

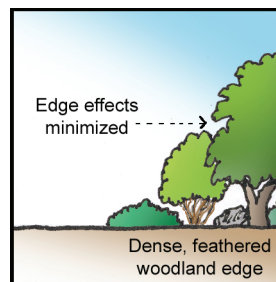
2.10 Edge effects of corridors

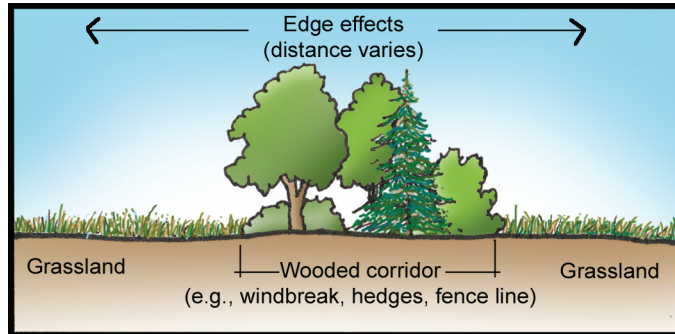
Corridors established in woodlands or grasslands can create negative edge effects that extend into the woodland or grassland. Examples include open corridors cleared for roads in woodlands and hedgerows established in grasslands.

Negative edge effects include increased risk of parasitism or disease, increased risk of predation, adverse microclimate conditions, and competition from invasive species. These factors should be considered when designing corridors.

Key considerations for reducing negative edge effects

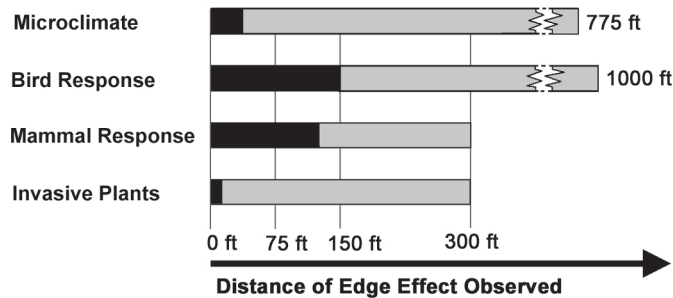
- Locate corridors along existing edges and avoid fragmenting habitat patches.
- Consolidate corridor uses to minimize fragmentation (e.g., combine road and utility corridors).
- In woodlands, create a dense, feathered edge with vegetation to reduce penetration of edge effects.
- Narrower corridors will generally have less edge effects into adjacent habitat.
- If the landscape already consists of patches dominated by edge, a corridor will probably not contribute additional negative impacts.



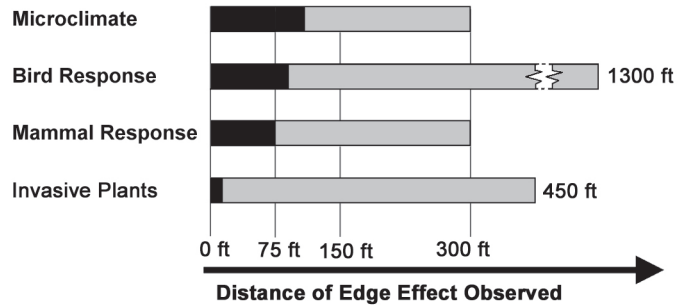


These graphs provide a summary of documented edge effects. These distances can be used for estimating the zone of impact and for designing ways to reduce these impacts.

Open Corridor in Woodland



Wooded Corridor in Grassland



Minimum distance edge effect observed
 Maximum distance edge effect observed

2.10 References

- As, S. 1999. Invasion of matrix species in small habitat patches. *Conservation Ecology*. 3(1): 1. <http://www.consecol.org/vol3/iss1/art1> [Date accessed: July 18, 2007].
- Askins, R.A. 1994. Open corridors in heavily forested landscape: impact on shrubland and forest-interior birds. *Wildlife Society Bulletin*. 22: 339-347.
- Bollinger, E.K.; Gavin, T.A. 2004. Responses of nesting bobolinks (*Dolichonyx Oryzivorus*) to habitat edges. *Auk*. 121: 767-776.
- Brittingham, M.C.; Temple, S.A. 1983. Have cowbirds caused forest songbirds to decline? *BioScience*. 33: 31-35.
- Brothers, T.; Spingarn, A. 1992. Forest fragmentation and alien plant invasion of central Indiana old-growth forests. *Conservation Biology*. 6: 91-100.
- Burger, L.D.; Burger, L.W., Jr.; Faaborg, J. 1004. Effects of prairie fragmentation on predation on artificial nests. *Journal of Wildlife Management*. 58: 249-254.
- Cadenasso, M.L.; Pickett, S.T.A. 2001. Effects of edge structure on the flux of species into forest interiors. *Conservation Biology*. 15: 91-97.
- Chasko, G.G.; Gates, J.E. 1982. Avian habitat suitability along a transmission line corridor in an oak-hickory forest region. *Wildlife Monographs*. 82: 1-41.
- Chen, J.; Franklin, J.; Spies, T. 1995. Growing season microclimatic gradients from clearcut edges into old-growth Douglas-Fir forests. *Ecological Applications*. 5: 74-86.
- Clarke, D.J.; Pearce, K.A.; White, J.G. 2006. Powerline corridors: degraded ecosystems or wildlife havens? *Wildlife Research*. 33: 615-626.
- Coppedge, B.R.; Engle, D.M.; Masters, R.E.; Gregory, M.S. 2001. Avian response to landscape change in fragmented southern Great Plains grasslands. *Ecological Applications*. 11: 47-59.
- Dignan, P.; Bren, L. 2003. Modelling light penetration edge effects for stream buffer design in mountain ash forest in southeastern Australia. *Forest Ecology and Management*. 179: 95-106.
- Euskirchen, E.S.; Chen, J.; Bi, R. 2001. Effects of edges on plant communities in a managed landscape in northern Wisconsin. *Forest Ecology and Management*. 148: 93-108.
- Fenske-Crawford, T.J.; Niemi, G.J. 1997. Predation of artificial ground nests at two types of edges in forest-dominated landscapes. *Condor*. 99: 13-24.

Fletcher, R.J., Jr.; Koford, R.F. 2003. Spatial responses of bobolinks (*Dolichonyx Oryzivorus*) near different types of edges in northern Iowa. *Auk*. 120: 799-810.

Fry, G.; Herlin, I.S. 1997. The ecological and amenity functions of woodland edges in the agricultural landscape: a basis for design and management. *Landscape and Urban Planning*. 37: 45-55.

Gates, J.E.; Gysel, L.W. 1978. Avian nest dispersion and fledgling success in field-forest ecotones. *Ecology*. 59: 871-883.

Gehlhausen, S.M.; Schwartz, M.W.; Augspurger, C.K. 2000. Vegetation and microclimate edge effects in two mixed-mesophytic forest fragments. *Plant Ecology*. 147: 21-35.

Hansen, M.J.; Clevenger, A.P. 2005. The influence of disturbance and habitat on the presence of non-native plant species along transport corridors. *Biological Conservation*. 125: 249-259.

Harper, K.A.; Macdonald, S.E.; Burton, P.J. [and others]. 2005. Edge influences on forest structure and composition in fragmented landscapes. *Conservation Biology*. 19: 768-782.

Henningsen, J.C.; Best, L.B. 2005. Grassland bird use of riparian filter strips in southeast Iowa. *Journal of Wildlife Management*. 69: 198-210.

Herlin, I.S. 2001. Approaches to forest edges as dynamic structures and functional concepts. *Landscape Research*. 26: 27-43.

Johnson, R.G.; Temple, S.A. 1990. Nest predation and brood parasitism of tallgrass prairie birds. *Journal of Wildlife Management*. 54: 106-111.

Kelsey, K.W.; Naugle, D.E.; Higgins, K.F. 2006. Planting trees in prairie landscapes: do the ecological costs outweigh the benefits? *Natural Areas Journal*. 26: 254-260.

Kennedy, C.; Wilkinson, J.; Balch, J. 2003. Conservation thresholds for land use planners. Washington, DC: Environmental Law Institute. 55 p.

Kuehl, A.K.; Clark, W.R. 2002. Predator activity related to landscape features in northern Iowa. *Journal of Wildlife Management*. 66: 1224-1234.

Lahti, D.C. 2001. The "edge effect on nest predation" hypothesis after twenty years. *Biological Conservation*. 99: 365-374.

Laurance, W.F.; Yensen, E. 1991. Predicting the impacts of edge effects in fragmented habitats. *Biological Conservation*. 55: 77-92.

Lidicker, W.Z., Jr. 1999. Responses of mammals to habitat edges: an overview. *Landscape Ecology*. 14: 333-343.

2.10 Biodiversity

Luken, J.O.; Hinton, A.C.; Baker, D.G. 1991. Forest edges associated with power-line corridors and implications for corridor siting. *Landscape and Urban Planning*. 20: 315-324.

Matlack, G.R. 1993. Sociological edge effects: spatial distribution of human impact in suburban forest fragments. *Environmental Management*. 17: 829-835.

Matlack, G.R. 1993. Microenvironment variation within and among forest edge sites in the Eastern United States. *Biological Conservation*. 66: 185-194.

McDonald, R.I.; Urban, D.L. 2006. Edge effects on species composition and exotic species abundance in the North Carolina Piedmont. *Biological Invasions*. 8: 1049-1060.

Murcia, C. 1995. Edge effects in fragmented forests: implications for conservation. *Trends in Ecology and Evolution*. 10: 58-62.

Newmark, W.D. 1993. The role and design of wildlife corridors with examples from Tanzania. *Ambio*. 22: 500-504.

Newton, J.L.; Heske, E.J. 2001. Predation on artificial nests in small grassland patches in east-central Illinois. *American Midland Naturalist*. 145: 29-39.

O'Leary, C.H.; Nyberg, D.W. 2000. Treelines between fields reduce density of grassland birds. *Natural Areas Journal*. 20: 243-249.

Ortega, Y.K.; Capen, D.E. 2002. Roads as edges: effects on birds in forested landscapes. *Forest Science*. 48: 381-390.

Paton, P.W.C. 1994. The effect of edge on avian nest success: how strong is the evidence? *Conservation Biology*. 8: 17-26.

Pierce, R.A.; Farrand, D.T.; Kurtz, W.B. 2001. Projecting the bird community response resulting from the adoption of shelterbelt agroforestry practices in Eastern Nebraska. *Agroforestry Systems*. 53: 333-350.

Ranney, J.W.; Bruner, M.C.; Levenson, J.B. 1981. The importance of edge in the structure and dynamics of forest islands. In: Burgess, R.L.; Sharpe, D.M., eds. *Forest island dynamics in man-dominated landscapes*. New York: Springer: 67-95.

Renfrew, R.B.; Ribic, C.A.; Nack, J.L. 2005. Edge avoidance by nesting grassland birds: a futile strategy in a fragmented landscape. *Auk*. 122: 618-636.

Ribic, C.A.; Sample, D.A. 2001. Associations of grassland birds with landscape factors in southern Wisconsin. *American Midland Naturalist*. 146: 105-121.

Rich, A.C.; Dobkin, D.S.; Niles, L.J. 1994. Defining forest fragmentation by corridor width: the influence of narrow forest-dividing corridors on forest-nesting birds in southern New Jersey. *Conservation Biology*. 8: 1109-1121.

Ries, L.; Debinski, D.M. 2001. Butterfly responses to habitat edges in highly fragmented prairies of Central Iowa. *Journal of Animal Ecology*. 70: 840-852.

Ries, L.; Fletcher, R.J.; Battin, J.; Sisk, T.D. 2004. Ecological responses to habitat edges: mechanisms, models, and variability explained. *Annual Review of Ecology, Evolution, and Systematics*. 35: 491-522.

Rodewald, A.D.; Vitz, A.C. 2005. Edge and area-sensitivity of shrubland birds. *Journal of Wildlife Management*. 69: 681-688.

Saunders, D.A.; Hobbs, R.J.; Margules, C.R. 1991. Biological consequences of ecosystem fragmentation: a review. *Conservation Biology*. 5: 18-32.

Simberloff, D.; Farr, J.A.; Cox, J.; Mehlman, D. 1992. Movement corridors: conservation bargains or poor investments? *Conservation Biology*. 6: 493-504.

Sinclair, K.E.; Hess, G.R.; Moorman, C.E.; Mason, J.H. 2005. Mammalian nest predators respond to greenway width, landscape context, and habitat structure. *Landscape and Urban Planning*. 71: 277-293.

Stauffer, D.F.; Best, L.B. 1980. Habitat selection by birds of riparian communities: evaluating effects of habitat alterations. *Journal of Wildlife Management*. 44: 1-15.

Steinblums, I.J.; Froehlich, H.A.; Lyons, J.K. 1984. Designing stable buffer strips for stream protection. *Journal of Forestry*. 82: 49-52.

Sutcliffe, O.L.; Thomas, C.D. 1996. Open corridors appear to facilitate dispersal by ringlet butterflies between woodland clearings. *Conservation Biology*. 10: 1359-1365.

Watkins, R.Z.; Chen, J.; Pickens, J.; Brososke, K.D. 2003. Effects of forest roads on understory plants in a managed hardwood landscape. *Conservation Biology*. 17: 411-419.

Weldon, A.J. 2006. How corridors reduce indigo bunting nest success. *Conservation Biology*. 20: 1300-1305.

Winter, M.; Johnson, D.H.; Faaborg, J. 2000. Evidence for edge effects on multiple levels in tallgrass prairie. *Condor*. 102: 256-266.

Yahner, R.H. 1988. Changes in wildlife communities near edges. *Conservation Biology*. 2: 333-339.

Yahner, R.H.; Mahan, C.G. 1997. Effects of logging roads on depredation of artificial ground nests in a forested landscape. *Wildlife Society Bulletin*. **25**: 158-162.

Yates, E.D.; Levia, D.F., Jr.; Williams, C.L. 2004. Recruitment of three non-native invasive plants into a fragmented forest in southern Illinois. *Forest Ecology and Management*. **190**: 119-130.

Yosef, R. 1994. The effects of fencelines on the reproductive success of loggerhead shrikes. *Conservation Biology*. **8**: 281-285.

Young, A.; Mitchell, N. 1994. Microclimate and vegetation edge effects in fragmented podocarp-broadleaf forest in New Zealand. *Biological Conservation*. **67**: 63-72.