WEEDS OF NATIONAL SIGNIFICANCE

CHILEAN NEEDLE GRASS

(*Nassella neesiana*)

Strategic Plan

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Supporting information about the National Weeds Strategy, Weeds of National Significance and progress to date may be found at www.weeds.org.au where links and downloads provide contact details for all species, their management committees and copies of the strategy.

This strategy was developed under the leadership of the Dept of Natural Resources & Environment, Victoria with full cooperation of all the States, Territories and Commonwealth of Australia.

Comments and constructive criticism are welcomed as an aid to improving the process and future revisions of this strategy.

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For further information contact:
John R Thorp, Project Manager
For the National Weeds Strategy Executive Committee
16 Flowers Court LAUNCESTON Tas. 7250
Telephone: (03) 6344 9657 Mobile: 0419 323 400 Fax: (03) 6343 1877
Email: jthorp@jta.com.au Web: www.weeds.org.au

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Dept of Natural Resources & Environment, Victoria
PO Box 41
EAST MELBOURNE VIC 3002

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EXECUTIVE SUMMARY

Chilean needle grass (*Nassella neesiana* (Trin. & Rupr.) Barkworth syn. *Stipa neesiana*) has been proclaimed a Weed of National Significance as it is threatening native grasslands and productive pastures throughout significant regions of south-eastern Australia. It is anticipated that it will be declared a noxious weed throughout much of Australia. To date it has only been found in the Australian Capital Territory, New South Wales, Victoria and some isolated locations in South Australia.

As with all weeds, the cheapest and most efficient control option is prevention.

The vision of this strategy is:

To stop the spread, and reduce the occurrence and impacts of Chilean needle grass in natural and agricultural ecosystems.

The strategy addresses four goals, listed below. It also recognises current research, and provides direction for future research.

1 Identify the Chilean needle grass problem.

- Increase public awareness of Chilean needle grass and its impacts.
- Map existing Chilean needle grass distribution
- Assess potential distribution of Chilean needle grass.
- Assess economic and conservation impacts, and determine cost/benefit of Chilean needle grass management.
- Develop and implement a decision support program to prioritise Chilean needle grass infestations for control.

2 Development of "best" management options for Chilean needle grass control.

- Identify and develop best management practices for Chilean needle grass control in both agricultural and conservation contexts.

3 Prevent, contain and rehabilitate Chilean needle grass infestations.

- Implement best management practices for Chilean needle grass control.
- Strategically reduce Chilean needle grass.
- Prevent new Chilean needle grass infestations.
- Rehabilitate lands.

4 Development of appropriate extension packages.

- Establish and implement a communication plan.
- Establish and implement an evaluation code.

It is hoped that Australian communities will embrace the national *Chilean needle grass Strategic Plan*; and develop their own regional Chilean needle grass management plans.

The extent to which these aims are achieved, is to be evaluated by a review process with a five-year cycle.

The implementation of the national Chilean needle grass Strategic Plan will result in containing the spread and reducing the impact of Chilean needle grass infestations across Australia.

THE CHALLENGE

Identification and Scope of Problem.
Chilean needle grass has only recently become recognised as a serious weed. The initial aim of management is to raise community awareness of its presence and impacts. It is likely that there are significant Chilean needle grass infestations that have not yet been documented. Its current known range extends from the Northern Tablelands of New South Wales, along the Great Dividing Range and its slopes through Victoria, to southeastern South Australia. Climate matching shows that there are more than 40 million ha in Australia climatically suited to Chilean needle grass.

The challenge is to educate land managers about the impact of Chilean needle grass and document its occurrence.

Chilean needle grass is highly invasive.
It can dominate both pasture and native grasslands. Its impacts and survival are aided by its ability to develop a large, persistent seed bank, high seedling survival, tolerance to drought and heavy grazing, and effective dispersal. Its reproduction is enhanced by production of stem seeds (cleistogenes) that enable it to reproduce despite slashing and fire.

The challenge is to determine ways of reducing Chilean needle grass spread.

Its impact is very high.
Chilean needle grass competes strongly in native grasslands and other natural ecosystems that are amongst the most threatened in Australia. Chilean needle grass reduces biodiversity and conservation values. Management of Chilean needle grass in natural ecosystems is complex, because it is inter-related with management of native species. Farm productivity is reduced by displacement of more desirable pasture species, injury to stock, downgrading of produce and increased management costs.

The challenge is to develop, identify, and implement best management practices for Chilean needle grass control.

Options for management are limited.
Little is currently known about appropriate management practices for Chilean needle grass in Australia. However, opportunities exist to investigate integration of several management techniques including herbicide technologies, biological control, grazing management and revegetation. Few regions have currently declared Chilean needle grass as a noxious weed making enforcement impossible.

The challenge is to get Chilean needle grass declared as a noxious weed throughout its distributions and utilise integrated management practices wherever possible.

Industry involvement / Government.
Appropriate government departments have a responsibility to reduce the impact of Chilean needle grass on public lands. Wool and meat industries are major beneficiaries of reducing the agricultural impacts of Chilean needle grass.

The challenge is to find ways to ensure that these industries along with government departments continue to take a leading role in Chilean needle grass management.

Issues are very broad.
The local impact of Chilean needle grass differs according to land use, stage of invasion, socioeconomic factors, and vulnerability of native flora and fauna.

The challenge is to identify best management practices for these differing situations.

Rehabilitation of Chilean needle grass infested land is very difficult.
Removal of Chilean needle grass from amongst native species is challenging and specialised techniques and resources may be required in many areas. Chilean needle grass also occurs in agricultural areas where the value of the land may be below the costs of controlling the weed or the weed occurs in non-arable land where rehabilitation will be extremely difficult. The challenge is to reinstate social, agricultural and environmental values in areas infested by Chilean needle grass.

1 BACKGROUND

Chilean needle grass (*Nassella neesiana* (Trin. & Rupr.) Barkworth (syn. *Stipa neesiana*) is a Weed of National Significance because it is threatening Australian native grassland communities and agricultural grasslands in general. It has been described as being potentially the worst environmental weed of native grasslands in southeastern Australia. Eleven exotic stipoid grasses are naturalised in Australia and are threatening Australian lands. Chilean needle grass and serrated tussock (*Nassella trichotoma*) are of such importance they have been identified as Weeds of National Significance. However, the threat posed by lobed needle grass (*N. charruana*), cane needle grass (*N. hyalina*), Texas needle grass (*N. leucotricha*), Mexican feather grass (*Nassella tenuissima*), and the espartillos (*Achnatherum caudatum* and *A. brachychaetum*) may be of equal importance, and these species should be included in any local stipoid grass management plan.

1.1. The biology of Chilean needle grass is a perennial tussock-forming grass.

Chilean needle grass is a perennial tussock – forming grass.

It usually forms dense clumps, and in the absence of grazing can grow to 1m in height. It is predominantly spread when seeds attach themselves to machinery, clothing, or livestock by means of their apical hairs.

The leaves are 1 – 5 mm wide, flat and strongly ribbed on their upper surface, with rough margins.

Figure 1. *Chilean needle grass tussock.*

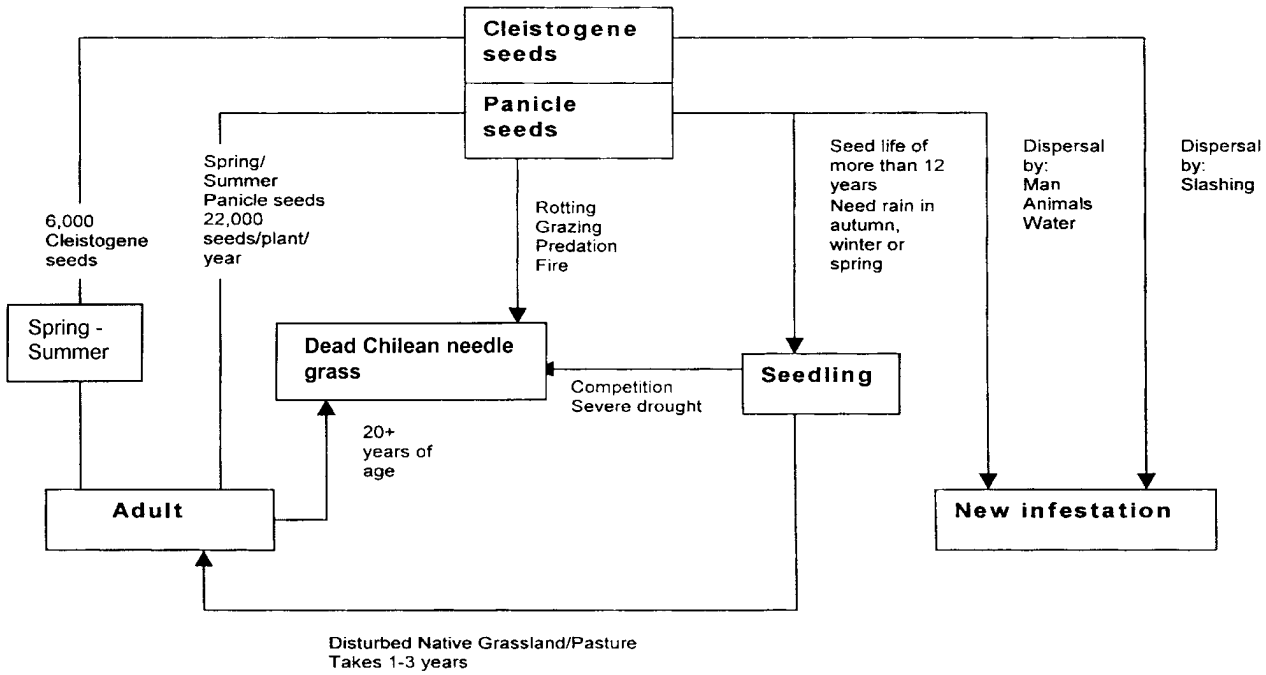

Figure 2. Life cycle of Chilean needle grass.

This grass produces two types of seeds, normal seeds borne on flowerheads, and cleistogenes (stem seeds) which are formed at the nodes and sheath base of the flowering stems. These cleistogenes allow the plant to reproduce even if flowering has been prevented

1.2. History of Spread

Chilean needle grass was introduced from South America where it occurs in Argentina, Bolivia, Ecuador, Uruguay, Southern Brazil, and Chile. The earliest known collection of Chilean needle grass in Australia was made in October 1934 at Northcote, an inner northern suburb of Melbourne. In New South Wales, the earliest collection was made in 1944 at Glen Innes on the New England Tablelands (284km SW of Brisbane). Chilean needle grass also naturalised in South Australia where it was first recorded from Lucindale (265 km SE of Adelaide) in 1988. The species is not recorded in Western Australia.

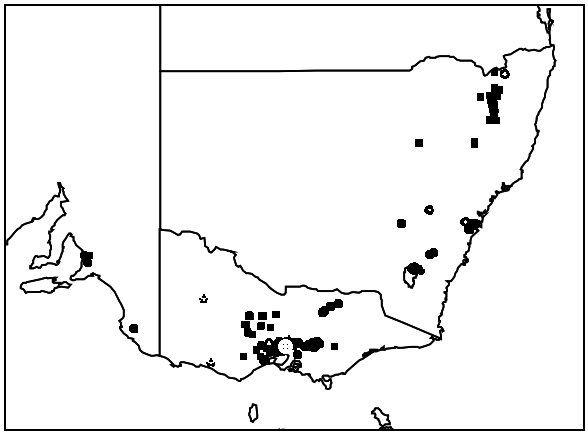

Figure 3. *The known distribution of Chilean needle grass in Australia*

The potential distribution of Chilean needle grass in Australia has been estimated to be more than 41 million ha (Figure 4).

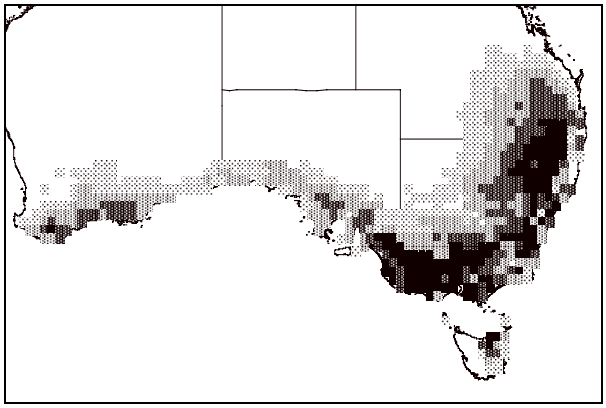

Figure 4. *The potential distribution of Chilean needle grass predicted by bioclimatic modelling from its known locations in Australia (41 million ha).*

1.3. Impacts of Chilean needle grass

In temperate Australia, Chilean needle grass occurs predominantly in pastures and grassy woodlands, on roadsides, along creeks and rivers, and is increasingly invading native grasslands.

Biological:

- Potential to invade into and replace native grass species and useful pasture species. Capacity to overshadow and swamp wildflower species native to the lowland grasslands of SE Australia, described as Australia's most threatened ecosystems (Kirkpatrick, *et al*., 1995). Examples include: the Sunshine spider orchid (*Diuris fragrantissima*), small milkwort (*Comesperma polygaloides*), the nationally vulnerable plains rice flower stands (*Pimelea spinescens*) and button wrinklewort (*Rutidosis leptorhynchoides*) (pers. comm. *Colin Hocking,*). It is invading extensive areas of rare native grasslands, encroaching on listed grassland plain communities.
- It also occurs extensively through the distribution of the relatively vulnerable striped legless lizard *(Delma impar)* north of Melbourne. It is unclear what impact

Chilean needle grass is having on this species at this time.

Primary Production:

- Reduced pasture production and stock carrying capacity.
- Control costs to primary industry estimated at $25/ha.
- Productivity has been decreased by as much as 50% due to heavy infestations of Chilean needle grass.

Tourism:

- The value of the Australian ecotourism industry is increasing, but Chilean needle grass infestations may reduce the natural attraction of the countryside and give the visitor a degraded experience.

1.4. Legislative controls

Chilean needle grass is a prohibited species under *The Quarantine Act* 1908, and is not allowed to be brought into, or sold in Australia.
Although Chilean needle grass has been declared an inaugural Weed of National Significance, it has not been declared a noxious weed within all the Australian regions it threatens (Table 1). Currently it is listed as a "prohibited" weed in Western Australia, and is not permitted entry into that state. In some local government areas of New South Wales it is a "W3 class weed", *i.e.* it must be prevented from spreading and its numbers and distribution reduced. In the ACT Chilean needle grass was declared a pest plant on 30 June 1999. Other states and territories are expected to list or proclaim Chilean needle grass shortly. In Victoria it has already been recommended for proscription (Nevill, 1999). The lack of legal status as a proclaimed noxious weed reduces the ability to enforce control measures, as compliance cannot be compelled.

State	Declaration
Queensland	Not declared
New South Wales	Limited declaration
Australian Capital Territory	Declared as a pest plant
Victoria	Not declared
Tasmania	Not declared
South Australia	Not declared
Northern Territory	Not declared
Western Australia	Prohibited and not permitted entry

Table 1. *Legislative status of Chilean needle grass.*

1.5. Control strategies

Chilean needle grass is extremely vigorous and competitive, with a long-lived seed bank. A combination of chemical, mechanical, rehabilitation, competition, grazing management, biological control techniques and hygiene regimes will be required in an integrated control program to reduce the impacts of this weed.

Chemical control

There are no herbicides currently registered for Chilean needle grass control in Australia. Experience from New Zealand indicates that Chilean needle grass may be more difficult to kill with herbicides than serrated tussock. However, some general pasture restoration herbicides such as glyphosate, have been used successfully but cannot be recommended until appropriate data have been obtained to enable the product to be registered by chemical companies and the National Registration Authority. There may be several other grass-herbicides that could also be effective. *A detailed research program investigating and documenting the effectiveness of herbicides for control of Chilean needle grass is of highest priority in both conservation and agricultural settings.*

Chilean needle grass can produce good feed during winter (in its vegetative state), but is reportedly unpalatable once it goes to flower during summer. A similar situation occurs with bent grass (*Agrostis castolana*) in Victoria. However, a technique has been developed to keep bent grass vegetative (*i.e.* available for grazing by stock) by spraying it with a low rate of glyphosate 1-2 weeks before panicle production. *Further investigations to find out if similar solutions are achievable for Chilean needle grass are required.*

Grazing Management

Preliminary studies in Melbourne suggest that stands of Chilean needle grass replaced by kangaroo grass (*Themeda triandra*) are not able to re-establish if the kangaroo grass is kept healthy by burning or grazing (pers. comm. Colin Hocking).

A number of sources from Australia and New Zealand have indicated that Chilean needle grass is only grazed by stock as a last resort. In the New England Tablelands of NSW, many sheep graziers have been forced into beef production because of the detrimental impacts of Chilean needle grass. However, in Argentina, Chilean needle grass is considered an important winter grass, producing good quality feed. It has been shown that if it can be kept in its vegetative growth stage, Chilean needle grass can be utilised as a useful fodder plant. *Investigations into grazing management are required to enable management of this weed in both agricultural and conservation areas where no other options are currently available.*

Mechanical Control

Hand weeding or chipping is very effective on single plants, small patches, or other situations where labour is not limiting.

Experimentation is required to determine exactly what impact and at what time cultivation can be used for Chilean needle grass control. As flowering Chilean needle grass possesses stem seeds, ploughing could assist its dispersal.

Fire could be a useful tool to strategically weaken mature plants and reduce seeding. However, Chilean needle grass cleistogenes in the base of the stem can occur below ground. Such seeds may enable rapid replacement of parent plants after fire. *The impact of fire on Chilean needle grass survival and seeding requires investigation.*

Slashing may reduce panicle seed-set, but it has been shown to actively disperse stem seeds if machinery is not kept clean. *Can modifications to slashing equipment be made to reduce Chilean needle grass spread?*

Biological control

As the distribution of Chilean needle grass is now beyond eradication, and is threatening Australia's flora, fauna, and agriculture, Chilean needle grass has been nominated as a target for biological control.

A biological control program has been initiated to identify pathogens in the countries of origin that only attack Chilean needle grass that can be safely introduced, and released in Australia.

It is anticipated that with present resourcing, pathogens will be brought into Australia for detailed host specificity testing during 2001 – 2002, but releases are unlikely until 2004 - 2005.

The national Chilean needle grass Strategic Plan can "fast-track" the biological control process, thereby potentially giving land managers additional management tools for Chilean needle grass control.

Rehabilitation

In any weed control program it is imperative that the treated weed species is replaced with more suitable species. Maintaining healthy and vigorous vegetation cover will help prevent invasion and domination by Chilean needle grass in both agricultural and conservation contexts.

Investigations to determine competitive grass and pasture species, fertilizer rates and strategic grazing may be important tools for managing Chilean needle grass in agricultural situations. Similarly, research is required to determine competitive local native species and techniques for their establishment in Chilean needle grass dominated localities.

Hygiene

Prevention of assisted spread.

Chilean needle grass, unlike many other weeds, has little ability to spread on the wind, and not having fleshy fruits, is unlikely to be carried by birds or feral animals such as foxes. The greatest dispersal hazard, for uninfested areas results from vectors created by man. Plant, equipment and material hygiene is of the greatest importance to prevent such dispersal, closely followed by controls over the movement of livestock from infested areas to clean areas. It is difficult, if not impossible, to address the latter without the implementation of local quarantine methods and zones.

Codes of practice covering work practice requirements should be developed and implemented in all industries that may spread Chilean needle grass. Plant, equipment, and material hygiene issues can be addressed by the inclusion of special conditions and/or requirements in tender or contract specifications. These additional conditions must include training for managers and employees to ensure that the standard of

care required is understood and maintained. Greatest emphasis for preventative measures should be placed on areas that pose the greatest threat. For example, roadsides where seed or plant material can be carried long distances.

1.6. Socioeconomic factors affecting management

As Chilean needle grass is such an invasive and competitive weed, controlling it provides benefits to land managers and the community.

Some land managers do not have the skills, motivation, money, or infrastructure to adopt best management strategies. Because of these situations, some land managers may have reduced options for control.

In some regions with Chilean needle grass infestations, the primary impact is environmental, and this may impact on management funding priorities in comparison with other, declared noxious weeds. However, because Chilean needle grass is a major threat to many state and nationally listed threatened species, its control should be given a high priority.

1.7. Principles underlying the plan

The national *Chilean needle grass Strategic Plan* is based on the recognition and acceptance of four principles outlined by the National Weeds Strategy:

- Weed management is an essential and integral part of the sustainable management of natural resources and the environment, and requires an integrated, multidisciplinary approach.
- Prevention and early intervention are the most cost-effective techniques that can be employed against weeds.
- Successful weed management requires a co-ordinated national approach that involves all levels of government in establishing appropriate legislative, educational and coordination frameworks in partnership with industry, land managers, and the community.
- The primary responsibility for weed management rests with land managers but collective action is necessary where the problem transcends the capacity of the individual land manager to address it adequately.

1.8. Relevance to other strategies

The national *Chilean needle grass Strategic Plan* has been established to provide a framework for co-ordinated management of the plant across the country. To date known infestations of this plant are limited to the three southeastern mainland states, but there is potential for spread to other states. The strategy has definite linkages to other national and state plans as (Table 2).

Table 2. *Policy and Strategy Linkages.*

Jurisdiction	Weed strategies	Related initiatives
Worldwide		• Agreements or conventions negotiated in United Nations or OECD forums • World Conservation Union
National	• *National Weeds Strategy* • Weeds of National Significance	• CRC for Weed Management Systems
Commonwealth	• Policies, strategies, plans and controls applied to Commonwealth lands (eg. Conservation and Military)	• World Heritage Areas • RAMSA Sites • Decade of Landcare • Natural Heritage Trust
Multi-state Regions		• Strategies under Murray-Darling Basin Initiative
State / Territory	• State weed strategies / plans • State strategies for Weeds of National Significance species • Listed community and species recovery plans • State biodiversity strategies,	• All State/Territory noxious weed and related legislation • Conservation strategies • State biodiversity strategies • Forest management plans • River, estuary and wetland policies
Regional and Local	• Regional and/or local weed plans and species strategies • Catchment / vegetation management plans	• *State of the Environment* reports • Regional environmental plans and other regional initiatives • Regional forest agreements • Development control plans • Landcare groups and plans
Utilities	• Rail, road, and utility corridor management plans	• Environmental impact assessments
Local Governments	• Local government pest management plans	• Local laws • Local conservation strategies • Local Agenda 21 programs • Integrated local area planning
Neighbourhood	• Community action strategies	• Landcare groups and plans, roadside conservation and other greening projects
Land / Property	• Management plans for land managers • Control schedules • Property / farm management plans	• Incentive schemes • Land For Wildlife

2 STRATEGIC PLAN

VISION

To stop the spread, and reduce the occurrence and impacts of Chilean needle grass in natural and agricultural ecosystems.

2.1 Identify the Chilean needle grass problem.

Desired Outcome

The Australian community is aware of the identity, impacts, and threat posed by Chilean needle grass.

Objectives

Widely publicise information, enabling identification of Chilean needle grass and its impacts.

Identify and map current Chilean needle grass infestations, and prioritise them for control.

Determine and publish the economic, social, and environmental impacts of Chilean needle grass.

Background

Land managers need to learn how to identify Chilean needle grass and be aware of its impacts. Accurate and thorough mapping will enable strategic planning and development of management plans for current Chilean needle grass infestations (if the land managers do not know where, or how prevalent Chilean needle grass infestations are, they will be unable to discern correct management options). It is also necessary to have accurate mapping data for adequate local weed declaration.

Land managers need to be pro-active to prevent introduction and establishment of Chilean needle grass (as with all other weeds), and to reduce those populations already present. Land managers must use all tools available to control Chilean needle grass. “Clean” areas must be kept Chilean needle grass-free if possible. Those land managers with Chilean needle grass already present need to know how to control it.

Performance indicators

Land managers know how to identify Chilean needle grass and are aware of its impacts.

Chilean needle grass infestations are mapped and prioritised for control.

The environmental, economic and social impacts of Chilean needle grass are documented and publicised.

Strategy	Actions	Responsibility	Priority
2.1.1 Increase public awareness of Chilean needle grass and its impacts.	**a** Identification brochures produced and media campaigns held.	State + Territory Governments State + Territory Weed Officers Local Government Weed Officers	1
2.1.2 Map existing Chilean needle grass distribution **(involve community groups).**	**a** Map and define existing Chilean needle grass distribution, in terms of density of invasion: *ie.* Low – Medium – High densities, set at consistent levels across all government and private agencies (state, territory and local).	State + Territory Weed Officers Local Government Weed Officers Land Managers	1
	b Involve community groups in correctly identifying, and mapping Chilean needle grass invasions (eg. Landcare groups, Field Naturalists, Friends groups, land managers).	State + Territory Governments to set up community weed mapping networks	1
2.1.3 Assess potential distribution of Chilean needle grass.	**a** Determine potential for Chilean needle grass distribution and density to spread.	AgVic + NSW Ag Industry	1
2.1.4 Assess economic and conservation impacts, and determine cost/benefit of Chilean needle grass management.	**a** Assess economic impacts of Chilean needle grass invasion on agriculture, and other production endeavours.	AgVic + NSW Ag Industry	1
	b Assess conservation impacts of Chilean needle grass invasion; include economic and environmental concerns, tourism, and social impacts.	AgVic + NSW Ag Industry	1
	c Determine cost/benefit of Chilean needle grass management.	AgVic + NSW Ag Industry	1
2.1.5 Develop and implement a decision support program to prioritise Chilean needle grass infestations for control.	**a** Develop and implement consistent criteria / questions to enable prioritisation of Chilean needle grass infestations for control.	State + Territory Governments	1
	b Prioritise areas, assigning highest priorities to lands with high conservation values, or with small, new infestations emerging that are “easily” treatable.	Regional Land Managers Local Governments Land Managers	1

2.2 Development of "best" management options for Chilean needle grass control.

Desired Outcome

Australia develops "best" management options to reduce the prevalence and impacts of Chilean needle grass.

Objectives

Identify current management options.

Identify gaps in our knowledge of potential management options.

Conduct research to develop "best bet" management options for Chilean needle grass control.

Background

As the impacts of Chilean needle grass are only now becoming apparent, relatively few management options are currently available. Resources need to be put into identifying weaknesses in the life cycle of Chilean needle grass, and developing integrated management techniques to target these weaknesses. This should be done by using a range of techniques including chemical control, biological control, grazing management, land and vegetation rehabilitation, mechanical control and better Chilean needle grass hygiene practices.

Evaluation and monitoring of Chilean needle grass treatment options will be an important component to developing best management practices.

Performance indicators

Current "best" management practices identified.

Research programs are established to address the "unknowns" in Chilean needle grass control.

Appropriate herbicides are registered for Chilean needle grass control.

Biological control initiated against Chilean needle grass.

New grazing management techniques developed for Chilean needle grass control.

Replacement species identified for rehabilitation of both agricultural and environmental situations.

Mechanical control techniques tested and developed – *i.e.* slashing, fire, cultivation, etc.

Hygiene protocols developed to reduce the spread of Chilean needle grass – *i.e.* soil and stock movement, vehicles, slashing, etc.

Strategy	Actions	Responsibility*	Priority
2.2.1 Identify and develop best management practices for Chilean needle grass control in both agricultural and conservation contexts.	a Identify appropriate herbicides, and liaise with states and chemical companies to have them registered. Determine the "best" method(s) and time(s) for herbicide application.	AgVic + NSW Ag Industry	1
	b Fast-track implementation of biological control program.	AgVic CSIRO Industry	1
	c Investigate grazing management options for Chilean needle grass control.	NSW Ag + AgVic Industry	1
	d Investigate replacement species for rehabilitation of both agricultural and environmental situations.	NSW Ag + AgVic Industry	1
	e Mechanical control techniques developed and tested – eg. slashing, cultivation, etc.	NSW Ag + AgVic Industry	1
	f Hygiene protocols developed to reduce the spread of Chilean needle grass – eg. soil and stock movement, vehicles, slashing, etc.	AgVic + NSWAg Experts (eg. Bruce Dupe -Surfcoast Shire) Industry	1
	g Investigate the biology and ecology of Chilean needle grass, and identify weaknesses in its lifecycle to exploit for management purposes.	AgVic + NSWAg Universities Industry	1

*Universities may also be able to contribute to several actions.

2.3 Prevent, contain, and rehabilitate Chilean needle grass infestations.

Desired Outcome

Australian communities implement best management practices to control Chilean needle grass.

Objectives

Implement best management practices for Chilean needle grass control.
Strategically reduce Chilean needle grass infestations across Australia

Background to the goal

Once the extent of the Chilean needle grass problem is documented through mapping (Goal 1), and management techniques for its control have been developed (Goal 2), then a full-scale management program can be implemented. For this to be successful, it is important to get key affected land managers (eg. for Victoria – Victorian Farmers' Federation, Parks Victoria, Agriculture Victoria, Landcare, etc) to form a working party to implement the strategy. In this, the affected parties obtain ownership of the strategy and its implementation is more likely to be accepted by the general public. The responsible state or territory departments will set up and facilitate the working parties.

Declaration of Chilean needle grass as a noxious weed in all affected and potentially affected states and territories will be an important milestone enabling appropriate levels of enforcement through legislation. Prohibiting the trade of Chilean needle grass throughout Australia is needed to reduce the spread, and subsequent establishment of new outbreaks.

Best management options chosen to manage Chilean needle grass infestations will differ according to the specific situation being dealt with. Some variables that will impact on the choice of treatment are:

- Does the infestation occur in an environmental or agricultural zone?
- Is the infestation extensive or small?
- Does the infestation threaten the economic or environmental values of surrounding land?
- Is the land is easily accessible?

Performance indicators

Chilean needle grass is declared as a noxious weed in all affected regions of Australia.

Trade of Chilean needle grass is prohibited throughout Australia.

Small and isolated Chilean needle grass infestations invading previously "clean areas" are controlled as a priority.

Movement of contaminated stock, soil, fodder etc is prevented from entering designated clean areas. Efforts are made to introduce stock, soil, vehicle, and machinery hygiene practices to reduce Chilean needle grass spread.

Appropriate vegetation is re-introduced to replace treated Chilean needle grass or to rehabilitate area's threatened by its invasion.

Control techniques are monitored and evaluated for improvement.

Strategy	Actions	Responsibility	Priority
2.3.1 Implement best management practices for Chilean needle grass control.	**a** Develop national Chilean needle grass taskforce to oversee implementation of the strategy - include key clients in working party eg. industries, primary producers, and local governments.	State + Territory Governments	1
	b Declaration of Chilean needle grass as a noxious weed to enable appropriate levels of enforcement and prohibition of trade.	State + Territory + Local Governments	1
	c Implement best management practices identified under goal 2.	Land Managers	1
	d Identify control responsibilities for land management.	State + Territory Governments Industry	1
	e Identify client(s)/land managers responsible for control.	State + Territory Governments	2
	f Develop targets at realistic and achievable control levels.	State + Territory Governments	2
	g Source and secure available funding/resources.	State + Territory Governments Industry	2
	h Develop State, regional and local Chilean needle grass management plans.	State + Territory + Local Governments Industry Land Managers	1
2.3.2 Strategically reduce Chilean needle grass.	**a** Contain or eliminate new Chilean needle grass outbreaks.	Land Managers	1
	b Prevent invasion of Chilean needle grass within infested areas by following best management practices.	Land Managers	1
	c Prevent spread of Chilean needle grass from infested areas to “clean” areas by following best management practices.	Land Managers	1
2.3.3 Prevent new Chilean needle grass infestations.	**a** Develop and implement a code of practice to prevent Chilean needle grass weed spread (eg. Machine hygiene).	Taskforce + State + Territory Governments Land Managers Industry	2
2.3.4 Rehabilitate lands.	**a** Rehabilitate all lands treated for Chilean needle grass infestations to a desired state.	Taskforce + State + Territory + Local Governments Land Managers	2

2.4 Develop appropriate extension packages.

Desired Outcome

Appropriate extension materials are developed to extensively publicise information on Chilean needle grass, and its "best" management in areas at risk.

Objectives

Establish and implement a communication plan.
Establish and implement an evaluation code.

Background

Once "best" management practices have been identified (Goal 2), it is essential that these practices are adequately publicised so that they are utilised to control Chilean needle grass. The benefits of Chilean needle grass control need to be obvious to land managers when prioritising resource deployment. Sharing of this knowledge with the community in an effective extension package is required. Often several packages are needed to cater for different needs and levels of control.

Land managers need to "want" to control weeds. Appropriate incentives are required to encourage effective management. These incentives include the basic economic and social benefits resulting from Chilean needle grass management, but "rewards" are also needed to entice some land managers.

Individual weed management plans need to include Chilean needle grass wherever it poses a threat to the local lands. The regular reporting of progress, as a result of these plans, also needs to allude to the success or failure in managing Chilean needle grass. A communication strategy to publicise and celebrate achievements in Chilean needle grass management is to be established to encourage further successes.

Performance indicators

A communication plan is developed and implemented to raise Australian awareness of the threats posed by Chilean needle grass.

Sought after incentive schemes are developed and introduced to land managers.

Management plans for weed control include the management of Chilean needle grass wherever it is a potential threat.

Annual reporting processes are developed and incorporated by land managers.

Strategy	Actions	Responsibility	Priority
2.4.1 Establish and implement a communication plan.	**a** Develop and implement extension methods.	State + Territory Governments Local Governments Industry	1
	b Develop and implement decision support system to enable appropriate management option.	State +Territory Governments Industry	2
	c Develop and implement incentive scheme(s).	State + Territory Governments Local Governments Industry	2
	d Encourage development and implementation of management plans.	State + Territory Governments Local Governments Industry	2
2.4.2 Establish and implement an evaluation code.	**a** Assess density and distribution of Chilean needle grass after treatment.	State + Territory Governments Land Managers	3
	b Audit effectiveness of treatment(s).	State + Territory Governments Local Governments Land Managers	3
	c Establish and implement annual reporting processes.	State + Territory Governments Local Governments Land Managers	3

3 MONITORING AND EVALUATION

This strategy needs to be subject to a five-year cycle of review.

A management group for Chilean needle grass should be established to monitor and evaluate the efficacy of this strategy, and the various plans that are involved with Chilean needle grass control. It is proposed that a joint taskforce for all weed stipoid grasses, including serrated tussock (*Nassella trichotoma*), be developed.

As the strategic actions from Goals 1 to 4 are developed and implemented, the performance of the preceding steps may be assessed. However, regular means of assessment also need to be clearly defined and established.
A range of performance indicators for the actions detailed in the Chilean needle grass plan are listed below:

- Increased awareness of, and action on, Chilean needle grass occurs at all levels throughout Australia.
- An accurate and thorough assessment of the current Chilean needle grass problem is made.

A range of performance indicators for the actions detailed in the Chilean needle grass plan are listed below:

- Increased awareness of, and action on, Chilean needle grass occurs at all levels throughout Australia.
- An accurate and thorough assessment of the current Chilean needle grass problem is made.
- Chilean needle grass is proclaimed under existing noxious weeds legislation (to enable appropriate levels of enforcement and trade prohibition).
- A clear understanding of the economic, social, and biodiversity impacts of Chilean needle grass, and its treatment(s) is obtained and published.
- Areas with Chilean needle grass infestations are identified and prioritised for treatment.
- Gaps in knowledge regarding Chilean needle grass life cycle and management are identified.
- "Best-bet management practices" are identified and implemented.
- An effective communication and extension plan is established and implemented.
- A range of incentive schemes for the on-going treatment of Chilean needle grass is established, and the necessary hygiene methods are put into operation.
- Increased resources are made available for "on-ground" actions to manage Chilean needle grass.

Further performance indicators are listed under each of the goals in chapter 2.

4 STAKEHOLDER ROLES AND RESPONSIBILITIES

All land managers, both public and private, shall achieve the highest level of control possible.

Public land managers

State government departments with responsibilities for conservation, environment and resources

To ensure that the social, economic and environmental impacts of Chilean needle grass are kept to a minimum throughout Australia by ensuring Chilean needle grass control is undertaken on all state-managed lands under their jurisdiction, including:

- National Parks and Reserves (National Parks and Wildlife Service).
- State Parks.
- Other Government land.

Federal government departments and corporations

- Ensure quarantine controls on entry of Chilean needle grass (AQIS)
- To ensure uptake by Departmental staff to restrict movement of weeds (agencies that manage land and travel on non-government land)
- To ensure Chilean needle grass control is undertaken on all federally managed lands (Defence, Environment Australia and other Commonwealth departments/ corporations that manage land)
- Oversee and manage federal funds including Natural Heritage Trust and National Weed Program (Environment Australia, Agriculture, Forestry and Fisheries – Australia).

Other state government departments

To ensure Chilean needle grass control is undertaken on all other state-managed lands throughout Australia, including:

- State road reserves (roads department).
- Unallocated State land.

Local governments

To ensure that social, economic and environmental impacts of Chilean needle grass are kept to a minimum throughout their municipality.

- In each affected municipality, Chilean needle grass control is undertaken on all lands managed by local governments.
- Assist in information exchange

Community groups

Encourage local involvement in the management of public lands.

- "Friends of" (and other) groups to actively manage weed infestations (including Chilean needle grass) on public lands where appropriate, under the direct supervision of public land managers.
- Landcare groups to actively manage Chilean needle grass infestations on public lands, with the approval and supervision of the land manager concerned.

Private land managers

To control Chilean needle grass on their own lands:

- Include Chilean needle grass management in property management plans.
- Participate in regional/catchment groups.

Community groups

Landcare groups to actively manage Chilean needle grass infestations on private lands, with the approval and supervision of the land manager concerned.

Industry

Industries will benefit from the actions resulting from the national *Chilean Needle Grass Strategic Plan*, such as those grazing sheep and cattle. Thus it is reasonable to expect their full involvement in their implementation and funding.

5 INVESTMENT PRINCIPLES

Public funding of projects under the Weeds of National Significance, national *Chilean Needle Grass Strategic Plan* will be based upon important principles including:

- management of Chilean needle grass and its impacts, will not be viewed in isolation from other weeds and resource management issues;
- projects supported will be subject to a competitive process of vigorous assessment and on-going review;
- progress and communication of knowledge to the community will be an integral component of any projects;
- comparison with all other potential projects.

6 ADDITIONAL READING

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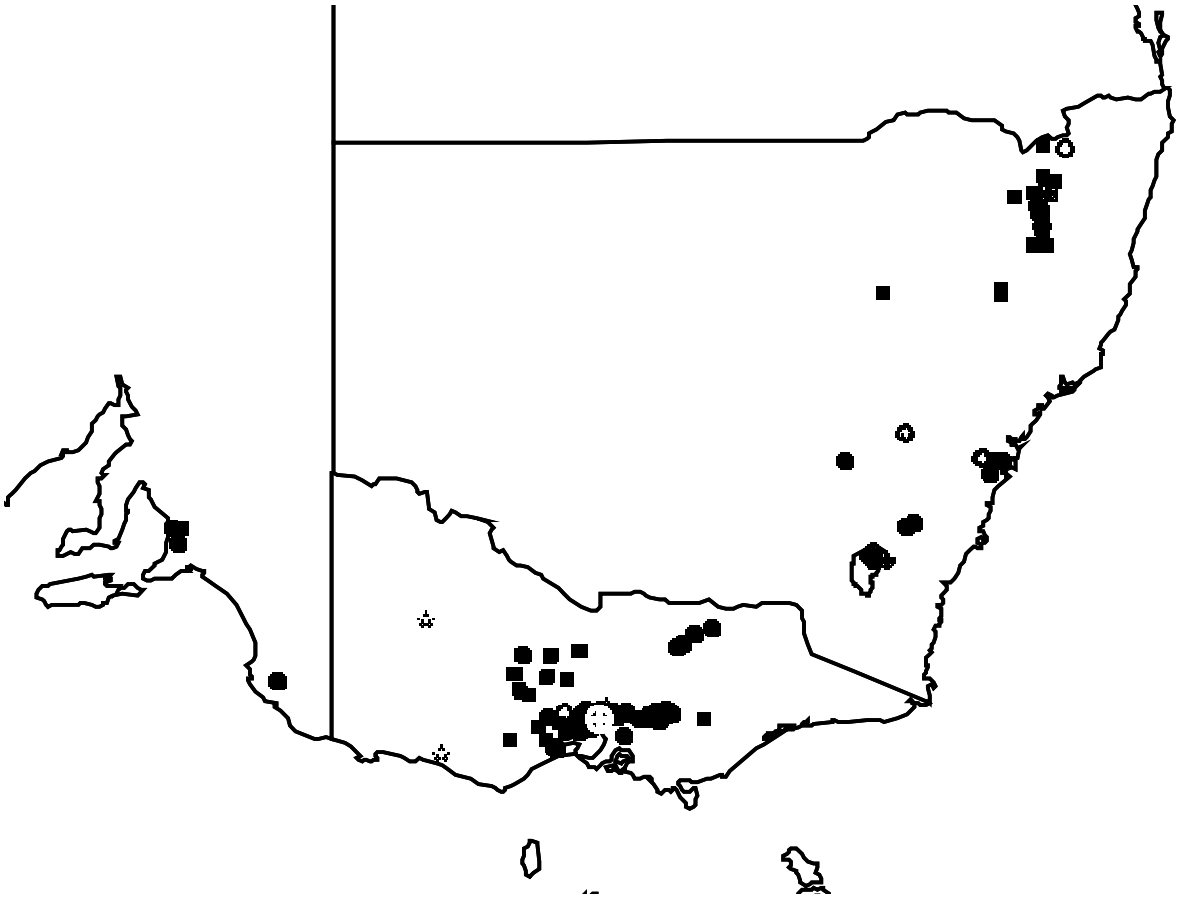
7 GLOSSARY

Ag Vic	Agriculture Victoria
AQIS	Australian Quarantine and Inspection Service
CRC	Co-operative Research Centre
CSIRO	Commonwealth Scientific & Industrial Research Organisation
KTRI	Keith Turnbull Research Institute
NSW Ag	New South Wales Agriculture
Cleistogene	Stem seed, formed at the nodes and sheath bases of flowering stems.
Land Manager	Any person involved in land management, both public and private.
Stipoid	Grasses within the Family Poaceae; refer to McLaren, D.A.; Stajsic, V. and Gardener, M.R. (1998) for specifics.

Appendix 1. Known distribution of Chilean needle grass in Australia (Feb 2000).



The actual distributions in Australia – First recorded
⊕ First record in Australia in 1935.
▲ 1930's, □ 1940's, ✚ 1950's, ☆ 1960's, O 1970's, ● 1980's,■ 1990's

Appendix 2. Process used to develop the national Chilean needle grass Strategic Plan

The national *Chilean needle grass Strategic Plan* is the product of several months of research, planning and consultation.

A Victorian Chilean needle grass scoping meeting was held in Frankston in September 1999.

John Thorp, from the National Weeds Strategy Executive Committee, provided the overall direction that led to a national workshop, held in Wodonga in November 1999. This national workshop (involving participants from New South Wales, the Australian Capital Territory, Tasmania and Victoria) resulted in the development of a draft national *Chilean needle grass Strategic Plan*.

These meetings, specific to Chilean needle grass, were considered necessary as a result of the *Nassella* workshop held in February 1998. This national strategy, and the inclusion of Chilean needle grass as a Weed of National Significance are direct results of the *Nassella* workshop.

Individuals and Organisations that contributed to the national *Chilean needle grass Strategic Plan*:

The lead agency for the formation of the national *Chilean needle grass Strategic Plan* was the Department of Natural Resources and Environment (Victoria).

Collators: Sarah Keel BSc (Hons) and David M^{c}Laren BSc (Hons) PhD

Wodonga national *Chilean needle grass Strategic Plan* workshop participants:

- AgResearch
  Shona Lamoureaux
- Charles Sturt University
  Ian Lunt (also CRC for Weed Management Systems)
- CMA, Vic
  John Riddiford
  David Sexton
- CSIRO
  Darren Kriticos (also CRC for Weed Management Systems)
- KTRI
  David M^{c}Laren (also CRC for Weed Management Systems)
  Tom Morley
  John Wiess (also CRC for Weed Management Systems)
- Municipal Representatives
  Bruce Dupe (Surfcoast Shire)
  Peter Gibbs (City of Wyndham)
- National Weeds Strategy Executive Committee
  John Thorp
- Northern New England Tablelands Plant Protection Board
  Robert Lynn
- NRE, Vic
  Sylvia Armand
  David Boyle
  Vanessa Craigie
  Greg Johnson
  Geoff Nevill
- NSW Agriculture
  Richard Carter
  David Michalk (also CRC for Weed Management Systems)
  Michael Michelmore
- University of New England
  Brian Sindel (also CRC for Weed Management Systems)
- Victoria University
  Colin Hocking

- Victorian Farmers' Federation
  Ian Lobban
- Warby Ranges Landcare Facilitator
  Pat Larkin

Additional feedback from the public release of the draft strategy was received from:

ACT Territory Government

Agriculture Victoria

Melbourne Water

NRE, Vic.

NSW Agriculture

Victoria University

Victorian Farmers' Federation

Appendix 3. Research and Extension Requirements

Due to the paucity of knowledge at this time about Chilean needle grass in Australia the requirement for further research is broad, especially in relation to ecology and agricultural impacts. Several areas requiring further research have already been noted in the strategy.

- The development of best management practices for Chilean needle grass control.
- Determination of safe, specific, and reliable herbicides for application in cooperation with chemical companies and regulatory bodies; and registration of these herbicides for Chilean needle grass treatment.
- Further investigations on the ecology of Chilean needle grass, eg. flowering time, survival of cleistogenes after fire or herbicide application.
- Identification of the best techniques to reduce Chilean needle grass seed production.
- Fast-track the biological control program.