

Taxon: Banksia integrifolia L. f.	Family: Proteaceae
Common Name(s): coast banksia honeysuckle oak white banksia white bottlebrush white honeysuckle	Synonym(s): Banksia compar R. Br.

Assessor: Chuck Chimera	Status: Assessor Approved	End Date: 16 Dec 2022
WRA Score: 5.0	Designation: H(HPWRA)	Rating: High Risk

Keywords: Tall Tree, Naturalized, Self-Fertile, Wind-Dispersed, Fire-Tolerant

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	y
205	Does the species have a history of repeated introductions outside its natural range?	y=-2, ?=-1, n=0	y
301	Naturalized beyond native range	y = 1*multiplier (see Appendix 2), n= question 205	y
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)	y
305	Congeneric weed	n=0, y = 1*multiplier (see Appendix 2)	y
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	y=1, n=-1	n
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

Qsn #	Question	Answer Option	Answer
408	Creates a fire hazard in natural ecosystems	y=1, n=0	y
409	Is a shade tolerant plant at some stage of its life cycle	y=1, n=0	n
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	y=1, n=-1	y
604	Self-compatible or apomictic	y=1, n=-1	y
605	Requires specialist pollinators	y=-1, n=0	n
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	3
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		
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)	y=1, n=-1	n
802	Evidence that a persistent propagule bank is formed (>1 yr)	y=1, n=-1	n
803	Well controlled by herbicides	y=-1, n=1	y
804	Tolerates, or benefits from, mutilation, cultivation, or fire	y=1, n=-1	y
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
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	[No evidence of domestication] "The species is indigenous to East and Southeast Australia, occurring in a coastal strip from Central Queensland through New South Wales to Victoria (Doran and Turnbull 1997 ; Boland et al. 1992). There was an isolated population on Long Island, Tasmania, in 1999, and an 1876 record allegedly from King Island (George 1999)."

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. (2022). 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, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 12 Dec 2022]	"Native Australasia AUSTRALIA: Australia [New South Wales (e.), Queensland (s.e.), Victoria (s.e.)]"

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, Agricultural Research Service, National Plant Germplasm System. (2022). Germplasm Resources Information Network (GRIN-Taxonomy). National Germplasm Resources Laboratory, Beltsville, Maryland. https://npgsweb.ars-grin.gov/ . [Accessed 12 Dec 2022]	

203	Broad climate suitability (environmental versatility)	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Fatemi, M., Houlston, G. J., Haddadchi, A., & Gross, C. L. (2013). Cost-effective microsatellite markers for <i>Banksia integrifolia</i> (Proteaceae). <i>Applications in Plant Sciences</i>, 1 (2), 1200130</p>	<p>"<i>Banksia integrifolia</i> L.f. (Proteaceae), the coast banksia, is one of the most widely distributed tree species along the eastern seaboard of Australia. It occurs over a remarkable climatic range from the tropics to the cool temperature latitudes of Bass Strait. It grows in a wide variety of woodland and scrub habitats, including dune systems, granite outcrops, and on soils derived from basalt (Brewer and Whelan, 2003)."</p>
	<p>Lim, T.K. (2014). <i>Edible Medicinal And Non-Medicinal Plants</i>. Volume 8, Flowers. Springer, Dordrecht</p>	<p>"<i>Banksia integrifolia</i> spans a broader geographical, climatic, latitudinal, altitudinal and ecological range than any other <i>Banksia</i> species (George 1981 ; Thiele and Ladiges 1994). The latitudinal range is 20–40°S and the altitudinal range is from sea level to 1,700 m. It occurs in a broad range of habitats, from coastal dunes to mountains. It grows near coastal cliffs and headlands, alongside river estuaries and even on stabilized sand dunes. The temperature range for this area is around 0–30 °C, in warm subhumid and humid climatic zones with almost no frosts (Taylor and Hopper 1988 ; Boland et al. 1992). <i>B. integrifolia</i> is found up to 200 km inland, with <i>B. integrifolia</i> subsp. <i>monticola</i> occurring in the Blue Mountains at altitudes up to 1,500 m with 65 frosts a year."</p>
	<p>Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. (2006). <i>Forest Trees of Australia</i>. CSIRO Publishing, Collingwood, Australia</p>	<p>"Climate: Altitudinal range: near sea level to 1500 m; hottest/coldest month: 25–31°C/0–15°C; Frost incidence: low to moderate (upland sites up to 100 per year); Rainfall: 650–2000 mm per year, summer max. in the north, uniform in the south."</p>
	<p>Weedbusters. (2022). Coastal banksia - <i>Banksia integrifolia</i>. https://www.weedbusters.org.nz/what-are-weeds/weed-list/coastal-banksia/. [Accessed 12 Dec 2022]</p>	<p>"Tolerant of a wide range of habitats and conditions, including salty soils and estuaries."</p>

Qsn #	Question	Answer
204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	Fatemi, M., Houliston, G. J., Haddadchi, A., & Gross, C. L. (2013). Cost-effective microsatellite markers for <i>Banksia integrifolia</i> (Proteaceae). <i>Applications in Plant Sciences</i> , 1 (2), 1200130	" <i>Banksia integrifolia</i> L.f. (Proteaceae), the coast banksia, is one of the most widely distributed tree species along the eastern seaboard of Australia. It occurs over a remarkable climatic range from the tropics to the cool temperature latitudes of Bass Strait."
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. <i>New Zealand Botanical Society Newsletter</i> , 59, 15-18	"In a period of 10 years, the widespread cultivated coast banksia has naturalised rapidly and widely in the North Island and at least at two sites in the South Island."
	Starr, F., Starr, K. & Loope, L.L. (2006). New plant records from the Hawaiian Archipelago. <i>Bishop Museum Occasional Papers</i> 87: 31-43	[East Maui] " <i>Banksia integrifolia</i> (coastal banksia), native to Queensland and New South Wales, Australia, was previously known from cultivation on Maui. This tree can now be found in the wild on Maui where it is sparingly naturalized in wide ranging localities on Haleakalā Ranch and other properties near Crater Rd. <i>Banksia integrifolia</i> can be distinguished by the following characteristics: "Tree, to 30 ft., leaves scattered, oblong to lanceolate, to 8 in. long and 1 in. wide, entire or sometimes toothed, white tomentose beneath; spikes to 6 in. long; flowers yellowish" (L.H. Bailey Hortorium, 1976). Material examined. MAUI: East Maui, Kaliainuui, one plant on sheer wall overhanging Crater Rd., in association with <i>Sadleria</i> sp. and <i>Dryopteris wallichiana</i> , 5800 ft [1767 m], 19 Jul 2005, Starr & Starr 050719-1; East Maui, Kamehameiki Gulch, tree with seedlings nearby, 4500 ft [1372 m], 17 Aug 2005, Starr, Starr, & Bio 050817-3."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Randall, R.P. (2017). <i>A Global Compendium of Weeds</i> . 3rd Edition. Perth, Western Australia. R.P. Randall	[Introduced to New Zealand, South Africa, Europe, the United State (including Hawaii), and elsewhere] "Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans References: New Zealand-E-246, New Zealand-N-280, New Zealand-W-225, Australia-E-380, New Zealand-NW-425, New Zealand-N-534, New Zealand-N-15, New Zealand-N-823, New Zealand-N-919, New Zealand-W-964, Australia-N-354, Portugal-N-1006, Europe-N-819, New Zealand-E-328, New Zealand-E-505, United States of America-N-1116, Africa-W-1127, United States of America-Q-1197, United States of America-N-1292, Australia-N-1902, South Africa-N-1991, New Zealand-N-2048, United States of America-N-2092, Australia-W-1977, New Zealand-W-1977, South Africa-W-1977."

301	Naturalized beyond native range	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall</p>	<p>"References: New Zealand-E-246, New Zealand-N-280, New Zealand-W-225, Australia-E-380, New Zealand-NW-425, New Zealand-N-534, New Zealand-N-15, New Zealand-N-823, New Zealand-N-919, New Zealand-W-964, Australia-N-354, Portugal-N-1006, Europe-N-819, New Zealand-E-328, New Zealand-E-505, United States of America-N-1116, Africa-W-1127, United States of America-Q-1197, United States of America-N-1292, Australia-N-1902, South Africa-N-1991, New Zealand-N-2048, United States of America-N-2092, Australia-W-1977, New Zealand-W-1977, South Africa-W-1977."</p>
	<p>Starr, F., Starr, K. & Loope, L.L. (2006). New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers 87: 31-43</p>	<p>[East Maui] "<i>Banksia integrifolia</i> (coastal banksia), native to Queensland and New South Wales, Australia, was previously known from cultivation on Maui. This tree can now be found in the wild on Maui where it is sparingly naturalized in wide ranging localities on Haleakalā Ranch and other properties near Crater Rd. <i>Banksia integrifolia</i> can be distinguished by the following characteristics: "Tree, to 30 ft., leaves scattered, oblong to lanceolate, to 8 in. long and 1 in. wide, entire or sometimes toothed, white tomentose beneath; spikes to 6 in. long; flowers yellowish" (L.H. Bailey Hortorium, 1976). Material examined. MAUI: East Maui, Kaliainui, one plant on sheer wall overhanging Crater Rd., in association with <i>Sadleria</i> sp. and <i>Dryopteris wallichiana</i>, 5800 ft [1767 m], 19 Jul 2005, Starr & Starr 050719-1; East Maui, Kamehameiki Gulch, tree with seedlings nearby, 4500 ft [1372 m], 17 Aug 2005, Starr, Starr, & Bio 050817-3."</p>
	<p>Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18</p>	<p>[Naturalized on the north and south islands of New Zealand.] "In a period of 10 years, the widespread cultivated coast banksia has naturalised rapidly and widely in the North Island and at least at two sites in the South Island. Several of the wild populations already cover quite large areas."</p>
	<p>Moodley, D., Geerts, S., Rebelo, T., Richardson, D. M., & Wilson, J. R. (2014). Site-specific conditions influence plant naturalization: the case of alien Proteaceae in South Africa. <i>Acta Oecologica</i>, 59, 62-71</p>	<p>[South Africa] "A long residence time provides an explanation for the spread of <i>B. integrifolia</i>. A single <i>B. integrifolia</i> tree was planted as an ornamental plant in Pringle Bay 33 years ago (landowner, pers. comm.). This is now an invasive population with several seedlings, juveniles and mature plants spread across a distance of 253m from the founder tree into natural vegetation. All other populations are much younger and are not yet spreading. These cases demonstrate that fine-scale determinants are important triggers of naturalization in this group and that naturalization at regional scales occurs when populations are given opportunities to spread (i.e. conditional invasions)."</p>

Qsn #	Question	Answer
302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"It is very hardy, tolerant of salt spray and capable of growing in a wide range of open habitats, from sea level to at least 620 m asl (Ohakune). The main habitats are sand dunes, cliffs and open (shrubby) roadside banks."
	Starr, F., Starr, K. & Loope, L.L. (2006). New plant records from the Hawaiian Archipelago. Bishop Museum Occasional Papers 87: 31-43	"This tree can now be found in the wild on Maui where it is sparingly naturalized in wide ranging localities on Haleakalā Ranch and other properties near Crater Rd."

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	y
	Source(s)	Notes
	Williams, P.A. (2008). Biological Success and Weediness of Some Terrestrial Weeds Not Presently in the Northland Regional Council's RPMS. Landcare Research Contract Report: LC0708/079/. Landcare Research, New Zealand	"Coastal banksia (<i>Banksia integrifolia</i>) ...Widespread coast weed in NZ. Not known as a weed elsewhere except in Western Australia where it has been introduced outside its native range...shades out native biota and competes with native species in vegetation succession."
	Fatemi, M., Houliston, G. J., Haddadchi, A., & Gross, C. L. (2013). Cost-effective microsatellite markers for <i>Banksia integrifolia</i> (Proteaceae). Applications in Plant Sciences, 1 (2), 1200130	"It has been introduced to New Zealand and Western Australia where it is considered an emerging weed."
	Weedbusters. (2022). Coastal banksia - <i>Banksia integrifolia</i> . https://www.weedbusters.org.nz/what-are-weeds/weed-list/coastal-banksia/ . [Accessed 12 Dec 2022]	"What damage does it do? Forms dense thickets that crowd out native plants. Which habitats is it likely to invade? Preferred habitat is within 50km of the coast, ranging from coastal dunes to sub alpine tussock grasslands. Threatens well-drained sites especially sand dunes."
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	[Concern over environmental impacts. Recommended for control] "Coast banksia should be removed from open natural areas, such as sand dunes, cliffs and banks (if cut down beware that it may root sucker). The rapid rate at which this species is naturalising and the types of habitats where it is establishing is of concern. There is already enough evidence that it should be banned from sale immediately. Alternative species, such as hardy natives or different banksia species, should be recommended as replacements."

305	Congeneric weed	y
	Source(s)	Notes

Qsn #	Question	Answer
	<p>SANBI. (2022). <i>Banksia ericifolia</i>. https://www.sanbi.org/resources/infobases/invasive-alien-plant-alert/banksia-ericifolia/. [Accessed 13 Dec 2022]</p>	<p>"Heath-leaved banksia is drought tolerant once established in a habitat. Its potential distribution covers most fynbos areas in the Western Cape and has the potential to be highly invasive in fynbos. Heath-leaved banksia outcompetes natural vegetation and is capable of forming mono-specific stands under specific fire regimes, attaining twice the height of indigenous proteoids."</p>
	<p>Honig, M. A., Cowling, R. M., & Richardson, D. M. (1992). The invasive potential of Australian banksias in South African fynbos: a comparison of the reproductive potential of <i>Banksia ericifolia</i> and <i>Leucadendron lauratum</i>. <i>Australian Journal of Ecology</i>, 17(3), 305-314</p>	<p>"The Bioclimatic Prediction System (BIOCLIM) was used to create a bioclimatic profile of <i>B. ericifolia</i> and identify climatically suitable areas in the Cape Province. Results show that its potential distribution covers most fynbos areas in the southwestern Cape. It is concluded that <i>B. ericifolia</i> has the potential to be highly invasive in fynbos."</p>
	<p>Geerts, S. et al. (2013). The absence of fire can cause a lag phase: The invasion dynamics of <i>Banksia ericifolia</i> (Proteaceae). <i>Austral Ecology</i>, 38(8), 931-941</p>	<p>"The transition from a species introduction to an invasion often spans many decades (a lag phase). However, few studies have determined the mechanisms underlying lag phases. Such a mechanistic understanding is vital if the potential ecosystem-level impacts are to be predicted and the invasion risks to be managed proactively. Here we examine <i>Banksia ericifolia</i>, introduced for floriculture to South Africa, as a case study. We found 18 sites where the species has been planted, with self-sustaining (naturalized) populations at four sites, and an invasive population at one site. The invasion originated from around 100 individuals planted 35 years ago; after several fires this population has grown to approximately 10 000 plants covering about 127 ha. The current invasion of <i>B. ericifolia</i> already has ecosystem-level impacts, for example the nectar available to bird pollinators has more than doubled, potentially disrupting native pollination networks. If fires occurred at the other naturalized sites we anticipate populations would rapidly spread and densify with invaded areas ultimately become banksia-dominated woodlands. Indeed the only site other than the invasive site where fire has occurred regularly is already showing signs of rapid population growth and spread. However, recruitment is mainly immediately post fire and no seed bank accumulates in the soil, mechanical control of adult plants is cheap and effective, and immature plants are easily detected. This study is a first in illustrating the importance of fire in driving lag phases and provides a valuable example for why it is essential to determine the mechanisms that mediate lag phases in introduced plant species. Serotinous species that have been introduced to areas where fire is suppressed could easily be misinterpreted as low risk species whilst they remain in a lag phase, but they can represent a major invasion risk."</p>

401	Produces spines, thorns or burrs	n
	Source(s)	Notes

Qsn #	Question	Answer
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	[No evidence] "Tree to 25 m tall, fire tolerant. Bark roughly tessellated. Stems pubescent and pilose, glabrescent, pale brown. Leaves in whorls of 3–5; petiole 4–10 mm long; lamina narrowly obovate to narrowly elliptic, 4–20 cm long, 10–26 mm wide, obtuse or emarginate; margins not or slightly recurved, entire; upper surface dull green, pubescent, glabrescent; lower surface closely white-woolly. Inflorescence 5–12 cm long; involucre bracts 2–10 mm long, tomentose. Flowers pale yellow, including styles. Perianth 22–25 mm long including limb of 3.5–4.5 mm, closely pubescent outside, glabrous inside. Pistil straight or slightly curved, 27–32 mm long, glabrous; pollen presenter 0.5–1 mm long, scarcely thickened. Old flowers soon falling. Follicles up to c. 60, narrowly elliptic, 7–15 mm long, 3–10 mm high, 3–6 mm wide; valves semi-elliptic, smooth, tomentose, glabrescent. Seed obovate, 10–20 mm long; seed body ±cuneate, 6–10 mm long, ±smooth."

402	Allelopathic	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	Unknown. No evidence found

403	Parasitic	n
	Source(s)	Notes
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	"Tree to 25 m tall, fire tolerant. Bark roughly tessellated. Stems pubescent and pilose, glabrescent, pale brown. Leaves in whorls of 3–5; petiole 4–10 mm long; lamina narrowly obovate to narrowly elliptic, 4–20 cm long, 10–26 mm wide, obtuse or emarginate; margins not or slightly recurved, entire; upper surface dull green, pubescent, glabrescent; lower surface closely white-woolly. Inflorescence 5–12 cm long; involucre bracts 2–10 mm long, tomentose."

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Davis, N. E., Coulson, G., & Forsyth, D. M. (2008). Diets of native and introduced mammalian herbivores in shrub-encroached grassy woodland, south-eastern Australia. <i>Wildlife Research</i> , 35(7), 684-694	" <i>B. integrifolia</i> , <i>A. verticillata</i> , <i>T. triandra</i> , <i>I. cylindrica</i> and <i>A. setacea</i> never formed more than 2% of the diet of any herbivore species."
	Hamilton, C. A. (1982). <i>Rusa</i> deer in the Royal National Park: diet, dietary overlap with <i>Wallabia bicolor</i> , influence on the vegetation, distribution and movements. MSc Thesis. University of Sydney, Sydney	"In areas where grasses were not readily available <i>Rusa</i> supplemented their diet from a wide range of browse plants, some of which look quite unpalatable (<i>Melaleuca</i> ~• <i>Eucalyptus</i> sp. and <i>Banksia</i> sp.). The results of both faecal and rumen analysis indicate that <i>Rusa</i> deer are preferential grazers but are able to adapt their diet to what is available in the various habitats they occupy in the park." ... "Appendix 4 - Plant Species Eaten by Deer." [Includes <i>Banksia serratifolia</i> , <i>Banksia integrifolia</i> and <i>Banksia</i> sp]

Qsn #	Question	Answer
	Price, J. N., & Morgan, J. W. (2003). Mechanisms controlling establishment of the non-bradysporous <i>Banksia integrifolia</i> (Coast Banksia) in an unburnt coastal woodland. <i>Austral Ecology</i> , 28(1), 82-92	"Seedling transplants exhibited extremely high mortality ($\geq 75\%$) due to browsing and summer soil desiccation and these factors appear to be major contributors to the lack of recruitment at the study site." ... "Dung pellet counts indicated the presence of the grazers <i>Wallabia bicolor</i> and <i>Oryctolagus cuniculus</i> in the vicinity of the experimental plots and implicated these herbivores in the browsing of <i>B. integrifolia</i> seedlings during this experiment."
	Kalafatakis, C. (2020). Associational Refuge Promotes Short-term Seedling Survival in <i>Banksia integrifolia</i> (Proteaceae). BSc Thesis. La Trobe University, Bundoora, Victoria	"There is a large population of both native (Swamp Wallaby) and exotic (Hog Deer) browsing herbivores on the Yanakie Isthmus, both of which target Coast Banksia (Davis et al. 2008)."

405	Toxic to animals	n
	Source(s)	Notes
	Kalafatakis, C. (2020). Associational Refuge Promotes Short-term Seedling Survival in <i>Banksia integrifolia</i> (Proteaceae). BSc Thesis. La Trobe University, Bundoora, Victoria	[No evidence] "There is a large population of both native (Swamp Wallaby) and exotic (Hog Deer) browsing herbivores on the Yanakie Isthmus, both of which target Coast Banksia (Davis et al. 2008)."
	Quattrocchi, U. (2012). <i>CRC World Dictionary of Medicinal and Poisonous Plants: Common Names, Scientific Names, Eponyms, Synonyms, and Etymology</i> . CRC Press, Boca Raton, FL	No evidence
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence from genus

Qsn #	Question	Answer
406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Aussie Green Thumb. (2022). Banksia Integrifolia Australian Grow & Care Guide. https://aussiegreenthumb.com/banksia-integrifolia/#t-1631499815942 . [Accessed 15 Dec 2022]	"Pests, Problems & Diseases. Now, banksia integrifolia coastal banksia are extremely resilient and hardy as opposed to most other outdoor plants. However, that doesn't mean you won't run into an issue or two from time to time. Pests won't be your biggest concern, except some caterpillars, perhaps. However, you will need to be on the lookout for any signs of a fungal infection. Some common conditions include: Grey Mould Shoot tip blight. Bacterial Leaf spot. Armillaria Root Rot Verticillium wilt The most detrimental threat to the banksia integrifolia plant, though, is a cinnamon fungus or phytophthora cinnamon. Cinnamon dieback is a devastating ecological condition affecting thousands of Australian flora species and causing incredible damage. "
	Erckie, L. N. K. (2017). Impacts and control of alien Proteaceae invasion in the Western Cape Province, South Africa. MSc Thesis. University of the Western Cape, Cape Town, SA	[Resistant to Phytophthora cinnamomi] "This study did not find evidence of any Banksia species with a low probability of invasion which the floricultural industry could target for commercial use. Most Banksia species, such as Banksia ericifolia, Banksia integrifolia and Banksia serrata, which are high-risk species are resistant to the Phytophthora cinnamomi root-fungus that may increase their chances of becoming invasive."

407	Causes allergies or is otherwise toxic to humans	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	[No evidence] "Indigenous Australians obtained nectar from B. integrifolia by stroking the flower spikes then licking their hands or by sucking the flower spikes or by steeping flower spikes in a coolamon overnight to obtain a sweet drink (Anonymous 2006)." ... "No nutritive or medicinal properties have been published. Early settlers used Coast Banksia nectar as syrup for sore throats and colds (Anonymous 2006)."
	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
	Wagstaff, D.J. (2008). International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

408	Creates a fire hazard in natural ecosystems	y
	Source(s)	Notes

Qsn #	Question	Answer
	Corbett, L. (2021). Safer Gardens: Plant Flammability & Planning for Fire. Australian Scholarly Publishing, Melbourne	"Banksia integrifolia - Coast banksia Australian native tree. Test indicates it has high to very high flammability. Bellamy (1988) rated the green leaf as between bad and very bad; applying my scale, this indicates it has high to very high flammability. The dry leaf he rated as very bad (very high flammability on my scale). He tested plants in the north coast region of NSW in late summer and early autumn. The Tasmania Fire Service said it has high flammability. Their rating is for the combined green and dry leaf results, based on Bellamy's research. Esther Leahy (Round the Bend 2013) said the leaves and upper branches of their coast banksia were scorched in the Black Saturday fire but most of the plant wasn't badly damaged. The burnt branches fell away. Leaves regrew on the healthy branches."
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	"Tree to 25 m tall, fire tolerant." [Flammable, but survives fire]
	Tasmanian Fire Research Fund. (2006). Fire retardant garden plants for the urban fringe and rural areas. https://www.fire.tas.gov.au . [Accessed 15 Dec 2022]	[Banksia integrifolia included among a list of high flammability plants] "High Flammability - These plants have been shown to be highly flammable and should not be planted or allowed to remain inside your house's Building Protection Zone. They should also be avoided in the Fuel Modified Zone. Move these plants away from your house and replace them with less flammable plants."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Australian Native Plants. (2022). Banksia integrifolia. https://www.australianplants.com/plants.aspx?id=1058 . [Accessed 15 Dec 2022]	"Exposure: Full Sun to Partial Shade"
	Plants for a Future. (2022). Banksia integrifolia. https://pfaf.org/user/Plant.aspx?LatinName=Banksia+integrifolia . [Accessed 15 Dec 2022]	"It cannot grow in the shade."

410	Tolerates a wide range of soil conditions (or limestone conditions if not a volcanic island)	y
	Source(s)	Notes
	Plants for a Future. (2022). Banksia integrifolia. https://pfaf.org/user/Plant.aspx?LatinName=Banksia+integrifolia . [Accessed 15 Dec 2022]	"Succeeds in most soils[157]. Requires a lime-free soil[1]. Thrives in acid sandy loams[167]. Prefers a pH between 6.3 and 6.5[200]. If this species is to be successfully cultivated, the soil should be low in nutrients, especially in nitrates and phosphates[200]."
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"This species is found on a wide variety of soil types, but best development is on acidic or neutral, well-drained, poor quality sandy soils derived from sandstone or loamy soils and alluvia derived from granite and basalt."

Qsn #	Question	Answer
411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. (2006). Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Coast banksia is one of the tallest banksias on the east coast of Australia, forming medium-sized trees to 16 m in height and 0.5 m in diameter. Tree boles are usually twisted and gnarled and the branches are often grotesque and contorted."

412	Forms dense thickets	y
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. (2006). Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Coast banksia can occur in pure stands in open forests, associated with a very wide range of species."
	Weedbusters. (2022). Coastal banksia - Banksia integrifolia. https://www.weedbusters.org.nz/what-are-weeds/weed-list/coastal-banksia/ . [Accessed 12 Dec 2022]	"Forms dense thickets that crowd out native plants."

501	Aquatic	n
	Source(s)	Notes
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	[Terrestrial] "Widespread along the east coast and inland to the nearby mountains, from Proserpine, Qld, to Port Phillip Bay, Vic."

502	Grass	n
	Source(s)	Notes
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	Proteaceae

503	Nitrogen fixing woody plant	n
	Source(s)	Notes
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	Proteaceae

Qsn #	Question	Answer
504	Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)	n
	Source(s)	Notes
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	"Tree to 25 m tall, fire tolerant. Bark roughly tessellated. Stems pubescent and pilose, glabrescent, pale brown. Leaves in whorls of 3–5; petiole 4–10 mm long; lamina narrowly obovate to narrowly elliptic, 4–20 cm long, 10–26 mm wide, obtuse or emarginate; margins not or slightly recurved, entire; upper surface dull green, pubescent, glabrescent; lower surface closely white-woolly."

601	Evidence of substantial reproductive failure in native habitat	n
	Source(s)	Notes
	Lim, T.K. (2014). Edible Medicinal And Non-Medicinal Plants. Volume 8, Flowers. Springer, Dordrecht	"Banksia integrifolia spans a broader geographical, climatic, latitudinal, altitudinal and ecological range than any other Banksia species (George 1981 ; Thiele and Ladiges 1994)."
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	[No evidence] "Widespread along the east coast and inland to the nearby mountains, from Proserpine, Qld, to Port Phillip Bay, Vic."

Qsn #	Question	Answer
602	Produces viable seed	y
	Source(s)	Notes
	Weiss, P. W. (1984). Seed characteristics and regeneration of some species in invaded coastal communities. Australian Journal of Ecology, 9(2), 99-106	"Both <i>B. integrifolia</i> and <i>C. monilifera</i> ssp, rotundata commenced flowering in March and continued until September and November, respectively. At least some seed drop occurred in all months of the year with ssp, rotundata and from May to November with <i>B. integrifolia</i> (Table 1)," ... "All seeds of <i>A. longifolia</i> which remained after 3 years burial in the field were viable. However, no viable seeds of <i>B. integrifolia</i> remained after 2 years burial (Table 2)."
	Dunphy, M., McAlpin, S., Nelson, P., Chapman, M., & Nicholson, H.(2020). Australian Rainforest Seeds: A Guide to Collecting, Processing and Propagation. CSIRO Publishing, Clayton South	"Fruit: Multiple fruit of follicles, brown, 7-15 mm long, 3-10 mm wide. Seed: 2 seeds per follicle, 6-10 mm long, 3-4 mm wide, wedge-shaped, brown wing attached. Fruiting interval: Annual Fruiting period: Sep-Apr Collecting: Collect from tree when flowers have died back and follicles on the cone are visible and turning brown. Processing and sowing: Dry cone in the sun until follicles open and release seeds. Separate material and seeds by shaking in a bag. Sow at medium density. Cover lightly with seed raising mix. Seed can be stored dry for at least 6 months Germination: Expect high germination. Takes 2-3 weeks. Allow up to 8 weeks."
	Sweedman, L. & Merritt, D. (2006). Australian seeds: a guide to their collection, identification and biology. Csiro Publishing, Collingwood, Australia	<i>Banksia integrifolia</i> M Mean time to germinate. = 36 days Q Quickest time to germinate. = 35 days L Longest time to germinate. = 42 days T Times sown. = 4 (The number of samples for a particular species for which germination was recorded) R Recommended pre-treatment. = None

603	Hybridizes naturally	y
	Source(s)	Notes
	Salkin, A. (1988). Hybridization of Eastern <i>Banksia</i> Species. <i>Banksia Study Report</i> 8: 30	"A number of natural crosses occur in the wild and tend to colonize the ecotone, the area between two ecosystems. In the case of the cross between <i>B. marginata</i> and <i>B. integrifolia</i> this is often less than 100 metres inland. The crosses are readily distinguished and seed collected in the wild breeds true the various forms listed below."

Qsn #	Question	Answer
	<p>Molyneux, W. M., & Forrester, S. G. (2007). <i>Banksia croajingolensis</i> (Proteaceae) a new species from East Gippsland, Victoria. <i>Telopea</i>, 11(4), 419-426</p>	<p>"It would appear from both physical observations and morphometric measurements that <i>B. integrifolia</i>, <i>B. marginata</i> and <i>B. paludosa</i> have influenced the development of <i>B. croajingolensis</i> and that this species may have resulted from various crossings and back crossings between them. In seedling trials conducted from 2006 to 2007, there was no apparent segregation in the offspring of <i>B. croajingolensis</i>. It is genetically segregated from the other three species because it is self perpetuating and clonal, and forms a substantial population. This cannot be said of the other three species as it can be demonstrated that there is clear hybridization between all of them, which has resulted in long standing confusion regarding the identity of certain specimens. Over approximately eight years of field study on the banksias of south-eastern NSW and far eastern Victoria from Green Cape in NSW to Shipwreck Creek and Sandpatch heathlands in Victoria, the authors have noted a number of these apparent hybrid swarms. In 1972 one of us (WMM) collected seed of a 'robust' <i>B. paludosa</i> among typical specimens on the middle south-west slopes of Green Cape. The few progeny which resulted from their germination appeared to share characters of <i>B. paludosa</i> and <i>B. integrifolia</i>, which are closely related. In 2004 the authors discovered a small population of a large spreading banksia up to ± 2 m tall on the lower south-west slopes of Green Cape. This small stand grew sympatrically with both dwarfed <i>B. paludosa</i> and small tree forms of <i>B. integrifolia</i>. Investigations of major characters such as branchlet indumentum, leaf undersurface indumentum, flower colour, the degree of spent flower retention and of long or short term seed retention, indicated that these stands should be regarded as hybrids between the two species."</p>

604	Self-compatible or apomictic	y
	Source(s)	Notes
	<p>Fatemi, M., Houlston, G. J., Haddadchi, A., & Gross, C. L. (2013). Cost-effective microsatellite markers for <i>Banksia integrifolia</i> (Proteaceae). <i>Applications in Plant Sciences</i>, 1 (2), 1200130</p>	<p>"Although many <i>Banksia</i> species are typically considered as outcrossing plants (Broadhurst and Coates, 2004), our results indicate substantial amounts of self-pollination and inbreeding within the same tree (i.e., correlated mating [range of mean F IS values without considering loci with null alleles: 0.352–0.588]) in the populations of <i>B. integrifolia</i> that we studied."</p>
	<p>Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. <i>New Zealand Botanical Society Newsletter</i>, 59, 15-18</p>	<p>"Coast banksia appears to be self fertile because a single cultivated specimen in the remote abandoned lighthouse garden on Burgess Island, Mokohinau Islands, January 1984 produced seedlings which were collected in 1992 and 1993 (AK226968,218538)."</p>
	<p>Moodley, D. (2013). Determinants of introduction and invasion success for Proteaceae. MSc Thesis. Stellenbosch University, Stellenbosch, South Africa</p>	<p>"Naturalized <i>Banksia</i> species showed more reliance on pollinators and although pollinators enhanced seed set of the invasive species, <i>B. integrifolia</i> demonstrated higher selfing capabilities. This provides support for Baker's law (Baker 1955) which states that establishment is more likely for self-fertilizing species and also supports studies showing that pollinators can improve seed production in self-fertilizing invasive species (Geerts and Pauw 2009; Rodger et al. 2010)."</p>

Qsn #	Question	Answer
605	Requires specialist pollinators	n
	Source(s)	Notes
	Moodley, D. (2013). Determinants of introduction and invasion success for Proteaceae. MSc Thesis. Stellenbosch University, Stellenbosch, South Africa	"All Banksia species were heavily utilized by native nectar-feeding birds and insects. Banksia speciosa and B. integrifolia were mostly visited by several nectar-feeding birds as well as honey bees (Table 1). The total visit per inflorescence per hour for B. speciosa was 0.34 and 0.02 visits per inflorescence per hour was observed for B. integrifolia."
	Cunningham, S. A. (1991). Experimental evidence for pollination of Banksia spp. by non-flying mammals. Oecologia, 87(1), 86-90	"Indirect and direct evidence indicate that non-flying mammals including Eastern Pygmy-Possums (Cercartetus nanus) were frequent nocturnal visitors. Birds, especially honeyeaters (Meliphagidae), were frequent diurnal visitors." ... "Pollinator exclusions indicate that non-flying mammals and birds were both major contributors to B. integrifolia fruit-set, and that insects were of minor importance. The fruit-set in the whole-tree mammal and bird exclusion cannot be wholly attributed to insects because of the failure of nets to completely exclude birds. The permanently caged treatment of the single-inflorescence experiment did allow access to insects alone and this treatment produced very low fruit-set."
	Fatemi, M., Houliston, G. J., Haddadchi, A., & Gross, C. L. (2013). Cost-effective microsatellite markers for Banksia integrifolia (Proteaceae). Applications in Plant Sciences, 1 (2), 1200130	"The barrel-shaped inflorescences provide a nectar resource for a variety of animals including blossom bats, birds, and nonflying mammals throughout the year, during autumn and winter in cold climates and at times when other species are not in flower (Hackett and Goldingay, 2001)."

606	Reproduction by vegetative fragmentation	n
	Source(s)	Notes
	Price, J. N., & Morgan, J. W. (2003). Mechanisms controlling establishment of the non-bradysporous Banksia integrifolia (Coast Banksia) in an unburnt coastal woodland. Austral Ecology, 28(1), 82-92	"George (1996) described the species as a fire-tolerant resprouter, although Hazard and Parsons (1977) described the species as fire-tolerant depending on fire intensity and age of the plant. There was no evidence at the study site that the species was root suckering."
	Plants for a Future. (2022). Banksia integrifolia. https://pfaf.org/user/Plant.aspx?LatinName=Banksia+integrifolia . [Accessed 16 Dec 2022]	Propagate by seed.

607	Minimum generative time (years)	3
	Source(s)	Notes
	Erckie, L. N. K. (2017). Impacts and control of alien Proteaceae invasion in the Western Cape Province, South Africa. MSc Thesis. University of the Western Cape, Cape Town, SA	"Appendix 9 A weed risk assessment of Banksia integrifolia adapted from Pheloung et al. (1999) modified for use in South Africa." [Minimum generative time (years) = 3]
	Cameron, E. K. (2000). The naturalisation of Banksia integrifolia in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seedlings grow rapidly and seem capable of flowering by 3-5 years old. Because they mature rapidly this species can spread and build up quickly in suitable areas."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seed is winged and wind dispersed, but most seedlings are within 100 m of an adult plant (note - the wildlings on the Waikawau dunes (Fig. 2) were c.300 m east of adult plants)." [No evidence. Unlikely. Seeds lack means of attachment]

702	Propagules dispersed intentionally by people	Y
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans"
	WRA Specialist. (2022). Personal Communication	<i>Banksia integrifolia</i> is cultivated as an ornamental plant in other parts of the world, including the United States, United Kingdom, and other countries with a Mediterranean-type climate. It is known for its attractive flowers and tough, drought-resistant nature, making it a popular choice for landscaping in dry areas. It is also used in horticulture as a rootstock for grafting other banksia species.

703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall	"Major Pathway/s: Crop, Herbal, Ornamental Dispersed by: Humans"
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seed is winged and wind dispersed, but most seedlings are within 100 m of an adult plant"

704	Propagules adapted to wind dispersal	Y
	Source(s)	Notes
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seed is winged and wind dispersed, but most seedlings are within 100 m of an adult plant (note - the wildlings on the Waikawau dunes (Fig. 2) were c.300 m east of adult plants)."

705	Propagules water dispersed	
	Source(s)	Notes
	WRA Specialist. (2022). Personal Communication	[Buoyancy of wind-dispersed seeds unknown. May be secondarily dispersed by water in riparian areas or river estuaries] "Coast banksia consists of three subspecies, the typical subspecies, subsp. compar and subsp. monticola. Subsp. integrifolia typically occurs near coastal cliffs and headlands, river estuaries and near sand dunes along the east coast of Australia from near Melbourne, Victoria, to near Tin Can Bay, Queensland. A small isolated population occurs on Long Island (Hogan Group), Tasmania. Subsp. compar occurs in coastal areas between Proserpine to Wide Bay, Queensland. Subsp. monticola is endemic to New South Wales between New England National Park and Mount Wilson in the Blue Mountains."

Qsn #	Question	Answer
706	Propagules bird dispersed	n
	Source(s)	Notes
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seed is winged and wind dispersed, but most seedlings are within 100 m of an adult plant"
	Robins, R. (2020). Viable seed dispersal after fire depends on highly variable flowering and cone production. Journal of Ecology The Blog. https://jecologyblog.com/2020/03/06/viable-seed-dispersal-after-fire-depends-on-highly-variable-flowering-and-cone-production/ . [Accessed 15 Dec 2022]	"Yellow-tailed Black Cockatoo feeding on a recent cone of <i>Banksia integrifolia</i> . Seed predation by cockatoos and insect larvae can account for a large number of stored seeds." [Birds can act as seed predators, but are unlikely to disperse intact seeds]

707	Propagules dispersed by other animals (externally)	n
	Source(s)	Notes
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seed is winged and wind dispersed" [No means of external attachment]

708	Propagules survive passage through the gut	n
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. (2006). Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Fruits: Spikes oblong or cylindrical, 7–15 × 7–8 cm, free of withered perianths and styles, often only 2–10 follicles develop and produce seed. Valves rather thin. Seed black, winged, ovate, up to 1.7 × 0.7 cm (including wing). Usually 2 seeds per follicle, often released spontaneously, usually within a year after maturation." [Not fleshy-fruited, or otherwise adapted to attract vertebrate dispersers]
	Cameron, E. K. (2000). The naturalisation of <i>Banksia integrifolia</i> in New Zealand; time for action. New Zealand Botanical Society Newsletter, 59, 15-18	"The seed is winged and wind dispersed"
	Robins, R. (2020). Viable seed dispersal after fire depends on highly variable flowering and cone production. Journal of Ecology The Blog. https://jecologyblog.com/2020/03/06/viable-seed-dispersal-after-fire-depends-on-highly-variable-flowering-and-cone-production/ . [Accessed 16 Dec 2022]	"Yellow-tailed Black Cockatoo feeding on a recent cone of <i>Banksia integrifolia</i> . Seed predation by cockatoos and insect larvae can account for a large number of stored seeds." [Birds presumably act as seed predators, rather than dispersers]

801	Prolific seed production (>1000/m2)	n
	Source(s)	Notes
	Boland, D.J. , Brooker, M.I.H., Chippendale, G.M., Hall, N., Hyland, B.P.M., Johnston, R.D., Kleinig, D.A., McDonald, M.W. & Turner, J.D. (2006). Forest Trees of Australia. CSIRO Publishing, Collingwood, Australia	"Fruits: Spikes oblong or cylindrical, 7–15 × 7–8 cm, free of withered perianths and styles, often only 2–10 follicles develop and produce seed. Valves rather thin. Seed black, winged, ovate, up to 1.7 × 0.7 cm (including wing). Usually 2 seeds per follicle, often released spontaneously, usually within a year after maturation."

802	Evidence that a persistent propagule bank is formed (>1 yr)	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Weiss, P. W. (1984). Seed characteristics and regeneration of some species in invaded coastal communities. <i>Australian Journal of Ecology</i> , 9(2), 99-106	"All seeds of <i>A. longifolia</i> which remained after 3 years burial in the field were viable. However, no viable seeds of <i>B. integrifolia</i> remained after 2 years burial (Table 2)."
	Campbell, M. L., Clarke, P. J., & Keith, D. A. (2012). Seed traits and seed bank longevity of wet sclerophyll forest shrubs. <i>Australian Journal of Botany</i> , 60(2), 96-103	"The annual seed crop in three species (<i>G. lotifolia</i> , <i>T. stipitata</i> and <i>T. laurina</i>) was released in a dormant state and developed a persistent seed bank, while one species (<i>B. integrifolia</i>) lacked dormancy and rapidly germinated under laboratory and field conditions." ... "Patterns of seed longevity and seed viability differed between each of the species over 2 years of burial (Fig. 1), as did the estimated half-lives of seed cohorts. No intact viable <i>Banksia</i> seed were recovered after 2 months of burial, owing to the majority of seed having germinated in the bags. This pattern of rapid decline though germination was reflected by the lack of <i>Banksia</i> seed recorded during the seed bank density assessment (Fig. 1)." ... "As expected, <i>Banksia</i> showed no evidence of accumulating a soil seed bank because all the non-dormant seed either germinated or died in less than 2 months after burial. The lack of either a canopy or soil-stored persistent seed bank appears to be compensated for in this <i>Banksia</i> by a high rate of seed production each year (536 seeds/year.plant)."

803	Well controlled by herbicides	y
	Source(s)	Notes
	Auckland Council. (2022). <i>Banksia integrifolia</i> - Coast banksia. https://www.tiakitamakimakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/banint/ . [Accessed 13 Dec 2022]	"Community agrichemical control recommendations No qualifications: Cut stump and paste freshly cut base of stems with metsulfuron gel. Basic Growsafe certified: Cut stump and spray freshly cut base with 5g metsulfuron-methyl per 1 L of water. Certified Handler/Experienced agrichemical user: Drill and inject trees with 10g metsulfuron-methyl per 1L of water if safe to do so. Drill 18mm holes (tangentially angled downwards) in a spiral up the trunk. For 50mm stems drill one hole. For 100mm stems drill two holes. For larger stems drill holes 150mm apart. Foliar spray seedlings with 5g metsulfuron-methyl per 10L of water and 20ml penetrant."
	Bay of Plenty Regional Council. (2022). Coastal banksia. https://www.boprc.govt.nz/environment/pests/pest-plants/shrubs-and-trees/coastal-banksia . [Accessed 13 Dec 2022]	"How do you get rid of it? Recommended: 1. Pull small seedlings. 2. Cut and paint stumps with herbicide gel. 3. Drill and fill large trees with herbicide."

Qsn #	Question	Answer
	Erckie, L. N. K. (2017). Impacts and control of alien Proteaceae invasion in the Western Cape Province, South Africa. MSc Thesis. University of the Western Cape, Cape Town, SA	"The chemical control of two resprouting Banksia species is reported for the first time in South Africa. Field experiments were conducted to evaluate the efficacy of various herbicides for the control of resprouting Banksia integrifolia and B. serrata. The herbicides metsulfuron, imazapyr and a picloram/triclopyr mix applied at different concentrations to cut-stumps were tested. Evaluation was done six months after cut-stump treatment application. Response variables measured were percentage of plants resprouting and not resprouting, average resprouting height and resprouting vigour. The triclopyr/picloram mix provided the best results with 100% stump mortality followed by imazapyr at 5% concentration with a 91% stump mortality. Metsulfuron at 1% concentration was the least effective treatment providing 45% stump mortality. A trend of effective control with increasing herbicide concentration was observed on stumps treated with imazapyr and metsulfuron. Average resprouting height ranged from 2 to 18 cm. Resprouting vigour varied from poor to good with some resprouts displaying some form of deformation. Results suggest that concentrations above 5% for imazapyr and metsulfuron is required for effective control. A full-scale trial is needed to determine the most effective herbicide with minimum dosage to minimize negative effects on non-target species before the triclopyr/picloram mix is registered as an effective herbicide for the control of B. integrifolia and B. serrata. Given the current spatial extent of infestation and biological features of the two species, eradication is considered feasible and should form part of management objectives. The invasive Banksia species should become a target for eradication under NEM:BA regulations."
	Weedbusters. (2022). Coastal banksia - Banksia integrifolia. https://www.weedbusters.org.nz/what-are-weeds/weed-list/coastal-banksia/ . [Accessed 13 Dec 2022]	"What can I do to get rid of it? 1. Pull small seedlings (difficult to pull larger ones). 2. Cut and stump paint: picloram gel." [Effectiveness of herbicide unspecified]

804	Tolerates, or benefits from, mutilation, cultivation, or fire	y
	Source(s)	Notes
	Australian Biological Resources Study. (1999). Flora of Australia Volume 17B, Proteaceae 3, Hakea to Dryandra. CSIRO Publishing, Melbourne	"Tree to 25 m tall, fire tolerant."
	Renshaw, A. (2005). The reproductive biology of four Banksia L. f. species with contrasting life histories. PhD Dissertation. University of Western Sydney	[Banksia integrifolia = sprouter - have the capacity to survive fire and produce vegetative sprouts] "Plants killed by fire and that rely on seed for regeneration are called seeders and those that have the capacity to survive fire and produce vegetative sprouts are called sprouters. The species are Banksia ericifolia (a nonlignotuberous serotinous shrub and a seeder), Banksia integrifolia (a nonserotinous, nonlignotuberous tree, and a sprouter), Banksia oblongifolia (a lignotuberous serotinous shrub, a sprouter) and Banksia serrata (a lignotuberous serotinous tree, and also a sprouter)."

Qsn #	Question	Answer
	Erckie, L. N. K. (2017). Impacts and control of alien Proteaceae invasion in the Western Cape Province, South Africa. MSc Thesis. University of the Western Cape, Cape Town, SA	[Resprouts without herbicide application] "This study evaluated the efficacy of metsulfuron, imazapyr and triclopyr+picloram herbicides for the control of resprouting <i>Banksia integrifolia</i> and <i>Banksia serrata</i> . A mechanical method of control, which involved cutting alone, is not a viable control option since <i>B. integrifolia</i> and <i>B. serrata</i> can resprout."
	Alpine Treemovals. (2022). <i>Banksia integrifolia</i> - Coast <i>Banksia</i> , White Honey Suckle. http://www.treemovals.com.au . [Accessed 13 Dec 2022]	[Tolerates hard pruning] "Pruning: The natural habit is very picturesque if allowed to develop, this tree can be pruned to a single leader or the one year old wood can be moderately hard pruned after flowering to encourage a dense shrub-like habit."

805	Effective natural enemies present locally (e.g. introduced biocontrol agents)	
	Source(s)	Notes
	Erckie, L. N. K. (2017). Impacts and control of alien Proteaceae invasion in the Western Cape Province, South Africa. MSc Thesis. University of the Western Cape, Cape Town, SA	[Resistant to <i>Phytophthora cinnamomi</i>] "This study did not find evidence of any <i>Banksia</i> species with a low probability of invasion which the floricultural industry could target for commercial use. Most <i>Banksia</i> species, such as <i>Banksia ericifolia</i> , <i>Banksia integrifolia</i> and <i>Banksia serrata</i> , which are high-risk species are resistant to the <i>Phytophthora cinnamomi</i> root-fungus that may increase their chances of becoming invasive."
	WRA Specialist. (2022). Personal Communication	Unknown

Summary of Risk Traits:

High Risk / Undesirable Traits

- Broad climate suitability and elevation range (>1000 m)
- Naturalized on Maui (Hawaiian Islands), New Zealand, and South Africa
- Reported to be an environmental weed in coastal New Zealand and recommended for control due to potential or actual impacts on native vegetation
- Other *Banksia* species are invasive weeds
- Reported to be highly flammable, but can survive fire
- Tolerates many soil types
- Reported to form pure stands and thickets in both native and introduced range
- Reproduces by wind-dispersed seeds
- Hybridizes with other *Banksia* species
- Self-fertile (i.e., viable seeds may be dispersed from isolated trees)
- Reaches maturity in 3-5 years
- Seeds dispersed by wind, possibly water, and through intentional cultivation
- Tolerates and resprouts after heavy pruning or fire

Low Risk Traits

- Valued as an ornamental tree, with negative impacts unquantified, or not observed, in some areas of its introduced range
- Unarmed (no spines, thorns, or burrs)
- Palatable to deer and possibly other browsing animals
- Non-toxic
- Grows best in high light environments (dense shade may inhibit spread)
- Seeds reported to lose viability within two months (i.e., will not form a persistent soil seed bank)
- Herbicides may provide effective control

Second Screening Results for Trees/tree-like shrubs

(A) Shade tolerant or known to form dense stands? Not shade tolerant but can form dense stands in native and introduced ranges.

(B) Bird- Or clearly wind- dispersed?> Wind-dispersed

(C) Life cycle <4 years? Yes. Capable of reaching maturity in 3-5 years

Outcome = Reject (High Risk)

