Advice to the Minister for the Environment and Heritage from the Threatened Species Scientific Committee (the Committee) on Amendments to the list of Threatened Species under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

1. Scientific name (common name)

Acanthocladium dockeri (Spiny Everlasting, Spiny Daisy)

2. Description

The Spiny Everlasting is a short rigid perennial shrub in the daisy family, with persistent woody stems and spine-tipped branches which are covered in short, dense, white-velvety hairs (Harden 1992). The Spiny Everlasting occurs in four populations and a recent genetic analysis indicates that each population consists of a single genet (i.e. a group of genetically identical individuals derived by asexual reproduction from a single individual) (Jusaitis and Adams 2005).

3. National Context

The Spiny Everlasting is endemic to Australia (Harden 1992). Herbarium records (Adelaide Herbarium 2005; Davies 1992; Harden 1992) indicate that the species was endemic to the states of South Australia and New South Wales at the time of European settlement. The Spiny Everlasting was presumed to be an extinct species until its discovery in 1999 near Laura, in the mid-north of South Australia.

The Spiny Everlasting is now confined to remnant grassland on low hills and plains in the mid-north of South Australia, a habitat that has largely been cleared for winter cereal cropping throughout the region. All known existing populations of the Spiny Everlasting occur on narrow road reserves that have been repeatedly disturbed in the past (Robertson 2002 a, b, c, d, e). The main plant species that occur with the Spiny Everlasting are scented mat-rush, *Lomandra effusa*, spear and wallaby grasses, and various native forbs (Robertson 2002 a).

The species is currently listed as presumed extinct under the New South Wales *Threatened Species Conservation Act 1995* and endangered under Schedule 7 of the South Australian *National Parks and Wildlife Act 1972*. Endangered is the highest threat category under South Australian legislation.

4. How judged by the Committee in relation to the EPBC Act criteria

The Committee judges the species to be **eligible** for listing as **critically endangered** under the EPBC Act. The justification against the criteria is as follows:

Criterion 1 – It has undergone, is suspected to have undergone or is likely to undergo in the immediate future a very severe, severe or substantial reduction in numbers

The Spiny Everlasting was first recorded in 1860 near the Darling River, during the Burke and Wills expedition. The species was not recorded again until 1910, when herbarium specimens were collected at Overland Corner on the Murray River in South Australia. By 1992, there had been no further record of the species and it was presumed to be extinct, following unsuccessful searching of the known general localities (Davies 1992).

Since the rediscovery of the species in 1999 near Laura, a further three populations have been located in the region. Three of the four known populations occur east of Laura, with the fourth

population located near Hart, about 65 km to the south of Laura. All four known populations occur in remnant native grassland located on roadside verges surrounded by agricultural land (Robertson 2002 a, b, c, d, e). The grassland habitat in which the Spiny Everlasting occurs has been fragmented and selectively cleared for agriculture in the Southern Lofty Ranges (Davies 1982, 2000), resulting in all the remaining populations of the species occurring in isolated patches. It is possible that further populations survive, however, any such populations are likely to be very limited in area and under considerable threat (similar to the four known populations), as surviving grasslands in the mid-north are both very restricted in area and degraded.

Old herbarium records, information in Burbidge (1958), and subsequent extensive searching (Davies 1992), indicate that the extent of occurrence of the Spiny Everlasting has declined since 1910. These records indicate that the species previously occurred adjacent to the Murray River at Overland Corner in South Australia and near Lake Pamaroo on the Darling River in New South Wales. Given the aridity of these areas compared with the four existing populations, it is possible that the species was confined to the banks or flood plains of these river systems.

The extinction of the species from areas adjacent to the Murray and Darling Rivers indicates that the area of occupancy of the species has declined drastically, although inadequate data were recorded with nineteenth century herbarium collections to determine how common and widespread the species was along these rivers. Despite a recorded decline in the species' extent of occurrence it is unclear to what degree the Spiny Everlasting has undergone a reduction in species numbers.

Plants at three of the four extant populations were counted in 2000 and again in 2001. These surveys indicated that the total number of shoots increased from 775 to 823 (at the Thornlea population) and from 352 to 518 (at the Rusty Cab population) despite, or possibly because of, being burnt by a fire in January 2001. The largest known population (Yangya) appears to be the most at risk, with numbers decreasing from 1 576 to 928 over the same period (Robertson 2002 a, b, c, d, e). Robertson (2002 c) described significant defoliation of plants occurring in this population in the spring of 2001, due to herbicide and/or snail damage.

Monitoring has not been undertaken over a long enough period to determine if the species experiences extreme natural fluctuations in population numbers. Therefore, given that these two surveys were completed over only one year, apparent changes in population size are not necessarily indicative of longer term trends.

Possible threats to the species include weed invasion and competition, the spread of perennial exotic grasses, the impact of the introduced common white or vineyard snail, and the impact on its habitat from road widening, slashing and herbicide spraying (Jusaitis pers. comm. cited in Robertson 2002 a, Robertson 2002 a, b, c, d, e).

The introduced common white or vineyard snail, *Cernuella virgata*, has been observed to have a dramatic impact on individuals of the Spiny Everlasting during wetter months. Snails have been in the Laura district for about ten years, are present at the sites of all Spiny Everlasting subpopulations, and their impact may be increasing (Robertson 2002 a, b, c, d, e). Weed invasion is also present at all known sites of the species. Although perennial weed species are also present, the dominant non-native plant species at all sites are annual grasses. It is possible that weed competition may limit the species' growth during a dry winter and that weed competition could be contributing to the lack of seedling recruitment. Since 1999, Spiny Everlasting populations have also been variously subjected to road widening (Thornlea), roadside slashing (Yangya and Hart) and herbicide spraying (Yangya).

The Spiny Everlasting is presumed to be extinct along the Murray and Darling Rivers. Davies (1992) and Robertson (2002 a) hypothesise that this is probably partially due to their former habitats being heavily degraded by rabbits and sheep grazing. The ongoing presence of rabbits will limit the success of any reintroductions of the Spiny Everlasting to its former sites along the Murray and Darling Rivers. However, neither Robertson (2002 a) nor Jusaitis and Adams (2005) mention vertebrate grazing as a threat to existing populations. The greatly altered hydrology of the Murray and Darling Rivers will limit the success of any reintroductions of the Spiny Everlasting to its former sites along these rivers, since these populations were possibly dependant on the seasonal flooding of flood plains which no longer occurs due to the regulation of flow by weirs.

Monitoring at the mid-north sites has been inadequate in duration for predictions to be made concerning future change in species numbers.

There are insufficient data available to assess the species against this criterion.

Criterion 2 – Its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited

The Spiny Everlasting is known to occur in two locations: one location in the vicinity of Laura which contains three populations within a radius of 4 km; and another location 65 km to the south, near Hart consisting of an additional population. The three Laura populations are included in the one location since they all occur on narrow roadside verges that could be damaged during one event, for example by herbicide spraying or roadworks (R. Davies 2005, pers. comm.).

The current extent of occurrence of the Spiny Everlasting is 23 km^2, determined using data in Robertson (2002 a, b, c, d, e), and Burbidge (1958).

All known populations of the Spiny Everlasting have been surveyed in detail and their areas of occupancy measured in the field total less than 0.01 km^2 (Robertson 2002 a, b, c, d, e). The area of occupancy of existing populations has not changed significantly since monitoring commenced in 2000 (M. Robertson, 2005 pers. comm.).

The Spiny Everlasting is severely fragmented, with all four known populations occurring in remnant native grassland on roadside verges in the mid-north of South Australia. Over 93% of native grasslands in this region have been cleared for agriculture since European settlement (Davies 2000). The largest population of the species (Yangya) occupies both road verges for more than 300 m, while all other populations extend fewer than 80 m along the verge. The verges have a width of 5 m or less and these three populations are immediately adjacent to intensively cropped land. The fourth population occurs near Hart, between a major sealed road and a disused rail reserve surrounded by agricultural land (Robertson 2002 a, b, c, d, e).

Potential threats to the species include weed invasion and competition, the spread of perennial exotic grasses, the impact of the introduced common white or vineyard snail, and the impact on its habitat from road widening, slashing and herbicide spraying. The geographic distribution of the Spiny Everlasting is very restricted and is precarious for the survival of the species.

Therefore, the species is **eligible** for listing as **critically endangered** under this criterion.

Criterion 3 – The estimated total number of mature individuals is limited to a particular degree and: (a) evidence suggests that the number will continue to decline at a particular rate; or (b) the number is likely to continue to decline and its geographic distribution is precarious for its survival

Plants of the Spiny Everlasting multiply vegetatively by root suckering (Jusaitis and Bond 1999). A recent genetic analysis indicates that each population consists of a single genet (i.e. a group of genetically identical individuals derived by asexual reproduction from a single individual) (Jusaitis and Adams 2005). Three of the four existing populations were counted in 2000 and again in 2001 and the total number of individuals was determined by counting the number of shoots. The total number of shoots increased from 775 to 823 at the Thornlea population and from 352 to 518 at the Rusty Cab population despite, or possibly because of, being burnt by a fire in January 2001. In contrast, numbers decreased at the Yangya population from 1 576 to 928 over the same period (Robertson 2002 a, b, c, d, e). Robertson (2002 c) described significant defoliation of plants occurring in the Yangya population during the spring of 2001, due to herbicide and/or snail damage.

Current data indicate the total population consists of at least 2 000 shoots (covering three of the four known populations). However, no data exist for the remaining population. Former populations along the Murray-Darling are presumed to be extinct. There are insufficient data to determine whether numbers are limited.

Surveys were made over only one year, and any changes in population size are not necessarily indicative of longer term trends. Monitoring has not been undertaken over a long enough period to determine if the species experiences extreme natural fluctuations in population numbers. There are insufficient data to determine whether numbers are likely to decline.

There are insufficient data available to assess the species against this criterion.

Criterion 4 – The estimated total number of mature individuals is extremely low, very low or low

The current estimated total number of mature individuals has been derived by counting the species' shoots. In total, at least 2 000 shoots are known to occur from three of the four surviving populations. There are no data on the remaining population and the population that once occurred along the Murray-Darling is now presumed to be extinct.

The estimated total number of mature individuals is not extremely low, very low or low.

Therefore, the species is **not eligible** for listing under this criterion.

Criterion 5 – Probability of extinction in the wild

There are no data available to assess the species against this criterion.

5. CONCLUSION

The Spiny Everlasting was presumed to be extinct until its rediscovery in 1999 near Laura, South Australia. Populations have historically been recorded along the Murray-Darling but these populations are now presumed to be extinct. The species is currently known to survive at two locations in the mid-north of South Australia near Laura, and near Hart, and consist of four populations confined to narrow road verges. The species has an estimated extent of occurrence of 23 km^2 and an estimated area of occupancy of less than 0.1 km^2.

The four known populations of the Spiny Everlasting represent four distinct genetic clones (Jusiatis and Adams 2005). Possible threats to the species include weed invasion and competition, the spread of perennial exotic grasses, the impact of the introduced common white or vineyard snail, and the impact on its habitat from road widening, slashing and herbicide spraying.

The geographic distribution of the Spiny Everlasting is very restricted and precarious for the survival of the species.

The species is **eligible** for listing as **critically endangered** under criterion 2.

6. Recommendation

The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **transferring** from the **extinct** category to the **critically endangered** category:

***Acanthocladium dockeri* (Spiny Everlasting, Spiny Daisy)**

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