

Appendix B4
Literature Review For Edge Effects

Barratt, D.G. 1998. Predation by house cats, *Felis catus* (L.) in Canberra, Australia. II. Factors affecting the amount of prey caught and estimates of the impact on wildlife. *Wildlife Research* 25:475-487.

More prey were caught by cats living near the rural/grassland and forest/woodland interfaces than those in inner suburban areas. The average amount of prey caught by house cats is significantly less than that needed by cats with no domestic food supplement. There is enormous variation in the amount of prey caught by house cats, from none to possibly hundreds annually. Seventy percent of cats were observed to catch less than 10 prey over 12 months, but 6% of the cats captured more than 50 prey over 12 months. Most of this variation was unexplained and may be due to individual variation.

Blair, R.B. 1996. Land use and avian species diversity along an urban gradient. *Ecological Applications* 6(2):506-519.

The composition of the bird community shifted from predominantly native species in the undisturbed area to invasive and exotic species in the business district. Species richness, Shannon diversity and bird biomass peaked at moderately disturbed sites. The predevelopment bird species dropped out gradually as the sites became more urban.

Bolger, D.T. and A.V. Suarez, K.R. Crooks, S.A. Morrison, and T.J. Case. 2000. Arthropods in urban habitat fragments in southern California: area, age and edge effects. *Ecological Applications* 10(4): 1230-1248.

Area, edge and secondary effects of fragmentation affect arthropods in coastal scrub habitat. Argentine ants are a “significant conservation threat” to arthropod fauna in southern California, although more research needs to be conducted to determine effects on other arthropods.

Cadenasso, M.L. and S.T.A. Pickett. 2001. Effect of edge structure on the flux of species into forest interiors. *Conservation Biology* 15((1)91-97.

The structure of vegetation on a forest edge interacts with the flux of wind-dispersed seed across the edge. An edge with intact vegetation can function as a physical barrier to seed dispersal. Therefore, the structure of vegetation on edges can influence the function of edges as barriers to seed flux into the forest interior.

Debinski, D.M. and R.D. Holt. 2000. A survey and overview of habitat fragmentation experiments. *Conservation Biology* 14(2):342-355

Lack of consistency in results across studies, including the influence of edge effects on ecosystem services. R. Bierregaard (pers.comm.) documented edge effects 300m or more into a tropical forest remnant.

Demaynadier, P.G. and M.L. Hunter, Jr. 1998. Effects of silvicultural edges on the distribution and abundance of amphibians in Maine. *Conservation Biology* 12(2):340-352.

For some management-sensitive amphibians (*Plethodon cinereus*, *Ambystoma maculatum*, *A. laterale*, and *Rana sylvatica*) are negatively affected by edge effects for 25-35 meters. In other literature that was cited, forest edge effects disappear within the first 50 meters for birds and plants (Paton 1994). Abiotic variables such as soil moisture, temperature, air and incident light level are affected within 8-25 meters (Kapos 1989).

(Paton, P.W.C. 1994. The effect of edge on avian nest success: how strong is the evidence. *Conservation Biology* 8:17-26; Kapos, V. 1989. Effects of isolation on the water status of forest patches in the Brazilian Amazon. *Journal of Tropical Ecology* 5:173-185.)

Hall, L.S., M.A. Kasparian, D. Van Vuren, and D.A. Kelt. 2000. Spatial organization and habitat use of feral cats (*Felis catus* L.) in Mediterranean California. *Mammalia* 64(1):19-28.

Home ranges of adult cats averaged 31.7 ha and did not significantly differ by sex or season. Cats strongly preferred riparian habitats and foraged mainly on small native mammals such as California voles (*Microtus californicus*) and Botta's pocket gophers (*Thomomys bottae*), even though the exotic small mammals predominated. They likely use riparian habitats for cover but forage in adjacent fields and annual grasslands. Impacts on native communities may be high due to feral cats. Since these cats are often given food by humans, cat populations may remain high even after prey populations have declined.

Holway, D.A. 1998. Effects of Argentine ant invasions on ground-dwelling arthropods in northern California riparian woodlands. *Oecologia* 116:252-258.

Argentine ants had an effect on non-native ants near edges but had no effect on non-ant arthropods.

Human, K.G., S. Weiss, A. Weiss, B. Sandler and D.M. Gordon. 1998. Effects of abiotic factors on the distribution and activity of the invasive Argentine ant (Hymenoptera: Formicidae). *Environmental Entomology* 27(4): 822-833.

The range of the Argentine ant in Central California is probably limited to areas with permanent sources of water. The Argentine ant is more limited by proximity to water than are native ant species.

Marzluff, J.M. and K. Ewing. 2001. Restoration of fragmented landscapes for the conservation of birds: a general framework and specific recommendations for urbanizing landscapes. *Restoration Ecology* 9(3):280-292.

The severity of the effects of fragmentation are determined by the following:

- (1) the natural disturbance regime
- (2) the similarity of the anthropogenic matrix to the natural matrix

(3) the persistence of the anthropogenic change

Urbanization is likely to produce greater effects of fragmentation than either agriculture or timber harvest. Ways to help restore ecological function in a fragment includes, among other things designing buffers that reduce penetration of undesirable agents from the matrix and recognizing that human activity is not compatible with interior conditions. "Interior areas" have been defined as more than 5-200 meters from an edge by Soulé (1991), Shafer (1997) and Rochelle *et al.* (1999). To prevent buffers acting as "wicks" that allow exotic and native predators and parasites to flow between the fragment and the matrix, buffers should be as impermeable as possible.

(Rochelle, J.A., L.A. Lehmann and J. Wisniewski, editors. 1999. Forest wildlife and fragmentation: management and implications. Brill, Leiden, The Netherlands; Soulé, M.E. 1991. Land use planning and wildlife maintenance. *Journal of the American Planning Association* 57:313-323; Shafer, C.L. 1997. Terrestrial nature reserve design at the urban/rural interface. Pages 345-378 in M.W. Schwartz, editor. *Conservation in highly fragmented landscapes*. Chapman and Hall, New York.)

Riffell, S.K., K.J. Gutzwiller, S.H. Anderson. 1996. Does repeated human intrusion cause cumulative declines in avian richness and abundance? *Ecological Applications* 6(2):492-505.

No cumulative effects to bird communities in a national forest from solitary hikers were recorded, although intrusion has some potential to generate problems for some or all bird species studied during the breeding season.

Sauvajot, R.M. Edge Effects and Anthropogenic Habitat Disturbance Near Urbanization in Southern California Chaparral Communities: Results for Small Mammals and Birds.

Variation in bird and mammal diversity and relative abundance was not found to be correlated with exposure to development in intact or modified sites. However, modified sites did have lower diversity and reduced mammal abundance relative to intact sites. Thus, while habitat alteration did influence community patterns, edge effects associated with development proximity were not apparent. These results may reflect characteristics of intact chaparral that precluded entry of impacts from nearby development.

Suarez, A.V., D.T. Bolger and T.J. Case. 1998. Effects of fragmentation and invasion on native ant communities in coastal southern California. *Ecology* 79(6): 2041-2056

Argentine ants were more abundant near developed edges and in areas dominated by exotic vegetation. Their densities decreased with distance from the edge. Areas sampled 200 meters from an urban edge contained few or no Argentine ants. The number of native ground-foraging ant species at any point declined from an average of <7 to >2 species in the presence of the Argentine ant.

Results from the study suggest that Argentine ants occur mostly at the preserve edges because it is expanding its range by spreading along the ground through colony fission.

Limiting human activity within nature preserves and creating reserves with a large area-to-perimeter ratio may prevent invasion of interior areas by these ants and other invasive species.