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#### Population W2: Hakone Rd, Woongarrah (Wyang LGA)

A population estimated to contain over 200 plants occurs off Hakone Road Woongarrah (Figure 9), with an overstorey dominated by *Eucalyptus capitellata*, but with occasional *Angophora costata*, *Eucalyptus resinifera* and *Eucalyptus haemastoma*. The dense ground cover consists of *Ptilothrix deusta*, *Themeda australis*, *Xanthorrhoea latifolia* and *Xanthorrhoea resinifera*. This vegetation conforms most readily to the Narrabeen Buttonderry Footslopes Forest [Unit 28 of Bell 2002], although the clear dominance of *Eucalyptus capitellata* is unusual (but locally common on the Warnervale-Charmhaven lowlands).

#### Population W3: Arizona Rd, Charmhaven (Wyang LGA)

A population of over 600 plants occurs in approximately 2 hectares on both sides of Arizona Road, Charmhaven (Figure 10), although the vast majority of plants occur on the western block (Lot 1 DP 597518). The habitat includes regrowth, patchy dense stands of *Melaleuca nodosa*, *Allocasuarina littoralis*, and a ground cover dominated by dense *Ptilothrix deusta*, *Aristida warburgii*, *Pultenaea palacea*, *Pultenaea tuberculata*, *Xanthorrhoea latifolia*, and *Hibbertia vestita*. Historical aerial photographs of this area (Black & white, flown 1941) show it to have been almost totally cleared, and consequently the present-day vegetation represents a regrowth community of perhaps >60 years of age, or younger if repeat clearing has occurred since that time. Surrounding vegetation in neighbouring properties supports high numbers of *Eucalyptus haemastoma*, which would indicate a pre-clearing vegetation of Doyalson Scribbly Gum Woodland [Unit 31 in Bell 2002]. The population at Arizona Road traverses the intersection of Arizona and Chelmsford Roads, and occurs on the road verge centimetres from the bitumen edge.



Figure 9: Hakone Road (Population W2)



Figure 10: Arizona Road (Population W3)

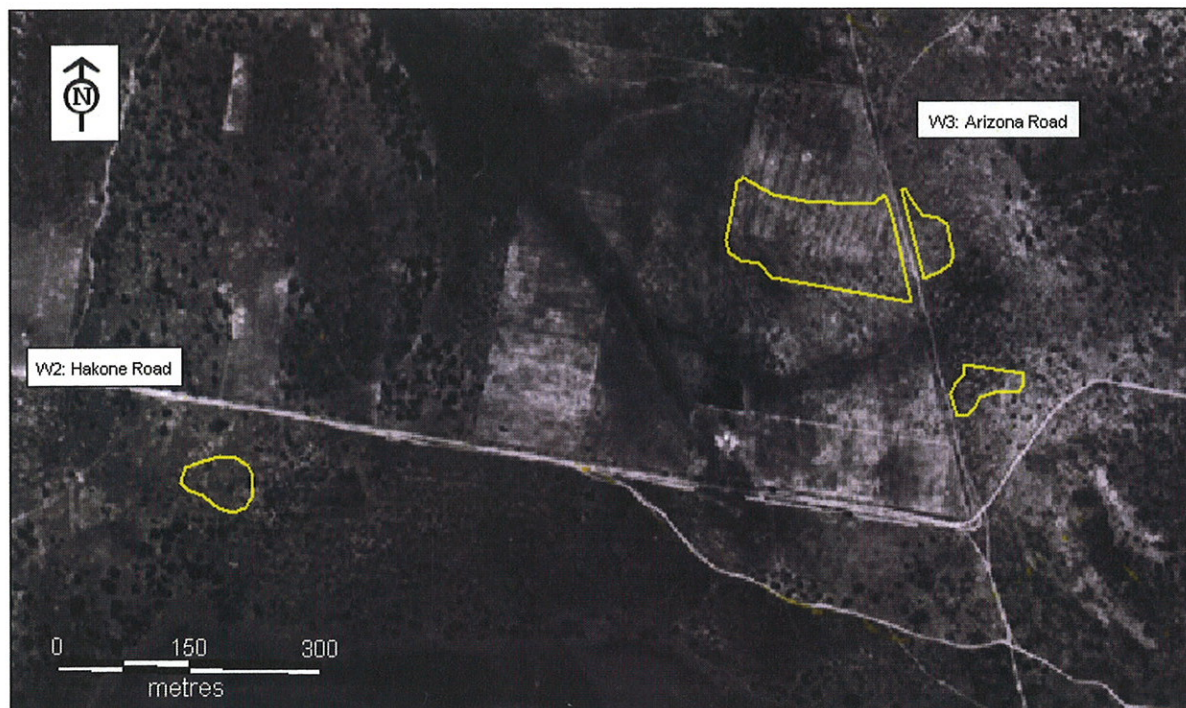
Both the Hakone Road (W2) and Arizona Road (W3) populations occur in lands that have been previously cleared, and now support regrowth vegetation. In the case of Hakone Road, the present day vegetation comprises an open forest dominated by *Eucalyptus capitellata*, over a dense grassy understorey. In 1941, this area supported only a few mature trees over what appears to be regrowth scrub of *Melaleuca nodosa*. At Arizona Road, the entire site had been cleared to the ground, but the present-day vegetation comprises an open to dense scrub of *Melaleuca nodosa* over a dense grassy understorey. Figure 11 shows the W2 and W3 populations over a 1941 black and white photograph of the area.

#### Population LM1: Wakefield (Lake Macquarie LGA)

This population is located in a powerline easement and consists of around 10 plants growing in an area of about 1m<sup>2</sup>. Comprehensive searches of the immediate area failed to result in any more



plants being found, and consequently this is a curiously isolated remnant population. The nearby forest was dominated by *Angophora costata*, *Eucalyptus piperita* and *Eucalyptus capitellata*.



**Figure 11:** The W2 (Hakone Rd) and W3 (Arizona Rd) populations of *Rutidosia heterogama* overlain on a B & W 1941 photograph of the area (photograph © Wyong Shire Council).

**Population LM2: Lot 2 Deaves Rd Cooranbong (Lake Macquarie LGA)**

About 50 plants spread across an area of around 0.3 ha in an underscrubbed allotment, with the dominant remnant tree species being *Eucalyptus globoidea*, *Eucalyptus resinifera*, *Angophora costata* and *Corymbia gummifera* (Figure 12).

**Population LM3: Deaves Rd reserve, Cooranbong (Lake Macquarie LGA)**

These plants are growing in a portion of the Deaves Road reserve, about 20m long and 1.5m wide and are scattered through a dense patch of *Imperata cylindrica var major* (Bladey Grass) where slashing is not easily carried out (Figure 13). The adjoining private property has a wide fire-break cleared between the fence and a forest dominated by *Corymbia maculata*. Stock have regularly grazed this area inside the fence and no *R. heterogama* was visible.



**Figure 12:** Lot 2 Deaves Road (Population LM2)



**Figure 13:** Deaves Rd reserve (Population LM3)



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Population LM4: Crawford Rd Cooranbong (Lake Macquarie LGA)

Plants in the Crawford Road population were mostly found along the road reserve at the intersection of Deaves and Crawford Roads Cooranbong, although several could be seen growing inside adjoining private properties. The total population estimate in the road reserves was around 300 plants.

Population C1: HEZ Kurri (Cessnock LGA)

These plants have been confirmed to occur within the land set aside for the Hunter Employment Zone near Kurri Kurri in the Lower Hunter (see [www2.tpgi.com.au](http://www2.tpgi.com.au); HSO 2004; Bell 2004). The numbers and distribution of these plants in this area have not been published, but estimates are in the order of >20000 plants (L. Grenadier, pers. comm.). Occupied habitat is largely confined to the Lower Hunter Spotted Gum – Ironbark Forest, although the species also occurs within an interesting variant of this type where Yellow Bloodwood (*Corymbia eximia*) dominates (Figure 14). A significant feature of this population is the location of these plants close to the adjoining Werakata National Park where similar vegetative habitat occurs, and plants have been observed within this reserve (L. Grenadier, pers. comm.).

Population C2: Lake Rd Elrington (Cessnock LGA)

This population occurs on the road reserve of Lake Road and extends into the adjoining Aberdare State Forest, and with plants occurring on both sides of the road. The forest is dominated by an overstorey of *Corymbia maculata* and *Eucalyptus fibrosa* with a ground cover of *Imperata cylindrica* var *major* and *Themeda australis* grasses.

Population C3: Church St Abermain (Cessnock LGA)

At Church St Abermain, there is a unique and restricted vegetation type dominated by stunted *Eucalyptus beyeriana*, occurring with *Eucalyptus parramattensis* subsp. *decadens* and *Eucalyptus punctata* (Figure 15). Understorey vegetation is generally grassy but with several heath-like shrubs present (eg: *Isopogon anemonifolius*, *Melaleuca thymifolia*, *Dillwynia retorta*). This vegetation does not fit neatly within the NPWS (2000) classification, but is perhaps closest to a form of the endangered Kurri Sands Swamp Woodland. *Rutidosia heterogama* occurs as a relatively small population on the higher slope, but counts have not been undertaken.



Figure 14: HEZ Kurri, *C. eximia* variant (Pop. C1)



Figure 15: Church St Abermain (Population C3)

Population C4: Werakata NP Abermain (Cessnock LGA)

In the north-eastern section of the Abermain portion of Werakata National Park, a large population of *Rutidosia heterogama* occurs within the Lower Hunter Spotted Gum – Ironbark Forest of NPWS (2000). In some areas, Grey Box (*Eucalyptus moluccana*) is prominent, but the understorey vegetation remains predominantly grassy with scattered shrubs.

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#### Population C5: Lang St Kurri (Cessnock LGA)

A population of unknown size occurs in the Lower Hunter Spotted Gum – Ironbark Forest of NPWS (2000) along a disused railway line on Crown land (M. Roderick, pers. comm.). This site has not yet been visited by the authors.

#### Population C6: Millfield Rd Paxton (Cessnock LGA)

A further population of unknown size occurs at Paxton, in the Hunter Lowlands Redgum Forest of NPWS (2000), also along a disused railway line on Crown land (M. Roderick, pers. comm.). This site has not yet been visited by the authors.

## 5.0 Discussion

### **5.1 Distribution and Abundance**

Urban and rural development has meant that *Rutidosia heterogama* is now extinct at all of the locations from which it was historically recorded in the region, and this is consistent with the national rating of 2VCa. As a result of the research documented in this report, the Central Coast/Hunter Valley distribution has now been extended to the Sparks Road area in the Wyong LGA (formerly only recorded as far south as the Hunter Valley), and occurs in disjunct locations in the Kurri Kurri/ Paxton area in the Lower Hunter. This extended range (south to Warnervale) would mean that the national status of the species should be revised to 3VCa, to reflect a known distribution of >100 km. Even so, the number of records of the plant are few, population sizes appear to be generally small and potentially reserved populations are very limited. The similarly threatened congener species *R. leptorhynchoides* is known from 24 locations with population numbers ranging from 5 – 100,000 plants and with a majority of populations having less than 200 plants (Young *et al.* 1999). By comparison, *R. heterogama* appears to be even less abundant than its nationally endangered relative. Reserved populations of *R. heterogama* are reported to occur in the Bundjalung, Broadwater and Yuraygir National Parks, as well as the Iluka Nature Reserve and Torrington State Conservation Area on the far North Coast (NPWS 1997; Stevenson 2004). In the Central Coast and Lower Hunter, the species is now known to occur within Werakata National Park, and also in the Aberdare State Forest. Populations growing in roadside reserves and powerline easements could also be considered as having a form of reserved status although the regular slashing of these areas by relevant managing authorities, and mowing and landscaping by nearby householders, limits the ecological value of these populations.

An illustration of the historical fragmentation of populations of *Rutidosia heterogama* can be seen from an analysis of the distribution of the plants in the Cooranbong area that includes the plants on Lot 2 Freemans Dive. All of the plants occur in remnant dry woodland dominated by stringy barks and bloodwoods. It is reasonable to conclude that the pre-1750 distribution of this plant in the area would have been in this drier habitat that occurs above the 10m contour line with the forest composition generally changing above the 20m contour line. Figure 16 shows the probable pre-1750 distribution and the current distribution which has been reduced to around 5% of the original available habitat.

### **5.2 Habitat on the Central Coast/ Hunter Valley**

Harden (1992) indicated that the preferred habitat of *Rutidosia heterogama* is mostly heath, often occurring along disturbed roadsides, in coastal districts from Maclean to the Hunter Valley, and inland to Torrington. Steenbeeke (1998) briefly outlines a description of the species, together with habitat details including its occurrence (or likely occurrence) in dry sclerophyll forest and woodland, heath, dunes (including stabilised dunes), and disturbed areas. NPWS (1997) report that the north-coast populations of *Rutidosia heterogama* present in Broadwater and Bundjalung National Parks, and Iluka Nature Reserve, occur in sedgeland on clay soil. The majority of habitat notes lodged with herbarium specimens (at NSW and MEL) also record the plant as growing in clay soils. In Torrington SCA, *Rutidosia heterogama* occurs mostly along fire trails and on granite-derived soils (L. Copeland, Botany Department, UNE, pers. comm.).



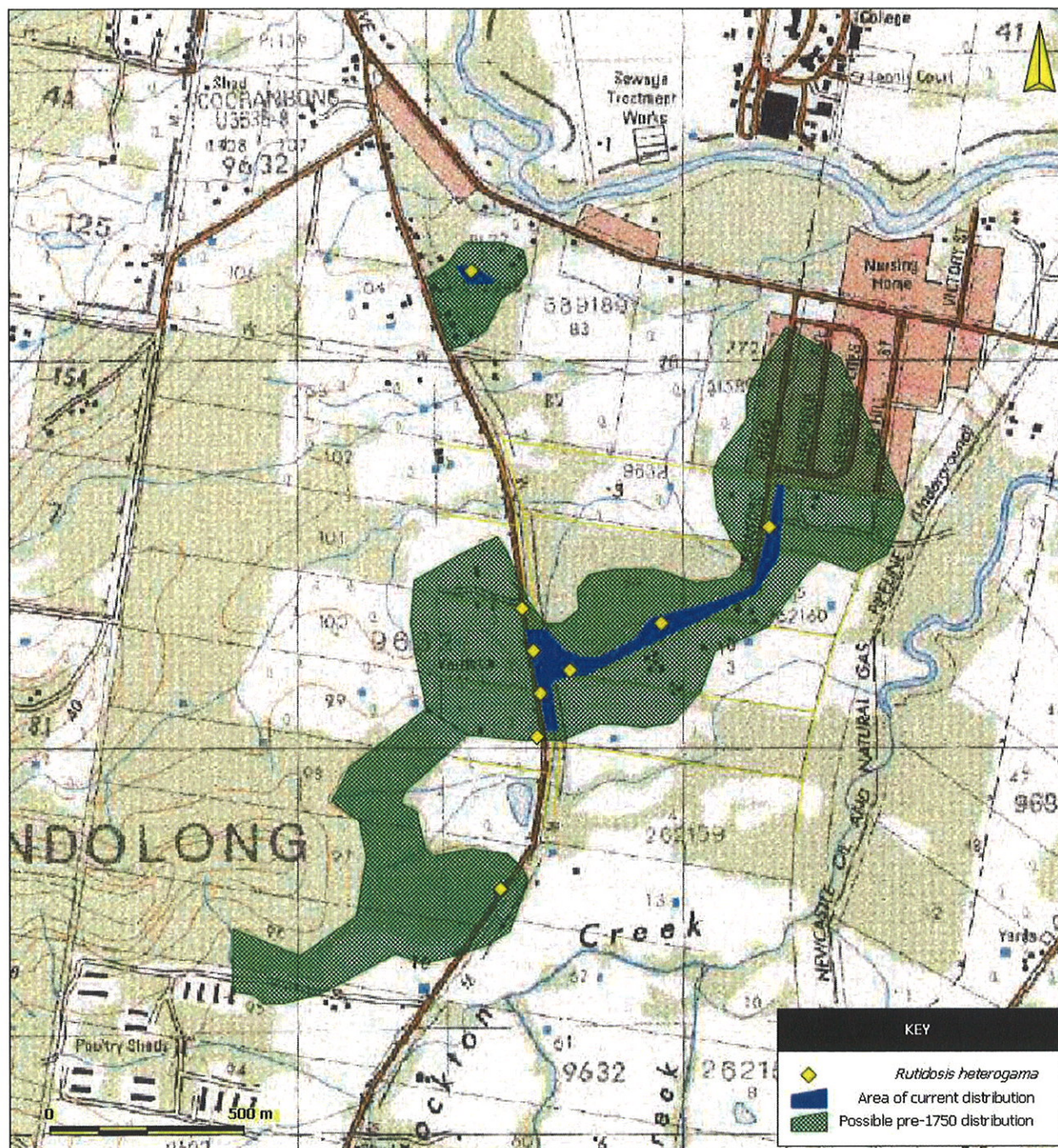


Figure 16: Estimated pre-1750 population of *Rutidosia heterogama* at Cooranbong, Lake Macquarie LGA.

Within the Hunter Valley and Central Coast, our observations indicate that *Rutidosia heterogama* tends to prefer dry sclerophyll forest vegetation where *Corymbia maculata* and/or *Eucalyptus capitellata* are prominent, and with a sparse-to-dense ground layer of grasses and other graminoids. We have recorded the species in six distinct vegetation types, encompassing five of the regional map units of NPWS (2000). At one location in Cessnock LGA, this species occurs within the Lower Hunter Spotted Gum – Ironbark Forest of NPWS (2000), and also within an interesting variation of that complex where *Corymbia eximia* dominates with several sandstone-