Field survey results for Chilean needlegrass (*Nassella neesiana* (Trin. & Rupr.) Barkworth) and Texas needlegrass (*Nassella leucotricha* (Trin. & Rupr.) R.W.Pohl) in the Mt. Lofty Ranges, Fleurieu Peninsula and greater Adelaide regions of South Australia

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Summary

Chilean needlegrass (*Nassella neesiana* (Trin. & Rupr.) Barkworth) is a declared Weed of National Significance as it poses a significant threat to Australian native grassland communities and agricultural grasslands in general. The Chilean Needlegrass (*Nassella neesiana*) Raising Awareness, Determining Extent and Targeting Control Project was started by the SA Chilean Needlegrass Working Group. The aim of the project was to determine the location, size, and site characteristics of infestations of *N. neesiana* and Texas needlegrass (*Nassella leucotricha* (Trin. & Rupr.) R.W.Pohl), whilst also raising awareness of the introduced *Nassella* spp. The project was restricted to infestations occurring within the Mt. Lofty Ranges, Fleurieu Peninsula and the Greater Adelaide regions. The field survey found a combined total of 415 infestations of *Nassella* located at six geographically distinct sites within the survey area. This consisted of 53 *N. neesiana* infestations and 362 *N. leucotricha* infestations. A total of 251.1 ha of land was found to be infested with *Nassella*, comprising 237.1 ha of *N. leucotricha* and 14.0 ha of *N. neesiana*. These infestations are considered to be quite small compared to interstate infestations and timely intervention and action now may provide an opportunity to contain or eradicate both of these species. This is reliant on adequate funding being available and an appropriate control program/ strategy being implemented.

Introduction

Chilean needlegrass (*Nassella neesiana* (Trin. & Rupr.) Barkworth) is a Weed of National Significance (Thorp and Lynch 2000) because it is threatening Australian native grassland communities and agricultural grasslands, is highly invasive, difficult to control and readily dispersed (Iaconis 2003). It has been described as potentially the worst environmental weed of indigenous grasslands, which are amongst the most threatened ecosystems in south-eastern Australia (Iaconis 2003). Very limited records exist on the occurrence of five foreign stipoid weeds in South Australia. *N. neesiana* has only been recorded in South Australia for just over a decade, with single records for the South East, Fleurieu Peninsula and outer suburbs of Adelaide. Texas needlegrass (*Nassella leucotricha* (Trin. & Rupr.) R.W.Pohl) has been recorded within the last decade across a range of different land tenures in the Onkaparinga Valley, south of Adelaide.

The SA Chilean Needlegrass Working Group (SACNGWG) was formed early in 2001 following the identification of *N. leucotricha* in preliminary surveys of the Onkaparinga Valley in late 2000. The extent of infestations of *N. neesiana* and *N. leucotricha* in South Australia was unknown before this project commenced. By determining the location, size, and site characteristics of infestations, combined with timely intervention, existing infestations could effectively be confined, preventing the further establishment and/or spread of these weeds within South Australia. This paper describes the results of the field survey component of the 'Chilean Needlegrass (*Nassella neesiana*) Raising Awareness, Determining Extent and Targeting Control' project of the SACNGWG (funded through the Weeds of National Significance Program and Natural Heritage Trust 2).

Field survey design and methodology

A methodology for a rapid assessment of the extent of *Nassella* infestation was developed. The survey commenced at sites of known *Nassella* infestations and extended into adjoining areas. Previously known locations included Clarendon, Angel Gully, Wirrina, Onkaparinga National Park and Modbury (Figure 1). An area within an approximate 2 km radius around each of the known infestations was surveyed. A geographic information system (GIS) was used to overlay cadastral boundaries onto aerial photographs of the survey area. The survey could then be carried out in a systematic way from land parcel to land parcel. The survey was conducted by vehicle wherever possible. Each land parcel (paddock) was traversed by firstly surveying the perimeter and then the interior in a grid like fashion. The survey was carried out on foot where the terrain of the survey area was steep or inaccessible. The survey was ceased at each location when no new infestations were recorded. Infestations were recorded as points, lines or polygons (using a Global Positioning System) and the data was put into GIS for further analysis.

Various attributes were then recorded for each infestation. The data collected for each separate infestation included: plan number/s, owner's name, roadside name (if applicable), date, observers names, species, current landuse, shape of infestation (for GIS purposes), density, size, soil type, aspect, slope, trial site potential, proximity to nearest watercourse, waypoints and any additional comments.

Several visits were made to known infestations prior to the field survey commencing. It was determined that *Nassella* were identifiable in October and therefore surveying commenced on 22nd October 2003, to coincide with the peak flowering period. The field survey was completed by 22nd December 2003. Preliminary data is presented in this paper.

Results

Clarendon and Angel Gully

Nassella leucotricha infestations were found to be extensive in the Clarendon region (Figure 1), with many being of moderate or greater density. *N. neesiana* was found at one site in Clarendon at low density within a grazed pasture. This species was previously unrecorded in the area. *N. leucotricha* was found in grazed pasture, hay cutting leases, vineyards, orchards, degraded bushland and roadsides.

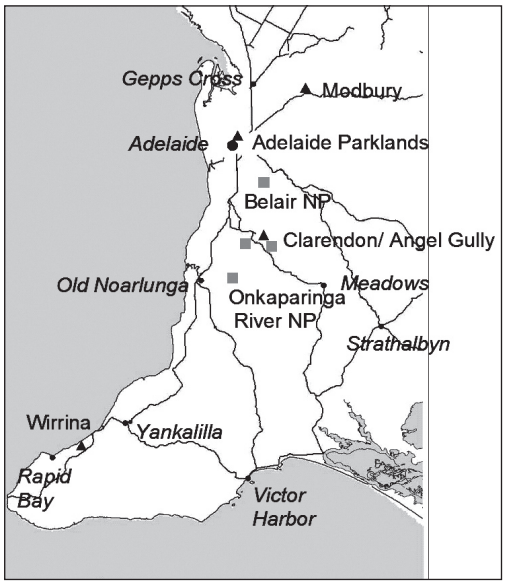

Figure 1. Locality map and distribution of *Nassella* infestations (● = town, ▲ = Chilean needlegrass, ■ = Texas needlegrass).

In the Angel Gully area, *N. leucotricha* infestations were predominantly restricted to roadsides and one area of private property. However, there were small areas of moderate and severe infestation on properties extending to the Onkaparinga River. A total of 223.3 ha of *N. leucotricha* and 0.02 ha of *N. neesiana* were recorded in the combined Clarendon/Angel Gully area.

Onkaparinga National Park

Nassella leucotricha was not found on roadsides or private property in the agricultural areas around the Onkaparinga River National Park (Figure 1). However, it was found within the National Park itself. Heavy to severe density outbreaks were recorded in the north-eastern section of the park. The entire length of the Onkaparinga River (within the National Park) was traversed on foot with scattered infestations of *N. leucotricha* being found adjacent to the river for most of its length. Small infestations were also recorded on some of the access tracks within the park. A total of 13.77 ha of *N. leucotricha* was recorded in this area. There were no recordings of *N. neesiana* within the Onkaparinga area.

Wirrina

Infestations of *N. neesiana* were surveyed at Wirrina (Figure 1), with the main outbreak recorded on hillsides in ungrazed pasture north of the oval. Additional small infestations were recorded in grazed and ungrazed pasture, revegetation areas and around the local golf course. Private property adjacent to the resort and the main road were surveyed, but no outbreaks of *Nassella* were found. A total of 13.77 ha of *N. neesiana* was recorded in this area. No *N. leucotricha* was recorded within the Wirrina area.

Adelaide

Small infestations of *N. neesiana* were found in the Adelaide Parklands and Modbury in Adelaide's northern suburbs (Figure 1). The five *N. neesiana* plants found in the Parklands were removed by hand after having their coordinates recorded. Moderate to heavy infestations of *N. neesiana* were found in the Modbury area, totalling 0.07 ha. This included an infestation in a creek line of the Dry Creek catchment. Small, scattered infestations of *N. leucotricha*, totalling 0.05 ha, were also found in Belair National Park in southern Adelaide (Figure 1).

Infestation densities

One of the characteristics collected during the field survey was density. Density was described as a visual estimate of vegetation cover and was assigned one of four categories: low (0–24%), moderate (25–49%), heavy (50–74%), or severe (75–100%). Table 1 summarizes the density of each *Nassella* spp. over all of the combined survey areas.

Discussion

A total of 415 infestations were recorded during the field surveys, 53 of which were *N. neesiana* and 362 *N. leucotricha*. A total of 251.1 ha of land were found to be infested overall, comprising of 237.1 ha of *N. leucotricha* and 14.0 ha of *N. neesiana*. The survey results have shown us that the infestations of *N. neesiana* and *N. leucotricha* in the survey area are much larger than was previously known from earlier records. However, this area is still relatively small when compared to interstate infestations (Iaconis and McLaren personal communication). With a total of only 14 ha of *N. neesiana*, timely intervention and action may lead towards eradication of this species in the region. An opportunity therefore exists to contain or eradicate both of these species if there is adequate funding and an appropriate control program.

The 'Chilean Needlegrass (*Nassella neesiana*) Raising Awareness, Determining Extent and Targeting Control' project is continuing with further work to be carried out in 2004. The next stage of the project involves looking at control options and possible field trials. Information from interstate research will be examined and possible control options developed. Management options for reducing the spread of *Nassella* spp. will also be developed. These may include hygiene procedures, stock management, management of hay cutting and quarantine. Information will be gathered on hygiene practices, with a particular focus on slashing equipment cleanliness, with the aim of disseminating information to landholders and land managers. The timing of hay cutting will also be considered with the possibility of using silage as a means of utilizing the cut hay and reducing the risk of spreading *Nassella* spp. Management and movement of stock will also be examined to formulate appropriate management options. The issue of quarantine is an important one considering the current restricted distribution of *Nassella*. The appropriateness and feasibility of quarantine as a method of restricting the spread of *Nassella* will be examined as an option for managing *Nassella* problems in South Australia.

Additional work will be carried out analysing the survey results to look for any possible correlations between *Nassella* distribution and the field data collected. It is also recommended that the survey component of this project be extended in subsequent years to incorporate other parts of the state.

Table 1. Density and area infested of *Nassella neesiana* and *Nassella leucotricha*.

Density	*N. neesiana* Area infested		*N. leucotricha* Area infested	
	ha	%	ha	%
Low	10.0	71.4	97.5	41.1
Moderate	1.1	7.9	68.0	28.7
Heavy	2.4	17.1	37.0	15.6
Severe	0.5	3.6	34.6	14.6
Total	14.0	100.0	237.1	100.0

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