

Table 14--Effects of road-associated factors on habitats and populations of broad-scale species of focus^a (continued)

Group	Species	Snag reduction	Downlog reduction	Negative edge effects	Over-hunting	Over-trapping	Poaching	Collection	Harassment	Collisions	Movement barrier	Displacement	Chronic, negative interactions
6	Williamson's sapsucker	A		B									
6	Winter wren	A	A	B									
7	Boreal owl	A		B									
8	Great gray owl	A											
9	Black-backed woodpecker	A		B									
10	Olive-sided flycatcher												
11	Three-toed woodpecker	A		B									
11	White-winged crossbill									69*			
12	Woodland caribou			B			13*			13*			
13	N. flying squirrel	A	A	B									
14	Hermit warbler			B									
15	Pygmy shrew										C		
15	Wolverine		A			47, 55			68				
16	Lynx		A			31*, 32			33				
17	Blue grouse (summer)								34				
17	Mountain quail (summer)								34				
18	Lazuli bunting												
19	Gray wolf			18*			16*, 17, 20, 21, 22, 72			17*, 20*, 21, 22*, 72		15*, 18*, 19*, 23*, 72	16, 19*, 17, 20, 22, 70*, 72
19	Grizzly bear						24, 25, 26, 14*, 72			24*, 26*, 72		14*, 25*, 28*, 29*, 30*, 72	24, 14*, 30*, 72

* = Cited reference makes a direct link with roads as a facilitator of the factor's effect. Cited references not marked by an asterisk establish the factor as a problem for the species but do not address whether roads facilitate the factor's effect.

^a Factors and effects listed here are defined in table 13. Factors and effects were documented from empirical literature and literature summaries, with each number listed below denoting a footnoted study. Presumed effects are denoted by a letter corresponding to a footnote that describes each presumed effect and cites the supporting literature related to others species of the taxa. A factor not marked with a number or letter (blank cells) indicates that we could find no research results on the factor in relation to the species or related taxa. Blank cells in this table therefore indicate no studies found rather than no effect of the factor.

A = Species depends on snags, down logs, or both structures to meet life requisites (Thomas and others 1979, volume 3, appendix 1, table 2); consequently, the species presumably is affected by a reduction in density of these structures and the documented link of this effect with roads (Hann and others 1997, Quigley and others 1996).

B = Species presumably responds negatively to openings or linear edges created by roads, based on its dependence on closed-canopy habitats and lack of dependence on disturbed or contrasting habitats of openings and closed-canopy forests (such as "habitat-interior" species [Marcot and others 1994]); additional research is needed, however, to validate the presumption.

C = Factor is presumed to have a negative effect on the species, based on documented effects of the factor on species of similar life history or taxa. For poaching or over-hunting of large mammals, documented effects include Cole and others (1997), Dood and others (1986), Knight and others (1988), McLellan and Shackleton (1988), Mech (1970), Scott and Servheen (1985), Stelfox (1971), Yoakum (1978). For over-harvest and poaching of ground squirrels ("plinking"), effects are described by Ingles (1965). For collisions of reptiles with vehicles, documented effects are summarized by Vestjens (1973) and Bennett (1991). For roads as barriers to movements of small mammals, documented effects are described by Mader (1984), Swihart and Slade (1984), and Merriam (1989). For displacement of all taxa, documented effects are summarized by Bennett (1991). For any other effects on taxa marked with a "C" but not explicitly identified here, documented effects are summarized by Bennett (1991). Presumed effects of factors marked with a "C" require additional research to validate the presumption.

References:

1. Hann and others 1997; 2. Quigley and others 1996; 3. Bock 1970; 4. Hodgman and others 1994; 5. Fortin and Cantin 1994; 6. Thompson 1994; 7. Nagorsen and Brigham 1993; 8. Idaho State Conservation Effort 1995; 9. Autenrieth 1978; 10. Coulter 1966; 11. Jones 1991; 12. Paragi and others 1994; 13. Scott and Servheen 1985; 14. Mace and others 1996; 15. Thurber and others 1994; 16. Mech 1970; 17. Van Ballenberghe and others 1975; 18. Mladenoff and others 1995; 19. Thiel 1985; 20. Fritts and others 1985; 21. Pletscher and others 1997; 22. Bangs and Fritts 1996; 23. Singer 1979; 24. Knight and others 1988; 25. McLellan and Shackleton 1988; 26. Dood and others 1986; 27. Yoakum 1978; 28. Kasworm and Manley 1990; 29. Mattson and others 1987; 30. Mattson and others 1992; 31. Bailey and others 1986; 32. Parker and others 1983; 33. Koehler and Brittell 1990; 34. ICBEMP 1996d; 35. ICBEMP 1996a; 36. Brown and others 1995; 37. Marti and Marks 1989; 38. Singer 1978; 39. Chadwick 1972; 40. Johnson 1983; 41. Joslin 1986; 42. Hamilton and others 1982; 43. Hicks and Elder 1979; 44. MacArthur and others 1979; 45. Bruns 1977; 46. Helms 1978; 47. Hornocker and Hash 1981; 48. Green and Anthony 1989; 49. Bechard and Schmutz 1995; 50. Lokemoen and Duebbert 1976; 51. Olendorff and Stoddart 1974; 52. Lanyon 1994; 53. Giesen and Connelly 1993; 54. Tirhi 1995; 55. Banci 1994; 56. Lehmkuhl and others 1997; 57. Geist 1971; 58. Moroz 1995; 59. USDA Forest Service and USDI Fish and Wildlife Service 1996; 60. Washington Department of Wildlife 1993b; 61. Yosef 1996; 62. Flickinger 1995; 63. DeStefano 1990; 64. Blumton 1989; 65. Stelfox 1971; 66. Taylor and others 1993; 67. Nussbaum and others 1983; 68. Copeland 1996; 69. Ehrlich and others 1988; 70. Mech 1973; 71. Tuttle 1988; 72. Frederick 1991; 73. Howard 1975; 74. Harmata 1981; 75. Gilmer and others 1985; 76. Clark 1975; 77. Holt 1992.

