



Habitat Loss & Fragmentation

The term **habitat** refers to an area with the resources and conditions present to produce occupancy by a given organism.¹ These resources and conditions include **food, water, cover, and any special factors needed by a species for survival and reproductive success.**² Since habitat is organism-specific, the appropriate mix of abiotic and biotic components necessary for successful reproduction and survival varies by species.¹

Habitat fragmentation occurs when a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original.³ Habitat fragmentation describes changes in habitat configuration and can be independent of or in addition to the effects of **habitat loss**—a reduction in habitat abundance.⁴

Habitat fragmentation and loss affect wildlife in a variety of ways. Though changes in habitat quality and composition occur naturally, human manipulation of landscapes has increasingly served as a source of habitat changes—**some with overall negative effects to wildlife.** Fortunately, there are numerous techniques biologists can use to mitigate these effects and manage habitats to benefit a diverse array of wildlife species.



Collared peccary: Border fences can fragment habitat, prevent migration, and limit access to vital resources⁸ (Credit: Matt Clark).

Effects of Habitat Loss & Fragmentation on Wildlife

Patch-Size Effects

- When fragmentation occurs, it **reduces the total area of continuous habitat** and creates barriers for movement between habitats. This can negatively effect many species, particularly those species that have large territories or home ranges.⁵

Edge Effects

- By breaking habitat up into smaller parts, this increases the amount of **edge**—perimeter area surrounding a patch. This increased edge can change both the biotic and abiotic aspects of the interior habitat and could **potentially reduce habitat quality** for some species.⁶ However, given the organism-specific nature of habitat, landscape changes that are detrimental to the habitat of one species may benefit the habitats of others and thus have a positive effect on biodiversity.⁴

Isolation Effects

- Fragmentation often isolates habitat and **prevents wildlife from moving** back and forth between patches. This can cause inbreeding, limit access to resources, and increase mortality for organisms unable to cross the non-habitat portion of land between patches.⁴

Sources of Human-Caused Habitat Loss & Fragmentation

Food Production

Urban Development

Roads & Railways

Energy Development



Photo Credit, from left to right: Pam Brophy, Simon Mortimer, Ken Kistler, Tim Evanson

Humans contribute to habitat loss and fragmentation in a variety of ways. As the worldwide human population and demand for **food production** continue to grow, the intensity of our land-use increases.⁹ Whether for **economic productivity** or **urban development**, humans alter the landscape matrix in ways that effect the spatial density, diversity, and quality of wildlife habitat.¹⁰ As habitat patches become smaller and more isolated, this affects the ability of wildlife to disperse—a factor further compounded by physical barriers like **fences and roadways** that bisect the landscape.¹¹ However, with knowledge of the habitat requirements for a particular species of interest (or group of species), land managers can make informed decisions as to how landscape alterations will influence ecological communities and then take appropriate steps to manage those habitats in a way that provides benefits to wildlife.¹²

Techniques to Prevent/Mitigate the Negative Effects of Habitat Fragmentation and Loss¹³

Wildlife Corridors:

A narrow strip of natural habitat that connects at least two significant habitat areas.

Land Acquisitions:

Local, state, federal, and private entities purchase land for habitat preservation.

Conservation Easements:

Agreements between private landowners and government agencies to prevent or limit commercial or residential development of critical habitat.

Restoration:

Converting once developed land to a natural state.

Mitigation:

Developers create or preserve lands of similar quality and size to that which they impact.

Zoning:

Adding wildlife and habitat conservation considerations into local development plans.

Buffer Zones:

Areas around targeted habitat that reduce the impacts of edge disturbances on species that require continuous habitat.

Wildlife Crossings:

A physical structure that facilitates the safe passage of animals over or under linear infrastructure like roads and railways.

- Hall, L. S., P. R. Krausman, & M. L. Morrison. 1997. The habitat concept and a plea for standard terminology. *Wildlife Society Bulletin* 25:173–182.
- Leopold, A. 1933. *Game Management*. Charles Scribner's Sons, New York.
- Wilcove, D. S., McLellan, C. H., & Dobson, A. P. 1986. Habitat fragmentation in the temperate zone. *Conservation Biology*, ed. ME Soule: 237–256.
- Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. *Annual Review of Ecology, Evolution, and Systematics* 34: 487–515.
- Bender, Darren J., Thomas A. Contreras, and Lenore Fahrig. 1998. Habitat loss and population decline: a meta-analysis of the patch size effect. *Ecology* 79:517–533.
- Hennings, L. 2010. Wildlife corridors and permeability: A literature review. Metro Sustainability Center. Available at <https://www.researchgate.net/publication/265085554_Wildlife_corridors_and_permeability_-_a_literature_review> Accessed Jan. 2017.
- Young, A., Boyle, T., & Brown, T. 1996. The population genetic consequences of habitat fragmentation for plants. *Trends in Ecology and Evolution* 11(10): 413–418
- Krausman, P. R., & Harris, L.K. 2011. *Cumulative Effects in Wildlife Management: Impact Mitigation*. CRC Press: 94.
- Donald, P. F., & Evans, A. D. 2006. Habitat connectivity and matrix restoration: the wider implications of agri-environment schemes. *Journal of Applied Ecology* 43:209–218.
- Radeloff, V. C., Hammer, R. B., Stewart, S. I., Fried, J. S., Holcomb, S. S., & McKeefry, J. F. 2005. The wildland-urban interface in the United States. *Ecological Applications* 15:799–805.
- White, P., Michalak, J., & Lerner, J. 2007. Linking Conservation and Transportation: Using the State Wildlife Action Plans to Protect Wildlife from Road Impacts. *Defenders of Wildlife*. Available at <http://www.defenders.org/publications/linking_conservation_and_transportation.pdf>. Accessed Jan. 2017.
- Krausman, P. R. 1999. *Grazing Behavior of Livestock and Wildlife*. Idaho Forest, Wildlife & Range Exp. Sta. Bull. #70, Univ. of Idaho, Moscow, ID.: 85-90.
- Editor, Silvy, N.J. 2012. *The Wildlife Techniques Manual*. 2 Volumes. The Johns Hopkins University Press, Baltimore, Maryland. Seventh edition.

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