



United States Department of Agriculture

United States
Department of
Agriculture

Animal and Plant
Health Inspection
Service

October 17, 2013

Version 2

Weed Risk Assessment for *Chrysanthemoides monilifera* (L.) Norl. Asteraceae – Boneseed, bitou bush



Top left/right: *Chrysanthemoides monilifera* subsp. *rotunda* (bitou bush) flower and seed/invasion. Bottom left/right: *Chrysanthemoides monilifera* subsp. *monilifera* (boneseed) flowers and invasion (source: N. Pitsas, New South Wales Department of Primary Industries).

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Introduction Plant Protection and Quarantine (PPQ) regulates noxious weeds under the authority of the Plant Protection Act (7 U.S.C. § 7701-7786, 2000) and the Federal Seed Act (7 U.S.C. § 1581-1610, 1939). A noxious weed is defined as “any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment” (7 U.S.C. § 7701-7786, 2000). We use weed risk assessment (WRA)—specifically, the PPQ WRA model (Koop et al., 2012)—to evaluate the risk potential of plants, including those newly detected in the United States, those proposed for import, and those emerging as weeds elsewhere in the world.

Because the PPQ WRA model is geographically and climatically neutral, it can be used to evaluate the baseline invasive/weed potential of any plant species for the entire United States or for any area within it. As part of this analysis, we use a stochastic simulation to evaluate how much the uncertainty associated with the analysis affects the model outcomes. We also use GIS overlays to evaluate those areas of the United States that may be suitable for the establishment of the plant. For more information on the PPQ WRA process, please refer to the document, *Background information on the PPQ Weed Risk Assessment*, which is available upon request.

***Chrysanthemoides monilifera* (L.) Norl. – Boneseed, bitou bush**

Species Family: Asteraceae

Information Synonyms: *Osteospermum moniliferum* L.; *O. pisiferum* L.; *O. pisiferum* var. *canescens* DC; *O. rotundatum* DC (ARS-GRIN, 2013).

Initiation: On November 25, 2011, Al Tasker (PPQ Federal Noxious Weed Program Manager) requested an assessment for *Chrysanthemoides monilifera* because it was being considered for Not Authorized Pending Pest Risk Assessment (NAPPRA) listing (Koop, 2011). During stakeholder consultation, one stakeholder said that based on its noninvasive status in the Mediterranean Region after 100 years, it should not prove invasive in the United States (Mace, 2011). He also reported that the species was first imported into the United States (as *Osteospermum moniliferum*) in 1912 (USDA Bureau of Plant Industry, 1914). The California Invasive Plants Council stated this taxon was neither naturalized nor sold in California (Brusati and Johnson, 2011). PPQ subsequently removed *C. monilifera* from NAPPRA consideration (Berlanger, 2012) but because of the apparent discrepancy between U.S. public opinion and this species’ behavior in Australia (Parsons and Cuthbertson, 2001), the PERAL Weed Team evaluated this species.

Foreign distribution: *Chrysanthemoides monilifera* is native to South Africa. It has been introduced into Sicily, southern France, New Zealand, and Australia (Parsons and Cuthbertson, 2001).

U.S. distribution and status: *Chrysanthemoides monilifera* subsp. *monilifera* was introduced into California (Palomar College, San Diego County) around 1980 and has naturalized in nearby coastal sage scrub hills (Armstrong, 2000; Jepson Flora Project (eds.), 2013). Although early records from the USDA indicate it was first introduced into the United States in 1912 (Mace, 2011), it does not appear to be widely cultivated or available in large nurseries.

WRA area¹: Entire United States, including territories.

1. *Chrysanthemoides monilifera* analysis

Establishment/Spread Potential This species is comprised of six subspecies, two of which are considered invasive and under regulation in Australia [*C. monilifera* subsp. *monilifera* (boneseed) and *C. monilifera* subsp. *rotundata* (bitou bush)] (Brougham et al., 2006). This species forms dense thickets, produces up to 50,000 seeds per plant per year, forms a persistent seed bank (Parsons and Cuthbertson, 2001), tolerates mutilation and fire (Queensland Government, 2011), and can be dispersed in ship ballast water, garden refuse, and contaminated gravel (Parsons and Cuthbertson, 2001). We had a very low level of uncertainty for this element.

Risk score = 16

Uncertainty index = 0.03

Impact Potential *Chrysanthemoides monilifera* is a weed of natural systems (Grice et al., 2008; Parsons and Cuthbertson, 2001). It changes ecosystem processes by altering nutrient cycling, particularly nitrogen cycling, at the expense of native species (Lindsay and French, 2005) and creating heavy shade in normally high light environments (Timmins and Mackenzie, 1995). It is considered a “weed of national significance” in Australia (Coutts-Smith and Downey, 2006) and has replaced entire stands of native species (Groves, 1994). This species is tolerant of saline conditions near coastal areas and may affect globally outstanding ecoregions and threatened and endangered species. We had low uncertainty for this element.

Risk score = 2.6

Uncertainty index = 0.08

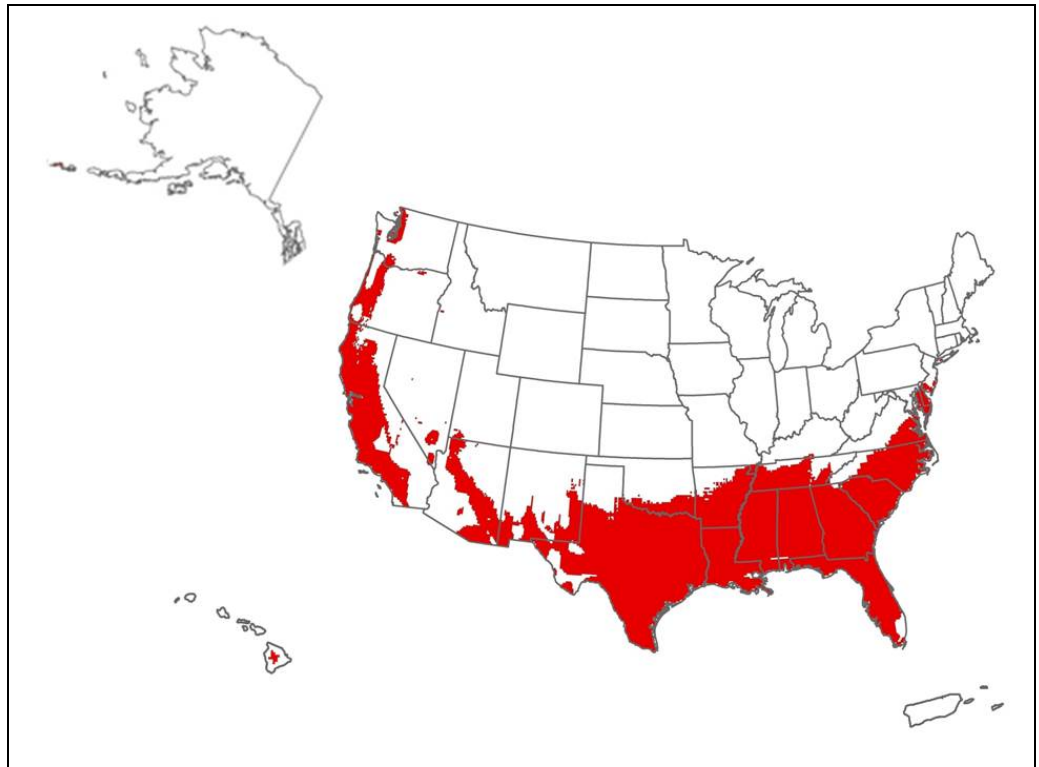
Geographic Potential Based on three climatic variables, we estimate that about 23 percent of the United States is suitable for the establishment of *Chrysanthemoides monilifera* (Fig. 1). This predicted distribution is based on the species’ known distribution elsewhere in the world and includes point-referenced localities and areas of occurrence. The map for *C. monilifera* represents the joint distribution of Plant Hardiness Zones 8-11, areas with 10-70 inches of annual precipitation, and the following Köppen-Geiger climate classes: tropical savannah, steppe, desert, Mediterranean, humid subtropical, and marine west coast. The area estimated likely represents a conservative estimate as it only

¹ “WRA area” is the area in relation to which the weed risk assessment is conducted [definition modified from that for “PRA area” (IPPC, 2012)].

uses three climatic variables. Other environmental variables, such as soil and habitat type, may further limit the areas in which this species is likely to establish.

Entry Potential We did not assess the entry potential of *Chrysanthemoides monilifera* because it is already present in the United States in California (Keil, 2012; Parsons and Cuthbertson, 2001).

Figure 1. Predicted distribution of *Chrysanthemoides monilifera* in the United States. Map insets for Alaska, Hawaii, and Puerto Rico are not to scale.



2. Results and Conclusion

Model Probabilities: P(Major Invader) = 76.8%

P(Minor Invader) = 22.3%

P(Non-Invader) = 1%

Risk Result = High Risk

Secondary Screening = N/A

Figure 2. *Chrysanthemoides monilifera* risk score (black box) relative to the risk scores of species used to develop and validate the PPQ WRA model (other symbols). See Appendix A for the complete assessment.

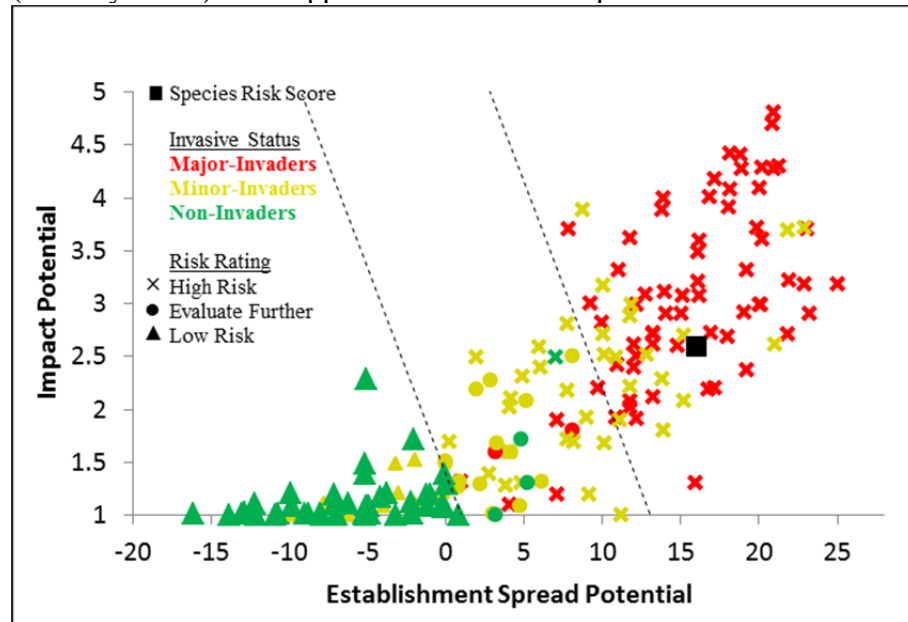
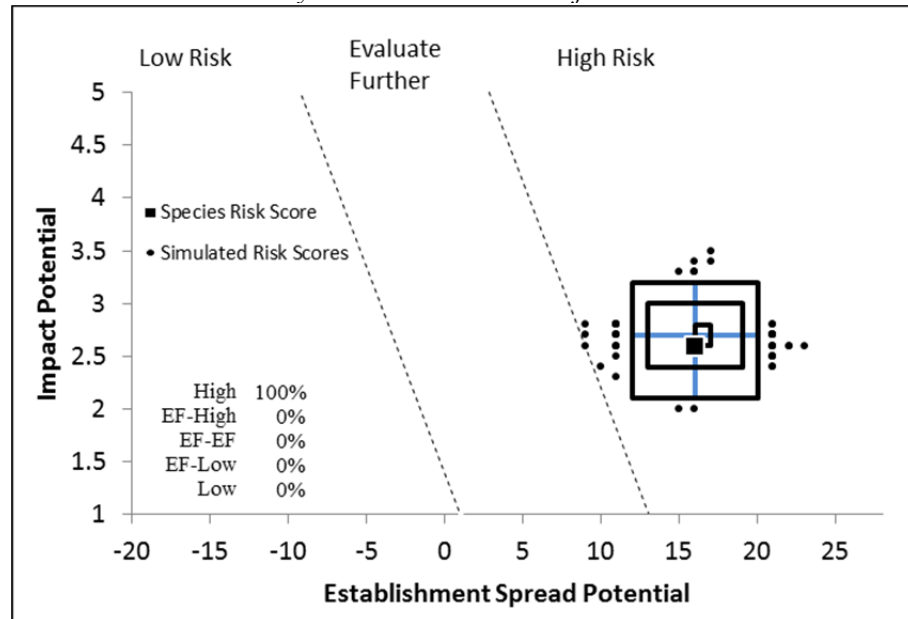


Figure 3. Monte Carlo simulation results (N=5,000) for uncertainty around the risk scores for *Chrysanthemoides monilifera*^a.



^a The blue “+” symbol represents the medians of the simulated outcomes. The smallest box contains 50 percent of the outcomes, the second 95 percent, and the largest 99 percent.

3. Discussion

The result of the weed risk assessment for *Chrysanthemoides monilifera* is High Risk (Fig. 2). Because a considerable amount of literature is available on this species, we had a low level of uncertainty in this risk assessment. All but one of our simulated risk scores (Fig. 3) resulted in a conclusion of High Risk prior to secondary screening, giving us confidence that our assessment is robust. This species is an aggressive invader of Australian bushlands (Parsons and Cuthbertson, 2001) and is considered a weed of national significance in New South Wales (Coutts-Smith and Downey, 2006). It was introduced into Australian gardens 150 years ago and has since “jumped the fence” into natural areas (Brougham et al., 2006). It was introduced into California around 1980 (Armstrong, 2000) and has naturalized in the hills surrounding its original introduction site (Keil, 2012). Its ability to spread, outcompete native plants, and change soil nutrient cycles may enable it to become invasive in coastal regions, although a lag may occur between establishment and noticeable impact.

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Appendix A. Weed risk assessment for *Chrysanthemoides monilifera* (L.) Norl. (Asteraceae). The following information came from the original risk assessment, which is available upon request (full responses and all guidance). We modified the information to fit on the page.

Question ID	Answer - Uncertainty	Score	Notes (and references)
ESTABLISHMENT/SPREAD POTENTIAL			
ES-1 (Status/invasiveness outside its native range)	f - negl	5	Native of southern and southeastern coastal areas of South Africa; has been introduced to a number of other countries, including the United States (California), Sicily, southern France, Australia, and New Zealand (Parsons and Cuthbertson, 2001). <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> has become an aggressive invader of native bushland in Australia (Parsons and Cuthbertson, 2001). <i>Chrysanthemoides monilifera</i> is invasive in Adelaide and Melbourne, Australia (Mulvaney, 1991). <i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> is fully naturalized in New Zealand (Howell and Sawyer, 2006). Alternate answers for the Monte Carlo simulation were both "e."
ES-2 (Is the species highly domesticated)	n - low	0	We found no evidence; well-known species.
ES-3 (Weedy congeners)	n - mod	0	This genus contains only two species (Mabberley, 2008). We found no evidence the congener is a significant weed—only <i>C. monilifera</i> appears to be a weed.
ES-4 (Shade tolerant at some stage of its life cycle)	n - low	0	Shade intolerant (Timmins and Mackenzie, 1995).
ES-5 (Climbing or smothering growth form)	n - negl	0	<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i> is an erect shrub, 3 m high (Keil, 2012). <i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> is a sprawling shrub with long decumbent branches, 1 to 2 m high unless supported by other vegetation (Parsons and Cuthbertson, 2001).
ES-6 (Forms dense thickets)	y - mod	2	Quickly forms a very dense cover that shades out other plants and can limit access to coastal areas (Weedbusters.co.nz, n.d.).
ES-7 (Aquatic)	n - negl	0	Terrestrial plant (Parsons and Cuthbertson, 2001).
ES-8 (Grass)	n - negl	0	Species is not in the grass family; it is in the Asteraceae (Parsons and Cuthbertson, 2001).
ES-9 (Nitrogen-fixing woody plant)	n - negl	0	<i>Chrysanthemoides monilifera</i> doesn't fix nitrogen per se, but there is increased nitrogen in the soil under which it grows (Lindsay and French, 2005). This appears to be related to the higher quality leaves and more rapid decomposition. The family Asteraceae is not known to contain any nitrogen-fixing species (Martin and Dowd, 1990).
ES-10 (Does it produce viable seeds or spores)	y - negl	1	Reproduction occurs from seeds (Csurhes and Edwards, 1998). About 60 percent of seeds are viable (Parsons and Cuthbertson, 2001).
ES-11 (Self-compatible or apomictic)	n - low	-1	We found no evidence; not described as being self-compatible (well-known species).

Question ID	Answer - Uncertainty	Score	Notes (and references)
ES-12 (Requires special pollinators)	n - low	0	Pollinated by insects, and bees find it particularly attractive (van Jaarsveld, 2001).
ES-13 (Minimum generation time)	c - low	0	Plants are at least 18 months and sometimes 3 years old before flowering (Parsons and Cuthbertson, 2001). Alternate answers for the Monte Carlo simulation were "b" and "d."
ES-14 (Prolific reproduction)	y - low	1	Seed production is prolific: up to 50,000 seeds per plant per year (Parsons and Cuthbertson, 2001).
ES-15 (Propagules likely to be dispersed unintentionally by people)	y - negl	1	<i>Chrysanthemoides monilifera</i> subsp. <i>rotunda</i> appears to have been introduced to New South Wales in ship ballast water that was dumped on the banks of the Hunter River in about 1908 (Parsons and Cuthbertson, 2001). The dumping of garden refuse and contaminated gravel carted from infested areas have been important means of spread in Victoria (Parsons and Cuthbertson, 2001).
ES-16 (Propagules likely to disperse in trade as contaminants or hitchhikers)	n - mod	-1	We found no evidence.
ES-17 (Number of natural dispersal vectors)	4	4	Description of fruit and seed for questions ES-17a through ES-17e: Fruit a drupe (Keil, 2012), green fleshy skin at first, becoming black, then flaking off to leave a hard whitish inner coat; globular, 6 to 8 mm diameter (<i>C. monilifera</i> subsp. <i>monilifera</i>), or ovoid, 5 to 7 mm long and 3 to 4 mm across (<i>C. monilifera</i> subsp. <i>rotundata</i>) (Parsons and Cuthbertson, 2001). Each fruit contains one seed (Weedbusters.co.nz, n.d.). Seed very hard and bone-like in color and texture when ripe; a single seed in each fruit, globular or ovoid (Parsons and Cuthbertson, 2001).
ES-17a (Wind dispersal)	n - negl		We found no evidence and no descriptions of morphological characteristics that might indicate wind dispersal. The fruit are too large to be dispersed by wind.
ES-17b (Water dispersal)	y -low		The fruit and seeds can be carried successfully by running water; <i>C. monilifera</i> subsp. <i>rotunda</i> is thought to have been introduced into New South Wales in ship ballast water (Parsons and Cuthbertson, 2001).
ES-17c (Bird dispersal)	y - negl		Birds have been a major dispersal agent because they readily eat the fleshy fruit and either pass or regurgitate the seed in a viable condition (Parsons and Cuthbertson, 2001). The fleshy fruits are a favored food of frugivorous birds (van Jaarsveld, 2001).
ES-17d (Animal external dispersal)	y - low		Ants sometimes carry the fruit to their nests, where they eat the fleshy skins and discard the seeds (Parsons and Cuthbertson, 2001).
ES-17e (Animal internal dispersal)	y - negl		Rabbits, foxes, and cattle eat the fruit and spread the seeds in their droppings (Parsons and Cuthbertson, 2001).
ES-18 (Evidence that a persistent (>1yr) propagule bank (seed bank) is formed)	y - negl	1	About 60 percent of seeds are viable (Parsons and Cuthbertson, 2001). The hard seed coat splits open in some and these germinate as soon as soil moisture is

Question ID	Answer - Uncertainty	Score	Notes (and references)
			adequate, but the seed coat remains intact for many seeds, which can remain dormant for at least 10 years. The viability of <i>C. monilifera</i> subsp. <i>rotundata</i> seed in the soil is reduced after two years and only a small number live more than four years; seed of <i>C. monilifera</i> ssp. <i>monilifera</i> is longer lived and remains viable for at least four or five years (Parsons and Cuthbertson, 2001). Seed viability is retained longer with increased depth of burial.
ES-19 (Tolerates/benefits from mutilation, cultivation or fire)	y - low	1	Fire destroys seedlings and many mature plants but plants regenerate quickly (Parsons and Cuthbertson, 2001). Slashing is not effective because strong regrowth occurs from the cut stumps (Parsons and Cuthbertson, 2001).
ES-20 (Is resistant to some herbicides or has the potential to become resistant)	n - low	0	Herbicides are often recommended and appear effective in controlling this species (Parsons and Cuthbertson, 2001; Weedbusters.co.nz, n.d.). Seedlings are susceptible to bromoxynil; several herbicides, including glyphosate and picloram, amine 2,4-D, amitrole T, and metsulfuron methyl are useful for control (Parsons and Cuthbertson, 2001). Not listed by Heap (2012).
ES-21 (Number of cold hardiness zones suitable for its survival)	4	0	
ES-22 (Number of climate types suitable for its survival)	6	2	
ES-23 (Number of precipitation bands suitable for its survival)	6	0	
IMPACT POTENTIAL			
General Impacts			
Imp-G1 (Allelopathic)	y - high	0.1	Recent evidence indicates that leaf litter and fruit leachates from this species inhibit the germination and growth of some species (Lindsay and French, 2005; Parsons and Cuthbertson, 2001).
Imp-G2 (Parasitic)	n - negl	0	The family Asteraceae is not known to contain any parasitic species (Nickrent, 2012).
Impacts to Natural Systems			
Imp-N1 (Change ecosystem processes and parameters that affect other species)	y - low	0.4	This species alters nutrient cycling (particularly nitrogen cycling) in Australian dune ecosystems in a way that favors its survival over native species (Lindsay and French, 2005). Creates heavy shade in environments where high light levels normally occur (Timmins and Mackenzie, 1995). Considered an emerging transformer in Mediterranean areas (Brunel and Tison, 2005).
Imp-N2 (Change community structure)	? - max		It is not described as changing community structure, but since it is a "future invader" exhibiting "transformer behavior" (Brunel and Tison, 2005), it may affect community structure under certain conditions.
Imp-N3 (Change community composition)	y - negl	0.2	This species has replaced stands of <i>Acacia longifolia</i>

Question ID	Answer - Uncertainty	Score	Notes (and references)
			var. <i>sophorae</i> in Australia (Groves 1994). Considered a "weed of national significance" in Australia, it is listed as a threat to 34 plant species, three plant populations, and five ecological communities (Coult-Smith and Downey, 2006; Parsons and Cuthbertson, 2001). Intentionally planted to colonize sandy soils along the coast of New South Wales, it dominates the vegetation to the detriment of native species such as <i>Acacia longifolia</i> , <i>Correa alba</i> , and <i>Leucopogon parviflorus</i> (Parsons and Cuthbertson, 2001). It outcompetes and eliminates many native species (Parsons and Cuthbertson, 2001). In New South Wales, it has replaced plant species known to be important food sources for migratory birds; it replaces plants important to apiarists as a source of nectar and pollen during winter (Parsons and Cuthbertson, 2001). Boneseed replaces lower-growing native seedlings and prevents the establishment of native plant seedlings (Ministry of Primary Industries, 2012).
Imp-N4 (Is it likely to affect federal Threatened and Endangered species)	y - low	0.1	<i>Chrysanthemoides monilifera</i> invades natural areas in coastal habitats (Parsons and Cuthbertson, 2001). Because there are many threatened and endangered species in coastal habitats, we answered yes.
Imp-N5 (Is it likely to affect any globally outstanding ecoregions)	y - low	0.1	This species is tolerant of saline conditions near the coast and has become invasive in such areas (Parsons and Cuthbertson, 2001). Because coastal regions are within the globally outstanding ecoregions as defined by Ricketts et al. (1999), we answered yes with low uncertainty.
Imp-N6 (Weed status in natural systems)	c - negl	0.6	Declared a noxious weed in New South Wales, Australia in 55 council areas; prohibited in 4 regions and controlled in 5 regions in Victoria (Parsons and Cuthbertson, 2001). It is a weed because of its ability to establish in areas of native vegetation ranging from malee scrub to wet sclerophyll forests, whether disturbed or not, and eventually to outcompete and eliminate many native species (Brougham et al., 2006; Parsons and Cuthbertson, 2001). Conservation groups have organized special drives against this species, enlisting the aid of naturalists, service clubs, school groups, scouts, guides, and others (Parsons and Cuthbertson, 2001). This species is listed in the New Zealand National Pest Plant Accord (NPPA) as a medium priority and is not sold or distributed in the country (Ministry of Primary Industries, 2013) Alternate answers for the Monte Carlo simulation are both "b".
Impact to Anthropogenic Systems (cities, suburbs, roadways)			
Imp-A1 (Impacts human property, processes, civilization, or safety)	n - low	0	We found no evidence; well-known species.
Imp-A2 (Changes or limits recreational use of an area)	y - mod	0.1	Quickly forms a very dense cover and can limit access to coastal areas (Weedbusters.co.nz, n.d.)

Question ID	Answer - Uncertainty	Score	Notes (and references)
Imp-A3 (Outcompetes, replaces, or otherwise affects desirable plants and vegetation)	n - low	0	This species' habitat includes coastal areas, subtropical and sub-humid scrublands (Parsons and Cuthbertson, 2001); not described as a problem in anthropogenic areas.
Imp-A4 (Weed status in anthropogenic systems)	a - low	0	Establishes very readily on disturbed areas (Parsons and Cuthbertson, 2001); however, not described as an urban weed. Alternate answers to the Monte Carlo simulation are both "b."
Impact to Production Systems (agriculture, nurseries, forest plantations, orchards, etc.)			
Imp-P1 (Reduces crop/product yield)	n - low	0	Does not affect agriculture detrimentally (Parsons and Cuthbertson, 2001).
Imp-P2 (Lowers commodity value)	n - low	0	Does not affect agriculture detrimentally (Parsons and Cuthbertson, 2001).
Imp-P3 (Is it likely to impact trade)	n - low	0	We found no evidence of this plant being an agricultural weed.
Imp-P4 (Reduces the quality or availability of irrigation, or strongly competes with plants for water)	n - low	0	We found no evidence of this plant reducing or affecting the availability of water.
Imp-P5 (Toxic to animals, including livestock/range animals and poultry)	n - low	0	This species is highly palatable to goats, but there is no known risk for toxicity to goats (Simmonds et al., 2000).
Imp-P6 (Weed status in production systems)	a - low	0	Boneseed does not affect agriculture detrimentally and is rarely found in pastures (Parsons and Cuthbertson, 2001). This species is considered of little to no importance to rangelands in Australia (Grice et al., 2008). Alternate answers to the Monte Carlo simulation are both "b."
GEOGRAPHIC POTENTIAL			
			Unless otherwise noted, all evidence below represents point-source data from the Global Biodiversity Information Facility database (GBIF, 2013).
Plant cold hardiness zones			
Geo-Z1 (Zone 1)	n - negl	N/A	We found no evidence; likely too cold.
Geo-Z2 (Zone 2)	n - negl	N/A	We found no evidence; likely too cold.
Geo-Z3 (Zone 3)	n - negl	N/A	We found no evidence; likely too cold.
Geo-Z4 (Zone 4)	n - negl	N/A	We found no evidence; likely too cold.
Geo-Z5 (Zone 5)	n - negl	N/A	We found no evidence; likely too cold.
Geo-Z6 (Zone 6)	n - negl	N/A	We found no evidence; likely too cold.
Geo-Z7 (Zone 7)	n - low	N/A	We found no evidence; possibly too cold.
Geo-Z8 (Zone 8)	y - low	N/A	South Africa and New Zealand.
Geo-Z9 (Zone 9)	y - negl	N/A	South Africa, Australia, and New Zealand.
Geo-Z10 (Zone 10)	y - negl	N/A	The United States (CA), Spain, Chile, Tanzania, South Africa, Australia, and New Zealand.
Geo-Z11 (Zone 11)	y - negl	N/A	The United States (CA), Chile, Tanzania, South Africa, Australia, and New Zealand.
Geo-Z12 (Zone 12)	n - low	N/A	We found no evidence.
Geo-Z13 (Zone 13)	n - low	N/A	We found no evidence.
Köppen-Geiger climate classes			
Geo-C1 (Tropical rainforest)	n - low	N/A	We found no evidence.

Weed Risk Assessment for *Chrysanthemoides monilifera*

Question ID	Answer - Uncertainty	Score	Notes (and references)
Geo-C2 (Tropical savanna)	y - negl	N/A	Tanzania.
Geo-C3 (Steppe)	y - negl	N/A	Spain, Chile, South Africa, and Australia.
Geo-C4 (Desert)	y - low	N/A	South Africa and Australia.
Geo-C5 (Mediterranean)	y - negl	N/A	The United States (CA), Chile, South Africa, and Australia.
Geo-C6 (Humid subtropical)	y - negl	N/A	Tanzania, South Africa, and Australia.
Geo-C7 (Marine west coast)	y - negl	N/A	South Africa, Australia, and New Zealand.
Geo-C8 (Humid cont. warm sum.)	n - low	N/A	We found no evidence.
Geo-C9 (Humid cont. cool sum.)	n - low	N/A	We found no evidence.
Geo-C10 (Subarctic)	n - negl	N/A	We found no evidence; probably too cold.
Geo-C11 (Tundra)	n - negl	N/A	We found no evidence; probably too cold.
Geo-C12 (Icecap)	n - negl	N/A	We found no evidence; probably too cold.
10-inch precipitation bands			
Geo-R1 (0-10 inches; 0-25 cm)	n - high	N/A	Spain (one point).
Geo-R2 (10-20 inches; 25-51 cm)	y - negl	N/A	The United States (CA), Chile, Tanzania, South Africa, and Australia.
Geo-R3 (20-30 inches; 51-76 cm)	y - negl	N/A	Chile, South Africa, New Zealand, and New Zealand.
Geo-R4 (30-40 inches; 76-102 cm)	y - negl	N/A	South Africa, Australia and New Zealand.
Geo-R5 (40-50 inches; 102-127 cm)	y - negl	N/A	Tanzania, South Africa, Australia, and New Zealand.
Geo-R6 (50-60 inches; 127-152 cm)	y - negl	N/A	Tanzania and New Zealand.
Geo-R7 (60-70 inches; 152-178 cm)	y - low	N/A	New Zealand.
Geo-R8 (70-80 inches; 178-203 cm)	n - mod	N/A	We found no evidence.
Geo-R9 (80-90 inches; 203-229 cm)	n - mod	N/A	We found no evidence.
Geo-R10 (90-100 inches; 229-254 cm)	n - low	N/A	We found no evidence.
Geo-R11 (100+ inches; 254+ cm))	n - low	N/A	We found no evidence.
Entry Potential			
Ent-1 (Plant already here)	y - negl	1	One naturalized population in the United States in California (Keil, 2012).
Ent-2 (Plant proposed for entry, or entry is imminent)	-	N/A	
Ent-3 (Human value & cultivation/trade status)	-	N/A	
Ent-4 (Entry as a contaminant)			
Ent-4a (Plant present in Canada, Mexico, Central America, the Caribbean or China)	-	N/A	
Ent-4b (Contaminant of plant propagative material (except seeds))	-	N/A	
Ent-4c (Contaminant of seeds for planting)	-	N/A	
Ent-4d (Contaminant of ballast water)	-	N/A	
Ent-4e (Contaminant of aquarium plants or other aquarium products)	-	N/A	
Ent-4f (Contaminant of landscape products)	-	N/A	
Ent-4g (Contaminant of containers, packing materials, trade goods, equipment	-	N/A	

Weed Risk Assessment for *Chrysanthemoides monilifera*

Question ID	Answer - Uncertainty	Score	Notes (and references)
or conveyances)			
Ent-4h (Contaminants of fruit, vegetables, or other products for consumption or processing)	-	N/A	
Ent-4i (Contaminant of some other pathway)	-	N/A	
Ent-5 (Likely to enter through natural dispersal)	-	N/A	