Literature Review And Synthesis Of The Effects Of Residential Development On Ungulate Winter Range In The Rocky Mountain West

Jean Polfus,* Research Associate, University of Montana, 520 Pattee Canyon Drive, Missoula, Montana, 59803, jeanpolfus@gmail.com

Doris Fischer, Land Use Planning Specialist, Montana Fish, Wildlife and Parks, P.O. Box 52, Sheridan, Montana 59749, dofischer@mt.gov

John Vore, Montana Fish, Wildlife and Parks, 490 N. Meridian, Kalispell, Montana 59901, jvore@mt.gov

In the past 40 years human population and rural residential development at exurban densities have increased dramatically in the Rocky Mountain West resulting in increasing rates of conflict between high quality ungulate habitat and development. Roads and subdivisions near and in winter range affect ungulates in multiple ways and reduce management options. The literature review covered more than 100 articles on the effects of land use change, especially residential development at exurban densities, on five focal species; elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), white tailed deer (*Odocoileus virginianus*), American pronghorn (*Antilocapra antilocapra*) and bighorn sheep (*Ovis canadensis*). The direct and indirect effects of exurban development on ungulate winter range vary by region, species, specific habitat type, development type, and human wildlife perceptions. Topics of particular interest included zone of human influence, minimum habitat patch size requirements, habituation, thresholds between functional and non-functional winter range, associated costs of exurban development, and cumulative effects. The literature sheds light on some of these issues, however, few studies addressed the impacts of land use change on population dynamics over the long term. For example, rigorous testing of the cumulative impact that multiple developments and development types, i.e., roads, housing, industrial development, have on seasonal habitat use and migratory behavior has been limited. Short-term and small-scale observational studies must be replaced by well designed experiments to help managers and planners make more credible recommendations to direct future exurban development.