**Consultation on Species Listing Eligibility and Conservation Actions**

***Leptospermum crassifolium***

You are invited to provide your views and supporting reasons about:

1) the eligibility of *Leptospermum crassifolium* for inclusion on the EPBC Act threatened species list in the Critically Endangered category; and

2) the necessary conservation actions for this species.

The Threatened Species Scientific Committee assesses species to determine their eligibility for inclusion in the list of threatened species under the EPBC Act and provides recommendations to the Australian Government Minister for the Environment and Water.

The purpose of this consultation document is to elicit additional information to better understand the status of the species and help inform conservation actions and further planning. This draft assessment should be considered to be **tentative** as it may change following this consultation process.

Responses are welcomed from any interested person.

Please provide your response in writing by email to: species.consultation@dcceew.gov.au.

Include the "*Leptospermum crassifolium*" in the Subject field.

or by mail to:

The Director

Threatened Species Assessment Section

Biodiversity Division

Department of Climate Change, Energy, the Environment and Water

(Attention: species.consultation@dcceew.gov.au)

GPO Box 3090

Canberra ACT 2601

**Responses are required to be submitted by 17 December 2024**.

|  |  |
| --- | --- |
| **Contents of this information package** | **Page** |
| General background information about listing threatened species | 2 |
| Information about this consultation process | 3 |
| Consultation questions specific to the assessment | 4 |
| Draft assessment/information about the species and its eligibility for listing | 5 |
| Conservation actions for the species | 16 |
| References cited | 18 |

**General background information about listing threatened species**

The Australian Government helps protect species at risk of extinction by listing them as threatened under Part 13 of the EPBC Act. Once listed under the EPBC Act, the species becomes a Matter of National Environmental Significance (MNES) and must be protected from significant impacts through the assessment and approval provisions of the EPBC Act. More information about threatened species is available on the department’s website at:

<https://www.dcceew.gov.au/environment/biodiversity/threatened>

Public nominations to list threatened species under the EPBC Act are received annually by the department. In order to determine if a species is eligible for listing as threatened under the EPBC Act, the Threatened Species Scientific Committee (the Committee) undertakes a rigorous scientific assessment of its status to determine if the species is eligible for listing against a set of criteria. These criteria are available on the Department’s website at:

[Guidelines for assessing the conservation status of native species according to the Environment Protection and Biodiversity Conservation Act 1999 and Environment Protection and Biodiversity Conservation Regulations 2000 (dcceew.gov.au)](https://www.dcceew.gov.au/sites/default/files/env/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/tssc-guidelines-assessing-species-2021.pdf).

As part of the assessment process, the Committee consults with the public and stakeholders to obtain specific details about the species, as well as advice on what conservation actions might be appropriate. Information provided through the consultation process is considered by the Committee in its assessment. The Committee provides its advice on the assessment (together with comments received) to the Minister regarding the eligibility of the species for listing under a particular category and what conservation actions might be appropriate. The Minister decides to add, or not to add, the species to the list of threatened species under the EPBC Act. More detailed information about the listing process is at: [Nominating a species, ecological community or key threatening process under the EPBC Act - DCCEEW](https://www.dcceew.gov.au/environment/biodiversity/threatened/nominations).

To promote the recovery of listed threatened species and ecological communities, conservation advices and where required, recovery plans are made or adopted in accordance with Part 13 of the EPBC Act. Conservation advices provide guidance at the time of listing on known threats and priority recovery actions that can be undertaken at a local and regional level. Recovery plans describe key threats and identify specific recovery actions that can be undertaken to enable recovery activities to occur within a planned and logical national framework. Information about recovery plans is available on the department’s website at: <https://www.dcceew.gov./environment/biodiversity/threatened/recovery-plans>

**Privacy notice**

The Department will collect, use, store and disclose the personal information you provide in a manner consistent with the Department’s obligations under the Privacy Act 1988 (Cth) and the Department’s Privacy Policy. Personal information means information or an opinion about an identified individual, or an individual who is reasonably identifiable.

Any personal information that you provide within, or in addition to, your comments in the threatened species assessment process may be used by the Department for the purposes of its functions relating to threatened species assessments, including contacting you if we have any questions about your comments in the future.

Further, the Commonwealth, State and Territory governments have agreed to share threatened species assessment documentation (including comments) to ensure that all States and Territories have access to the same documentation when making a decision on the status of a potentially threatened species. This is also known as the ‘[Common Assessment Method’ (CAM)](https://www.dcceew.gov.au/environment/biodiversity/threatened/cam). As a result, any personal information that you have provided in connection with your comments may be shared between Commonwealth, State or Territory government entities to assist with their assessment processes.

The Department’s Privacy Policy contains details about how respondents may access and make corrections to personal information that the Department holds about the respondent, how respondents may make a complaint about a breach of an Australian Privacy Principle, and how the Department will deal with that complaint. Alternatively, email the department at privacy@dcceew.gov.au. A copy of the Department’s Privacy Policy is available at: <https://www.dcceew.gov.au/about/commitment/privacy>

**Information about this consultation process**

Responses to this consultation can be provided electronically or in hard copy to the contact addresses provided on Page 1. All responses received will be provided in full to the Committee and then to the Australian Government Minister for the Environment and Water.

In providing comments, please provide references to published data where possible. Should the Committee use the information you provide in formulating its advice, the information will be attributed to you and referenced as a ‘personal communication’ unless you provide references or otherwise attribute this information (please specify if your organisation requires that this information is attributed to your organisation instead of yourself). The final advice by the Committee will be published on the department’s website following the listing decision by the Minister.

Information provided through consultation may be subject to freedom of information legislation and court processes. It is also important to note that under the EPBC Act,the deliberations and recommendations of the Committee are confidential until the Minister has made a final decision on the nomination, unless otherwise determined by the Minister.

**Consultation questions for *Leptospermum crassifolium***

**PART 1 – INFORMATION TO ASSIST LISTING ASSESSMENT**

1. Do you have any additional information on the **ecology or biology** of the species?

2. Can you provide any additional information or estimates on **longevity, average life span or generation length** for the species?

3. Do you have additional information to support an **estimate of the current population size** of mature adults of the species (national extent)?

4. Do you have additional information on **population trends** over 3 generations, or an historic population size for the species (national extent)?

* Where standing plants at time of survey were seedlings, can you provide a method to estimate the resulting standing crop of mature individuals? (see Population size pp8-9, Table 1)

5. Do you have additional information on **current range** (national extent) or **location of populations** for the species?

6. Can you provide additional information on any **change in range** or **location of populations**, or an **historic range** (national extent)?

7. Are you aware of any **cultural importance or use** that the species has?

**PART 2 – INFORMATION FOR CONSERVATION ADVICE ON THREATS AND CONSERVATION ACTIONS**

8. Do you have further information on the historic, current or potential **threats** facing the species?

9. Do you have further information on current or potential **management actions** to support protection and recovery of the species?

10. Do you have further information on current or potential **monitoring** or **research activities** for the species?

11. Are you aware of **other knowledge** (e.g., traditional ecological knowledge) that may help better understand the threats and management actions to aid recovery of the species?

12. What **individuals or organisations** are currently, or potentially could be, involved in management and recovery of the species?

**PART 3 – ANY OTHER INFORMATION**

13. Do you have comments on **any other matters** relevant to the assessment of this species.

Conservation Advice for
Leptospermum crassifolium

This draft document is being released for consultation on the species listing eligibility and conservation actions

The purpose of this consultation document is to elicit additional information to better understand the eligibility of the species for listing and inform conservation actions, further planning and the potential need for a Recovery Plan.

The draft assessment below should therefore be considered **tentative** at this stage, as it may change as a result of responses to this consultation process.

Note: Specific consultation questions relating to the below draft assessment and preliminary determination have been included in the consultation cover paper for your consideration.



*Leptospermum crassifolium* © Copyright, M. Fagg (from Australian Plant Image Index).

## Conservation status

*Leptospermum crassifolium* is proposed to be listed in the Critically Endangered category of the threatened species list under the Environment Protection and Biodiversity Conservation Act 1999 (Cwth) (EPBC Act).

*Leptospermum crassifolium* was assessed by the Threatened Species Scientific Committee to be eligible for listing as Critically Endangered under Criterion 2. The Committee’s assessment is at Attachment A. The Committee’s assessment of the species’ eligibility against each of the listing criteria is:

* Criterion 1: Insufficient data
* Criterion 2: B1ab(i,ii,iii,iv,v): Critically Endangered
* Criterion 3: Ineligible
* Criterion 4: Ineligible
* Criterion 5: Insufficient data

The main factors that make the species proposed for listing in the Critically Endangered category are a very restricted Extent of Occurrence (EOO) and number of locations, and observed continuing decline in EOO, Area of Occupancy (AOO), subpopulations, and inferred continuing decline in habitat quality and number of mature individuals due to fire regimes that cause declines to biodiversity (high fire frequency and high fire severity), climate change (drought and soil erosion), localised trampling and weed invasion.

Species may also be listed as threatened under state and territory legislation. For information on the current listing status of this species see the [Species Profile and Threats Database](http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl).

Contents

[Conservation status 5](#_Toc178929310)

[Species information 7](#_Toc178929311)

[Taxonomy 7](#_Toc178929312)

[Description 7](#_Toc178929313)

[Distribution 8](#_Toc178929314)

[Cultural and community significance 10](#_Toc178929315)

[Relevant biology and ecology 11](#_Toc178929316)

[Habitat critical to the survival 11](#_Toc178929317)

[Important populations 12](#_Toc178929318)

[Threats 12](#_Toc178929319)

[Conservation and recovery actions 16](#_Toc178929320)

[Primary conservation objective 16](#_Toc178929321)

[Conservation and management priorities 16](#_Toc178929322)

[Stakeholder engagement/community engagement 17](#_Toc178929323)

[Survey and monitoring priorities 17](#_Toc178929324)

[Information and research priorities 17](#_Toc178929325)

[Links to relevant implementation documents 18](#_Toc178929326)

[Conservation Advice and Listing Assessment references 18](#_Toc178929327)

[Other sources 20](#_Toc178929328)

[Attachment A: Listing Assessment for *Leptospermum crassifolium* 21](#_Toc178929329)

[Reason for assessment 21](#_Toc178929330)

[Assessment of eligibility for listing 21](#_Toc178929331)

[Key assessment parameters 21](#_Toc178929332)

[Criterion 1 evidence 25](#_Toc178929333)

[Criterion 2 evidence 26](#_Toc178929334)

[Criterion 3 evidence 28](#_Toc178929335)

[Criterion 4 evidence 30](#_Toc178929336)

[Criterion 5 evidence 31](#_Toc178929337)

[Adequacy of survey 31](#_Toc178929338)

[Public consultation 31](#_Toc178929339)

[Listing and Recovery Plan Recommendations 31](#_Toc178929340)

## Species information

### Taxonomy

Conventionally accepted as *Leptospermum crassifolium* Joy Thomps. Family: Myrtaceae.

### Description

#### Simple description

*Leptospermum crassifolium* is a shrub up to 2 m high with thick, aromatic leaves and white flowers in summer.

#### Formal taxonomic description

Thompson (1989) described *L. crassifolium* as “shrub 1–2 m in height with close bark; the younger stems rather stout with a minute close pubescence, without a flange but thickened around the leaf-bases, branching at c. 60° but often soon curving. Leaves somewhat aromatic, dense, and rather erect at first, later diverging and usually with the upper part recurving, mostly 7 mm or less in length and 3–4 mm wide, broadly elliptical, very thick in texture, incurved in cross-section and often infolded near the apex, glabrous and very glossy with prominent glands on the lower surface, the margins often minutely pubescent, the apex broadly acute, usually with a stout blunt point, the base broad above a distinct often broad-based petiole. Flowers white, c. 18 mm in diameter, single on modified shoots terminating leafy side-branches, the new growth extending from branch-ends and from beyond the flowers after flowering. Bracts large, very broad and concave, almost spherical, golden brown and rather thin, stiff but translucent, the inner and bracteoles longer but enabling the long-pointed sepals to protrude, many tending to persist about the open flower. Hypanthium glabrous apart from a minute pubescence on the upper parts and rather dark, c. 5 mm long, the upper part not much expanded, the lower rather straight-sided and rounded above a fluted pedicel, the top of the ovary glabrous. Sepals persistent, c. 5 mm long, long-deltoid, with a thin silky pubescence, the margins pale, the upper part infolded and the tip hooded. Petals c. 7 mm long. Stamens in bundles of 5–7, c. 4 mm long, the anther-cells 0.6–0.7 mm long, somewhat recurved and folded, much-thickened and opening wide but deep in the outer part. Style inset, evenly slender or with a very short broad base, the stigma rather small. Ovary (4-) 5-locular, each loculus with c. 80 ovules in (6-) 8-rows on a large, rather shallow and close-set placenta. Fruit long-persistent with the base becoming very broad, mostly 8–10 mm in diameter, the rim woody but not much expanded, the lower part rather straight-sided or rounded above a broad base, the surface lifting as a very thin layer, the valves very woody, exserted to form only a very low dome with a small central depression, after opening the surface lifting, and the valves raised and spreading to some extent so as to be less wide than the rim and usually about half the depth of the base. Mature seedsc. 2.5 mm long, linear-cuneiform, striate. Main flowering period: February and perhaps later.”

### Distribution

*Leptospermum crassifolium* is endemic to New South Wales (NSW) where it occurs on moist peaty sand and rock crevices, on sandstone in the Budawang Range in south-eastern NSW (Thompson 1989) (see Table 1). All sites are within Morton National Park.

The southern most record in ALA (2022) is a georeferencing error and the site is in the northern part of the species distribution near Quilties Mountain (T Auld 2023. pers comm 20 October). The ALA (2022) record from near Round Mountain is also a georeferencing error and should be near Quilties Mountain. Sites 4 km north- east of Corang Trig are incorrectly georeferenced in ALA (2022) and Bionet (2022) as being north- west of Corang Trig.

Herbarium collections (ALA 2022) note the species as ‘common’, ‘dominant to frequent’, ‘co-dominant’ and ‘abundant’.

#### Population size

Surveys after the 2019–20 bushfires were conducted in the two main habitat areas (Quilties Mountain area and Corang Trig area) in June 2021 (DPE 2021). The Quilties Mountain subpopulation was reported to have experienced extreme fire severity, with only 53 seedlings counted over five different sites (survey methodology unknown and varied between sites) (DPE 2021). In the Corang Trig area subpopulation, extreme fire severity was also reported, with seven sites surveyed (DPE 2021). No plants were recorded in sites 1–3 and 5–6. Site 4 recorded the largest number of seedlings. Three transects with ten quadrats each (1 x 1 m) were surveyed (mean number of seedlings/m2: transect 1 = 0.5; transect 2 = 7.3; transect 3 = 0), with an overall mean of 2.6/m2 (95% confidence interval = 0.58), leading to an estimate of 131,040 seedlings (± 29,080) within a 5.04 ha surveyed area. Ten unburnt mature individuals were also recorded. Site 7 recorded 32 seedlings along a walking track. Due to estimates of high seedling density in this subpopulation, if assuming a high mortality rate of 90% attrition as seedlings thin out before maturity (typical of seedlings of Leptospermum species less than 18 months old; D Keith pers comm. 24 November 2023), it is estimated the total mature subpopulation size from the Corang Trig area subpopulation could comprise at least 13,100 individuals; however, these estimates are highly uncertain due to the large confidence intervals determined (95% confidence interval 3,900 – 23,300).

In addition, extensive searching across the top of Sturgiss Mountain, could not find any evidence of *L. crassifolium* either as seedlings, or mature surviving plants (or killed) by fire (Table 1; DPE 2021). However, there was a mass seedling recruitment event taking place at the time of the surveys, and other *Leptospermum* species present on Sturgiss Mountain, thus *L. crassifolium* may have been present but required additional growth to allow flowering/fruiting for identification. If seedlings were not yet present, it is unlikely the species could successfully recruit in the dense existing regrowth. The area north-east of Corang Trig was also searched, but no plants were found.

**Table 1 Summary of population estimates and fire history for *Leptospermum crassifolium***

|  |  |  |  |
| --- | --- | --- | --- |
| **Likely subpopulation** | **Population size prior to 2019**–**20 bushfires (ALA 2022)** | **Population size in 2021 (post 2019**–**20 bushfires) (DPE 2021)** | **Bushfire history** (DPE SEED 2022) |
| Quilties Mountain | Dominant to frequent in 1981 | >53 seedlings; no mature individuals  | 1979–80c 1980–81 2019–20  |
| Sturgiss Mountain | Unknown | No mature individuals foundNo confirmed seedlings found a  | 1968–69 1975–76 c 1978–79 c 1980–81 2019–20 |
| 4 km NE of Corang Trig  | Abundant in 1986 | No seedlings or mature individuals found | 1972–73 1979–80 c 1979–80 2019–20 |
| Corang Trig area | Common in 1992>1000 based on estimate of dead stems in 2021b  | Very variable locally but 130,100 (± 29,080) seedlings10 unburnt mature individuals | 1972–73 1979–80 c 1979–80 2013–14 2019–20  |

a mass seedling recruitment was taking place at the time of the survey with other dead mature *Leptospermum* species identified. *Leptospermum* seedlings were identified but identification to the species level was not possible.

b from DPE (2021)

c prescribed burn

Map 1 Modelled distribution of *Leptospermum crassifolium*

 **Source:** Base map Geoscience Australia; species distribution data [Species of National Environmental Significance](http://www.environment.gov.au/science/erin/databases-maps/snes) database.

**Caveat:** The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein. Due to limited survey effort and information available, *C. scabrella*, and its habitat, may occur in areas where it has not yet been recorded, and the modelled distribution (Map 1) should be considered as indicative only.

**Species distribution mapping:** The species distribution mapping categories are indicative only and aim to capture (a) the habitat or geographic feature that represents recent observed locations of the species (known to occur) or habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

### Cultural and community significance

The cultural, customary and spiritual significance of species and the ecological communities they form are diverse and varied for Indigenous Australians and their stewardship of Country. Knowledge may be held by Indigenous Australians who are the custodians of this knowledge and have the rights to decide how this knowledge is shared and used.

*Leptospermum crassifolium* occurs on Yuin land (AIATSIS 1996).

### Relevant biology and ecology

#### Habitat

*Leptospermum crassifolium* occurs on moist peaty sand and rock crevices, on sandstone (Thompson 1989). Records (ALA 2022) note the species from open shrubland, heath, open heath, sometime in seepage slopes (Benson 1990). They also note a range of associated species including, *Allocasuarina nana* (dwarf she-oak)*, L. subglabratum, L. trinervium* (flaky-barked tea-tree), *L. obovatum, L. scoparium* var. *rotundifolium. Prostanthera saxicola* var. *montana, Banksia ericifolia* (heath-leaved banksia)*, Leucopogon* sp., and *Melaleuca capitata*.

#### Reproductive ecology

Although pollination of *L. crassifolium* has not yet been documented, it is likely similar to that of other *Leptospermum* species, where butterflies, hover flies and native bees have all been recorded visiting species (Armstrong 1979; O'Brien 1992), while moths have recently been recorded pollinating *L. scoparium* (manuka) (Buxton et al. 2022).

Dispersal in *Leptospermum* species, of dry seeds or, in some species, indehiscent fruits, is primarily by gravity and wind, though some secondary dispersal might occur by ants as well as wind and water (Myerscough 1998). Like other Myrtaceae genera, the seed dispersal distance for the species is unlikely to be more than several metres.

The life span and generation length are unknown for the species. For *Leptospermum* species, these traits vary depending on a species’ response to fire (resprouter versus seeder) (Ferrer-Paris & Keith 2022), with obligate seeders generally being shorter lived (30–50 years) (Benson & McDougall 1998).

#### Fire ecology

Based on survey observations (DPE 2021), *L.* *crassifolium* is likely to be an obligate seeder (standing plants killed by fire) with a serotinous seed bank, in which the opening of the mature fruit held on the plant is delayed for a period and often requires external stimuli such as the heat from a fire for opening (Myerscough 1998). Time to first flowering is unknown but can be more than 5–7 years in other *Leptospermum* spp. (Benson & McDougall 1998).

There has been evidence of frequent recurrence of fires at several sites (Table 1), which may disrupt seedling maturation and seed bank accumulation in this species across its range (Table 1). Fire severity may impact survival of seeds in woody fruit of *Leptospermum* species (Judd & Ashton 1991). However, surveys in 2021 found a high abundance of *L. crassifolium* seedlings in one site of the Corang Trig area subpopulation after the extreme 2019-20 bushfires, suggesting this site may have significant recovery once these seedlings mature (DPE 2021).

### Habitat critical to the survival

All habitat for this species is habitat critical to the survival of L. *crassifolium*. This includes the area occupied by the known extant subpopulations, areas of similar habitat surrounding the known subpopulations, and additional occurrences of similar habitat that may contain undiscovered subpopulations of the species or be suitable for future translocations.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

### Important populations

In this section, the word ‘population’ is used to refer to a subpopulation, in keeping with the terminology used in the EPBC Act and state/territory environmental legislation. All known populations are considered important to the species long-term survival and recovery.

### Threats

*Leptospermum crassifolium* is threatened by fire regimes that cause declines in biodiversity (high fire frequency, high fire severity), climate change (drought and soil erosion), localised trampling near tracks, track maintenance impacts, and weed impacts.

Table 2 Threats

| Threat  | Status **a** | Evidence  |
| --- | --- | --- |
| Fire |
| Fire regimes that cause declines in biodiversity b | * Timing: historical/current/ future
* Confidence: observed/estimated/ inferred/ projected
* Likelihood: almost certain
* Consequence: major
* Trend: increasing
* Extent: across the entire range
 | ‘Fire regimes that cause declines in biodiversity’ is listed as a Key Threatening Process (KTP) under the EPBC Act (DAWE 2022). Gallagher (2020) and Auld et al. (2020) found that 100% of known sites overlapped with the extent of the burnt area from the 2019–20 bushfires, with up to 70% of sites also having been burnt in the previous 15 years (Auld et al. 2020).*High fire frequency* There is evidence of frequent fire across the species’ range (Table 1). As an obligate seeder, there needs to be sufficient time between fires to allow replenishment of the seed bank. Time to first flowering is unknown in *L. crassifolium* but can be more than 5–7 years in other *Leptospermum* species (Benson & McDougall 1998). This means that any fire intervals of less than 10–15 years may lead to population declines. While the species occurs in association with sandstone rock outcrops and some plants may survive fire in refugia with little fuel in this habitat, surveys after the 2019–20 bushfires (DPE 2021) suggest that all plants were burnt and killed by the fires at most sites. Only one sampled subpopulation (Corang Trig area) had a small (10 mature individuals, estimated to be <1% of the subpopulation) number of mature individuals only partially scorched or unscorched and hence able to survive.*High severity fire* Surveys after the 2019–20 bushfires (DPE 2021) note that all subpopulations were burnt at ‘extreme’ fire severity. This may be related to pre-fire drought and subsequent dry fuels, and/or fire weather. Such fires leave few refugia where plants may survive. High fire severity may also impact the survival of seeds in woody fruits in the canopy of plants (Judd & Ashton 1991) or near the soil surface in a soil seed bank (Tangney et al. 2020). For two subpopulations (Sturgiss Mountain and 4 km NE of Corang Trig; see Table 1) no seedlings (or mature unburnt individuals) could be re-located after the 2019–20 bushfires, suggesting a loss of the seed bank (canopy or soil or both), or recruitment failure. All sites surveyed had dense regeneration of seedlings and resprouts of other species including other *Leptospermum* species.*Interactions between fire and drought*Gallagher (2020) notes the species was impacted by pre-fire drought. This can affect how fire behaves in the habitat, but also it may cause fruits in the canopy to dehisce and expose seeds to subsequent lethal heating in fires. |
| Climate change |
| Increased frequency of extreme temperatures, droughts and fire danger weather, and changes in precipitation | * Timing: current/ future
* Confidence: observed/inferred/ projected
* Likelihood: almost certain
* Consequence: major
* Trend: increasing
* Extent: across the entire range
 | ‘Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases’ is listed as a KTP under the EPBC Act (DEH 2001). The species occurs in the South East and Tablelands region where mean temperatures are projected to rise 0.7°C by 2030 and 2.0°C by 2070, with the greatest increase during spring and summer. Annual rainfall is projected to increase by 2030 during summer and autumn, and to decrease in spring and winter. The number of hot days (above 35°C) are projected to increase across the region by an average of three days per year by 2030, and an average of eight days by 2070. Severe fire weather is expected to increase during summer (peak fire risk season) and spring (peak prescribed burning season) by 2030 and decrease during autumn (Adapt NSW 2022). Time spent in drought (East Coast South) where *L crassifolium* occurs, is also projected, with medium confidence, to increase over the course of the century. Whilst increased intensity of extreme rainfall events is projected with high confidence (CSIRO 2022).*Drought*Drought in the 12 months preceeding the 2019–20 bushfires was projected to have overlapped with approximately 77% of the species’ modelled distribution (Gallagher 2022). The species’ restriction to rock crevices may make it sensitive to an increase in the severity, duration and frequency of droughts but more research is required. Droughts reduce the size of the seed bank and reduce seedling and adult survival (Choat et al. 2018).*Soil erosion*More frequent extreme weather events, such as heavy downpours (heavy rains in short period of time), are a major cause of soil erosion. This is due to the soil not absorbing the large amounts of water, leading to water flows across the surface taking a layer of topsoil with it. Seepage slopes where the species occurs (see Habitat section) have a higher risk of rainfall erosion, in comparison to flat terrain, and results in loss of the finest soil particles that contain most of the available nutrients and organic matter in the soil. Hillslope erosion in the South East and Tablelands region is predicted to increase by 1–15% in the next 60 years (Adapt NSW 2015).Surveys in 2021 (DPE 2021) noted localised erosion affecting plants along existing walking tracks in Corang Trig area subpopulation and Quilties Mountain subpopulation.  |
| Disease |
| Dieback and disease caused by *Austropuccinia psidii* (myrtle rust) and other diseases | * Timing: future
* Confidence: suspected
* Likelihood: possible
* Consequence: moderate
* Trend: unknown
* Extent: across the entire range
 | Myrtle rust is an introduced pathogen that infects a wide variety of Myrtaceae plant species causing severe dieback in susceptible species (Makinson et al. 2020). *Leptospermum crassifolium* is not known to be impacted by this disease, but other *Leptospermum* species are (Makinson et al. 2020) and *L. crassifolium* should be tested for susceptibility to myrtle rust.*Phytophthora cinnamomi* has been recorded in the roots of several symptomatic species at Corang Peak in Morton National Park, after the 2013 fire (e.g. *Persoonia mollis* (soft geebung), *Hakea teretifolia* (dagger hakea), *Patersonia* sp.). *Armillaria luteobubalina* (Australian honey fungus) has also been recorded in the roots of *Pultenaea baeuerlenii* (Budawangs bush-pea) before the 2013 fire. The susceptibility of *L. crassifolium* to either pathogen is unknown. Leptospermums are often not affected greatly by *P. cinnamomi* (though *L. continentale* is) and most woody species can probably be affected by *Armillaria* (K McDougall 2024. pers comm 28 March). |
| Habitat disturbance |
| Trampling, track maintenance | * Timing: current/ future
* Confidence: observed/
* Likelihood: likely
* Consequence: minor
* Trend: unknown
* Extent: across part of its range
 | A number of sites are on, adjacent to, or near, walking tracks in the Corang Trig area subpopulation. Most adverse impacts are likely to be localised, with large areas of habitat away from such disturbances. Any track maintenance will also impact plants in these sites. |
| Invasive species |
| Weeds | * Timing: current/ future
* Confidence: observed
* Likelihood: likely
* Consequence: minor
* Trend: unknown
* Extent: across part of its range
 | Weeds can invade, establish in, and outcompete native vegetation, particularly following disturbance events such as fires (Brown et al. 2016), reducing recruitment success. Some weed species were reported in surveys following the 2019–20 bushfires in Corang Trig area subpopulation (DPE 2021). These included *Hypochaeris radicata* (catsear) and *Conyza* sp. These weeds were only occasional and localised and are not a major threat at present. Although, they may have some local impacts on recruitment as they may compete with seedlings after fire. |

aTiming—identifies the temporal nature of the threat

Confidence—identifies the nature of the evidence about the impact of the threat on the species

Likelihood—identifies the likelihood of the threat impacting on the whole population or extent of the species

Consequence—identifies the severity of the threat

Trend—identifies the extent to which it will continue to operate on the species

Extent—identifies its spatial context in terms of the range of the species

bFire regimes that cause declines in biodiversity include the full range of fire-related ecological processes that directly or indirectly cause persistent declines in the distribution, abundance, genetic diversity or function of a species or ecological community. ‘Fire regime’ refers to the frequency, intensity or severity, season, and types (aerial/subterranean) of successive fire events at a point in the landscape

**Categories for likelihood are defined as follows:**

Almost certain – >90% chance that threat will have an impact on the species within the next 3 generations or 10 years, whichever is longer

Likely – 66–90% chance that threat will have an impact on the species within the next 3 generations or 10 years, whichever is longer

Possible – 33–66% chance that threat will have an impact on the species within the next 3 generations or 10 years, whichever is longer

Unlikely – <33% chance that threat will have an impact on the species within the next 3 generations or 10 years, whichever is longer

Unknown – probability that threat will have an impact on the species within the next 3 generations or 10 years, whichever is longer, could be 0–100%

**Categories for consequences are defined as follows:**

Catastrophic – affecting survival, reproduction or essential movement of individuals in >80% of the population or across >80% of the distribution within the next 3 generations or 10 years, whichever is longer

Major – affecting survival, reproduction or essential movement of individuals in 50-80 % of the population or across 50-80% of the distribution within the next 3 generations or 10 years, whichever is longer

Moderate – affecting survival, reproduction or essential movement of individuals in 20-50% of the population or across 20-50% of the distribution within the next 3 generations or 10 years, whichever is longer

Minor – affecting survival, reproduction or essential movement of individuals in 5-30% of the population or across 5-30% of the distribution within the next 3 generations or 10 years, whichever is longer

Not significant – affecting survival, reproduction or essential movement of individuals in <5% of the population or across <5% of the distribution within the next 3 generations or 10 years, whichever is longer

The risk matrix (Table 3) provides a visual depiction of the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are: the life stage they affect; the duration of the impact; the spatial extent, and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed in consultation with experts and using available literature.

Table 3 Risk Matrix

| Likelihood | Consequences |
| --- | --- |
| Not significant | Minor | Moderate | Major | Catastrophic |
| **Almost certain** |  |  |  | **Fire regimes that cause declines in biodiversity** **Increased frequency of extreme temperatures, droughts and fire danger weather, and changes in precipitation** |  |
| **Likely** |  | **Weeds** **Trampling, track maintenance** |  |  |  |
| **Possible** |  |  | **Dieback and disease caused by *Austropuccinia psidii* (myrtle rust)** **and other diseases** |  |  |
| **Unlikely** |  |  |  |  |  |
| **Unknown** |  |  |  |  |  |

Risk Matrix legend/Risk rating:

|  |  |  |  |
| --- | --- | --- | --- |
| Low Risk | Moderate Risk | High Risk | Very High Risk |

## Conservation and recovery actions

### Primary conservation objective

By 2034, the population of *L. crassifolium* will have increased in abundance and Extent of Occurrence (EOO) and Area of Occupancy (AOO) will have increased. The species will be sustained in habitats where threats are managed effectively.

### Conservation and management priorities

#### Fire impacts

* Develop and implement an appropriate fire management strategy across the species’ range.
	+ Avoid burning at high fire frequencies.
	+ The current recommended fire interval for the species is not known but will depend on the time it takes to replenish the seed bank (which may vary with fire severity and drought). As a precaution, sites burnt in the 2019–20 bushfires should be managed to exclude fire until at least 2033.
	+ Avoid burning from mid-autumn to late spring. This will avoid delayed and reduced germination responses and exposure of seedlings to desiccation in their first summer (see Miller et al. 2019).
* Avoid use of any fire retardants in habitat of the species. Use of fire retardants can lead to direct plant mortality and weed invasion, and it is also toxic to wildlife (Bell et al. 2005).

#### Climate change and severe weather impacts

* Investigate options for maintaining in situ persistence as the climate changes, for example by minimising other population pressures, enhancing resilience and promoting recruitment or supplementing existing subpopulations.

#### Habitat loss, disturbance and modifications impacts

* Avoid damaging plants in any track maintenance.
* Control and repair erosion damage that is impacting plants.

#### Invasive species impacts

* Control any weed incursions into and around known sites and suitable habitats, particularly in the disturbed subpopulation of Corang Trig area.

#### Disease impacts

* Investigate if the species is sensitive to dieback and disease caused by myrtle rust, *P.* *cinnamomi* and Australian honey fungus.
* Ensure phytosanitory guidelines are followed when visiting sites or doing track maintenance. Develop biosanitation protocols in accordance with national guidelines (see ‘Arrive Clean, Leave Clean’ (Department of Environment 2015)).

#### Ex situ recovery actions

* Develop and implement a targeted germplasm or seed collection program for ex situ seed banking, with sampling across the full range of the subspecies, following best-practice guidelines (Martyn Yenson et al. 2021).
* Investigate options for enhancing subpopulations that declined markedly after the 2019–20 bushfires (Sturgiss Mountain and 4 km NE of Corang Trig), that are thought to be very small through augmentation plantings with appropriate genetic diversity.
* Implement national translocation protocols (Commander et al. 2018) if establishing additional subpopulations or enhancing subpopulations is considered necessary and feasible.

### Stakeholder engagement/community engagement

* Support landholders and land managers to implement conservation and management actions.
* Support engagement of Traditional Owners in sharing knowledge and Caring for Country, including cultural burning, while ensuring the processes and protocols to record, store, and share any knowledge are agreed and appropriately resourced.

### Survey and monitoring priorities

* Maintain a monitoring program to:
	+ monitor subpopulations post-fire (including the 2019–20 bushfires), monitor recruitment (seedling survivorship), plant health/growth, time to maturity, magnitude of fecundity over time once plants reach maturity, rate of replenishment of the seed, plant longevity, seed viability and seed dispersal;
	+ determine trends in population size and to see if any plants recruit at the two subpopulations where there has been no observed recovery after the 2019–20 bushfires (Sturgiss Mountain and 4 km NE of Corang Trig);
	+ monitor for threats such as:
		- habitat degradation by recreational activities or other site disturbances;
		- adverse herbivory impacts, especially on seedling recruitment;
		- signs of disease and drought;
		- competition with other species that may limit recovery after fire.
	+ monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
* Conduct targeted population surveys to determine population size and demographics and the impacts of 2019–20 bushfires across the species range.

### Information and research priorities

* Conduct research into the life history and ecology of the species. This includes determining plant longevity, pollinators, recruitment processes, seed bank magnitude in relation to time since fire, seed bank viability and dynamics, and seed dispersal methods.
* Investigate the role of fire severity and heating in seed survival within canopy fruits.
* Test for the presence of myrtle rust and other diseases such as *P. cinnamomi* and Australian honey fungus in the habitat where the species occurs (habitat area of all known subpopulations) and include the species in susceptibility screening tests for the diseases.
* Work with Traditional Owners to gather, use and record Indigenous Ecological Knowledge practices, ensuring Indigenous Cultural Intellectual Property protocols are applied.

## Links to relevant implementation documents

[Fire regimes that cause declines in biodiversity (2022)](https://www.awe.gov.au/environment/biodiversity/threatened/key-threatening-processes/fire-regimes-that-cause-declines-in-biodiversity)

[Plant germplasm conservation in Australia: strategies and guidelines for developing, managing and utilising ex situ collections (2021)](https://anpc.asn.au/wp-content/uploads/2021/09/GermplasmGuidelinesThirdEdition_FINAL_210902.pdf)

[Guidelines for the translocation of threatened plants in Australia (2018)](https://www.anpc.asn.au/wp-content/uploads/2019/03/Translocation-Guidelines_FINAL-WEB2.pdf)

[Arrive clean, leave clean (2015)](https://www.awe.gov.au/sites/default/files/documents/arrive-clean-leave-clean.pdf)

[Morton and Budawang National Parks plan of management (2001)](https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Parks-reserves-and-protected-areas/Parks-plans-of-management/morton-budawang-national-parks-plan-of-management-010131.pdf/)

## Conservation Advice and Listing Assessment references

Cahill, D M, Rookes, J E, Wilson, B A, Gibson, L, and McDougall, K L.

2008. Phytophthora cinnamomi and Australia’s biodiversity:

impacts, predictions and progress towards control Australian

Journal of Botany, 56: 279–310

Adapt NSW (2022) [*South East and Tablelands climate change snapshot*](https://www.climatechange.environment.nsw.gov.au/projections-map). NSW Office of Environment and Heritage.

Adapt NSW (2015) [Soil erosion climate change impact snapshot](https://www.climatechange.environment.nsw.gov.au/sites/default/files/2021-06/Soil%20Erosion%20Climate%20Change%20Impact%20Snapshot.pdf). NSW Office of Environment and Heritage.

AIATSIS (1996) [The AIATSIS map of indigenous Australia](https://aiatsis.gov.au/explore/map-indigenous-australia). Accessed: 13 July 2022.

ALA (2022) [Atlas of Living Australia](http://www.ala.org.au).

Armstrong JA (1979) Biotic pollination mechanisms in the Australian flora — a review. *New Zealand Journal of Botany* 17, 467–5.

Auld TD, Mackenzie BDE, Le Breton T, Keith DA, Ooi MKJ, Allen S & Gallagher RV (2020) *A preliminary assessment of the impact of the 2019/2020 fires on NSW plants of national significance*. Unpublished report NSW Department of Planning Industry and Environment.

Bachman S, Moat J, Hill AW, de la Torre J & Scott B (2011) Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *Zookeys* 150, 117–126.

Bell T, Tolhurst K & Wouters M (2005) Effects of the fire retardant Phos-Chek on vegetation in eastern Australian heathlands. *International Journal of Wildland Fire* 14(2) 199–211.

Benson DH & McDougall L (2001) Ecology of Sydney plants: Part 8Dicotyledon families Rutaceae to Zygophyllaceae. *Cunninghamia* 7(2), 241–462.

Benson DH (1990) *Leptospermum*: Rare or threatened species in New South Wales. *Cunninghamia*. 2(2), 337–341.

Benson DH & McDougall L (1998) Ecology of Sydney plants: Part 6: Dicotyledon family Myrtaceae. *Cunninghamia* 5(4), 808–907.

Bionet (2022) [NSW Bionet Atlas records for *Leptospermum crassifolium*](https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/nsw-bionet). Accessed: 1 November 2022.

Brown K, Paczkowska G & Gibson N (2016). Mitigating impacts of weeds and kangaroo grazing following prescribed fire in a Banksia woodland. *Ecological Management and Restoration* 17, 133–139.

Buxton MN, Anderson BJ & Lord JM (2022) Moths can transfer pollen between flowers under experimental conditions. *New Zealand Journal of Ecology* 46(1), 1–5.

Choat B, Brodribb TJ, Brodersen CR, Duursma RA, López R & Medlyn BE (2018). Triggers of tree mortality under drought. Nature, 558, 531–539.

Commander LE, Coates D, Broadhurst L, Offord CA, Makinson RO & Matthes M (2018) [Guidelines for the translocation of threatened plants in Australia](https://www.anpc.asn.au/wp-content/uploads/2019/03/Translocation-Guidelines_FINAL-WEB2.pdf). Third Edition. *Australian Network for Plant Conservation*, Canberra. Accessed 3 May 2022.

CSIRO (2022) [Climate change in Australia, east coast south](https://www.climatechangeinaustralia.gov.au/en/projections-tools/regional-climate-change-explorer/sub-clusters/?current=ECSC&tooltip=true&popup=true).

DAWE (2022) *Fire regimes that cause declines in biodiversity as a key threatening process*, Department of Agriculture, Water and the Environment, Canberra.

DEH (Department of Environment and Heritage) (2001) *Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases – key threatening process*. Department of Environment and Heritage, Canberra.

Ferrer-Paris JR & Keith DA (2022) Fire Ecology Traits for Plants: A database for fire research and management. Version 1.00. Centre for Ecosystem Science, University of New South Wales, Sydney, Australia.

Fung HC & Waples RS (2017). Performance of IUCN proxies for generation length. *Conservation Biology* 31(4), 883–893.

Gallagher RV (2020) *National prioritisation of Australian plants affected by the 2019*–*2020 bushfire season*. Report to the Commonwealth Department of Agriculture, Water and Environment.

Gallagher RV (2022) Bushfire Expert Panel – Fire-affected plant species data. [https://doi.org/10.5281/zenodo.5908826](https://aus01.safelinks.protection.outlook.com/?url=https%3A%2F%2Fdoi.org%2F10.5281%2Fzenodo.5908826&data=04%7C01%7CCatarina.Martins%40environment.gov.au%7Cccc01e73f1fe42ecc95b08d9e158df05%7C78f05d85d6b34eeba5c3948d2dcdae8a%7C0%7C0%7C637788594073747893%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000&sdata=yQsdXndNg%2FjsvDWW7FU0g%2BqvrIpsSTi%2BjnLv06qNnQo%3D&reserved=0)

Gallagher RV, Allen S, Mackenzie BDE, Yates CJ, Gosper CR, Keith DA, Merow C, White MD, Wenk E, Maitner BS, He K, Adams VM & Auld TD (2021) High fire frequency and the impact of the 2019–2020 megafires on Australian plant diversity. *Diversity and Distributions* 27, 1166–1179.

IUCN (International Union for Conservation of Nature) (2022) [*Guidelines for Using the IUCN Red List Categories and Criteria*](http://www.iucnredlist.org/documents/RedListGuidelines.pdf). Version 15.1. Prepared by the Standards and Petitions Committee, International Union for the Conservation of Nature.

Judd TS & Ashton DH (1991) Fruit clustering in the Myrtaceae: seed survival in capsules subjected to experimental heating. *Australian Journal of Botany* 39, 241–245.

Makinson RO, Pegg GS & Carnegie AJ (2020) *Myrtle Rust in Australia – a National Action Plan.* Australian Plant Biosecurity Science Foundation, Canberra, Australia.

Martyn Yenson AJ, Offord CA, Meagher PF, Auld T, Bush D, Coates DJ, Commander LE, Guja LK, Norton SL, Makinson RO, Stanley R, Walsh N, Wrigley D, Broadhurst L (2021) [Plant Germplasm Conservation in Australia: strategies and guidelines for developing, managing and utilising ex situ collections](https://anpc.asn.au/wp-content/uploads/2021/09/GermplasmGuidelinesThirdEdition_FINAL_210902.pdf). Third edition. *Australian Network for Plant Conservation*, Canberra.

Miller RG, Tangney R, Enright NJ, Fontaine JB, Merritt DJ, Ooi MKJ, Ruthrof KX & Miller BP (2019) Mechanisms of fire seasonality effects on plant populations. *Trends in Ecology and Evolution* 34, 1104–1117.

Myerscough PJ (1998) Ecology of Myrtaceae with special reference to the Sydney region. *Cunninghamia* 5(4), 787 – 807.

NSW DPE SEED (2022) [SEED the central resource for sharing and enabling environmental data in NSW](https://geo.seed.nsw.gov.au/Public_Viewer/index.html?viewer=Public_Viewer&locale=en-AU). Accessed: 20 June 2022.

O’Brien SP (1992) *The comparative reproductive biology of two species of Leptospermum Forst. & Forst*. PhD Thesis, University of Melbourne.

PlantNET (The NSW Plant Information Network System) [Royal Botanic Gardens and Domain Trust](https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Leptospermum~crassifolium), Sydney (2022). Accessed on: 30 October 2022.

Tangney R, Merritt DJ, Callow JN, Fontaine JB & Miller BP (2020) Seed traits determine species' responses to fire under varying soil heating scenarios. *Functional Ecology* 34, 1967–1978.

Thompson J (1989) A revision of the genus *Leptospermum* (Myrtaceae). *Telopea*3(3), 301–449.

### Other sources

DPE (2021) NSW Department of Environment. Post-fire survey data for *Leptospermum crassifolium.*

D Keith (2023) Personal communication by email, 24 November 2023. University of New South Wales.

K McDougall (2024) Personal communication by email, 28 March 2024. La Trobe University.

T Auld (2023) Personal communication by email, 20 October 2023. Department of Planning and Environment.

## Attachment A: Listing Assessment for *Leptospermum crassifolium*

### Reason for assessment

The bushfires that burnt more than 10.3 million hectares across southern and eastern Australia in 2019–20 severely impacted native plants, ecosystems, wildlife and habitat. This created an urgent need for hundreds of species and ecological communities (ECs) to be assessed against EPBC Act criteria for threatened listing status, so that the recovery and future resilience of fire-affected species and ECs could be supported by statutory protection commensurate with their post-fire status, and to ensure EPBC Act lists are as current and accurate as possible, helping improve environmental resilience and preparedness for future fire events.

As part of the Australian Government’s bushfire response the Department engaged scientific experts to deliver a number of Species Expert Assessment Plans (SEAPs) for groups of fire-affected and non-fire affected species and ECs, to enable hundreds of species and ECs to be assessed against EPBC Act criteria for threatened listing status and improve the currency of EPBC Act lists in a timely manner.

This assessment follows evaluation of the conservation status of the species through the SEAP project.

### Assessment of eligibility for listing

This assessment uses the criteria set out in the [EPBC Regulations](https://www.dcceew.gov.au/sites/default/files/env/pages/d72dfd1a-f0d8-4699-8d43-5d95bbb02428/files/tssc-guidelines-assessing-species-2021.pdf). The thresholds used correspond with those in the [IUCN Red List criteria](https://www.iucnredlist.org/resources/categories-and-criteria) except where noted in Criterion 4, sub-Criterion D2. The IUCN criteria are used by Australian jurisdictions to achieve consistent listing assessments through the Common Assessment Method (CAM).

### Key assessment parameters

Table 4 includes the key assessment parameters used in the assessment of eligibility for listing against the criteria. The definition of each of the parameters follows the [Guidelines for Using the IUCN Red List Categories and Criteria](https://www.iucnredlist.org/resources/redlistguidelines).

Table 4 Key assessment parameters

| Metric | Estimate used in the assessment | Minimum plausible value | Maximum plausible value | Justification |
| --- | --- | --- | --- | --- |
| ****Number of mature individuals**** | 13,100 | 3900 | 22,300 | During 2021 post-fire surveys, the Corang Trig area subpopulation was estimated to have 131,000 (± 29,080) seedlings and 10 unburnt mature individuals, the Quilties Mountain subpopulation had a much smaller number of seedlings (53) while no plants could be found at the other two known subpopulations (Sturgiss Mountain and 4km NE Corang Trig area) (DPE 2021). Assuming a low seedling survival of 10%, given the high density of seedlings observedat Corang Trig area, (the site with the significant majority of seedlings (Table 1)), there is predicted to be 13,100 mature individuals once seedlings mature (see Population size for more details).The minimum and maximum plausible values are the lower and upper bound seedling estimates based on the large confidence interval determined (95% confidence interval; see Population size section for calculations) at the Corang Trig area subpopulation and applying the same survival rate of 10%. |
| ****Trend**** | Declining | No plants could be found at two of the four known subpopulations after the 2019–20 bushfires (DPE 2021), suggesting the number of mature individuals is likely to be declining. The other two subpopulations where seedlings were surveyed are likely stable, as mass seedling recruitment has been observed in one of them. |
| ****Generation time (years)**** | 10–20 | 10–20 | 10–20 | The species in an obligate seeder and could have a life span of 20–50 years based on other *Leptospermum* species (Benson & McDougall 1998; Ferrier-Paris & Keith 2022). Time to first flowering is unknown but could be more than 5-7 years in other *Leptospermum* species (Benson & McDougall 1998). Coarse estimates of generation length were calculated using the formula recommended by the IUCN Guidelines (2022), with z (reproductive output) = 0.3 (Fung & Waples 2017): primary juvenile period + [z \* length of reproductive period]:5 + [0.3\*(20-5)] = 10 years7 + [0.3\*(50-7)] = 20 years |
| Extent of occurrence (****EOO)**** | 24 km2 | 16 km2 | >24 km2 | Extent of occurrence was calculated by fitting a minimum convex polygon around all confirmed records as per IUCN guidelines (IUCN 2022). Extent of occurrence is estimated as equal to AOO as per IUCN Guidelines (2022) on the basis that the EOO cannot be smaller than AOO by definition. The estimate used in this assessment assumes four subpopulations are extant. The minimum plausible value excludes the two subpopulations where plants were not relocated after the 2019–20 bushfires.  |
| ****Trend**** | Contracting | No plants could be found at two of the four known subpopulations after the 2019–20 bushfires (DPE 2021). |
| ****Area of Occupancy (AOO)**** | 24 km2 | 16 km2 | >24 km2 | **Area of Occupancy** was calculated using a 2 x 2 km grid as per IUCN guidelines (IUCN 2022). The estimate used in this assessment assumes four subpopulations are extant. The minimum plausible value excludes the two subpopulations where plants were not relocated after the 2019–20 bushfires.  |
| **AOO is a standardised spatial measure of the risk of extinction, that represents the area of suitable habitat known, inferred or projected to be currently occupied by the taxon. It is estimated using a 2 x 2 km grid to enable comparison with the criteria thresholds.** **The resolution (grid size) that maximizes the correlation between AOO and extinction risk is determined more by the spatial scale of threats than by the spatial scale at which AOO is estimated or shape of the taxon's distribution. It is not a fine-scale estimate of the actual area occupied. In some cases, AOO is the smallest area essential at any stage to the survival of existing subpopulations of a taxon (e.g. breeding sites for migratory species).** For further information see IUCN Standards and Petitions Committee (2023). |
| ****Trend**** | Contracting | No plants could be found at two of the four known subpopulations after the 2019-20 bushfires (DPE 2021). |
| ****Number of subpopulations**** | 4 | 2 | Unknown | There are four known subpopulations (Table 1). The minimum estimate excludes the two subpopulations where no plants could be found during surveys after the 2019–20 bushfires.  |
| ****Trend**** | Declining | No plants could be found at two of the four known subpopulations after the 2019–20 bushfires (DPE 2021). |
| ****Basis of assessment of population number**** | See justification for number of subpopulations.  |
| ****No. locations**** | 1 | 1 | 1 | All subpopulations were burnt in the 2019–20 bushfires and no plants could be found at two of the four known subpopulations after the 2019–20 bushfires (DPE 2021). There is considered to be one location based on the threat of high fire frequency and high fire severity. Any undiscovered subpopulations were also likely to have been burnt in the 2019–20 bushfires, given the fires burned over all likely habitat for the species. |
| ****Trend**** | Unknown | There are insufficient data to determine whether there has been any change in the number of locations. |
| ****Basis of assessment of location number**** | See justification for number of locations.  |
| ****Fragmentation**** | The largest subpopulation around Corang Trig area appears to be viable (capable of producing viable offspring that have reached maturity or are likely to do so), however the viability of the other subpopulations is unknown. No plants could be located at two subpopulations after the 2019–20 bushfires. Any sites that are lost are unlikely to be able to be recolonised due to the limited seed dispersal distance in the species. Currently it is not known if the species is severely fragmented.  |
| ****Fluctuations**** | It is not known if the species undergoes extreme fluctuations.  |

Criterion 1 Population size reduction (*IUCN Criterion A*)

|  |
| --- |
| Reduction in total numbers (measured over the longer of 10 years or 3 generations) based on any of A1 to A4 |
| – | **Critically Endangered****Very severe reduction** | **Endangered****Severe reduction** | **Vulnerable****Substantial reduction** |
| **A1** | ≥ 90% | ≥ 70% | ≥ 50% |
| **A2, A3, A4** | ≥ 80% | ≥ 50% | ≥ 30% |
| **A1** Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.**A2** Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.**A3** Population reduction, projected, inferred or suspected to be met in the future (up to a maximum of 100 years) [(*a) cannot be used for A3*]**A4** An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible. | Based on any of the following | (a) direct observation [except A3](b) an index of abundance appropriate to the taxon(c) a decline in AOO, EOO and/or quality of habitat(d) actual or potential levels of exploitation(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites |

Source:IUCN Red List Criteria used to evaluate if taxon is eligible to be included in a IUCN Red List threatened category (Critically Endangered, Endangered or Vulnerable).

### Criterion 1 evidence

**Insufficient data to determine eligibility**

#### Generation length

Given the considerable uncertainty around key life history traits of *L. crassifolium*, coarse estimates of generation length were calculated using the formula recommended by the IUCN Guidelines (2022) (see Table 4) giving a generation time estimate of 10–20 years and

an estimated three-generation period of approximately 30–60 years. Given the lack of information on the species’ biology, the actual generation length may be substantially longer or shorter than identified here. Therefore, this estimate requires further investigation in the field.

#### Population trends prior to 2019–20 bushfires

There has been no known past survey effort before the 2019–20 bushfires, therefore it is not possible to determine a rate of decline and whether population estimates represent changes in population size of *L. crassifolium.*

#### Conclusion

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this Criterion.

The purpose of this consultation document is to elicit additional information to better understand the species’ status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 2 Geographic distribution as indicators for either Extent of Occurrence AND/OR Area of Occupancy (*IUCN Criterion B*)

|  |
| --- |
|  |
| – | **Critically Endangered****Very restricted** | **Endangered****Restricted** | **Vulnerable****Limited** |
| **B1.** Extent of Occurrence (EOO) | **< 100 km2** | **< 5000 km2** | **< 20,000 km2** |
| **B2.** Area of Occupancy (AOO) | **< 10 km2** | **< 500 km2** | **< 2000 km2** |
| **AND at least 2 of the following 3 conditions:** |
| (a) Severely fragmented OR Number of locations | **= 1** | **≤ 5** | **≤ 10** |
| (b) Continuing decline observed, estimated, inferred or projected in any of: (i) EOO; (ii) AOO; (iii) area, extent and/or quality of habitat; (iv) number of locations or populations; (v) number of mature individuals |
| (c) Extreme fluctuations in any of: (i) EOO; (ii) AOO; (iii) number of locations or populations; (iv) number of mature individuals |

Source:IUCN Red List Criteria used to evaluate if taxon is eligible to be included in an IUCN Red List threatened category (Critically Endangered, Endangered or Vulnerable).

### Criterion 2 evidence

**Eligible under Criterion 2** **B1ab(i,ii,iii,iv,v)** **for listing as Critically Endangered**

#### Extent of Occurrence (EOO) and Area of Occupancy (AOO)

The Kew Geospatial Conservation Assessment Tool (GeoCAT; Bachman et al. 2011) was used to calculate EOO and AOO. Extent of Occurrence is based on a minimum convex hull polygon encompassing all cleaned records of the species as recommended by IUCN (2022). Extent of occurrence is estimated as equal to AOO as per IUCN Guidelines (2022) on the basis that the EOO cannot be smaller than AOO by definition (IUCN 2022). The AOO is estimated to be 24 km2 based on the species records occupying six 2 x 2 km grid cells as per IUCN Guidelines (2022).*Leptospermum crassifolium* meets the thresholds for Critically Endangered for EOO (<100 km2) and Endangered for AOO (<500 km2), respectively.

#### Severe fragmentation

The largest subpopulation around Corang Trig area appears to be viable, the viability of the other subpopulations are unknown. No plants could be located in two populations following the 2019–20 bushfires. Currently it is not known if the species is severely fragmented.

#### Number of locations

All subpopulations were burnt in the 2019–20 bushfires and no plants could be found at two of the four known subpopulations after the 2019–20 bushfires (DPE 2021). There is considered to be one known location based on the threats of high fire frequency and high fire severity, given evidence that all subpopulations burnt in the same fire event in 2019–20 (Table 1). Any additional undiscovered subpopulations were also likely to have been burnt in 2019–20 bushfires given they burnt over the entire likely habitat area for the species.

#### Continuing decline

*Leptospermum crassifolium* is threatened by fire regimes that cause declines to biodiversity, climate change (drought and soil erosion), localised trampling near tracks, track maintenance impacts and some weed impacts.

The entire distribution of the species was burnt in 2019–20 bushfires (Gallagher 2020). At two subpopulations (see Table 1) no seedlings (or mature unburnt individuals) could be re-located, suggesting the loss of the seed bank (canopy and/or soil) and recruitment failure. Furthermore, there is evidence of frequent fire across the species range, with any fire intervals of less than 10–15 years expected to lead to declines (see Table 1 and 2) due to the species’ primary juvenile period likely being more than 5–7 years (see reproductive ecology section). ‘Extreme’ fire severity, possibly due to pre-fire drought, fire weather and dry fuels, was also observed during the 2019–20 bushfires, impacting the survival of seeds in woody fruits in the canopy of plants (Judd & Ashton 1991) or near the soil surface in a soil seed bank (Tangney et al. 2020). Climate change resulting in increasing drought events is also considered to be a threat leading to continuing decline since droughts reduce the size of the seed bank and reduce seedling and adult survival (see Table 2). This has led to a contraction of EOO, AOO and number of subpopulations. Identified threats to the species are also likely to reduce habitat quality due to changes in habitat structure and composition as a consequence of altered fire regimes, climate change, trampling and weed excursion.

Therefore, continuing decline is observed in EOO, AOO and number of populations, and inferred in area, extent and/or quality habitat, and number of mature individuals.

#### Conclusion

The Committee considers that the species’ geographic distribution (EOO) and number of locations are very restricted and continuing decline is observed and inferred in EOO, AOO, area, extent and/or quality habitat, number of populations, and number of mature individuals. Therefore, the species has met the relevant elements of Criterion 2 to make it eligible for listing as Critically Endangered.

The purpose of this consultation document is to elicit additional information to better understand the species’ status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 3 Population size and decline (*IUCN Criterion C*)

|  |
| --- |
|  |
| – | **Critically Endangered****Very low** | **Endangered****Low** | **Vulnerable****Limited** |
| Estimated number of mature individuals | **< 250** | **< 2500**  | **< 10,000**  |
| AND either (C1) or (C2) is true |  |  |  |
| **C1.** An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future) | **Very high rate****25% in 3 years or 1 generation****(whichever is longer)** | **High rate****20% in 5 years or 2 generation****(whichever is longer)** | **Substantial rate****10% in 10 years or 3 generations****(whichever is longer)** |
| **C2.** An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival1 based on at least 1 of the following 3 conditions: |  |  |  |
| (a) | (i) Number of mature individuals in each population  | **≤ 50** | **≤ 250** | **≤ 1000** |
| (ii) % of mature individuals in one population = | **90 – 100%** | **95 – 100%** | **100%** |
| (b) Extreme fluctuations in the number of mature individuals |  |  |  |

1 The IUCN Red List Criterion C does not allow for the provision for ‘geographic distribution is precarious for its survival’. The corresponding Criterion 3 in the EPBC Regulations currently includes the provision for considering the geographic distribution impact on the survival of the species.

### Criterion 3 evidence

**Not eligible**

#### Number of mature individuals

The total number of mature individuals from the Corang Trig Area subpopulation alone is estimated to be around 13,100 although there is uncertainty in this estimate and the minimum plausible value (3900 mature individuals) is well within the threshold for Vulnerable status (see Population size section; Table 1 and 4). The number of mature individuals might be limited, but is not considered as such for the purpose of this assessment.

#### C1. Rate of continuing decline

There are insufficient data to assess the rate or magnitude of any declines in the number of mature individuals.

#### C2. Continuing decline and population abundance/distribution

Continuing decline is inferred in the number of mature individuals (see Criterion 2).

#### C2a(i) Number of mature individuals in each population

There is estimated to be >1000 plants in one subpopulation (13,100; see Table 4).

#### C2a(ii) Percentage of mature individuals in one population

The percentage of mature individuals in each subpopulation is unknown since plants were only found in two out of the four subpopulations. Although most mature individuals are estimated to be in one subpopulation (Corang Trig area; see Table 1), this accounts for less than 100% and therefore this subcriterion is not met.

**C2b. Extreme fluctuations**

It is not known if the species undergoes extreme fluctuations.

#### Conclusion

The estimated total number of mature individuals of this species might be limited (within the lower plausible bound of the estimate); however, the necessary subcriteria are not met. Therefore, the species has not met the required elements of this Criterion.

The purpose of this consultation document is to elicit additional information to better understand the species’ status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 4 Number of mature individuals (*IUCN Criterion D*)

|  |
| --- |
|  |
| – | **Critically Endangered****Extremely low** | **Endangered****Very Low** | **Vulnerable****Low** |
| **D.** Number of mature individuals | < 50 | < 250 | < 1000 |
| **D2.**1 *Only applies to the Vulnerable category*Restricted AOO or number of locations with a plausible future threat that could drive the species to Critically Endangered or Extinct in a very short time | - | - | D2. Typically: AOO < 20 km2 or number of locations ≤ 5 |

1 The IUCN Red List Criterion D allows for species to be listed as Vulnerable under Criterion D2. The corresponding Criterion 4 in the EPBC Regulations does not currently include the provision for listing a species under D2. As such, a species cannot currently be listed under the EPBC Act under Criterion D2 only. However, assessments may include information relevant to D2. This information will not be considered by the Committee in making its recommendation of the species’ eligibility for listing under the EPBC Act, but may assist other jurisdictions to adopt the assessment outcome under the [*common assessment method*](http://www.environment.gov.au/biodiversity/threatened/cam).

### Criterion 4 evidence

**Not eligible**

#### Number of mature individuals

The estimated total number of mature individuals from the Corang Trig Area subpopulation alone is around 13,100 (see population size section; Table 1 and 4). The minimum plausible value is 3900. The number of mature individuals is not considered low.

The Committee considers that the number of locations is ≤5, and there is a plausible future threat that could drive the species to Critically Endangered or Extinct in a very short time. However, EPBC regulations do not currently include provisions for listing species under subcriterion D2 (see 1).

#### Conclusion

The species does not meet the thresholds for listing in any category under Criterion 4 D. Therefore, the species has not met this required element of this Criterion.

The purpose of this consultation document is to elicit additional information to better understand the species’ status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

Criterion 5 Quantitative analysis (*IUCN Criterion E*)

|  |
| --- |
|  |
| – | **Critically Endangered****Immediate future** | **Endangered****Near future** | **Vulnerable****Medium-term future** |
| **Indicating the probability of extinction in the wild to be:**  | **≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)** | **≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)** | **≥ 10% in 100 years**  |

Source:IUCN Red List Criteria used to evaluate if taxon is eligible to be included in an IUCN Red List threatened category (Critically Endangered, Endangered or Vulnerable).

### Criterion 5 evidence

**Insufficient data to determine eligibility**

Population viability analysis has not been undertaken. Therefore, there is insufficient information to determine the eligibility of the species for listing in any category under this Criterion.

The purpose of this consultation document is to elicit additional information to better understand the species’ status. This conclusion should therefore be considered to be tentative at this stage, as it may be changed as a result of responses to this consultation process.

### Adequacy of survey

The survey effort has been considered adequate and there is sufficient scientific evidence to support the assessment.

### Public consultation

Notice of the proposed amendment and a consultation document is made available for public comment for a minimum of 30 business days. Any comments received relevant to the survival of the species are considered by the Committee as part of the assessment process.

### Listing and Recovery Plan Recommendations

A decision about whether there should be a Recovery Plan for this species has not yet been determined. The purpose of this consultation document is to elicit additional information to help inform the decision.

© Commonwealth of Australia 2024 

**Ownership of intellectual property rights**

Unless otherwise noted, copyright (and any other intellectual property rights) in this publication is owned by the Commonwealth of Australia (referred to as the Commonwealth).

**Creative Commons licence**

All material in this publication is licensed under a [Creative Commons Attribution 4.0 International Licence](https://creativecommons.org/licenses/by/4.0/legalcode) except content supplied by third parties, logos and the Commonwealth Coat of Arms.

Content published on the department website, including Conservation Advices, are subject to these copyright terms**:** <https://www.dcceew.gov.au/about/copyright>. [Contact us](https://www.dcceew.gov.au/about/contact) to request permission to use material for purposes outside the terms stated on the website or on the material.

**Cataloguing data**

This publication (and any material sourced from it) should be attributed as: Department of Climate Change, Energy, the Environment and Water 2024, Conservation Advice for *Leptospermum crassifolium*, Canberra. 

This publication is available at the [SPRAT profile for Leptospermum crassifolium](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=21812).

Department of Climate Change, Energy, the Environment and Water

GPO Box 3090, Canberra ACT 2601

Telephone 1800 920 528

Web [dcceew.gov.au](http://agriculture.gov.au/)

The Australian Government acting through the Department of Climate Change, Energy, the Environment and Water has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Climate Change, Energy, the Environment and Water, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.

**Acknowledgements**

The Threatened Species Scientific Committee and the Department of Climate Change, Energy, the Environment and Water acknowledge the contributions of Prof. Tony Auld, Centre for Ecosystem Science, University of New South Wales, in preparing this document.