Guideline for the survey of arid bronze azure butterfly (ABAB) in Western Australia

Background

The arid bronze azure butterfly (*Ogyris subterrestris petrina*, 'ABAB') is a threatened species that is listed as critically endangered under the national *Environment Protection and Biodiversity Conservation Act 1999* and the state *Biodiversity Conservation Act 2016*. The ABAB is listed due to its low abundance and severely fragmented distribution, with only two extant subpopulations being recorded in Western Australia. These subpopulations are at Barbalin Nature Reserve (BNR), and at a second site ~100 km from Barbalin. A third subpopulation (the first discovered, in the 1980s) occurred near Lake Douglas, 12 km SW of Kalgoorlie, but is now locally extinct and no ABAB have been recorded there since 1993. Threats to the ABAB include land clearing and habitat degradation.

At the two known extant sites where the ABAB occurs, the vegetation is mature mixed gimlet *Eucalyptus salubris* / salmon gum *E. salmonophloia* woodlands on red-brown loam soils, with an open understorey. In addition to gimlet and salmon gum, other smooth-barked eucalyptus at these sites which have basal ant colonies include wandoo *E. capilosa* subsp. wandoo, smooth-barked York gum *E. loxophleba* subsp. *lissophloia* and ribbon-barked mallee *E. sheathiana*. The habitat at the locally extinct Lake Douglas site differs from the other sites but is also dominated by mature smooth-barked eucalypt woodland, particularly Victoria Desert mallee *E. concinna*.

The ABAB has an obligate association with a sugar ant *Camponotus* sp. nr. *terebrans*. The ABAB larvae live entirely within the ant's nest during their development. The ants protect the larvae from predators and are thought to be rewarded with secretions produced by the larvae. The larvae are cryptic and extremely difficult to detect – only two have ever been seen. The most critical factor for habitat occupancy by the butterfly is the presence of large colonies of the host ant; only large colonies can support the ABAB because, being a parasitic species, it requires large numbers of hosts. The potential distribution of the ant is extensive (see map) and encompasses much of the semi-arid zone (rainfall < 325 mm) south of approximately 26° S latitude (see McArthur *et al.* 1997).

Scope

Surveys for the ABAB may be required where development or land management activities that could potentially affect the species and/or suitable habitat are proposed. This document provides guidelines for detecting current presence, or asserting the absence, of the ABAB when an on-ground survey is required.

This document provides guidance for survey methods to determine the presence of the ABAB and its host ant, as well as estimating the area of potential habitat. Prior to survey, all applicable licences, permits and approvals must be in place. With the commencement of the *Biodiversity Conservation Act 2016* from 1 January 2019, there is a requirement for a threatened fauna authorisation to take or disturb a threatened species. Surveys of the host ant may require a licence to take or disturb fauna (non-threatened) under the *Biodiversity Conservation Regulations 2018*. As a condition of the authorisation and licence, the licensee is required to submit a return detailing the species and numbers that were captured or sighted (data return and written report).

Survey protocol

Direct surveys to determine the presence of the ABAB undertaken without a host ant survey is not recommended. This is because (i) other butterflies and diurnal moths may be confused with the ABAB in flight, so a voucher specimen would be needed to confirm identity; and (ii) ABABs sometimes disperse from their natal colony across unsuitable habitat in search of new host ant colonies – so their presence at a site where the host ant is absent may indicate an ABAB colony occurs somewhere nearby, but does not indicate ABAB breeding habitat. The protocol has two components: (i) a survey to detect whether the host ant is present in large numbers; and (ii) if it is, then a survey to determine if the ABAB is present.

Ant survey

The host ant colonies occur at the base of mature smooth-barked eucalypts. Host ant colonies seem to occur at two extremes - either the ant colonies are very sparse and difficult to find; or else they are very widespread, with ants obvious and abundant.

To determine if the host ant is present at a site, and in what numbers, a random sample of trees is examined and assessed for ant presence/absence. Ant presence can be determined either by nocturnal survey (visit the trees in the evening, commencing in the first hour after sunset) or by diurnal survey (disturbing the soil around the base of the trees, to a depth of ~ 10 cm, to determine if an ant colony is present). Nocturnal surveys are non-destructive and the ants will be immediately apparent, as they are typically active in large numbers. Photographs of the ants will be sufficient to confirm their identity.

Determine the number of mature trees to sample and their approximate spacing as follows:

$$\text{No. sample trees} = 10 \times \sqrt{\text{(site area in hectares)}}$$

$$\text{Spacing} = \sqrt{[(\text{site area in hectares} \times 10{,}000) / \text{No. sample trees}]}$$

For example, a site with 10 hectares of mature smooth-barked eucalypt woodland would require a sample of 30 mature trees, at an approximate spacing of 55 m. Trees sampled should include those beside roads and tracks, where ants (and the ABAB) are typically more abundant. If a large colony of the host ant is present, the ants will be clearly apparent on tree trunks in the evening, or in nests at the base of trees during the day.

ABAB survey

A survey to detect the ABAB is only required if a large colony of host ants is detected. An ABAB survey should be conducted by someone familiar with the species using a standard butterfly transect survey. Surveys can only be conducted in fine weather with a forecast maximum temperature ≥ 23° C. The transect should sample the area around where the host ant was recorded in the ant survey and especially any roads or tracks adjacent to the ant colonies.

The transect length is determined as follows:

$$\text{Length} = 0.7 \times \sqrt{\text{(ant habitat area in hectares)}}\ \text{km}.$$

For example, if an estimated 5 hectares of a site contains ant colonies, then the transect will be 1.6 km long.

Because the length of the ABAB flight season is variable and adults may be sparse and difficult to detect, several repeat surveys with no ABAB sightings are needed to confirm absence of the species at a site. During the main flight period, between mid-September and late October, three repeat surveys at (at least) 2-week intervals are sufficient; between November and late April, 5 repeat surveys are needed, also at (at least) 2-week intervals. If the ABAB is detected, specimens should be photographed to confirm their identification, and then released.

Further information

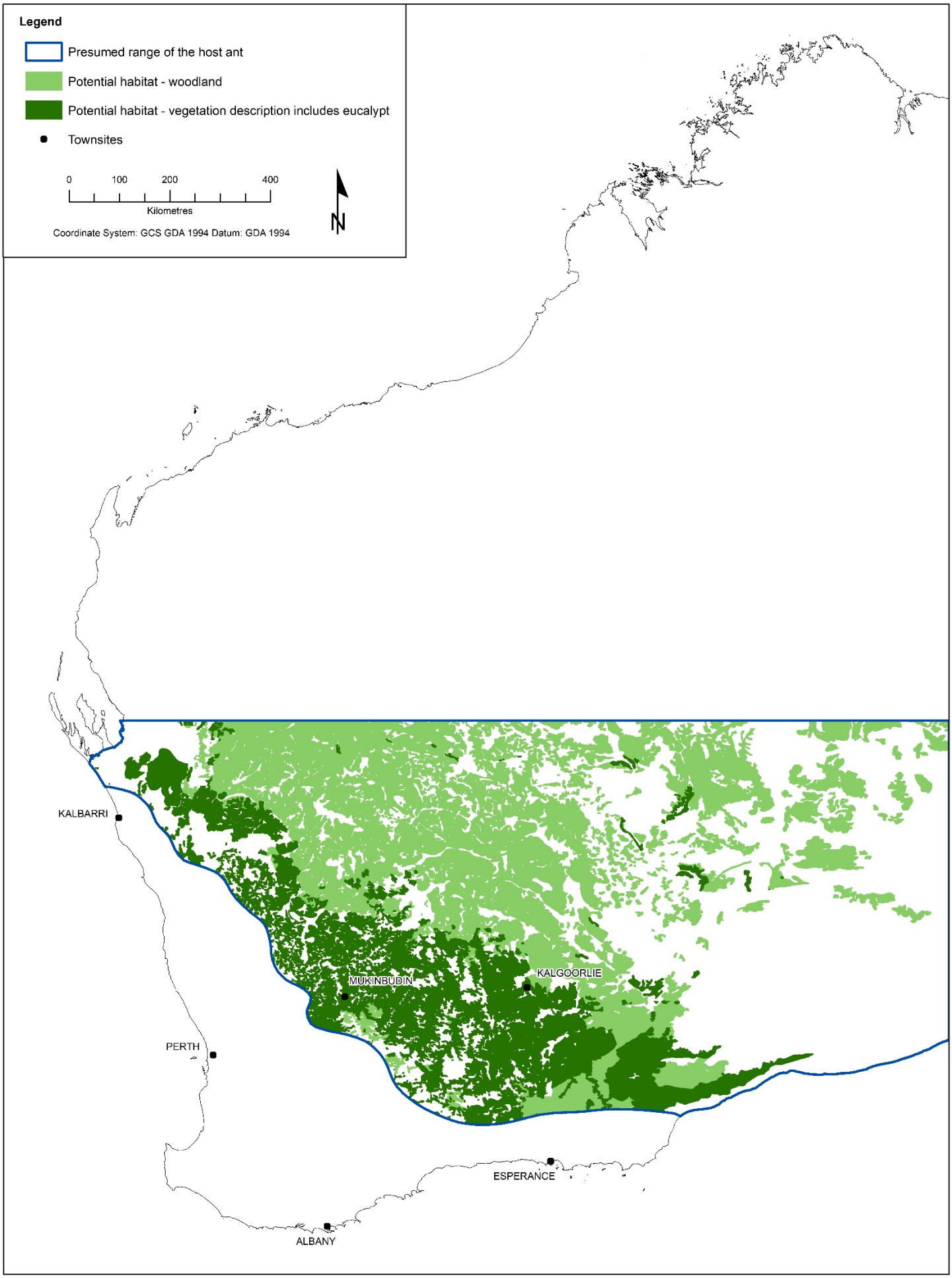
Department of Biodiversity, Conservation and Attractions *Threatened animals* web page.

Australian Government Department of Agriculture, Water and the Environment *Species Profile and Threats Database* profile for *Ogyris subterrestris petrina* — Arid Bronze Azure and the Conservation Advice *Ogyris subterrestris petrina* Arid bronze azure (a butterfly).

McArthur, A.J., Adams, M., Shattuck, S.O., 1997. A morphological and molecular review of *Camponotus terebrans* (Lowne) (Hymenoptera :Formicidae). Australian Journal of Zoology 45: 579-598.

Note that some sources refer to the host ant by its now-outdated name, *Camponotus terebrans*.

Arid bronze azure butterfly - host ant potential distribution



Note: This map is based on the best available information at the time of production.
It will be modified as new knowledge becomes available.

Further information:
Guideline for the survey of arid bronze azure butterfly (ABAB) in Western Australia (DBCA 2020).

Department of **Biodiversity, Conservation and Attractions**

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