Title
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SMALL MAMMAL USE OF MODIFIED CULVERTS ON THE LOLO SOUTH PROJECT OF WESTERN MONTANA - AN UPDATE

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Abstract

A highway reconstruction project, termed the Lolo South Project, is currently underway in west-central Montana to expand Highway 93 from two lanes to four over a distance of approximately 45 miles from the town of Lolo to that of Hamilton. Portions of this highway bisect a series of wetlands which currently support a variety and abundance of wildlife. As one wildlife mitigation approach, several three- and four-foot-diameter culverts have been placed at these sites to encourage animal movement between the fragmented wetlands. Metal shelves serviced by ramps were installed in three of the culverts to allow animal movement during periods of high water. The current research project continued and expanded upon the initial pilot study which was begun in January 2001 (and reported at the ICOET 2001 meetings). In particular, additional culverts were added to the original study to increase the sample size, and modifications of the shelf design were made based upon early results, and these refinements were rigorously tested.

A total of 10 culverts spaced over a distance of approximately six miles along a series of wetlands along Highway 93 are now being studied, five with 25inch-wide shelves (experimentals) and five without (controls). Besides the 3 to 4-foot-diameter culverts originally employed, larger culverts have been added (ranging up to 10-foot-wide squash culverts). An additional four culverts along Interstate 90 through Missoula (ranging from 3- to 10-foot widths) are also being studied. This phase of the study was initiated in October 2001 and will continue through December 2003. Remote sensing TrailMaster® cameras, which are triggered by a combination of heat and motion, were mounted on the roof of each culvert, approximately 15 meters from one entrance. These cameras were positioned so that any mammals traversing the culvert either on the floor of experimental or control culverts or on the ramps in the experimental culverts would be photographed. Cameras are being checked once each week, and film is replaced as needed. Once each month (March - October) the small mammal populations which exist along the wetlands adjacent to the original six culverts are being censussed. For this purpose, 25 Sherman® live traps baited with rolled oats are placed in single transect lines approximately 10 meters from each entrance, with a trap spacing of five meters. Traps are checked twice per day at 6:00 am and 6:00 pm for a total of three days. All animals captured are identified to species, sexed, weighed, their reproductive status noted, aged (immature/juvenile/mature), and marked before being released at the point of capture. Environmental data loggers, which record temperature, light, and humidity levels at 30-second intervals 24 hours/day, were placed at three sites; information from each data logger is downloaded each week. Finally, habitat characteristics adjacent to each culvert entrance are being described. Given this experimental design we are able to determine which small mammal species are present adjacent to the culverts and which of these are actually using the culverts to move between wetland sites on each side of the highway. Seasonal use of the culverts and use of the shelves during periods of high water are being assessed. Activity patterns of those animals traversing the culverts is determined from date and time information imprinted on each photograph. Activity patterns are also being correlated with prevailing environmental conditions.

Trapping data to date have identified seven small mammal species living adjacent to the culverts: meadow voles (*Microtus pennsylvanicus*), deer mice (*Peromyscus maniculatus*), vagrant shrews (*Sorex vagrans*) short-tailed weasels (*Mustela erminea*), House mice (*Mus musculus*), Columbian ground squirrels (*Spermophilus columbianus*), and striped skunks (*Mephitis mephitis*). Other species surely reside here as well, though they are too large for the traps employed.

Since the original pilot study the floor of the original shelves has been modified to provide a better surface for small mammals and a “vole tube” has been incorporated to address apparent shyness to enter culverts by meadow voles. Photographic evidence has so far demonstrated culvert use by a total of 23 species including the species listed above (with the exception of the house mouse), and muskrats (*Ondatra zibethicus*), raccoons (*Procyon lotor*), coyotes (*Canis latrans*), red foxes (*Vulpes vulpes*), and white-tailed deer (*Odocoileus virginianus*) among others.

During periods in which water has covered the floor of the culverts, deer mice, short-tailed weasels, striped skunks, raccoons, and domestic cats have used the shelves in the experimental culverts. Meadow voles, the most abundant small mammal species adjacent to the culverts, have now been observed freely moving through the culverts equipped with tubes. These tubes are also heavily used by weasels.

From these data several conclusions can be drawn. Most importantly, several species of small mammals appear to readily use the shelves when water in the culvert would otherwise prevent movement; thus, these devices seem to be very effective. Behavioral differences in some species, notably the meadow vole which will not expose itself to an open environment, have been overcome with the development of a protective tube. Further refinements are continuing to be made. The application of these devices for retrofitting small culverts, as well as their utility in large culverts with permanent water flow were examined.

Biographical Sketch: Kerry Foresman received his B.A. degree in zoology from the University of Montana in 1971. He then went on to receive an M.S. degree in zoology from the University of Idaho in 1973. In 1977 he earned his Ph.D in physiology from the University of Idaho. Kerry is currently a professor of biology and wildlife biology in the Division of Biological Sciences at the University of Montana. He is a Mammalian ecologist primarily working on sensitive and threatened species. Much of his research focuses on reintroduction of threatened species. He is also studying the effects of habitat fragmentation on wildlife populations and ways to mitigate such effects.