

THE PHYTOSOCIOLOGY AND SYNECOLOGY OF TASMANIAN VEGETATION WITH *CALLITRIS*

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(with two tables, two text-figures and an appendix)

Eleven discernible floristic plant communities were identified in vegetation containing *Callitris* in Tasmania. *C. rhomboidea* and *C. oblonga* largely segregate into two sets of communities. These sets occupy distinctly different parts of the environmental range of *Callitris* in Tasmania. *Callitris* co-occurs with at least 14% of the Tasmanian native higher plant flora in rainforest, wet eucalypt forest, dry eucalypt forest, grassy woodland, scrub and heath, and is dominant in some quadrats of most communities. The major measured correlates of floristic variation in the data set were temperature and precipitation conditions. The combination of the wide ecological range demonstrated by the data set and the highly restricted nature of *Callitris* distribution suggests that the taxon has a range much diminished by short-term perturbation. *Callitris* may have been part of an extensive dry rainforest formation in eastern Tasmania before people invaded the area.

Key Words: *Callitris*, dry rainforest, phytosociology, synecology.

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INTRODUCTION

METHODS

Callitris is the only native gymnosperm genus found in the drier parts of Tasmania, where it is sporadically prominent within a range characterised by seemingly random absences and prominent disjunctions (Harris 1989). The gymnosperms of the wetter parts of Tasmania have suffered a considerable diminution of their ranges since European settlement (Kirkpatrick & Dickinson 1984, Cullen & Kirkpatrick 1988, Brown 1988). Experience elsewhere (e.g. Bowman *et al.* 1988) and some limited observations in Tasmania (Kirkpatrick 1977, Brown & Bayly-Stark 1979a, Harris & Brown 1980, Harris & Kirkpatrick 1982, Duncan & Duncan 1984, Duncan & Brown 1985) suggested to us that *Callitris* was also in a state of retreat. The investigation reported herein is part of a larger study directed towards the long-term conservation management of *Callitris* species and communities in Tasmania. Later papers will discuss the autecology of *C. rhomboidea* and *C. oblonga*, their regeneration and stand dynamics, the history and palaeohistory of their distributions, and their conservation requirements.

In this paper we define and describe floristic communities within the range of *Callitris*, analyse their environmental relationships and discuss the implications of these results.

During the summers of 1986/87, 1987/88 and 1988/89, floristic and environmental data were collected from 126 10 × 10 m quadrats distributed evenly throughout the range of *Callitris* in Tasmania. These data included floristic lists, height and cover by stratum, dominance, topographic position, the date of the last fire (where determinable from information, tree rings or growth whorls on *Banksia*), geomorphological situation (13 classes), slope, surface geology, altitude, drainage (three classes), slope aspect, soil texture (using the classes of Corbett 1969), soil depth and surface soil pH (using a CSIRO soil-testing kit). Class data, where possible, were arranged to form a continuous series. Thus, geologic classes were ordered from argillaceous to siliceous and slope aspect was scored from northwest to southeast to reflect the effect of exposure on insolation. Climatic data were derived from the extrapolated surfaces produced by the BIOCLIM modelling package (Busby 1986).

The polythetic divisive classificatory program TWINSPLAN (Hill 1979) was used to gain an initial sorted table which was reworked, where appropriate, using a table resorting program (Minchin 1986). Eleven communities were selected for description. The environmental relationships of the communities were determined using one-way analysis of variance.

Species nomenclature follows Buchanan *et al.* (1989). Structural nomenclature follows Duncan & Brown (1985) where apposite, and Sepeck (1981) otherwise.

TABLE 1
 Percentage Frequency of Taxa Occurring in More than 40%
 of the Quadrats in Any One Group

1 = 1–10%, 2 = 11–20%, 3 = 21–30%, 4 = 31–40%, 5 = 41–50%, 6 = 51–60%, 7 = 61–70%, 8 = 71–80%, 9 = 81–100%.

	1	2	3	4	5	6	7	8	9	10	11
<i>Holcus lanatus</i>	7	–	–	2	–	–	2	–	–	–	–
<i>Cassinia aculeata</i>	9	–	–	–	1	1	2	–	–	–	–
<i>Poa labillardieri</i>	9	7	–	–	–	1	–	–	1	–	–
<i>Rosa rubiginosa</i>	4	5	–	–	–	–	2	–	–	–	–
<i>Melaleuca gibbosa</i>	–	6	3	–	–	–	–	1	–	–	–
<i>Schoenus apogon</i>	–	5	–	2	2	–	–	–	–	–	–
<i>Eucalyptus ovata</i>	4	8	3	1	–	1	–	–	–	–	–
<i>Acacia dealbata</i>	7	4	2	5	2	2	–	–	–	–	–
<i>Eucalyptus viminalis</i>	7	4	2	4	7	5	6	–	1	–	–
<i>Leptospermum lanigerum</i>	4	5	2	2	2	2	2	1	–	–	–
<i>Plantago lanceolata</i>	4	–	2	–	1	1	6	–	–	–	–
<i>Ulex europaeus</i>	4	2	9	1	1	–	4	–	–	–	–
<i>Acaena novae-zelandiae</i>	4	2	–	2	2	6	8	–	–	–	2
<i>Bursaria spinosa</i>	4	2	5	3	7	5	8	–	–	3	–
<i>Callitris oblonga</i>	–	9	9	2	1	1	4	1	–	–	–
<i>Banksia marginata</i>	–	2	3	6	2	4	4	5	–	–	–
<i>Epacris impressa</i>	–	5	–	7	4	2	2	3	–	–	–
<i>Lomandra longifolia</i>	–	7	9	6	8	2	6	–	–	–	–
<i>Bossiaea prostrata</i>	–	3	2	2	5	1	–	–	–	–	–
<i>Callistemon paludosus</i>	–	1	5	1	2	1	–	–	1	–	–
<i>Gonocarpus tetragynus</i>	–	3	–	3	5	1	–	–	–	–	–
<i>Hibbertia riparia</i>	–	1	2	4	5	–	–	1	–	–	–
<i>Astroloma humifusum</i>	–	1	–	6	8	2	–	–	1	–	–
<i>Hypochoeris radicata</i>	–	2	2	2	1	–	6	–	–	2	–
<i>Oxalis corniculata</i>	–	1	2	3	4	7	9	–	1	2	–
<i>Lepidosperma elatius</i>	–	3	2	4	6	9	2	–	4	–	2
<i>Pomaderris apetala</i>	–	2	6	–	2	8	8	–	–	–	6
<i>Micranthemum hexandrum</i>	–	–	6	–	2	1	2	–	–	–	–
<i>Gonocarpus micranthus</i>	–	–	6	–	1	–	2	1	–	–	–
<i>Leptospermum scoparium</i>	–	–	2	5	2	2	–	5	4	–	–
<i>Acacia verticillata</i>	–	–	3	2	2	7	2	2	1	–	–
<i>Melaleuca ericifolia</i>	–	–	3	2	1	2	2	2	5	3	–
<i>Allocasuarina verticillata</i>	–	–	2	2	3	1	2	2	7	3	2
<i>Dodonaea viscosa</i>	–	–	2	1	2	2	–	1	1	6	2
<i>Acacia mucronata</i>	–	–	3	–	4	2	2	8	7	–	4
<i>Notelaea ligustrina</i>	–	–	3	–	4	3	–	–	1	–	6
<i>Callitris rhomboidea</i>	9	–	–	9	9	9	8	9	9	9	9
<i>Eucalyptus globulus</i>	–	–	–	3	3	7	4	6	2	–	6
<i>Pteridium esculentum</i>	–	–	–	5	2	6	2	2	4	–	2
<i>Pultenaea daphnoides</i>	–	–	–	1	–	2	–	1	5	–	–
<i>Viola hederacea</i>	–	–	–	3	5	5	–	1	–	–	–
<i>Lepidosperma lineare</i>	–	–	–	2	5	–	–	1	–	–	–
<i>Poa rodwayi</i>	–	–	–	1	7	1	–	–	–	–	–
<i>Eucalyptus pulchella</i>	–	–	–	–	6	4	2	–	–	–	2
<i>Coprosma quadrifida</i>	–	–	2	–	1	6	–	–	–	–	4
<i>Beyeria viscosa</i>	–	–	3	–	2	5	2	–	–	–	8
<i>Asplenium flabellifolium</i>	–	–	–	1	2	4	–	–	–	–	8
<i>Bedfordia salicina</i>	–	–	–	2	–	3	–	–	–	–	6
<i>Ctenopteris heterophylla</i>	–	–	–	–	–	2	–	–	–	–	8
<i>Rumohra adiantiformis</i>	–	–	–	–	–	1	–	–	–	–	6
<i>Microsorium diversifolium</i>	–	–	–	–	–	2	–	1	1	–	6

	1	2	3	4	5	6	7	8	9	10	11
<i>Leptospermum glaucescens</i>	—	—	—	—	—	—	—	5	—	—	—
<i>Leptospermum laevigatum</i>	—	—	—	—	—	—	—	5	6	9	—
<i>Rhagodia candolleana</i>	—	—	—	—	—	—	—	1	1	5	—
<i>Leucopogon parviflorus</i>	—	—	—	2	—	—	—	2	1	6	—
<i>Poa poiformis</i>	—	—	—	1	—	—	—	—	1	5	—
<i>Crassula sieberana</i>	—	—	—	1	1	—	—	1	—	5	2
<i>Bromus diandrus</i>	—	—	—	—	—	—	2	—	—	6	—
<i>Polycarpon tetraphyllum</i>	—	—	—	—	—	—	—	—	—	5	—

THE COMMUNITIES AND THEIR ENVIRONMENTS

Structural Variation

Callitris oblonga occurred most frequently in woodland, scrub and shrubland dominated by *Eucalyptus*, the most common dominants being *E. ovata* and *E. viminalis*, followed by *E. amygdalina* (table 1). *C. oblonga* was the next most common dominant (table 2), forming a scrub or shrubland. Other non-eucalypts dominating scrub or shrubland with *C. oblonga* included *Leptospermum lanigerum*, *L. scoparium*, *Melaleuca pustulata*, *Hakea microcarpa*, *Acacia mucronata* and *Pomaderris apetala*.

In contrast to *C. oblonga*, *C. rhomboidea* was as common in open forest as in woodland, scrub or shrubland. *C. rhomboidea* also occurred in closed forest and heath. A wide range of eucalypt species was recorded as dominant in vegetation with *C. rhomboidea*. This range included *E. globulus*, *E. viminalis*, *E. amygdalina*, *E. obliqua*, *E. pulchella*, *E. tenuiramis*, *E. ovata*, *E. nitida* and *E. regnans*. *C. rhomboidea* was the most common non-eucalypt dominant. Others included *Allocasuarina verticillata*, *Melaleuca ericifolia*, *Leptospermum laevigatum*, *Kunzea ambigua* and *Banksia marginata*.

Floristic Communities

A list of all higher plant species observed in association with *Callitris* in Tasmania is given in the appendix. The percentage frequency of each abundant observed taxon in each of the 11 communities discussed below is presented in table 1. The community distributions are shown in figure 1 and their environmental characteristics are shown in figure 2. They are named by the most common dominant species and structural type, by the species of *Callitris* present and by the most characteristic (i.e. constant and faithful) other species. The dominant and most characteristic species are not necessarily highly constant within each

group, as dominance was not an input to the classificatory procedure and characteristic species are defined by fidelity. Thus, the titles indicate a nodum of variation.

(1) *Eucalyptus viminalis*—*Callitris rhomboidea*—*Cassinia aculeata* shrubland — This is a community of silty, flat, near-coastal sites. The few quadrats in this group have been invaded by exotic grasses and herbs. It occurs on significantly flatter sites than all other communities and on significantly warmer sites in winter than community (2). Disturbance, leading to the invasion of exotics, may largely account for its distinctiveness.

(2) *Eucalyptus ovata*—*Callitris oblonga*—*Melaleuca gibbosa* shrubby woodland — This is the community of alluvial river flats. It is most closely related to community (3), which occurs in more rocky riparian situations. It extends into colder winter environments than all others but (3) and (11), and occurs in areas of much lower precipitation, especially during the drier months, than community (11).

(3) *Callitris oblonga*—*Callistemon paludosus* tall open shrubland — This community occurs on rocky riparian sites on the South Esk, Apsley and Swan Rivers. Dolerite is the dominant rock. The community is typically heavily invaded by *Ulex europaeus*. It occurs in areas with lower precipitation during the driest months than communities (4), (5), (6) and (11) and lower winter temperatures than communities (4), (7), (8), (9) and (10).

(4) *Eucalyptus amygdalina*—*Callitris rhomboidea*—*Epacris impressa* shrubby woodland — *E. obliqua*, *E. globulus* and *E. viminalis* are also occasionally dominant in this community, which extends from Tasman Peninsula to Bicheno on sandy sites in relatively moist areas and on skeletal dolerite soils where precipitation is high. The community is in the middle part of the climatic range on all variables. It occurs on significantly more sandy sites than group (6) and significantly more acid sites than communities (5) and (6). It differs environmentally from most other communities in its climatic characteristics.

(5) *Eucalyptus pulchella*/*E. viminalis*—*Callitris rhomboidea*—*Poa rodwayi* woodland — This is the community of dry and rocky, dolerite sites, i.e. either

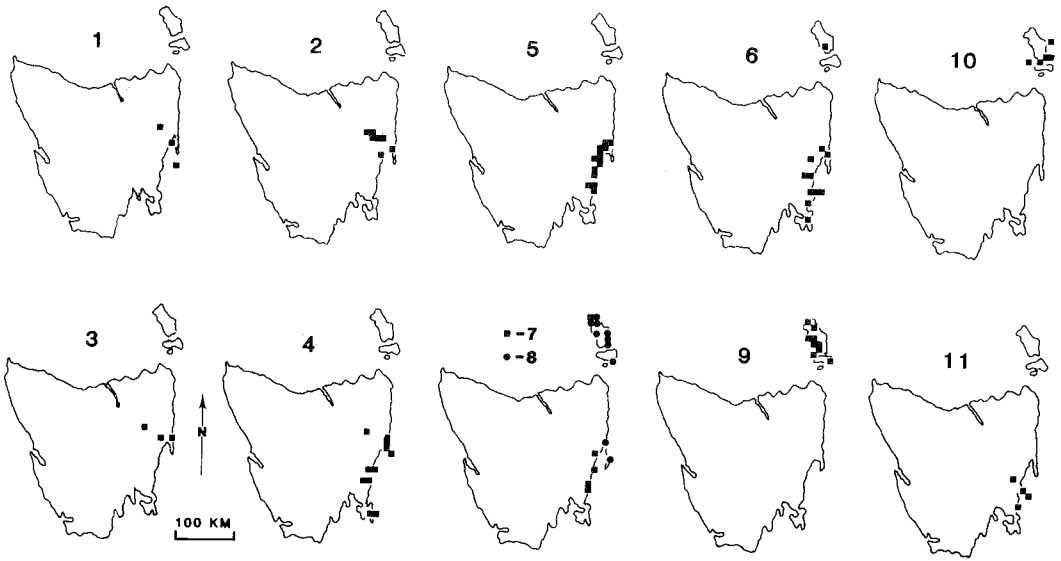


FIG. 1 — The distribution of the *Callitris* communities.

TABLE 2
The Proportion of Quadrats in Classificatory Groups
Dominated by Non-Eucalypt Genera

Genus	Group										
	1	2	3	4	5	6	7	8	9	10	11
<i>Callitris</i>	—	—	62	6	8	7	—	24	62	100	40
<i>Acacia</i>	—	—	12	—	—	—	—	—	—	—	—
<i>Allocasuarina</i>	—	—	—	—	—	—	—	—	13	14	—
<i>Banksia</i>	—	—	—	—	—	7	—	—	—	—	—
<i>Hakea</i>	—	—	25	—	—	—	—	—	—	—	—
<i>Kunzea</i>	—	—	—	—	—	—	—	—	15	14	—
<i>Leptospermum</i>	—	—	12	—	—	—	—	29	15	71	—
<i>Leucopogon</i>	—	—	—	—	—	—	—	—	—	29	—
<i>Melaleuca</i>	—	—	12	—	4	—	—	—	23	14	—
<i>Pomaderris</i>	—	—	12	—	—	7	—	—	—	—	—

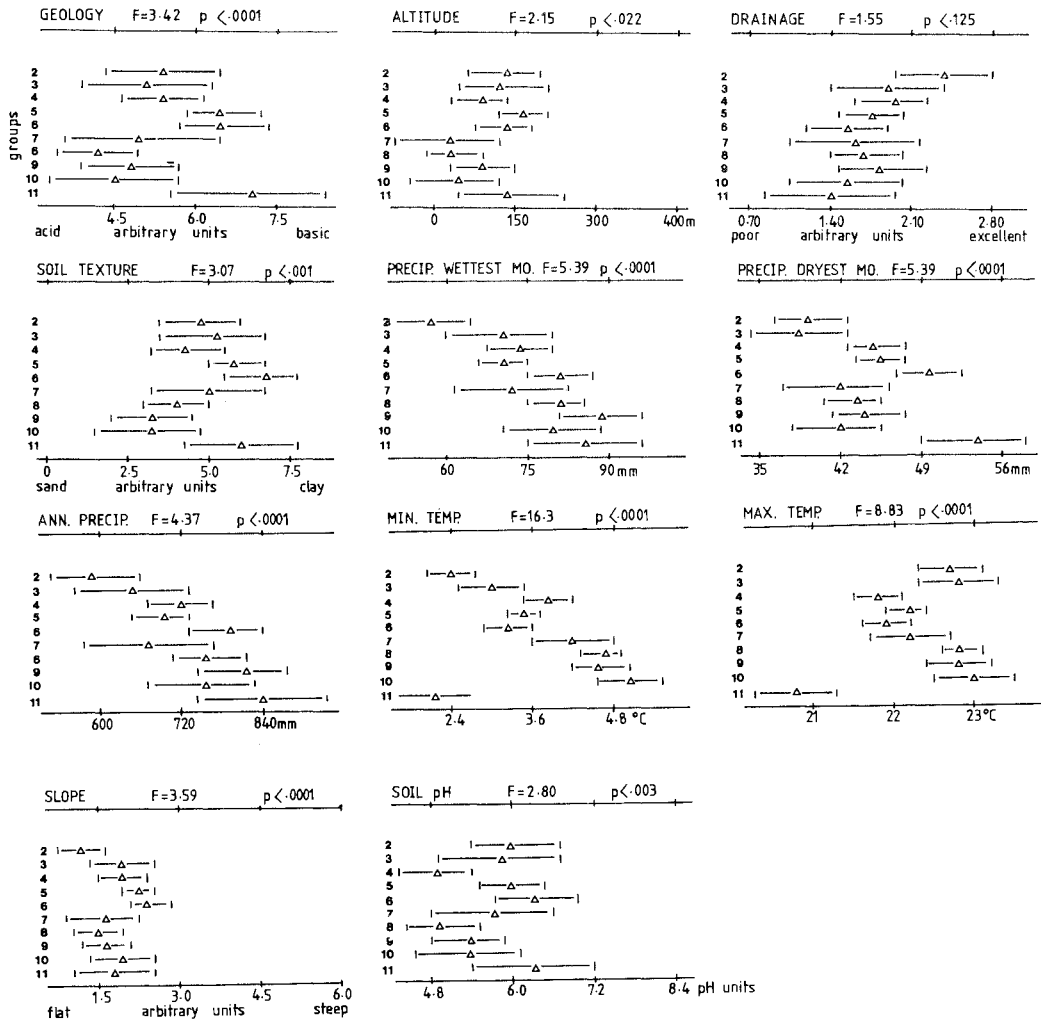


FIG. 2 — Means and 95% confidence limits for communities on selected environmental variables (community (1) is excluded because of the low number of quadrats).

rocky ridges, rocky knolls or talus slopes. The understorey is variably shrubby or grassy. The community occupies a highly distinct microenvironment, which differentiates it from communities (4) and (7), and a macroclimatic zone distinct from that of most other communities.

(6) *Eucalyptus globulus/E. obliqua-Callitris rhomboidea-Coprosma quadrifida* shrubby woodland — This community occupies wetter sites than community (5), often on rocky talus slopes within steep gullies, but these sites are also usually on dolerite.

The community is marginal to wet eucalypt forest. Its macroclimate is significantly different from that of most other communities.

(7) *Eucalyptus viminalis-Callitris rhomboidea-Bursaria spinosa* woodland — This community occurs on deep, well-drained soils on disturbed sites, such as river banks and dunes along the central east coast. It is heavily invaded by exotic taxa.

(8) *Eucalyptus globulus-Callitris rhomboidea-Allocasuarina monilifera* woodland — This community of the Bass Strait islands typically occurs

on leached soils on granitic colluvium. The understorey is characterised by typical heath species, such as *Allocasuarina monilifera* and *Leptospermum scoparium*. Communities (9) and (10), also from Bass Strait, typically occur in places more subject to coastal influences than community (8), and community (9) also occurs on shallower soils. The Tasmanian mainland communities are climatically and edaphically distinct in their environmental range.

(9) *Allocasuarina verticillata*–*Callitris rhomboidea*–*Leptospermum laevigatum* low closed forest — This Bass Strait island community occurs close to the coast on a variety of soils, most of which are shallow and acid. Like the previous community, it is climatically distinct in its range from the communities of the Tasmanian mainland.

(10) *Callitris rhomboidea*–*Dodonaea viscosa* closed scrub — This near-coastal Bass Strait island community has a climate that distinguishes it from most other communities, and tends to occur in slightly drier coastal situations than community (8).

(11) *Eucalyptus globulus*–*Callitris rhomboidea*–*Bedfordia salicina* (woodland) closed forest — This community occupies dolerite talus in extremely moist conditions, where *Callitris* is found mixed with species that extend to the rainforests of western Tasmania and is associated with a rich variety of hygrophilous ferns. It is climatically distinct from all others except community (1), which occupies a distinctly different topographic situation.

The one-way analysis of variance indicated that the mean temperatures of the coldest and warmest months were the best discriminators between communities, followed by the precipitation of the wettest and driest months. There was less segregation of the communities in response to the topographic and soil-related variables.

Although in most quadrats in most communities the *Callitris* species are subordinate to eucalypts, substantial proportions of the quadrats in groups (3), (8), (9), (10) and (11) have one of the two species as the sole dominant or a codominant (table 2). Thus, *C. oblonga* is most likely to be dominant in the tallest stratum in rocky riparian situations, whereas *C. rhomboidea* is most frequently dominant on the Bass Strait islands and the moistest part of its range on the Tasmanian mainland. Nevertheless, it is only in communities (1), (2) and (7) that there is no quadrat with *Callitris* as a dominant. These groups contain the most heavily human-disturbed sites in the survey.

The communities containing *Callitris* cover a substantial proportion of the environmental conditions found in eastern Tasmania. For example, soil pH varies from 3.0 to 8.5, altitude from sea level to 575 m, parent material from fertile alluvium to deeply leached sand,

frost climate from severe to frost free, precipitation from 500 mm per annum to 1400 mm. Fourteen per cent of the Tasmanian native higher plant species were recorded from the 126 quadrats in the survey.

GENERAL DISCUSSION

The quadrat environmental data collected for this study indicate that the types of biophysical environments occupied by both species are far more extensive than their present ranges. *Callitris oblonga* is now largely restricted to the riparian zone of a few major rivers, yet can and does occur on shallow, well-drained soils well above the flood zone, and on at least one coastal sand dune system. It is totally absent from rivers identical in attributes to those from which it has been recorded. Similarly, with catholic tastes in soil and climate, *C. rhomboidea* has a surprisingly limited local occurrence and macrodistribution. For example, communities (4), (5) and (6) are virtually identical in their species composition, excluding *C. rhomboidea*, to wet and dry eucalypt forest communities known to occur widely in the Hobart region (Hogg & Kirkpatrick 1974, Brown & Bayly-Stark 1979b, Kirkpatrick *et al.* 1988). This pattern of distribution is consistent with the hypothesis that *Callitris* has a range reduced from its edaphic/climatic potential by uncongenial disturbance regimes and a limited dispersal ability (cf. Clayton-Greene 1981, Bowman *et al.* 1988). Further evidence in relation to this question will be presented and discussed in our later papers.

Kirkpatrick (1989) postulated the existence of a dry rainforest formation covering much of eastern Tasmania before the invasion of people and suggests that the following east coast tree species are likely to be capable of gap phase regeneration without exogenous disturbance: *Callitris rhomboidea*, *C. oblonga*, *Allocasuarina verticillata*, *A. littoralis*, *Asterotrichion discolor*, *Beyeria viscosa*, *Coprosma quadrifida*, *Dodonaea viscosa*, *Exocarpos cupressiformis*, *Pittosporum bicolor*, *Pomaderris apetala*, *Bedfordia salicina*, *Notelaea ligustrina* and *Olearia argophylla*. It is notable that these species, and others identified by Jarman *et al.* (1984) as components of Tasmanian rainforest, are all found within the range of *Callitris* today (table 1 and appendix).

The putatively relict nature of *Callitris* in Tasmania makes it important to ensure that stands in a wide range of environments are protected from clearance or inappropriate disturbance regimes. Groups (1), (5), (6), (9), (10) and (11) are known from national parks or equivalent reserves. Group (2) is found within a private nature reserve established by the Tasmanian Conservation Trust Inc. Group (3) is found in the Gorge

and the Trevallyn State Recreation Area. Group (4) is found near Cape Hauy in a forest reserve. Group (8) is found in the area under threat of alienation, but proposed for a nature reserve, at Wingaroo on Flinders Island. Group (7) is found in crown land at the coast at Orford. While some substantial populations of *C. rhomboidea* are found within reserves with first-class security and appropriately informed management, *C. oblonga* is a rare and threatened species with only one small private nature reserve being managed to the end of its preservation, and with most of its remaining populations, all small, being on private land. This taxon and the communities in which it occurs require active management if they are to survive another century. High concentrations of invasive, inflammable exotics make the future of most stands dependent on weed control,

The reservation and management programme that needs to be developed for *Callitris* communities in Tasmania will benefit two species of considerable horticultural worth that provide an interesting visual contrast in the eucalypt-dominated landscape of eastern Tasmania.

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APPENDIX

Vascular Plant Species in Association with *Callitris*

Recorded from quadrat samples throughout the Tasmanian range of *C. rhomboidea* and *C. oblonga*. Nomenclature follows Buchanan *et al.* (1989) except for *Olearia archeri* Lander and *Cupressus macrocarpa* Hartw.

DICOTYLEDONS

AIZOACEAE (FICOIDEAE)

*Carpobrotus rossii**Tetragonia implexicoma*

APIACEAE (UMBELLIFERAE)

*Daucus glochidiatus**Hydrocotyle* sp.*Hydrocotyle hirta**Hydrocotyle sibthorpioides**Xanthosia pilosa**Xanthosia tridentata*

APOCYNACEAE

Vinca major

ASTERACEAE (COMPOSITAE)

*Arctotheca calendula**Bedfordia linearis**Bedfordia salicina**Brachyscome aculeata**Brachyscome decipiens**Brachyscome parvula**Brachyscome rigidula**Cassinia aculeata**Cirsium vulgare**Gnaphalium collinum**Helichrysum antennarium**Helichrysum apiculatum**Helichrysum costatifructum**Helichrysum dendroideum**Helichrysum lycopodioides**Helichrysum obcordatum**Helichrysum scorpioides**Helichrysum scutellifolium**Hypochoeris glabra**Hypochoeris radicata**Lagenifera stipitata**Leontodon taraxacoides**Leptorhynchus squamatus**Odixia angusta**Olearia archeri* Lander*Olearia argophylla**Olearia ericoides**Olearia lepidophylla**Olearia lirata**Olearia myrsinoides**Olearia persoonioides**Olearia phlogopappa**Olearia stellulata**Olearia viscosa**Senecio* sp.*Senecio gunnii**Senecio hispidulus**Senecio lautus**Senecio linearifolius**Senecio minimus**Senecio quadridentatus**Sonchus* sp.*Sonchus asper**Sonchus oleraceus*

BRASSICACEAE (CRUCIFERAE)

Cardamine sp.*Rorippa* sp.

CAMPANULACEAE

Wahlenbergia sp.*Wahlenbergia gracilentia**Wahlenbergia gymnoclada*

CARYOPHYLLACEAE

Cerastium fontanum Baumg.*Polycarpon tetraphyllum**Silene* sp.

CASUARINACEAE

*Allocasuarina littoralis**Allocasuarina monilifera**Allocasuarina verticillata*

CHENOPODIACEAE

Rhagodia candolleana

CLUSIACEAE (GUTTIFERAE)

Hypericum gramineum

CONVOLVULACEAE

Dichondra repens

CRASSULACEAE

Crassula sieberana

CUNONIACEAE

Bauera rubioides

DILLENIACEAE

*Hibbertia aspera**Hibbertia empetrifolia**Hibbertia hirsuta**Hibbertia prostrata**Hibbertia riparia**Hibbertia serpyllifolia*

DROSERACEAE

Drosera peltata

ELAEOCARPACEAE

Elaeocarpus reticulatus

EPACRIDACEAE

*Acrotiche serrulata**Astroloma humifusum**Astroloma pinifolium**Cyathodes divaricata**Cyathodes glauca**Cyathodes juniperina**Epacris gunnii**Epacris impressa**Epacris lanuginosa*

- Epacris marginata*
Epacris paludosa
Epacris tasmanica
Leucopogon collinus
Leucopogon ericoides
Leucopogon parviflorus
Lissanthe strigosa
Monotoca elliptica
Monotoca glauca
- ESCALLONIACEAE
- Anopterus glandulosus*
- EUPHORBIACEAE
- Amperea xiphioclada*
Beyeria viscosa
Micranthemum hexandrum
Phyllanthus australis
Phyllanthus gunnii
Poranthera microphylla
Ricinocarpus pinifolius
- FABACEAE (LEGUMINOSAE)
- Acacia axillaris*
Acacia dealbata
Acacia genistifolia
Acacia mearnsii
Acacia melanoxylon
Acacia mucronata
Acacia myrtifolia
Acacia sophorae
Acacia stricta
Acacia suaveolens
Acacia terminalis
Acacia verniciflua
Acacia verticillata
Aotus ericoides
Bossiaea cinerea
Bossiaea prostrata
Daviesia ulicifolia
Dillwynia cinerascens
Dillwynia glaberrima
Dillwynia sericea
Glycine clandestina
Gompholobium huegelii
Goodia lotifolia
Hovea lanceolata
Hovea linearis
Indigofera australis
Platylobium formosum
Platylobium triangulare
Pultenaea daphnoides var. *obcordata*
Pultenaea gunnii
Pultenaea juniperina
Pultenaea pedunculata
Pultenaea stricta
Sphaerolobium vimineum
Trifolium dubium
Trifolium repens
Ulex europaeus
Vicia sp.
- GENTIANACEAE
- Centaurium erythraea*
- GERANIACEAE
- Geranium potentilloides*
Geranium solanderi
Pelargonium inodorum
- GOODENIACEAE
- Dampiera stricta*
Goodenia elongata
Goodenia lanata
Goodenia ovata
- HALORAGACEAE
- Gonocarpus micranthus*
Gonocarpus tetragynus
Gonocarpus teucroides
- LAMIACEAE (LABIATAE)
- Ajuga australis*
Mentha diemenica
Prostanthera lasianthos
Prunella vulgaris
- LAURACEAE
- Cassytha glabella*
Cassytha melantha
Cassytha pubescens
- MALVACEAE
- Asterotrichion discolor*
- MONIMIACEAE
- Atherosperma moschatum*
- MYOPORACEAE
- Myoporum insulare*
- MYRTACEAE
- Baeckea ramosissima*
Callistemon paludosus
Calytrix tetragona
Eucalyptus amygdalina
Eucalyptus delegatensis
Eucalyptus globulus
Eucalyptus nitida
Eucalyptus obliqua
Eucalyptus ovata
Eucalyptus pulchella
Eucalyptus regnans
Eucalyptus tenuiramis
Eucalyptus viminalis
Kunzea ambigua
Leptospermum glaucescens
Leptospermum grandiflorum
Leptospermum laevigatum
Leptospermum lanigerum
Leptospermum scoparium
Melaleuca ericifolia
Melaleuca gibbosa
Melaleuca pustulata
Melaleuca squarrosa
- OLEACEAE
- Notelaea ligustrina*
- ONAGRACEAE
- Epilobium* sp.
- OXALIDACEAE
- Oxalis corniculata*
- PITTOSPORACEAE
- Billardiera longiflora*

- Billardiera procumbens*
Billardiera scandens
Bursaria spinosa
Pittosporum bicolor
 PLANTAGINACEAE
Plantago lanceolata
Plantago varia
 POLYGALACEAE
Cornesperma volubile
 POLYGONACEAE
Muehlenbeckia adpressa
Rumex acetosella
Rumex brownii
 PRIMULACEAE
Anagallis arvensis
 PROTEACEAE
Banksia marginata
Grevillea australis var *linearifolia*
Hakea lissosperma
Hakea sericea
Hakea teretifolia
Lomatia tinctoria
Personia juniperina var *juniperina*
 RANUNCULACEAE
Clematis aristata
Clematis gentianoides
Ranunculus sp.
 RHAMNACEAE
Pomaderris apetala
Pomaderris elliptica
Pomaderris pilifera
Spyridium microphyllum
Spyridium obovatum
Spyridium vexilliferum
Stenanthemum pimeleoides
 ROSACEAE
Acaena echinata
Acaena novae-zelandiae
Crataegus monogyna
Rosa rubiginosa
Rubus fruticosus
Rubus parvifolius
 RUBIACEAE
Coprosma hirtella
Coprosma quadrifida
Galium australe
Galium ciliare
Galium gaudichaudii
 RUTACEAE
Boronia anemonifolia
Boronia citriodora
Boronia pilosa
Correa lawrenciana
Correa reflexa
Eriostemon verrucosus
Phebalium bilobum
Phebalium squameum
Zieria arborescens
 SANTALACEAE
Exocarpos cupressiformis
Exocarpos syrticola
- Leptomeria drupacea*
 SAPINDACEAE
Dodonaea viscosa
 SCROPHULARIACEAE
Veronica calycina
Veronica formosa
 SOLANACEAE
Solanum laciniatum
Solanum nigrum
 STACKHOUSIACEAE
Stackhousia monogyna
 STERCULIACEAE
Lasiopetalum baueri
Lasiopetalum micranthum
 STYLIDIACEAE
Stylidium graminifolium
 THYMELAEACEAE
Pimelea drupacea
Pimelea flava
Pimelea humilis
Pimelea nivea
 TREMANDRACEAE
Tetradlea labillardieri
Tetradlea pilosa
 URTICACEAE
Australina pusilla
Urtica incisa
 VIOLACEAE
Viola sp.
Viola hederacea
 WINTERACEAE
Tasmannia lanceolata
 ZYGOPHYLLACEAE
Zygophyllum billardieri
- MONOCOTYLEDONS
 CENTROLEPIDACEAE
Centrolepis strigosa
 CYPERACEAE
Baumea juncea
Carex breviculmis
Carex iynx
Carex longibrachiata
Eleocharis acuta
Gahnia graminifolia
Gahnia grandis
Gahnia microstachya
Gahnia radula
Gahnia trifida
Isolepis cernua
Isolepis nodosa
Isolepis subtilissima
Lepidosperma concavum
Lepidosperma elatius
Lepidosperma laterale
Lepidosperma lineare
Lepidosperma longitudinale
Schoenus apogon
Tetraria capillaris
 HYPOXIDACEAE
Hypoxis glabella

IRIDACEAE

- Diplarrena moraea*
- Iris foetidissima*
- Patersonia fragilis*

JUNCACEAE

- Juncus pallidus*
- Juncus pauciflorus*
- Luzula* sp.
- Luzula novae-cambriae*

LILIACEAE

- Arthropodium minus*
- Bulbine bulbosa*
- Bulbine semibarbata*
- Dianella revoluta*
- Dianella tasmanica*

ORCHIDACEAE

- Caladenia* sp.
- Caladenia catenata*
- Dendrobium striolatum*
- Pterostylis longifolia*
- Thelymitra* sp.

POACEAE (GRAMINEAE)

- Agrostis capillaris*
- Agrostis parviflora*
- Agrostis stolonifera*
- Aira caryophyllea*
- Briza maxima*
- Bromus diandrus*
- Bromus sterilis*
- Cynosurus echinatus*
- Danthonia caespitosa*
- Danthonia dimidiata*
- Danthonia pilosa*
- Danthonia racemosa*
- Danthonia semiannularis*
- Danthonia setacea*
- Deyeuxia accedens*
- Deyeuxia monticola*
- Deyeuxia quadriseta*
- Dichelachne rara*
- Ehrharta distichophylla*
- Ehrharta stipoides*
- Holcus lanatus*
- Phalaris aquatica*
- Phragmites australis*
- Poa* sp.
- Poa labillardieri*
- Poa poiformis*
- Poa rodwayi*
- Poa sieberiana*
- Stipa* sp.
- Stipa aphylla*
- Stipa mollis*
- Stipa pubinodis*
- Stipa rudis*
- Themeda triandra*

RESTIONACEAE

- Hypolaena fastigiata*
- Leptocarpus brownii*
- Leptocarpus tenax*

XANTHORRHOEACEAE

- Lomandra longifolia*
- Lomandra nana*
- Xanthorrhoea australis*

GYMNOSPERMS

CUPRESSACEAE

- Callitris oblonga*
- Callitris rhomboidea*
- Cupressus macrocarpa* Hartw.

PHYLLOCLADACEAE

- Phyllocladus aspleniifolius*

PTERIDOPHYTES

ADIANTACEAE

- Adiantum aethiopicum*

ASPIDACEAE

- Polystichum proliferum*

ASPLENIACEAE

- Asplenium flabellifolium*

BLECHNACEAE

- Blechnum nudum*
- Blechnum watsii*

DAVALLIACEAE

- Rumohra adiantiformis*

DENNSTAEDTIACEAE

- Histiopteris incisa*
- Pteridium esculentum*

DICKSONIACEAE

- Dicksonia antarctica*

GRAMMITIDACEAE

- Ctenopteris heterophylla*
- Grammitis billardieri*

HYMENOPHYLLACEAE

- Hymenophyllum cupressiforme*
- Hymenophyllum flabellatum*
- Hymenophyllum peltatum*
- Hymenophyllum rarum*

LINDSAEACEAE

- Lindsaea linearis*

LYCOPODIACEAE

- Lycopodium varium*

POLYPODIACEAE

- Microsorium diversifolium*

SELAGINELLACEAE

- Selaginella uliginosa*

SINOPTERIDACEAE

- Cheilanthes austrotenuifolia*
- Pellaea falcata*