RIVER FORESHORE CORRIDORS IN THE SOUTH COAST REGION OF WESTERN AUSTRALIA

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Introduction

The CALM South Coast Region extends from Albany in the west along the South Coast of Western Australia approximately 1200 km to the South Australian border in the east, and inland up to 400 km (Figure 1).

The region is renowned for its varied and spectacular landscapes including the southern coastline and most of the major mountain peaks of South Western Australia. Tourism and primary production are the major industries and several of the State's oldest and largest national parks are located within the area together with an extensive system of nature reserves. The flora is especially diverse with almost one fifth of the Western Australian flora known to occur in one area alone, viz the Fitzgerald River National Park. Several other reserves also contain a high number of flora species including the Stirling Range National Park and the proposed Waychinicup National Park, near Albany. Several species of rare or endangered fauna are also known to occur, particularly in the coastal reserves and in the Fitzgerald River National Park.

The study area discussed in this paper lies in the western part of the CALM South Coast Region. It extends from Albany in the west to Esperance in the east. This area was chosen for study because it is the portion of the region which has been partially cleared for agriculture and because it contains the only river systems of any significant size.

Land form, hydrology and vegetation

The study area is characterised by laterised plateaux with dissected edges and emergent quartzite ranges, specifically the Stirling Range, the Barren Ranges and Mount Ragged. The Porongurup Range, of granite origin, lies to the south of the Stirling Range and other major granite areas occur along the coast in the vicinity of Albany and at Cape Le Grand just east of Esperance. In these areas the coastline is dominated by granite and gneissic headlands and curved sandy beaches.

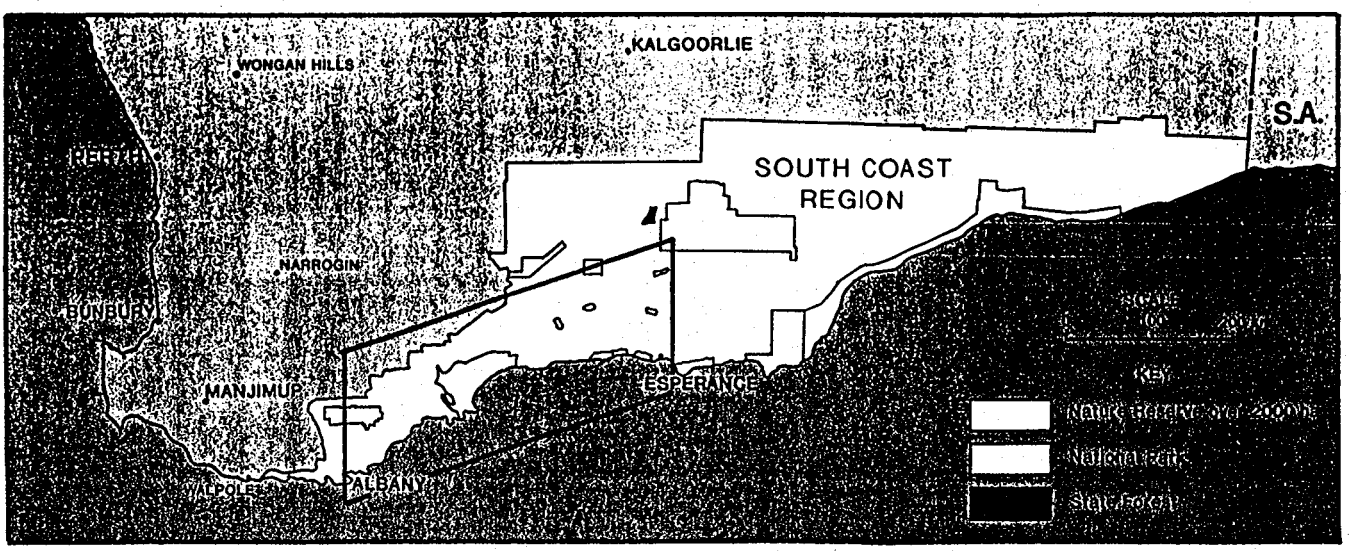

FIGURE 1. CALM SOUTH COAST REGION SHOWING AREA OF PRIMARY INTEREST.

There are several rivers, but with one exception (the Pallinup River) these extend only 60-70 km inland. The rivers discharge into inlets or "harbours", most of which are permanently or semi-permanently closed to the ocean. Rivers are incised into the landscape, having cut valleys ranging from less than 100 metres to several kilometres wide. In several instances the width of the river valley has influenced the width of the associated river foreshore reserve and, as will be seen below, this has ramifications for the potential reservation of vegetation corridors along the river system.

The study area falls entirely within the Eyre Botanical District of the South-west Botanical Province (Beard, 1980). Scrub and mallee heath occur on the sandplains with Tallerack (Eucalyptus tetragona) as a characteristic species. Mallee woodlands, particularly E. redunca and E. incrassata occupy valleys.

Throughout the study area there has been considerable clearing of native vegetation in order to provide land for agriculture, roads and settlements. However, several quite substantial areas remain uncleared and these are largely national parks and nature reserves. These areas remain as islands of remnant vegetation, for example, the Stirling Range National Park, the Fitzgerald River National Park, and the nearby Lake Magenta Nature Reserve.

Conservation Reserves

In Western Australia the major areas formally set aside as conservation reserves are nature reserves and national parks. Obviously areas of uncleared land such as timber reserves, other reserves, vacant Crown land and uncleared private land, may also have conservation value but these areas have not been designated with conservation as the priority use. A major review of existing nature reserves and national parks of the region took place in the early 1970's (CTRC, 1974) and resulted in a series of government endorsed Environmental Protection Authority recommendations in 1976 (EPA, 1976). Regrettably, due to competition from alternative land uses several of these recommendations have not yet been implemented.

The formation of CALM

Up to 1985 nature reserves and national parks were managed by different agencies. Nature reserves were vested in the WA Wildlife Authority and were managed by the Department of Fisheries and Wildlife, whereas national parks were vested in the National Parks Authority of WA and managed by authority staff. In March 1985 the two agencies were combined, along with the former Forests Department of WA, to form the Department of Conservation and Land Management (CALM). Nature reserves and national parks are now vested in the National Parks and Nature Conservation Authority (NPNCA) and are managed for that authority by the department.

1988 Review of conservation reserves

In 1988 a major review of the region's system of nature reserves and national parks was undertaken for several reasons.

First, the Government of Western Australia (1988) announced a new policy towards mining and mineral exploration in national parks and nature reserves.

As part of the policy it was stated that a review of all "B" and "C" class conservation reserves would be undertaken to establish whether the areas should be upgraded to class "A" (i.e. made more secure against competing land use), or devested, with the conservation purpose being removed. This review of "B" and "C" class reserves was undertaken by each CALM region using a series of selection criteria including the presence of rare or endangered species, populations at the edge of their natural range, or the presence of important breeding sites etc.

Second, the government mining policy also stated that a review of all uncompleted recommendations from the 1976 EPA review would so be made. The purpose appeared to be to speed up action in areas where delays were occurring.

Third, and quite coincidentally, a regional management plan addressing all operations, interests and land managed by the department within the South Coast Region of the State was also commenced. This plan automatically adopted recommendations from the previous two reviews of reserves, and in addition identified other areas with potential for management by CALM, including several possible "corridor reserves" (CALM, 1989).

Corridor reserve potential

Two broad types of corridor can be recognised within the area. First, in larger reserves "landform corridors" may exist, for example along river valleys, along mountain ridges or along the coastline. In this case the corridor is generally completely or substantially located within existing reserve boundaries. Examples include the main ridge of the Stirling Range National Park, and the lower and middle courses of major rivers within the Fitzgerald River National Park.

The second, broad type are not necessarily related to land form and may be described as "remnant corridors". For example, the study area contains numerous vegetated road reserves which in some cases provide corridors of remnant vegetation up to 400 metres wide. Some are of substantial length, for example the Hassell National Park and much of the roadside corridor between Jerramungup and Ravensthorpe. However, it is probably at the local level that most of these corridors have the greatest value, often forming the only links between small nature reserves and other areas of uncleared land.

River foreshore corridors

A third type which embraces features of the two broad types above also occurs in the study area viz river foreshore corridors. These by definition have attributes of landform corridors as they follow river valleys, but they are generally also areas of remnant vegetation somewhat similar to roadside verges.

As mentioned previously, the width of these river foreshore reserves varies considerably, and is usually related to landform, particularly the valley width. Whilst recognising that these river corridors may be very narrow and degraded in some sections (this aspect is discussed in more detail below), they may nevertheless be specially important because they link the existing substantial system of reserves located along the Albany - Esperance coastline with important inland nature reserves or with other uncleared areas which in essence extend across the full width of the Australian continent.

Assessment technique

Assessment of corridor potential comprised a desk review and limited field inspection. The following steps were undertaken:

1. Satellite photographs at a scale of 1:500 000 were carefully examined to identify potential corridor links. This produced the broad scale corridor map shown in Figure 2. The photography used for this purpose was dated June 1984-April 1985. It was considered unlikely that further substantial clearing would have occurred since 1985 due to a moratorium on new land releases introduced in 1983, and due to introduction of the Soil and Land Conservation Act of 1985 which restricts clearing where deleterious effects on soil stability or water salinity might subsequently occur.

2. The potential corridors were then assessed on 1:50 000 cadastral maps to identify current land tenure. Where the river corridors were protected by reserves, the current tenure, purpose and classification of the reserve was established by reference to Department of Land Administration records.

   For the narrower sections of reserve, standard aerial photographs were used to ascertain where adjacent private land remained uncleared, thereby providing a wider vegetation corridor.

3. Finally, having identified those corridors which appeared to have the greatest potential for reservation, field inspection was undertaken (E Sandiford) in order to check for any recent clearing or degradation of reserves through stock grazing, weed encroachment or public use. The field visits also enabled a general description of landform, vegetation and disturbance to be undertaken. Any unusual species were noted on an opportunistic basis. Generally, access for field inspection was difficult and was restricted to intersection points with roads every few kilometres along the system. An example of one such assessment is presented in Appendix I. The time frame and costs involved did not allow for a more detailed assessment process.

As a result of the above assessment procedure four river foreshore corridor systems have been recommended for reservation as linear nature reserves in the Draft South Coast Regional Plan (CALM, 1989).

- the lower Pallinup River and Corackerup Creek system linking the coast with Corackerup and proposed Peniup Nature Reserves

- the upper Fitzgerald River linking Fitzgerald River National Park with Lake Magenta Nature Reserve

- the Young and Lort Rivers each of which links coastal reserves between Hopetoun and Esperance with the Southern Goldfields and Australian interior.

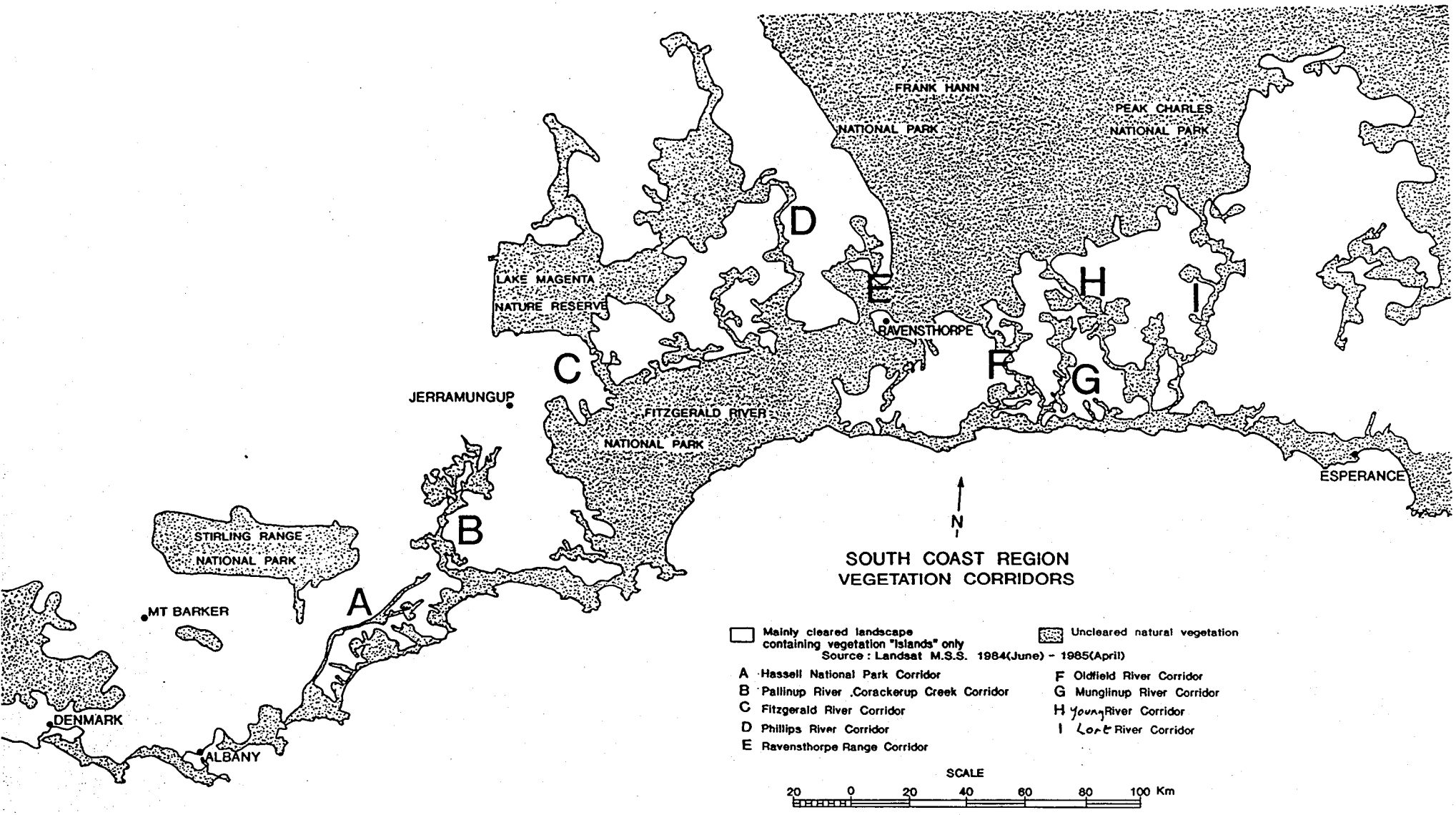
FRANK HANN
NATIONAL PARK
PEAK CHARLES
NATIONAL PARK
LAKE MAGENTA
NATURE RESERVE
RAVENSTHORPE
JERRAMUNGUP
FITZGERALD RIVER
NATIONAL PARK
ESPERANCE
STIRLING RANGE
NATIONAL PARK
MT BARKER
DENMARK
ALBANY
A
B
C
D
E
F
G
H
I
N
SOUTH COAST REGION
VEGETATION CORRIDORS
Mainly cleared landscape containing vegetation "Islands" only
Uncleared natural vegetation
Source : Landsat M.S.S. 1984(June) - 1985(April)
A Hassell National Park Corridor
B Pallinup River ,Corackerup Creek Corridor
C Fitzgerald River Corridor
D Phillips River Corridor
E Ravensthorpe Range Corridor
F Oldfield River Corridor
G Munglinup River Corridor
H Young River Corridor
I Lort River Corridor
SCALE
20 0 20 40 60 80 100 Km

FIG 2

Some Management considerations

Costs

In terms of boundary to area ratio, river reserve corridors present the worst possible scenario for the land manager. Moreover, whereas management access is simple and guaranteed in the case of roadside reserve corridors, in the case of rivers vehicular management access is usually difficult or impossible, and depends largely upon the cooperation of adjoining land holders. It is therefore anticipated that management costs associated with pests or weeds, and protection from disease or fire damage, will be very high.

Dieback disease

Much of the flora of the South Coast Region is susceptible to an introduced soil-borne fungus Phytophthora cinnamomi. The disease is already widespread throughout the study area and is frequently associated with infected gravel used on roads. A major method of spread of the disease is through the movement of mud or soil particles on the tyres and underbodies of vehicles. The disease spreads naturally downslope, rapidly in surface runoff during extreme conditions, and more slowly at subsurface levels.

Unfortunately river corridors are at a very high risk due to their low position in the landscape and the lack of direct control over movement of infected soil or machinery in adjacent farmlands, or on nearby roads. Infection may also spread downstream in river water.

There is a high probability therefore that vegetation susceptible to dieback disease will gradually be lost from river corridors. Depending on the species involved this may result in major structural changes in the vegetation. At our present level of understanding, management activities can not prevent this happening, they can only help to slow the process down by minimising the risk of new infections.

Water quality

Under natural conditions, river systems in Western Australia retain their water quality even under flood conditions, due to the filtering effects of native vegetation. However, where rivers drain cleared areas, run off is more immediate and soil particles are washed into the river during storm events, creating murky or muddy flood waters (see for example Watson, 1978). Regretably all the river reserve corridors under consideration here are subject to this effect. As a result it is inevitable that general river water quality will be changed, due to run off of nutrients and chemicals from agricultural practices within the river catchment area and due to the increased sediment load. This in turn will result in subtle changes to the vegetation immediately adjacent to or within the river bed. Furthermore, as native vegetation is cleared within these catchments there is generally a rise in ground water level which in turn causes salinity levels to rise in the surface drainage system.

Tenure

The question may be asked "Why should these river corridors be formally vested and managed by CALM?" Indeed if field assessment indicates that they are currently in good condition then it could be argued that they should remain as unvested reserves or vacant Crown land. However, whereas currently there appears to be growing rural community support for retention of native vegetation and tree planting, especially along water courses, there is no guarantee that attitudes may not change again in the future. Furthermore, if some of the river systems subsequently prove to have contemporary value as corridors for movement of rare or restricted fauna, then careful management, especially with regard to more obvious damaging influences such as grazing by stock, weed encroachment, and particularly dieback disease and fire, may be crucial.

It should also be noted that the land clearing within these catchments is quite recent having mainly occurred within the last thirty years, hence the time frame for which the river reserves have been remnants of vegetation has been very short. It may therefore be that the corridors have survived reasonably well without active management up till now but that this may not be the case for much longer.

Research and Monitoring Needs

New proposals for the establishment of river reserve corridors in the South Coast Region of Western Australia certainly appear attractive in theory, but in practice present some difficult, and in some cases insurmountable, management problems as outlined above. As the potential costs of management are very high, it is essential that research and monitoring programmes be established within selected corridors in order to ascertain more objectively the current and future value of such corridors for nature conservation purposes.

In particular we need to know their value as corridors not only for the movement of fauna but also for sedentary species. Monitoring should not be restricted to native species as corridors may prove to be equally valuable for survival of pest species such as rabbits and for predators such as feral cats and foxes.

We also need to study the effects of land use on adjacent areas and within the river catchments as a whole, particularly as this relates to water quality and dieback disease impact.

Finally, we need some objective data on the width requirements for corridors and on the effectiveness of management techniques. At the moment we have only a gut feeling that the wider the corridor the more valuable it is likely to be. We also believe that a requirement for active management will be an improvement upon "no management" as at present but again this is presently only a gut feeling.

Conclusions

There appears to be an excellent opportunity within the South Coast Region to augment natural land form corridors and remnant vegetation corridors along road reserves with a series of river foreshore corridors which provide vegetated links between coastal reserve systems in the south and major uncleared areas to the north.

However, the river reserve corridors are clearly subject to serious external influences including dieback disease, changes in water quality and edge effects due to their narrow width.

Research and monitoring is therefore required to assess more clearly the current and future value of river foreshore corridors.

Acknowledgements

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References

Beard, J. S., 1980. A new photogeographic map of Western Australia, W.A. Herbarium Research Notes 3, 37-58.

Conservation Through Reserves Committee, 1974. Conservation reserves for Western Australia, Department of Conservation and Environment, Perth.

Department of Conservation and Land Management, 1989. The South Coast Region Draft Management Plan, CALM, Albany, April 1989.

Government of Western Australia, 1988. Mining and the environment. Balancing the scales, Western Australian Government Policy Report.

Watson, J.R., 1977. Seasonal variation in the biodegradation of 2,4-D in river water, Water Research, 11, 153-157.

APPENDIX 1 (Extract from field notes)

INSPECTION OF FITZGERALD RIVER CORRIDOR BETWEEN FITZGERALD RIVER NATIONAL PARK AND LAKE MAGENTA NATURE RESERVE 29/11/88

Five sections of the reserve were inspected using private and public access.

Section 1 Area south of and abutting Lake Magenta Nature Reserve.

The river corridor is approximately 1 km wide and contains undisturbed vegetation in excellent condition. The main vegetation associations are Open Scrub Hakea spp over low heath and low Open Mallee (mixed species over open scrub Melaleuca uncinata and open sedgeland Gahnia ancistophylla/Lepidibolus sp.)

Pathes of low Open Mallee, E tetragona, over open scrub Hakea spp (mixed) and low open heath Beaufortia micrantha also occur.

Scattered along the river bank and bed is open scrub Melaleuca hamulosa/Melalueca sp, Actinostrobus sp.

There is no evidence of stock grazing, human degradation or weed invasion (except along boundary fences). Double firebreaks (ie both sides of boundary fences exist on both the west and east side of the corridor reserve (26172). The corridor (27162) abuts cleared land on the east side and both cleared and uncleared land on the west side.

Section 2 O'Neils Road - access via O'Neils Road and western firebreak Reserve 36207

Vegetation of the corridor reserve north of O'Neils Road is similar to that of Section 1 - consisting of low Open Mallee (mixed species), open scrub (Hakea spp) over low open heath, and along the river edge open-closed scrub Melaleuca/hamulosa/Melaleuca sp. The vegetation is in excellent condition with negligible disturbance.

South of O'Neils Road the vegetation consists predominantly of Open Yate Woodland, Eucalyptus occidentalis/Allocasuarina heugelliana, over open scrub Melaleuca uncinata/Acacia sp and open grassland on the river flats and open-closed scrub Melaleuca hamulosa/M.cuticularis/Melaleuca sp on the river edge.

The understorey of the Yate Woodland is open and some agricultural grasses, eg Avena sp are present, though many native herbs, grasses and sedges are also present, eg Waitzia acuminata, Lepidibolus sp, Logania sp. The reserve here abuts predominantly cleared land, separated on the east and west by double firebreaks. No evidence of grazing or recreational activities was observed.

Section 3 Between O'Neils Road and Highway

The area inspected includes the narrowest section of river corridor. The river bed and banks are vegetated by open-closed scrub Melaleuca hamulosa/Melaleuca sp over samphires (Halosarcia sp). The park is vegetated predominantly by Open Woodland Allocasuarina heugelliana, Eucalyptus occidentalis over open scrub Melaleuca uncinata/Dodonea sp/Acacia sp over sedgeland Gahnia ancistrophylla/Neurachne turbinatus. The vegetation in this section is in good condition with negligible disturbance and no evidence of recreational activities. The reserve abuts cleared land to the west. To the east the reserve abuts uncleared land - predominantly open Yate Woodland, Eucalyptus occidentalis/Allocagsuarina heugelliana over open scrub Acacia saligna, near the river with Open Low Mallee (mixed species) over open heath up to 1 km from the river. The former has probably been grazed in the past, present fences are generally in poor condition, and the latter appears to be regrowth from a previous clearing. The band of uncleared land to the east extends for 1 to 1.5 km from the river and if retained in present condition by farmers or added to the corridor would enhance the conservation values of the reserve corridor (which is approximately 200 metres wide in this section). It is recommended that the extent of native vegetation abutting the reserve between Reserve 36207 and Reserve 1028 be accurately determined from current aerial photography.

Section 4 Reserve 1028 adjacent Highway

The river beds and edges are dominated by open-closed scrub Melaleuca hamulosa/Melaleuca sp/Callistemon phoeniceus whilst the river banks are predominantly vegetated by Open Woodland Eucalyptus occidentalis/Allocasuarina huegeliana over open scrub (including Dodonaea, Melaleuca uncinata, Acacia sp over open grass/sedgeland). The reserve has a moderate proportion of exotic grasses present, eg Avena sp in the understorey and represents the most disturbed area inspected. Nevertheless there is good cover of native vegetation at ground, shrub, and tree layers. There appears to be little evidence of present human use except in the vicinity of the "Resting Place", though it is likely that this area is used for horse riding, and has been used in the past for grazing.

Section 5 Reserve 35398, south of the Highway

The reserve consists predominantly of relatively undisturbed open scrub Melaleuca sp (mixed) along the river bed and banks and Open Woodland E.occidentalis over open heath Melaleuca uncinata, Acacia sp and sedgeland on the high slopes.

A small area of Open Mallee E.annulata and Open Scrubland Acacia sp. over sedgeland/grassland was also observed. Some agricultural grasses were observed in low numbers. A fenceline cuts across the reserve at the southern boundary of two locations, and there are no fences between these locations and the reserve. The southern portion and possibly the majority of some adjacent locations are uncleared though grazing may occur. No evidence of recreational activities, eg motorbike riding or horse riding ~~were~~ was observed - though it is possible that the river bed and/or firebreaks are used for this purpose.

During inspection the following birds and animals were observed:

Western Grey Kangaroo, Rabbit, Fox, Grey Crowned Babbler, Bee eater Willie Wagtail, Galah, Crested Bellbird, Crested Pigeon, Bronzewing Wedgetailed Eagle, Nankeen Kestrel, Black-faced Cuckooshrike, Bobtail.

Conclusion

The river reserves between Lake Magenta Nature Reserve and Fitzgerald River National Park contain a variety of vegetation in good to excellent condition. Degradation (predominantly weed invasion) is low. The area would be suitable as a wildlife corridor, providing plenty of cover of native vegetation.

The narrowest portion of the river reserves abut areas of uncleared land which have low degradation. Inclusion of parts of these locations, either by land purchase or under land protection schemes, would significantly enhance the value of the corridor by widening it at its narrowest portion and thus reducing likely future problems of edging effects such as weed invasion. It is recommended that the extent of this native vegetation adjacent to the river reserve be accurately determined, that efforts be made to secure some of it, and that such land be fenced to limit the possibility of grazing in the reserve. It is recommended that fences be erected along the boundaries of the reserves where none exist now to limit the possibility of grazing.

No evidence of horse riding activities was observed in any areas of the reserve, though it is likely that firebreaks are used at times.

(Amended extract of field notes prepared by E. Sandiford)