



## 2.13 Roads and wildlife crossings

When wildlife corridors are bisected by roads, safe passage should be provided through culverts, bridges, and/or overpasses. Landscape-scale assessments can aid in locating wildlife crossings. When using culverts for crossings, include culverts of mixed-sized classes and avoid creating barriers to movement like debris grates. Design guides are available.

### 2.13 References

- Aresco, M.J. 2005. Mitigation measures to reduce highway mortality of turtles and other herpetofauna at a north Florida lake. *Journal of Wildlife Management*. 69: 549-560.
- Ascensão, F.; Mira, A. 2007. Factors affecting culvert use by vertebrates along two stretches of road in southern Portugal. *Ecological Research*. 22: 57-66.
- Ashley, E.P.; Robinson, J.T. 1996. Road mortality of amphibians, reptiles, and other wildlife on the Long Point Causeway, Lake Erie, Ontario. *Canadian Field Naturalist*. 110: 403-412.
- Cavallaro, L.; Sanden, K.; Schellhase, J.; Tanaka, M. 2005. Designing road crossings for safe wildlife passage: Ventura county guidelines. Santa Barbara, CA: University of California. 90 p. M.S. thesis. [http://www.bren.ucsb.edu/research/documents/corridors\\_final.pdf](http://www.bren.ucsb.edu/research/documents/corridors_final.pdf) [Date accessed July 19, 2007].
- Clevenger, A.P.; Chruszcz, B.; Gunson, K. 2001. Drainage culverts as habitat linkages and factors affecting passage by animals. *Journal of Applied Ecology*. 38: 1340-1349.

- Clevenger, A.P.; Walther, N. 2000. Factors influencing the effectiveness of wildlife underpasses in Banff National Park, Alberta, Canada. *Conservation Biology*. 14: 47-56.
- Clevenger, A.P.; Walther, N. 2005. Performance indices to identify attributes of highway crossing structures facilitating movement of large mammals. *Biological Conservation*. 121: 453-464.
- Clevenger, A.P.; Wierchowski, K. 2006. Maintaining and restoring connectivity in landscapes fragmented by roads. In: Crooks, K.R.; Sanjayan, M., eds. *Connectivity conservation*. Cambridge, UK: Cambridge University Press. 502-535.
- Dodd, C.K., Jr.; Barichivich, W.J.; Smith, L.L. 2004. Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. *Biological Conservation*. 118: 619-631.
- Foster, M.L.; Humphrey, S.R. 1995. Use of highway underpasses by Florida panthers and other wildlife. *Wildlife Society Bulletin*. 23: 95-100.
- Hunt, A.; Dickens, H.J.; Whelan, R.J. 1987. Movement of mammals through tunnels under railway lines. *Australian Zoologist*. 24: 89-93.
- Jackson, S.D.; Griffin, C.R. 2000. A strategy for mitigating highway impacts on wildlife. In: Messmer, T.A.; West, B., eds. *Wildlife and highways: seeking solutions to an ecological and socio-economic dilemma*. Washington, DC: The Wildlife Society:143-159.
- Jaeger, J.A.; Fahrig, L. 2004. Effects of road fencing on population persistence. *Conservation Biology*. 18: 1651-1657.
- Lesbarres, D.; Lode, T.; Merila, J. 2004. What type of amphibian tunnel could reduce road kills? *Oryx*. 38: 220-223.
- Little, S.J.; Harcourt, R.G.; Clevenger, A.P. 2002. Do wildlife passages act as prey-traps? *Biological Conservation*. 107: 135-145.
- Mader, H.J. 1984. Animal habitat isolation by roads and agricultural fields. *Biological Conservation*. 29: 81-96.
- Mazerolle, M.J. 2004. Drainage ditches facilitate frog movements in a hostile landscape. *Landscape Ecology*. 20: 579-590.
- McDonald, W.; St. Clair, C.C. 2004. Elements that promote highway crossing structure use by small mammals in Banff National Park. *Journal of Applied Ecology*. 41: 82-93.
- McDonald, W.; St. Clair, C.C. 2004. The effects of artificial and natural barriers on the movement of small mammals in Banff National Park, Canada. *Oikos*. 105: 397-407.

- Ng, S.J.; Dole, J.W.; Sauvajot, S.; Riley, S.P.D.; Valone, T.J. 2004. Use of highway undercrossings by wildlife in southern California. *Biological Conservation*. 115: 499-507.
- Reed, D.F.; Woodard, T.W.; Pojar, T.M. 1975. Behavioral response of mule deer to a highway underpass. *Journal of Wildlife Management*. 39: 361-367.
- Rodriguez, A.; Crema, G.; Delibes, M. 1996. Use of non-wildlife passages across a high speed railway by terrestrial vertebrates. *Journal of Applied Ecology*. 33: 1527-1540.
- Taylor, B.D.; Goldingay, R.L. 2003. Cutting the carnage: wildlife usage of road culverts in north-eastern New South Wales. *Wildlife Research*. 30: 529-537.
- Trombulak, S.C.; Frissell, C.A. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology*. 14: 18-30.
- Yanes, M.; Velasco, J.M.; Suarez, F. 1995. Permeability of roads and railways to vertebrates: the importance of culverts. *Biological Conservation*. 71: 217-222.