Guidelines for Bush Corridors

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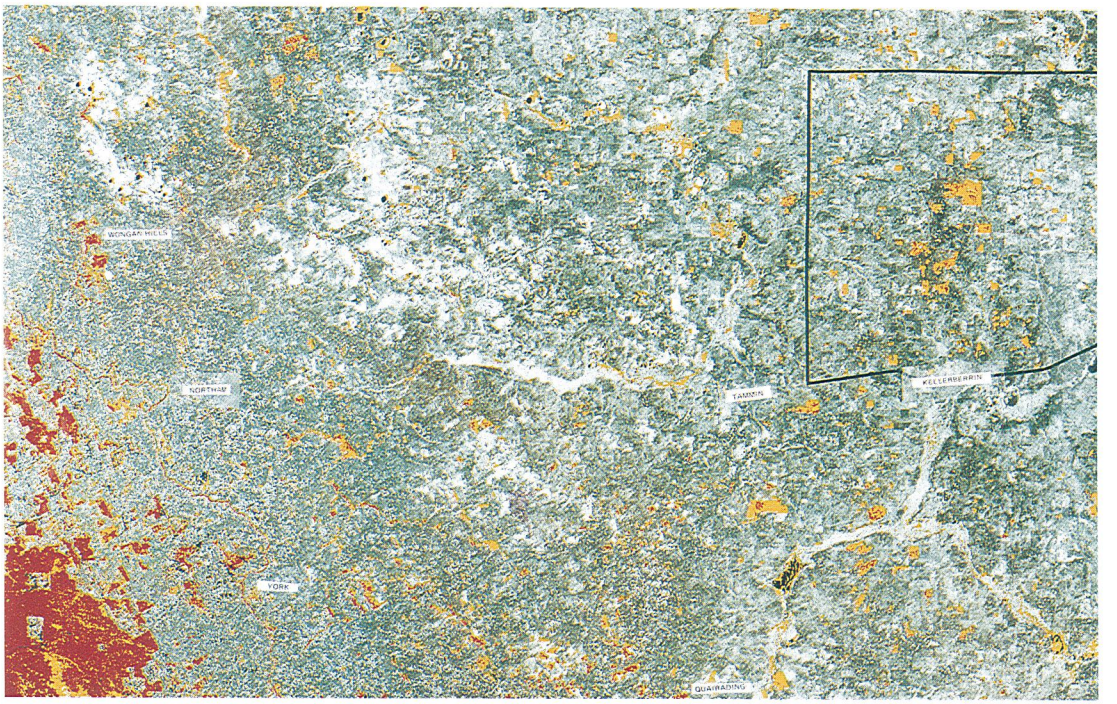
D. A. Saunders



LANDSAT "false colour" photograph of the central wheatbelt of Western Australia showing fragmentation of native vegetation. Native vegetation shows as yellow and red.

Front Cover: Marchagee Sand Plain Corridor — Main Roads Department, WA.

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Corridors for Conservation

by

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with assistance from

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from the workshop/conference on
"Nature Conservation: the Role of Corridors"
held in Western Australia in September 1989

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PREFACE

In many parts of the world, human activities have made great changes to the natural landscape. Where once there was an unbroken expanse of forest, woodland, wetland and heath, there is now a mosaic of farmland, towns, industries, roads and railways, with various sized and shaped patches of native vegetation among them. These patches or remnants are the only places where many species of native plants and animals are able to survive.

Remnants are often very different in appearance and quality. Some are linear, for example, the long narrow strips alongside roads, railways, rivers or paddock boundaries. Fauna may use these strips to move across the countryside. When movement of animals takes place, these linear strips of natural or near-natural habitat linking other patches may be called "corridors".

A conference/workshop was held in Busselton, Western Australia, during September 1989 to investigate the value of linear remnants for nature conservation, and to consider how they can best be managed. This meeting brought together research workers, managers and other concerned people from Australia, Belgium, Canada, New Zealand, South Africa and the USA. The meeting considered the role of corridors under four broad headings:

- Inventory and assessment of corridors
- Values of corridors
- Movement of biota via corridors
- Management of corridors including establishment, maintenance and rehabilitation.

This booklet presents the principal findings of that conference/workshop, arranged in such a way that land managers can use them to help with the management of linear remnants for uses which include nature conservation. Since this summary booklet has been written by Western Australians, we make no apology for the fact that the illustrations used as examples have a Western Australian bias.

Why Nature Conservation?

We live on a fragile planet where it is becoming increasingly obvious that human activities have upset the delicate balance of nature. If we are to achieve the world goal of sustainable development, it is essential that we manage the environment so as to conserve its natural resources, diversity of species and underlying ecological processes.

Species extinctions are occurring more rapidly than ever before. The World Conservation Union, IUCN, estimates that 5–15% of the world's species are likely to become extinct between 1990 and 2020, unless we take action now to halt the trend. Loss of gene pools (the particular characteristics represented by the genetic heritage of populations living in different areas) is happening on an even faster scale. Most of these extinctions are caused by human actions such as the removal of native vegetation, overexploitation of natural resources or the introduction of exotic predators, competitors and diseases.

In the wheatbelt of Western Australia, for example, about 24 species of plant, 13 species of mammals, two species of birds and an unknown but probably very large number of invertebrates have disappeared from the region and many of these species are now extinct.

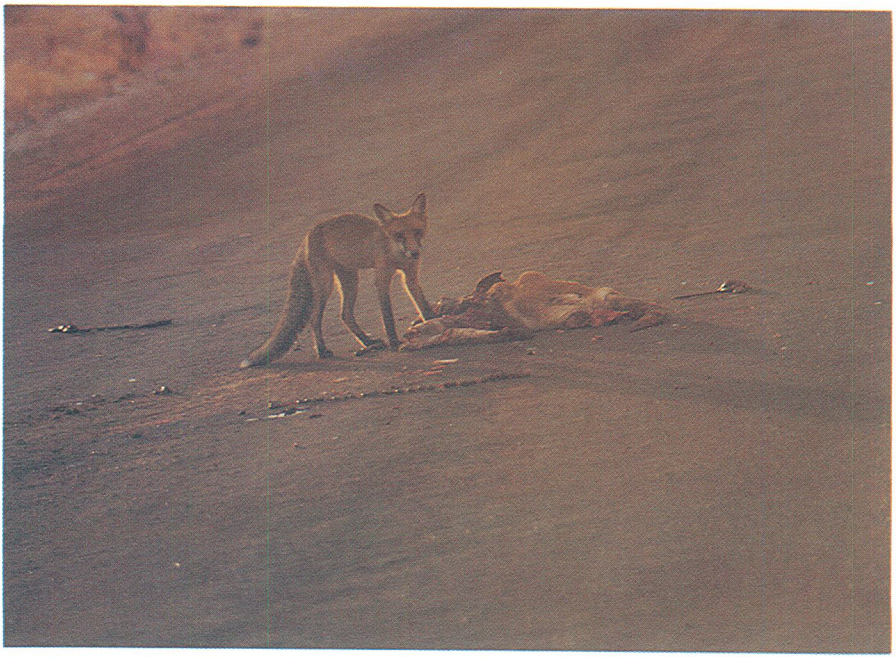
The loss of a species is irreversible. It is the responsibility of all people to ensure the survival of all species, and to preserve their habitats. Only if this is done will each generation leave to the future a world that is as rich and diverse as the one it inherited.

Aerial view of road, railway and stream vegetation corridors (B. M. J. Hussey).

Fragmentation

In many parts of the world, human activities have made great changes to the natural landscape, converting it into a pattern of agriculture, forestry, industry and urbanization. What native vegetation remains is fragmented into many remnants.

In Australia, for example, development has created many patches of remnant vegetation. As they become isolated and surrounded by other land uses the species composition gradually changes and the remnants become more vulnerable: for example, isolated populations are too small to be viable and die out; the road is graded just a bit wider each year; the reserve burnt too frequently. This results in greater pressure on both plants and animals. The fauna may be forced into smaller and more isolated patches of habitat. Should the animals move from these patches, they encounter many extra dangers. Natural or introduced predators, high-speed traffic and chemicals designed for pest control all take their toll. For conservation to be effective in rural



Fox dining on kangaroo killed by a vehicle (B. M. J. Hussey).

Tawny-crowned honeyeater feeding on Melaleuca radula *(Babs and Bert Wells).*

landscapes, it is necessary to conserve existing remnants, regenerate further areas and maintain and establish corridors linking these remnants.

A corridor is a linear feature of vegetation which differs from the surrounding vegetation and connects at least two patches which were connected in historical time. This definition covers natural corridors, such as ridge-lines and vegetation along drainage lines, as well as ones created by human activities. These include vegetation along roadsides and railways as well as windbreaks and shelterbelts.

If linear strips of vegetation are to function as corridors to foster the movement of native biota, it is important that they are managed so as to retain or enhance that function.

Why living things need to move

For most animals, movement is necessary on a daily, seasonal or intermittent basis, to enable them to find food, shelter, breeding sites or mates. The amazing migrations of trans-equatorial wading birds, familiar to most people, are examples of these movements. Many wetlands are conserved in order to provide these long-distance migrants with resting or breeding sites. Many small bush birds such as honeyeaters need to move locally, going from one patch of bush to another as flowers come into bloom.

Young animals also need to disperse from their natal area. Dispersal prevents overpopulation and inbreeding which may occur in an isolated community. However, successful dispersal requires that an animal has somewhere to go and a way to get there.

Many people do not realise that plants also need an opportunity to move. Not only to enable seed dispersal, but also, by cross-pollination, to allow the exchange of genes between different plants. It is this gene flow which ensures that variability and adaptability will persist within a population; an essential feature which enables the population to cope with change.

Values of Corridors

Corridors have many positive values in nature conservation and general land management. They may be habitat in their own right for native plants and animals, permit species to move along them, and so enable gene flow to occur between different members of a population.

Where corridors are remnants of a pre-existing vegetation community, they may provide a regional representation of the vegetation associations which were present prior to development. They may, in themselves, represent significant areas of conserved land and they may also contain populations of rare or endangered species, especially plants.

Corridor vegetation is a valuable educational resource as it is prominent and easily accessible. Amateur birdwatchers, wildflower enthusiasts and school children can use roadsides to observe the inter-relationships of an ecosystem in miniature. This may help to foster a land care ethic in every member of the community. Such an ethic is essential if we are to develop a

respect for the land and its wildlife. However, using corridors for education may lead to increased disturbance, but, as many corridors are already considerably disturbed, the benefits of using corridors for raising the public profile of corridor value is probably worth the risk of possible increased degradation.

Corridors also have wider benefits which affect the general appearance and productivity of the landscape. They help to combat land degradation, by contributing to the prevention of erosion and to the control of dryland salinity. They also provide shade and shelter for stock.

Roadside vegetation is important for preserving elements of the original flora (B. M. J. Hussey).

On the other hand, corridors may channel species into areas where they face increased risks of mortality, from cars, hunters or other predators. Since corridors are often open, disturbed areas, they are ideal for weed establishment and also as habitat for introduced animals such as rabbits and foxes. These compete with native species and contribute to the increased pressure upon native species by fragmentation.

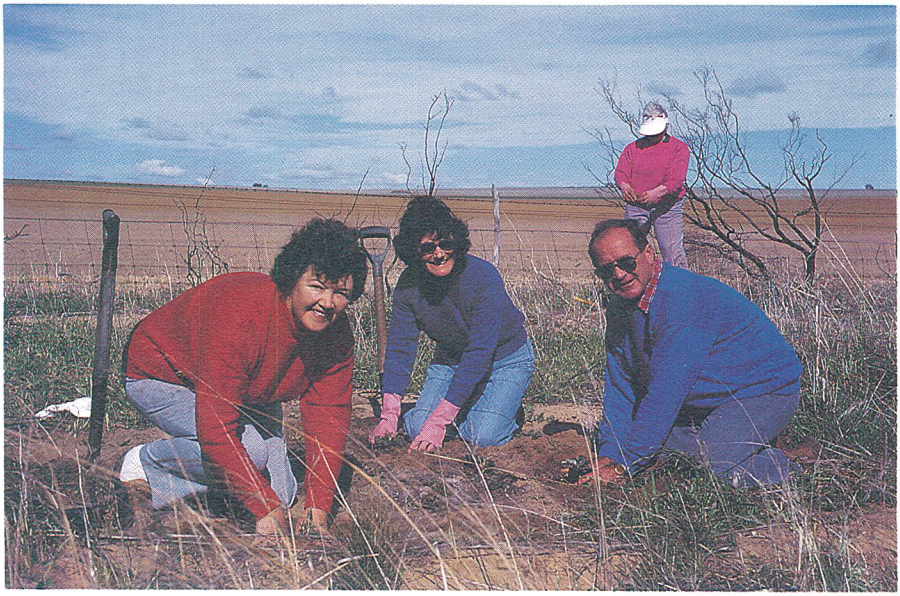
Where are the Corridors?

In order to be able to manage corridors effectively, the first task is to document the distribution and extent of remnant vegetation and to determine its condition. All remnants, both those on public and private land, should be mapped at a regional scale and the data incorporated in a Geographic Information System. Linear remnants should be included in this system.

Ground survey, aerial photography or remote sensing may be used for this mapping, depending on the detail and accuracy required, and the time or personnel available for the work. From a regional conservation perspective, this work is best co-ordinated by a State body but interested local people can make a very valuable contribution by carrying out the assessment.

Having mapped the remnants, it is necessary to establish their general conservation value by identifying those which are likely to function as corridors and document their dimensions, plant communities, the occurrence of rare species, the degree of weed invasion, the type of ownership and the disturbance history.

It is then necessary to look at the distribution and abundance of animals on a regional scale, and determine what use they make of each remnant in order to assess their value as corridors.



Volunteers are important for corridor revegetation projects (B. M. J. Hussey).

Role of the Community

Steps that could be taken by individuals

1. Bring the value of corridors to the attention of all appropriate management bodies.
2. Take part in the collection and collation of information.
3. Where land is owned which includes remnant vegetation, ensure that there are corridors which are as wide as possible, linking patches to obtain maximum conservation value.
4. Work with neighbours to provide continuity of the conservation network of corridors across properties.

Steps that could be taken by Local Government

1. If there is a requirement for local govenment to prepare town or area planning schemes, ensure that these planning schemes take the conservation of remnants, including corridors, into account.
2. Bring the value of corridors to the attention of appropriate local groups (e.g., landcare group, greening group, etc.) involved in land management, with a request that they include a consideration of corridors in their planning.
3. Promote the collection of information on remnants, both patches and linear strips, by:
   (i) encouraging suitable local groups (e.g., field naturalists' clubs, Royal Australasian Ornithologists' Union, Association of Societies for Growing Australian Plants) to collect the information as a voluntary project. Several states have developed specific methodologies for this; consult Appendix for organizations to contact for details;
   (ii) providing finance to employ a suitable consultant to collect information.
4. Provide the finance to place this information on maps.
5. Determine which corridors are the highest priority for management by liaising with research personnel in CSIRO, universities, and state government agencies (see Appendix).
6. Determine where corridors are currently lacking, but could be valuable, by a similar liaison.
7. Communicate the findings widely.

The Management of Existing Corridors

Conservation of our Natural Heritage

The aim of nature conservation is to ensure the survival of the native plants and animals in a region. In patchy landscapes, this means that animals must be able to recolonize patches from which they have become locally extinct; connecting patches with corridors will assist this process. However, animals have different habitat requirements and, all too often, these requirements are not known. We need to understand these requirements, especially for the animals at greatest risk of extinction, if we are to conserve them.

Plants move along corridors through dispersal of their seeds by animals. Gene flow in some populations is facilitated by the movement of pollen by animals. Much research, including long-term studies, needs to be conducted on how organisms use corridors.

It is not known what effect corridor shape, width, length and vegetation composition has on the value of the remnant for fostering movement, except that everyone seems to agree that "wider is better". Much depends on the structure of the plant communities. A rainforest corridor may need to be a minimum of 100 m wide, whereas in heath vegetation the minimum may be 30 m wide. Vegetation strips narrower than this may still be valuable, and should not be discarded. In some landscapes, for some animals, even a strip one shrub wide can facilitate movement, however, it will not be viable in the long term. The aim should be to conserve the widest possible corridor. There should, however, be a note of caution here: a linear strip of vegetation leading nowhere, or one that is too long or too narrow, may function as a sink drawing off individuals to their death, and so harming the original population. Again, more research is needed to determine this.

Many organisms, such as pigeons or other birds which undertake long distance movements, do not need continuous corridors, only patches of vegetation to provide stepping stones to help them on their journey. Some arboreal mammals, for example koalas, can use isolated trees in a similar manner. On the other hand, many small birds need continuous corridors of shrubs. Again, this points to the need for increased knowledge of the biology of the species concerned.

Unfortunately we do not have the time to accumulate all the relevant information before we act. Potential corridors are continually being lost to development or downgraded by attrition. In the absence of full knowledge, it is better to preserve these landscape linkages rather than lose them and find later that they were essential to nature conservation.

Remnants comprise the bulk of our natural heritage, especially in agricultural and urban areas, and we can not afford to lose any more native vegetation.

Management aims

Nature conservation is a community activity. Management of linear strips as corridors for nature conservation should involve everyone, regardless of land ownership. The creation of a conservation ethic among the general population is an important responsibility of everyone, especially biologists, planners and managers. These experts should spend at least 10% of their time sharing their knowledge and aims with the general community. A country's living natural resources are its heritage, and the responsibility, of the entire nation.

Each local community can carry out an inventory of its remnant vegetation and potential corridors and then use these data to set priorities for managing their conservation network. Various methods have been designed to do this, and the Appendix provides contacts to enable information to be obtained. Management plans should be considered at the landscape scale and take into account the conservation values of all categories of land ownership. The

Trial of grass-selective herbicide along a roadside (B. M. J. Hussey).

postulated effects of global climate change should, where possible, be incorporated in this plan, as it could lead to a greatly increased value for corridors.

Linear strips are extremely difficult to manage as they are so vulnerable to outside influences, both natural (e.g., wind) and from the different landuses which occur adjacent to them. Management of existing corridors, such as roadsides, should concentrate on maintaining habitat, principally by minimizing disturbance which tends to encourage weed invasion and leads to general degradation of the corridor plant community. Active management must be undertaken with great care. For example, weed control, either mechanically or with chemicals, can also damage native vegetation and create a seedbed ideal for further weed establishment.

Existing corridors can be enhanced by judicious management practices and suitable revegetation techniques including the use of local native species to recreate an approximation of all structural components in the original community (see Bibliography for greater detail). Buffer plantings whose primary function is not related to conservation (e.g., shelterbelt or woodlot) could be located alongside corridors to enhance their value.

Where there are scarce resources, priorities need to be established. In regional conservation plans, management should first be directed at wide corridors in good condition that link substantial remnants. Management may include fencing, replanting or regeneration, minimizing external influences and encouraging private landowners to protect and manage potential corridor vegetation.

The Role of the Community

Steps that could be taken by individuals

1. Minimize any adverse effects on a corridor generated by the adjacent landuse, for example, fence to exclude grazing stock and ensure that herbicides, insecticides and fertilizer do not drift into the corridors.
2. Manage and rehabilitate corridors adjacent to your property.
3. Create buffer strips inside your property to widen existing corridors and create new ones to link internal remnants. These buffer strips could include plantations of trees and shrubs established for commercial reasons.
4. Offer to help local landowners who wish to create corridors.

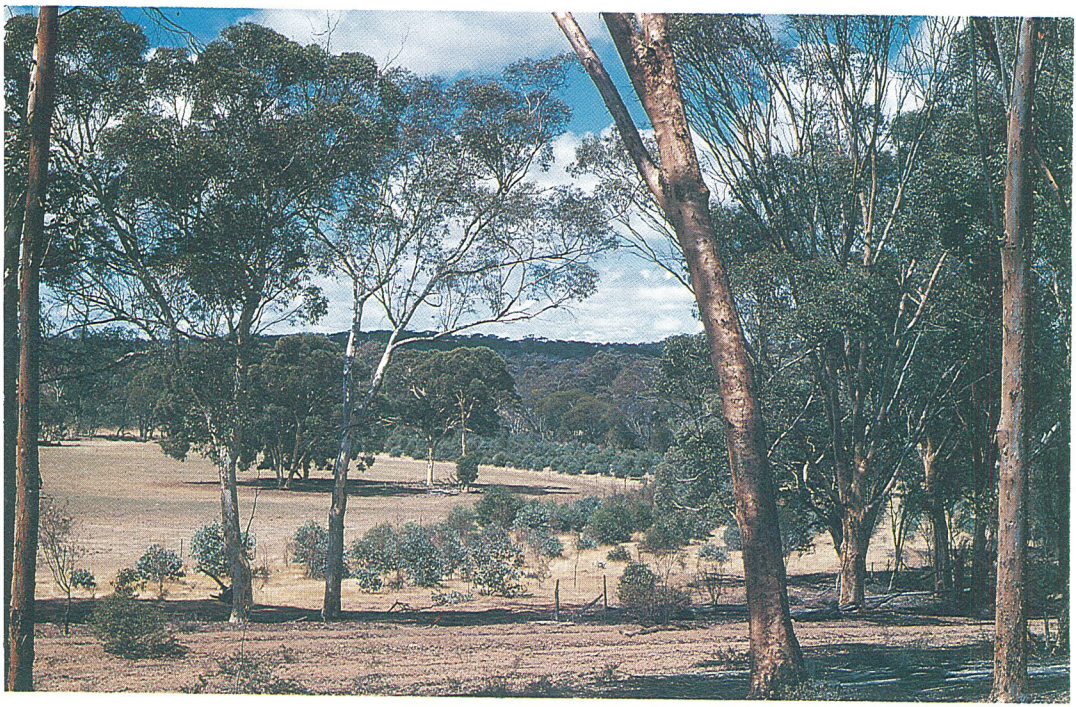
Steps that could be taken by Local Government

1. Use statutory mechanisms to control clearing and protect remnant vegetation.
2. Raise community awareness of corridors and take the lead in involving local communities in their management. For example, a local roadside advisory committee or a landcare group could be set up to organize conservation activities.
3. Adopt the principle of "the wider the better" and attempt to preserve the widest possible corridor. Set priorities based on width, condition of the vegetation, known importance for animal movement, etc.
4. Encourage the voluntary widening of corridors by the setting back of boundary fences accompanied by buffer planting or bush regeneration.
5. Minimize the losses and degradation of existing corridors and networks by avoiding disturbances that will reduce width or increase edge effects. For example: keep all road maintenance within a defined maintenance zone and prune obstructing vegetation, rather than remove the entire plant. See Appendix for contacts concerning roadside management in various states.
6. Place all roads and utilities along one side of corridors so that the other side remains undisturbed.
7. Widen roads to the most degraded side only, leaving the strip of undisturbed vegetation as wide as possible.
8. If disturbance is inevitable, revegetate with suitable local native plants, including all strata of the original vegetation.
9. Record all actions taken and their results.
10. Monitor the progress of the revegetation project. A simple method of doing this is taking a photograph each year from exactly the same point.
11. Management of plant and animal communities is a dynamic process. Management plans need to be adaptable and should be adjusted as a result of monitoring.
12. Disseminate the results widely, so that others can benefit from the experience gained.

Creation of New Corridors

When drawing up a management plan for conservation in a region, design a conservation network. The value of existing corridors should be assessed and at the same time the need for new corridors should be examined. Large, secure areas of native vegetation, separated by a narrow width of recently alienated land, would be an obvious case for corridor re-establishment. The minimum width of the corridor needed is dependant upon the vegetation type and the species expected to use it, but in general, the wider the better. In heath vegetation a corridor width of 30 m could be adequate, but it should be at least 100 m for rainforest or tall eucalypt forest.

Corridor creation can be linked with other uses such as shelterbelts and woodlots, but to be the greatest value for wildlife the corridor should have a diversity of species, including as many as possible of local provenance, and contain all the strata found in the original vegetation. Again, wider is better, and three to five rows of trees and shrubs provide a better shelterbelt and corridor than a single row of trees.



Creation of a corridor along a road through farmland linking two patches of forest (B. M. J. Hussey).

Red-tailed phascogale, a rare and endangered species uses habitat trees along roadside in southwestern Australia (Babs and Bert Wells).

Role of the Community

Steps that could be taken by Local Government

1. Use local species from all natural strata when creating or rehabilitating corridors.
2. Use the existing corridor network as a basis for widening corridors.
3. Encourage adjoining landowners to set back fences and undertake revegetation to widen corridors.
4. Where land vested in the local government authority is suitable (e.g., a river foreshore, an unused road reserve, etc.) consider making it available for corridor creation.
5. Encourage groups and individuals, particularly urban residents, to take part in conservation projects.

Steps that could be taken by an individual

1. Where corridors occur on or adjacent to your land, take steps to widen them using a wide range of suitable local native species or plan buffer plantings adjacent to the corridor.
2. Plan to link areas within your landholding or on adjacent land.
3. Encourage urban residents to come and help create and maintain corridors in rural areas.

APPENDIX

The appendix has been compiled with the help of Jackie Ayre, Carla Catterall, Hugh Cross, Louise Gilfedder, Kerry Howell, Peter Johnston, Tein McDonald, Rod Safstrom, David Shorthouse, Graeme Stone and Kristen Williams.

Further information on the following subjects can be obtained from the agencies listed below.

Herbicide use

NSW: District Agronomist, New South Wales Agriculture and Fisheries. Head Office: P.O. Box K220, Haymarket, New South Wales 2000. Phone (02) 217 6666.

Qld: Department of Primary Industries, Long Pocket Laboratories, Meiers Road, Indooroopilly 4068 (phone (07) 878 9311) and regional offices throughout Queensland.

Forest Service, Department of Primary Industries, G.P.O. Box 994, Brisbane 4001. Phone (07) 224 8372.

SA: Department of Agriculture, P.O. Box 1671, Adelaide 5001 (phone (08) 226 0222) and branches throughout South Australia.

Tas.: Department of Primary Industry, 1 Franklin Wharf, Hobart 7000. Phone (002) 308 011.

Vic.: Department of Agriculture (phone (03) 651 7011) and regional offices throughout Victoria.

WA Agriculture Protection Board, c/- Department of Agriculture, Baron-Hay Court, South Perth 6151 (phone (09) 368 3333) and regional offices throughout Western Australia.

Linear Reserve Management and Assessment

ACT: Conservation and Wildlife Section, ACT Parks and Conservation Service, P.O. Box 1119, Tuggeranong 2901. Phone (06) 293 5111.

NSW: Department of Lands, 23–33 Bridge Street, Sydney 2000. Phone (02) 228 6111.

Department of Water Resources, 10 Valentine Avenue, Parramatta (phone (02) 895 6211) and regional offices.

Roads and Traffic Authority, P.O. Box K198, Sydney 2001. Phone (02) 218 6888.

State Rail Authority, 11 York Street, Sydney 2000. Phone (02) 219 8888.

The Electricity Commission of New South Wales, Cnr Park and Elizabeth Streets, Sydney 2000. Phone (02) 268 8111.

Qld: National Parks and Wildlife Service, Department of Environment and Heritage, P.O. Box 155, North Quay 4002 (phone (07) 227 7111) and offices throughout Queensland.

Roadside Conservation Committee, c/- Queensland National Parks and Wildlife Service, P.O. Box 155, North Quay 4002. Phone (07) 277 7796.

Rural Lands Protection Board, G.P.O. Box 169, North Quay 4002. Phone (07) 227 8736.

SA: Department of Road Transport, P.O. Box 1, Walkerville 5801. Phone (08) 343 2222.

Roadside Vegetation Committee, G.P.O. Box 667, Adelaide 5001. Phone (08) 216 7777.

Tas.: Department of Roads and Transport, 10 Murray Street, Hobart 7000. Phone (002) 308 011.

Department of Parks, Wildlife and Heritage, 134 Macquarie Street, Hobart 7000. Phone (002) 308 011.

Vic.: Department of Conservation and Environment (Linear Reserves Officer), 250 Victoria Parade, East Melbourne 3002. Phone (03) 412 4413.

Roadsides Conservation Committee, 250 Victoria Parade, East Melbourne 3002. Phone (03) 412 4653.

Vic Roads (Roadside Development Officer), 60 Denmark Street, Kew 3101. Phone (03) 860 2335.

WA: Main Roads Department, Waterloo Crescent, East Perth 6001 (phone (09) 323 4111) and offices throughout Western Australia.

Roadside Conservation Committee, P.O. Box 104, Como 6052. Phone (09) 367 0423.

Regeneration and Replanting

ACT: Landcare Section, Australian Capital Territory Parks and Conservation Service, P.O. Box 1119, Tuggeranong 2901. Phone (06) 293 5111.

Greening Australia ACT, P.O. Box E216, Queen Victoria Terrace, Canberra 2601. Phone (06) 282 3214.

NSW: Greening Australia NSW, G.P.O. Box 9868, Sydney 2001. Phone (02) 550 0720.

National Trust of Australia (New South Wales), G.P.O. Box 518, Sydney 2001. Phone (02) 258 0123.

New South Wales National Parks and Wildlife Service, 34 Bridge Street, Hurstville 2220 (phone (02) 585 6444) and District Offices.

Soil Conservation Service, 821 Pacific Highway, Chatswood 2067 (phone (02) 413 5555) and District Landcare Co-ordinators.

NT: Greening Australia NT, P.O. Box 1604, Darwin 0801. Phone (089) 811 962.

Qld.: CSIRO, Tropical Forest Research Centre, P.O. Box 780, Atherton 4883. Phone (07) 91 1755.

Qld.: Forest Service, Department of Primary Industries, G.P.O. Box 994, Brisbane 4001. Phone (07) 224 8372.

Greening Australia Qld, G.P.O. Box 9868, Brisbane 4001. Phone (07) 391 6655.

SA: Greening Australia SA, G.P.O. Box 9868, Adelaide City 5001. Phone (08) 337 2646.

State Tree Centre, Brockway Drive, Campbelltown 5074. Phone (08) 337 2646.

Woods and Forests Department, G.P.O. Box 1604, Adelaide 5001. Phone (08) 226 9900.

Tas.: Greening Australia Tas., 100 Brisbane Street, Hobart 7000. Phone (002) 232 843.

Tasmanian Forestry Commission, 199 Macquarie Street, Hobart 7000. Phone (002) 308 011.

Vic.: Greening Australia, Vic., G.P.O. Box 9868, Melbourne City 3001. Phone (03) 654 1800.

National Trust, Tasma Terrace, Parliament Place, Melbourne 3002. Phone (03) 654 4711.

WA: Department of Agriculture, Baron-Hay Court, South Perth 6151 (phone (09) 368 3333) and offices throughout Western Australia.

Department of Conservation and Land Management, P.O. Box 104, Como 6152 (phone (09) 367 0333) and offices throughout Western Australia.

Greening Australia WA, Unit 6, 106 Oxford Street, Leederville 6007. Phone (09) 227 5771.

Statutory Measures for Land Use Planning

NSW: Department of Planning, 175 Liverpool Street, Sydney 2000 (phone (02) 391 2000) and Regional Offices.

NSW National Parks and Wildlife Service, 34 Bridge Street, Hurstville 2220 (phone (02) 585 6444) and District Offices.

Western Lands Commission, Cnr Bridge and MacQuarie Streets, Sydney 2000 (phone (02) 228 6111) and District Offices.

Qld.: Department of Housing and Local Government, Town Planning Division, 61 Mary Street, Brisbane 4001. Phone (07) 237 1253.

SA: Department of Environment and Planning, G.P.O. Box 667, Adelaide 5001. Phone (08) 216 7777.

Tas.: Department of Environment and Planning, 134 Macquarie Street, Hobart 7000. Phone (002) 308 011.

Vic.: Department of Planning and Housing, 477 Collins Street, Melbourne 3000. Phone (03) 628 5111.

WA: Department of Planning and Urban Development, 469 Wellington Street, Perth 6000. Phone (09) 264 7777.

Flora and Fauna Conservation

ACT: Conservation and Wildlife Section, Australian Capital Territory Parks and Conservation Service, P.O. Box 1119, Tuggeranong 2901. Phone (06) 293 5111.

Conservation Council of the South-east Region and Canberra, G.P.O. Box 1875, Canberra City 2601. Phone (06) 247 7808.

NSW: National Herbarium, Mrs MacQuarie Road, Sydney 2000. Phone (02) 231 8111.

National Trust of Australia (New South Wales), G.P.O. Box 518, Sydney 2001. Phone (02) 258 0123.

Nature Conservation Council of New South Wales, 39 George Street, Sydney 2000. Phone (02) 247 4206.

New South Wales National Parks and Wildlife Service, 34 Bridge Street, Hurstville 2220 (phone (02 585 6444) and District Offices.

NT: Conservation Commission, P.O. Box 496, Palmerston 0831. Phone (089) 89 5511.

The Environment Centre, P.O. Box 2120, Darwin 5794. Phone (089) 811 984.

Qld.: Conservation Council of Queensland, P.O. Box 238, North Quay 4002. Phone (07) 221 0188.

National Parks and Wildlife Service, Department of Environment and Heritage, P.O Box 155, North Quay, 4002 (phone (07) 227 7111) and offices throughout Queensland.

SA: Conservation Council of South Australia, 120 Wakefield Street, Adelaide 5000 Phone (08) 223 5155.

Department of Environment and Planning, G.P.O. Box 667, Adelaide 5001. Phone (08) 216 7777.

Tas.: Department of Parks, Wildlife and Heritage, 134 Macquarie Street, Hobart 7000. Phone (002) 308 011.

Tasmanian Environment Centre, 102 Bathurst Street, Hobart 7000. Phone (002) 345 566.

Vic.: Arthur Rylah Institute for Environmental Research, P.O. Box 137, Heidelberg 3084. Phone (03) 450 8600.

Conservation Council of Victoria, 247 Flinders Lane, Melbourne 3000. Phone (03) 654 4833.

Department of Conservation and Environment, 250 Victoria Parade, East Melbourne 3002 (phone (03) 412 4011) and offices throughout Victoria.

WA: Conservation Council of Western Australia, 79 Stirling Street, North Perth 6001. Phone (09) 220 0652.

Department of Conservation and Land Management, P.O. Box 104, Como 6152 (phone (09) 367 0333) and offices throughout Western Australia.

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