Edges - their effect on vegetation and wildlife

May, 1993
LW0023
ISSN 1440-2106

Lyndall Rowley, Robyn Edwards and Paul Kelly

The "edge effect" is a term used to describe the various consequences, on vegetation and wildlife, that occur as a result of one type of vegetation sharing a border with another. These edges may be natural, such as forest grading into woodland, streamside vegetation passing through an arid zone, burnt and unburnt areas; or induced, such as pasture abutting forest or a road through a forest.

Edges may have a variety of effects on wildlife. For example, when thin, narrow strips of roadside vegetation and larger, square forest blocks in northern Victoria were compared, they shared only one common bird species, the Willie Wagtail (Bennett, 1993). This can be attributed to the large amount of edge habitat typical of roadsides and its consequences for the fauna of this habitat.

Managing edge effects can improve the quality and long-term viability of wildlife habitats.

What kind of changes occur at edges?

Depending on the aims of management, edges may have positive or negative effects on wildlife and property management.

Edges may affect wildlife through:

1. Micro-climatic changes

Solar radiation, humidity, air temperature, wind speed and soil temperature may all be altered along edges. This can have a dramatic impact on the vegetation and, ultimately, the wildlife. For example, new roadworks through bushland will increase sunlight and air temperature, which raises soil temperature and decreases soil moisture. This may prevent seeds of shade-tolerant species from germinating and favour other plant species (e.g. species which thrive with increased light). The increased exposure can stress vegetation leading to dieback through insect attack, parasites, wind damage or fungal attack. Rainforest species, which normally exist in a 'closed' environment, are particularly vulnerable.

2. Different inhabitants, edge species

Along with the altered pattern of vegetation, a change in wildlife can occur. Firstly, species that have particular habitat requirements (usually found in the interior or 'core', further away from the edge) may be lost from the area. For example, Long-nosed Bandicoots at Naringal in south-western Victoria survive only in larger remnants (Bennett, 1987). Secondly, 'vacancies' may be filled by species that have a wider tolerance range and the new edge may introduce species that would not normally be found in the core. Thirdly, aggressive edge-dwelling species, such as Noisy Miners and Bell Miners, may invade the habitat and displace prior inhabitants.

Edges provide habitat for species of wildlife that prefer edge habitats, and which are not all harmful. Many birds, such as parrots and cockatoos, will use edges for perching and nesting. Kangaroos and wallabies feed and move out along edges. Because edges are a meeting place between adjacent habitats, they are often rich in species (e.g. mixing of forest species, edge species and farmland species). Also, edges, especially where there is a scattered open 'buffer' type area, are often good places to see and experience wildlife.

3. An increase in pest animals

Pest animals such as foxes, cats and dogs tend to move and harbour along roads, tracks and cleared areas adjacent to or in bush areas. Edges, by providing improved access, can cause a decline in wildlife populations through predation and competition. Experimental and observational studies have shown that bird nests are more often preyed upon in edge habitats compared with core habitats (Andren & Anglestam, 1988; Wilcove, 1985). Platypus and quolls have suffered from predation by foxes moving along bush tracks, particularly beside rivers (LFW News, 1991).

4. Weed invasion

Edges can provide opportunities for the invasion of natural vegetation by weeds. Disturbance creates opportunities for weeds to establish. Weed seeds are spread by wind, water, animals, people (and their use of vehicles), soil, livestock and in agricultural products. These movements may be facilitated by edges.

5. Impacts from adjacent land-use

Edges are prone to many disturbances such as chemical and fertilizer drift from adjacent farmland, trampling and grazing by stock, fire escaping into habitat areas, recreational disturbance and littering. New tracks or clearing of vegetation may also change the hydrology of an area and cause erosion as water runs off compacted soil.

6. Noise and movement

An increase in traffic or human activities is not often considered. Many wildlife species rely on the seclusion of undisturbed habitat in order to breed successfully. For

example, the Wedge-tailed Eagle has been known to abandon its nest due to disturbance (J. Robinson pers. comm.).

Edge effects are likely to be most influential on **narrow strips** or **small areas** of habitat. Consequently, they are an important issue in the management of corridors and small bush blocks. Larger areas are also vulnerable where disturbance, track construction and other activities create edges.

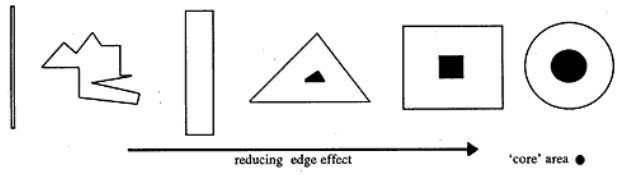
Larger bush blocks may benefit from retaining or managing edge habitats to meet other goals. For example, manipulation of shape, length and composition of edges is probably an effective way of managing for Eastern Grey Kangaroos - the more edge, the more kangaroos. Until the last decade or so, North American wildlife (game) managers actively managed edges in order to create ideal conditions for some game species.

How do edge effects vary with shape and size?

Generally speaking, the longer the edge, the larger the area disturbed.

The more angular the edges, the greater the edge effect. Corners increase disturbance. Rounded edges and regular shapes minimise edge effects.

The smaller the area, the greater the risk of impact occurring throughout the vegetation, with the core habitat being destroyed.



How far do edge effects extend?

The 'depth' of the effect in habitat varies greatly with the length of the edge, the contrast in edge, the width of the habitat, the type of vegetation, the species of wildlife and the stability of the vegetation. One study showed that in terms of vegetation structure, the width of a forest edge was less than 13 metres, but based upon the distribution of birds' nests, the functional width of the edge ranged from 9 to 64 metres (Gates and Mosher, 1980).

It would be difficult to determine the exact extent of the "edge effect" in an area of private wildlife habitat. However, there are many actions landholders can take to prevent or diminish these effects in areas where edges are likely to have negative impacts.

Reducing the negative impact of edges.

1. Shortening edge lengths

The best way to reduce negative edge effects is to reduce the length of the edge. Rounded edges achieve this and also increase the 'core' size.

2. Modifying edge shapes

Edges can be modified by revegetation of areas, such as vehicle tracks, that penetrate existing vegetation.

3. Revegetation

Revegetation of degraded areas with local native species and planting a buffer zone around edges to increase the size of the habitat and its core can reduce edge effects. Buffer zones also have the effect of 'softening' the edges by reducing the contrast between land uses. The chances of success will be greatly increased if these areas are fenced off. Buffer plantings may be enhanced by selection of plant species that are tolerant of the stressful edge conditions - useful local species filling this role may be recognized along natural edges. Buffer plantings can reduce the influx of weed seeds from adjacent land use. Buffer plantings of non-invasive native species between remnant vegetation and pasture can moderate the effect of pasture species invading native vegetation remnants.

4. Fencing wildlife habitats

Uncontrolled grazing by stock is not compatible with sound native vegetation management. Fencing-off habitat areas, so that grazing stock cannot enter, may assist natural regeneration to occur (see LFW Note 13) and will reduce the impact of grazing on plant species.

5. Controlling weeds

Prevent weed invasion by limiting disturbance along edges, and avoid introducing potential weed seed carriers, such as stock feed and vehicles, to edges. Monitor edges for new species that may be weeds and effect control of any weeds promptly.

6. Controlling pest animals

CNR can offer advice on the control of pest animals. Advice on how to reduce the impact of domestic animals on wildlife is also available from CNR.

7. Re-routing tracks

Minimize the number and length of edges. Wherever possible, close off and revegetate tracks that dissect the habitat. Create new tracks and firebreaks outside the habitat area.

8. Using caution with chemicals

Care should be taken when using chemical sprays and fertilizers. Preferably use them well away from wildlife habitats. If this is unavoidable, take notice of wind direction to prevent drift and be aware that chemicals could runoff or leach through the soil into the habitat and cause extensive damage.

9. Removing rubbish

Garden clippings and other litter can introduce weeds and change the nutrient levels of the soil. Rubbish can also attract pest animals or cause injury to native wildlife. Refuse should be placed well away from habitat areas where it can be recycled, composted or placed in sealed storage prior to transport to an official refuse depot.

10. Locating a house away from habitat areas.

The noise, movement, soil disturbance, and other effects associated with human occupation, can be avoided by siting houses away from habitat areas. This will protect the habitat so that it can be enjoyed in its best condition.

11. Clumping revegetation areas.

Several landholders, each contributing a small amount of habitat, can increase the 'core' area by grouping their revegetation effort along common boundaries.

Monitoring edges

Habitat edges require regular monitoring. Look for:

- plants that have not been seen before;
- known weeds;
- diseased or unhealthy-looking plants;
- evidence of pest animals (cat faeces, tracks, wildlife remains)
- signs of erosion;
- litter.

Try recording your observations over time using a diary, fixed photographic points or other technique is recommended.

If action is required, seek advice on the most appropriate solutions, then proceed cautiously. The Department of Conservation and Natural Resources (CNR) can offer advice for your particular property.

References & further reading:

Andren, H. & Anglestam, P., (1988) ***Elevated predation rates as an edge effect in habitat islands: experimental evidence***, Ecology 69: 544-47.

Bennett, A.F. (1987) Conservation of mammals in a fragmented forest environment: the contributions of insular biogeography and autecology. In 'Nature conservation: The Role of Remnants of Native Vegetation'. (Eds. D.A. Saunders, G.W. Arnold, A.A. Burbidge and A.J.M. Hopkins. Surrey Beatty & Sons: Sydney.

Bennett, A.F. (1990) Habitat Corridors: Their Role in Wildlife Management and Conservation', Department of Conservation and Environment, Victoria.

Bennett, A.F. (1993) Fauna Conservation in Box and Ironbark Forests: A Landscape Approach. Vict. Nat. Vol. 110 (1), pp 15-23.

Bradley, J. (1988) "Bringing back the bush", Landsdowne.

Gates, J.E. & Mosher, J.A. (1981) A habitat approach to estimating habitat edge width for birds. Am. Midl. Nat. 105: 189-92.

Land for Wildlife News, (1991) Vol 1, No. 2, p 11.

Wilcove, D.S., (1985) Nest predation in forest tracts and the decline of migratory songbirds, Ecology 66: 1211-14. Edited by Stephen Platt