the Weeds CRC Regional Coordinator (two coordinators; Townsville, Rockhampton) who filter specimens using Queensland Herbarium criteria before forwarding onto the Queensland Herbarium. One specimen is retained in the regional herbarium and the other forwarded onto Queensland Herbarium.

3. Queensland Herbarium provides taxonomic verification of specimen. Specimens representing new records and distributions are incorporated into the collection and associated database HERBRECS.

4. The Queensland Herbarium notifies the Queensland Department of Natural Resources, Mines and Water (NRM&W) of new naturalisations through a notification protocol. In the pilot regions, the Queensland Herbarium includes the Local Government Pest Management Officer in the notification loop.

5. This pilot project does not cover the response component. The diagram describes what may occur once NRM&W has received notification.

**Role of the Weeds CRC Regional Coordinator (Weeds CRC RC)** The two coordinators act as conduits for feedback from Steps 3 and 4 to Weed Spotters in each region.

Coordinators have direct links to State and Local Government and community groups through the network. This ensures good communication and dissemination of information about new incursions.

**Role of Weeds CRC National Weed Detection Project Officer (Weeds CRC PO)** This officer has the role of developing, managing and coordinating the project across Queensland, including supporting the Weeds CRC RCs and providing training, information and material for use by Weed Spotters across Queensland. This position is currently based at the Queensland Herbarium.

**ROLLING OUT THE NETWORK**

**Initial presentations to potential spotters** From June 2004 to May 2005 presentations were delivered to key groups and umbrella groups in pilot regions, describing the NWDP and how to become involved in the Weed Spotters network. Registrations from these groups occurred in this time frame with 54 people registering their interest.

**Evaluation of botanical expertise in the pilot regions** In late 2004 the existing level and distribution of plant identification expertise was assessed in the Queensland pilot regions. The analysis of this evaluation fed directly into the design and development of the Weed Spotters training resources. A questionnaire was given to nine people who had high levels of botanical expertise. These people were asked to describe a group of others they worked with, either professionally and/or personally, in terms of the level and distribution of plant identification skills.

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**Figure 1.** National Weed Detection Model being piloted in Queensland.
The level of botanical expertise described by recipients was in field recognition and not taxonomy. The majority of those with field recognition skills were located in major towns such as Townsville, Rockhampton and Gladstone rather than rural communities. Training therefore was designed for delivery in the field and in regional centres of the pilot regions.

Queensland Naturalised Flora Surveys Project Funding was committed to the Queensland Herbarium from the Weeds CRC to provide base line survey data for both pilot regions over the 2004–2007 time frame. The data collected will provide additional support and resources for the NWDP through updated geographical and ecological data for naturalised exotic plants in those areas.

In 2004–2005, the eight local government areas in the Rockhampton pilot region were surveyed. 2500 specimens for 500 species were collected and incorporated into the Queensland Herbarium collection. The Townsville survey began in March 2006 covering the six local government areas in the Townsville pilot region. These weed surveys have strategically sampled disturbed, modified and developed sites such as road and railway corridors, rubbish dumps, sale yards and disturbed remnant vegetation areas which were considered to be vulnerable.

Development, delivery and evaluation of Weed Spotters training Training resources in weed collection techniques were developed in early 2005. These were aligned to the Conservation and Land Management National Training Package, Level Two competency RTD2004A: Collect, prepare and preserve plant specimens.

Delivery of weed collection techniques training began in May 2005. Seven sessions across both regions over a seven-month time frame were delivered. A total of 94 people have been trained. Evaluation of the training in December 2005 confirmed that the training provided relevant information and practical skills. A recommendation from this evaluation was to further provide weed recognition training in both pilot regions for Weed Spotters. This training is underway at present in the Rockhampton region using the Naturalised Flora Survey baseline species data.

The Weed Spotters network In March 2006 the Weed Spotters network had 142 people registered with 94 of those trained in weed collection techniques and a further 18 people trained in weed recognition in the pilot regions of Queensland. Seven weed collection and a weed recognition training session has been delivered. The main audience is local community groups such as Landcare and Society for Growing Native Plants, Local Government Pest Management Officers and individual landholders. The majority of Weed Spotters are members of 14 community groups or employees of 12 Local Governments.

Resources to the network Weed Spotters receive the following resources when attending the training:

- Training manual in Weed Collection techniques or Weed Recognition
- Weed Spotters Kit containing resources that assist with collecting, preserving and collection of data for weed specimens.
- Field plant press provided to each community group and Local Government that attend training
- Quarterly Weed Spotters newsletter highlighting weeds found by spotters in the network and new naturalisations to Queensland.

Note: In March 2006, 279 people receive this newsletter electronically or by mail.

What have spotters spotted? Weed Spotters have submitted at least 159 specimens to the Queensland Herbarium since January 2005. Of those fourteen have been notified to the State and Local Pest Management Agency. The following lists those weeds notified:

- Acacia curassavica (Britton & Killip) Stehlé – Class 1
- Thunbergia fragrans (Roxb. ex Rottler) Roxb. – Class 1
- Thunbergia grandiflora (Roxb. ex Rottler) Roxb. – Class 2
- Asystasia gangetica subsp. gangetica Alert weed reference DEH Alert Weed Publications
- Eichhornia crassipes (Mart.) Solms. – Class 2
- Sporobolus jacquemontii Kunth. – Class 2
- Barleria lupulina Lindl. – Alert weed reference DEH Alert Weed Publication
- Turnera ulmifolia L. – considered to be a potential environmental weed.

(Class 1 and 2: Declared plants under the Queensland Land Protection (Pest and Stock Route Management) Act 2002).

Acacia curassavica specimens were collected from three different locations and T. fragrans specimens were collected from five different locations.

Response to finds Though this community-based weed detection network model does not deal with response, the network has provided key information to State and Local Agencies about particular weeds, enabling them to respond within their jurisdiction.
In the cases of *A. curassavica* and *T. fragrans* the Queensland Department of Natural Resources, Mines and Water responded to the notifications and Townsville City Council also responded to the notifications for *A. gangetica* subsp. *gangetica*, *B. lupulina* and *T. ulmifolia*.

**Data recording** All specimen data is recorded into WildNet Lite to nationally agreed core attributes for measuring and recording weed monitoring programs/projects (Thackway *et al.* 2004). WildNet is the Queensland Environmental Protection Agencies corporate information system for Queensland wildlife and includes the specimen label information from the Herbarium’s HERBRECS database. It is used for entry and management of wildlife and site information. Each of the Weeds CRC RC’s and the Weeds CRC PO record all specimen information submitted by Weed Spotters. This data can be extracted and provided to other platforms such as PestInfo (NRM&W) for analysis.

**CONCLUSION**
This project has raised awareness of new and emerging weeds and delivered processes and protocols for the early detection and notification of weed incursions to State Agencies, Local Governments, NRM Regional Bodies, Community Groups and individual members of the community in two regions in Queensland.

**Raised awareness in new and emerging weeds** The number of subscribers to the Weeds Spotters Quarterly newsletter shows a definite interest in potential new and emerging weeds. The first newsletter was released in September 2005 to those 94 people who had registered as Weed Spotters in the training. By the third newsletter in March 2006 interest had increased to over 259 subscribers. This increase could be seen as a domino effect with the newsletter being forwarded onto friends/co-workers and interested persons who request to be put into the database to receive this information. It would seem there is a knowledge gap in this area that the Weed Spotters newsletter has filled. The raising of awareness of subscribers can only lead to a better-informed detection network and potential new Weed Spotters in the future.

**Model of collaboration** Detection of new and emerging weeds is often the weakest point in early invasive species management. The rolling out of the NWDP in Queensland provides an effective, low cost method for addressing this dilemma.

Drawing on Weed Spotters in a network, trained to a consistent level in plant collection techniques and weed recognition provides quality specimens and field information to those State and Local Agencies whose core business is verification, notification and response to new weed incursions. There is substantial long-term economic and environmental benefit to be gained from early detection (Agtrans Research 2005). By linking NRM Regional Bodies, State Agencies, Local Governments, Community Groups and individual members of the community to a functioning weed detection process and protocol, this weak point in early invasive species management is minimised.

Added benefits include recording data to nationally agreed core attributes and access to specimen-backed data nationally through the Australian Virtual Herbarium (AVH).

Should the Australian Government choose to invest in the national application of regionally based weed detection networks they would be capitalising on an effective, low cost tool in early invasive species management.

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**REFERENCES**

