Corridors and connectivity

This note looks at how corridors might be used to maximise the wildlife habitat value of a fragmented landscape, and what to consider when planning a corridor project.

In agricultural and other developed landscapes, natural habitat is often only available in small, isolated patches. These landscapes are unable to support their full complement of native plants and wildlife, and those that have survived may be in difficulty. To restore landscape connectivity, many revegetation projects in recent decades have aimed not only to increase the area of habitat but to also re-link isolated natural areas with corridors.

The superb blue wren will make use of planted habitat within a few years, however many other birds will only use large areas of healthy native vegetation. Our knowledge of how animals might use corridors is still quite limited. Photo: V Bear

Types of corridors

Linear or strip corridors are continuous, or mostly continuous, bands of vegetation or waterway.

Stepping stones are isolated patches of vegetation, single trees, or wetlands or farm dams. The patches become a corridor when the distance between them is small enough for some species to be able to move from one patch to the next. Even single paddock trees are valuable and can act as stepping stones or provide habitat for some species.

Remnants of native vegetation in an agricultural landscape. Roadside vegetation forms a strip corridor linking patch A with patch B. A series of small remnants and paddock trees form a stepping stone corridor linking B and C.

The role of corridors

Expanding available habitat by allowing movement between patches. An island of bush will only be able to sustain a limited number of plant and animal species. Many animals do not like crossing cleared areas as it exposes them to predators. Cleared areas may be impossible for an arboreal (tree dwelling) animal to cross.

Linking these 'islands' with corridors suitable for animals to move through can potentially expand the total size of the habitat patch, allowing animals to forage over a much wider area, to expand their home range, to maintain their seasonal movements and, for some species, their continued migration. Plants and fungi may also move through corridors, as their seeds or spores are often spread by animals and wind.

Enabling recolonisation. If a population of animals is reduced by a bushfire or predator, it will usually be replaced by animals from other areas. But if the habitat is isolated, new animals may not be able to reach it. Corridors may help by re-connecting isolated patches.

Providing additional habitat. More than just allowing species to move from one habitat area to another, corridors can provide habitat where native birds and animals can live permanently. In those parts of NSW which have been extensively cleared, such as the wheat-sheep belt of the Central Division, the only places where some habitats remain are in corridors such as along roadsides and travelling stock routes. Consequently, these may be the only areas where local animal species can survive.

Connecting gene pools. Many species of native animals are not migratory or nomadic and may have small territories (home ranges). Long-term survival depends on the movement of genes from one population to another over many generations. Where corridors are broken, populations of native plants and animals (even those living in protected habitats) may become isolated and may eventually become inbred. This can lead to local or regional extinctions.

Building and managing corridors

Protect and enhance existing remnant vegetation and corridors first

It is sometimes easy to recognise opportunities at a local scale for new linkages, or identify vegetation that is already providing a corridor. However, for an overview of the broader landscape, and to set priorities, good-quality vegetation maps or aerial photos are essential.

Vegetation maps will highlight existing corridors and show whether they connect to other vegetation patches, such as travelling stock reserves, state forests or conservation reserves, and help clarify where new corridors are most needed. Tree-cover maps are useful, but these do not show all vegetation communities, and often completely miss grassland, shrubland or sparse woodland areas. Therefore, the vegetation map should show structural formations and plant associations.

Internet based systems such as Google Earth are an excellent resource. The CMA, Local Council or Landcare group may also be able to assist with aerial photography.

Local and regional linkages

Some corridors will be important at a regional scale as they assist migratory and nomadic species to move across a large area, as well as connecting the gene pools of widely dispersed populations. Other corridors will be more significant on a local or property scale as they connect two or three areas of isolated habitat.

If new corridors are to be established, three strategies for optimising their effect for both wildlife and property management are:

- Joining or reducing gaps in stepping stone corridors, especially if the gap is over one kilometre — the maximum separation distance for patches to provide connectivity and act as a corridor is generally accepted to be 100 metres.
- Connecting large, isolated patches of vegetation — blocks greater than one hectare generally provide the best habitat, but the larger the better. Corridors between small, isolated, degraded remnants of vegetation, or plantings would be beneficial, but probably less valuable as these areas are likely to have a low diversity of native plants and animals.
- Linking two or more corridors of regional significance.

Catchment management authorities and local councils are a good source of advice about corridor planning.

Corridor priorities and tips

Take advantage of any natural resilience in the landscape. Where there is a choice for the location of the corridor, incorporate areas of native tree, shrub or grassland regrowth, existing isolated trees, and permanent water sources. If possible, avoid areas that have been heavily fertilised. This will optimise the opportunities for natural regeneration once the corridor is fenced.

Avoid excessively weedy areas as they will require additional on-going maintenance. In some circumstances, it may be necessary to include such areas to make connections between isolated patches or to improve the vegetation connectivity along riparian zones, provided that weeds are managed.

Fence around paddock trees to allow for natural regeneration.

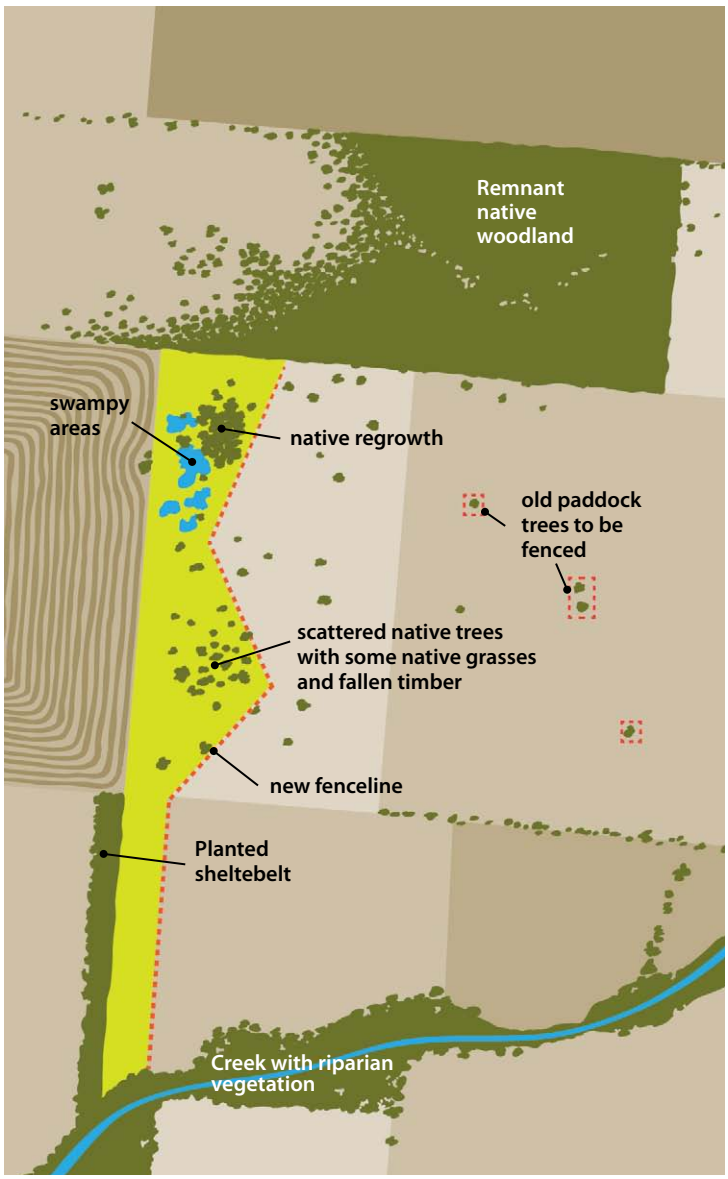
Plant new paddock trees.

Waterways form important corridors, and revegetation along the banks can improve corridor water quality as well as corridor width.

Consider revegetating prominent sites so that the scenic quality of the local area and the region is enhanced — this might also add to the asset value of individual properties.

Create or widen corridors along existing fence lines — this way only one side needs to be fenced.

If planning shelterbelts, windbreaks or woodlots, consider whether they can be positioned to also serve as corridors.



Plan of a new corridor, including existing habitat features and sources of resilience.

The wider the better. In general the wider the corridor, or the larger the patch, the more resilient it will be, and the greater its habitat value, so a wider range of species will have a chance of using it. Wide corridors have a core area free from edge effects, and may provide enough resources for some species to live within them. However, even the narrowest of corridors have value — a line of shrubs by a roadside may host insects and rare plants. The aim of the project may influence corridor width — if it is to connect two isolated populations of a particular animal, the corridor should be designed to meet their requirements.

Mimic the composition and structure of healthy local vegetation. New corridors should use local native plant species. This is particularly important in enabling corridors to become habitat, especially in extensively cleared areas where little of the indigenous vegetation remains. Plantings should have a similar structure to reference sites or benchmarks for the vegetation type. The local catchment management authority (CMA) can provide information.

Maximise structural complexity. A well-structured corridor would include a variety of species and layers such as leaf litter, fallen timber, grasses and groundcovers, shrubs and trees (depending on the character of the local vegetation) - this generally offers habitat for a wider range of species.

Fallen timber is an important habitat feature that takes many decades to develop — give a new corridor a head start by including areas with fallen timber, or if fallen timber has to be cleared from another area add it to the corridor.

Assessing the landscape with vegetation maps, and aerial photography

It is sometimes easy to recognise opportunities at a local scale for new linkages, or identify vegetation that is already providing a corridor. However, for an overview of the broader landscape, and to set priorities, good-quality vegetation maps or aerial photos are essential.

Internet based systems such as Google Earth have made aerial photography very accessible and are an excellent resource. The CMA, Local Council or Landcare group may also be able to assist with aerial photography and vegetation maps.

Vegetation maps show existing corridors and whether they connect to other vegetation patches, such as travelling stock reserves, state forests or conservation reserves. They help clarify where new corridors are most needed. Tree-cover maps are useful, but do not show all vegetation communities, and often completely miss grassland, shrubland or sparse woodland areas. Therefore, the vegetation map should show structural formations and plant associations.

Typical places where corridors of native vegetation can be found include:

- *along roadsides*
- *along travelling stock routes*
- *along rivers, creeks and other drainage lines*
- *around wetlands, dams and lakes*
- *along railway lines*
- *along disused roads*
- *along ridges*
- *along fence lines.*

Maintenance and monitoring

New corridors, and existing corridors that are in degraded condition, will require on-going maintenance — particularly the control of environmental weeds. Fencing needs to be maintained and, as with all land, feral and pest animals must be controlled. In some cases, strategic grazing may assist in weed management.

It is important to find out if and how animals are using corridors. Monitoring, such as regular bird counts, will inform property management in general, and the design of future revegetation.

The more generalist animals such as wrens and the scarlet robin, and many insects, may start using new corridors within a few years, but as with all plantings, new corridors will take many decades to approach the complexity and character of natural vegetation (e.g. old trees and fallen timber), required by many species. We still have much to learn about how animals and plants use planted corridors — particularly older corridors.

Useful references

Related Conservation Management Notes:

- Restoring native vegetation: regenerate or revegetate?
- Natural regeneration
- Revegetation
- Integrating wildlife conservation and farm management
- Watching wildlife

Bennett AF 2003, *Linkages in the landscape: the role of corridors and connectivity in wildlife conservation*, IUCN

Bennett, et al. 2000 *Revegetation and wildlife: a guide to enhancing revegetated habitats for wildlife conservation in rural environments,* Australian Government Dept of Environment and Heritage *www.environment.gov.au/land/publications/pubs/revegwild.pdf*

Lindenmayer DB et al 2011, *What makes a good farm for wildlife?* CSIRO Publishing

Lindenmeyer DB & Fischer J 2006, *Habitat fragmentation and landscape change: an ecological and conservation synthesis*, CSIRO Publishing

Mackey B, Watson J & Worboys GL of ANU Enterprises Pty Ltd 2010, *Connectivity conservation and the great eastern ranges corridor, an independent report to the Interstate Agency Working Group (Alps To Atherton Connectivity Conservation Working Group) convened under the Environment Heritage and Protection Council/Natural Resource Management Ministerial Council,* DECCW *www.environment.nsw.gov.au/ger/science.htm*

Munro N & Lindenmayer D 2011, *Planting for wildlife: a practical guide to restoring native woodlands* CSIRO Publishing

Platt SJ 2002, *How to plan wildlife landscapes: a guide for community organisations,* Department of Natural Resources and Environment, Melbourne *www.dse.vic.gov.au/__data/assets/pdf_file/0017/100358/How_to_plan_wildlife_landscapes.pdf*

Salt D & Lindenmayer D 2008 *Is revegetation good for biodiversity?* Land & Water Australia *http://lwa.gov.au/files/products/native-vegetation-program/pn21580/pn21580.pdf*

Wilson A& Lindenmayer DB 1995, *Wildlife corridors and the conservation of biodiversity – a review*, Centre for Resource and Environmental Studies, Australian National University, Canberra

Published by Office of Environment and Heritage, Department of Premier and Cabinet NSW.

59–61 Goulburn Street, Sydney
PO Box A290, Sydney South 1232
p: 02 9995 5000
e: *info@environment.nsw.gov.au*
w: *www.environment.nsw.gov.au*

ISBN 978 1 74293 314 6
OEH 2011/0657

A key source is: Sheahan M (ed) 1998 *VegNotes 2.4 Corridors of Vegetation* Murray Catchment Management Committee and Department of Land & Water Conservation. Other sources include the references listed and contributions from various individuals.

The views expressed in this publication do not necessarily represent those of OEH. Whilst every effort has been made to ensure that the information is accurate at the time of printing, OEH cannot accept responsibility for errors or omissions.

Supported by

CARING FOR OUR COUNTRY