Taxon: Protea eximia (Knight) Fourc. **Family:** Proteaceae

Common Name(s): broad leaf sugarbush
duchess protea

Synonym(s): Erodendrum eximium Knight
Protea latifolia R. Br.

Assessor: Chuck Chimera **Status:** Assessor Approved **End Date:** 26 Apr 2017

WRA Score: -2.0 **Designation:** L **Rating:** Low Risk

Keywords: Woody Shrub, Unarmed, Dense Stands, Serotinous, Wind-Dispersed

Qsn #	Question	Answer Option	Answer
101	Is the species highly domesticated?	y=-3, n=0	n
102	Has the species become naturalized where grown?		
103	Does the species have weedy races?		
201	Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"	(0-low; 1-intermediate; 2-high) (See Appendix 2)	Intermediate
202	Quality of climate match data	(0-low; 1-intermediate; 2-high) (See Appendix 2)	High
203	Broad climate suitability (environmental versatility)	y=1, n=0	y
204	Native or naturalized in regions with tropical or subtropical climates	y=1, n=0	n
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	?
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	n
302	Garden/amenity/disturbance weed	n=0, y = 1*multiplier (see Appendix 2)	n
303	Agricultural/forestry/horticultural weed	n=0, y = 2*multiplier (see Appendix 2)	n
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
305	Congeneric weed		
401	Produces spines, thorns or burrs	y=1, n=0	n
402	Allelopathic		
403	Parasitic	y=1, n=0	n
404	Unpalatable to grazing animals		
405	Toxic to animals	y=1, n=0	n
406	Host for recognized pests and pathogens		
407	Causes allergies or is otherwise toxic to humans	y=1, n=0	n
408	Creates a fire hazard in natural ecosystems		
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n

Qsn #	Question	Answer Option	Answer
410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y=1, n=0	y
411	Climbing or smothering growth habit	y=1, n=0	n
412	Forms dense thickets	y=1, n=0	y
501	Aquatic	y=5, n=0	n
502	Grass	y=1, n=0	n
503	Nitrogen fixing woody plant	y=1, n=0	n
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	y=1, n=0	n
601	Evidence of substantial reproductive failure in native habitat	y=1, n=0	n
602	Produces viable seed	y=1, n=-1	y
603	Hybridizes naturally		
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	y
606	Reproduction by vegetative fragmentation	y=1, n=-1	n
607	Minimum generative time (years)	1 year = 1, 2 or 3 years = 0, 4+ years = -1	2
701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y=1, n=-1	n
702	Propagules dispersed intentionally by people	y=1, n=-1	y
703	Propagules likely to disperse as a produce contaminant	y=1, n=-1	n
704	Propagules adapted to wind dispersal	y=1, n=-1	y
705	Propagules water dispersed	y=1, n=-1	n
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)	y=1, n=-1	n
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m2)		
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	y
803	Well controlled by herbicides		
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	n
805	Effective natural enemies present locally (e.g. introduced biocontrol agents)		

Supporting Data:

Qsn #	Question	Answer
101	**Is the species highly domesticated?**	**n**
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	[No evidence of domestication. Cultivars have been produced] "Protea eximia is good cut flower, with long-lasting flower heads and long stems, and is cultivated for the export market. There is a degree of variation within the species with different forms of it around. A very striking form that has been named is P. eximia 'Fiery Duchess' with blue-grey foliage and very deep reddish pink floral bracts. P. eximia is also the parent in a number of hybrids e.g. P. eximia x susannae 'Sylvia', P. eximia x susannae 'Cardinal' and P. compacta x eximia 'Pink Duke'."

102	**Has the species become naturalized where grown?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	NA

103	**Does the species have weedy races?**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	NA

201	**Species suited to tropical or subtropical climate(s) - If island is primarily wet habitat, then substitute "wet tropical" for "tropical or subtropical"**	**Intermediate**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 25 Apr 2017]	"Native: Africa Southern Africa: South Africa - Cape Province"

202	**Quality of climate match data**	**High**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 25 Apr 2017]	

Qsn #	Question	Answer
203	**Broad climate suitability (environmental versatility)**	**y**
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 2 May 2017]	"Within its distribution range, rainfall varies from 380 mm to 1 000 mm per year. P. eximia occurs in dense stands on sandstone slopes, 200–1 600 m above sea level. It is found growing in many different habitats, from dense well-watered fynbos at low altitudes, to sparse, arid fynbos on the high mountains where light frost and snowfalls occur during the winter months."

204	**Native or naturalized in regions with tropical or subtropical climates**	**n**
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 25 Apr 2017]	"Native: Africa Southern Africa: South Africa - Cape Province"
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"Protea eximia is widespread throughout the mountains of the southern Cape, from the Keeromsberg near Worcester, along the Langeberg, Outeniqua and Tzitzikamma Mountains to Van Stadensberg near Port Elizabeth. It is also found on the Waboomsberg, Klein Swartberg, Rooiberg, Groot Swartberg, Kamanassie and Kouga Mountains and Strydomsberg."
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

205	**Does the species have a history of repeated introductions outside its natural range?**	**?**
	Source(s)	**Notes**
	Dave's Garden. 2017. Duchess Protea, Ray-flowered Protea, Broad-leaved Protea - Protea eximia. http://davesgarden.com/guides/pf/go/91580/. [Accessed 25 Apr 2017]	"This plant has been said to grow in the following regions: Vista, California"
	Australian Native Plants Nursery. 2017. Protea eximia. http://www.australianplants.com/plants.aspx?id=1415. [Accessed 25 Apr 2017]	[Sold in Australia] "Attractive, shrub 8'x8', with grey-green leaves and deep pink red-purple flowers in winter and spring. Grows best in full sun and well-drained soils, tolerates some alkalinity. Tolerates frost and extended dry periods once established. Excellent hedge or screen and cut flower. Good container plant"
	Staples, G.W. & Herbst, D.R. 2005. A Tropical Garden Flora - Plants Cultivated in the Hawaiian Islands and Other Tropical Places. Bishop Museum Press, Honolulu, HI	Cultivated
	Imada, C.T., Staples, G.W. & Herbst, D.R. 2005. Annotated Checklist of Cultivated Plants of Hawai'i. http://www2.bishopmuseum.org/HBS/botany/cultivatedplants/. [Accessed 25 Apr 2017]	Locations: Maui Agricultural Research Center (Kula Experimental Farm)

301	**Naturalized beyond native range**	**n**

Qsn #	Question	Answer
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence
	Wagner, W.L., Herbst, D.R.& Lorence, D.H. 2017. Flora of the Hawaiian Islands. Smithsonian Institution, Washington, D.C. http://botany.si.edu/. [Accessed]	No evidence to date

302	Garden/amenity/disturbance weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

303	Agricultural/forestry/horticultural weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

304	Environmental weed	n
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	No evidence

305	Congeneric weed	
	Source(s)	**Notes**
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	A number of other Protea species are listed as naturalized and/or weeds, but unable to corroborate with references cited.

401	Produces spines, thorns or burrs	n
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	[No evidence] "Protea eximia is a large, upright shrub, 2–5 m tall with a single main trunk and a rather lanky, sparsely branched growth habit. The leaves are greyish green to purplish green and are coated with a whitish bloom that can be rubbed off (glaucous). The leaves are leathery and hairless, narrowly to broadly egg-shaped, 60–100 x 30–65 mm. The base of the leaf, where it attaches to the petiole, is heart-shaped with a deep notch where the petiole is inserted (cordate), and in some plants the two rounded lobes at the base of the leaf are ear-shaped and project quite prominently (auriculate)."

Qsn #	Question	Answer
402	**Allelopathic**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

403	**Parasitic**	**n**
	Source(s)	**Notes**
	Manning, J. 2007. Field Guide to Fynbos. Struik Publishers, Cape Town, South Africa	"Shrub to 5 m with hairless, oval to oblong leaves 60-100 mm long, spreading and lobed at the base" [Proteaceae. No evidence]

404	**Unpalatable to grazing animals**	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown. Flowers and flower buds of other Protea species consumed by animals.

405	**Toxic to animals**	**n**
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

406	**Host for recognized pests and pathogens**	
	Source(s)	**Notes**
	Crous, P. W., Summerell, B. A., Mostert, L., & Groenewald, J. Z. (2008). Host specificity and speciation of Mycosphaerella and Teratosphaeria species associated with leaf spots of Proteaceae. Persoonia 20(1), 59-86	"Fig. 8 Teratosphaeria bellula (CBS 111699). a. Leaf spot on Protea eximia"
	Knox-Davies, P. S. (1975). Decline disease of silver trees and other indigenous species. Veld & Flora, 61(2), 20-21	"Phytophthora cinnamomi has a wide host range and a list of non-hosts would probably be shorter than a host list." ... "In South Africa it has long been known as an important pathogen of avocado trees on heavy soils." ... "Moderately Susceptible to Moderately Resistant ... Protea eximia"

407	**Causes allergies or is otherwise toxic to humans**	**n**
	Source(s)	**Notes**
	Quattrocchi, U. 2012. CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology. CRC Press, Boca Raton, FL	No evidence

408	**Creates a fire hazard in natural ecosystems**	

Qsn #	Question	Answer
	Source(s)	**Notes**
	Van Wyk, B. & Van Wyk, P. 1997. Field Guide to Trees of Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree: occurring in mountain fynbos, often in extensive stands on sandy soils." [Potentially. From fire-prone ecosystems. Could increase fire risk in dense stands]

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	**Notes**
	Australian Native Plants Nursery. 2017. Protea eximia. http://www.australianplants.com/plants.aspx?id=1415. [Accessed 26 Apr 2017]	"Exposure: Full Sun"
	Brown, N. & Duncan, G. 2006. Grow Fynbos Plants. South African National Biodiversity Institute, Cape Town	"It is easily cultivated, requiring full sun and acid, well-drained soil and is suited to medium-sized or large gardens."
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 26 Apr 2017]	"Plant it in a sunny position, in well-drained soil where there is free air circulation."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"Protea eximia is one of the easier proteas to cultivate as it tolerates quite a wide range of soils and conditions, as well as wind and light frost."

411	Climbing or smothering growth habit	n
	Source(s)	**Notes**
	Van Wyk, B. & Van Wyk, P. 1997. Field Guide to Trees of Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree: occurring in mountain fynbos"

412	Forms dense thickets	y
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"P. eximia occurs in dense stands on sandstone slopes,200–1 600 m above sea level."
	Van Wyk, B. & Van Wyk, P. 1997. Field Guide to Trees of Southern Africa. Struik Publishers, Cape Town, South Africa	"Shrub or small tree: occurring in mountain fynbos, often in extensive stands on sandy soils."

Qsn #	Question	Answer
501	**Aquatic**	**n**
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	[Terrestrial] "Protea eximia is a large, upright shrub, 2–5 m tall with a single main trunk and a rather lanky, sparsely branched growth habit." ... "Within its distribution range, rainfall varies from 380 mm to 1 000 mm per year. P. eximia occurs in dense stands on sandstone slopes, 200–1 600 m above sea level."

502	Grass	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 25 Apr 2017]	Proteaceae

503	Nitrogen fixing woody plant	n
	Source(s)	**Notes**
	USDA, ARS, Germplasm Resources Information Network. 2017. National Plant Germplasm System [Online Database]. http://www.ars-grin.gov/npgs/index.html. [Accessed 25 Apr 2017]	Proteaceae

504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	**Notes**
	Manning, J. 2007. Field Guide to Fynbos. Struik Publishers, Cape Town, South Africa	"Shrub to 5 m with hairless, oval to oblong leaves 60-100 mm long, spreading and lobed at the base"

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"Conservation status Protea eximia is not threatened. Distribution and habitat Protea eximia is widespread throughout the mountains of the southern Cape, from the Keeromsberg near Worcester, along the Langeberg, Outeniqua and Tzitzikamma Mountains to Van Stadensberg near Port Elizabeth. It is also found on the Waboomsberg, Klein Swartberg, Rooiberg, Groot Swartberg, Kamanassie and Kouga Mountains and Strydomsberg."

Qsn #	Question	Answer
602	**Produces viable seed**	**y**
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"Protea eximia can be propagated by seed or cuttings. Sow seed in autumn to early summer, in well-drained soil, lightly covered with clean sand or fine-milled bark and kept moist but not wet. Germination occurs after 3 weeks. Treating the seed with a fungicide increases the number of surviving seedlings."

603	**Hybridizes naturally**	
	Source(s)	**Notes**
	Coetzee, J. H., Littlejohn, G. M., & Janick, J. (2007). Protea: a floricultural crop from the Cape Floristic Kingdom. Scripta Horticulturae, 5, 77-112	"Interspecific incompatibility can be exhibited at different stages during the reproduction process or in the interspecific hybrid plant. The simplest form of incompatibility takes place prior to fertilization, where pollen tube growth from a “foreign” species cannot grow down the style of the seed parent and no fertilization occurs (Van Tuyl 1989). Studies on P. repens and P. eximia indicated that the ten-fold decrease in achene set observed after interspecific pollination compared to intraspecific pollination was due to pollen tube growth being interrupted while growing down the style of the female parent (Van der Walt and Littlejohn 1996a). High correlation was observed between the number of flowers in which pollen tubes observed entered the ovule and the percentage achene set recorded. This indicates that in these two species, post fertilization mechanisms to inhibit interspecific hybridization were not active."
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"It is most often confused with the hybrids Sylvia and Cardinal, which are hybrids between itself and P. susannae and they have inherited its purple-centred flower head but not its foliage."
	Van der Walt, I. D. (1995). Pollen biology in relation to artificial hybridization in the genus Protea. PhD Diss. University of Stellenbosch, Stellenbosch	"Seed set percentages over treatments were found to be extremely low « 11%) (see also Chapter 6). and no significant differences were found between the effects of self-pollination, intraspecific cross-pollination and cross-pollination with the P. eximia hybrid, nor between the control (autogamy) and interspecific cross-pollination. However, the observed differences between the two pairs of treatments are significant. Only two inflorescences produced seed in the interspecific cross-pollination (1.3%), while no seeds were produced in the control (autogamy)."

604	**Self-compatible or apomictic**	**y**
	Source(s)	**Notes**
	Steenhuisen, S.-L. 2012. Mating systems, insect pollination and chemical ecology of grassland Protea species (Proteaceae). PhD Dissertation. University of KwaZulu-Natal, Durban	"Similarly, van der Walt (1995) found partial autonomous selfing and self-compatibility in P. eximia, previously reported as self-incompatible (Horn, 1962)."

605	**Requires specialist pollinators**	**y**
	Source(s)	**Notes**

Qsn #	Question	Answer
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"Protea eximia is pollinated by the Sugarbird, Promerops cafer. Nectar is found at the base of each flower. To get to it, the Sugarbird has to push its head between the massed flowers. While doing this, pollen is rubbed of onto the bird's head. It then flies off to another bush and transfers its load of pollen to other flowers while it picks up some more. The flower heads are also visited by many insects, including the protea beetle, which comes in search of pollen and nectar. The protea beetles are large and brush the pollen onto themselves as they move through the flower head and do effect some pollination, but are not the main pollinators. Sunbirds also feed on the nectar, but they do not effect pollination as they'cheat' by sticking their beaks into the side of the flower heads straight to the base of the flowers, bypassing the pollen."

606	Reproduction by vegetative fragmentation	n
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	[No evidence of natural vegetative reproduction] "Protea eximia can be propagated by seed or cuttings." ... "Take semi-hardwood cuttings from the current season's growth, in autumn or spring. Remove the leaves from the basal third of the cutting, treat with a rooting hormone, and place in a well-drained rooting medium under intermittent mist with a bottom heat of 25°C."

607	Minimum generative time (years)	2
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	"Seedlings grow rapidly and the first flowers can be expected in their second or third year."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	**Notes**
	Brown, N. A. C., Van Staden, J., Daws, M. I., Johnson, T., & Van Wyk, A. E. (2003). Patterns in the seed germination response to smoke in plants from the Cape Floristic Region, South Africa. South African Journal of Botany, 69 (4), 514-525	"Appendix 1: ... Protea eximia ... Dispersal mode (DM): W/P = wind/passive"

702	Propagules dispersed intentionally by people	y
	Source(s)	**Notes**
	Van Wyk, B. & Van Wyk, P. 1997. Field Guide to Trees of Southern Africa. Struik Publishers, Cape Town, South Africa	"A commonly cultivated garden plant."

703	Propagules likely to disperse as a produce contaminant	n

Qsn #	Question	Answer
	Source(s)	**Notes**
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Fruit: Stored on plant Seed dispersal: Wind Seed storage: In seedheads on plant"

704	Propagules adapted to wind dispersal	y
	Source(s)	**Notes**
	Brown, N. A. C., Van Staden, J., Daws, M. I., Johnson, T., & Van Wyk, A. E. (2003). Patterns in the seed germination response to smoke in plants from the Cape Floristic Region, South Africa. South African Journal of Botany, 69 (4), 514-525	"Appendix 1: ... Protea eximia ... Dispersal mode (DM): W/P = wind/passive"
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Broadleaf Sugarbush - Protea eximia" ... "Seed dispersal: Wind"

705	Propagules water dispersed	n
	Source(s)	**Notes**
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Fruit: Stored on plant Seed dispersal: Wind Seed storage: In seedheads on plant"

706	Propagules bird dispersed	n
	Source(s)	**Notes**
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Fruit: Stored on plant Seed dispersal: Wind Seed storage: In seedheads on plant"

707	Propagules dispersed by other animals (externally)	n
	Source(s)	**Notes**
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Fruit: Stored on plant Seed dispersal: Wind Seed storage: In seedheads on plant"

708	Propagules survive passage through the gut	n
	Source(s)	**Notes**
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Fruit: Stored on plant Seed dispersal: Wind Seed storage: In seedheads on plant"

801	Prolific seed production (>1000/m2)	
	Source(s)	**Notes**

Qsn #	Question	Answer
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 26 Apr 2017]	[Densities unknown] "Fynbos is fire-adapted and plants have developed different strategies to survive fires, the main two being reseeding and resprouting. A reseeder is usually single-stemmed at ground level and the whole plant is killed by the fire, but it produces large numbers of seeds that are often stored on the bush during its lifetime and germinate en masse after a fire. A resprouter is usually multi stemmed at ground level and although the above-ground parts of the plant are killed, it has a large underground rootstock, known as a lignotuber, which survives and sends out vigorous new growth soon after the fire. Protea eximia is a reseeder. It holds the previous year's seeds in the old flower heads, which are stored on the bush."

802	Evidence that a persistent propagule bank is formed (>1 yr)	y
	Source(s)	**Notes**
	Protea Atlas Project. 2017. Spoon-bract Sugarbushes - Proteas. http://www.proteaatlas.org.za/sugar9.htm. [Accessed 26 Apr 2017]	"Fruit: Stored on plant Seed dispersal: Wind Seed storage: In seedheads on plant" ["Canopy" seed bank]

803	Well controlled by herbicides	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown. No information on herbicide efficacy or chemical control of this species

804	Tolerates, or benefits from, mutilation, cultivation, or fire	n
	Source(s)	**Notes**
	Notten, A. 2009. Protea eximia. PlantZAfrica. SANBI. https://www.plantzafrica.com/plantnop/proteaeximia.htm. [Accessed 25 Apr 2017]	[A reseeder. Killed by fire] "Fynbos is fire-adapted and plants have developed different strategies to survive fires, the main two being reseeding and resprouting. A reseeder is usually single-stemmed at ground level and the whole plant is killed by the fire, but it produces large numbers of seeds that are often stored on the bush during its lifetime and germinate en masse after a fire. A resprouter is usually multi stemmed at ground level and although the above-ground parts of the plant are killed, it has a large underground rootstock, known as a lignotuber, which survives and sends out vigorous new growth soon after the fire. Protea eximia is a reseeder. It holds the previous year's seeds in the old flower heads, which are stored on the bush."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	**Notes**
	WRA Specialist. 2017. Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits
• Grows in maritime, Mediterranean climates
• Elevation range exceeds 1000 m, demonstrating environmental versatility
• From fire-prone ecosystem. May increase fire risk in introduced range.
• Tolerates many soil types
• Forms dense stands in native range
• Reproduces by seeds
• Self-compatible
• Reaches maturity in 2+ years
• May hybridize with other Protea species
• Seeds dispersed by wind & intentionally by people
• Serotinous seeds form a persistent canopy “seed bank”

Low Risk Traits
• No reports of naturalization or invasiveness to date
• Unarmed (no spines, thorns, or burrs)
• Non-toxic
• Ornamentals
• Requires full sun
• Not reported to spread vegetatively
• Requires specialized pollinators (sugar birds & protea beetles)
• Relatively large, serotinous seeds unlikely to be inadvertently dispersed
• Killed by fires