NSW SCIENTIFIC COMMITTEE

Bertya sp.A Cobar-Coolabah (Cunningham & Milthorpe s.n., 2/8/73 - Euphorbiaceae)

(NOTE: This is now considered to be 2 species; *Bertya opponens* and *Bertya* sp. Clouds Creek)

Review of Current Information in NSW

April 2008

Current status:

The entity currently referred to as *Bertya* sp.A Cobar-Coolabah on the *Threatened Species Conservation Act* 1995 (TSC Act), and the Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (EPBC Act; as Endangered) has recently been found to consist of two closely related species. Plants on the western slopes and plains are typical *Bertya opponens* which was initially thought to be endemic to Queensland. The populations growing in rocky areas along the Great Escarpment are an undescribed species best referred to as *Bertya* sp. (Clouds Creek, M. Fatemi 4). The NSW Scientific Committee recently determined that *Bertya opponens* and *Bertya* sp. Clouds Creek meet criteria for listing as Vulnerable and Endangered, respectively, in NSW under the TSC Act, based on information contained in this report and other information available for the species.

Taxonomy:

There has been considerable confusion surrounding the true identity of plants treated as *Bertya* sp.A Cobar-Coolabah (Cunningham & Milthorpe s.n., 2/8/73). Recent studies taxonomic studies indicate that *Bertya* sp.A Cobar-Coolabah (Cunningham & Milthorpe s.n., 2/8/73) actually consists of two distinct taxa. Populations from the western areas (e.g. Cobar, Coolabah and Jacks Creek SF) are referable to *B. opponens*, while populations along the eastern escarpment (Gibraltar Range, Kangaroo River State Forest, etc.) are an undescribed species endemic to north-eastern NSW. The phrase name of "Cobar-Coolabah" is inappropriate for this latter species because is not known to occur in western localities. Fatemi *et al.* (2007) refer to this new taxon as "*Bertya* sp. (Clouds Creek, M. Fatemi 4)". Throughout the remainder of this report the two taxa will be assessed separately, and the undescribed species will be abbreviated to *Bertya* sp. (Clouds Creek). For a brief period a manuscript name of *Bertya algida* was proposed for this new species but it is advised that this name is no longer appropriate (expert advice).

Specific information for *Bertya opponens* in NSW

Species description:

The best available description of *B. opponens* (as *Bertya* sp.A Cobar-Coolabah) is taken directly from James & Harden (1990, p. 418) as follows: "Slender shrub or small tree to 4 m high with a thick, whitish to brown tomentum. Leaves mostly opposite, oblong to oblanceolate or narrow-elliptic, 10-50 mm long, 5-25 mm wide, thick, margins recurved to revolute, upper surface hairy, becoming scabrous, lower surface densely white-tomentose with prominent midrib; petiole 3-5 mm long. Flowers sessile, 1-3 male and female flowers together; bracts 4, conspicuous, narrow,

2-5 mm long, thick, yellowish-brown tomentose, 2 inner bracts obscure, heavily viscid. Perianth segments 4, broad-ovate, 5-6 mm long, mostly glabrous and viscid; female segments fused towards the base, lobes oblong-ovate. Ovary densely villous, styles 3 or 4, mostly deeply 4-lobed. Capsule ovoid to globose, 8-9 mm long, densely villous."

Note that the description of *B. opponens* in the latest taxonomic revision of *Bertya* (Halford & Henderson 2002) is inappropriate as it also includes plants from north-eastern NSW which are now considered a different species (i.e. *Bertya* sp. (Clouds Creek)).

Distribution and number of populations:

Bertya opponens is known from three populations in central-northern NSW (Figure 1) and numerous locations in central Queensland. The western-most population in NSW is on the private property "Nurrungal" (formerly "Elmore Station") approximately 65 km north-east of Cobar. The largest population is in Jacks Creek State Forest (SF), approximately 18 km south-south-east of Narrabri. A third population occurs approximately 12 km to the north-west of the second population along the Newell Highway (i.e. 10 km south-west of Narrabri). A fourth population in NSW was originally known from "Windera Station", approximately 50 km north-north-east of Cobar, but this population is now believed to be extinct (Austen 1999; NSW NPWS 2002; see section on "Population reduction and continuing declines" in this report). Figure 1 maps the distribution of *B. opponens* in NSW which extends approximately 350 km from east to west, while Appendix 1 summarises the location, habitat and population details of the four populations.

As the two populations in the Narrabri district are relatively close (approximately 12 km apart), occur in very similar habitat, and are connected by a large remnant of more or less continuous vegetation, it is appropriate to consider these two populations as comprising a single 'location' (IUCN 2008). The total number of locations of *B. opponens* in NSW is therefore two.

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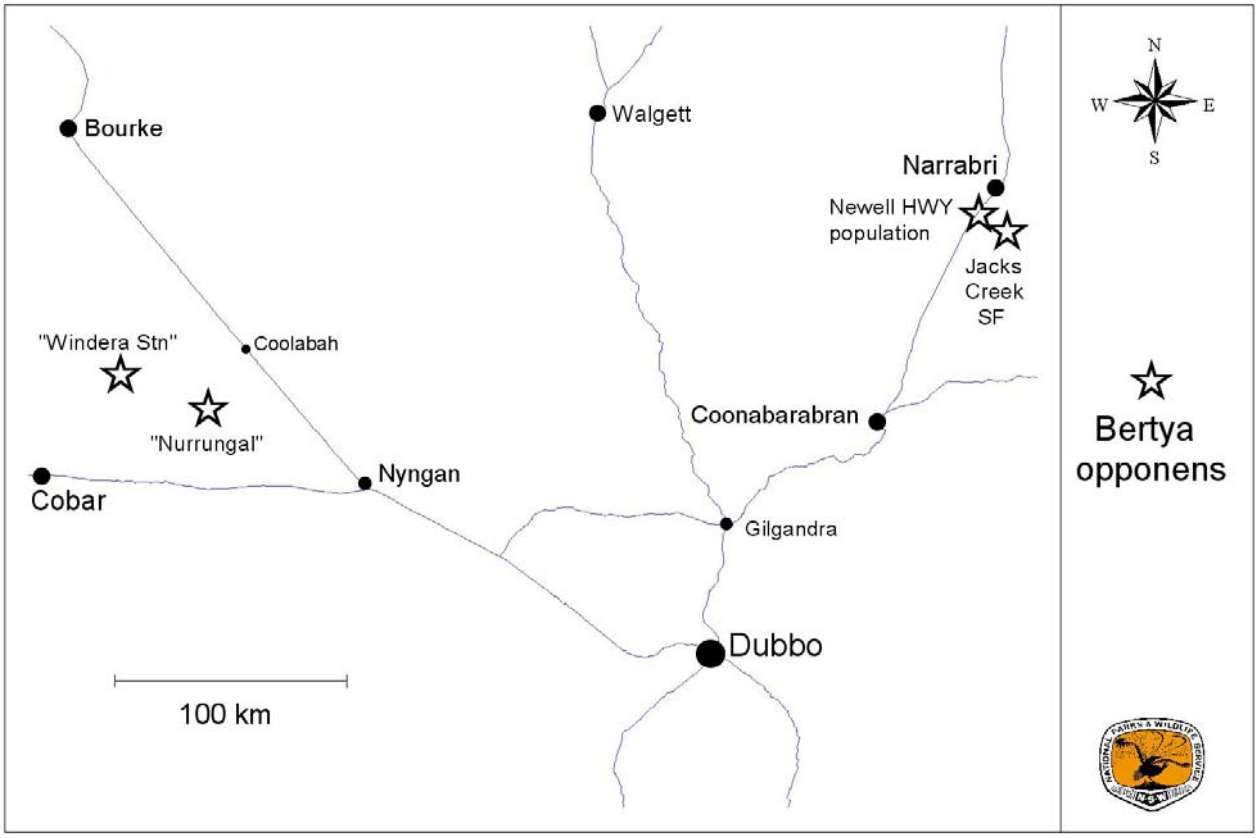

Figure 1: The distribution of *Bertya opponens* in central-northern NSW.

Ecology:

All three populations of *B. opponens* occur on slightly elevated ridges with moderately coarse, sandy soil. The substrate on "Nurrungal" is relatively shallow and rocky while the two populations near Narrabri are on much deeper, well-drained soil. The ridge on "Nurrungal" supports a mallee community dominated by *Eucalyptus viridis*, *E. morrisii* and *Callitris glaucophylla* with virtually no shrubs other than the *Bertya* (Austen 1999). In contrast, the two Narrabri populations occur in taller Eucalypt woodland with a well-developed shrub layer. The dominant trees are *Eucalyptus chloroclada*, *E. crebra*, *Callitris glaucophylla* and *Corymbia trachyphloia.*

Little is known about the reproductive biology of *B. opponens* although Austen (1999) speculated that the plants are wind pollinated and relatively long-lived. Austen (1999) also notes that populations may need some form of disturbance to stimulate recruitment (e.g. fire or physical disturbance such as that associated with earthworks). Most plants of *B. opponens* are believed to be killed by fire although wildfires may increase the rate of germination from the seed bank.

Number of mature individuals:

The largest and healthiest population of *B. opponens* is located in Jacks Creek SF. Austen (1999) estimates that at least 5 000 000 plants occur scattered over several square kilometres. This estimate was made after counting the number of individuals in 10 quadrats and extrapolating over

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the average counts over the entire area of occupancy. The population has a balanced age structure with many adults, juveniles and seedlings across the entire area. In contrast, the population on "Nurrungal" appears to be senescing with most of the 500-600 adults showing signs of ill-health due to age (Austen 1999). Only two juveniles were found amongst the adults in the 1999 survey. The third population south-west of Narrabri appears to be very small with approximately five adult plants observed in December 2000 (expert advice). It is quite likely that more plants would occur in the broader area, however, as this recently discovered population was not thoroughly surveyed.

Threats:

There appear to be no major threats to the thriving population in Jacks Creek SF. The area occupied by *B. opponens* is considered unsuitable for logging even though it is within a state forest (Austen 1999). Some small-scale disturbance of the population by roadworks and apiarist activities appear to have favoured recruitment of the species (Austen 1999). A few plants on the eastern extremity of this population occur just outside the state forest boundary on private property but these plants also appear to be under no current threat. It is considered unlikely that this area will be cleared due to its poor soils and low productivity (Austen 1999).

The small population along the Newell Highway appears to be under no apparent threats other than having very low numbers (expert advice). They occur about 20 m in from the road in a relatively intact woodland remnant.

The moderate-sized population on "Nurrungal" is less healthy than the other two and is facing a number of perceived threats. Grazing of the *Bertya* plants on "Nurrungal" by feral goats is a serious problem and this is suspected to be one of the causes of the very low number of juveniles present (Austen 1999). The recovery plan for *Bertya opponens* (NSW NPWS 2002) stated that half of the population would be fenced off to prevent excessive grazing in the future. This action never took place, however, due to a change of ownership of the property shortly after (expert advice).. Severe drought in the area may also have killed some of the adults and prevented active recruitment of seedlings. Austen (1999) also noted that many hundreds of plants have been blown over in the wind and are now dead. This has probably resulted from a combination of strong winds, an exposed position in the landscape and the tall, senescent nature of most of the plants. 'Competition and habitat degradation by Feral Goats, *Capra hircus*' is listed as a Key Threatening Process under the TSC Act in NSW.

Extreme fluctuations:

There is no evidence of extreme fluctuations in the large population in Jacks Creek SF nor of the smaller population along the Newell Highway. The population on "Nurrungal" is believed to have substantially declined over the past 20 years but this is more a result of reduction due to a number of threatening processes rather than due to natural fluctuations.

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Population reduction and continuing declines:

As stated above, the population on "Nurrungal" is believed to have substantially declined over the past 20 years. Austen (1999) noted that up to 2.5 times as many dead plants were observed as living plants. Most of these dead plants had been blown over by the wind and were now parallel to the ground. Relatively few juvenile plants were observed and the population appeared to be either lacking the required germination cues and/or grazing by goats may have prevented the establishment of most seedlings that did germinate. A continuing decline of this population seems likely given the high mortality rate of the adults and the relative lack of recruitment.

The original collection of *B. opponens* from NSW (as *B. oppositifolia*) was from "Windera Station" by Geoff Cunningham in 1969. This population was further sampled as late as 1982 but is now believed to be extinct. The combination of a severe drought followed by an intense wildfire in 1984 is thought to have totally eliminated the last remaining plants (Austen 1999). An "extensive search" in 1999 failed to find any plants (Austen 1999). The size of this population prior to its inferred extinction remains unknown and no population information was given on the labels of any of the herbarium specimens.

There is no evidence of a population reduction or continuing decline in either of the two eastern populations near Narrabri.

Extent of Occurrence (EOO) & Area of Occupancy (AOO):

The EOO of occurrence of *B. opponens* in NSW, based on a distribution from "Nurrungal" east to Jacks Creek SF and north to the Queensland border, is approximately 47 000 km^2. This figure excludes the extinct population on "Windera Station" which would have otherwise have increased the EOO to approximately 50 000 km^2.

The AOO of the large population in Jacks Creek SF is estimated to be approximately 24 km^2. This figure is based upon a mapped area presented in the appendix of Austen (1999). The other two populations in NSW are relatively small in size and cover an area of no more than 4 km^2, based on a 2 x 2 km grid, the spatial scale of assessment recommended by the IUCN (2008). The total AOO of *B. opponens* in NSW is therefore estimated to be 32 km^2.

Severe fragmentation:

Despite the large disjunction between the western and eastern populations, there is no evidence to suggest that the distribution of *B. opponens* has become severely fragmented. It is possible that the natural distribution of *B. opponens* has always been sporadic as appears to be the case with many of the Queensland populations (Austen 1999). In any case, *Bertya opponens* would not be considered to be 'severely fragmented' (IUCN 2008) as most of its individuals occur within a single, large, relatively undisturbed population (Jacks Creek SF).

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Specific information for *Bertya* sp. (Clouds Creek)

Species description:

There is currently no description available for *Bertya* sp. (Clouds Creek) although the species is very similar to *B. opponens*. The main distinguishing features for *Bertya* sp. (Clouds Creek) are the presence of stipitate glands near the base of the leaves and the mostly golden (rather than white) colour of the indumentum (Fatemi *et al.* 2007;expert advice).

Distribution and number of populations:

Bertya sp. (Clouds Creek) is currently known from seven populations along the Great Escarpment of north-eastern NSW (Figure 2). The most northerly population is in Barool NP at the south-western edge of the Gibraltar Range. This population has often been incorrectly cited as being in Gibraltar Range NP (e.g. Austen 1999; Hogbin 2002; NSW NPWS 2002) which is adjacent to, but further north of Barool NP. The species extends approximately 150 km south to the Winterbourne Gorge east of Walcha. The Winterbourne Gorge population is on land currently owned by the NSW National Parks & Wildlife Group but is yet to be gazetted as a conservation reserve. However at this time, this land is effectively managed as a National Park and will ultimately be included within Oxley Wild Rivers NP (expert advice). Appendix 2 summarises the location, habitat and population details of all known populations of *Bertya* sp. (Clouds Creek). Note that some of these populations have only recently been discovered and are documented here for the first time.

Ecology:

All seven populations of *Bertya* sp. (Clouds Creek) occur on steep rocky slopes in shallow soil. The parent material is either granitic (at least three populations) or metasedimetary (most of the southern-most populations). The vegetation community is usually heath or low shrubland surrounded by stunted eucalypts. Altitudes range from 300-1000 m asl. Little is known about any interactions with other species.

Like many species of *Bertya*, *Bertya* sp. (Clouds Creek) appears to be an obligate seeder in which standing plants are killed by fire but the species often germinates from a soil seedbank shortly afterwards (expert advice). Little is known about the reproductive biology of *Bertya* sp. (Clouds Creek) although it is speculated that the plants are wind pollinated and relatively long-lived (Austen 1999).

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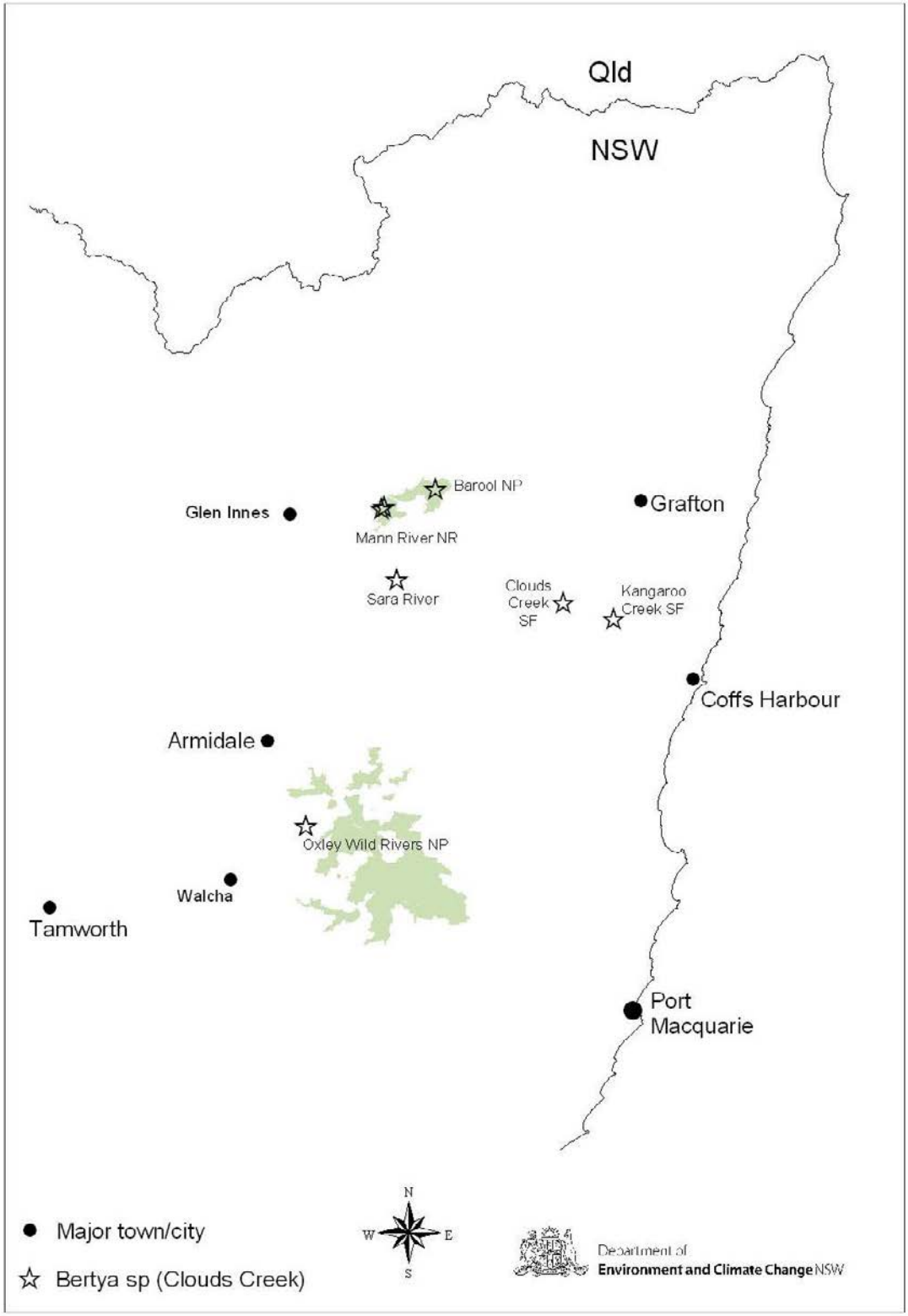

Figure 2: The distribution of *Bertya* sp. (Clouds Creek) in north-eastern NSW.

Number of mature individuals:

Population data, including the number and proportion of mature adults in each population, is available for all but one of the seven confirmed localities (Sara River). Details of the Sara River population are lacking but the herbarium label did say that the area covered was approximately

0.5 ha which suggests only a modest number of plants. The largest population appears to be at the unreserved site in Kangaroo River SF. Surveys by Austen (1999) estimated the total population to be at least 500 individuals and noted that about half of these were mature adults. Populations notes for the other localities are summarised in Appendix 2.

A lower bound population of 400 mature plants is estimated for the species by totalling the conservative figures in Appendix 2. This estimate excludes the poorly known population along the Sara River. An upper bound estimate for the species is approximately 480 which assumes that the Sara River population is a similar size to the other two restricted populations nearby in Mann River NR (i.e. *c*. 30 mature individuals). This figure also allows for an additional 50 mature individuals in the Kangaroo River SF population which is plausible given that the estimate by Austen (1999) was cited as being "at least...". The bounded estimate for *Bertya* sp. (Clouds Creek) is therefore 400 - 480 mature individuals.

Threats:

Austen (1999) concludes that neither of the two populations known at the time (Barool NP and Kangaroo River SF) were under any active threats. The Barool NP population, however, was though to be senescent and a lack of juveniles suggested limitations on germination or seedling recruitment. Austen (1999, p. 36) stated that "the outlook for the population does not seem good"and that the population is "in danger of disappearing". Austen (1999) considered that a disturbance event was necessary to stimulate recruitment, but if there were two such events in quick succession "the whole population may be removed from the area". The ongoing lack of a favourable disturbance event (and the risk of two in quick succession) can be considered to be an indirect threat, or at least a reason to suspect that the population will decline. As of April 2008, this area has remained unburnt (expert advice).

Surveys of the northernmost Mann River NR population and of the plants in Oxley Wild Rivers NP also failed to identify any current threats (expert advice). The southernmost Mann River NR population is believed to be in good health and not under any current threats (expert advice).The plants in Clouds Creek SF also appear to be under no threats although the total population is relatively small (expert advice). In summary, *Bertya* sp. (Clouds Creek) occurs in relatively undisturbed areas on crown land that is unlikely to be cleared or disturbed in the near future. The two state forest populations occur on rocky outcrops surrounded by low, stunted trees of little value for forestry activities. The main concern is that most populations are relatively small and the moderate levels of disturbance required for active recruitment may be a limiting factor.

Extreme fluctuations:

There is no evidence of extreme fluctuations in any of the populations of *Bertya* sp. (Clouds Creek).

Population reduction and continuing declines:

There is no evidence of population reduction in any of the populations of *Bertya* sp. (Clouds Creek) although the senescent population in Barool NP may decline (at least in terms of the

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standing plants) if the lack of recruitment continues (see discussion of this in the threats section above).

Extent of Occurrence (EOO) & Area of Occupancy (AOO):

The EOO of *Bertya* sp. (Clouds Creek) is approximately 6 500 km^2 while the AOO is approximately 28 km^2. The later figure was calculated assuming that each of the seven populations occupies a maximum of 4 km^2, based on a 2 x 2 km grid, the spatial scale of assessment suggested by the IUCN (2008).

Severe fragmentation:

There is no evidence to suggest that the population or habitat of *Bertya* sp. (Clouds Creek) has undergone severe fragmentation.

References:

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Fatemi M, Gross CL, Bruhl JJ (2007) The first phenetic analysis of species limits in *Bertya* (Euphorbiaceae). *Australian Systematic Botany* **20**, 448-463.

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Explanatory note

Between 2007 and 2009 the NSW Scientific Committee undertook a systematic review of the conservation status of a selection of plant and animal species listed under the Threatened Species Conservation Act. This species summary report provides a review of the information gathered on this species at the time the Review was undertaken.

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The Scientific Committee's report on the Review of Schedules project and final determinations relating to species that were either delisted or had a change in conservation status can be found on the following website: www.environment.nsw.gov.au .

The Committee gratefully acknowledges the past and present Committee members and project officers who ably assisted the Committee in undertaking the Review of Schedules Project. Information on the people involved in the project can be found in the Acknowledgement section of the project report entitled "Review of the Schedules of the Threatened Species Conservation Act 1995. A summary report on the review of selected species" which is available on the abovementioned website.

This species summary report may be cited as:

NSW Scientific Committee (2008) *Bertya* sp.A Cobar-Coolabah (Cunningham & Milthorpe s.n., 2/8/73 Review of current information in NSW. April 2008. Unpublished report arising from the Review of the Schedules of the Threatened Species Conservation Act 1995. NSW Scientific Committee, Hurstville.

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Appendix 1: Location, habitat and population details for all four NSW populations of *Bertya opponens*

Pop.	Location	Habitat	Last Survey	Population notes	Info Source
1	11 km SW of Narrabri along Newell HWY	Flat terrain, deep sandy soil over sandstone. Shrubby *Eucalyptus – Callitris* woodland.	Dec. 2000	About five adult plants.	1) expert advice 2) NE herbarium specimen
2	Jacks Creek SF, *c.* 18 km SSE of Narrabri	Flat terrain, deep sandy soil over sandstone. Vegetation dominated by *Eucalyptus chloroclada*, *E. crebra*, *Callitris glaucophylla* and *Corymbia trachyphloia.* Relatively shrubby understorey.	Dec. 2000	Estimated to be 5 000 000 + plants. Good population structure with many juveniles and adults.	1) Austen 1999 + 2) NSW NPWS 2002
3	"Windera Station", 50 km NNE of Cobar	Stony mallee ridge. Population now believed to be extinct.	1982	An unknown number of plants were recorded in 1982 but extensive searches in 1999 failed to relocate any plants.	1) Austen 1999 + 2) NSW NPWS 2002
4	"Nurrungal" [formerly "Elmore Station"], 65 km NE of Cobar	Shallow red earth on a mallee ridge. Altitude of 260 m asl. Vegetation dominated by *Eucalyptus viridis*, *E. morrisii* and *Callitris glaucophylla*.	1999	500-600 adult plants and only 2 seedlings. Most adults unhealthy and senescing.	1) Austen 1999 + 2) NSW NPWS 2002

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Appendix 2: Location, habitat and population details for all seven confirmed populations of *Bertya* sp. (Clouds Creek, M. Fatemi 4)

Pop.	Location	Habitat	Last Survey	Population notes	Info Source
1	Barool NP, rocky bluff SE of Barool Ck.	Edge of rocky outcrop – skeletal soil derived from granite. Shrubland surrounded by open forest of *Eucalyptus campanulata* and *E. notabilis*.	1999	20 mature adults and no juveniles	1) Austen 1999
2	Mann River NR, western side of Tommy's Rock Lookout	Shallow sandy loam over granite, steep northerly aspect. Heath with *Leucopogon juniperinus* and *Sannantha* sp.	23/9/07	*c*. 30 mature adults and several seedlings	1) NE Herbarium specimen 2) expert advice
3	Mann River NR, 4 km SW of Tommy's Rock Lookout	Steep rocky slope on granite – Westerly aspect.	2004	*c*. 30 mature adults and several seedlings	1) expert advice
4	Sara River [*c*. 50 km SE of Glen Innes]	Steep rocky slope. Growing in *Acacia diphylla* shrubland amongst sedimentary rocks.	15/11/ 94	Population size unknown but as area was said to be less than 0.5 ha.	1) CFSHB Herbarium specimen collected by N. Cobcroft
5	Clouds Creek SF, gorge above Clouds Creek Falls	Steep rocky slope with sparse shrubs.	28/8/00	*c*. 50 mature adults.	1) NE Herbarium specimen 2) expert advice
6	Kangaroo River SF, Devils Face	Skeletal soil amongst crevices of a metasedimentary outcrop. Shrubland dominated by *Acacia fimbriata*.	1999	At least 500 plants, approximately half of which are mature adults.	1) Austen 1999 2) NE Herbarium specimen 3) expert advice.
7	Winterbourne Gorge [effectively managed as part of Oxley Wild Rivers NP].	Shallow loamy soil over metasediments. Steep slope. Edge of dry rainforest.	2/6/07	*c*. 20 mature adults and several seedlings	1) NE Herbarium 2) expert advice.