Under-representation of weeds in herbarium collections: a case study using *Thinopyrum junceiforme* and *Polygala myrtifolia* on the South East coast of South Australia

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Summary A coastal action plan for the South East region of South Australia is currently being produced. Assessment of weed threats via the collections of target weed species held in the State Herbarium of South Australia revealed a lack of data in the existing biological databases. Distribution information for two potentially harmful environmental weeds, *Thinopyrum junceiforme* and *Polygala myrtifolia,* is presented before and after a weed survey demonstrating the under-representation of weeds in herbarium collections.

Keywords *Thinopyrum junceiforme*, *Polygala myrtifolia*, herbarium, weed threats.

INTRODUCTION

The Coorong and Limestone Coast Conservation Action Plan is the outcome of a coastal conservation assessment for the South East coast of South Australia between the Murray Mouth and the Victorian border (Figure 1). The coastal strip (dune, cliff-top and near saltmarsh habitats) is particularly vulnerable and accessible to invasion by weed species. Information about the distribution of weeds is held within the collections of the State Herbarium of South Australia and the Biological Databases of SA. These data will be used for the weed threat assessment. However, collections and observations of exotic plants are frequently under-represented in such datasets. Regional workers suggested the distribution of weeds was far more widespread than the data to hand suggested and extra field observations and collections would be required to document actual distribution. *Thinopyrum junceiforme, s*ea wheat grass (Figures 2–4), and *Polygala myrtifolia,* myrtle-leaf milkwort (Figures 5–7), are used as case studies.

MATERIALS AND METHODS

The survey area included the South East Coastal zones in South Australia (Figure 1). Much of the northern half of the coastal zone was not visited in 2009 due to inaccessibility. Distribution of target species from existing records was plotted using GIS systems. Herbarium collections of target weeds were subsequently made for each population found. All roads, beach access tracks and the majority of 4-wheel drive tracks were systematically searched for *Thinopyrum junceiforme*, *Polygala myrtifolia* and other target species. Information regarding population size, density, habit, habitat and associated species was recorded. Maps were subsequently re-plotted using the new data.

RESULTS

Both *Thinopyrum junceiforme* and *Polygala myrtifolia* were far more widespread than the original data suggested (Table 1).

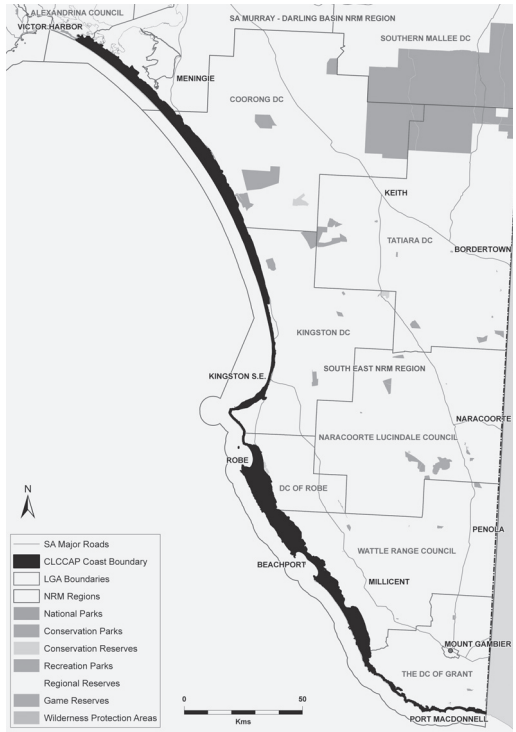

Figure 1. The study area for The Coorong and Limestone Coast Conservation Action Plan, South East of South Australia. Weed surveys for *Thinopyrum junceiforme* and *Polygala myrtifolia* were carried out in the zone marked in black.

Figure 2. *Thinopyrum junceiforme* colonising an area of sand above the high water mark. (Photo: R. Sandercock, Coast Management Branch, DENR).

Figure 3. *Thinopyrum junceiforme* forming a new foredune where native species do not normally grow, and altering the geomorphology of the beach in the South East of South Australia.

Figure 4. Scarping of the new foredune due to the presence of *Thinopyrum junceiforme* altering the geomorphology of this beach in Robe, South Australia.

Figure 5. *Polygala myrtifolia* invading native vegetation.

Figure 6. *Polygala myrtifolia* forming dense stands in native vegetation in Bernoulli Conservation Reserve, South Australia.

Figure 7. *Polygala myrtifolia* leaves and flowers with purple bracts. (Photo: R. Sandercock, Coast Management Branch, DENR).

Table 1. Number of specimen records before and after the 2009 weed survey.

Species	Number of records	
	Before survey	After survey
Thinopyrum junceiforme	18	55
Polygala myrtifolia	6	23

Figures 8 and 9 show the distribution of *Thinopyrum junceiforme* and *Polygala myrtifolia* before and after the 2009 weed survey.

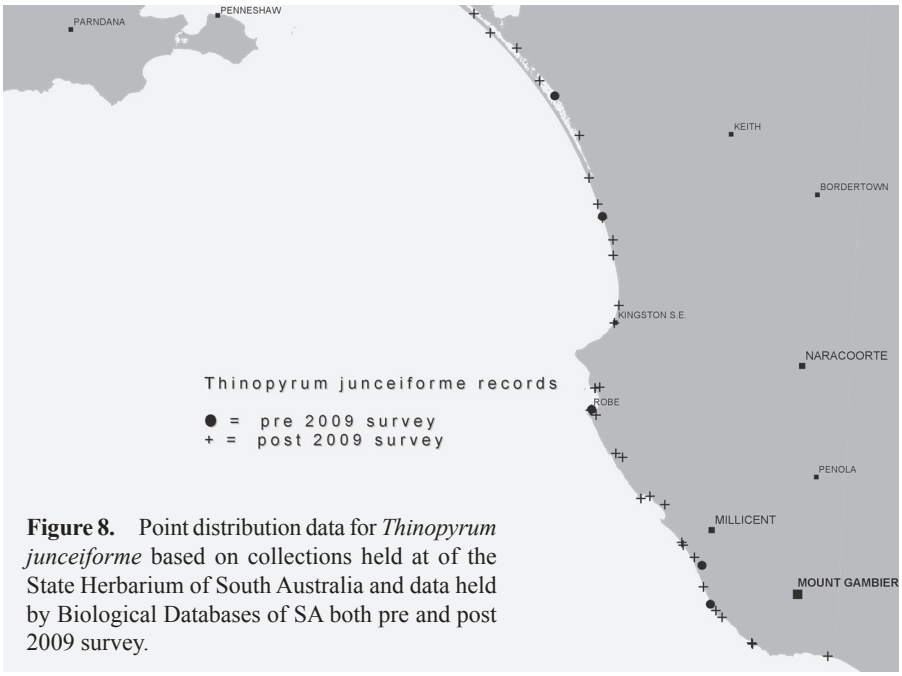

Figure 8. Point distribution data for *Thinopyrum junceiforme* based on collections held at of the State Herbarium of South Australia and data held by Biological Databases of SA both pre and post 2009 survey.

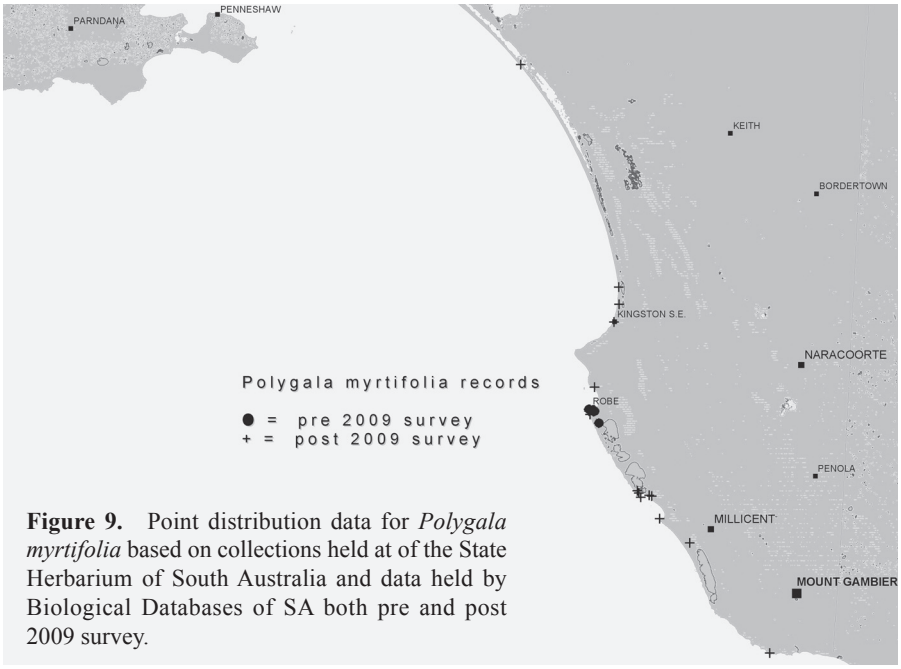

Figure 9. Point distribution data for *Polygala myrtifolia* based on collections held at of the State Herbarium of South Australia and data held by Biological Databases of SA both pre and post 2009 survey.

DISCUSSION

Collections held by the State Herbarium of South Australia are used to inform scientific publications. Herbarium specimen data are also accessed via the world-wide web and are used to underpin the South Australian (http://www.flora.sa.gov.au/census.html) and Australian (http://www.anbg.gov.au/chah/apc/) plant censuses as well as map producing facilities, such as Australia's Virtual Herbarium (AVH). An under-collection of weed species means that these publications will not accurately document the state's naturalised flora.

Increasingly GIS applications are using biological data for conservation assessments (Caton *et al.* 2009). However, it is plant specimens held in a herbarium that provide a physical and permanent record of scientific studies that can be re-examined and verified at any time. Anecdotal records are difficult to verify and therefore are of limited value in long-term studies.

CONCLUSION

Weeds including coastal weeds can be under-represented in herbarium collections. Specimen collections and associated field observations submitted to herbaria are required to properly represent an accurate, verified, easily accessible and up-to-date record of weed distribution. This distribution data facilitates the development of effective management plans.

Recommendations:

- Include targeted collection of weeds in future assessment of weed threats.
- Make friends with your local herbarium who can advise on collecting and recording plant specimens.
- Encourage anyone who discovers a new weed or suspected new infestation to submit specimens to a herbarium so that the identity can be verified and distribution records are as up-to-date as possible.

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