How is the national Chilean needle grass program progressing?

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Summary The National Chilean Needle Grass Task-force recently reviewed the progress of the ‘Weeds of National Significance Chilean Needle Grass (Nassella neesiana) Strategic Plan’. Twelve national projects funded through the Natural Heritage Trust are making an important contribution to the four goals of the Plan. Detailed Chilean needle grass, Nassella neesiana (Trin. & Ru. Barkworth), distribution mapping has allowed the problem to be more accurately scoped. Best practice management, utilising a range of techniques, continues to be advanced. New technologies for preventing spread have been developed. Extension packages to inform land managers of the issue and solutions have been executed.

Keywords Chilean needle grass (CNG), Nassella neesiana, Weed of National Significance (WONS), weed strategic planning.

INTRODUCTION
The value of strategic plans pertaining to weeds is often questioned. Much effort and resources may be expended in their development, with little or nothing remaining for implementation. The ‘Weeds of National Significance Chilean Needle Grass (Nassella neesiana) Strategic Plan’ (ARMCANZ, ANZECC and FM 2001) (hereafter referred to as the National Strategic Plan), launched in 2001, well highlights the vast and numerous challenges that confront those endeavouring to combat this weed of pastures, roadsides and indigenous grasslands. Four goals underpin the actions in the National Strategic Plan: The need to (1) scope out the problem; (2) develop best management options; (3) prevent, contain and rehabilitate infestations; and (4) develop extension packages. With such large tasks at hand, one may ask: ‘How is the national Chilean needle grass (CNG) program progressing?’

McLaren et al. (2002) outlined the proposed activities of 12 national CNG projects funded through the Natural Heritage Trust (NHT) (Table 1). Projects commenced through 2001 to 2003, with all levels of Australian Government and two major universities involved in managing the projects, and working to achieve the vision of the National Strategic Plan: ‘To stop the spread and reduce the occurrence and impacts of CNG in natural and agricultural ecosystems’. A National Taskforce was established in April 2003 to oversee the implementation of the National Strategic Plan and set priorities and future directions. The Taskforce has recently reviewed the progress of these projects against the actions in the National Strategic Plan, to highlight what still needs to be achieved. This rigorous monitoring and evaluation allows for an accurate answer to the question posed.

Table 1. CNG projects funded through the national component of the NHT.

<table>
<thead>
<tr>
<th>Project title</th>
<th>Responsible organisation</th>
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<tbody>
<tr>
<td>1. National coordinator</td>
<td>Victorian Department of Primary Industries (DPI)</td>
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<tr>
<td>2. Regional best practice management</td>
<td>DPI and NSW Agriculture</td>
</tr>
<tr>
<td>3. Grazing management for long-term utilisation and control</td>
<td>The University of New England, The University of Melbourne and DPI</td>
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<tr>
<td>4. Raising awareness, determining extent and targeting control</td>
<td>South Australia Animal and Plant Control Board</td>
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<td>5. Implementation of biological control</td>
<td>CRC for Australian Weed Management and DPI</td>
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<tr>
<td>6. Landscape support – weeds on roadsides</td>
<td>Rural City of Wangaratta</td>
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<tr>
<td>7. Landscape support – weeds on roadsides</td>
<td>Indigo Shire Council</td>
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<td>8. Testing and improving the effectiveness of best practice control in a range of practical land management contexts</td>
<td>Victoria University of Technology (VUT)</td>
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<td>9. Reducing spread through improved slasher hygiene</td>
<td>Royal Melbourne Institute of Technology (RMIT), DPI and City of Hume</td>
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<td>10. Victorian community coordination to minimise impacts</td>
<td>DPI</td>
</tr>
<tr>
<td>11. Helping the community by investigating herbicide options for its control</td>
<td>DPI</td>
</tr>
<tr>
<td>12. Management in the ACT</td>
<td>Environment ACT, NSW National Parks and Wildlife Service</td>
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RESULTS AND DISCUSSION

Highlights of how these 12 projects have contributed to the fulfilment of the four main goals of the National Strategic Plan are outlined below. Before considering the activities that have occurred, one must realise that the impacts of CNG have only begun to be appreciated. The goals of the National Strategic Plan thus focus on fundamental extension and research activities.

**Goal 1: Scope out the problem** Although CNG (Nassella neesiana (Trin. & Rupr.) Barkworth) has been present in Australia for decades (first being recorded in a northern Melbourne suburb in 1934), it has only recently been recognised as a serious weed threat. Mapping is an essential tool to scope the CNG problem that exists, so that further spread can be mitigated and appropriate prioritisation of control activities can occur.

The project ‘Victorian Community Coordination to Minimise Impacts’ highlights how this challenge was met throughout this State. Four regional facilitators, based in regions of Victoria where the weed occurs, developed a mapping methodology specifically for CNG and undertook surveys throughout their respective regions. Local government, notably the Rural City of Wangaratta and the Shire of Indigo through their projects ‘Landscape Support – Weeds on Roadsides’, rendered assistance in this endeavour. Data were recorded on the Victorian Department of Primary Industries’ (DPI) statewide mapping program for weeds, the Integrated Pest Management System (IPMS). A more accurate representation of the extent of CNG throughout Victoria is now available.

Similar results have been achieved in South Australia, where mapping was carried out in the project titled ‘Raising Awareness, Determining Extent and Targeting Control’, and in the Australian Capital Territory in the project titled ‘Management in the ACT’.

**Goal 2: Develop best bet management options** ‘So, how do I control CNG?’ It may sound like a simple question, but there is often not a simple answer. Knowledge of appropriate management practices for CNG is fragmentary and largely untested. The National Strategic Plan identifies grazing management, mechanical control, chemical control and biological control as being potential control tools, and each of these options has been or is being investigated in the national WONS program.

Grazing management to control CNG is being applied in the ‘Regional Best Practice Management’ and ‘Grazing Management for Long-Term Utilisation and Control’ projects. Research for both projects is being undertaken as a Ph.D. study that commenced during 2003. The former project has seen the establishment of five demonstration sites throughout the Australian range of CNG. Treatments designed to explore the value of grazing management, fertility management, herbicide application, adding competitive pasture species and cropping, were devised in consultation with local land managers to reflect district practices. The basic philosophy used in the design of the experiments is to attempt to reduce grazing selectivity and thereby promote competition from desirable species. Once completed, best-bet management guides for the control of CNG in pastures will be produced.

The second aspect of the Ph.D. project focuses more closely on grazing management by investigating the optimum stock class (i.e. sheep versus cattle) and grazing regime (i.e. set stock versus rotational) for CNG control, the use of spray topping (herbicide application at a sub-lethal rate) after grazing to limit the production of panicle seeds, and the use of seasonal burns to reduce the soil seedbank. Feed evaluation trials have also been planned, in order to quantify the nutritional value of CNG. Although both grazing management projects have commenced data collection, there are limited data for analysis at this stage. Conclusive results, with published studies, are not expected until 2006.

The management of CNG is not limited to agricultural ecosystems. Invasion is also a major threat to endangered indigenous grassland communities. Management prescriptions for the control of CNG in areas of conservation value were targeted in the project ‘Testing and Improving the Effectiveness of Best Practice Control in a Range of Practical Land Management Contexts’, which concluded in December 2003. Efforts focused on utilising slashing, burning, chemical control, and replacement of CNG with indigenous grasses. Although slashing or burning in late spring did not destroy plants, they demonstrably weakened growth and prevented reproduction, and so can make a useful contribution to an integrated management regime. The CNG seedbank and emergent seedlings were reduced to low levels by repeated spraying with selective herbicides, and control was even more effective when followed by revegetation with highly competitive kangaroo grass (Themeda triandra) (Hocking and Wlodarczyk pers. comm.).

At present, there are no herbicides registered for the control of CNG in Australia. Before registration can occur, the optimum herbicide at the optimum rate must be determined. The DPI is working to achieve this end in the project ‘Helping the Community by Investigating Herbicide Options for its Control’. Trials using different herbicides, at different rates, by different application methods and at different times
are to determine the means by which: to give complete control of plants; to arrest replenishment of the soil seedbank and allow for grazing by preventing both aerial and cleistogone seed production; and to spot treat sporadic infestations. Trials were first carried out in 2003 (mostly in spring, before unpalatable flower stalks were produced), and will be repeated at the same time in 2004. Discussions with major chemical companies indicate their willingness to put CNG on their labels once the necessary data have been generated (McLaren pers. comm.). Once accomplished, special permits for off-label use of herbicides to control CNG will no longer be required.

A project examining the possibility for biological control of *Nassella neesiana*, Implementation of Biological Control’ is another long-term undertaking that could provide a useful management tool. Surveys of pathogens attacking the plant in its native range of South America revealed three potential pathogens for biological control – a smut, *Ustilago sp.* and two rust species, *Puccinia nassellae* and *Uromyces pencanus*. Results show that Australian *N. neesiana* is susceptible to infection by both *U. pencanus* and *P. nassellae*. *U. pencanus* particularly holds promise, as its full life cycle occurs on CNG and it attacks CNG collected from a range of Australian locations. However, only two of the 64 plant species selected for investigation had undergone host specificity testing at the time of writing. Testing is being carried out by a plant pathologist in Argentina, as biological control quarantine facilities in Australia do not currently meet standards that permit work with airborne pathogens.

Please note that no single management technique described above is likely to result in the effective long-term control of CNG. Rather, a combination of treatments – often labelled Integrated Weed Management (IWM) – is the recommended approach. Such an approach has been adopted in projects two, three, eight and twelve of the national CNG program (Table 1).

**Goal 3: Prevent, contain and rehabilitate infestations** ‘Prevention is better than cure’. This old adage is very true when related to the management of CNG, which becomes extremely difficult to control once established. Since people are primarily responsible for the spread of CNG, through contaminated equipment and materials and the movement of livestock from infested to clean areas, prevention means stopping, or at least reducing the spread of propagules.

‘Reducing Spread Through Improved Slasher Hygiene’ is a project tackling this issue. Slashers are frequently used in routine maintenance and fire management activities, and are implicated in significant weed spread, particularly along roadsides. A virtual slasher model was developed as a fundamental first step for understanding what happens during the slashing process and how the design of the slasher influences the dispersal of CNG. The accuracy of the model-generated data was validated through a comparison with field data, from slashing of actual infestations at Sunbury (Victoria), after which the slashers were placed in a wind tunnel to enable clear identification of ‘dead zones’ (i.e. areas of the slasher where the accumulation of debris occurs). Results clearly show that vast numbers of CNG seeds fall on the slasher deck, inevitably dropping off the deck and are dispersed.

Simple modifications of existing slashers have been developed to minimise this collection and dispersal process. Front shields attached to the slasher deck, were shown to reduce seed accumulation by about half, from 16,212 seeds collected on a basic slasher to about 8000 seeds on a slasher fitted with shields (Subic pers. comm.). A more substantial reduction of seed accumulation on the slasher deck has been realised through the development of a novel slasher cover, with the number of accumulated seeds being reduced to just 122 (Subic pers. comm.). The benefits of this research transcend the CNG program, as widespread utilisation of such a cover would significantly minimise the spread of all weed species occurring in the slasher’s pathway. RMIT and DPI are currently investigating means of delivering the slasher modifications to the community.

**Goal 4: Develop extension packages** The four regional facilitators who undertook the state-wide mapping program under the project ‘Victorian Community Coordination To Minimise Impacts’, also embarked on a major extension campaign. As well as holding numerous information sessions with community groups and others, they produced various extension packages. A PowerPoint training presentation was developed and distributed, focusing on the identification of CNG and weed hygiene practices. Its simple design (of pictures/illustrations with associated text on each slide) enables state government weed or catchment management officers, local government environment officers and community group representatives to give the presentation themselves, thus reaching a far greater audience than if the facilitators alone gave presentations. To aid machinery hygiene practices, a Landcare Note detailing step-by-step procedures for operators was developed (Tyers et al. 2004).

**Monitoring and evaluation** The National Strategic Plan states: ‘A management group for CNG should be established to monitor and evaluate the efficacy of this strategy’ (p. 19). A National CNG Taskforce was
established in April 2003, with members representing relevant State and Territory government agencies, research organisations, industry and the community. Under the guidance of the National CNG Coordinator, who acts as Executive Officer to the Taskforce, the main term of reference for the group is: ‘To coordinate the implementation of the National Strategic Plan for CNG and monitor progress’.

With implementation of the National Strategic Plan underway through various projects, the Taskforce determined that there was a need to further facilitate the coordinated effort. This firstly involved evaluating the extent to which actions in the National Strategic Plan were being addressed. In September 2003, the National CNG Coordinator produced ‘The 2003 Annual CNG Progress Report for the Australian Weeds Committee’ (unpublished report). The report outlined progress against the actions in the National Strategic Plan, and highlighted the achievements as well as the ‘gaps’. The Taskforce then used this document to determine what various land managers should be encouraged to undertake as a matter of priority. The resulting working document (unpublished report), was endorsed by all members in December 2003.

The Taskforce found that most of the actions revolving around the four major goals in the National Strategic Plan are complete or in progress. The first goal ‘to scope out the problem’ has been carried out throughout the Australian range of CNG, even in NSW (although maps of CNG infestations throughout NSW are not available to the public at this stage). The Taskforce is likewise pleased with progress of the second goal, ‘to develop best management options’, as all weed control techniques (i.e. herbicides, mechanical control, grazing, fire and biological control) are currently being investigated in the projects described.

Some aspects of the third goal ‘to prevent, contain and rehabilitate infestations’ require a more concerted effort. The development of novel technologies to significantly reduce seed spread by slashers has gained much acclaim, however hygiene protocols need to be implemented nationwide for spread to be effectively prevented. Rehabilitation is also difficult at this time, with best management options still being researched. The affected jurisdictions and Taskforce will need to further promote management options and associated rehabilitation when suitable tools have been proven effective by current research efforts. All affected jurisdictions have embraced the need to develop extension packages by producing extension material and by holding workshops/displays to enable the accurate identification of CNG. Extension is a crucial first step, as land managers must be able to accurately identify a weed before they can be expected to control it.

Therefore, with most of the actions in the National Strategic Plan either having already delivered an outcome or in the process of so doing, it must be concluded that the projects involved in the national CNG program have made an integral contribution toward achieving the desired outcomes. An evident demonstration of how a strategic plan need not gain dust, but be guided to fruition.

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REFERENCES


