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BIOLOGICAL SURVEY

GREAT NORTHERN HIGHWAY

WUBIN TO DALWALLINU SECTION

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Prepared for: Main Roads Department

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PLANT COMMUNITY TYPES :

Mapping Unit No.	Plant Community Type
1.	Open Woodland of E. loxophleba
2.	Open Woodland of E. salubris
3.	Open Woodland of E. salmonophloia
4.	Low Woodland to Open Mallee of E. loxophleba – Eucalyptus spp.
5.	Scrub–Heath with Mallee (E. ewartiana)
6.	Open Mallee of E. brachycorys
7.	Open Mallee of Eucalyptus spp. over dense Sedgelands
8.	Tall Shrubland of Melaleuca spp.
9.	Tall Shrubland of Hakea–Acacia–Banksia species
10.	Closed Scrub –Heath of Allocasuarina spp.
11.	Open Scrub –Heath of mixed Proteaceae–Mimosaceae–Myrtaceae families, with emergent Mallees
12.	Halophytic Complex of Samphires
13.	Cleared Land

LEGEND

DISTURBANCE LEVELS :

0 No disturbance
1 Slightly disturbed, generally few introduced species with only the occasional bulldozed track
2 Disturbed, with pockets of remnant native vegetation
3 Very disturbed, few native trees or understorey species left, often Acacia and grasses dominant in disturbed areas.

4/11 – 1/2 Communities (4 and 11) with Disturbance Levels (1 and 2)
4 – 1 Communities 4 with Disturbance Level 1
(80) Observation Site with detailed recordings
..... Boundary between Plant Community Types
..... Boundary between Disturbance Levels

VEGETATION MAP – DALWALLINU TO WUBIN

Prepared by E.M. Mattiske & Associates

MEAN SCALE :	1 : 25 000	KILOMETRE S.L.D. : 222.87 TO 241.70	ROAD : GREAT NORTHERN HIGHWAY NO. : 116
SHEET NO. 15	OF 17	POSTS : TO	LOCAL AUTHORITY : DALWALLINU NO. : 503
DRAWN :	B.D.	LITHO NO. 64 80 89 80	DIVISION : MOORA NO. : 08

MAIN ROADS DEPARTMENT W. A.

FILE NUMBER	DRAWING TYPE	DRAWING NUMBER
	25	7422-33

1. SUMMARY

The field survey of the Road Reserve between Wubin and Dalwallinu was carried out during the months of March and April 1988.

Climatic data for the region was extracted and summarized. The data should assist in future planning of revegetation programmes along the Wubin to Dalwallinu road verge. Soil data was collected from the detailed 29 observation sites, in conjunction with the botanical field studies. Results are presented in relation to the defined plant community types.

A total of 33 families, 69 genera and 152 vascular plant species were recorded in the survey area between Wubin and Dalwallinu. Four of these plant species were introduced to the area, while two of the Eucalypts were planted at regular intervals. In view of the seasonal conditions only the dominant species were collected. It is expected that the total number of species in the Road Reserve could be substantially increased if the work was undertaken during the spring - flowering months. The dominant families were Myrtaceae, Proteaceae, Chenopodiaceae, Mimosaceae and Papilionaceae.

A total of 8 plant community types were defined for the survey area (9 if the cleared land is included as a community type). These community types varied substantially in their structure and floristic composition. The communities with the highest range of species were the scrub-heaths. The latter range is significant for the conservation of flora species. Other plant communities were also significant for a variety of reasons, including the pressure of clearing in adjacent agricultural areas. Amongst these were the woodlands of Gimlet (Eucalyptus salubris) and Salmon Gum (Eucalyptus salmonophloia). A review of the representation of the respective plant community types along the road verge was assessed by calculating the proportion of road distance covered by the respective plant community types. These calculations assisted in the review of the local significance of the respective plant communities. In addition the conservation status of these communities on a regional scale was reviewed.

Thirty-two species of bird, 3 native and three introduced mammals were recorded. No amphibians or reptiles were seen. The results of other surveys conducted in the area and W.A. Museum computer records indicate that a further 73 birds, 11 native mammals, 5

frogs and 43 reptiles could be expected if a series of surveys including trapping were carried out. In keeping with the Wubin to Perenjori verge the area is therefore potentially rich in fauna (E.M.Mattiske & Assoc., 1987). The richest habitat for vertebrate species was the cleared land with some revegetation. This is considered to be a product of the structural diversity of these areas. York Gum woodland was second highest in species richness followed by all other habitats which were fairly uniform in productivity.

Due to the amount of clearing in the region the whole road verge is considered to be of value to the flora and fauna. Plant communities and habitats of particular note are the small woodland remnants, areas of mixed scrub-heath and the combination of disturbed areas such as the railway reserves, town margins, sidings and grassed areas. In view of the degree of regional clearing for agricultural activities, the contribution of the uncleared areas in the Road and adjacent Railway Reserves becomes particularly significant. Further, these corridors provide continuity with the scattered uncleared patches of native vegetation on the range of reserves and the planned towns and currently operating railway sidings. The latter areas should be reviewed with the appropriate Government Departments and Local Shires to encourage management of the native communities on these areas. It is significant that the Environmental Protection Authority recognized the significance of these areas to the conservation of native communities in 1974:

> "In addition to the areas specified above, the Committee draws attention to two types of reserves which, as a result of the extensive clearing and the lack of conservation reserves in the Wheatbelt, are today significant for the conservation of wildlife".

The report expands on these two areas as the "Country and Railway Water Supply Reserves" and the "Townsites". In addition a series of reserves were inspected, both abutting the road verge and in nearby areas. Observations from these reserves were compared with results collected along the road verges from Wubin to Dalwallinu (summarized in this report) and from Wubin to Perenjori (E.M. Mattiske & Assoc., 1987).

Management procedures designed to enhance the value of road verges are provided, with particular attention being directed to techniques to encourage the return of the native flora and fauna in degraded areas and recently added cleared areas.

2. OBJECTIVES

The Main Roads Department of Western Australia is currently developing a revegetation and management plan for the Wubin to Dalwallinu section of the Great Northern Highway. To facilitate this procedure E.M. Mattiske & Associates was commissioned to undertake a biological survey of the Road Reserve between Dalwallinu (234 SLK) and Wubin (253 SLK). The fauna section was subcontracted to Ninox Wildlife Consulting. The following report (and attached maps) summarizes findings.

The specific objectives were to provide:

- a detailed description and summary of climatic data,
- soil descriptions and relate to topography and plant communities,
- an inventory of the vascular plant species in the road verge between Wubin and Dalwallinu,
- a review of plant species considered to be rare and endangered, geographically restricted or an outlier population,
- an inventory of the exotic plants, including declared plants,
- general physical characteristics of plants and flowering times,
- a description and location of the plant communities on the road verge,
- a review of the local and regional significance of the plant communities,
- an inventory of:
  - (a) the vertebrate fauna species records gathered during the current survey;
  - (b) recent published and unpublished species records; and
  - (c) provisional records of seasonal migrants or cryptic species likely to occur but as yet unrecorded;
- a review of the fauna species considered to be rare and endangered, geographically restricted or an outlier population,
- a review of pest, declared or vermin animals,
- a review of species in need of special consideration.
- an assessment of the relationships between vertebrates and the plant communities present on the road verge and identify any habitats of significance;
- a review of the zoogeographic region as a whole and an assessment of the regional and local conservation status of the road verge fauna;

- an assessment of the value of the road verge in providing habitat and facilitating movement between conservation areas; and,
- information directed towards management techniques for improving the value of road verges for flora and fauna species.

3. BACKGROUND

3.1 Climate

The climate is Mediterranean, with cold, wet winters and hot, dry summers. Winter rains are derived from the southern cyclonic depressions and typically related to frontal activity, while summer rains are erratic and heavy. The area has been classified as Winter Rainfall (moderate to heavy) - Temperate (Bureau of Meteorology, 1986). As noted, this is typical for the West Australian Wheatbelt, although the "moderate to heavy" classification changes to "mainly moderate" in eastern areas of the Wheatbelt. The latter differences within the Wheatbelt relate to the proximity of the Indian Ocean and the rain bearing depressions from the west. Gentilli (1972) refers to the area as the "Winter-Wet South West". All these classifications refer to the seasonal climatic conditions, which typify the Mediterranean climate.

3.2 Physiography

The survey area lies on the Darling Plateau, on a gently undulating surface approximately 300 metres above sea level. The area is drained by broad intermittent creeks, although there were no dried salt lakes or saline drainage lines in the current study area (Bettenay, 1962; Bettenay and Mulcahy, 1972; Beard, 1973; Beard 1976). The landscape is generally lacking in relief, with only remnant areas of exposed rock (e.g. Buntine Rock to the north, E.M. Mattiske & Assoc., 1987).

3.3 Soils

The Wubin area is covered in broad terms by the C.S.I.R.O soil map (Northcote et al., 1967). In the survey area there is a relatively simple pattern of sandplains on remnants of the duricrusted Tertiary surface and red loams in the valleys. These components appear on the C.S.I.R.O. soil map as Ms9, yellow earths with no A2 horizon and acid reaction; Oc35, hard setting loamy soils with red clayey subsoils, alkaline reaction; and SV4, loamy soils of minimal development (Northcote et al., 1967; Beard, 1976). The dominance of sandplains on the survey area, particularly in the northern section of the area was previously noted by Beard and Sprenger (1984). The continuity of these areas with other more extensive sandplains can also be seen from the map presented in the publication by Beard.

3.4 Human Influences

The northern Wheatbelt has been largely cleared for agricultural purposes, so that only remnants of stony, sandy or saline areas remain relatively intact. Kitchener (1979) reviewed the recent clearing activities in the vicinity of the Buntine Nature Reserve. The observations in this survey reflect this clearing impact.

In assessing the areas of native vegetation in the area it was apparent that there were remnant pockets of native vegetation on selected private properties and a range of reserves. However for a variety of reasons (including exposure and grazing of seedlings) many of these stands have been degenerating. Old et al. (1981) recognized the large variety of causes that can lead to "dieback" symptoms in the Australian landscape. The northern Wheatbelt illustrates many of these concepts of deterioration, The lack of extensive stands of native vegetation in the area, only stresses the conservation significance of the Road, Railway and Nature Reserves.

Other impacts include the passage of fire, both intentional and accidental. Although various arguments abound about the advantages or disadvantages of fire, it appears that frequent fires are deleterious to the native communities in the area. Further, little information is available on the regeneration strategies of many species which occur in the West Australian Wheatbelt. The recent summary of a workshop held in Busselton (Saunders et al., 1987)

highlights many of the research and management needs associated with the smaller areas of native vegetation left in the Australian landscape. Many of the principles discussed in this publication are applicable to this survey area.

3.5 Flora and Vegetation

The survey area occurs in the South-Western Botanical Province (Beard, 1980). Previous studies have been carried out in the survey area by Beard (1976; 1979) and Muir (1979). The following formations recorded in the area were noted by Beard (1976):

A. Woodland
"Sclerophyll woodland, an open tree formation with woody understorey on red loam valley soils. Four species are distinguished which associate variously, *Eucalyptus loxophleba*, *E. oleosa*, *E. salmonophloia* and *E. salubris*" (Beard, 1976).

B. Shrubland
2. "Shrubland with scattered trees. Thickets and scrub, generally of *Acacia*, with scattered emergent trees too sparse to qualify as woodland, the shrub layer being dominant" (Beard, 1976).
"(c) Mallee and *Acacia* with scattered *Casuarina*'s (now *Allocasuarina*)
(d) *A. acuminata* scrub with scattered *E. loxophleba*.

3. Thicket
"Closed shrub formation. .... all members of the widespread *Acacia* - *Casuarina* - *Melaleuca* alliance" (Beard, 1976).
"(a) *Acacia* - *Casuarina* thicket on sandplain.
(b) Mixed *Acacia* thicket on sandplain.
(c) Mixed *Acacia* thicket with heath understorey.
(d) *Acacia acuminata* - *M. uncinata* thicket.
(e) *Casuarina campestris* thicket on stony and lateritic ground.
(f) *Casuarina* - *Melaleuca* thicket on stony hills."

4. Scrub
"Open Shrub formations" (Beard, 1976).
"(a) *Acacia* scrub.
(b) *Casuarina campestris* scrub.

5. Scrub heath
"A community with a sparse to open tall shrub layer - in which Proteaceae are prominent, and a dense heath ground layer mainly of Myrtaceae, on leached sand soils " (Beard ,1976).
"(a) Association No. 7 on sandhills.
(b) Association No. 8 on sandplains."

Muir (1979) mapped the vegetation in the Buntine Nature Reserve. Results illustrate the dominance of the Shrublands and Heaths on this Reserve (47% and 31% respectively). The Woodland and Mallee formations were noted to contribute to 18 % of the Reserve area (6% and 12% respectively).

3.6 Fauna

As a direct result of land clearing throughout the Western Australian Wheatbelt there has been a dramatic decline in populations of birds, mammals, amphibians and reptiles. In response to this decline the Western Australian Museum initiated a major survey to examine and record the status of remnant populations; the study commenced in 1971 and Kitchener (1976) published the main survey objectives. The study resulted in a series of baseline publications, detailing the vegetation and fauna of 24 Wheatbelt reserves and included accessory data on adjacent farmland, uncleared bushland and road reserves.

Following these reports three significant papers were published in an international conservation journal. In these papers, Kitchener et al., (1980a, 1980b, 1982) summarized the current status of the vertebrate groups found in the Wheatbelt and detailed their habitat requirements and conservation implications. In their assessment of birds, Kitchener et al. (1982) concluded with the following statement:

> "We have observed almost all the resident bird species in Wheatbelt road verges and consider that the long-term viability of the Wheatbelt nature reserve system would be considerably enhanced if natural vegetation on road and

railway verges and other corridors of vegetation linking reserves throughout the region could be protected by careful management and in most instances by widening verges. This would allow immigration to counter the effects of inbreeding in small populations (Hooper, 1971) and allow for reinvasion of more mobile species into reserves following catastrophies to fauna such as those caused by fire."

Since then there has been an increasing awareness of the value of narrow strips or remnants of natural vegetation to facilitate the movements of vertebrates (especially birds) between conservation reserves. The recent publication by Saunders et al. (1987) includes 21 papers dealing exclusively with remnant patches of vegetation; most of these include discussions on their importance to fauna.

The road verge north of Wubin was assessed for fauna in May 1987 and included detailed information gathered by the Western Australian Naturalists' Club in 1986. Because of the proximity of the Wubin to Dalwallinu road verge to this previously surveyed northern section it can effectively be considered as a very similar southern extension. Kitchener (1979) presents data for the Nugadong and East Nugadong Nature Reserves, and the Nugadong Forest Reserve, three locations which are near the study area. The Wubin to Dalwallinu road verge supports many of the fauna habitats found in these reserves, albeit in an attenuated and isolated condition. Basic species lists have been compiled from this source.

3.7 Reserves

A range of reserves occur both adjacent and near the survey area, however their purposes and vestings differ, Table 1. All are relatively small in size, and therefore subject to the problems of management associated with the smaller areas of native vegetation (e.g. edge effects, fire regimes, track disturbances, indiscriminate rubbish dumping). Nevertheless they still provide value for conservation, and should be reviewed for possible change of purpose and vesting (e.g. to joint vestings of "conservation of flora and fauna and water").

Table 1: Summary of Reserves near the Wubin to Dalwallinu Road

Reserve No.	Purpose of Vesting	Appropriate Location
26837	Flora and Fauna	Buntine
16379	Water	Buntine (abuts 26837)
9935	Flora and Fauna	Wubin to Jibbering Road
18245	Flora and Fauna	Wubin
28184	Flora	South-east of Wubin
12614	Flora	East of Nugadong
20372	Flora	East of Nugadong
10351	Water and Flora	East of Nugadong
15463	Water	East of Dalwallinu
2736	Flora	West of Dalwallinu

The range of reserves in the vicinity, although largely small in area, enabled the opportunity to undertake a comparison with the Road Reserve on the Wubin to Dalwallinu stretch of the Great Northern Highway.

4. METHODS

4.1 Climate

Records were extracted from information at the Bureau of Meteorology, Perth. The 1986 and 1987 data were not available from the Bureau of Meteorology. Therefore all data to 1985 was summarized in tabular form to assist in interpretation.

4.2 Soils

At most of the 29 detailed vegetation observation sites, soil details were recorded, to allow correlation with plant community types. Soils were defined using basic assessments of size particles and colour. To minimize bias by the recorders a reference was made to the system defined in the Rock Colour Charts (based on Munsell Colour Charts). Additional notes were made on distinctive characteristics of the soil for management purposes.

4.3 Flora

Plant specimens were recorded and collected at regular intervals, in conjunction with the vegetation studies. All specimens were pressed, dried, fumigated and checked at the Western Australian State Herbarium. Identifications were carried out with the assistance of Herbarium staff with particular expertize. Their assistance was critical in view of the lack of flowering or fruiting material (due to the timing of the survey). Scientific names used in this report follow Green (1985), although several are based on State Herbarium records (e.g. Petrophile incurvata was extracted from State Herbarium records).

During the survey an attempt was made to contact the local Agricultural Protection Board officer in Dalwallinu, however there was no one currently acting in this position. Therefore it was not possible to refer to Departmental noxious weed records on the Wubin to Dalwallinu road verge. During field studies attention was directed at searching for noxious weed infestations during the native flora and vegetation survey work.

4.4 Vegetation

A reconnaissance was carried out by the botanists. This was achieved by driving the length of road to be surveyed and by reviewing all reserves in close proximity to the survey area. All field work was undertaken in March 1988. The latter timing led to some difficulties with lack of flowering and fruiting material.

The flora and vegetation studies were based on regular observations along the 19.0 km stretch of road and at a series of detailed observation points (29 sites), numbered consecutively from Wubin to Dalwallinu (1 to 29). The location of the observation sites is recorded on the vegetation maps at the distance along the road to enable future relocation. All dominant species were recorded for each site, and where necessary collected for identification in Perth. In view of the previous study on the Wubin to Perenjori Road an established field herbarium enabled a ready reference for many of the species.

The degree of disturbance was recorded using the following ranking:

0 - No Disturbance.
1 - Slightly Disturbed, generally few introduced species with only the occasional bulldozed track.
2 - Disturbed, with pockets of remnant native vegetation.
3 - Very Disturbed, few native trees or understorey species left, often Acacia and Grasses dominant in disturbed areas.

The Road Reserve was restricted largely to the eastern side of the road. The width of uncleared vegetation varied from 2 to 40 metres. The majority of the vegetation was disturbed or very disturbed. In addition, observations were also carried out on the western side of the road in the Railway Reserve. The latter was important in view of the major contribution of the Railway Reserve to the stands of native vegetation along the road verges. In most instances the vegetation mapping boundaries were at right angles to the road. The significance of reviewing both sides of the road concurrently is important in view of the need to cover the changes, as well as to address the management and conservation issues.

The boundaries between different plant community types were mapped with solid lines, while the changes in degrees of disturbance within a particular plant community type were mapped using broken lines. All vegetation mapping was undertaken on plans supplied by the Main Roads Department (1:25,000). Plant community type boundaries and disturbance level boundaries were checked with the Aerial Photographs supplied by the Main Roads Department (at a scale of 1:25,000).

A range of calculations were carried out on the composition of the plant communities and the location of plant communities for assessing the conservation status of the respective species and communities. Wherever possible these results were tabulated to assist in the interpretative stage of the project.

4.5 Fauna

The Wubin to Dalwallinu road verge was assessed for vertebrate fauna in April 1988 using two field personnel. The verge was completely traversed by vehicle on three separate occasions. A rapid familiarisation traverse was carried out initially. This was followed by a slow spot-check until nightfall of the same day. Spot-checking on foot was then carried out for all major vegetation communities. Twenty-five points on the verge were sampled.

Birds: All birds sighted were recorded in conjunction with accessory information on vegetation type and points of interest such as last seasons' nests.

Mammals: Sightings or evidence of this group such as scats, tracks, scratchings, burrows or skeletons were recorded.

Amphibians and reptiles: Hand-foraging was conducted for this group and checks were made for active individuals.

Field data were supplemented by commissioning a computer search of W.A. Museum records. Relevant publications dealing with fauna in close proximity to the study area were examined for information on species already recorded or likely to occur in the general area. Information on distribution, habitat preference and conservation status was drawn from these sources.

As birds were the most common group observed along the verge these have been used to give a preliminary indication of the condition and relative productivity of the vegetation types assessed. Data collected included :

(1) the number of bird species recorded in a particular habitat expressed as a percentage of the total recorded in all habitats;

(2) the abundance of individuals in a habitat expressed as a percentage of the total seen in all habitats,

(3) the number of species recorded and expected from a habitat expressed a a percentage of the total number recorded and expected in all habitats.

The provisional list included in this last category is based on the assumption that an observer conducting an extremely long-term survey would eventually record all seasonal migrants, passage migrants, nomadic and cryptic species using the road verge. Our experience has shown that a survey conducted in spring over a five-day period is likely to record about 55-60% of all species present; thereafter a point of diminishing return for effort is reached. Kitchener et al. (1979) for example surveyed the Nugadong reserves over a two-year period and spent 31 days in the field. Seventy-five birds out of a potential 105 (Appendix E) were recorded. This represents 71% of the provisional list; the current survey recorded 30.5% in one day.

Vernacular and scientific nomenclature used in this report follows Blakers et al., 1984 (Birds); Strahan, 1983 (Mammals); Storr et al., 1981, 1983, 1986 (Reptiles) and Tyler et al., 1984 (Amphibians). In several cases names have been taken from more recent taxonomic descriptions.

5. GENERAL RESULTS

5.1 Climate

Climatic data for Dalwallinu are summarized in Appendix A. The seasonal conditions are reflected in the temperatures, evaporation and rainfall results. The results should assist in planning revegetation work, particularly where seeding or planting of seedlings is contemplated. The risk of seasonal drought conditions cannot be emphasized sufficiently, particularly if losses of young native plants are to be minimized. Observations on the condition of native plants during the study reflected the potential damage of an extended dry period, and therefore any planting or seeding programme requires an inbuilt contingency for some failure. In fact during the study a significant number of perennial plants were seen to be suffering drought stress or had recently died.

5.2 Soils and Topography

In general, the landscape is mildly undulating with broad flat plateau surfaces and mildly dissected broad valley floors. The aeolian landscapes mapped by Beard and Sprenger (1984) are

reflected in the relative proportion of deeper sands on the upper plateau soils in the northern section of the survey area.

The soils and topographical positions were related to the plant communities (Table 2 and Appendix C). The plant community numbers assigned in the previous report for the Wubin to Perenjori road verge study (E.M. Mattiske & Assoc., 1987) were adopted for this mapping exercise. The soils could be further subdivided as follows:

A. Valley Soils

(a) Reddish brown clays, clay loams and sandy clays on valley soils.
1. E. loxophleba (clay loams).
3. E. salmonophloia (clay loams).
4. E. loxophleba - Mixed Mallees (clay loams to sandier clays).
8. Melaleuca spp. (sandy clays).

(b) Grayish orange pink or moderate brown clays over yellowish brown clays and sandy clays on valley soils.
2. E. salubris - E. loxophleba (pale clays to brown clays).
7. Mixed Mallee over Sedges (pale grayish to yellow brown sandy clays).

B. Plateau Soils

(a) Yellowish brown sandy soils.
11. Mixed Scrub-Heath with emergent Mallee (steeper sandy soils).

(b) Yellowish brown to brown sands with quartz and gravel mixtures.
10. Allocasuarina spp. (sandy clays with gravel).

Some of the clays and clay loams appeared to clod when bulldozed. The latter has implications for planning rehabilitation and revegetation programmes in the Road Reserve. To minimize the risk of disease, all earthworks should be carried out under dry conditions. Further all planning of earthworks should account for local drainage conditions, thereby minimizing the risk of impeding drainage (e.g. lack of culverts near watercourses, even though they may be seasonal in nature).

Table 2: Summary of Soils in the Wubin to Dalwallinu Road Verge

Plant Community No.	Plant Community Type Coding	Soil Description	Colour Coding
1	Open Woodland of E. loxophleba	Reddish brown clay loams with occasional gravels	Moderate reddish brown 10R 4/6
2	Open Woodland of E. salubris	Crusting clay soils ranging from grayish orange pink over moderate browns on the surface, grayish orange pink over moderate yellowish brown soils.	Surface 5YR 7/2 over 5YR 4/4, ranging to 5YR 7/2 over 10YR 5/4
3	Open Woodland of E. salmonophloia	Clodding dark reddish brown to moderate reddish brown clay loams.	Midway between 10R 3/4 and 10R 4/6
4	E.loxophleba - Mixed Mallees	Reddish brown clay loams ranging to sandier clays	Reddish brown 10R 4/6 to 10R 3/5
7	Open Mallee of Eucalyptus spp. over dense Sedgelands	Grayish orange to pale yellowish brown sandy clays over moderate yellowish brown sandy clays.	10YR 7/4 or 10YR 6/2 over 10YR 5/4.
8	Tall Shrubland of Melaleuca spp.	Moderate reddish brown sandy to sandy clay & surface of fine quartz with some crusting.	10R 4/6
10	Scrub-Heath of Allocasuarina spp.	Moderate brown to moderate yellowish brown and grayish orange sandy clays with quartz and gravel mixtures.	5YR 4/4, 5YR 3/4 ranging to 10YR 5/4 and 10YR 7/4.
11	Mixed Scrub-Heath with emergent Mallees	Moderate yellowish brown to dark yellowish orange sandy clays. Predominantly deeper sandy soils.	10YR 5/4

6. FLORA AND VEGETATION RESULTS

6.1 Flora

A total of 33 families, 69 genera and 152 vascular plant species were recorded on the road verges from Wubin to Dalwallinu (Appendix B). Two of these species were introduced, while an additional 2 Eucalypts were planted (Eucalyptus camaldulensis and E. torquata). These plantings were largely near the townsites, parking bays and railway sidings.

Although no noxious weeds were recorded, a range of species were successfully spreading into disturbed areas along the road verges. The latter included the introduced species of the families - Poaceae, and Asteraceae (e.g. Dittrichia graveolens), and a range of native species (including Solanum spp. and Acacia spp.). The success of some of the native species in disturbed areas should be encouraged through additional seeding in the recently bulldozed additions to the road verge.

All botanical studies were carried out in the month of March, 1988, so that many species were not collected. It is estimated that the results covered approximately 50% of the flora present along the road verge. Although the length of road was less than for the previous survey, the number of species approximated the former study (a total of 152 species recorded between Wubin to Dalwallinu and a total of 159 species recorded between Wubin and Perenjori - E.M. Mattiske & Assoc., 1987).

As many of the specimens collected were not flowering the process of identification was lengthened. The assistance of all staff at the State Herbarium is gratefully acknowledged.

To assist in future planning of revegetation, the flowering times and plant lifeforms are summarized (Appendix D). The majority of this information was extracted from literature and State Herbarium Records (Beard, 1965; Newbey, 1968; Hall et al., 1970; Newbey 1972; Chippendale, 1973; Erickson et al., 1973; Blackall and Grieve, 1974; Grieve and Blackall, 1975; Simpfendorfer, 1975; Gardner, 1979; Blackall and Grieve, 1980; Jessop, 1981; George, 1984; Marchant et al., 1987a and 1987b).

6.2 Vegetation

The vegetation results are summarized by plant community type in Appendix C and on the accompanying vegetation maps, at a scale of 1:25,000.

The plant community types were defined on the basis of structural characteristics and floristic composition. A total of 8 community types were defined (9 if cleared land is included - see fauna summaries in Chapter 7). To assist in regional planning the mapping unit numbers adopted in the previous report (E.M. Mattiske & Assoc.,1987) were used in the current mapping between Wubin and Dalwallinu.

The plant communities differed substantially in the range of species, see species richness results in Table 3. In general despite the sampling regime (i.e. the number of respective observation sites per plant community type, see Appendix C), the scrub-heath communities support a wider range of species. Although the result is significant for the conservation of a large range of native species, other communities provide a substantial contribution to the regional diversity of floristic and structural composition.

The percentage road verge distances for the respective plant community types are summarized in Table 4. These enable a comparison of respective occurrences of the different types of communities on the eastern road verge from Wubin to Dalwallinu.

Table 3: Summary of Species Richness in the Plant Community Types on theRoad Verge from Wubin to Dalwallinu

Mapping Unit No.	Plant Community Type	Species Richness
1	Open Woodland of E. loxophleba	15 (29)
2	Open Woodland of E. salubris	11 (27)
3	Open Woodland of E. salmonophloia	9 (14)
4	Low Woodland to Open Mallee of E.loxophleba - Eucalyptus spp.	21 (33)
7	Open Mallee of Eucalyptus spp. over dense Sedgelands	18 (19)
8	Tall Shrubland of Melaleuca spp.	20 (15)
10	Closed Scrub-Heath of Allocasuarina spp.	72 (83)
11	Open Scrub-Heath of mixed Proteaceae - Mimosaceae - Myrtaceae, with emergent Mallees	47 (76)

Note: Species Richness results in brackets are extracted from Table 3 for Wubin to Perenjori road (E.M. Mattiske & Assoc., 1987)

Table 4: Comparison of Percentage Road Verge Distances of Respective Plant Community Types along the Wubin to Dalwallinu Road.

Mapping Unit No.	Plant Community Type	% of Road Verge Distance
1	Open Woodland of E. loxophleba	6 (10)
2	Open Woodland of E. salubris	9.5 (2.6)
3	Open Woodland of E. salmonophloia	6.5 (1)
4	Low Woodland to Open Mallee of E.loxophleba - Eucalyptus spp.	9 (4)
7	Open Mallee of Eucalyptus spp. over dense Sedgelands	8 (1)
8	Tall Shrubland of Melaleuca spp.	3 (3.9)
10	Closed Scrub-Heath of Allocasuarina spp.	56 (36)
11	Open Scrub-Heath of mixed Proteaceae - Mimosaceae - Myrtaceae, with emergent Mallees	2 (33)

Note: Results in brackets are extracted from Table 4 for Wubin to Perenjori road (E.M. Mattiske & Assoc., 1987)

It is apparent that the dominant communities are the shrublands and scrub-heaths (a total of 61%) followed by the range of woodlands and mallees (39%). Both these figures compare favourably with findings by Muir (1979) in the Buntine Nature Reserve (see Section 3.5) where the ratio of shrublands and scrub-heaths to woodlands and mallees was 78%:18%. The ratio of woodlands has increased in this section of the road reserve. These results are predictable as woodlands dominate the landscape immediately north of the township of Dalwallinu and the thickets or scrub heath dominate the landscape north of Nugadong. A similar trend was also observed and mapped by Beard (1979).

The following text provides a background assessment of results for each plant community type.

1. Open Woodland of *E. loxophleba*

These woodlands occurred as small pockets on the valley slopes. The stands are scattered at regular intervals along the road verge (see results in Appendix C1 from 3 observation sites scattered along the route and the vegetation maps). In many areas the effects of clearing have led to severe depletion of the overstorey of York Gums. In these degraded areas several of the *Acacia* species have become dominant and replaced the tree layer as the upper structural component. As indicated by the fauna studies this degraded community dominated by Wattles was significant for the avifauna. Other local trends include the shift towards the dominance of Chenopods in the understorey on the lower lying areas. A range of species within this community are acting as colonizers; namely, *Acacia acuminata* and the *Solanum* species.

2. Open Woodland of *E. salubris*

This plant community type was restricted along the road verge between Wubin and Dalwallinu (Table 4; 2 observation sites, Appendix C2 and vegetation maps). The trees are degraded and show signs of stress through defoliation. The causes of this deterioration may include exposure. Management options include additional plantings of Gimlet seedlings to encourage the upper tree layer. Several species are acting as colonizers within this community; namely, *Acacia* spp. and *Solanum hoplopetalum*.

3. Open Woodland of E. salmonophloia

This plant community type was restricted along the road verge between Wubin and Dalwallinu (Table 4: 1 observation site, Appendix C3 and the vegetation maps). The trees are exposed and generally showing signs of stress through defoliation. Management options include planting seedlings of Salmon Gum to enable future replacement of older trees. The Solanum species are acting as colonizer species in disturbed areas of this community.

4. Low Woodland to Open Mallee of E. loxophleba - Eucalyptus spp.

This mixed plant community type occurred as a transitory community between the woodlands of York Gum and the heaths-shrublands with emergent Mallees on the deeper sands (Table 4; 3 observation sites, Appendix C4 and vegetation maps). In composition it overlaps with communities 1 and 11 in particular. Several species were acting as colonizer species, namely the Acacia and Solanum spp..

7. Open Mallee of Eucalyptus spp. over dense Sedgelands

This plant community type was restricted within the survey area (Table 4; 1 observation site, Appendix C5 and vegetation maps). It occurred largely on the flats near the township of Wubin. The range of species reflects the overlap with nearby Mallee and scrub-heath communities.

8. Tall Shrubland of Melaleuca spp.

This plant community type was restricted in the survey area (Table 4; 3 observation sites, Appendix C6 and vegetation maps). It occurred on the valley slopes in the broader drainage lines. In the area north of Wubin this community type was often associated with saline areas. In the survey area south of Wubin there was no development of these saline areas.

10. Closed Scrub-Heath of Allocasuarina spp.

This plant community type was particularly diverse, with 72 species recorded at the large number of observation sites (18) covering some 56% of the survey area distance along the road (Tables 3 and 4; Appendix C7-C8, vegetation maps). The diversity of flora present in these areas should provide a useful basis for planned revegetation programmes, particularly on the eastern edges of the road. Floristically this plant community type varies locally, with patches of Allocasuarina campestris, Allocasuarina acutivalvis and dense mixed family scrub-heaths. This variation appears to form an intricate mosaic on the ground and could only be differentiated with a substantial amount of field work and large scale aerial photography; which was not feasible within the time or budget of this current project. Several of the Acacia species acted as colonizers in disturbed areas. This ability to spread into disturbed areas should be taken into account during planning stages of the revegetation programmes.

11. Open Scrub-Heath of mixed Proteaceae-Mimosaceae-Myrtaceae, with emergent Mallees

This plant community type was also particularly diverse, with 47 species recorded in the section of the road reserve (Tables 3 and 4; Appendix C9, vegetation maps). The diversity of flora present in these areas should also provide a useful basis for planned revegetation programmes.

The zoologists also recognized the significance of the cleared areas, particularly for the avifauna, however these areas are insignificant for flora conservation.

7. FAUNA RESULTS

7.1 Birds

Thirty-two species of bird totalling 448 individual records were noted in this survey of the Wubin to Dalwallinu road verge and are listed in Table 5. These results compare favourably with the Wubin to Perenjori verge where 45 species and 749 individuals were noted over a much longer distance. Five species of bird not recorded in the above survey were seen on the Wubin to Dalwallinu road verge and 19 birds recorded during the earlier survey were not observed during this session. These are marked in Table 5 and Appendix E. Variations such as these represent vagaries of short-term sampling rather than major differences in the conservation status of the verges. During the current survey the season was somewhat earlier, there was very little standing water for aquatic species and no halophytic complex occurred on this section of road verge.

The richest habitat for birds, in terms of species, was the cleared areas with sparse plantings of Eucalyptus spp. These locations included grassed areas with isolated trees and shrubs, gravel and sandpits, narrow shelter belts along property boundaries and plantings on the peripheries of towns. Eighteen species of bird (58.1% of the total list) and 97 individuals were found here. This result reflects the wide variety of available strata and niches present in this composite habitat and is similar to the results of the Wubin to Perenjori survey.

The second richest habitat was the degraded Eucalyptus loxophleba woodland with remnant Acacia thickets and Grasses (Mapping Units 1 and 4). This supported 16 species (51.6% of the total list) and 109 individual records. Compared to the Wubin to Perenjori results this habitat ranks very high, almost certainly because the normally rich Open Woodlands of E. loxophleba, E. salubris and E. salmonophloia (Mapping Units 1,2 and 3) are in extremely poor condition along the Wubin to Dalwallinu road verge. In effect, birds which would usually prefer the latter habitat, have been forced into the former. This is particularly evident in the % species richness column in Table 6.

Table 5 : List of Bird Species and Numbers of Individuals Recorded in the Plant Community Types on the Wubin to Dalwallinu Road Verge in April 1988.

Explanatory Note: The following mapping unit numbers relate to the vegetation maps.

This was not separated for the fauna assessment due to lack of representation, see previous report (E.M.Mattiske & Assoc., 1987).

Mapping Unit No.	Plant Community Types
1,2,3	Open woodlands of E. loxophleba, E. salubris and E. salmonophloia.
1*,4*	Degraded E. loxophleba woodland with remnant Acacia thickets and Grasses.
7	Mallee over Sedgelands (near Wubin) restricted occurrence.
8 #	Tall Shrubland of Melaleuca spp.
10	Closed Scrub-Heath of Allocasuarina spp.
11	Open Scrub-Heath of mixed Proteaceae - Mimosaceae - Myrtaceae families, with emergent Mallees. (11a and 11b not separated in vegetation mapping, due to level of mapping).
13	Cleared Land.

Table 5 : List of Bird Species and Numbers of Individuals Recorded in the Plant Community Types on the Wubin to Dalwallinu Road Verge in April 1988 (Continued).

Vegetation codes can be expanded by reference to Vegetation and Flora (this report).

B = old nests only (not included in analysis).

+ = birds not recorded during the Wubin to Perenjori survey

		Mapping Units					
Species - Birds	Common Name	1,2,3	1*,4*	7	10	11	13
FALCONIDAE							
Falco cenchroides	Australian Kestrel						1
COLUMBIDAE							
Phaps chalcoptera	Common Bronzewing		4			2	
Ocyphaps lophotes	Crested Pigeon		11		3	8	2
CACATUIDAE							
Calyptorhynchus magnificus	Red-tailed Black-Cockatoo+	4					40
Cactua roseicapilla	Galah	60		2	2		7
POLYTELITIDAE							
Polytelis anthopeplus	Regent Parrot +		2	14			
PLATYCERCIDAE							
Barnardius zonarius	Port Lincoln Ringneck		25				8
Neophema elegans	Elegant Parrot +		1			1	
HIRUNDINIDAE							
Cheramoeca leucosternum	White-backed Swallow						B
Hirundo neoxena	Welcome Swallow				3		
Cecropis nigricans	Tree Martin			4			
MOTACILLIDAE							
Anthus novaeseelandiae	Richard's Pipit						1
MUSCICAPIDAE							
Petroica goodenovii	Red-capped Robin			2		1	7
Oreoica gutturalis	Crested Bellbird		3	2	2		
Rhipidura leucophrys	Willie Wagtail		6	2	5	2	2
TIMALIIDAE							
Pomatostomus superciliosus	White-browed Babbler			2	11	8	

Table 5 : List of Bird Species and Numbers of Individuals Recorded in the Plant Community Types on the Wubin to Dalwallinu Road Verge in April 1988 (Continued).

Vegetation codes can be expanded by reference to Vegetation and Flora (this report).

B = old nests only (not included in analysis).

+ = birds not recorded during the Wubin to Perenjori survey

		Mapping Units					
Species - Birds	Common Name	1,2,3	1*,4*	7	10	11	13
MALURIDAE							
Malurus pulcherrimus	Blue-breasted Fairy-wren			3			
ACANTHIZIDAE							
Smicrornis brevirostris	Weebill		4			1	5
Gerygone fusca	Western Gerygone						2
Acanthiza apicalis	Inland Thornbill				2		
A. chrysorrhoa	Yellow-rumped Thornbill		3		8		3
MELIPHAGIDAE							
Manorina flavigula	Yellow-throated Miner			1		11	2
Lichenostomus virescens	Singing Honeyeater	1	14	3	7	6	2
L. leucotis	White-eared Honeyeater +		1				
Melithreptus brevirostris	Brown-headed Honeyeater+		12				
PLOCEIDAE							
Poephila guttata	Zebra Finch				6		
GRALLINIDAE							
Grallina cyanoleuca	Australian Magpie-lark	1	3			1	1
ARTAMIDAE							
Artamus cinereus	Black-faced Woodswallow		17	3	20	4	9
CRACTICIDAE							
Cracticus torquatus	Grey Butcherbird			1			
C. nigrogularis	Pied Butcherbird		2				
Gymnorhina tibicen	Australian Magpie	4	1		4	1	3
CORVIDAE							
Corvus coronoides	Australian Raven	2		4	5	3	2

Table 6: Percentage Bird Totals by Vegetation Mapping Unit for (1) Species Richness, (2) Abundance Totals and (3) Provisional plus Actual Species Totals.

Mapping Unit	%Species Richness	%Abundance	%Provisional plus Actual Species
1,2,3	19.4	16.1	71.4
1,4	51.6	24.3	83.8
7	41.9	9.6	68.6
10	41.9	17.4	69.5
11	41.9	10.9	69.5
13	58.1	21.7	83.8

Note: 13 refers to the cleared areas.

Results in Table 6 show that apart from the habitats discussed earlier the remaining units along the road were very similar in species richness and, to a lesser extent, abundance during the survey period.

In order to bring this into a wider, more realistic perspective (ie. assuming that the verge had been systematically surveyed over several seasons), the %total of actual species has been combined with the %total expected (Appendix E) and is listed for each habitat in Table 6. This shows that cleared land with plantings and the York Gum woodland (Mapping Units 1,4) are potentially the richest habitats along the Dalwallinu road verge, a projection in keeping with the survey results.

The shrubland/mallee communities (Mapping Units 7,10,11) are unlikely to be as species rich but will tend to support more specialised, secretive birds dependant on dense cover for feeding and breeding.

The provisional/actual %species richness for the mixed Eucalypt woodland (Mapping Units 1,2,3) in Table 6 differs substantially from the survey results in that it is much higher despite this being a very degraded habitat. Three factors have influenced the projected figure.

1. these woodlands represent a small proportion of the verge and can therefore support only a limited number of species at a given time;

2. the survey was not long enough to sample temporary residents, passage migrants, and nomads which would use this habitat for a limited period (see Methods).

3. the open, degraded nature of this unit is such that many birds typifying mixed woodland would no longer be there because of the lack of trees and understorey; their place (and this was evident during the survey) would be taken by more open-country birds, giving this habitat a strong component of the rich cleared land with plantings unit (Table 5).

Taken in conjunction with the adjacent railway reserve the Wubin to Dalwallinu road verge provides an important resource base for avifauna and represents an essential area of relatively pristine country for resident species which have undergone adverse changes in their conservation status due to excessive land-clearing. Typical examples of these recognised by Kitchener et. al. (1982) are: Spotted Nightjar; Mallee Fowl; Blue-breasted Fairy-wren and Grey Butcherbird. The two latter species were recorded during this survey. Old nests of the Grey Butcherbird were seen along the road verge as were those of the Magpie, Australian Raven and White-browed Babbler.

Two introduced species of bird are potentially present on the Wubin to Dalwallinu road verge. These are the Feral Pigeon and the Laughing Turtle Dove. Both species are closely linked with human habitation and exotic weeds. Their presence therefore is likely to be limited to towns, sidings and wheat storage facilities. No control measures are necessary for these species.

7.2 Mammals

Three native and three introduced mammals were recorded during the survey (Table 7). Distribution patterns for fauna and the condition of the verge indicate that a further 11 native species could be expected along the road verge especially when the adjacent railway reserve is considered (Appendix E). Terrestrial mammals are likely to be poorly represented since this group is prone to the effects of habitat disturbance. Seven of the potential species are bats; these will be concentrated in mature tree-stands with hollow limbs. (Mapping Units 1,2,3 and 1,4).

Table 7 : List of Mammal Species and Numbers of Individuals Recorded in the Plant Community Types on the Wubin to Dalwallinu Road Verge in April 1988.

Explanatory Note: The following mapping unit numbers relate to the vegetation maps.

This was not separated for the fauna assessment due to lack of representation, see previous report (E.M.Mattiske & Assoc., 1987).

Mapping Unit No.	Plant Community Types
1,2,3	Open woodlands of E. loxophleba, E. salubris and E. salmonophloia.
1*,4*	Degraded E. loxophleba woodland with remnant Acacia thickets and Grasses.
7	Mallee over Sedgelands (near Wubin) restricted occurrence.
8 #	Tall Shrubland of Melaleuca spp.
10	Closed Scrub-Heath of Allocasuarina spp.
11	Open Scrub-Heath of mixed Proteaceae - Mimosaceae - Myrtaceae families, with emergent Mallees. (11a and 11b not separated in vegetation mapping, due to level of mapping).
13	Cleared Land.

Table 7 : List of Mammal Species and Numbers of Individuals Recorded in the Plant Community Types on the Wubin to Dalwallinu Road Verge in April 1988 (Continued).

Vegetation codes can be expanded by reference to Vegetation and Flora (this report).

S = scats, tracks, diggings, skeletal remains.

+ = introduced species

		Mapping Units					
Species - Mammals	Common Name	1,2,3	1*,4*	7	10	11	13
TACHYGLOSSIDAE							
Tachyglossus aculeatus	Short-beaked Echidna		S	S	S		
MACROPODIDAE							
Macropus rufus	Red Kangaroo		1	1			
Macropus sp.	Unidentified Kangaroo		S	S	S		
LEPORIDAE							
Oryctolagus cuniculus	Rabbit +		S	6	S	1	
CANIDAE							
Canis familiaris dingo	Dingo				S		
Vulpes vulpes	Fox +		S	1	S	S	S
FELIDAE							
Felis catus	Feral Cat +		S				

Five of the mammals recorded or expected to occur on the verge are pest or vermin species: House Mouse, Rabbit, Dingo, Fox and Feral Cat. We believe that a fairly unstable predator/prey relationship exists within this group and that the attrition of native fauna by these highly successful animals has, to a degree, stabilised. Any attempt to apply control measures would (a) have to be directed simultaneously towards all five, (b) be very expensive and, (c) probably have little effect since rapid recruitment would take place from surrounding areas.

7.3 Amphibians and Reptiles

No amphibians and reptiles were seen during the road verge survey. Results of the Nugadong reserve surveys (Kitchener et al, 1979) and W.A. Museum records show that five frogs and 43 reptiles can be expected from the area (Appendix E).

8. DISCUSSION

8.1 Flora and Vegetation

8.1.1 Conservation Status of the Flora

The conservation status of the flora in the Wheatbelt has been markedly affected by the clearing activities this century. The review by Kitchener (1979) of the areas near Buntine and Nugadong Nature Reserves exemplify this trend. Despite the obvious signs of deterioration it is only in recent years that the State and Local Authorities have recognized the significant values of these remnant pockets of native flora to the larger community.

All vascular plant species recorded on the road verges were checked with the following publications to assess their conservation status (Rye and Hopper, 1981; Patrick and Hopper, 1982; Rye, 1982; Anon, 1982; Department of Conservation and Land Management, 1985).

No species recorded in the survey area is gazetted as "rare flora" under the Wildlife Conservation Act 1950-1980 and its regulations or in current listings published by the Department of Conservation and Land Management, 1985.

Several species recorded were noted to be defined by Rye, 1982 as geographically restricted, namely:

Acacia flabellifolia, which geographically ranges between 100 and 160 kilometres in the Northern Sandplains and Heaths. This species has previously been recorded from Yandanooka and Watheroo (Rye, 1982). In the current survey it was recorded in the northern section of the survey area, in the scrub-heath of Allocasuarina spp. just south of Wubin and in the low open woodland of Eucalyptus spp. over Sedgelands near Wubin.

Persoonia rufiflora, which geographically ranges between 100 and 160 kilometres in the Wheatbelt. This species has previously been recorded from the Gairdner Ranges and Wubin (Rye, 1982). In the current survey it was restricted to the scrub-heath of Allocasuarina spp. near Wubin.

Other species were noted to be poorly collected, restricted or range extensions, namely:

Jacksonia rhadinoclada has been poorly collected. Records in the State Herbarium indicated only 10 previous collections.

Verticordia ? monadelpha was collected in this survey on the outer edge of its known range and is therefore of interest.

Westringia discipulorum has not been well collected.

Halgania sp. (2-9) has been collected only once before by C.A. Gardner from Ballidu.

Leptomeria sp. (4-29) has been collected once before (50 km east of Merredin).

Patersonia drummondii was collected in this survey beyond previously known boundaries of its distribution.

As additional studies are undertaken in the area, further species may be recognized as needing particular attention.

8.1.2 Regional Conservation Status

The major changes to the native vegetation in the northern Wheatbelt have occurred since European settlement. Although the most obvious is the direct activities of clearing, many indirect and less obvious effects have led to the degradation of natural resources. The survey area typifies the remnant nature of the native vegetation in the Wheatbelt. Many aspects associated with the research and management of remnant vegetation areas have been addressed by Saunders et al. (1987).

The changes in native vegetation have been selective to some degree. The latter largely relates to the unsuitability of some soils for agricultural pursuits. In the survey area the sandier, stony and lower-lying (seasonally wet) soils have been considered unsuitable for agriculture in the past. Consequently some areas have been left relatively intact in nearby and abutting areas. All of these areas add to the conservation value of the respective plant communities in the region. Unfortunately, at the time areas were set aside for reserves (e.g. conservation of flora and fauna, water, timber and town sites) few of the concepts associated with minimum requirements for conserving representative areas of native vegetation were recognized by the appropriate managing authorities. Consequently many of the stands of relatively undisturbed vegetation left in the region are almost accidental. Fortunately the change in attitude within the community and government authorities has led to positive approaches in the conservation of natural resources on a regional level.

The significance of the road side vegetation, railway sidings, planned town sites and small reserves (irrespective of purpose has been stressed by the Environmental Protection Authority (1974) and more recently by Kitchener et al. (1982) and Saunders et al. (1987). One of the main concerns in reviewing the native vegetation in the region is that the management obligations are scattered amongst an array of authorities with differing priorities and concepts of conservation. Needless to say, the progress shown by the Main Roads Department in widening and revegetating the road verges is very commendable. If only a fraction of the private land-owners and other managing authorities took similar steps, the

degree of degradation of the native vegetation could be reduced in the northern Wheatbelt. The following section compares representation of the plant communities types on the road verge with nearby reserves.

8.1.3 Local Conservation Status

The Wubin to Dalwallinu road verge has considerable conservation value for the range of flora and plant community types which occur within its boundaries. As summarized in Table 3 in the Results section, there are distinct differences in the species richness recordings for each plant community type. The latter reinforces earlier observations by Muir (1979). Further, similar results were recorded for the relative occurrence of the range of structural formations in the road reserve as compared with the Buntine Nature Reserve (Section 6.2 and Muir, 1979). Although the shrublands and scrub-heaths obviously contribute the most to the range of species, the other plant community types and structural formations are significant as they provide the regional diversity of structural and floristic composition.

A review was carried out of the plant communities on the nearby reserves, see Table 8. Results illustrate the relative occurrence of the respective plant communities. For example the more common plant community types on the road verge (e.g. 1, 10 and 11) were observed regularly in the nearby reserves, while those communities which were restricted in occurrence on the road verge were also either rare or absent from the nearby reserves (e.g. 2,3 and 7). The woodlands of E. salubris and E. salmonophloia occurred in several larger pockets to the east, while their occurrence on the road verge were limited. Another community type not recorded on the road verge was the lithic complex, which Muir (1979) recorded in the Buntine Nature Reserve. Despite the lack of these communities, the road verge still contributes substantially to the conservation values of the region.

Table 8: Summary of Representation of Plant Community Types observed along the Wubin to Dalwallinu Road Reserve in nearby Reserves. (Based on field observations and Beard, 1976)

Reserve No.	Purpose of Vesting	Plant Community Type Mapping No. 1	2	3	4	5	6	7	8	9	10	11	12
26837	Flora and Fauna	+	+	-	+	-	-	+	+	+	+	+	-
16379	Water	+	+	-	+	-	-	+	+	+	+	+	-
9935	Flora and Fauna	+	-	+	+	-	-	-	+	-	+	-	-
18245	Flora and Fauna	+	-	-	+	-	-	-	+	-	+	-	-
28184	Flora	+	-	-	-	-	-	-	-	-	+	-	-
12614	Flora	+	-	-	-	-	-	-	+	-	+	+	-
20372	Flora	-	-	-	-	-	-	-	-	+	+	+	-
10351*	Water and Flora	+	+	-	+	-	-	-	+	-	+	+	-
15463*	Water	+	-	-	+	-	-	-	-	-	+	+	-
2736	Flora	+	-	-	+	-	-	-	+	+	+	+	+

(Note: * Lithic Complex also observed on these reserves)

The degree of disturbance in each plant community type on the Wubin to Dalwallinu road reserve is summarized in Table 9. These results reflect that most of the communities are degraded to some degree (levels 2 or 3). The majority of plant community types included species that were acting as colonizers in disturbed areas (e.g. many of the Acacia species). These should be used as potential revegetation species, to allow rapid regeneration of plant cover in severely degraded areas.

8.1.4 Plant Communities of Significance

In view of the amount of clearing it is apparent that all plant communities on the road verge are significant for the conservation of species and community types. Those areas with less disturbance and greater floristic and community diversity are further highlighted. In planning revegetation work within the region it is important that the other management aspects of bulldozing, physical disturbance, drainage developments, burning and the provision of public facilities do not diminish the current or proposed areas of

native plant cover. The need to jointly coordinate some of these aspects cannot be over emphasised in an area where many of the small reserves and uncleared areas are owned and managed by a variety of private and public groups. Therefore it is important to educate the public of the advantages of maintaining the remaining areas of native vegetation.

Table 9: Summary of Percentage Disturbance Levels in each Plant Community Type in the Road Reserve from Wubin to Dalwallinu

Plant Community Type	Percentage Disturbance Level		
	1	2	3
1. Open Woodland of E.loxophleba	-	59	41
2. Open Woodland of E.salubris	-	21	79
3. Open Woodland of E.salmonophloia	-	-	100
4. Low Woodland to Open Mallee of E. loxophleba - Eucalyptus spp.	-	11	89
7. Open Mallee of Eucalyptus spp. over dense Sedgelands	50	50	-
8. Tall Shrubland of Melaleuca spp.	36	50	14
10. Closed Scrub-Heath of Allocasuarina spp.	14	36	50
11. Open Scrub-Heath of mixed Proteaceae-Mimosaceae-Myrtaceae	-	-	100

8.2 Fauna

8.2.1 Conservation Status of the Fauna

Declared Species: no species of vertebrate classified as "rare or otherwise in need of special protection" were noted during the Wubin to Dalwallinu road verge survey. Two gazetted species, the Peregrine Falcon and the Pink Cockatoo have been included in the list of provisional species (Appendix E) since both are known from the general area (Dell, 1979; Sedgwick, 1950).

8.2.2 Regional Conservation Status

In their paper outlining the implications for conservation of Wheatbelt birds, Kitchener et al. (1982) drew attention to the major post-European changes that have occurred in the region as a direct result of land clearing, salination and altered fire regimes. They defined the main problem as being the reduction and fragmentation of bird populations, especially small, insectivorous passerines (song birds) which are specialised feeders in natural vegetation. This gradual reduction in natural vegetation is having an increasing effect on population levels and species distributions in the northern Wheatbelt. The map in Kitchener (1979) shows the almost total isolation of remaining bushland along corridors typified by the Wubin to Dalwallinu road and shows the extensive clearing which took place between 1959 and 1970. This reinforces the argument of Kitchener et al. (1982) who considered that the long term viability of the Wheatbelt reserve system, and the region as a whole, would be considerably enhanced if natural vegetation on road and railway verges, and other corridors of vegetation linking reserves could be protected by careful management and forward planning.

8.2.3 Local Conservation Status

Like the Wubin to Perenjori verge this southern extension of the road has considerable significance to fauna, especially birds. It links a series of Wheatbelt reserves running north to Wilroy and is further improved by the presence of good quality bushland along the adjacent Railway Reserve. In an area such as the Wheatbelt which has been subjected to broad-scale clearing the "corridor effect" of this bushland is invaluable. It has the essential function of improving gene flow, providing feeding and nesting resources and optimising the amount of area available to resident habitat specific birds. The latter species are generally associated with denser, extensive areas of shrubland and fall into the category of Wheatblt birds which are either vulnerable or of uncertain status as defined by Kitchener et al. (1982). Typical examples are the Spotted Nightjar, Mallee Fowl, Blue-breasted Fairy-wren and Grey Butcherbird. In comparison to the poorly vegetated Walebing to Bindi Bindi verge, the current study area has a far greater potential to act as a valuable adjunct to the nature reserves in the area. Apart from the

mixed Eucalypt woodlands (Mapping Units 1,2 and 3) which require special attention (see Sections 8.2.5, 9) the bulk of the Wubin to Dalwallinu road verge, in conjunction with the contiguous Railway Reserve provides a relatively effective faunal corridor. As the Walebing to Bindi Bindi verge does not fulfil this function, a system of rehabilitation funding priorities should be established to target those areas which could have a locally restrictive effect on faunal movements.

The Wubin to Dalwallinu road verge has the capacity to support a fairly large number of amphibian and reptile species (Appendix E). A definitive assessment of its contribution to conservation of species would only be possible after an intensive trapping program.

As with other verge surveys, few native mammals were apparent except for the larger, more obvious species (Table 7). The comments made for amphibians and reptiles apply here.

8.2.4 Seasonal Significance of the Road Verge

Several species of bird migrate out of the south-west corner of Western Australia at the onset of winter. Migratory species recorded in the Wubin to Dalwallinu road verge in April 1988 included the Willie Wagtail, Western Gerygone and Australian Magpie-lark. Southward movements in winter and spring include several species of Cuckoo, White-winged Triller, Rainbow Bee-eater, Sacred and Red-backed Kingfisher. These essential movements would be hindered without access to areas of native vegetation.

During spring when the Proteaceae and Myrtaceae heaths are flowering (see Appendix D) they will attract several species and large numbers of nectivorous birds. Some are nomads from coastal areas, others come from the more arid inland areas.

The period between September and December is the time of peak reptile activity. Most reptiles emerge from winter hibernation at this time and are very active prior to breeding. While not as pronounced, many mammals are active and breed in these same months. Amphibians are active in winter after the first rains.

8.2.5 Habitats of Significance

In consideration of the amount of historical and current pastoral clearing in the Wheatbelt and the degradation of many remaining areas through increased salinity, wildfires and gravel pits, all remaining bushland, pristine or disturbed, is of significance to fauna. Certain habitats are of special significance. Woodland has been recognised as the most important bird habitat in the Wheatbelt because of the number of species and high total of individuals per unit area. Mixed Eucalypt woodland along the Wubin to Dalwallinu road verge is in a very poor condition and few mature Salmon Gum or Gimlet remain. Those that do are extremely important to the depauperate range of fauna using them. This includes birds which nest in hollows, birds which prefer to nest high and mammals such as bats which roost and breed in hollow trees.

The heath and shrubland communities on sands and gravel are also very important in providing dense shelter for small insectivorous species of bird. These diverse plant communities also provide the variety of nectar sources required by nomadic and migratory honeyeaters. A large proportion of all gecko, skink and dragon lizards are liable to be found in the sandy heath communities, as are a range of mammals.

9. RECOMMENDATIONS AND MANAGEMENT IMPLICATIONS

In the previous section special attention was paid to the poor condition of the mixed Eucalypt woodlands on the Wubin to Dalwallinu road verge. Revegetation of these areas should be given a high priority although the contribution of mature trees to fauna conservation will take many years to fulfil. In the long term the future of the rare and endangered Pink Cockatoo in the Wheatbelt may be more assured.

The capacity of cleared/planted areas to support a large range of fauna is documented in this and other road verge reports. The productivity of this habitat is directly linked to its structural diversity, and future revegetation of the Wubin to Dalwallinu road verge should be directed towards this end. As has been recommended in previous reports the provision of fast growing local shrubs should be given some priority since these plants rapidly provide cover and leaf litter, both of which advantage a large number of

vertebrates. The various species of Acacia are typical examples and if possible these should be planted at greater than normal densities.

There are several sand-pits along the Wubin to Dalwallinu road verge which have still retained vertical faces. Nests of the White-backed Swallow had been excavated in this situation. While it is preferable to stabilise such areas during re-vegetation by reducing the slope, consideration should be given to maintaining at least some of these vertical faces. This would provide ideal nesting conditions for species which as the White-backed Swallow, Red-backed Kingfisher and Rainbow Bee-eater all of which are burrow-breeders.

Other management procedures capable of enhancing the quality of verges for flora and fauna (in particular terrestrial species) are:

1. fragmentary cool burns in autumn;
2. making provision for logs and rocks to be returned to verge areas undergoing rehabilitation. These act as seed traps and fauna refuges. The logs and rocks could be set well back from the road for aesthetic and safety reasons;
3. making provision for natural leaf litter, twig litter and topsoil to be returned to verge areas undergoing rehabilitation and revegetation;
4. ripping and replanting disused tracks to reduce their effect as faunal barriers;
5. providing micro-relief into bulldozed and ripped areas to allow maximization of water harvesting in seeded area; and
6. rehabilitation of gravel pits by providing batters, replanting, dumping excess rubble and logs within their confines and leaving areas where water can collect.

In summary, the road verge typifies many of the areas in the northern Wheatbelt. Management problems are diverse and complex, however, the need to conserve and improve the native vegetation and range of habitats for the native fauna is recognized by the Main Roads Department. The results summarized in this report should assist in the planning process of improving the diversity of flora and fauna on this section of the Wubin to Dalwallinu Road.

10. LIST OF PARTICIPANTS

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12. REFERENCES

Anon. (1982). "Rare Flora List Amendments". Swans 12(2):27.

Beard, J.S. (1965). "A Descriptive Catalogue of West Australian Plants". Edited by Beard, Published by the Society for Growing Australian Plants, Perth W.A.

Beard, J.S. (1973). "The elucidation of palaeodrainage patterns in Western Australia through vegetation mapping". Vegetation Survey of W.A. Occ. Pap. 1, Vegmap Publications, Applecross.

Beard, J.S. (1976). "The Vegetation of the Perenjori Area Western Australia. Map and Explanatory Memoir, 1:250,000 Series". Vegmap Publications, Perth.

Beard, J.S. (1979). " The vegetation of the Moora & Hill River areas, Western Australia. Map and Explanatory Memoir, 1:250,000 Series". Vegmap Publications, Perth.

Beard, J.S. (1980). " A new phytogeographic map of Western Australia". Western Australian Herbarium Research Notes 3: 37-58.

Beard, J.S. & B.S. Sprenger, (1984). "Vegetation Survey of Western Australia Occasional Paper No.2. Geographical Data from the Vegetation Survey of Western Australia : with Map of Aeolian Landforms, 1:3,000,000". Vegmap Publications, Perth.

Bettenay, A.E. (1962). "The salt lake systems and their associated aeolian features in the semi-arid regions of Western Australia". J. Soil Sci. 13: 10-17.

Bettenay, A.E. & M.J. Mulcahy (1972). "Soil and Landscape studies in Western Australia. (2). Valley form and surface features of the South-west drainage Division". J.Geol. Soc. Aust. 18: 359-369.

Blackall, W.E. & B.J. Grieve, (1974). "How to Know Western Australian Wildflowers." Parts I,II,III. University of Western Australia Press.

Blackall, W.E. & B.J. Grieve, (1980). "How to Know Western Australian Wildflowers". Part IIIA. University of Western Australia Press.

Blakers, M., Davies, S.J.J.F. and Reilly,P.N. (1984). "The Atlas of Australian Birds". Melbourne University Press.

Bureau of Meteorology (1986). "District Rainfall Deciles - Australia. Meteorological Summary September 1986." Department of Science, Australian Government Publishing Service, Canberra.

Chippendale, G.M. (1973). "Eucalypts of the Western Australian goldfields (and the adjacent Wheatbelt)". Department of Primary Industry, Forestry and Timber Bureau, Aust. Govt. Publishing Service, Canberra.

Dell, J. (1979). "Birds of Buntine and Nugadong Reserves". In : Biological Survey of the Western Australian Wheatbelt, Part 10. Rec. West. Aust. Mus. Supp. 9:95-115.

Department of Conservation and Land Management (1985). "Protecting Our Flora - a brief guide to the legislation". List of Gazetted Rare Flora, Department of Conservation and Land Management, Perth.

Environmental Protection Authority (1974). "Conservation Reserves in Western Australia". Report of the Conservation through Reserves Committee to the Environmental Protection Authority, Perth.

Erickson, R., George, A.S., Marchant, N.G., and Morcombe, M.K. (1973). "Australian Flora in Colour: Flowers and Plants of Western Australia". A.H. & A.W. Reed Pty Ltd.

Gardner, C.A. (1979). "Eucalypts of Western Australia". W.A. Dept. of Agriculture. Bulletin 4013: 1-260.

Gentilli, J. (1972). "Australian Climate Patterns". Published by Thomas Nelson (Australia) Limited, Melbourne.

George, A.S. (1984). "The Banksia Book". Kangaroo Press in association with The Society for Growing Australian Plants - N.S.W. Ltd.

Green, J.W. (1985). "Census of the Vascular Plants of Western Australia". Western Australian Department of Agriculture, Perth.

Grieve, B.J. & W.E. Blackall. (1975). "How to Know Western Australian Wildflowers". Part IV. University of Western Australia Press.

Hall, N., Johnston, R.D. and Chippendale, G.M. (1970). "Forest Trees of Australia". Department of National Development, Forestry and Timber Bureau, Aust. Govt. Publishing Service, Canberra.

Hooper, M.D. (1971). "The size and surroundings of Nature Reserves". In : "The Scientific Management of Animal and Plant Communities for Conservation". Ed. E.Duffey and A.S. Watt, pp.551-561. Oxford Blackwell Scientific Publications.

Jessop, J. (1981). "Flora of Central Australia". Published by The Australian Systematic Botany Society. A.H. & A.W. Reed Pty Ltd, Sydney.

Kitchener, D.J. (1976). "Biological Survey of the Western Australian Wheatbelt, Part 1 : Preface to the Series". Rec. West. Aust. Mus. Supp.2.

Kitchener, D.J., Chapman, A., Dell, J. and Muir, B.G. (1979). "Biological survey of the Western Australian Wheatbelt, Part 10. Buntine, Nugadong and East Nugadong Reserves and Nugadong Forest Reserve". Rec. West. Aust. Mus. Supp., 9.

Kitchener, D.J., Chapman, A., Dell, J., Muir, B.G., and Palmer, M. (1980a). "Lizard assemblage and reserve size and structure in the Western Australian Wheatbelt". Some implications for conservation. Biological Conservation (17)1:25-62.

Kitchener, D.J., Chapman, A., Muir, B.G., and Palmer, M. (1980b). "The conservation value for Mammals of Reserves in the Western Australian Wheatbelt". Biological Conservation (18)3:179-208.

Kitchener, D.J., Dell, J., Muir, B.G., and Palmer, M. (1982). "Birds in Western Australian Wheatbelt Reserves - Implications for Conservation". Biological Conservation 22:127-163.

Marchant, N.G., Wheeler, J.R., Rye, B.L., Bennett, E.M., Lander, N.S., and Macfarlane, T.D. (1987a). "Flora of the Perth Region, Part One". Publication of W.A. Herbarium, Dept. of Agriculture, Western Australia.

Marchant, N.G., Wheeler, J.R., Rye, B.L., Bennett, E.M., Lander, N.S. and Macfarlane, T.D. (1987b). "Flora of the Perth Region, Part Two". Publication of W.A. Herbarium, Dept. of Agriculture, Western Australia.

Muir, B.G. (1979). "Vegetation of Buntine and Nugadong Reserve:. Chapter II. In: Kitchener, D.J., A. Chapman, J. Dell and B.G. Muir "Biological Survey of the Western Australian Wheatbelt". Records of the Western Australian Museum, Supplement 9:15-83.

Newbey, K. (1968). "West Australian Wildflowers for Horticulture. Part 1 - Wildflowers Principally from the Temperate Regions of Western Australia". Published by the Society for Growing Australian Plants, Surrey Beatty & Sons, N.S.W.

Newbey, K. (1972). "West Australian Wildflowers Plants for Horticulture. Part 2 - Wildflowers Principally from the Temperate Regions of Western Australia". Published by the Society for Growing Australian Plants, Surrey Beatty & Sons, N.S.W.

Northcote, K.H., Bettenay, A.E., McArthur, W.M. & H.M. Churchward (1967). "Atlas of Australian Soils, Sheet 5, Perth - Albany - Esperance Area". C.S.I.R.O., Melbourne.

Old, K.M., Kile, G.A. & Ohmart, C.P. (1981). "Eucalypt Dieback in Forests and Woodlands". Forest Research, C.S.I.R.O., Aust.

Patrick, S.J. & S.D. Hopper, (1982). "A Guide to the Gazetted Rare Flora of Western Australia : Supplement 1. Report 54. Department of Fisheries & Wildlife, Perth, Western Australia.

Rye, B.L. (1982). "Geographically Restricted Plants of Southern Western Australia. Report 49. Department of Fisheries & Wildlife. Perth, Western Australia.

Rye, B.L. & S.D. Hopper, (1981). "A Guide to the Gazetted Rare Flora of Western Australia. Report 42. Department of Fisheries & Wildlife, Perth, Western Australia.

Saunders, D., Arnold, G., Burbidge, A. and Hopkins, A. (1987)(Eds). "Nature Conservation the Role of Remnants of Native Vegetation". Surrey Beatty & Sons Pty Ltd. Chipping Norton, NSW.

Sedgwick, E.H. (1950). "Pink Cockatoo at Caron". West. Aust. Nat. 2:143.

Simpfendorfer, K.J. (1975). "An Introduction to Trees for South-Eastern Australia". Inkata Press, Melbourne.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1981). "Lizards of Western Australia. Vol.1. Skinks". University of Western Australia Press with Western Australia Museum. Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983). "Lizards of Western Australia. Vol.II. Dragons and Monitors". West. Aust. Mus. Perth.

Storr, G.M., Smith, L.A. and Johnstone, R.E. (1986). "Snakes of Western Australia". West. Aust. Mus. Perth.

Strahan, R. (1983)(Ed). "The Australian Museum complete Book of Australian Mammals". Angus & Robertson. Sydney.

Tyler, M.J., Smith, L.A. and Johnstone, R.E. (1984)."Frogs of Western Australia". West. Aust. Mus. Perth.

APPENDIX A : SUMMARY OF CLIMATIC DATA - DALWALLINU

Dalwallinu 1912-1985 Elevation 335.0 M
Latitude 30 deg. 17 min. S Longitude 116 deg. 39 min. E

Temperatures (1912-1985)
9 am Mean temperatures (^{o}c) + Mean relative humidity %

	Dry Bulb	Wet Bulb	Dew pt.	Humidity
January	26.0	17.4	11	39
February	25.2	17.7	12	45
March	22.8	16.3	11	48
April	18.5	14.2	11	60
May	14.5	11.5	9	68
June	11.6	10.2	9	83
July	10.4	9.0	8	82
August	11.3	9.4	7	77
September	14.0	10.7	7	64
October	17.9	12.5	7	50
November	21.4	14.3	8	42
December	24.9	16.3	9	37
Year	18.2	13.3	9	58

3 pm Mean temperatures (^{o}c) + Mean relative humidity %

	Dry Bulb	Wet Bulb	Dew pt.	Humidity
January	34.0	19.6	9	21
February	33.5	20.1	11	25
March	30.6	18.7	10	28
April	25.1	16.3	9	36
May	20.6	13.9	8	44
June	16.9	12.6	9	58
July	15.9	11.6	7	57
August	17.0	12.0	7	52
September	19.8	12.8	6	40
October	23.9	14.4	5	30
November	28.1	16.2	6	24
December	32.1	18.4	7	32
Year	24.8	15.6	8	36

APPENDIX A : SUMMARY OF CLIMATIC DATA - DALWALLINU

Temperatures (1912-1985)

Daily Maximum Temperatures. (^{o}c)

	Mean	86 percentile	14 percentile
January	35.3	40.6	30.1
February	34.6	39.3	29.6
March	31.6	37.2	26.1
April	26.2	31.5	21.1
May	21.6	25.6	17.8
June	18.0	21.0	15.1
July	16.9	19.6	14.4
August	18.1	21.6	15.1
September	20.9	25.1	17.2
October	25.1	30.9	19.9
November	29.3	35.0	23.9
December	33.3	38.3	28.2
Year	25.9		

Daily Minimum Temperatures. (^{o}c)

	Mean	86 percentile	14 percentile
January	18.5	22.8	14.4
February	18.6	22.6	14.9
March	16.7	20.6	12.8
April	13.2	16.7	10.0
May	9.9	13.4	6.7
June	8.2	11.2	5.0
July	6.7	9.4	3.9
August	6.5	9.4	3.8
September	7.6	10.4	5.0
October	10.2	13.5	7.1
November	13.2	16.8	9.9
December	16.3	20.7	12.2
Year	12.1		

APPENDIX A : SUMMARY OF CLIMATIC DATA - DALWALLINU

Rainfall (1912 - 1985)

	Rainfall (mm)		Raindays (No.)
	Mean	Median	Mean
January	13	6	2
February	17	5	3
March	23	9	3
April	22	15	5
May	43	41	8
June	71	63	12
July	61	55	13
August	46	41	11
September	24	23	8
October	17	15	5
November	11	5	3
December	8	4	2
Year	356	354	75

Evaporation (1976)

Average Monthly Evaporation

January	390 mm
February	340
March	310
April	180
May	120
June	80
July	70
August	95
September	135
October	215
November	275
December	370
Average Annual Evaporation	2500 mm

APPENDIX B - VASCULAR PLANT SPECIES - WUBIN TO DALWALLINU ROAD VERGE

FAMILY	GENERA	SPECIES
POACEAE	*Briza	maxima
	Stipa	elegantissima
CYPERACEAE	Chrysitrix	distigmatosa
	Gahnia	drummondii
	Lepidosperma	resinosum
	Schoenus	sp. (BK-W158)
RESTIONACEAE	Ecdeiocolea	monostachya
	Lepidobolus	preissianus
LILIACEAE	Borya	sphaerocephala
	Dianella	revoluta
IRIDACEAE	Patersonia	drummondii
CASUARINACEAE	Allocasuarina	acutivalvis
	Allocasuarina	campestris
PROTEACEAE	Banksia	benthamiana
	Conospermum	brownii
	Grevillea	eriostachya
	Grevillea	eryngioides
	Grevillea	?integrifolia
	Grevillea	paniculata
	Grevillea	paradoxa
	Grevillea	petrophiloides
	Grevillea	pterosperma
	Hakea	coriacea
	Hakea	falcata
	Hakea	sulcata
	Isopogon	scabriusculus
	Persoonia	coriacea
	Persoonia	rufiflora
	Persoonia	saundersiana
	Persoonia	striata
	Petrophile	?drummondii
	Petrophile	incurvata
	Petrophile	macrostachya

APPENDIX B - VASCULAR PLANT SPECIES - WUBIN TO DALWALLINU ROAD VERGE

FAMILY	GENERA	SPECIES
SANTALACEAE	Exocarpos	sparteus
	Leptomeria	sp. (4-19)
	Santalum	acuminatum
	Santalum	spicatum
CHENOPODIACEAE	Atriplex	semibaccata
	Atriplex	stipitata
	Enchylaena	tomentosa
	Maireana	brevifolia
	Maireana	tomentosa
	Maireana	sp. (6-31)
	Rhagodia	drummondii
	Rhagodia	preissii
	Rhagodia	sp. (6-32)
AMARANTHACEAE	Ptilotus	polystachyus
GYROSTEMONACEAE	Codonocarpus	cotinifolius
LAURACEAE	Cassytha	glabella
MIMOSACEAE	Acacia	acuaria
	Acacia	acuminata
	Acacia	aff. bidentata
	Acacia	colletioides
	Acacia	coolgardiensis
	Acacia	daviesioides
	Acacia	? daviesioides (BK-W128)
	Acacia	densiflora ("group")
	Acacia	dielsii
	Acacia	erinacea
	Acacia	aff. flabellifolia
	Acacia	fragilis
	Acacia	hemiteles
	Acacia	lineolata
	Acacia	mackeyana
	Acacia	aff. microbotrya
	Acacia	merrallii

APPENDIX B - VASCULAR PLANT SPECIES - WUBIN TO DALWALLINU ROAD VERGE

FAMILY	GENERA	SPECIES
MIMOSACEAE (Cont.)	Acacia	neurophylla
	Acacia	signata
	Acacia	stereophylla
	Acacia	sp. (16-64)
	Acacia	sp. (17-67)
CAESALPINIACEAE	Cassia	? charlesiana
PAPILIONACEAE	Daviesia	cardiophylla
	Daviesia	hakeoides
	Gastrolobium	laytonii
	Gastrolobium	spinosum var. grandiflorum
	Jacksonia	foliosa
	Jacksonia	rhadinoclada
	Jacksonia	sp. (2-10)
	Leptosema	tomentosum
	Mirbelia	trichocalyx
	Pultenaea	capitata
	Templetonia	sulcata
RUTACEAE	Drummondita	hassellii
	Phebalium	ambiguum
	Phebalium	microphyllum
EUPHORBIACEAE	Beyeria	?lechenaultii
SAPINDACEAE	Dodonaea	bursariifolia
	Dodonaea	inaequifolia
	Dodonaea	viscosa ssp. angustissima
	Dodonaea	sp. (3-16)
RHAMNACEAE	Cryptandra	nutans
	Spyridium	? complicatum
MALVACEAE	Alyogyne	hakeifolia
STERCULIACEAE	Keraudrenia	integrifolia

APPENDIX B - VASCULAR PLANT SPECIES - WUBIN TO DALWALLINU ROAD VERGE

FAMILY	GENERA	SPECIES
DILLENIACEAE	Hibbertia	glomerosa
	Hibbertia	aff. eatoniae
MYRTACEAE	Baeckea	crispiflora
	Baeckea	cryptandroides
	Baeckea	aff. cryptandroides
	Baeckea	sp.(BK-W149, M.E.Trudgen (9)
	Calothamnus	gilesii
	Darwinia	aff. diosmoides
	*Eucalyptus	camaldulensis
	Eucalyptus	erythronema var. marginata
	Eucalyptus	flocktoniae
	Eucalyptus	foecunda
	Eucalyptus	kochii
	Eucalyptus	leptopoda
	Eucalyptus	loxophleba
	Eucalyptus	oleosa var. borealis
	Eucalyptus	pyriformis
	Eucalyptus	redunca var. melanophloia
	Eucalyptus	redunca var. subangusta
	Eucalyptus	salmonophloia
	Eucalyptus	salubris
	Eucalyptus	stowardii
	*Eucalyptus	torquata
	Eucalyptus	sp. (BK-W64)
	Malleostemon	roseus
	Melaleuca	acuminata ssp. websteri
	Melaleuca	adnata
	Melaleuca	cardiophylla/undulata
	Melaleuca	conothamnoides
	Melaleuca	cordata
	Melaleuca	eleuterostachya
	Melaleuca	filifolia

APPENDIX B - VASCULAR PLANT SPECIES - WUBIN TO DALWALLINU ROAD VERGE

FAMILY	GENERA	SPECIES
MYRTACEAE (Cont.)	Melaleuca	lateriflora var. acutifolia
	Melaleuca	lateriflora var. lateriflora
	Melaleuca	laxiflora
	Melaleuca	aff. scabra
	Melaleuca	uncinata
	Melaleuca	sp. (3-15)
	Thryptomene	cuspidata
	Verticordia	brachypoda
	Verticordia	?monadelpha
	Verticordia	spicata
	Verticordia	sp. (20-73)
HALORAGACEAE	Glischrocaryon	aureum
APIACEAE	Platysace	commutata
	Platysace	maxwellii
EPACRIDACEAE	Astroloma	serratifolium
	Leucopogon	hamulosus
BORAGINACEAE	Halgania	sp. (2-9)
CHLOANTHACEAE	Pityrodia	terminalis
LAMIACEAE	Hemigenia	westringioides
	Hemigenia	sp. (23-83)
	Westringia	discipulorum
SOLANACEAE	Solanum	hoplopetalum
	Solanum	lasiophyllum
MYOPORACEAE	Eremophila	decipiens
	Eremophila	sp. (29-92)

APPENDIX B - VASCULAR PLANT SPECIES - WUBIN TO DALWALLINU ROAD VERGE

FAMILY	GENERA	SPECIES
GOODENIACEAE	Lechenaultia	sp. (2-6)
ASTERACEAE	*Dittrichia	graveolens
	Olearia	muelleri
	Helipterum	sp.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Open Woodland of York Gum (Eucalyptus loxophleba), with admixtures of Jam (Acacia acuminata) and a mixture of low Chenopods and herbaceous species.

Mapping Code: 1.

Site Locations: 15, 22, and 29.

Indicator Species:

Acacia acuminata	Eucalyptus salubris
Acacia coolgardiensis	Maireana brevifolia
*Dittrichia graveolens	Maireana sp. (6-31)
Dodonaea inaequifolia	Melaleuca acuminata ssp. websteri
Enchylaena tomentosa	Melaleuca lateriflora var. acutifolia
Eremophila decipiens	Rhagodia drummondii
Eremophila sp. (29-92)	Solanum hoplopetalum
Eucalyptus loxophleba	

Site Description:

Topography: Flat, undulating slopes.

Soils: Reddish brown, clay-loams with occasional gravels (10R4/6).

Comments:

This community is often disturbed due to the effects of clearing. Several variants of the community were also noted, although for this mapping programme, were not separated:

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Open Woodland of Eucalyptus salubris (Gimlet).

Mapping Code: 2.

Site Locations: 21 and 24.

Indicator Species:

Acacia erinacea
Acacia hemiteles
Acacia merrallii
Alyogyne hakeifolia
Atriplex semibaccata
*Dittrichia graveolens
Eucalyptus salubris
Eucalyptus salmonophloia
Solanum hoplopetalum
Solanum lasiophyllum
Templetonia sulcata

Site Description:

Topography : Flat, slightly undulating slopes.
Soils : Clays, crusting on surface. Surface 5YR 7/2 to 5YR 4/4 at depth ranging to 5YR7/2 over 10YR5/4.

Comments:

This community is relatively restricted in distribution within the study area and has been degraded by disturbance and exposure.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Open Woodland of Salmon Gum (Eucalyptus salmonophloia) with low understorey.

Mapping Code: 3.

Site Locations: 24.

Indicator Species:

Acacia hemiteles
Acacia merrallii
*Dittrichia graveolens
Eucalyptus salmonophloia
Eucalyptus salubris
Maireana brevifolia
Solanum hoplopetalum
Solanum lasiophyllum
Templetonia sulcata

Site Description:

Topography : Slightly undulating upper slopes.
Soils : Clay-loams, mid-way between dark reddish brown 10R 3/4 and moderate reddish brown 10R 4/6. Soils clod when bulldozed.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Low Woodland to Open Mallee of York Gum (Eucalyptus loxophleba) and mixed Mallees (Eucalyptus spp) as the soil becomes sandier.

Mapping Code: 4.

Site Locations: 25, 27 and 28.

Indicator Species:

Acacia acuaria	Eucalyptus loxophleba
Acacia acuminata	Eucalyptus salmonophloia
Acacia aff. bidentata	Eucalyptus stowardii
Acacia coolgardiensis	Grevillea eriostachya
Allocasuarina acutivalvis	Grevillea paniculata
Allocasuarina campestris	Maireana brevifolia
Cassia ?charlesiana	Maireana tomentosa
Dianella revoluta	Melaleuca uncinata
Ecdeiocolea monostachya	Santalum spicatum
Eucalyptus foecunda	Solanum lasiophyllum

Site Description:

Topography: Flat, undulating Slopes.

Soils: Reddish-brown Clay loams ranging to sandier clays (10R4/6 to 10R3/5).

Comments:

This plant community forms a transitory community between the woodlands of York Gum (E. loxophleba) and the heaths and shrublands with emergent mallees on the deeper sands.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Low Open Woodland to Open Mallee of Eucalyptus spp. over dense Sedgelands (e.g. Ecdeiochloa monostachya) on sandy-clays.

Mapping Code: 7.

Site Locations: 17.

Indicator Species:

Acacia aff. flabellifolia
Acacia sp. (17-67)
Allocasuarina campestris
Borya sphaerocephala
Chrysitrix distigmatosa
Ecdeiocolea monostachya
Eucalyptus leptopoda
Gastrolobium spinosum var. grandiflorum
Grevillea paradoxa
Hakea sulcata
Isopogon scabriusculus
Leucopogon hamulosus
Melaleuca conothamnoides
Melaleuca cordata
Melaleuca uncinata
Petrophile incurvata
Petrophile macrostachya
Schoenus sp.(BK-W158)

Site Description:

Topography : Flat, undulating slopes, seasonally wet.
Soils : Yellow-brown sandy-clay soils (10YR 7/4) varying to (10YR 6/2) on surface over sandy clay (10YR 5/4).

Comments:

This community is a variant of the former Mixed Mallees over a range of Heath species. It was restricted to the flat are, immediately north of Wubin, although it is known to occur on other reserves in the northern Wheatbelt near Kellerberrin.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Tall Shrubland of Melaleuca spp., although in some locations it forms pure stands of the respective species.

Mapping Code: 8.

Site Locations: 6, 11 and 12.

Indicator Species:

Acacia acuaria
Acacia hemiteles
Acacia acuminata
Acacia lineolata
Atriplex stipitata
Eucalyptus flocktoniae
Eucalyptus kochii
Eucalyptus redunca var. subangusta
Maireana sp. (6-31)
Melaleuca acuminata
ssp. websteri
Melaleuca adnata
Melaleuca cardiophylla/uncinata
Melaleuca eleuterostachya
Melaleuca lateriflora var. acutifolia
Melaleuca lateriflora var. lateriflora
Melaleuca uncinata
Rhagodia preissii
Rhagodia sp. (6-32)
Santalum acuminatum
Solanum hoplopetalum

Site Description:

Topography : Lower slopes near saline depressions and lakes.
Soils : Sandy to sandy clays (10R 4/6), surface fine quartz (lighter in colour), some crusting and sheet drainage.

Comments:

This community occurred in two restricted pockets on upper drainage lines near Wubin.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Closed Scrub-Heath of Allocasuarina spp., associated with a range of Proteaceae, Mimosaceae and Myrtaceae species.

Mapping Code: 10.

Site Locations: 1, 2, 3, 4, 5, 7, 8, 9, 10, 13, 14, 16, 17, 18, 19, 20, 23 and 26.

Indicator Species:

Acacia acuminata
Acacia colletioides
Acacia coolgardiensis
Acacia daviesioides
Acacia densiflora ("group")
Acacia dielsii
Acacia fragilis
Acacia hemiteles
Acacia lineolata
Acacia aff. microbotrya
Acacia neurophylla
Acacia signata
Acacia stereophylla
Acacia sp.(16-64)
Acacia sp. (17-67)
Allocasuarina acutivalvis
Allocasuarina campestris
Astroloma serratifolium
Baeckea crispiflora
Baeckea aff. cryptandroides
Baeckea sp. (BK-W149, M.E. Trudgen (9))
Beyeria ?lechenaultia
Borya sphaerocephala
Calothamnus gilesii
Cassytha glabella
Chrysitrix distigmatosa
Codonocarpus cotinifolius
Conospermum brownii
Cryptandra nutans
Dampiera lavandulacea
Daviesia cardiophylla
Daviesia hakeoides
Dianella revoluta
Dittrichia graveolens
Dodonaea bursariifolia
Dodonaea viscosa ssp. angustissima
Dodonaea sp. (3-16)
Drummondita hassellii
Ecdeicolea monostachya
Eucalyptus erythronema var. marginata
Eucalyptus foecunda
Eucalyptus leptopoda
Eucalyptus redunca var. subangusta
Eucalyptus salubris
Eucalyptus stowardii
Exocarpos sparteus
Gahnia drummondii
Gastrolobium spinosum var. grandiflorum
Glischrocaryon aureum
Grevillea eriostachya
Grevillea eryngioides
Grevillea ?integrifolia
Grevillea paniculata
Grevillea paradoxa
Grevillea petrophiloides
Grevillea pterosperma
Hakea coriacea
Hakea falcata
Hakea sulcata
Halgania sp. (2-9)

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Closed Scrub-Heath of Allocasuarina spp., associated with a range of Proteaceae, Mimosaceae and Myrtaceae species. (Cont.)

Indicator Species: (Cont.)

Helipterum sp.
Hemigenia westringioides
Hemigenia sp. (23-83)
Hibbertia aff. eatoniae
Hibbertia glomerosa
Isopogon scabriusculus
Jacksonia foliosa
Jacksonia rhadinoclada
Keraudrenia integrifolia
Lechenaultia sp. (2-6)
Lepidobolus preissianus
Lepidosperma resinosum
Leptosema tomentosum
Leptomeria sp. (4-19)
Leucopogon hamulosus
Maireana brevifolia
Malleostemon roseus
Melaleuca conothamnoides
Melaleuca cordata
Melaleuca filifolia
Melaleuca laxiflora
Melaleuca aff. scabra
Melaleuca uncinata
Melaleuca sp. (3-15)
Mirbelia trichocalyx
Olearia muelleri
Patersonia drummondii
Persoonia coriacea
Persoonia rufiflora
Persoonia saundersiana
Persoonia striata
Petrophile ?drummondii
Petrophile incurvata
Petrophile macrostachya
Phebalium ambiguum
Phebalium microphyllum
Pityrodia terminalis
Platysace commutata
Platysace maxwellii
Pultenaea capitata
Rhagodia preissii
Santalum acuminatum
Schoenus sp. (BK-W158)
Solanum hoplopetalum
Solanum lasiophyllum
Spyridium ?complicatum
Thyptomene cuspidata
Verticordia brachypoda
Verticordia ?monodelpha
Verticordia spicata
Verticordia sp. (20-73)
Westringia ?discipulorum

Site Description:

Topography : Upper slopes, slightly undulating
Soils : Mottled brown to yellow-brown sandy-clays with quartz and gravel mixture (5YR 4/4, 5YR 3/4 and 10YR 5/4, 10YR 7/4)).

Comments:

In disturbed areas this community supports a range of Wattles and herbaceous species.

APPENDIX C

SUMMARY OF PLANT COMMUNITY TYPES RECORDED IN THE WUBIN TO DALWALLINU ROAD VERGE SURVEY AREA

Plant Community Type: Open Scrub-Heath of mixed Proteaceae - Mimosaceae - Myrtaceae families with emergent Mallees.

Mapping Code: 11.

Site Locations: No observation sites.

Indicator Species:

Acacia acuaria	Eucalyptus pyriformis
Acacia acuminata	Exocarpos sparteus
Acacia coolgardiensis (dominant)	Gastrolobium laytonii
Acacia ?daviesiodes	Glischocaryon aureum
Acacia dielsii	Grevillea eriostachya
Acacia erinacea	Grevillea paradoxa
Acacia hemiteles	Grevillea petrophiloides
Astroloma serratifolium	Grevillea pterosperma
Baeckea crispiflora	Hakea coriacea
Banksia benthamiana	Hakea falcata
Borya sphaerocephala	Hibbertia glomerosa
Calothamnus gilesii	Jacksonia foliosa
Cassytha glabella	Keraudrenia integrifolia
Chrysitrix distigmatosa	Malleostemon roseus
Codonocarpus cotinifolius	Melaleuca conothamnoides
Cryptandra nutans	Melaleuca cordata
Dianella revoluta	Melaleuca aff. scabra
Dodonaea bursariifolia	Melaleuca uncinata
Dodonaea inaequifolia	Olearia muelleri
Dodonaea viscosa ssp.angustissima	Petrophile macrostachya
Ecdeiocolea monostachya	Santalum acuminatum
Eucalyptus foecunda	Santalum spicatum
Eucalyptus leptopoda	Solanum lasiophyllum
Eucalyptus loxophleba	Spyridium ?complicatum
Eucalyptus oleosa var. borealis	Thryptomene cuspidata

Site Description:

Topography : Flat, undulating slopes.

Soils : Moderate yellowish-brown to dark yellowish-orange sandy-clay soils (10YR 5/4) varying to (10YR 6/6). Some crusting on soil surface. (10YR 7/4 and 10YR 6/6). Predominantly deep sandy-clay soils.

Comments:

In disturbed areas the wattles - Acacia acuminata and A. coolgardiensis remain as dominants over herbaceous species.

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA

The following summary is based on survey findings, literature and herbarium labels of specimens at the State Herbarium (South Perth).

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Acacia acuaria	Shrub, yellow flowers.		
Acacia acuminata	Tall shrub or small tree, "Rasberry Jam", Yellow cylindrical flower heads.	July to October	
Acacia aff. bidentata	Dense shrub to 1m yellow inflorescence.	Spring	
Acacia colletioides	Compact rigid, rounded low shrub, yellow flowers.	August to October	
Acacia coolgardiensis	Medium to tall spreading shrub; flowers yellow.		
Acacia ? daviesoides (BK-W128)	"leafless", yellow globular flower head.	Spring	
Acacia daviesoides	"leafless", yellow globular flower head.	Spring	
Acacia densiflora ("group")	Compact, erect shrub with "snarled" appearance.		
Acacia dielsii	Wiry shrub, yellow flowers.		
Acacia erinacea	Rigid compact shrub, yellow globular flower heads.	June to November	May have two sets of flowers in the one year.
Acacia aff. flabellifolia	Sparse erect shrub yellow flowers.		

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Acacia fragilis	Shrub to 1.5m yellow inflorescence	Spring/early Summer	
Acacia hemiteles	Medium to tall rounded shrub.		
Acacia lineolata	Erect, slender shrub to 4m yellow inflorescence	September	
Acacia mackeyana			
Acacia merrallii	Low compact shrub to 0.6m yellow inflorescence	Spring	
Acacia aff. microbotrya	Small bushy tree, flower heads, usually pale yellow and globular.	April to July	
Acacia neurophylla	Shrub to small tree to 4m yellow inflorescence.	Late Winter	
Acacia signata	Shrub, yellow flowers (bright green foliage).		
Acacia stereophylla	Tree to 4m	early Summer	
Allocasuarina acutivalvis	Tall shrub, multi-stemmed.		Sheoak
Allocasuarina campestris	Dense medium shrub, multi-stemmed spreading.		
Alyogyne hakeifolia	Sparse shrub, attractive "Hibiscus" type flower (mauve & red)	Summer	
Astroloma serratifolium	Low erect compact shrub, red flowers.		
Atriplex semibaccata	Low spreading perennial shrub.	Mainly March to June	

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Atriplex stipitata	Low-open shrub to 1m. grey-green leaves & inconspicuous flowers.		"Mallee saltbush"
Baeckea crispiflora	Shrub, white or pink flowers.	August to November	
Baeckea cryptandroides	Spreading shrub, pink flowers.		
Baeckea sp.(BK-W149, M.E.Trudgen (9))	Erect spreading shrub.		
Banksia benthamiana	Erect shrub.	Late November to January	
Beyeria ?lechenaultia	Shrub to 1.5m	June to January	
Borya sphaerocephala	Perennial,dense sward.		
Calothamnus gilesii	Med-tall spreading shrub scarlet flowers.		
Cassia ? charlesiana	Shrub, yellow flowers.		
Cassytha glabella	Parasitic vine.	All year	
Chrysitrix distigmatosa	Perennial herb, sedge.		
Codonocarpus cotinifolius	Small tree. "Desert poplar, Native poplar or western bell fruit", flowers not conspicuous, fruit-bell shaped.		
Conospermum brownii	Glabrous shrub, white flowers.		
Cryptandra nutans	Compact low shrub.	Mainly July to August	
Darwinia aff. diosmoides	Dense shrub to 1m, small white flowers.	April to January	
Daviesia cardiophylla	Low shrub to 0.6m, small bright red-purple flowers.	Winter	
Daviesia hakeoides	Shrub, flowers orange-red.	May-July	

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Dianella revoluta	Perennial herb.		
Dodonaea bursariifolia	Compact low-med shrub green or purple fruits.		
Dodonaea inaequifolia	Shrub, red fruits.		
Dodonaea viscosa ssp. angustissima	Erect rounded shrub.		
Dodonaea sp. (2-16)			
Drummondita hassellii			
Ecdeiocolea monostachya	Perennial tussock herb, sedge.		
Enchylaena tomentosa	Straggly shrub, "Ruby Saltbush", red fruiting perianth.	Flowers and fruits probably all year, although mainly recorded May to September	
Eremophila decipiens	Viscid shrub to 1m, red flowers	Spring	"Slender Fuchsia"
Eucalyptus camaldulensis	Tree "River Red Gum", planted, cream flowers.	September to February	
Eucalyptus erythronema var. marginata	Slender mallee or small tree to 6m, smooth white-pink bark and red flowers	October to February	Red flowered Mallee
Eucalyptus flocktoniae	Slender tree to 12m, bark smooth grey & deciduous, dark foliage, cream flowers	September to December	"Merrit"
Eucalyptus foecunda	Mallee, "Narrow-leaved Red Mallee", cream flowers.	November to March mainly January to March	

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Eucalyptus kochii	Spreading mallee or small tree	September to January	name commemorates Max Koch, a collector who found plant eastwards of Dalwallinu.
Eucalyptus leptopoda	Mallee, "Tammin Mallee" cream flowers.	December to March	Bark at base stripping
Eucalyptus loxophleba	Tree and Mallee forms "York Gum", white flowers.	Mainly September to December	
Eucalyptus oleosa var. borealis	"Ningham Mallee". White to creamy yellow flowers.	December and January (summer months)	(grey stocking at base)
Eucalyptus pyriformis	Pear-fruited Mallee. Large pale yellow to pink or red flowers.	Late winter to spring (July to October)	Bark fibrous, at base stripping, smooth upper stems.
Eucalyptus redunca var. subangusta	"Black Marlock" Mallee, pale creamy-yellow flowers.	December to March	
Eucalyptus redunca var. melanophloia	Mallee to 5m, smooth light bark rounded canopy, cream flowers	December to March	Black Marlock
Eucalyptus salmonophloia	Tree "Salmon Gum", creamy white flowers.	November to March	
Eucalyptus salubris	Tree to Mallee form, "Gimlet" cream to white flowers.	October to March	
Eucalyptus stowardii	"Fluted Horn Mallee", yellow flowers.	July to October, also sometimes in summer months.	

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Eucalyptus torquata	Small tree "Coral Gum", planted, salmon pink flowers	Predominantly in summer and autumn; with peak in September to November.	
Exocarpos sparteus	Medium shrub, "Broom ballart".	Mainly February to October.	
Gahnia drummondii	Perennial tufted grass		
Gastrolobium laytonii	Multi-stemmed low shrub, "Kite-leaved Poison", "Breelya" red & yellow flowers.		
Gastrolobium spinosum var. grandiflorum	Open spreading shrub to 1.5m abundant red and yellow flowers.	August to March	
Glischrocaryon aureum	Erect perennial herbs, tussock appearance. yellow flowers, rarely reddish.	September to October	
Grevillea eriostachya	Pine-like, medium-tall shrub. Pale yellow flowers.	September to November	
Grevillea eryngioides	Open shrub, purple flowers.	September to November	
Grevillea ?integrifolia	Shrub to 3m.	November.	
Grevillea paniculata	Medium,multi-stemmed,compact shrub, white flowers.	August to September	
Grevillea paradoxa	Compact medium shrub, purple to red flowers.	August to October	
Grevillea petrophiloides	Medium to tall shrub, pink flowers.	August to November	Flowering stalks above foliage.
Grevillea pterosperma	Tall shrub, white flowers.	Spring months	
Hakea coriacea	Tall shrub to small tree, deep red to deep pink flowers.	July to September	

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Hakea falcata	Multi-stemmed spreading shrub.	September to November	
Hakea sulcata	Erect shrub, white flowers.	August to September	
Helipterum sp.			
Hemigenia westringioides	Open shrub to 1m, pinky-mauve flowers.	Spring	
Hibbertia aff. eatoniae	Low shrub, bright green foliage & yellow flowers	late Winter	
Hibbertia glomerosa	Low spreading shrub, large yellow flowers.	September to October	
Isopogon scabriusculus	Upright, rigid shrub to 1m, rose-pink flowers	July/August	
Jacksonia foliosa	Small medium spindly (or open) shrub, orange-yellow flowers.		
Jacksonia rhadinoclada	Bushy shrub to 0.4m, small yellow flowers	October to November	
Keraudrenia integrifolia	Shrub, purple-voilet flowers.	September to November	
Lepidobolus preissianus	Rush with attractive button-like inflorescences		
Leptosema tomentosum	Low perennial herb, attractive foliage & red flowers at base		
Leucopogon hamulosus	Dense rounded to 0.5m., white flowers.	Winter	
Maireana brevifolia	Erect shrub, "Cotton Bush".		
Maireana tomentosa	Erect spreading shrub.		
Malleostemon roseus	Multi-stemmed compact shrub.		

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Persoonia saundersiana	Shrub to 3m	September	
Persoonia striata	Low dense bush to 0.5m		
Petrophile ?drummondii	Upright prickly shrub to 1.5m Bright yellow flowers	August to September	
Petrophile incurvata	Low-medium shrub, multi-stemmed, spreading.		
Petrophile macrostachya	Medium spreading shrub.	August to November, may start in July near study area.	
Phebalium ambiguum	Bushy shrub to 0.5m, small yellow flowers	April to November	
Phebalium microphyllum	Compact shrub to 0.6m, small pale yellow flowers	July to October	
Pityrodia terminalis	Low shrub, felty leaves, "foxglove" flowers		
Platysace commutata	Small whispy shrub, off-white flowers.		
Platysace maxwellii	Shrub to 0.6m, inconspicuous cream flowers.	late Summer	
Ptilotus polystachyus	Perenial herb, flowers pale green in "burhs-like" inflorescence		"Bottle-washers"
Pultenaea capitata	Erect shrub to 0.3m, orange & red flowers.	Spring	
Rhagodia drummondii	Climbing shrub.		
Rhagodia preissii	Erect shrub, Red berry.		

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Melaleuca acuminata ssp. websteri	Erect shrub to 3m, white flowers	September	
Melaleuca adnata	Low spreading shrub white flowers.		
Melaleuca cardiophylla/ undulata	Spreading shrub to 2m, reddish tinge to leaves, white flowers.		
Melaleuca conothamnoides	Compact, multi-stemmed spreading shrub, purple flowers.	Spring, September to November	
Melaleuca cordata	Shrub, scarlet-pink flowers.	Spring into early summer	
Melaleuca eleuterostachya	Medium to tall broom-shaped shrub, cream to white flowers.		
Melaleuca filifolia	Shrub.		
Melaleuca lateriflora var. acutifolia	Shrub, broom-bush, white flowers.	January to March	
Melaleuca lateriflora var. lateriflora	Erect bushy shrub to 2m, white flowers	June to January	
Melaleuca laxiflora	Shrub to 1.5m, purple-pink flowers.	July to December	
Melaleuca aff. scabra	Small shrub, pink-purple flowers.	September to December	
Melaleuca uncinata	Shrub, broom-bush, cream to pale yellow flowers.	July to December	
Olearia muelleri	Shrub, white flowers.		
Persoonia coriacea	Shrub to 1m.		
Persoonia rufiflora	Open many stemmed shrub.		

APPENDIX D: SUMMARY OF LIFEFORMS AND FLOWERING TIMES FOR VASCULAR PLANT SPECIES IN SURVEY AREA (Cont.)

SPECIES	LIFEFORM	FLOWERING TIMES	COMMENTS
Santalum acuminatum	Shrub to small tree, root parasitic, "Quandong".	November to March	Rounded tree
Santalum spicatum	Shrub to small tree parasitic root, "Sandalwood"	March to May	
Schoenus sp. (BK - W158)	Perennial tussock herb.		
Solanum hoplopetalum	Trailing spreading perennial, very thorny.		
Solanum lasiophyllum	Shrub, "Flannel Bush", purple flowers.	May to October	
Spyridium ? complicatum	Spreading shrub, whitish-pubescent flowers.		
Stipa elegantissima	Perennial Grass.	August to January	
Templetonia sulcata	Leafless rounded shrub. "Centipede Bush".		
Thryptomene cuspidata	Broom-shaped shrub.		
Verticordia brachypoda	Small shrub		
Verticordia ?monodelpha	Dense shrub to 1m, conspicuous pink mauve "feather flowers".	Spring	
Verticordia spicata	Shrub to 0.6m pink "feather flowers".	early Summer	
Westringia discipulorum	Open shrub to 1.5m, grey hoary leaves, white flowers.	Spring	

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE.

R = Recorded;
A = Predicted species overflying but not touching down in the habitat;
X = Predicted species utilising the habitat;
+ = Introduced species;
#= Birds recorded during the Wubin to Perenjori survey but not in the current study area.

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - BIRDS							
DROMAIIDAE							
Dromaius novaehollandiae	Emu	X	X	X	X	X	X
ARDEIDAE							
Ardea novaehollandiae	White-faced Heron	X	X				X
ACCIPITRIDAE							
Elanus notatus	Black-shouldered Kite	X	X	A	A	A	X
Haliastur sphenurus	Whistling Kite	X	X	A	A	A	X
Accipiter fasciatus	Brown Goshawk	X	X	A	A	A	X
A. cirrhocephalus	Collared Sparrowhawk			X	X	X	
Aquila audax	Wedge-tailed Eagle	X	X	A	A	A	X
Hieraaetus morphnoides	Little Eagle	X	X	A	A	A	X
Circus assimilis	Spotted Harrier	X	X	A	A	A	X
FALCONIDAE							
Falco peregrinus	Peregrine Falcon	X	X	A	A	A	X
F. longipennis	Australian Hobby	X	X	A	A	A	X
F. berigora	Brown Falcon	X	X	A	A	A	X
F. cenchroides	Australian Kestrel	X	X	A	A	A	R
MEGAPODIIDAE							
Leipoa ocellata	Malleefowl #			X	X	X	
PHASIANIDAE							
Coturnix novaezealandiae	Stubble Quail	X	X				X
TURNICIDAE							
Turnix velox	Little Button-quail	X	X	X	X	X	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - BIRDS (Continued)							
OTIDIDAE							
Ardeotis australis	Australian Bustard		X				X
CHARADRIIDAE							
Vanellus tricolor	Banded Lapwing	X					X
Charadrius melanops	Black-fronted Plover	X	X				X
Peltohyas australis	Inland Dotterel	X	X				X
COLUMBIDAE							
Columba livia	Feral Pigeon +						X
Streptopelia seneqalensis	Laughing Turtle-Dove +#						X
Phaps chalcoptera	Common Bronzewing	X	R	X	X	R	X
Ocyphaps lophotes	Crested Pigeon	X	R	X	R	R	R
CACATUIDAE							
Calyptorhynchus magnificus	Red-tailed Black-Cockatoo	R	X				R
Calyptorhynchus sp.	White-tailed Black-Cockatoo	X	X	X	X	X	X
Cacatua roseicapilla	Galah	R	X	R	R	X	R
C. tenuirostris	Long-billed Corella #	X	X				X
C. leadbeateri	Pink Cockatoo	X	X				X
POLYTELITIDAE							
Polytelis anthopeplus	Regent Parrot	X	R	R	X	X	X
Nymphicus hollandicus	Cockatiel	X					X
PLATYCERCIDAE							
Melopsittacus undulatus	Budgerigar	X	X				X
Barnardius zonarius	Port Lincoln Ringneck	X	R	X	X	X	R
Psephotus varius	Mulga Parrot #	X	X	X	X	X	X
Neophema elegans	Elegant Parrot	X	R			R	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - BIRDS (Continued)							
CUCULIDAE							
Cuculus pallidus	Pallid Cuckoo	X	X	X	X	X	X
C. pyrrhophanus	Fan-tailed Cuckoo	X	X	X	X	X	X
Chrysococcyx osculans	Black-eared Cuckoo	X	X				X
C. basalis	Horsfield's Bronze-Cuckoo	X	X				X
C. lucidus	Shining Bronze-Cuckoo	X	X	X	X	X	X
STRIGIDAE							
Ninox novaeseelandiae	Southern Boobook	X	X				X
TYTONIDAE							
Tyto alba	Barn Owl	X	X				X
PODARGIDAE							
Podargus strigoides	Tawny Frogmouth #	X	X	X	X	X	X
AEGOTHELIDAE							
Aegotheles cristatus	Australian Owlet-Nightjar	X	X	X	X	X	X
CAPRIMULGIDAE							
Caprimulgus guttatus	Spotted Nightjar #	X	X	X	X	X	X
APODIDAE							
Apus pacificus	Fork-tailed Swift	A	A	A	A	A	A
ALCEDINIDAE							
Halcyon pyrrhopygia	Red-backed Kingfisher	X	X				X
H. sancta	Sacred Kingfisher	X	X				X
MEROPIDAE							
Merops ornatus	Rainbow Bee-eater	X	X	A	A	A	X
HIRUNDINIDAE							
Cheramoeca leucosternum	White-backed Swallow	X	X	A	A	X	R
Hirundo neoxena	Welcome Swallow	X	X	A	R	A	X
Cecropis nigricans	Tree Martin	X	X	R	A	A	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - BIRDS (Continued)							
MOTACILLIDAE							
Anthus novaeseelandiae	Richard's Pipit	X	X				R
CAMPEPHAGIDAE							
Coracina novaehollandiae	Black-faced Cuckoo-shrike	X	X	X	X	X	X
Lalage sueurii	White-winged Triller	X	X				X
MUSCICAPIDAE							
Drymodes brunneopygia	Southern Scrub-robin #			X	X	X	
Petroica goodenovii	Red-capped Robin	X	X	R	X	R	R
Melanodryas cucullata	Hooded Robin	X	X				X
Eopsaltria griseogularis	Western Yellow Robin #		X				
Pachycephala pectoralis	Golden Whistler		X	X	X	X	
P. rufiventris	Rufous Whistler	X	X				X
Colluricincla harmonica	Grey Shrike-thrush #		X	X	X	X	
Oreoica gutturalis	Crested Bellbird		R	R	R	X	X
Rhipidura fuliginosa	Grey Fantail #	X	X	X	X	X	X
R. leucophrys	Willie Wagtail	X	R	R	R	R	R
TIMALIIDAE							
Pomatostomus superciliosus	White-browed Babbler		X	R	R	R	X
SYLVIIDAE							
Cinclorhamphus mathewsi	Rufous Songlark	X					X
C. cruralis	Brown Songlark	X					X
MALURIDAE							
Malurus pulcherrimus	Blue-breasted Fairy-wren			R	X	X	
ACANTHIZIDAE							
Sericornis frontalis	White-browed Scrubwren			X	X	X	
S. cautus	Shy Hylacola			X	X	X	
S. brunneus	Redthroat #			X	X	X	
S. fuliginosus	Calamanthus			X	X	X	
Smicrornis brevirostris	Weebill	X	R	X	X	R	R
Gerygone fusca	Western Gerygone	X	X	X	X	X	R

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - BIRDS (Continued)							
ACANTHIZIDAE (Cont.)							
Acanthiza apicalis	Inland Thornbill		X	X	R	X	X
A. uropygialis	Chestnut-rumped Thornbill #		X	X	X	X	
A. chrysorrhoa	Yellow-rumped Thornbill	X	R		R		R
NEOSITTIDAE							
Daphoenositta chrysoptera	Varied Sittella	X	X				X
MELIPHAGIDAE							
Anthochaera carunculata	Red Wattlebird	X	X	X	X	X	X
Acanthagenys rufogularis	Spiny-cheeked Honeyeater #		X	X	X	X	
Manorina flavigula	Yellow-throated Miner	X	X	R	X	R	R
Lichenostomus virescens	Singing Honeyeater	R	R	R	R	R	R
L. leucotis	White-eared Honeyeater		R	X	X	X	X
L. ornatus	Yellow-plumed Honeyeater	X	X				X
Melithreptus brevirostris	Brown-headed Honeyeater		R	X	X	X	X
Lichmera indistincta	Brown Honeyeater	X	X	X	X	X	X
Phylidonyris albifrons	White-fronted Honeyeater	X	X				X
P. melanops	Tawny-crowned Honeyeater			X	X	X	
Certhionyx variegatus	Pied Honeyeater			X	X	X	
EPHTHIANURIDAE							
Ephthianura tricolor	Crimson Chat		X	X	X	X	
E. albifrons	White-fronted Chat #						X
DICAEIDAE							
Dicaeum hirundinaceum	Mistletoebird	X	X	X	X	X	X
PARDALOTIDAE							
Pardalotus striatus	Striated Pardalote #	X	X	X	X	X	X
ZOSTEROPIDAE							
Zosterops lateralis	Silvereye	X	X	X	X	X	X
PLOCEIDAE							
Poephila guttata	Zebra Finch		X	X	R	X	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - BIRDS (Continued)							
GRALLINIDAE							
Grallina cyanoleuca	Australian Magpie-lark	R	R	X	X	R	R
ARTAMIDAE							
Artamus personatus	Masked Woodswallow	X	X	X	X	X	X
A. cinereus	Black-faced Woodswallow	X	R	R	R	R	R
CRACTICIDAE							
Cracticus torquatus	Grey Butcherbird		X	R	X	X	
C. nigrogularis	Pied Butcherbird	X	R				X
Gymnorhina tibicen	Australian Magpie	R	R	X	R	R	R
Strepera versicolor	Grey Currawong		X	X	X	X	X
CORVIDAE							
Corvus coronoides	Australian Raven	R	X	R	R	R	R
C. bennetti	Little Crow #	X	X	X	X	X	X
SPECIES - MAMMALS							
TACHYGLOSSIDAE							
Tachyglossus aculeatus	Short beaked Echidna	X	R	R	R	X	X
DASYURIDAE							
Sminthopsis dolichura	Common Dunnart			X	X	X	
S. crassicaudata	Fat-tailed Dunnart	X					X
MACROPODIDAE							
Macropus fuliginosus	Western Grey Kangaroo	X	X	X	X	X	X
M. rufus	Red Kangaroo	X	R	R	X	X	X
MOLOSSIDAE							
Tadarida australis	White-striped Mastiff-bat	X	X	A	A	A	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

		Mapping Units					
	Common Name	1,2,3	1*,4*	7	10	11	13
SPECIES - MAMMALS (Continued)							
VESPERTILIONIDAE							
Nyctophilus major	Greater Long-eared Bat	X	X	A	A	A	X
N. geoffroyi	Lesser Long-eared Bat	X	X	A	A	A	X
Chalinolobus gouldii	Gould's Wattled Bat	X	X	A	A	A	X
C. morio	Chocolate Wattled Bat	X	X	A	A	A	X
Scotorepens balstoni	Western Broad-nosed Bat	X	X	A	A	A	X
Eptesicus regulus	King River Eptesicus	X	X	A	A	A	X
MURIDAE							
Notomys mitchellii	Mitchell's Hopping-mouse				X	X	
Mus musculus	House Mouse +	X	X	X	X	X	X
LEPORIDAE							
Oryctolagus cuniculus	Rabbit +	X	R	R	R	R	X
CANIDAE							
Canis familiaris dingo	Dingo	X	X	X	R	X	X
Vulpes vulpes	Fox +	X	R	R	R	R	R
FELIDAE							
Felis catus	Feral Cat +	X	R	X	X	X	X
SPECIES - AMPHIBIANS & REPTILES							
LEPTODACTYLIDAE - FROGS							
Heleioporus albopunctatus			X	X	X	X	X
Neobatrachus kunapalari					X	X	X
N. pelobatoides			X	X			X
N. sutor					X	X	X
Pseudophryne quentheri		X	X	X	X	X	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

Common Name	Mapping Units 1,2,3	1*,4*	7	10	11	13
SPECIES - AMPHIBIANS & REPTILES (Continued)						
GEKKONIDAE - GECKOS						
Crenadactylus o. ocellatus		X	X			
Diplodactylus granariensis	X	X		X	X	X
D. maini	X	X		X	X	X
D. pulcher	X	X		X	X	X
Gehyra variegata	X	X	X	X	X	X
Heteronotia binoei	X	X	X	X	X	X
Oedura reticulata	X					
PYGOPODIDAE - LEGLESS LIZARDS						
Delma australis		X	X	X	X	X
D. fraseri		X	X	X	X	X
D. grayii		X	X	X	X	X
Lialis burtonis		X	X	X	X	X
Pygopus lepidopodus		X	X	X	X	X
AGAMIDAE - DRAGON LIZARDS						
Ctenophorus reticulatus		X	X	X	X	X
C. scutulatus		X				X
Moloch horridus		X		X	X	X
Pogona m. minor	X	X	X	X	X	X
SCINCIDAE - SKINKS						
Cryptoblepharus plagiocephalus	X	X				X
Ctenotus p. pantherinus				X	X	X
C. schomburgkii				X	X	X
Egernia depressa	X	X		X	X	X
E. inornata				X	X	X
E. stokesii badia	X	X				X
Lerista distinguenda	X	X	X	X	X	X
L. gerrardii	X	X	X	X	X	X
L. lineopunctulata				X	X	X
L. muelleri	X	X	X	X	X	X
Menetia greyii	X	X	X	X	X	X
Morethia obscura	X	X	X	X	X	X
Tiliqua occipitalis				X	X	X
T. r. rugosa	X	X	X	X	X	X

APPENDIX E : LIST OF VERTEBRATES RECORDED OR EXPECTED TO OCCUR IN THE PLANT COMMUNITY TYPES ON THE WUBIN TO DALWALLINU ROAD VERGE. (Continued)

Common Name	Mapping Units 1,2,3	1*,4*	7	10	11	13
SPECIES - AMPHIBIANS & REPTILES (Continued)						
VARANIDAE - MONITORS						
Varanus caudolineatus	X	X				X
V. gouldii	X	X	X	X	X	X
V. t. tristis	X	X				X
TYPHLOPIDAE - BLIND SNAKES						
Ramphotyphlops hamatus				X	X	X
R. waitii				X	X	X
ELAPIDAE - ELAPID SNAKES						
Demansia psammophis reticulata				X	X	X
Denisonia fasciata	X	X				X
Pseudechis australis	X	X	X	X	X	X
Pseudonaja modesta				X	X	X
P. nuchalis	X	X	X	X	X	X
Rhinoplocephalus monachus				X	X	X
Vermicella bertholdi				X	X	X
V. semifasciata				X	X	X