

<b>Taxon:</b> <i>Callitris columellaris</i>	<b>Family:</b> Cupressaceae
<b>Common Name(s):</b> Murray River cypress pine northern cypress pine white cypress pine	<b>Synonym(s):</b> <i>Callitris intratropica</i> R.T.Baker & H.C.C.

<b>Assessor:</b> Chuck Chimera	<b>Status:</b> Assessor Approved	<b>End Date:</b> 9 Apr 2015
<b>WRA Score:</b> 4.0	<b>Designation:</b> EVALUATE	<b>Rating:</b> Evaluate

**Keywords:** Naturalized, Tropical Tree, Fire-suppressing, Drought-tolerant, 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)	High
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		
304	Environmental weed	n=0, y = 2*multiplier (see Appendix 2)	n
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	y=1, n=0	n
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		
408	Creates a fire hazard in natural ecosystems	y=1, n=0	n
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		
605	Requires specialist pollinators	y=-1, n=0	n
606	Reproduction by vegetative fragmentation		
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	y=1, n=-1	y
706	Propagules bird dispersed	y=1, n=-1	n
707	Propagules dispersed by other animals (externally)		
708	Propagules survive passage through the gut	y=1, n=-1	n
801	Prolific seed production (>1000/m <sup>2</sup> )	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		
804	Tolerates, or benefits from, mutilation, cultivation, or fire		
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
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 1. Koninklijke Brill NV, Leiden, The Netherlands	No evidence of domestication that reduces invasive traits

102	Has the species become naturalized where grown?	
	Source(s)	Notes
	WRA Specialist. 2015. Personal Communication	NA

103	Does the species have weedy races?	
	Source(s)	Notes
	WRA Specialist. 2015. 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"	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 8 Apr 2015]	"Native: AUSTRALASIA Australia: Australia - Ashmore and Cartier, Austr. Capital Terr., New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia"
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	[ <i>Callitris intratropica</i> R.T.Baker & H.G.Sm. is a synonym of <i>Callitris columellaris</i> F.Muell.] "Northern cypress pine is the most northerly species of <i>Callitris</i> , occurring only north of 18°S (hence "within the tropics") ... "Northernmost Australia from northeastern Western Australia to northern Queensland...Zone 10."

202	Quality of climate match data	High
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed ]	

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

Qsn #	Question	Answer
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	" <i>C. columellaris</i> has a wide geographic range across continental Australia, reflecting its extreme drought tolerance (Clayton-Greene, 1983; Brodribb et al., 2010)..." ... "The 90 sampled <i>C. columellaris</i> sites spanned extremely wide ranges of mean annual temperature (14.1–28.4 °C), mean annual rainfall (168–2117mm) and rainfall seasonality index (0.09–1.04) (Table 1). Thirty-four were classed as tropical, 36 as arid, and 20 as temperate"
	CSIRO. 2010. Australian Tropical Rainforest Plants Edition 6 - <i>Callitris intratropica</i> . <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Callitris_intratropica.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Callitris_intratropica.htm</a> . [Accessed 8 Apr 2015]	"The taxonomy of <i>Callitris</i> still poses some difficulties. This species (as currently recognized) has broad ecological amplitude. Usually found as a component of open forest but sometimes found on rainforest margins or in closed forest on old sand dunes."

204	Native or naturalized in regions with tropical or subtropical climates	y
	Source(s)	Notes
	USDA, ARS, National Genetic Resources Program. 2015. Germplasm Resources Information Network - (GRIN) [Online Database]. National Germplasm Resources Laboratory, Beltsville, Maryland. URL: <a href="http://www.ars-grin.gov/">http://www.ars-grin.gov/</a> . [Accessed 8 Apr 2015]	"Native: AUSTRALASIA Australia: Australia - Ashmore and Cartier, Austr. Capital Terr., New South Wales, Northern Territory, Queensland, South Australia, Victoria, Western Australia"
	Eckenwalder, J.E. 2009. <i>Conifers of the World: The Complete Reference</i> . Timber Press, Portland, OR	[ <i>Callitris intratropica</i> R.T.Baker & H.G.Sm. is a synonym of <i>Callitris columellaris</i> F.Muell.] "Northern cypress pine is the most northerly species of <i>Callitris</i> , occurring only north of 18°S (hence "within the tropics") ... "Northernmost Australia from northeastern Western Australia to northern Queensland...Zone 10."

205	Does the species have a history of repeated introductions outside its natural range?	y
	Source(s)	Notes
	Mishra, T. K., & Banerjee, S. K. (1994). Performance of <i>Callitris intertropica</i> -a new introduction to lateritic soil of West Bengal. <i>Environment and Ecology</i> , 12(2): 298-302	"Data on synecology, biomass production and soil properties are presented from a study of a plantation of <i>Callitris intertropica</i> [( <i>C. intratropica</i> = <i>C. columellaris</i> ) a coniferous species endemic to Australia) established in 1984 in West Midnapore Division, West Bengal. The stand was close (212 dominant trees/ha, 527 average trees and 317 suppressed trees) and the amount of understorey and number of associations were low in comparison with other stands in the region (a comparison was made with <i>Shorea robusta</i> ). Biomass production (3.18×10 <sup>3</sup> kg/ha p.a.) was close to that of <i>Shorea robusta</i> and <i>Acacia auriculiformis</i> . Soil under <i>C. columellaris</i> was richer in nutrients than that under <i>S. robusta</i> , but lower in microbial population (bacteria, actinomycetes and fungi)."
	Negi, P. S., & Hajra, P. K. 2007. Alien flora of Doon Valley, Northwest Himalaya. <i>Current Science</i> 92(7): 968-978	"Table 1. Exotics of the Doon Valley" [Includes <i>Callitris columellaris</i> ]
	Skolmen, R.G. 1980. Plantings on the forest reserves of Hawaii: 1910–1960. Institute of Pacific Islands Forestry, Pacific Southwest Forest & Range Experiment Station, US Forest Service, Honolulu, HI	1,290 trees planted between 1935-1937 [407 on Oahu, 846 on Maui, 37 on Hawaii Island]

Qsn #	Question	Answer
301	Naturalized beyond native range	y
	Source(s)	Notes
	Frohlich, D. & Lau, A. 2012. New plant records for the Hawaiian islands. Bishop Museum Occasional Papers 113: 27–54	"Some 407 individuals of this species were planted in forest reserves on o‘ahu between 1910 and 1960 (Skolmen 1980), which may help to explain its spread. This gymnosperm, previously found naturalizing on Maui, was collected on o‘ahu in a couple of lowland roadside areas in Schofield Barracks. Many individuals of varying size were seen. Material examined. O‘AHU: Schofield Barracks East range in area along Higgins rd. In vegetation off-road around buildings and in forested areas. Guava and Eucalyptus-dominated forest. Individuals of varying size (3–7 m) in area. cones round, split open when dry, 2–3 cm across. New island record, 26 May 2009, J. Beachy & K. Kawelo US Army 158; Schofield Barracks East range along centerline road. Mesic lowland roadside area. Tree about 5 m tall. Male and female cones present; seed cones open in star shape. lots of plants in the general area of various sizes; seedlings and immatures present and common. Naturalizing, 7 Jan 2010, US Army 176."
	Oppenheimer, H. L. 2002. The Spread of Gymnosperms on Maui: A Neglected Element of the Modern Hawaiian Flora. Bishop Museum Occasional Papers 68: 19–23	"The white cypress-pine, from Queensland, Australia (Sl. John, 1973: 12) is escaping from forestry plantings along the road to Haela‘au Cabin in the Mahinahina Gulch area" [ <i>Callitris intratropica</i> R.T.Baker & H.G.Sm. is a synonym of <i>Callitris columellaris</i> F.Muell.]

302	Garden/amenity/disturbance weed	n
	Source(s)	Notes
	Randall, R.P. 2012. A Global Compendium of Weeds. 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

303	Agricultural/forestry/horticultural weed	
	Source(s)	Notes
	Farquharson, R. J., Kelly, J. A., Welsh, P., Mazur, K., & Bennett, J. W. 2009. Policy responses to invasive native species: issues of social and private benefits and costs. Pp. 10-13 In Contributed Paper for the 53rd Annual Conference of the Australian Agricultural and Resource Economics Society Inc., Cairns	"Farm and catchment managers in Australia face decisions about controlling invasive native species (or scrub) (INS) which may infest agricultural land. In north-west NSW, White Cypress Pine ( <i>Callitris glaucophylla</i> ) is estimated to cover approximately 5,000 ha in the Nandewar region and 120,000 ha across the Namoi catchment. Past land management practices have contributed to this infestation, resulting in private agricultural (soil erosion, loss of productivity) and public (lessening of biodiversity) land impacts. In many cases these infestations occur on private lands and treatment is costly to landholders." ... "The private costs of treating a White Cypress Pine infestation on one property in north-west NSW are in the order of \$33,000. Yet there is evidence of social benefits from an increase in the area of native vegetation and associated waterway improvement in an amount of around \$400,000. Existing government policies and programs offer assistance to landholders for such purposes, and the results of this analysis provide evidence of the likely private costs and social benefits from such actions."

Qsn #	Question	Answer
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	"In the absence of fire, <i>C. columellaris</i> can reproduce rapidly, and it is classed as an invasive native species in some agricultural areas (Harris and Lamb, 2004; McHenry et al., 2006)."
	Condon, R. W. (1976). Pastoral Management, Economics and Land Use Options in the Poplar Box ( <i>Eucalyptus populnea</i> ) Lands of New South Wales. <i>The Rangeland Journal</i> , 1(4): 260-266	"Towards the southern extremities of the poplar box lands, seedling pine ( <i>Callitris columellaris</i> ) has been the principal woody weed on softer loamy soils south of Cobar to the Lachlan River."
	Thompson, W. A., & Eldridge, D. J. (2005). White cypress pine ( <i>Callitris glaucophylla</i> ): a review of its roles in landscape and ecological processes in eastern Australia. <i>Australian Journal of Botany</i> , 53(6): 555-570	[ <i>Callitris glaucophylla</i> is a synonym of <i>Callitris columellaris</i> . Impacts to agricultural lands are questionable] "Some claim that areas of dense regeneration, known colloquially as 'regrowth' or 'invasive scrub', hamper the grazing value of woodlands because of the reduction in groundstorey plants, particularly grasses (Nicholson 1997; Eldridge et al. 2003). For example, Cunningham et al. (1992) noted that in the Cobar area of NSW, dense thickets of young <i>C. glaucophylla</i> cover extensive areas. However, the inter-departmental report on scrub and timber regrowth in the Cobar–Byrock area noted that the proliferation of timber and scrub regrowth was not singularly responsible for the decline in productivity of pastoral lands (Anon. 1969). The report pointed out that widespread erosion, and the dire conditions of pastoralists in the Cobar area, attributed to extensive overgrazing by sheep and rabbits, was exacerbated by a prolonged drought in the late 1800s (Anon. 1969)."
	WRA Specialist. 2015. Personal Communication	Impacts are uncertain. Some studies (Condon 1976, Farquharson et al. 2009, Prior et al. 2011) suggest that invasion by <i>Callitris columellaris</i> (Syn. <i>C. intratropica</i> , <i>C. glaucophylla</i> ) can reduce pasture productivity & incur associated control costs, but others (cited in Thompson & Eldridge 2005) is not responsible for lost productivity.

304	Environmental weed	n
	Source(s)	Notes
	Randall, R.P. 2012. <i>A Global Compendium of Weeds</i> . 2nd Edition. Department of Agriculture and Food, Western Australia	No evidence

Qsn #	Question	Answer
305	<b>Congeneric weed</b>	<b>y</b>
	<b>Source(s)</b>	<b>Notes</b>
	Queensland Government. 2011. Weeds of Australia - Oyster Bay cypress pine - <i>Callitris rhomboidea</i> . <a href="http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/Html/Callitris_rhomboidea.htm">http://keyserver.lucidcentral.org/weeds/data/080c0106-040c-4508-8300-0b0a06060e01/media/Html/Callitris_rhomboidea.htm</a> . [Accessed 8 Apr 2015]	"This native tree species is regarded as an environmental weed where it is growing outside its natural range in central Victoria."
	Queensland Government. 2011. Weeds of Australia - Black cypress pine - <i>Callitris endlicheri</i> . <a href="http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Callitris_endlicheri.htm">http://keyserver.lucidcentral.org/weeds/data/03030800-0b07-490a-8d04-0605030c0f01/media/Html/Callitris_endlicheri.htm</a> . [Accessed 8 Apr 2015]	"This native tree species is regarded as an environmental weed where it is growing beyond its natural range in central Victoria."

401	<b>Produces spines, thorns or burrs</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 1. Koninklijke Brill NV, Leiden, The Netherlands	[No evidence] "Trees to 20 m tall; monopodial, usually branching low or occasionally forked, up to 50 cm d.b.h. Bark spreading or near the top ascending, long, forming a conical, pyramidal or broadly domed, more or less open crown. Foliage branchlets numerous, spreading or ascending, ultimately very slender, terete, 0.7-1.0 mm diam., covered with closely appressed leaves, persistent. Leaves in alternate, whorls of 3, decurrent, closely appressed, apices appressed or free on some leading shoots (whip shoots), connate but parting with thickening of branches, persisting several years, linear, 2-6 mm long on ultimate branchlets, 0.4-0.8 mm wide, abaxially convex; margins denticulate near slightly broadened acute-acuminate apex; epistomatic, stomata in tow marginal lines, abaxial stomata near base of leaves only or absent; abaxial surface weakly verrucose, green or glaucous, variable with many intermediate shades of colour."

402	<b>Allelopathic</b>	<b>n</b>
	<b>Source(s)</b>	<b>Notes</b>

Qsn #	Question	Answer
	Harris, M. R., Lamb, D., & Erskine, P. D. (2003). An investigation into the possible inhibitory effects of white cypress pine ( <i>Callitris glaucophylla</i> ) litter on the germination and growth of associated ground cover species. <i>Australian Journal of Botany</i> , 51(1): 93-102	[ <i>Callitris glaucophylla</i> does NOT have allelopathic effects in this study. <i>Callitris glaucophylla</i> J.Thomps. & L.A.S.Johnson is a synonym of <i>Callitris columellaris</i> F.Muell] "Abstract. White cypress-pine stands typically support sparse densities of shrubs and grasses. The commonly held opinion is that leaching of allelopathic chemical compounds from cypress-pine litter partly facilitates this exclusion. Germination and growth of cypress pine seedlings do not appear to be similarly affected. This study set out to determine whether cypress litter had a differential effect on germination and growth of cypress pine seedlings and on associated ground-cover species. Glasshouse trials comparing seedling emergence under cypress- and artificial-litter layers were undertaken. Cypress-pine litter did not have an inhibitory effect on the germination or growth of groundcover species. In most cases, seedling emergence was facilitated by the application of cypress-pine litter due to its ability to increase the water holding capacity of the underlying soil. Cypress litter did not promote growth of its own seedlings over its competitors except on coarse-textured soils where it provided an ameliorative function to water stress due to the soil's reduced water holding capacity. The inhibition of ground-cover species' germination and growth in pure cypress stands was suggested to be the result of high below-ground resource competition due to the pine's expansive root morphology."

403	Parasitic	n
	Source(s)	Notes
	Farjon, A. 2010. <i>A Handbook of the World's Conifers</i> . Volume 1. Koninklijke Brill NV, Leiden, The Netherlands	"Trees to 20 m tall; trunk monopodia, usually branching low or occasionally forked, up to 50 cm d.b.h." [No evidence in Cupressaceae]

404	Unpalatable to grazing animals	n
	Source(s)	Notes
	Rosa García, R., Celaya, R., García, U., & Osoro, K. 2012. Goat grazing, its interactions with other herbivores and biodiversity conservation issues. <i>Small Ruminant Research</i> , 107(2): 49-64	"Table 2 Summary of plant species considered weeds and which are palatable to goats." [Includes <i>Callitris columellaris</i> & <i>Callitris endlicheri</i> ]
	Clayton-Greene, K. A., & Ashton, D. H. (1990). The dynamics of <i>Callitris columellaris</i> / <i>Eucalyptus albens</i> communities along the Snowy River and its tributaries in south-eastern Australia. <i>Australian Journal of Botany</i> , 38 (4): 403-432	"The reduction in numbers of <i>C. columellaris</i> in the smaller size classes in some communities (Fig. 6) is probably a consequence of rabbit predation. The species is heavily browsed by rabbits."
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	Seedlings are vulnerable to grazing animals, especially goats, sheep and rabbits

405	Toxic to animals	n
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Qsn #	Question	Answer
	Source(s)	Notes
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	[No evidence] "Key aspects of the biology of <i>C. columellaris</i> that make it a sensitive bio-indicator of environmental change since European settlement of Australia are" ... "(f) seedlings are readily killed by fire, and vulnerable to introduced herbivores, particularly sheep, goats and rabbits (Lacey, 1973; Bowman et al., 1988; Bowman and Panton, 1993; Russell- Smith, 2006)."
	Wagstaff, D.J. 2008. International poisonous plants checklist: an evidence-based reference. CRC Press, Boca Raton, FL	No evidence

406	Host for recognized pests and pathogens	
	Source(s)	Notes
	Webb, D. B., Wood, P. J., Smith, J. P. & Henman, G. S. 1984 <i>A Guide to Species Selection for Tropical and Sub-Tropical Plantations</i> . University of Oxford, Oxford UK	"Principal Pests and Diseases: <i>Fomes robustus</i> may occur in trees over 20 years"
	Watanabe, Y., Mihara, R., Mitsunaga, T., & Yoshimura, T. (2005). Termite repellent sesquiterpenoids from <i>Callitris glaucophylla</i> heartwood. <i>Journal of Wood Science</i> , 51(5): 514-519	[Contains termite resistant chemicals] "In conclusion, whole terpenoid fractions of <i>C. glaucophylla</i> heartwood extracts consisting of monoterpene carboxylic acids, sesquiterpene alcohols, sesquiterpene carboxylic acids and their derivatives, and sesquiterpene lactones showed repellent activity against <i>C. formosanus</i> ."
	Hawkeswood, T. J. (1986). New larval host records for eight Australian jewel beetles (Coleoptera, Buprestidae). <i>Giornale italiano di Entomologia</i> , 3(12): 173-177	[Impacts on other <i>Callitris</i> species or Cupressaceae unknown] "New food plants (mostly forest trees or timber from them) are recorded for 8 buprestid species belonging to 8 genera in Australia. These beetles included <i>Astraeus mastersi</i> on a fallen log of <i>Eucalyptus propinqua</i> , <i>Melobasis purpurascens</i> on timber of <i>Flindersia australis</i> , <i>Theryaxia suttoni</i> on log billets of <i>Callitris columellaris</i> , <i>Cyphogastra pistora</i> on <i>Terminalia catappa</i> and <i>Chrysobothris saundersii</i> on a log billet of <i>Acacia leiocalyx</i> , all from Queensland; <i>Nascioides parryi</i> on the leaves of <i>E. viminalis</i> from New South Wales and on <i>E. phaeotricha</i> from Queensland; and <i>Castalia bimaculata</i> on <i>Camptostemon</i> from the Northern Territory."

407	Causes allergies or is otherwise toxic to humans	
	Source(s)	Notes
	Williams, C. 2011. <i>Medicinal Plants in Australia Volume 2: Gums, Resins, Tannin and Essential Oils</i> . Rosenberg Publishing, Kenthurst NSW	[Gum may be toxic if ingested] "In the northern tropical regions, a similar gum was sourced from <i>Callitris intratropica</i> . It was noted to be particularly valuable when a strong glue was required and was employed in making durable, tough appliances or tools, for instance, attaching wooden prongs to fish spears or the hardwood head to the shaft of a bamboo spear. However, the gum had toxic properties. Ingestion was said to cause swelling of the stomach, and even inhaling fumes when the gum was heated was believed harmful. Children were kept well away from where the resin was being used (Levitt 1981)."

Qsn #	Question	Answer
	Stevenson, J., Haberle, S. G., Johnston, F. H., & Bowman, D. M. (2007). Seasonal distribution of pollen in the atmosphere of Darwin, tropical Australia: Preliminary results. <i>Grana</i> , 46(1): 34-42	[Pollen may be allergenic to susceptible individuals] "In Darwin <i>Callitris intratropica</i> is the dominant Cupressaceae species in the landscape, with <i>Callitris</i> pollen comprising round 11% of the yearly pollen load (Table II). <i>Callitris intratropica</i> is known to fruit between June and October (Brock, 2001) making the second peak in November a curiosity. Refloating of pollen or long distant transport by inland winds is a possibility (e.g., Green et al., 2004; Stennett & Beggs, 2004) and will be tested with ongoing monitoring and statistical analyses that incorporate meteorological data."

408	Creates a fire hazard in natural ecosystems	n
	Source(s)	Notes
	Trauernicht, C., Murphy, B. P., Portner, T. E., & Bowman, D. M. (2012). Tree cover–fire interactions promote the persistence of a fire-sensitive conifer in a highly flammable savanna. <i>Journal of Ecology</i> , 100(4): 958-968	[Reduces fire risk] "A significant, negative relationship between canopy cover and the probability of burning provides strong evidence that closed-canopy <i>C. intratropica</i> groves are capable of excluding low-intensity savanna fires, thereby enabling the persistence of patches of fire-sensitive forest or woodland amid open, highly flammable savanna vegetation." ... " ... the reduction in grass biomass within <i>C. intratropica</i> groves has direct consequences for limiting both fire intensity, critical for adult survival and stand persistence, and fire occurrence, critical for juvenile recruitment (e.g. Thaxton&Platt 2006; Engber et al. 2011)." ... "Our data provide compelling evidence that closed-canopy groves of <i>C. intratropica</i> have a lower probability of being burnt (Fig. 5a). In addition, calorimeter measurements suggest that those areas that do burn within closed-canopy <i>C. intratropica</i> groves experience fires of lower intensity than outside or along the edges of groves (Fig. 5b)."

409	Is a shade tolerant plant at some stage of its life cycle	n
	Source(s)	Notes
	Hunter Water. 2010. savewater!® gardens. <a href="http://www.hunterwater.com.au/Resources/Documents/fact-Sheets/Saving-Water/drought-tolerant-plant-list.pdf">http://www.hunterwater.com.au/Resources/Documents/fact-Sheets/Saving-Water/drought-tolerant-plant-list.pdf</a> . [Accessed 9 Apr 2015]	" <i>Callitris columellaris</i> " ... "is slow growing this tree and best used in a sunny, well-drained garden location."
	Webb, D. B., Wood, P. J., Smith, J. P. & Henman, G. S. 1984 A Guide to Species Selection for Tropical and Sub-Tropical Plantations. University of Oxford, Oxford UK	" <i>Callitris columellaris</i> " ... "Light Requirements - Strongly demanding"
	Plants for a Future. 2012. <i>Callitris columellaris</i> . <a href="http://www.pfaf.org/user/Plant.aspx?LatinName=Callitris+columellaris">http://www.pfaf.org/user/Plant.aspx?LatinName=Callitris+columellaris</a> . [Accessed 9 Apr 2015]	"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
	Bowman, D. M. J. S., & Panton, W. J. (1993). Decline of <i>Callitris intratropica</i> RT Baker & HG Smith in the Northern Territory: implications for pre-and post-European colonization fire regimes. <i>Journal of Biogeography</i> , 20(4): 373-381	" <i>C. intratropica</i> is known to occur on both swampy and well drained soils (Bowman et al., 1988), and co-occurs with savanna (Wilson et al., 1991) and wet and dry monsoon rain forest vegetation (Russell-Smith, 1991) on a range of substrate types."

Qsn #	Question	Answer
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	"Dry open or closed woodlands, forests and scrublands on a variety of soils from sands to clays and loams; (0-)50-300(-500) m. Zone 10."
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	"Soils ranged from very acidic (pH 3.7) to alkaline (pH 8.3) (Table 1). Soil carbon content was generally low (average 1.4–2.8% in the three climate zones), as were soil N (0.09–0.10%) and soil P (0.011–0.018%). Soil pH tended to be lowest in the tropics, while soil percent C, N and P were generally higher in the temperate zone than in the tropics or the arid zone."

411	Climbing or smothering growth habit	n
	Source(s)	Notes
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	"Tree to 20 m tall, with trunk to 0.8 m in diameter, or shrubby on drier sites."

412	Forms dense thickets	y
	Source(s)	Notes
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 1. Koninklijke Brill NV, Leiden, The Netherlands	" <i>Callitris columellaris</i> " ... "Forming dense stands on sandy soils of the immediate coastal region"
	Lawes, M. J., Taplin, P., Bellairs, S. M., & Franklin, D. C. (2013). A trade-off in stand size effects in the reproductive biology of a declining tropical conifer <i>Callitris intratropica</i> . <i>Plant Ecology</i> , 214(1): 169-174	" <i>Callitris intratropica</i> R.T. Baker & H.G. Smith is an obligate-seeding tree that often occurs in monodominant stands embedded within savannas and on the fringes of monsoon forests." ... "It exhibits a strong but not universal proclivity to occur in monodominant stands (Hammer 1981; Bowman et al. 1988; Russell-Smith et al. 2012)." ... "Stands were characterised by a continuous monospecific canopy and a suppressed understorey." ... "Thus, the success of monodominance of <i>C. intratropica</i> is likely driven by the ability of monodominant stands to suppress grass fuel loads (Bowman and Wilson 1988; Trauernicht et al. 2012), thus reducing the intensity and/or frequency of fire and increasing survival of adults and seedlings (Bowman et al. 1988; Trauernicht et al. 2012)."

501	Aquatic	n
	Source(s)	Notes
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	[Terrestrial] "Dry open or closed woodlands, forests and scrublands on a variety of soils from sands to clays and loams; (0-)50-300(-500) m. "

502	Grass	n
	Source(s)	Notes
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	"Tree to 20 m tall, with trunk to 0.8 m in diameter, or shrubby on drier sites." [Cupressaceae]

Qsn #	Question	Answer
503	<b>Nitrogen fixing woody plant</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	Cupressaceae

504	<b>Geophyte (herbaceous with underground storage organs -- bulbs, corms, or tubers)</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Eckenwalder, J.E. 2009. Conifers of the World: The Complete Reference. Timber Press, Portland, OR	"Tree to 20 m tall, with trunk to 0.8 m in diameter, or shrubby on drier sites."

601	<b>Evidence of substantial reproductive failure in native habitat</b>	n
	<b>Source(s)</b>	<b>Notes</b>
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 8 Apr 2015]	"Conservation Code: Not threatened "
	Farjon, A. 2010. A Handbook of the World's Conifers. Volume 1. Koninklijke Brill NV, Leiden, The Netherlands	Conservation - IUCN: Least Concern

602	<b>Produces viable seed</b>	y
	<b>Source(s)</b>	<b>Notes</b>
	Lawes, M. J., Taplin, P., Bellairs, S. M., & Franklin, D. C. (2013). A trade-off in stand size effects in the reproductive biology of a declining tropical conifer <i>Callitris intratropica</i> . <i>Plant Ecology</i> , 214(1): 169-174	" <i>Callitris intratropica</i> R.T. Baker & H.G. Smith is an obligate-seeding tree that often occurs in monodominant stands embedded within savannas and on the fringes of monsoon forests. We found that isolated trees 50-300 m from stands) were taller, of broader profile, and produced approximately twice the number of cones (*407 cones per tree) as those in large stands (*173 cones per tree), suggesting that monodominance generates intraspecific competition. The number of seeds per cone (27 seeds) was not related to stand size. However, a contrasting effect in which seed germinability was higher in large stands (*20 vs. \10 % in small stands) was approximately compensatory and consistent with an Allee effect of wind pollination."
	Clayton-Greene, K. A., & Ashton, D. H. (1990). The dynamics of <i>Callitris columellaris</i> / <i>Eucalyptus albens</i> communities along the Snowy River and its tributaries in south-eastern Australia. <i>Australian Journal of Botany</i> , 38 (4): 403-432	"The results for <i>C. columellaris</i> are similar to those obtained by Scott (1968) although we obtained a higher percentage of viable seeds (26%)."

Qsn #	Question	Answer
603	Hybridizes naturally	
	Source(s)	Notes
	Wood, B. 2015. Plants and fungi of southwestern NSW. <a href="http://keys.lucidcentral.org/key-server/data/050b0c0b-0707-4c0a-8f02-0b04020b0007/media/Html/home.html">http://keys.lucidcentral.org/key-server/data/050b0c0b-0707-4c0a-8f02-0b04020b0007/media/Html/home.html</a> . [Accessed 9 Apr 2015]	"Hybrids between <i>Callitris glaucophylla</i> and <i>Callitris verrucosa</i> have been reported from the area covered by this key."

604	Self-compatible or apomictic	
	Source(s)	Notes
	Lawes, M. J., Taplin, P., Bellairs, S. M., & Franklin, D. C. (2013). A trade-off in stand size effects in the reproductive biology of a declining tropical conifer <i>Callitris intratropica</i> . <i>Plant Ecology</i> , 214(1): 169-174	"Self-incompatibility systems, acting before fertilisation, have not been recorded for any conifer, but members of the Pinaceae family can exclude selfed embryos via the embryo lethal system (Williams et al. 2003; Restoux et al. 2008). The latter may explain the large proportion of infertile seeds (on average <11 % of seeds were fertile in small stands; about half the percent proportion of viable seeds in large stands) observed in the early stages of seed development in small stands and isolated <i>C. intratropica</i> trees."

605	Requires specialist pollinators	n
	Source(s)	Notes
	Lawes, M. J., Taplin, P., Bellairs, S. M., & Franklin, D. C. (2013). A trade-off in stand size effects in the reproductive biology of a declining tropical conifer <i>Callitris intratropica</i> . <i>Plant Ecology</i> , 214(1): 169-174	" <i>Callitris intratropica</i> R.T. Baker & H.G. Smith is a wind-pollinated, obligate-seeding, fire-sensitive conifer of fire-prone savannas and monsoon-forest fringes in northern Australia (Bowman and Harris 1995)."

606	Reproduction by vegetative fragmentation	
	Source(s)	Notes
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 8 Apr 2015]	"Vegetative regeneration strategy. Produces root suckers. "

Qsn #	Question	Answer
607	Minimum generative time (years)	>3
	Source(s)	Notes
	Russell-Smith, J. (2006). Recruitment dynamics of the long-lived obligate seeders <i>Callitris intratropica</i> (Cupressaceae) and <i>Petraeomyrtus punicea</i> (Myrtaceae). <i>Australian Journal of Botany</i> , 54(5): 479-485	"For <i>C. intratropica</i> , it was found that (1) contrary to other published observations, initial growth was slow, with juveniles taking ~10 years to attain 2-m height, (2) maturation substantially exceeds 10 years and" ... "Available information for <i>C. intratropica</i> suggests that, for nursery grown stock, maturation under plantation conditions can be attained at 4 years of age, whereas in natural stands, 'flowering does not occur until the regeneration is about 12 years old' (Stocker 1966, p. 4)."
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 9 Apr 2015]	"Time to first flowering. 6-8 years."

701	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	n
	Source(s)	Notes
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	"Key aspects of the biology of <i>C. columellaris</i> that make it a sensitive bio-indicator of environmental change since European settlement of Australia are ... (d) very limited seed dispersal (Stocker, 1966; Bowman et al., 1988);"
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 9 Apr 2015]	"Reproduction. Seed. Dispersal. Wind, water."

702	Propagules dispersed intentionally by people	y
	Source(s)	Notes
	eBay. 2015. Northern Cypress Pine ( <i>Callitris intratropica</i> ) 30 seeds. <a href="http://www.ebay.com/itm/NORTHERN-CYPRESS-PINE-Callitris-intratropica-30-seeds-/390820541910">http://www.ebay.com/itm/NORTHERN-CYPRESS-PINE-Callitris-intratropica-30-seeds-/390820541910</a> . [Accessed 9 Apr 2015]	"For sale is a packet of 30 fresh seeds."
	B & T World Seeds. 2015. <i>Callitris columellaris</i> . <a href="http://b-and-t-world-seeds.com/cartall.asp?species=Callitris%20columellaris&amp;sref=5032">http://b-and-t-world-seeds.com/cartall.asp?species=Callitris%20columellaris&amp;sref=5032</a> . [Accessed 9 Apr 2015]	"Information and prices for <i>Callitris columellaris</i> " [Seeds sold commercially online]

Qsn #	Question	Answer
703	Propagules likely to disperse as a produce contaminant	n
	Source(s)	Notes
	Graham, G. (2002). An assessment of the distribution and status of Arnhem cypress pine <i>Callitris intratropica</i> (RT Baker & HG Sm.) in the Kimberley Region, Western Australia. Unpublished report to the National Reserves System Program, Environment Australia, Canberra	" <i>C. intratropica</i> is very fire sensitive at the seedling and saplings stage, requires at least 12 years before it is mature, has a limited seed dispersal from the parent tree and has a short term of seed viability."
	WRA Specialist. 2015. Personal Communication	No evidence. Long time to reproductive maturity, limited dispersibility of seeds, and short seed viability makes this unlikely

704	Propagules adapted to wind dispersal	y
	Source(s)	Notes
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 8 Apr 2015]	"Dispersal. Wind, water."
	Givnish, T. J. (1980). Ecological constraints on the evolution of breeding systems in seed plants: dioecy and dispersal in gymnosperms. <i>Evolution</i> , 34(5): 959-972	"TABLE 1. Gymnosperm breeding systems and dispersal syndromes. Number of species per genus indicated in parentheses." [ <i>Callitris</i> (20) - Dispersal syndrome = Winged seeds]
	Clayton-Greene, K. A., & Ashton, D. H. (1990). The dynamics of <i>Callitris columellaris</i> / <i>Eucalyptus albens</i> communities along the Snowy River and its tributaries in south-eastern Australia. <i>Australian Journal of Botany</i> , 38 (4): 403-432	"The mean terminal velocity of <i>C. columellaris</i> and <i>E. albens</i> seed was estimated, using equation (1), to be 1.27 m s <sup>-1</sup> and 3.56 m s <sup>-1</sup> respectively. Thus a wind speed of 14.5 km h <sup>-1</sup> is necessary to carry <i>E. albens</i> seed a horizontal distance equal to its vertical fall, compared with only 6.4 km h <sup>-1</sup> for <i>C. columellaris</i> ."
	Eckenwalder, J.E. 2009. <i>Conifers of the World: The Complete Reference</i> . Timber Press, Portland, OR	[Morphology suggests adaptations for wind dispersal] "Seeds three to seven on each scale, chestnut brown, the body 3-6 mm long, 2-3 mm wide, with two nearly equal wings with translucent tips, 1-4 mm wide."

705	Propagules water dispersed	y
	Source(s)	Notes
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 9 Apr 2015]	"Reproduction. Seed. Dispersal. Wind, water."

706	Propagules bird dispersed	n
	Source(s)	Notes
	Graham, G. (2002). An assessment of the distribution and status of Arnhem cypress pine <i>Callitris intratropica</i> (RT Baker & HG Sm.) in the Kimberley Region, Western Australia. Unpublished report to the National Reserves System Program, Environment Australia, Canberra	[No evidence. Primarily wind-dispersed over short distances] "Studies have shown that the winged seed has a somewhat limited dispersal from the parent tree (Stocker 1966)."

707	Propagules dispersed by other animals (externally)	

Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Clayton-Greene, K. A., & Ashton, D. H. (1990). The dynamics of <i>Callitris columellaris</i> / <i>Eucalyptus albens</i> communities along the Snowy River and its tributaries in south-eastern Australia. <i>Australian Journal of Botany</i> , 38 (4): 403-432	[Ants remove seeds. Unknown what percentage, if any, survive predation] "In the summer of 1979, no insects removed <i>C. columellaris</i> seed although <i>Iridomyrmex detectus</i> palpated the seed frequently. By summer 1980, after two dry years, <i>C. columellaris</i> seed was rapidly removed by <i>I. detectus</i> and carried, often up to 20 m, into the nest. A similar pattern was noted in March 1966 after the drought of 1965."
	Farjon, A. 2010. <i>A Handbook of the World's Conifers</i> . Volume 1. Koninklijke Brill NV, Leiden, The Netherlands	[Seeds lack means of external attachment] "Seeds 4-10 on each scale (the higher number on larger scales), triangular, flattened up to 8 mm including wings (seed body up to 4-5 x 2-3 mm), dark brown with whitish concave hilum; wings 2 on opposite sides, 4-5 mm wide, more or less equal in shape and size."

708	Propagules survive passage through the gut	n
	<b>Source(s)</b>	<b>Notes</b>
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 9 Apr 2015]	"Reproduction. Seed. Dispersal. Wind, water."
	Gordon, D. R., Mitterdorfer, B., Pheloung, P. C., Ansari, S., Buddenhagen, C., Chimera, C., ... & Williams, P. A. 2010). Guidance for addressing the Australian Weed Risk Assessment questions. <i>Plant Protection Quarterly</i> , 25(2): 56-74	[No evidence that seeds are consumed by vertebrates that could internally disperse the seeds] "Answer 'no' where the taxon is unlikely to be eaten by animals or if seeds are not viable following passage through the gut"

801	Prolific seed production (>1000/m2)	n
	<b>Source(s)</b>	<b>Notes</b>
	Lacey, C. J. (1973). <i>Silvicultural characteristics of white cypress pine</i> . Forestry Commission of New South Wales	[Maximum seed production estimated to be around 540 seeds per square meter] "The quantity of seed produced in Cypress Pine stands naturally shows marked annual variation, but good seed supplies can be expected at frequent intervals. Hawkins (1966) found that seed production could be as high as 62.3 lb per acre (70 kg/ha), or 2,173,000 seeds per acre (5.4 million/ha) for a good seed year and as low as 0.6 lb per acre (0.7 kg/ha) or 24,000 seeds per acre (60,000/ha) in a poor seed year." ... "At basal areas greater than 80 sq ft per acre (18.5m2/ha) negligible seed is produced and seed production is increased dramatically when basal area is lowered. In one seed trap experiment during a good seedfall year production varied from 48.7 lb per acre (54.5 kg/ha) or 1.6 million seeds per acre (4 million/ha) at 20 sq ft per acre (4.6 m2/ha) basal area to 6.0 lb per acre (6.7 kg/ha) or 0.3 million seeds per acre (750,000/ha) at 62 sq ft (14.2 m2/ha) basal area. (Lacey, 1972.) Similar results have been observed in a wide variety of other forest trees."

802	Evidence that a persistent propagule bank is formed (>1 yr)	n



Qsn #	Question	Answer
	<b>Source(s)</b>	<b>Notes</b>
	Trauernicht, C. 2013. The fire ecology of <i>Callitris intratropica</i> : Tracing the legacy of Aboriginal fire management to inform contemporary responses to a conservation crisis on the Arnhem Plateau, northern Australia. PhD Dissertation. University of Tasmania, Hobart TAS	" <i>C. intratropica</i> is monocious and although cone and seed production may vary considerably year to year (Hawkins 1966), the species does not form persistent seed banks either in the soil or in cones retained in the canopy."
	Prior, L. D., McCaw, W. L., Grierson, P. F., Murphy, B. P., & Bowman, D. M. (2011). Population structures of the widespread Australian conifer <i>Callitris columellaris</i> are a bio-indicator of continental environmental change. <i>Forest Ecology and Management</i> , 262(2): 252-262	"Key aspects of the biology of <i>C. columellaris</i> that make it a sensitive bio-indicator of environmental change since European settlement of Australia are ... " ... "absence of a soil seedbank (Hawkins, 1966; Stocker, 1966; Lacey, 1973);"
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 8 Apr 2015]	"Seedbank persistence. Short, days-1 year."

803	Well controlled by herbicides	
	<b>Source(s)</b>	<b>Notes</b>
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 8 Apr 2015]	[Efficacy unknown] "Suggested method of management and control. Apply 250 ml Access® in 15 L of diesel to basal 50 cm of trunk (basal bark) or cut and paint with 100% glyphosate. Stem injection in this species may be ineffective due to non-porous wood."

804	Tolerates, or benefits from, mutilation, cultivation, or fire	
	<b>Source(s)</b>	<b>Notes</b>
	Russell-Smith, J. (2006). Recruitment dynamics of the long-lived obligate seeders <i>Callitris intratropica</i> (Cupressaceae) and <i>Petraeomyrtus punicea</i> (Myrtaceae). <i>Australian Journal of Botany</i> , 54(5): 479-485	"...previously unreported, even juveniles may occasionally resprout following very low-intensity fires after 100% scorch."
	Western Australian Herbarium (1998–2015). FloraBase—the Western Australian Flora. Department of Parks and Wildlife. <a href="https://florabase.dpaw.wa.gov.au/">https://florabase.dpaw.wa.gov.au/</a> . [Accessed 8 Apr 2015]	"Fire response. Hot fire kills mature plants. Seed is released from the canopy and germinates rapidly in the post fire environment."
	Trauernicht, C., Murphy, B. P., Portner, T. E., & Bowman, D. M. (2012). Tree cover–fire interactions promote the persistence of a fire-sensitive conifer in a highly flammable savanna. <i>Journal of Ecology</i> , 100(4): 958-968	"It is well established that frequent savanna fires limit the establishment and recruitment of woody plants (Mourik et al. 2007; Hoffmann et al. 2009) especially if they are obligate-seeding species (i.e. incapable of resprouting after fire) like <i>C. intratropica</i> (Cohn et al. 2011; Prior et al. 2011). Conversely, high rates of <i>C. intratropica</i> recruitment have been observed in savannas where fire has been excluded (Bowman, Wilson & Davis 1988). <i>Callitris intratropica</i> is a long-lived species, and larger trees appear capable of surviving decades of high-frequency surface fires typical of Australian savannas (Prior, Bowman & Brook 2007)."

Qsn #	Question	Answer
	Bowman, D. M. J. S., & Panton, W. J. (1993). Decline of <i>Callitris intratropica</i> RT Baker & HG Smith in the Northern Territory: implications for pre-and post-European colonization fire regimes. <i>Journal of Biogeography</i> , 20(4): 373-381	[Depends on fire intensity & age of trees] " <i>C. intratropica</i> is a valuable indicator species because:" ... "trees are undamaged by low intensity fires, but are scarred or killed by intense fires (Stocker, 1966a: Haynes, 1985; Bowman, Wilson & Davis, 1988" ... "Fire clearly has a significant impact on <i>C. intratropica</i> . The simple burning experiment showed the extreme fire sensitivity of seedlings. Bowman et al. (1988) have demonstrated that fire protection results in stands heavily stocked with juveniles (such as group 4, Fig. 3), and that fire kills the smallest individuals in regeneration cohorts."
	Bowman, D. M. J. S., Wilson, B. A., & Davis, G. W. (1988). Response of <i>Callitris intratropica</i> RT Baker & HG Smith to fire protection, Murganella, northern Australia. <i>Australian Journal of Ecology</i> , 13(2): 147-159	[Larger trees may tolerate fire] "Fire suppression over the past 18 years has allowed some <i>C. intratropica</i> to establish on Eucalyptus forest sites with fine textured soils It is argued that distribution of <i>Callitris</i> preceding fire management was controlled by the interactive effects of fire, soils and understory vegetation. High grass fuel loads (and thus intense fires), and competition are thought to have previously limited establishment of <i>C. intratropica</i> on fine textured soils. Early dry season burning by Aboriginals may also have been important in limiting fire intensities and accumulation of fuel in <i>Callitris</i> stands. Dry electrical storms commonly cause fires prior to the summer rains. Such wildfires did not completely kill stands of <i>Callitris</i> saplings or trees at Murganella. Survivors were found to be significantly bigger and to have thicker bark than the dead stems. Sapling size is related to age and density, thus fire may be an important mechanism in thinning heavily stocked stands."

805	<b>Effective natural enemies present locally (e.g. introduced biocontrol agents)</b>	
	<b>Source(s)</b>	<b>Notes</b>
	WRA Specialist. 2015. Personal Communication	Unknown. No native Cupressaceae in the Hawaiian Islands, and none have been the subject of biological control

**Summary of Risk Traits:**

## High Risk / Undesirable Traits

- Broad climate suitability
- Thrives in tropical climates
- Naturalizing on Oahu & Maui, Hawaiian Islands
- A potential agricultural weed which may reduce pasture productivity
- Other *Callitris* species have invasive tendencies
- Gum may be toxic if ingested. Pollen may be allergenic to susceptible individuals
- Tolerates many soil types
- Forms dense stands in native range
- Reproduces by seed, and possibly by suckering
- Seeds dispersed by wind, water & intentionally by people
- May seed prolifically in certain years (although not in excess of 1000 seeds m<sup>-2</sup>)
- Older trees may be resistant to fire. Younger trees are killed

## Low Risk Traits

- Unarmed (no spines, thorns or burrs)
- Palatable & non-toxic to browsing animals
- Reduces fire risk
- Relatively slow-growing. Reaches maturity after 6+ years
- Limited dispersibility of seeds
- Does not form a persistent seed bank

## Second Screening Results for Tree/tree-like shrubs

(A) Shade tolerant or known to form dense stands?> Yes. Forms dense stands in native range

(B) Bird OR clearly wind-dispersed?> Yes. Wind-dispersed seeds

(C) Life cycle <4 years? No. 6+ years to maturity

Outcome = Evaluate further

