



SAVING OUR SPECIES

Bega Wattle

(Acacia georgensis)

2018–19 survey



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Executive summary

Bega wattle (*Acacia georgensis*) is a threatened plant that can grow as an erect or spreading shrub or as a tree up to 25 metres high, depending on the site conditions where it is growing. It is endemic to the NSW south coast and occurs between the coastal escarpment and the coastline. The northern-most site is 40 kilometres west of Narooma with the southern-most record at the Towamba River, west of the town of Burragate (Map 1). It grows on rocky sites ranging from clifftops to lower slopes in areas with shallow soils. This species is known to occur in national parks, flora reserves and on Crown land.

Prior to this survey, the extent and recorded locations of Bega wattle had not been compiled and checked since the 2002 recovery plan for the species (NPWS 2002). As part of the *Saving our Species* (SoS) program this Keep Watch species was targeted for an updated survey. A Keep Watch species is defined under the SoS program as a species that requires no immediate action to protect it. Sixteen of 29 sites were surveyed with nine permanent plots and one photopoint plot established across the species' range. One of these sites was a new population found in June 2019. Seed was collected from one site and is now stored at the Australian Plant Bank at Mount Annan. One specimen was collected and is held at the Australian National Herbarium (Table 2, Appendix B).

Few threats were recorded in the wild populations, but fires in the 2017–18 season burnt a number of the known sites. The impact of frequent fire on this species remains unknown, so survey of the fire-affected areas will be required to determine how long these populations take to recover after such a disturbance. Deer activity was also recorded in Bega wattle habitat, and although not directly impacting at present, it may be a potential future threat.

Based on the results of this survey, it is recommended that the Bega wattle remains in the Keep Watch management stream of the SoS program. The sites should be re-surveyed in 2023–24, to ensure the populations remain stable and the long-term survival of this species is assured, particularly as a number have been impacted by fire. Also, a survey of some of the 13 sites not surveyed in 2018–19 should be included in any 2023–24 work.

1. Background

Bega wattle (*Acacia georgensis*) is an erect or spreading shrub or tree that can grow up to 25 metres high. It has deeply fissured brown bark, 'leaves' (phyllodes) are stiff and curved, 7–17 centimetres long, 15–30 millimetres wide. Flower heads are in long spikes, golden-yellow in colour, and appear singly or in pairs. The pods are more or less straight and flat 2–7 centimetres long and 3–4 millimetres wide. Flowers appear between August and October (NSW Threatened Species Database, OEH 2018). Seeds are black, elliptical, shiny and hard, to 4.5 millimetres long; they hang when ripe from the open pod on cream or orange-fawn arils (NPWS 2002).

Bega wattle occurs on the NSW far south coast between the coastal escarpment and the coastline, with the northern-most populations 40 kilometres west of Narooma and southern-most near Burragate (Map 1). Early records indicated the species was confined to rocky outcrops on mountain tops and coastal sites. More recent records have found it on lower slopes though still in areas with very shallow soils. Populations occur between 10 metres and 500 metres elevation. The species is protected in Wadbilliga, Bournda and South East Forest national parks, Tanja Flora Reserve, and there is one site on Crown land.

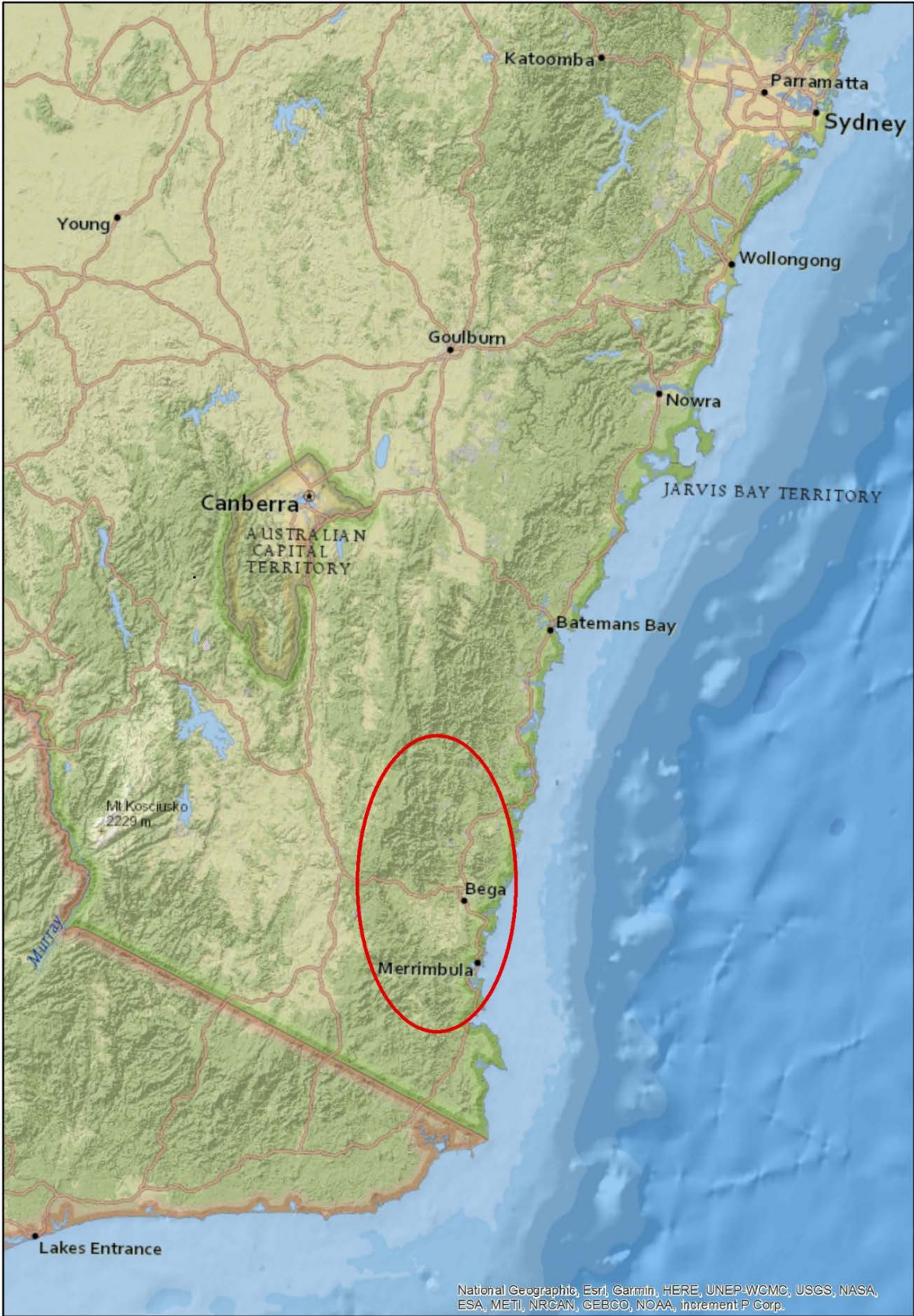
Bega wattle is endemic to the NSW south coast and was first collected by William Francis in 1913. Born in Bega in 1889, he was employed as a botanical collector from 1919 to 1954 by the Queensland Herbarium. This first collection was not processed and included in the herbarium until 2002 (some 90 years later). From the description, the most likely location of this collection was from the Kianinny area south of Tathra, still an extant population of the species today.



Photo 1 *Acacia georgensis* in fruit, image of a cultivated plant in Bega, 29 June 2006
Photo: J Miles

The species was first described in 1980 from the population at Dr George Mountain (Tindale 1980), as the 1919 collection by William Francis from 'Tathra, Bega district' at this time was still unknown. The Dr George Mountain site was the only known location of this species until 1983–84, when single populations were located in Wadbilliga National Park to the north (no precise location data), and a more recent collection was made at Bournda National Park (Kianinny Bay) to the south. All herbarium records of this species up until 2000 were collected from these three sites (Table 1, Appendix B). In the mid to late 1990s, several more populations of the species were located within two kilometres of the Kianinny site, but in 1997 a new record from Towamba River in South East Forests National Park extended the southern distribution limit by 30 kilometres.

In 2001 a survey was conducted that focused on the northern populations of the Bega wattle in Wadbilliga and South East Forests national parks (Miles 2001). This survey confirmed previous records and increased the number of known sites for the species in these areas. The work included recording full floristics in a series of 20 x 20 metre plots that provided baseline data for future monitoring. These data were also used in the *Recovery Plan for Threatened Flora of Rocky Outcrops in South Eastern New South Wales* (NPWS 2002) in which the Bega wattle is included. Since the 2001 surveys new populations were found in two areas: Tanja Flora Reserve, five kilometres north-east of Tathra, and in Bournda National Park, above Bournda Lagoon. Prior to this survey there were four main localities for the species, containing 28 sites (Map 2). A population estimate for the species in 2002 was 15,000 plants (NPWS 2002), which did not include the more recently discovered sites near Tathra. However, in 2018 fire impacted sites in two of the four known localities, which has decreased the number of mature *Acacia georgensis* within the species' range.



Map 1 *Acacia georgensis* extent in south-east New South Wales, April 2019
Map: G Wright/DPIE

2. Purpose

Acacia georgensis is listed as vulnerable under both the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. The species is currently assigned to the Keep Watch management stream in the *Saving our Species (SoS)* program. As part of that program, the priority action for this species is that it be monitored regularly to detect any possible change to its status. The last survey was done in 2001 (18 years ago); this current survey was conducted to check a subset of known records to ensure the species is still assigned to the appropriate category.

Where possible, herbarium specimens were collected to substantiate unvouchered distribution records, and seed collections made to safeguard the species in the longer term.

The objectives of the current survey were to:

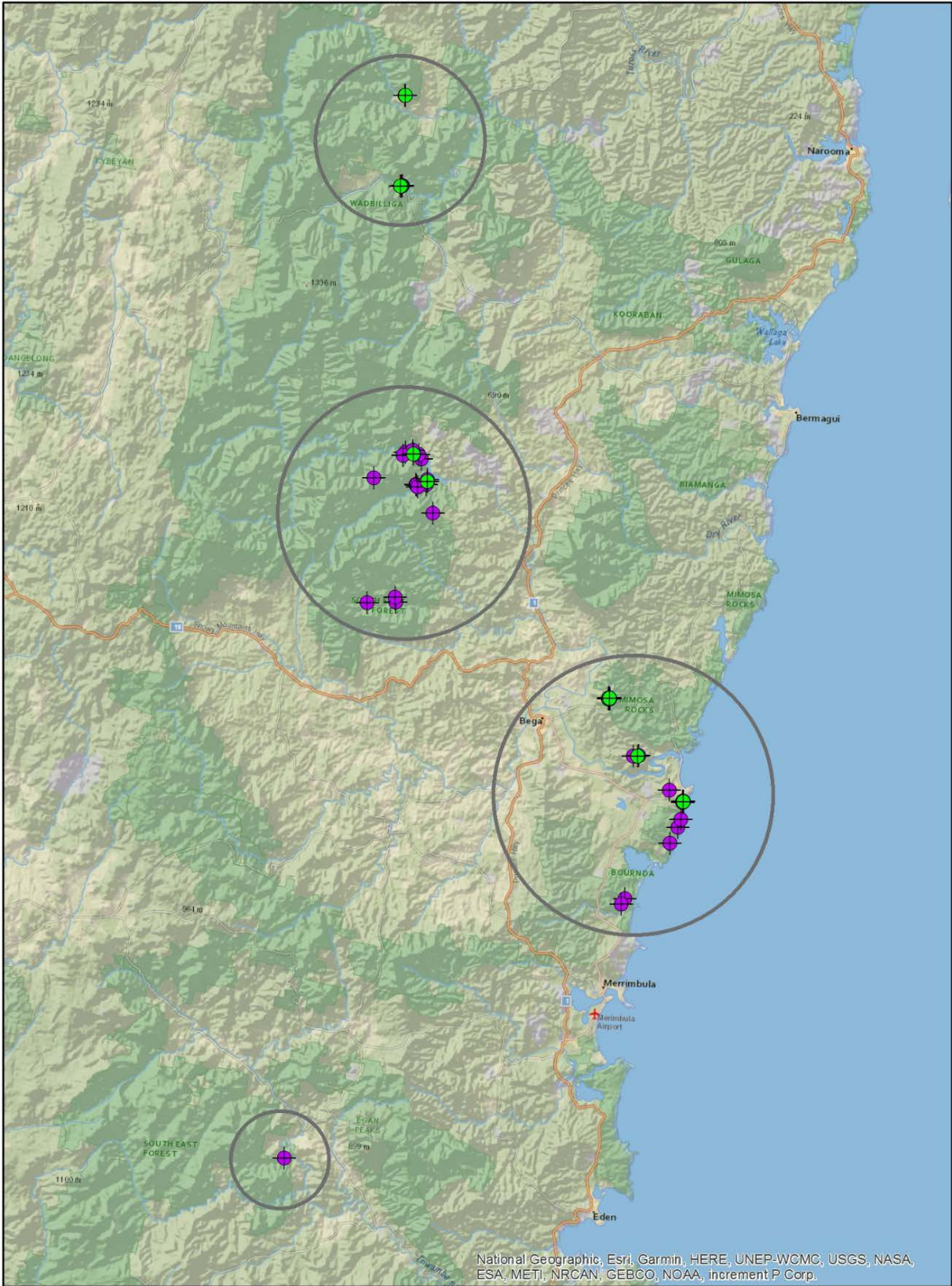
- establish and/or re-survey 20 x 20 metre plots within the species' range, recording full floristics and diameter at breast height (DBH) of all *Acacia georgensis* within the plot to provide baseline data for future monitoring
- re-locate plants at sites where previously recorded
- record habitat type
- identify current or potential threats
- collect herbarium specimens
- collect seed if available
- record any other ecological observations.

This document reports on surveys conducted between November 2018 and April 2019 across the geographic range of the species in south-east NSW.



Photo 2 *Acacia georgensis* post-fire seedling, with diagnostic hairs on leaf margins and phyllodes
Photo: G Wright/DPIE

Bega wattle (*Acacia georgensis*) 2018–19 survey



- Australian Virtual Herbarium (AVH) records
- BIONET records

Map 2 *Acacia georgensis*, four localities in the south coast region, April 2019
Map: G Wright/DPIE

3. Survey method

The 2018–19 survey work was undertaken in Wadbilliga, Bournda and South East Forests national parks, Tanja Flora Reserve, Tathra Forest Wildlife Reserve and one Crown land site from November 2018 through to April 2019. It was conducted over a six-month period and of the 15 sites surveyed, 14 had extant populations.

Prior to survey, an ArcGIS layer was developed using BioNet and Australian Virtual Herbarium (AVH) records (extracted August 2018) and during this process records that were not accurately located were moved to their correct location. This cleaned data layer was used to examine the spatial distribution of the species and to identify key populations to survey.

Sixteen *A. georgensis* sites were surveyed and at nine of these a single permanent 20 x 20 metre plot was established. Within each of these, full floristics and cover of all species was recorded and the total number of *A. georgensis* counted. For larger *A. georgensis* plants a DBH measurement was recorded. Corner posts of each plot were used for photopoints and a minimum of two images were taken at each plot. At the Towamba River site in South East Forests National Park the terrain is steep and rocky, so a permanent photopoint was established rather than a plot.

The 2001 surveyed plots provided a focal point for the establishment of permanent 20 x 20 metre plots. Every effort was made to re-locate and use the same site, but this was difficult as no images had been taken and there were no permanent markers. Of the nine permanent plots established, five were located as close to the 2001 plots as possible (Plots 1–5).

The Yankees Gap 2018 wildfire and associated backburns burnt *A. georgensis* populations within Wadbilliga and South East Forests national parks. Plots were established in four of these sites (Plots 3, 4, 5 & 6, Appendix A). The Tanja Flora Reserve also had a wildfire in March 2018, which burnt both *A. georgensis* populations that occur within the reserve. A plot was established in one of the two known sites (Plot 7, Appendix A), but both areas were surveyed post-fire.

For all 15 sites surveyed with *A. georgensis* present, habitat, associated species and potential threats were recorded, but total population counts were not completed due to time constraints and difficult terrain. Seed and herbarium specimens were collected when possible.

A number of ecological observations were made which are documented in the following section.

4. Ecological observations

4.1 Fire response

Both sites with *Acacia georgensis* in Tanja Flora Reserve were burnt in a high-intensity wildfire in March 2018. The majority of adult *A. georgensis* plants within this population were impacted by the burn. These plants had no sign of vegetative re-sprouting and all affected plants were dead (Plot 7, Appendix A). Close inspection found seedlings coming up in the area around these dead adult plants (Photo 3).

In Wadbilliga National Park (Plot 4, Appendix A), burnt in September 2018, *A. georgensis* seedlings had established two months post-fire. Observations during a second visit to this same site recorded *A. georgensis* having multiple recruitment events post-fire (Photo 4) and one *A. georgensis* re-sprouting after fire, although this was the only plant seen responding this way in all the surveys completed in burnt *A. georgensis* stands (Photo 5). The fire at this site was a low to moderate intensity backburn and some mature *A. georgensis* that had no crown scorch survived.



Photo 3 *Acacia georgensis* seedling observed in burnt area after the Tathra wildfire. Image taken eight months after fire, 15 November 2018
Photo: G Wright/DPIE



Photo 4 *Acacia georgensis* seedlings observed in burnt area after the Wadbilliga fire, showing more than one post-fire germination event. Image taken six months after fire, 10 April 2019
Photo: G Wright/DPIE



Photo 5 *Acacia georgensis* after the Wadbilliga fire, re-sprouting from base. Image taken six months after fire, 10 April 2019
Photo: G Wright/DPIE

In both the Wadbilliga and Tanja burnt areas the *A. georgensis* seedlings showed signs of browsing impacts. Only macropod scats were evident within the vicinity of this activity, so it is assumed wallabies and wombats would have been the main browsers (Photo 6). The impact of this activity on the recovery of *A. georgensis* at these sites is unknown, but not all plants were browsed, indicating some should reach maturity.



Photo 6 *Acacia georgensis* browsed seedling, 12 months after Tathra wildfire, 15 March 2019
Photo: G Wright/DPIE

4.2 Age structure

Age structure was variable among the unburnt sites surveyed. The northern Kianinny site (Plot 8, Appendix A) appeared to be even aged and presumably established after a high-intensity wildfire that killed all the adult plants. The northern-most site at 'Belowra' (Plot 1, Appendix A) had no apparent recruitment, mature plants of variable ages, and evidence of the loss of a number of mature adult plants since the 2001 survey. The sites on Bourkes Road, Dr George Mountain and Bournda (Plots 2, 6 and 9 respectively) had a range of age and size classes with recent recruitment observed at all sites (Photo 7). Similar observations were made at these sites in 2001 (NPWS 2002).



Photo 7 *Acacia georgensis* recruitment (left image) and mid-size plant (right image)
Photo: G Wright/DPIE

4.3 Seed collection



Photo 8 *Acacia georgensis* seeds from Nelson Creek, Brogo Dam, 1 January 2017
Photo: J Miles

Acacia georgensis seed is currently stored at the Australian PlantBank, from the Dr George Mountain site (1986, 1000 seeds; 2016, 3900 seeds) and the site on Bourkes Road (2016, 1000 seeds).

On 13 December 2018, 24 bags were put on stems of *A. georgensis* in the early stages of pod development (Photos 9 & 10) at the Bourkes Road site in Wadbilliga National Park. The bags were collected on 15 March 2019. The seed had ripened and pods split open, confirming the three-month ripening of seed typical of the genus (NPWS 2002). Only 122 seeds were collected and these were sent to the Seedbank Curator at the Australian PlantBank, Australian Botanic Garden, Mount Annan, New South Wales. The seed is now stored at this location (Table 3).

At all other sites seed was not present. Flowering was observed at several sites, but this had fallen from the plants and was covering the ground under the trees. Conditions preceding the survey had been very dry, which may have caused flowers to fall without setting seed at most sites. It has been noted in the past that this species produces seed irregularly (G Errington pers. comm., 14 June 2019).



Photo 9 *Acacia georgensis* pod development, Wadbilliga National Park, 13 December 2018
Photo: G Wright/DPIE



Photo 10 *Acacia georgensis* seed bagging, Wadbilliga National Park, 13 December 2018
Photo: G Wright/DPIE

4.4 Species extent

The terrain where this species occurs is rough and difficult to navigate, so total population counts would have been too time-consuming and in places, too dangerous to complete without safety equipment. The potential habitat around some populations extends well beyond the area surveyed and surveys in potential habitat between the four known localities were not attempted during this survey. It should be noted that there are extensive unsurveyed areas of remote, rugged terrain that could contain the species.

If funds became available, aerial surveys of potential habitat between known sites could increase the numbers of known locations of this species significantly.



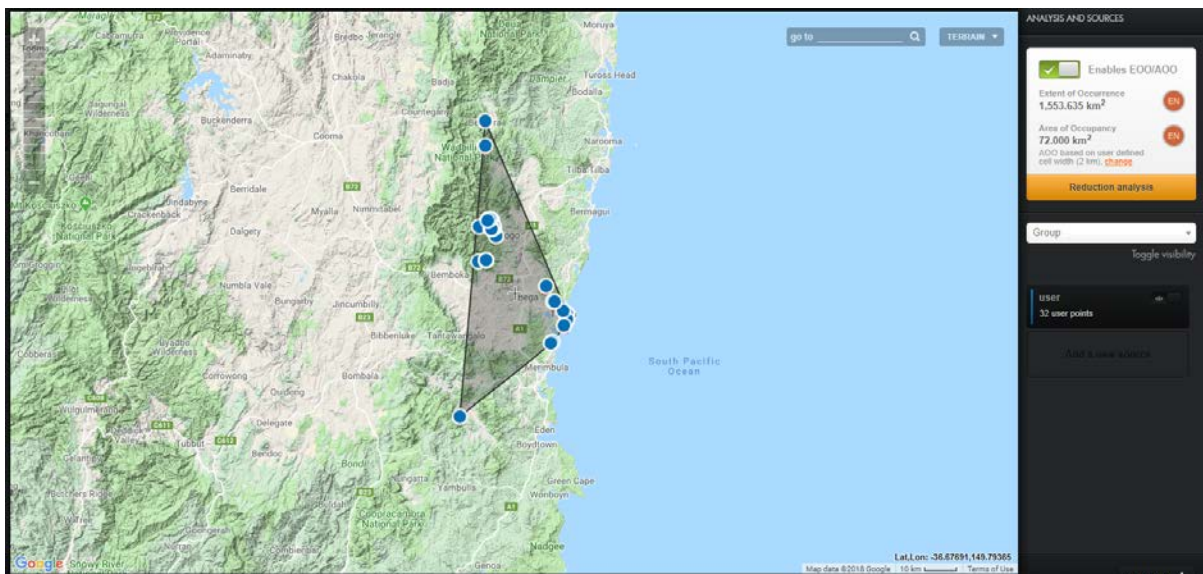
Photo 11 *Acacia georgensis* habitat, Towamba River, 11 April 2019
Photo: G Wright/DPIE

5. Discussion

The purpose of this work was to survey the distributional range of Bega wattle and establish permanent plots in a subset of sites, to check that the species was still present, and ensure that no new threats had emerged. This work was done to ascertain whether populations remained at specific sites, rather than to undertake a comprehensive search of all known sites and/or conduct searches for new populations based on habitat suitability. Prior to this survey the known northern limit of the species was on a ridge above the Tuross River in Wadbilliga National Park, and the southern limit was South East Forests National Park above the Towamba River, three kilometres south-west of Burragate. Results of this survey have confirmed this geographical extent of the species, although it is likely more populations remain undiscovered to the north of Belowra.

The NSW Government's threatened species recovery program provided funding for a comprehensive survey of the northern distribution of *A. georgensis* in April 2001 (Miles 2001). In 2002 the *Recovery Plan for Threatened Flora of Rocky Outcrops in South Eastern New South Wales* was completed, which documented the distribution and ecology of the Bega wattle (NPWS 2002). The extent of occurrence of the species has not changed since these documents were written, but two major sites were found within the species' geographical extent, one in Tanja Flora Reserve in 2012 and one in Bournda National Park above Bournda Lagoon in 2016. Both sites have two known sub-populations. In June 2019, one new population was also found in Bournda National Park, in close proximity to the Kianinny records; this was an incidental find associated with habitat assessment work for long-nosed potoroos.

The current area of occupancy of Bega wattle is 72 square kilometres and it has an extent of occurrence of 1554 square kilometres (Map 3; Bachman et al. 2011).



Map 3 *Acacia georgensis* area of occupancy and extent of occurrence
GeoCAT (Bachman et al. 2011)

During this survey extant populations were found at 14 of the 15 sites surveyed. The population from the Tathra Forest Wildlife Reserve (BioNet 1994 record) was not re-located despite survey at the recorded location. An exhaustive search of the reserve was not completed and additional survey may locate this original record, though suitable habitat was lacking in the vicinity of the recorded location. The area had been burnt in the May 2018 wildfire.

The 2018–19 surveys coincided with wildfires that burnt a number of areas where Bega wattle occurs. Surveys in fire-affected habitat were conducted as soon as two months post-fire and confirmed the species is fire killed: only one mature *A. georgensis* out of all those observed was found to be re-sprouting after fire (Photo 5), in an area where the fire was likely to have been of low intensity. Seedling recruitment was occurring throughout burnt areas, with more than one recruitment event observed, as indicated by the presence of seedlings in a range of sizes (Photo 4).

The recovery plan (NPWS 2002) suggested that fire would kill established stands and stimulate seedling recruitment; this has been confirmed to be the case. This survey also confirmed that mature trees can survive a fire of low intensity, but observations suggest this is a very rare occurrence for trees that are crown-scorched.

Field observations also confirmed that fire is not essential for recruitment to occur. Recruitment was observed around the edges of established stands, but also in canopy gaps within existing stands of *A. georgensis*.

These two types of recruitment patterns are evident in the populations surveyed. At the Dr George Mountain, Towamba River and Bournda populations, distribution and age structure of the Bega wattle is very uneven, with young to old plants present, including the presence of seedlings. At the Kianinny Bay site (Plot 8, Appendix A) the bulk of the population appears to be of a single cohort germinating following a past fire. No seedlings were present at this stand, which could be due to light exclusion by the canopy of the dense adult population, or to competition for soil moisture with the co-occurring small tree *Melaleuca armillaris*.

Only one *Acacia georgensis* population surveyed produced fruit in 2019, at Plot 2 on Bourkes Road in Wadbilliga National Park. Populations at Dr George Mountain and in Bournda National Park had flowered, but these flowers had dropped, presumably aborted due to unfavourable seasonal conditions. This species is known to be a difficult one from which to collect seed (G Errington pers. comm., 14 June 2019). Seedlings were observed during the survey, but these were infrequent, suggesting a juvenile-deficient structure exists in populations of this species. However, the seed of *Acacia* species have a hard seedcoat and would remain in the seedbank for a considerable time. The seedling recruitment observed in all burnt sites suggests that a healthy seedbank is present.

The terrain where this species occurs is rough and difficult to navigate, so total population counts were not completed due to time constraints and accessibility of sites. The potential habitat around some populations extends well beyond the area surveyed and surveys in potential habitat between the four known localities have not been done. It should be noted that there are extensive unsurveyed areas of remote, rugged terrain that could support many additional populations of this species. The 2001 surveys (Miles 2001) observed several possible additional populations, detected near confirmed sites through binoculars. If funds became available, aerial surveys of potential habitat between known sites, and survey of those areas identified in 2001 could increase the numbers of known locations of this species significantly.

Bega wattle is a long-lived, highly drought tolerant, fire-sensitive tree. One live plant at the Towamba River population with a stem diameter of 70 centimetres is assumed to be several hundred years old (NPWS 2002). It is assumed to develop a long-lived soil-stored seedbank, as is typical in *Acacia*, but no data are available on its size or seed longevity (NPWS 2002). Seedling post-fire recruitment observed during this survey certainly supports the presence of a seedbank.

The Kianinny populations of *A. georgensis* are the earliest documented, first collected in 1913, indicating it has been present in the area for over 106 years. The Dr George Mountain population on Crown land, first collected from in 1974, has been persistent for at least 45 years, although occasional disturbance to *A. georgensis* occurs here around the telecommunications facility and along the nearby powerline easement. The observed

response of the species to this disturbance has been to promote regeneration (Miles 2010). In Wadbilliga National Park the Bourkes Road site was first recorded in 1984 (35 years ago). This site is little changed since the 2001 surveys and again remains secure.

Threats to this species at the sites surveyed currently appear to be minimal. In burnt areas browsing of seedlings by native browsers (presumably) was noted, but the long-term impacts of this are unknown. At one site in Wadbilliga National Park, there seems to have been loss of some mature individuals. Whether this is a natural process, or the impact of drought is unknown. At a number of sites in Bournda National Park death of old mature individuals was also noted.

The results of this survey suggest that at present *Acacia georgensis* is reasonably secure in the wild, even though there appears to have been reduction in plant numbers at some sites. Threats also appear to be minimal, although re-survey of existing sites would be recommended to ensure this remains the case, particularly in those sites impacted by fire.

No immediate threats to known populations were observed; however, given the species largely occupies sites with very shallow soils, it could be vulnerable to the effects of increasing drought frequency or intensity. Numerous instances of mature plants dying during droughts have been observed in the most closely monitored site on Desert Creek in South East Forests National Park. On one monitoring plot between 2001 and 2014 (during the Millennium Drought and two subsequent wet years) the number of mature plants dropped from 28 to eight in the 11 years of observations. This plot then had substantial post-drought recruitment, with 63 saplings recorded on the plot in 2014 (Miles 2014). It was not possible to re-survey this site in 2018–19 due to access difficulties, and it is very likely to have been burnt in the Yankees Gap Road fire. Comparison of *A. georgensis* numbers in survey plots between 2001 and 2018–19 also suggest that mature plants have died in that period, presumably due to the impact of the 2002–09 Millennium Drought.

Other possible future threats to *Acacia georgensis* populations are the impacts of feral deer. Browsing and thrashing impacts were observed within the species' habitat during the 2018–19 surveys. As deer are currently expanding their distribution and increasing in density in the south coast region, impacts to *A. georgensis* plants are possible in the future and should be considered.

6. Recommendations

The following recommendations are made in response to the survey findings:

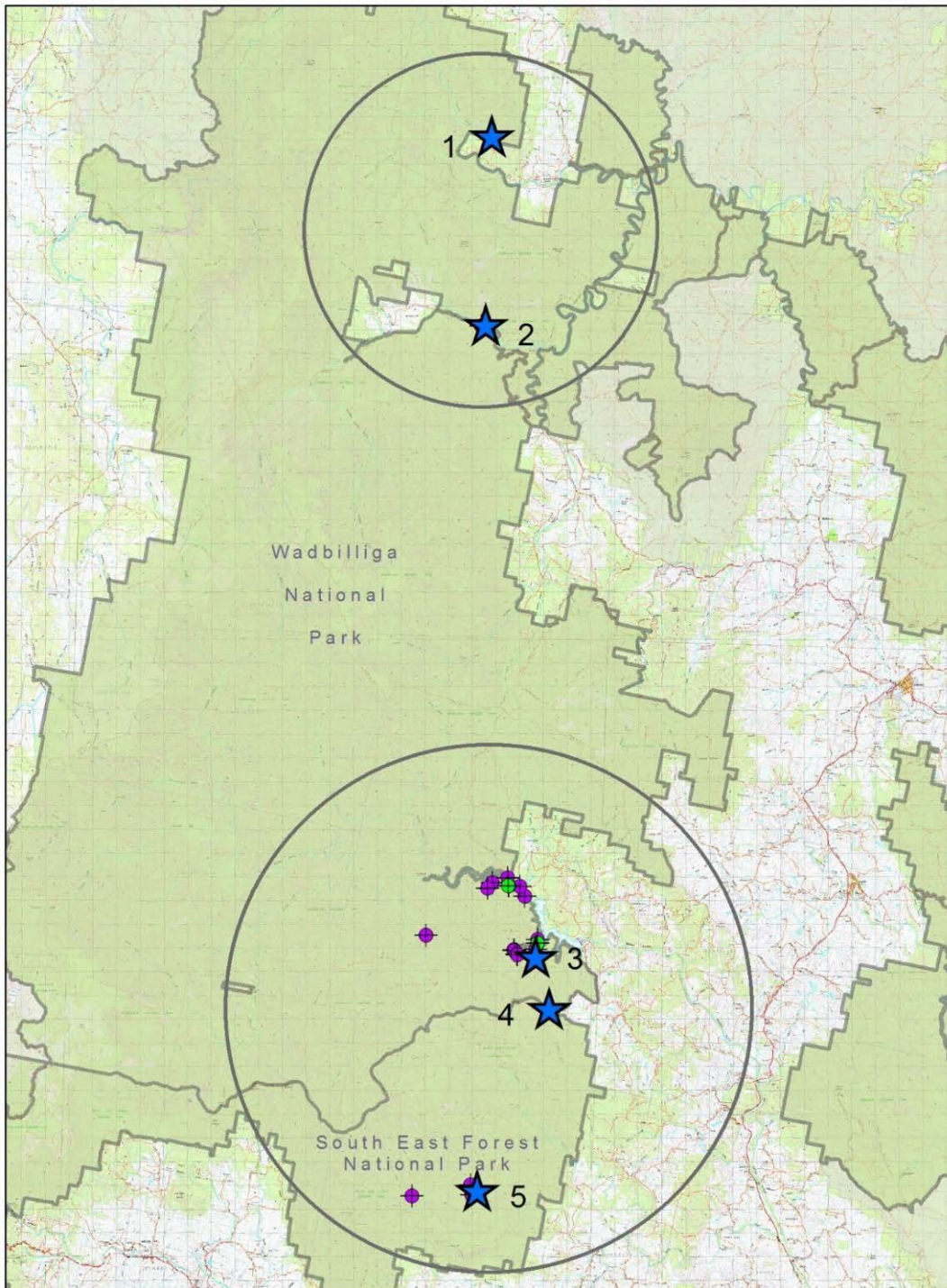
- Re-survey of the burnt plots should be completed in September–October 2020. Mark and monitor a number of seedlings until first fruit set.
- Revisit (in 2023) the nine plots surveyed in 2018–19.
- Include additional sites that were not checked during this study in the proposed 2023 survey.
- Undertake surveys in suitable habitat within the known distribution to locate any additional populations.
- Undertake opportunistic seed collection during any subsequent site visits and continue to collect herbarium specimens at any unvouchered distribution records.




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Appendix A – Full-floristic plots

A.1 Wadbilliga and South East Forests national parks – Plots 1 to 5



-  Australian Virtual Herbarium (AVH) records
-  BIONET records
-  *Acacia georgensis* plots

Map 4 *Acacia georgensis* plot locations Wadbilliga and South East Forests National Park

In Wadbilliga National Park there are nine herbarium collections, from four locations. The majority of the BioNet records are from the Brogo Dam area in the southern part of the park. In South East Forests National Park there have been no herbarium collections, all three location records are from BioNet. At each of sites 1 to 5 (Map 4) one 20 x 20 metre permanent plot was established in 2018. Three of these plots had been burnt during the 2018 Yankees Gap wildfire (Plots 3–5). The endangered species large-leaved *Monotaxis* was associated with *A. georgensis* in Plot 5 (Photo 12).



Photo 12 Endangered species large-leaved *Monotaxis* (*Monotaxis macrophylla*), South East Forests National Park, post-fire response, 10 April 2019
Photo: G Wright/DPIE

Plot 1 – Wadbilliga National Park



Photo 13 Plot 1, Wadbilliga National Park
Photo: G Wright/DPIE

Plot 1 – Wadbilliga National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 741859; Northing: 5992150

Date: 14 November 2018

Elevation: 350 metres above sea level (asl)

Slope: 10°

Aspect: 275° westerly

Vegetation Information System (VIS): Acgeo01 in survey SE_EATS_ThrFlo.

Location: Ridge on Wadbilliga National Park and private property boundary. The ridge is above the Tuross River, about two kilometres north-west of the property 'Belowra'.

Habitat: Either Wadbilliga Dry Shrub Forest (Map Unit W1) or Wadbilliga Gorge Dry Forest (W5) (Keith & Bedward 1999).

Geology: Granitoid, possibly granodiorite.

Landform: Mid-slope of steep west-facing gully, with cliffs.

Associated species: Apple-topped gum (*Eucalyptus angophoroides*), Jilliga ash (*Eucalyptus stenostoma*), rough-barked apple (*Angophora floribunda*), black she-oak (*Allocasuarina littoralis*), narrow-leaved geebung (*Persoonia linearis*), spicy everlasting (*Ozothamnus argophyllus*), shrubby platysace (*Platysace lanceolata*), sedge (*Lepidosperma laterale*) and prickly beard-heath (*Leucopogon juniperinus*).

Threats: None apparent, but four of the mature *Acacia georgensis* have died since the 2001 surveys.

Notes: At this site the plot established was very close to the original location (within three metres). The 2001 count was seven live plants; the 2018 count was three live plants. There were four dead standing *A. georgensis* recorded in the plot in 2018, so there was evidence of a reduction in plant numbers. As the plot could not be precisely located, the reduction in number can only be a general observation. The post is located in the south-east corner of the quadrat, which is located near the lower end of the stand.

Seven other *A. georgensis* were recorded within 25 metres of the plot. This site was not burnt.

Previous survey notes: This area was first surveyed on 6 May 2001. In 2001 there were a few fallen dead *A. georgensis* within the stand, and some standing dead trees. Damage to the larger eucalypts in the vicinity suggests a severe fire a few decades ago. One of the standing mature live *A. georgensis* trees had fire scarring at the base, suggesting there has been at least one fire of moderate intensity more recently.

Plot 2 – Wadbilliga National Park



Photo 14 Plot 2, Wadbilliga National Park
Photo: G Wright/DPIE

Plot 2 – Wadbilliga National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 741608; Northing: 5984212.

Date: 14 November 2018.

Elevation: 210 metres asl.

Slope: 25°.

Aspect: 325° north north-west.

Vegetation Information System (VIS): Acgeo02 in survey SE_EATS_ThrFlo.

Collection No.: GTW578.

Location: Wadbilliga National Park, between Bourkes Road and Wadbilliga River. Approx. 13.7 kilometres by road from the bridge over the Yowrie River.

Habitat: Either Wadbilliga Dry Shrub Forest (Map Unit W1) or Wadbilliga Gorge Dry Forest (W5) (Keith & Bedward 1999).

Geology: Ordovician metasiltstone immediately below the road, with some outcropping of granitoid rock at the top of the cliffs above the Wadbilliga River.

Landform: Lower slope of steep ridge, above 20 metre cliff into Wadbilliga River.

Associated species: Rough-barked apple (*Angophora floribunda*), wallaby bush (*Beyeria lasiocarpa*), slender tea-tree (*Leptospermum brevipes*), a grevillea (*Grevillea irrasa* subsp. *didymochiton*) and the sedge (*Lepidosperma urophorum*).

Threats: None apparent.

Notes: No obvious disturbance, apart from that associated with the road, which is minor. The absence of large trees, and presence of a dense subcanopy of either *Allocasuarina littoralis* or *Callitris* sp. throughout much of the north-facing slope above the Wadbilliga River suggests a severe fire a few decades ago. At this site the plot established was very close to the original location (within three metres). In 2001 there were 34 *A. georgensis* plants in the quadrat of which 26 were alive and eight standing dead. In 2018 there were 27 live plants and five recently dead, indicating losses had been replaced by recruits. This stand is multi-aged, with active recruitment occurring, with one seedling observed. It was also the only stand observed to be flowering abundantly in the dry spring of 2018. Other stands visited had aborted flowers. It was possible to collect a small amount of seed from this stand in 2019. Its position relatively low in the landscape probably means there is more soil moisture available on this site than on most others.

The post is located on the south-west corner of the quadrat with a second post 20 metres to the 'east' on a bearing of 50°. The quadrat includes part of the road batter, as the top of the cliff is only 15 metres below the posts.

Previous survey notes: This site was included in the 2001 surveys. A single plot was established on 22 April 2001.

Plot 3 – Wadbilliga National Park



Photo 15 Plot 3, Wadbilliga National Park
Photo: G Wright/DPIE

Plot 3 – Wadbilliga National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 743710; Northing: 5957917.

Date: 16 November 2018.

Elevation: 190 metres asl.

Slope: 5°.

Aspect: 340° north north-west

Vegetation Information System (VIS): Acgeo04 in survey SE_EATS_ThrFlo.

Location: Wadbilliga National Park, Nelson Creek cliffs, above Brogo Dam. Approx. 160 metres from the end of the fire trail.

Habitat: Adjacent to Wadbilliga Dry Shrub Forest (Map Unit W1 in Keith & Bedward 1999).

Geology: Devonian sandstone and red siltstone ('redbeds').

Landform: Rocky clifftop

Associated species: Blue-leaved stringybark (*Eucalyptus agglomerata*), black she-oak (*Allocasuarina littoralis*), narrow-leaved geebung (*Persoonia linearis*), shrubby platysace (*Platysace lanceolata*) and the sedges *Lepidosperma urophorum* and *Lepidosperma gunnii*.

Threats: Recent fire. At the 2018 visit there was evidence of feral deer rubbing and browsing on *Persoonia linearis*.

Notes: In 2018 backburning to contain the Yankees Gap Road fire which started on 15 August was conducted over a period of about six weeks. Most of the quadrat was affected by a patchy low intensity fire, although the upper edge was unburnt. Eighty-seven plants were recorded in the 20 x 20 metre plot (31 unscorched, 56 scorched). The original quadrat data (19 April 2001) indicated 54 live plants within the 20 x 20 metre quadrat. The placement of this new plot was established within the general vicinity of the 2001 plot, but the extent to which the area overlapped with the 2001 site is not known. No direct comparison between visits can be made, but general observations between visits indicate a large amount of recruitment of *A. georgensis* into the understorey of eucalypt open forest since 2001, most of which is assumed to have occurred after the breaking of the 2002–09 drought.

Previous survey notes: This site was included in the 2001 surveys. A single plot was established on 28 April 2001. In 2001 there was no evidence of disturbance other than some old fire damage to the larger trees over most of the area investigated, although a very rough 4WD track exists between the informal camping area and the top of the cliff.

Plot 4 – Wadbilliga National Park



Photo 16 Plot 4, Wadbilliga National Park
Photo: G Wright/DPIE

Plot 4 – Wadbilliga National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 744270; Northing: 5955405.

Date: 16 November 2018.

Elevation: 410 metres asl.

Slope: 30°

Aspect: 30° north-east

Vegetation Information System (VIS): Acgeo03 in survey SE_EATS_ThrFlo.

Location: Wadbilliga National Park, Warrigal Fire Trail, approx. 2.8 kilometres from the intersection of Warrigal Fire Trail and Warrigal Range Road. Approx. 40 metres north of the fire trail below hairpin bend in trail.

Habitat: Coastal Dry Shrub Forest (Map Unit 49 in Keith & Bedward 1999).

Geology: Devonian sandstone and red siltstone ('redbeds').

Landform: Steep upper slope on exposed aspects and gully heads.

Associated species: Gully gum (*Eucalyptus smithii*), blue-leaved stringybark (*Eucalyptus agglomerata*), black she-oak (*Allocasuarina littoralis*).

Threats: Browsing of seedling recruits.

Notes: In August 2018 the Yankees Gap Road fire swept through South East Forests National Park Bemboka Section. Control efforts included backburning within Wadbilliga National Park, including along Warrigal Fire Trail. At this location the fire appeared to have been lit off the fire trail and to have decreased in intensity as it burnt downslope. When the quadrat was established in 2018 only 20 of the 89 standing *A. georgensis* plants in the plot had unscorched crowns. This plot was established in the area of the 2001 plot, but the exact site could not be re-located, so a comparison of plant numbers between visits cannot be made. The post is located in the centre of the quadrat.

Previous survey notes: This site was included in the 2001 surveys. A single plot was established on 19 April 2001. It was noted that a severe fire, probably the 1952 wildfire, had affected the whole area. There was evidence of this fire in eucalypts, none on the ridgetop or exposed slope were very large, and most of those which survived the fire had their top killed, with new branches arising lower down the trunk. Most eucalypts appear to be regrowth dating from after the 1952 fire, with most having a DBH of only 30 centimetres or so. It seems likely that the *A. georgensis* also dates from this time.

In 2001 there were a substantial number of fallen dead *A. georgensis* within the stand, and some standing dead trees. Some of the standing mature trees had fire scarring at their base, suggesting there has been at least one fire of moderate intensity since 1952. Local information (Ted Johnston, farmer, Warrigal Range Road), is that there has been no crown fire in the area since 1952, but there have been a few smaller fires resulting from escaped cool burns. None of these have been within the past 20 years. There was an attempt to cool burn the area via aerial ignition in the 1990s, but results were very patchy.

Dead trees seen in 2001 might also have died during the short but very intense drought during the summer of 1997–98, which did cause a lot of tree deaths generally on the far south coast.

Plot 5 – South East Forests National Park



Photo 17 Plot 5, Wadbilliga National Park
Photo: G Wright/DPIE

Plot 5 – South East Forests National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 741251; Northing: 5947753.

Date: 10 April 2019.

Elevation: 260 metres asl.

Slope: 5°.

Vegetation Information System (VIS): Acgeo08 in survey SE_EATS_ThrFlo.

Aspect: 260° westerly.

Location: South East Forests National Park, Bemboka Section. Located on a clifftop above the confluence of Desert Creek and an unnamed tributary that provides the first ford on Mistake Fire Trail past the junction with Tin Hut Fire Trail.

Habitat: Coastal Dry Shrub Forest (Map Unit 49 in Keith & Bedward 1999).

Geology: Devonian conglomerate.

Landform: Lower slope above cliffs.

Associated species: Dr George mallee (*Eucalyptus spectatrix*), black she-oak (*Allocasuarina littoralis*), fringed heath-myrtle (*Micromyrtus ciliata*), narrow-leaved geebung (*Persoonia linearis*), wiry panic (*Entolasia stricta*), large-leaved Monotaxis (*Monotaxis macrophylla*), thyme spurge (*Phyllanthus hirtellus*).

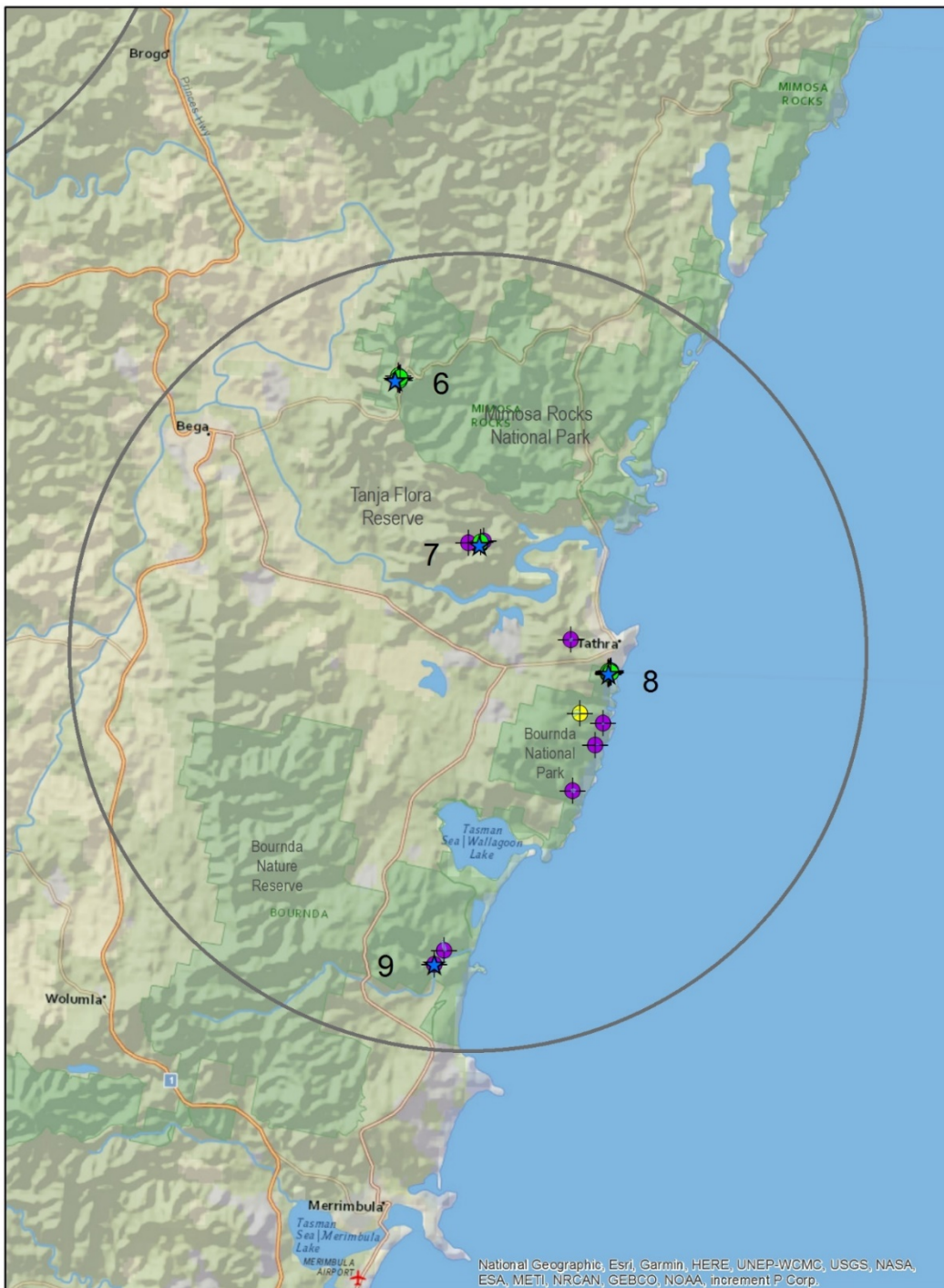
Threats: Browsing of seedling recruits.

Notes: Twenty-two live plants in 20 x 20 metre plot (19 seedlings, one sapling and two unscorched mature plants). The tallest seedling was 58 centimetres, but most were 15 centimetres or less in height. Post is located at the 10 metre point along the upper edge of the plot, which runs parallel and perpendicular to the slope.

Damage to the larger eucalypts in the vicinity suggests a severe fire a few decades ago, presumably the 1952 wildfire. The stand was partially burnt in the Yankees Gap Road wildfire which started on 15 August 2018 and burnt for about six weeks, though it is not clear if this site was part of the main fire or only affected by backburning. The fire was of moderate to low intensity on the quadrat, with some vegetation at the lower end unburnt, including the mature and regrowth *A. georgensis*. There were five long-dead *A. georgensis* within or just below the quadrat, probably a result of the 2002–09 drought.

Previous survey notes: Earlier surveys in this area were part of a survey of rocky outcrops in the Desert Creek catchment. This work was completed to map occurrences of Rare or Threatened Australian Plants (ROTAP), conducted on behalf of the National Parks and Wildlife Service Narooma office. Quadrats including *A. georgensis* were installed in two locations, one of which has been surveyed five times between 2003 and 2014 (Miles 2014); however, neither could be repeated in 2019 due to access difficulties. A new quadrat was installed near Mistake Fire Trail in the most accessible stand.

A2 Dr George Mountain, Tanja Flora Reserve and Bournda National Park – Plots 6 to 9



- ★ Australian Virtual Herbarium (AVH) records
- ★ BIONET records
- ★ *Acacia georgensis* plots
- ★ 2019 new record

Map 5 *Acacia georgensis* locations, Crown land surrounded by Mimosa Rocks National Park, Tanja Flora Reserve and Bournda National Park

The Dr George Mountain location for *A. georgensis* occurs on Crown land set aside for public recreation or conservation. The majority of herbarium collections are from this one locality (40 collections) (Table 1, Appendix B). One 20 x 20 metre permanent plot was established here in November 2018.

The records from Tanja Flora Reserve were from 2012. There is one herbarium collection and two populations confirmed at this site. The Tanja Flora Reserve was burnt in a wildfire in March 2018.

Prior to this survey, the Bournda National Park had six existing sites. The current survey checked and confirmed five of these sites, located one new site and one site, north-east of Plot 9 (Map 5) was not surveyed. Total confirmed sites in Bournda National Park is seven. The record west of the coastal town of Tathra, from within the Tathra Forest Wildlife Reserve was checked but could not be re-located. This 1994 record is yet to be confirmed.

Plot 6 – Dr George Mountain



Photo 18 Plot 6, Dr George Mountain
Photo: G Wright/DPIE

Plot 6 – Dr George Mountain, cont.

Grid ref.: (GDA94, Z55): Easting: 759658; Northing: 5939023.

Date: 15 November 2018.

Elevation: 290 metres asl.

Slope: 5°.

Aspect: 240° westerly.

Vegetation Information System (VIS): Acgeo08 in survey SE_EATS_ThrFlo.

Location: Dr George Mountain, on west side of ridge, approx. 6 kilometres north-east of the town of Bega.

Habitat: Mumbulla Dry Shrub Forest (Map Unit 48 in Keith & Bedward 1999).

Geology: Granite.

Landform: Upper slope above steep rocky drop-off.

Associated species: Tick bush (*Kunzea ambigua*), rock waxflower (*Philotheca trachyphylla*), cut-leaved mint-bush (*Prostanthera incisa*), raspwort (*Gonocarpus teucrioides*), mulga fern (*Cheilanthes sieberi*) and the grass *Digitaria ramularis*.

Threats: None observed.

Notes: Twenty-one plants were recorded in the 20 x 20 metre plot. The tree with a dense low crown on the lower edge of the plot is hanging partly in, and was not counted. The tree with 450 millimetres DBH has its trunk outside the plot about half-way down from the south-east corner but is leaning strongly into the plot and was included. The north-west corner post is located among shrubs on the upper edge of the plot. A second post is 20 metres away on a bearing of 150°, and tapes were run downhill on a bearing of 240° from each post. There are signs of an old severe fire in the area; the biggest *A. georgensis* just above the quadrat has an old fire-scar at the base and there are three long-dead *A. georgensis* stags.

Previous survey notes: This site was surveyed in connection with proposed clearing around infrastructure in 2010 (Miles 2010). The following is taken from the report of that survey:

The northern and southern extremities of the *Acacia georgensis* population were recorded with a GPS and were about 400 metres apart. The eastern limit of the population consists of a few outlying saplings on the edge of the powerline easement which runs east from the summit. The western limit is the foot of the cliffs on the western side of the summit ridge. The width of the area in which *Acacia georgensis* occurs is no more than 150 metres. Within this 6 hectare area mature *A. georgensis* plants occur mostly on the steep rocky westerly aspect of the summit ridge, while regrowth tends to be mostly within the disturbed area of the powerline easement and around the radio communications compound, although there are some mature plants along the eastern side of the powerline easement, and there is some regeneration on the cliffs.

Plants on the cliffs were not counted as access is too difficult in this area. Thirty mature plants were counted on the ridge crest south from the trig point, and the population is more or less continuous for the full 400 metres from there to the northern extremity. It is likely to consist of at least 200 mature plants. Plants in the disturbed area around the infrastructure were counted, and came to 21 mature plants and 222 saplings, of which up to 30 are likely to be removed.

The total population on the site is likely to be at least 443 plants, and if regrowth on the cliffs at the northern end were counted, probably considerably more.

Plot 7 – Tanja Flora Reserve



Photo 19 Plot 7, Tanja Flora Reserve
Photo: G Wright/DPIE

Plot 7 – Tanja Flora Reserve, cont.

Grid ref.: (GDA94, Z55): Easting: 762242; Northing: 5933960.

Date: 11 April 2019.

Elevation: 60 metres asl.

Slope: 20°

Aspect: 275° westerly.

Vegetation Information System (VIS): Acgeo09 in survey SE_EATS_ThrFlo.

Location: Tanja Flora Reserve, on west side of ridge, on lower slope above a gully. Approx. 160 metres west of Vimy Ridge Road and five kilometres north-west of the town of Tathra.

Habitat: Coastal Foothills Dry Shrub Forest (Map Unit 32 in Keith & Bedward 1999).

Geology: Ordovician metasiltstone.

Landform: Lower slope above gully.

Associated species: Woollybutt (*Eucalyptus longifolia*), coast grey box (*Eucalyptus bosistoana*), brush kurrajong (*Commersonia fraseri*), a kangaroo apple (*Solanum vescum*), broad-leaved hickory (*Acacia falciformis*), a Pomaderris (*Pomaderris brogoensis*), forest nightshade (*Solanum prinophyllum*) and long-leaved wallaby grass (*Rytidosperma longifolium*).

Threats: Browsing of seedling recruits, soil erosion.

Notes: Both populations were burnt in the Tathra–Reedy Swamp fire (March 2018). One plot was established in the *A. georgensis* population closest to Vimy Ridge Road. The fire was of moderate to high-intensity on the quadrat, with some tall eucalypts at the lower end having less severely damaged crowns, but all understorey plants killed. Ninety-six *Acacia georgensis* seedlings were recorded in the 20 x 20 metre plot. The post is located at the 10 metre point along the upper edge of the plot, which runs parallel and perpendicular to the slope.

Previous survey notes: The two populations at this site were found in 2012; at this time a general survey was conducted and a single herbarium collection made, but no plots were established.

Plot 8 – Bournda National Park



Photo 20 Plot 8, Bournda National Park
Photo: G Wright/DPIE

Plot 8 – Bournda National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 766224; Northing: 5929989

Date: 15 November 2018

Elevation: 30 metres asl.

Slope: 10°

Vegetation Information System (VIS): Acgeo07 in survey SE_EATS_ThrFlo.

Aspect: 280° westerly

Location: 40 metres west of the Kangarutha walking track past the highest point reached after the initial ascent from Kianinny Bay.

Habitat: Coastal Scrub (Map Unit 61 in Keith & Bedward 1999).

Geology: Rhyolite.

Landform: Ridge crest

Associated species: Tick bush (*Kunzea ambigua*), bracelet honey-myrtle (*Melaleuca armillaris*), wallaby bush (*Beyeria lasiocarpa*).

Threats: None observed.

Notes: Twenty-six plants in 20 x 20 metre plot. The site had been permanently marked making plot data comparable. In 2014 there were 31 *A. georgensis* counted on the plot, suggesting that five plants could have died between 2014 and 2018. In addition to the live trees there were 16 dead standing and seven fallen. Dead trees were not counted in 2014 so it is not clear whether five trees had died in the intervening four years or whether the difference is due to counting some trees near the edge of the plot in 2014 but not in 2018. There was no indication of any recruitment at this site, with most of the plants being of a similar size.

Previous survey notes: This is a repeat of a quadrat first installed in August 2014 as part of a survey of coastal scrub communities dominated by *Melaleuca armillaris* (Miles 2017). When established the plot was located with a central permanent post. There are signs of a very old severe fire, probably in 1952. Briggs (1990) reports that the area burnt in 1979–80 (Margaret Parris, pers. comm., 1986) and that the western part of the site had been burnt again recently when he undertook field work there in 1986.

Plot 9 – Bournda National Park



Photo 21 Plot 9, Bournda National Park
Photo: G Wright/DPIE

Plot 9 – Bournda National Park, cont.

Grid ref.: (GDA94, Z55): Easting: 760848; Northing: 5921025

Date: 15 November 2018

Elevation: 15 metres asl.

Slope: 10°

Aspect: 240° westerly

Vegetation Information System (VIS): Acgeo06 in survey SE_EATS_ThrFlo.

Location: Bournda National Park, just above Bournda Lagoon walking track, approximately 150 metres west of the western edge of Bournda Lagoon.

Habitat: Coastal Foothills Dry Shrub Forest (Map Unit 32 in Keith & Bedward 1999).

Geology: Rhyolite.

Landform: Lower slope above steep rocky drop-off into the creek.

Associated species: Coast grey box (*Eucalyptus bosistoana*), bracelet honey-myrtle (*Melaleuca armillaris*), the sedge *Lepidosperma urophorum* and mat-rush *Lomandra confertifolia* subsp. *rubiginosis*.

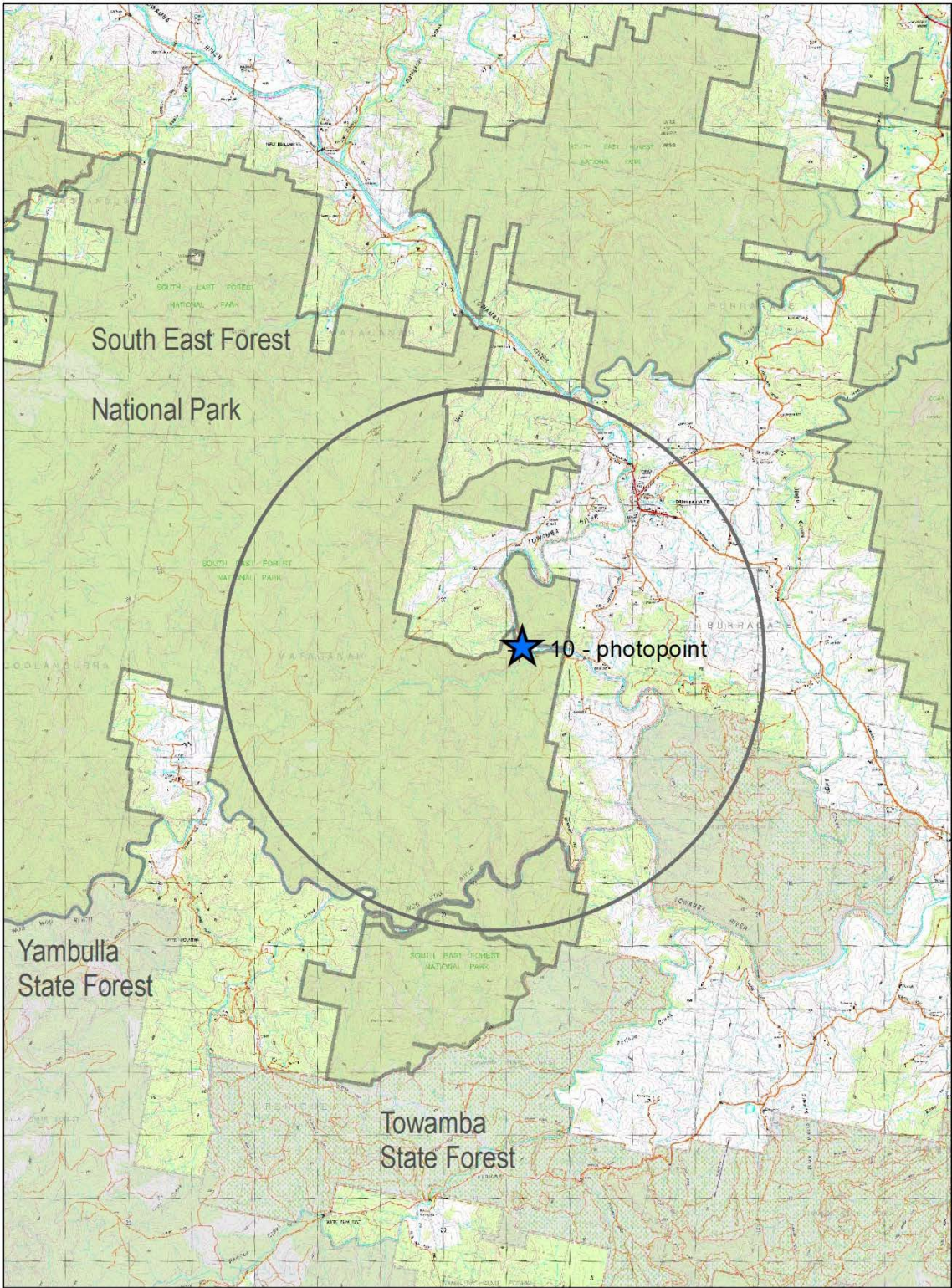
Threats: Rubbing and browsing by feral deer on *Philothea trachyphylla*.

Notes: Eleven plants in 20 x 20 metre plot, six dead standing and several dead fallen and/or suspended.

There are signs of a very old severe fire, probably in 1952. Other than this the site appears long unburnt. There are more *A. georgensis* uphill of the quadrat including one or two younger mature plants, one seedling was observed, but generally there appears to be little regeneration on this site.

Previous survey notes: November 2018 was the first survey of this site since it was first found by Steve Burrows in 2016.

A3 South East Forests National Park – Site 10



 *Acacia georgensis* site

Map 6 *Acacia georgensis* location in South East Forests National Park, photopoint

Photopoint 10 – South East Forests National Park



Photo 22 **Photopoint 10, South East Forests National Park**
Photo: G Wright/DPIE

This is an isolated record in the South East Forests National Park, Coolangubra Section. In 1997 a single herbarium specimen was collected from this site and sent to the NSW Herbarium. It appears this specimen has not been processed as it is not currently listed in the AVH. This is the southern-most limit of the species and the site remains unburnt.

The site was too steep and rocky to establish a permanent 20 x 20 metre plot. A photopoint was established as the entire population can be seen from the eastern side of the Towamba River facing south-west. The grid reference of the photopoint is 731260 Easting, 5898772 Nothing (GDA94).

Notes: Starts (downstream end) at GR 731282/5898686. The population extends for less than 100 metres upstream from this point. Site aspect 360°, slope 40°, elevation 120 metres asl. Extends upslope for 50 metres. Total plants between 30 and 40 approximate count.

Plants at this site look healthy, forming a canopy over sparse rock waxflower (*Philotheca trachyphylla*), sticky hop-bush (*Dodonaea viscosa* subsp. *angustifolia*), bracelet honey-myrtle (*Melaleuca armillaris*).

Appendix B – Herbarium collections

Table 1 Herbarium collections prior to the 2018–19 survey (AVH 2018)

Collection number	Collector/s	Collection date	Location
NSW 514988	Francis, WD	1/10/1913	Location notes 'Tathra, Bega district' most likely Kianinny site
NSW 457432	Blaxell, DF	20/04/1974	Dr George Mountain
AD 98439242	Coveny, R; Armstrong, J	17/10/1974	Dr George Mountain
CANB 350504.1	Coveny, R	17/10/1974	Dr George Mountain
MEL 0272755A	Coveny, RG	17/10/1974	Dr George Mountain
NSW 107897	Coveny, RG	17/10/1974	Dr George Mountain
NSW 475573	Not provided	17/10/1974	Dr George Mountain
NSW 535885	Coveny, RG	17/10/1974	Dr George Mountain
NSW 107898	Coveny, RG	16/07/1975	Dr George Mountain
NSW 517293	Coveny, RG	16/07/1975	Dr George Mountain
NSW 517294	Coveny, RG	16/07/1975	Dr George Mountain
PERTH 7190727	Coveny, RG	16/07/1975	Dr George Mountain
AD 98528278	Coveny, R	16/12/1975	Dr George Mountain
CANB 352955.1	Coveny, R	16/12/1975	Dr George Mountain
MEL 0272756A	Coveny, RG	16/12/1975	Dr George Mountain
CANB 306837.1	Wheeler, C	27/08/1977	Dr George Mountain
MEL 2085982A	Wheeler, C	27/08/1977	Dr George Mountain
NSW 108136	Wheeler, C	27/08/1977	Dr George Mountain
NSW 540338	Wheeler, C	27/08/1977	Dr George Mountain
CANB 8002074.1	Parris, M	13/10/1977	Dr George Mountain
CANB 8002073.1	Parris, M	12/02/1978	Dr George Mountain
CANB 306836.1	Parris, M	13/10/1978	Dr George Mountain
MEL 2075451A	Parris, M	13/10/1978	Dr George Mountain
NSW 108545	Parris, M	13/10/1978	Dr George Mountain
NSW 457433	Blaxell, DF	2/05/1979	Dr George Mountain
NSW 256426	Perry, N	23/09/1981	Dr George Mountain
NSW 713589	Perry, N	23/09/1981	Dr George Mountain
CBG 8910682.1	Outhred, R	12/03/1983	Wadbilliga River, Wadbilliga NP
CBG 8412778.1	Parris, M	3/09/1984	Kianinny
CBG 8413940.1	Parris, M	15/12/1984	Kianinny
CBG 8413941.1	Parris, M	15/12/1984	Kianinny
NSW 205840	Rodd, AN	15/12/1984	Kianinny

Bega wattle (*Acacia georgensis*) 2018–19 survey

Collection number	Collector/s	Collection date	Location
NSW 205841	Rodd, AN	15/12/1984	Kianinny
MEL 0272753A	Rodd, AN	15/12/1984	Kianinny
AD 98724097	Parris, M	15/12/1984	Kianinny
MEL 0678078A	Parris, M	15/12/1984	Kianinny
NSW 252799	Parris, M	15/12/1984	Kianinny
NSW 457435	Parris, M	15/12/1984	Kianinny
CBG 8412778.1	Parris, M	3/09/1984	Kianinny
CANB 8413943.1	Parris, M	12/12/1984	Dr George Mountain
AD 98724095	Parris, M	14/12/1984	Dr George Mountain
CANB 8413949.1	Parris, M	14/12/1984	Dr George Mountain
NSW 205837	Rodd, AN	14/12/1984	Dr George Mountain
PERTH 856282	Rodd, AN	14/12/1984	Dr George Mountain
AD 98917047	Rodd, AN	18/12/1984	Wadbilliga River, Wadbilliga NP
AD 98917048	Rodd, AN	18/12/1984	Wadbilliga River, Wadbilliga NP
CANB 379726.1	Rodd, AN	18/12/1984	Wadbilliga River, Wadbilliga NP
CANB 379733.2	Rodd, AN	18/12/1984	Wadbilliga River, Wadbilliga NP
NSW 205173	Rodd, AN	18/12/1984	Wadbilliga River, Wadbilliga NP
CANB 366876.1	Briggs, JD	2/08/1986	Kianinny
NSW 457434	Briggs, JD	2/08/1986	Kianinny
MEL 2013681A	Walsh, NG	2/12/1986	Dr George Mountain
PERTH 894621	Tame, T	1/09/1988	Dr George Mountain
NSW 255345	Simmons, MH	1/09/1990	Dr George Mountain
MEL 2285943A	Simmons, JG; Simmons, MH	20/09/1990	Dr George Mountain
NSW 280486	Wimbush, DW	11/08/1991	Kangarutha track
NSW 269080	Benson, JS	14/01/1992	Dr George Mountain
CANB 9504195.1	Donaldson, S	13/04/1995	Dr George Mountain
CANB 9504195.2	Donaldson, S	13/04/1995	Dr George Mountain
NSW 407832	Jobson, PC	30/07/1995	Dr George Mountain
MEL 2047373A	Walsh, NG	13/10/1995	Dr George Mountain
NSW 454753	Miles, J	22/08/2000	Brogo Dam
NSW 498057	Miles, J	13/10/2001	Brogo Dam
NSW 491695	Miles, J	6/05/2001	Tuross River, Wadbilliga NP
CANB 660440.1	Sloan, N	1/03/2005	Canberra Botanic Gardens
NSW 977890	Miles, J	5/09/2012	Tanja Flora Reserve
NSW 992074	Phillips, GP; Errington, G	20/12/2016	Dr George Mountain

Collection number	Collector/s	Collection date	Location
NSW 992091	Phillips, GP; Errington, G	22/12/2016	Wadbilliga River, Wadbilliga NP

Table 2 Herbarium collections, 2018–19 survey

Location	Site no.	Collector/s	Collection number	Date
Wadbilliga River, Wadbilliga NP	2	Genevieve Wright, Jackie Miles	GTW578	14/11/2018

Table 3 Seed collections

Accession number	Collector/s	Collection date	Location	No. seeds
NSW P1984-2882	AN Rodd	14/12/1984	Dr George Mountain, east north-east of Bega	1000
NSW P2016-1015	GP Phillips, G Errington	20/12/2016	Dr George Mountain, around trig point at summit	3900
NSW P2016-1020	GP Phillips, G Errington	22/12/2016	Bourkes Rd, approx. 9.3 km west of eastern boundary gate into Wadbilliga NP	1000
NSW P2019-0148	G Wright	13/12/2018	Bourkes Rd, approx. 9.3 km west of eastern boundary gate into Wadbilliga NP	122