FINAL
Review of Wildlife Mitigation for the Thorncreek Road to Moscow Highway Development Project (US 95)

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Looking West Across The Thorncreek Road to Moscow Project Towards The Bald Butte Area

INTRODUCTION

The following is from Chapter 1, Purpose and Need of the Thorncreek Road to Moscow highway project on US 95. It briefly describes the project:

"In 1999, ITD began developing an Environmental Assessment (EA) for the Top of Lewiston Hill to Moscow project on U.S. 95. The EA was approved in May 2002. In 2003, the Top of Lewiston Hill to Moscow project was litigated. The result of the legal challenge was a change to the approved project limits. Two projects were defined, the Top of Lewiston Hill to Genesee and Genesee to Thorncreek Road. Construction on these projects began in October 2004.

Idaho District court found that an EIS would be required for the Thorncreek Road to Moscow project. Work on the EIS began when the Notice of Intent to prepare an EIS was published on the Federal Register on November 13, 2003. Volume 68 No. 219. Environmental evaluation of the project began in the spring of 2004."

There are three basic alternatives: A "western route" which would require building a new portion of the highway west of the current route. A "center route" that would closely follow the current alignment, taking out some of the present curves and elevation changes. And, an "eastern route" that would require a new highway alignment to the east of the current highway. The eastern route was the original preferred route when the project was approved in the 2002 Environmental Analysis.

Regardless of which route is taken, the design for the highway would be based on AASHTO standards (October 1999) to construct a four-lane divided highway with 36-foot lanes in both directions. The design year is 2023 and the project has a design speed of 70 mph."

Several resource agencies have indicated that their "preferred alternative" is the center route, which follows the current highway alignment. The resource agencies involved in the project include Idaho Department of Fish and Game (IFG), US Fish and Wildlife Service (FWS), Environmental Protection Agency (EPA) and the Corps of Engineers (Corps). The author agrees from an environmental perspective that the center alternative has the least impacts on wildlife, wildlife habitat and plant communities. Both the western and eastern alternatives would require significant new construction and right-of-way (ROW) and the current alignment would also have to be maintained to allow for resident access to existing homes. However, there are other factors that Idaho Transportation Department (ITD) must consider such as cost, safety and many other environmental factors.

EFFECTS OF HIGHWAYS ON WILDLIFE

Prior to discussing the specific effects and mitigation proposed for the Thorncreek to Moscow project, it is important to describe the effects highways have on wildlife. The

effect of the highway on wildlife, plus highway safety issues (collisions with wildlife), should form the basis of mitigation measures. One of the premises the author makes is that the mitigation should be commensurate with the significance of impacts to wildlife and wildlife habitat. Highway projects that have major and significant impacts should require more measures and cost to mitigate these impacts than projects that have minimal or insignificant impacts.

The effects on wildlife and wildlife habitat caused by roads and highways have been described in various papers (Forman et al. 2003, Ruediger and Wall 2005, Ruediger 2004, Ruediger 1996). These effects can be generalized into the following categories:

Habitat Fragmentation – Forman (2002) defines habitat fragmentation as "the breaking of a habitat into pieces (with the consequent loss of connectivity)." Habitat fragmentation can also occur when individuals or meta-populations are disassociated from critical habitat components such as seasonal ranges, water, cover or security. It can also affect dispersal of young animals, access to breeding by some individuals and use or configuration of a species home range (Ruediger 2004).

Direct and Indirect Habitat Loss – As affected by highways can be defined in various ways: the direct loss of acres, the indirect loss caused by reduction in habitat quality or avoidance (see displacement below). Ruediger (2005) defined the direct effects of habitat loss on elk of a two-lane highway as 18.18 acres/mile of highway and for a four lane highway as 36.36 acres/mile. These are based on 150 foot ROW's for two-lane highways and 300 feet for four-lane highways. For most other wildlife species the effects would be much less.

Displacement of Wildlife – Is the response by wildlife to use habitat near highways or roads less than similar habitat without roads. For elk, which are a species that appear to be severely disrupted by roads and highways, Ruediger (2004) estimated the reduced use to be equivalent to the loss of approximately 732.18 acres of habitat. The effects of displacement are complex and likely influenced by the species of animal, terrain, vegetation, harassment factors (like hunting), traffic volume and how the highway is designed.

Highway-Caused Wildlife Mortality – Is mostly related to animals that find their way onto the highway and are struck by vehicles. However, in some situations wildlife mortality might be caused by pollution factors such as fuel or oil contamination. Mostly, animals are hit trying to cross highways. When large animals are hit by cars, such as moose, elk, deer and bears, the result is a serious human safety hazard. Traffic volume has a direct impact on the severity of wildlife mortality on highways (Bank et al 2002).

Associated Human Developments – results when highways are improved and commute times and ease of access by humans is increased. The result can be housing commercial developments, which have their own set of adverse effects to wildlife.

WILDLIFE AND HIGHWAY SAFETY

The presence of wildlife on highways can significantly affect human safety. Large animals such as elk, mule deer, moose, bear and other species can cause collisions either by direct impact with vehicles or by motorists trying to avoid collisions with wildlife. In many situations the hazards of wildlife on highways is adequate reason to provide wildlife fencing and crossings.

HISTORICAL BASIS FOR PROVIDING WILDLIFE MITIGATION ON HIGHWAYS

Highway mitigation has evolved in the United States and elsewhere. Legally required mitigation of wildlife has usually been associated with impacts to wetland habitat and adverse effects to federally listed threatened or endangered species. Although the author is not an expert with what are commonly called 4(f) lands (National Parks, wildlife refuges and other specific public lands), there may be legally required mitigation measures required for highway projects that have impacts to 4 (f) resources.

There are other situations where mitigation can or may occur. These include situations where wildlife presents serious road hazards, or where a land manager or owner requires mitigation for ROW acquisition. In the author's experience, these would normally be for situations where high value big game winter range is present, when other rare or limited wildlife habitats are impacted, or for species recognized by state or federal agencies as sensitive or species of concerns. In these situations, there is a great deal of DOT latitude as to whether or not mitigation is warranted.

SPECIFIC EFFECTS OF THE THORNCREEK ROAD TO MOSCOW PROJECT ON WILDLIFE

The author made a thorough review of the information prepared by Idaho Fish and Game (two reports undated and December 2006), Dr. Tony Clevenger (undated), Dr. Wayne Melquist (December 2005) and information from the project environmental documents. After reviewing the specific effects of the Thorncreek Road to Moscow highway project on-site wildlife and wildlife habitat within or adjacent to the ROW, the following effects are evident:

General description of wildlife habitat effected by the Throncreek Road to Moscow project. The primary habitat affected by all three of the Throncreek Road to Moscow project alternatives is plowed and cultivated agricultural fields or agricultural fields presently in the Conservation Reserve Program (CRP). Native wildlife habitat, mostly what is referred to as Palouse Prairie in various documents, was converted to agricultural lands perhaps one hundred years ago. In the draft Idaho Fish and Game Terrestrial Wildlife Assessment of the project, it is stated that 89 percent of the Ponderosa Pine

communities have been lost in Latah County (Idaho) and that the Palouse Prairie has seen nearly a 100 percent conversion to cultivated agricultural lands.

Figure 1. Most of the right-of-way for all alternatives is agricultural lands, either cultivated fields, like the above or lands placed in the CRP program.

The native Palouse Prairie biome is rightly defined as one of the rarest and most endangered prairie ecosystems in North America (Idaho Fish and Game, undated and Noss et al 1995). The eastern route affects one Ponderosa Pine stand and the central and western routes do not impact either native Ponderosa Pine or Palouse Prairie habitats. The removal of a few Ponderosa Pine trees is not a significant impact.

The following are how the proposed project alternatives (western, central and eastern routes) affect wildlife and wildlife habitats:

Habitat Fragmentation. All three of the Thorncreek Road to Moscow project alternatives have a similar impact on habitat fragmentation. They fragment existing agricultural lands, including CRP. The eastern route comes closer to Paradise Ridge and thus could affect some local deer and elk winter range and other seasonal or year-round habitat. The Bald Butte area, a few miles west of the present Highway 95 has limited amounts of coniferous habitat and remnant Palouse Prairie, however the amount of habitat is very limited and it

is already disjunct from Paradise Ridge and other similar habitat. Melquist mentions in his 2005 report (page 5) that an Idaho Fish and Game employee had observed elk east of Highway 95, but these animals "were never observed crossing the highway in the direction of Tomer Butte."

Based on the author's experiences evaluating and mitigating wildlife habitat fragmentation in Idaho and several other states, there seems little evidence that significant habitat fragmentation will occur with any of the three Thorncreek Road to Moscow project alternatives, even the proposed eastern route that comes closest to Paradise Ridge. There is an identified wildlife habitat linkage (ID2-056) in the Highway/Wildlife Linkage Mapping (Idaho & Montana (see http://geodataservicesinc.com/linkage/pdf/ITD2_Crossings_1.pdf). Based on the author's experience at mapping wildlife habitat linkages in many western states, this wildlife linkage (056) would likely rate as low priority on a regional basis and certainly so on a statewide basis.

There will be some fragmentation of habitat, mostly along drainages and draws for small-sized wildlife such as raccoon, skunks, coyotes, small mammals, amphibians and reptiles.

The present traffic volume on Highway 95 of approximately 6,100 vehicles is considered problematic for wildlife. Highways with traffic volumes of 2,000 to 4,000 vehicles per day are considered to have adverse effects on all wildlife species (with as much as 50 percent mortality for some species). Traffic volumes exceeding 4,000 vehicles per day were considered to be causing significant habitat fragmentation and wildlife mortality (Evink et al 1999). In Europe highways with 10,000 vehicles per day are considered complete barriers, with little or no wildlife surviving crossing attempts (Bank et al 2002). The predicted traffic volume in 20 years on Highway 95 is approximately 9,400 vehicles per day, which is very close to being a complete barrier.

One of the problems of assigning a high significance to wildlife habitat fragmentation on the Thorncreek Road to Moscow project is that native habitat and many of the species that occurred with it have long ago been lost to agricultural conversion. What remains are mostly non-native species and habitat generalist species like raccoon, white-tailed deer and a variety of other common species. These species, while important locally, are mainly species already adaptable to habitat modifications, fragmentation and high levels of human use. Elk and moose are exceptions to the situation and are somewhat more specific as to habitat and human use patterns. Regardless, the habitat for elk and moose is limited in quantity and quality and confined to the Paradise Ridge vicinity. Since nearly all of the elk and moose habitat is on Paradise Ridge and eastward, habitat fragmentation for these species is minimal (not significant).

Direct and Indirect Habitat Loss. The direct habitat loss would be the habitat affected by the new four-lane highway, which is approximately 158 acres for the western or eastern routes. The center route would be somewhat less (101 acres) since some of the ROW would exist on the present location and some would be built off the present location. The direct loss of habitat is almost all on agricultural land and there is no basis to provide

mitigation for this wildlife habitat. The direct loss of wetlands would be required for all alternatives. There is no direct habitat loss for federally listed species (as confirmed by Clay Fletcher, USFWS, Boise, Idaho – phone call 8/10/07).

Displacement of Wildlife. Displacement of wildlife by project activities is always difficult to assess. If elk are used for analysis purposes (which are the species for which the greatest likely impact would occur) the displacement would be none or negligible for the western and central routes, since almost all of the impacts would be on agricultural fields (some displacement on CRP lands impacted on birds and small mammals).

On the eastern route, the exact amount of habitat could be determined using aerial photographs and topography maps and appears to be the two miles in length (along Paradise Ridge), with a calculated effect of 714 acres (see Ruediger 2005). This assumes that the displacement for elk extends 1.10 miles out, only on the east side of the highway. The east side of this route is where Paradise Ridge is located and where most of the habitat of concern exists. This process assumes a habitat effectiveness of .25 for the first .45 mile from the ROW and a habitat effectiveness of .67 for habitat from .45 miles to 1.10 miles of the ROW. As mentioned before, the impact is calculated for elk but would certainly be inclusive of whitetail deer, moose and virtually all other wildlife species. The actual amount of displacement for whitetail and mule deer would be less, and it is unknown for moose. Paradise Ridge does not appear to be an important winter habitat for elk, deer or moose; rather it is an appendage of more extensive habitat to the east and north. The 714 acres of potential habitat loss does not take into consideration whether the habitat is considered critical, average or marginal in quality.

The effects of displacement described above come from the paper entitled The Effects of Highways on Elk (*Cervus elaphus*) Habitat in the Western United States and Proposed Mitigation Approaches (Ruediger 2005). The following is from the section dealing with displacement of elk: “Elk responses to highways and roads vary by a number of factors such as topography, vegetation, traffic volumes, how the highway is designed and whether or not elk are hunted. Elk have been shown to use habitat adjacent to roads less than similar habitat that is not affected by roads (Rowland et al. 2004, Wisdom 1998, Johnson et al. 2000, Ager et al. 2003, Perry and Overly 1977, Lyon 1979). Generally, elk use decreases as the proximity to roads and highways increases. Rowland et al. (2000) found that there was a measurable decline in elk use up to 1.8 kilometers (5,500 feet)) from roads. Roloff (1998) and Rowland et al. (2000) suggest assessing elk habitat using distance band approaches. Using distance band approaches from the Roloff (1998) and Rowland et al (2000) and habitat effectiveness (HE) equations from Hitchcock and Ager (1992), the Wallow-Whitman National Forest calculated values of .17 to .83 for five distance bands of habitat moving from the roadside outward. Each of the five bands was 1,182 feet wide (394 yards) and exists on each side of the highway (Rowland et al. 2004). The authors of this paper simplified the Wallow-Whitman elk HE information into three zones as follows. Zone 1, highway right-of-way with HE = 0; Zone 2, roadside to 0.45 miles with HE = 0.25 and Zone 3, 0.45 – 1.1 mile with HE = .67. Note: Zones 2 and 3 extend on both sides of the highway, so the total corridor of highway effects to elk is approximately 2.26 miles for a four-lane road, slightly less for a two-lane road.”

It is the author's opinion that the amount of elk habitat affected on Paradise Ridge is OVERSTATED using the above model. The reason for this is that elk habitat on Paradise Ridge is peripheral to the primary habitat to the east and north and has a very limited carrying capacity for elk. Discussions with Dr. Jim Peek, University of Idaho (9/10/07) confirm that Paradise Ridge is secondary habitat for elk and moose, at best.

Highway Caused Mortality to Wildlife. Melquist (2006) mentions that 10-15 deer per year are killed near Tomer Butte on Highway 8 and that in some years moose are also killed. There is no mention of elk being struck by vehicles. These collisions are not within the Thorncreek Road to Moscow project. Idaho Transportation Department told the author that reported collisions with wildlife were not common in the Thorncreek Road to Moscow section and that they considered the number of large animal collisions "low" compared to many other sections of highways within District 2, or elsewhere in Idaho.

A high number of collisions with deer, elk or moose would indicate that there is serious habitat fragmentation occurring and that there is a significant human safety issue. In the case of the present relative collision information for the Thorncreek Road to Moscow project there seems to be little to suggest that either highway mortality or habitat fragmentation is significant. As noted by Melquist (2005) "none of these alignments (eastern route) would have a detrimental impact on resident deer, elk or moose populations." Although still at relatively low levels, this author believe collisions with wildlife would be more prevalent on the eastern route compared with either the center or western alternatives. The reason for this is that the main attraction for deer, elk and moose is the Paradise Ridge complex and the nearer a highway is to this habitat, the more likely that collisions with large and smaller wildlife will occur. Also, if wildlife must cross the highway to access water, this would be a strong stimulus. Even though there are some ponds to provide water on both sides of the eastern route, the author has recommended that additional measures be taken to increase water sources on the Paradise Ridge side of the eastern route (see Recommendation #2 Wildlife Crossing Mitigation Measures, number 3, pages 10 and 11 of this report).

Associated Human Developments. There are already indications of dispersed housing along the existing highway corridor and the side roads. There are proposed subdivisions near the western route and new houses along Paradise Ridge. This development is occurring regardless of the highway and is mostly a factor to the areas in proximity to the City of Moscow. This development is problematic for future wildlife, especially along Paradise Ridge. There seems to be little land use control of housing and other developments specific to protecting wildlife habitat. The future developments must be considered when spending public funds for wildlife mitigation. If the land is private and there is no conservation easements or acquisition plan (for open space or wildlife habitat protection), then wildlife mitigation measures may be ineffective over time.

RECOMMENDATION FOR WILDLIFE MITIGATION ON THE THORNCREEK TO MOSCOW PROPOSED HIGHWAY DEVELOPMENT

The following recommendations are based on:

1. Review of wildlife impacts and mitigation proposed by Idaho Department of Fish and Game (2006) and Melquist (2005).
2. A field review of the Thorncreek to Moscow Project site on 8/1/07.
3. Interviews with ITD, FHWA, IFG, EPA and FWS personnel.
4. Experience with previous highway mitigation, including assessments of habitat fragmentation and wildlife crossings.

Recommendation #1. Mitigation for direct and indirect habitat loss (including displacement of animals).

There is a legal basis to provide all necessary habitat replacement of wetlands in any of the Highway 95 alternatives. There is no conflict over this element. Impacted wetlands will be mitigated as required.

There are no significant effects to federally listed threatened or endangered species, so no habitat replacement mitigation is proposed or recommended.

On the west, central and east routes there will be approximately 159, 101 and 158 acres respectively of agriculture lands directly lost as a result of the proposed highway. There is no legal requirement for wildlife habitat replacement mitigation of these lands. See the following comment on “optional mitigation measures.”

On the eastern route there is approximately 714 acres of elk habitat impact based on displacement caused by this proposed ROW on the Paradise Ridge side of the highway. There are likely other species also impacted, such as deer, moose and birds, but these effects were not separated from, and are part of, the elk displacement impact. There is no legal requirement to mitigate for wildlife habitat loss. The significance of this loss of habitat is likely low on either the species involved (at a population level) or on the total amount of habitat available in Latah County, the Region or State. See optional mitigation measures.

Optional Mitigation Measures. Idaho Department of Fish and Game, Environmental Protection Agency and US Fish and Wildlife Service have voiced support for mitigation of direct and indirect wildlife habitat lost or adversely affected by the proposed highways. In discussions the author had with these agencies, and Wayne Melquist, all were aware that there is no legal requirement for the proposed loss of habitat, except for wetlands. Based on other highways reviewed by the author in Idaho and other western states, the Thorncreek Road to Moscow project has relatively minor effects on wildlife.

The question for all agencies is: Where should the limited amount of highway mitigation funding be applied? Should it be applied to relatively low impact and low priority situations? Reason would suggest that "optional mitigation" should be applied only to situations where the habitat impacts, including loss, displacement and fragmentation are significant, serious and of moderate or high priority to resource agencies – and that the general public supports these uses of highway funds. There could be situations where wildlife habitat of local importance would be replaced, but probably through a partnership with the community or other conservation entity where there has been shown to be a high level of concern through land use planning, purchases of open space or other significant contributions. San Diego County, California and Tucson, Arizona have had such programs where DOT's have contributed either land or wildlife crossings to support community wildlife habitat protection programs. Citizens in Missoula, Montana and Vail, Colorado have gone to Congress and successfully obtained federal funding for wildlife crossings or wildlife crossing studies that state DOT's could not afford.

Without similar community support for wildlife habitat protection, the author does not see a strong rationale why ITD should fund wildlife habitat replacement mitigation for the Thorncreek Road to Moscow highway project on-site in the Paradise Ridge vicinity. The small amount of acreage for mitigation would not adequately protect the Paradise Ridge area or wildlife habitat linkages to and from core habitats to the north and east. Home building would eventually consume or adversely affect much of the present habitat, especially for larger species. Mitigation could provide a small remnant of natural habitat for plants and small animals, however, these species are minimally impacted by the project. If Paradise Ridge is an important ecological area it should be protected from the major sources of impact, those being rural housing development and subdivision. This responsibility should be born by the county government, local conservation groups or the state heritage or park system.

A second option would to provide funding for habitat off-site as Idaho Transportation Department deems appropriate. This is consistent with recent recommended FHWA direction, which included participation from the US Fish and Wildlife Service, Environmental Protection Agency and other Federal agencies. See Eco-Logical: An Ecosystem Approach to Developing Infrastructure Projects (Brown 2006).

Recommendation #2. Wildlife Crossing Mitigation Measures. Support was expressed by several agencies for wildlife crossings. Where the author found general agreement was:

1. For small animal wildlife crossings at drainage crossings, draws and other places where wildlife is known to need habitat or population connectivity. The recommended structures would be 36" to 48" round or box culvert. These would require wing-fencing to funnel animals into the culverts. Thirty six inch high 4"x 2" page wire is recommended for animals down to skunk size. If small reptiles or amphibians are target species, small-mesh wire must be placed along the bottom of the wing fencing. Cement

Figure 2. Badger tunnel with small animal fencing (Netherlands). Suitable for small mammals, reptiles or amphibians. Author recommends 36" or 48" box culverts for common mid-sized species.

box culverts are recommended over galvanized steel or cement round pipes. If round pipes are used, cement pipes are recommended. Thirty six inch box culverts or pipes are recommended for species smaller than coyotes and bobcats. If coyote passage is desired, 48" structures are recommended (see Ruediger and DiGeorgio. 2007). The length of wing-fencing should be determined in the field with Idaho Fish and Game biologists.

2. Wildlife crossings for elk, deer and moose should be incorporated into any county or rural road underpasses of Highway 95 (see Figure 3). These crossings also need wildlife fencing (8-foot high page wire), should have soft (dirt or small gravel) side walls and paths (rather than cement or other hard surfaces) and the bridges should be high and wide enough to facilitate wildlife use. Provisions for wildlife crossings should only be made where wildlife use is expected and where wildlife are welcome on private lands (deer, elk and moose).

3. Mitigation for water development(s) for the eastern route. Access to water may be an attraction for wildlife to cross the highway. If access to water for wildlife is cut off by the highway, then alternate water sources should be developed.

There is also a proposal to provide two stand-alone wildlife crossings for deer and elk. The author found that the rationale for where these should be located, or even if they are

needed, is not strong. There is neither significant road kill nor adequate habitat to the east to warrant stand-alone wildlife crossings. Tony Clevenger provided excellent recommendations on the type of wildlife crossings which would likely be effective. The locations, which he did not assess, appeared to funnel animals only into marginal habitat on the west side of the highway. A more reasonable location would be in a location that allowed animals to move toward the Bald Butte area, probably on the divide between Paradise Ridge and Bald Butte. Wildlife using the east side of Paradise Ridge could likely use the county road underpasses, and these would be logical places to develop crossings for large ungulates, if desired.

CONTACTS: The following people were contacted by the author for this report:

1. Dave Cadwallader, Regional Supervisor, Idaho Department of Fish and Game. Lewiston, ID.
2. Ray Henneky, Environmental Staff Biologist, Idaho Department of Fish and Game. Lewiston, ID.
3. Jerome Hansen, Wildlife Biologist, Idaho Department of Fish and Game. Lewiston, ID.
4. Gregg Servheen, Wildlife Biologist, Idaho Department of Fish and Game. Boise, ID.
5. Clay Fletcher, Wildlife Biologist, US Fish and Wildlife Service, Boise, ID.
6. Elaine Somers, Environmental Protection Agency, Seattle, WA.
7. Ken Helm, Transportation Planner, Idaho Transportation Planner, Lewiston, ID.
8. Kim Just, Idaho Transportation Department, Boise, ID.
9. Zacary Funkhouser, Senior Environmental Planner, Lewiston, ID
10. Wayne Melquist, Wildlife Biologist, CREX Consulting, St. Maries, ID.
11. Brent Ingrham, Environmental Program Manager, Federal Highway Administration, Boise, ID.
12. Dr. Jim Peek, Professor of Wildlife Management Emeritus, University of Idaho, Moscow, ID.

Figure 3. Country road crossing (twin spans) of US 6 near Price, Utah. This structure serves as an effective vehicle and wildlife crossing. Note the natural soil/vegetation on the sides of the bridge and the adequate length of the structure.

APPENDIX A: WILDLIFE AND FISH SPECIES MENTIONED IN TEXT - US 95 – THORNCREEK TO MOSCOW.

1. Raccoon	*Procyon lotor*
2. Skunk	*Mephitis mephitis*
3. White-tailed deer	*Odocoileus virginianus*
4. Mule deer	*Odocoileus hemionus*
5. Rocky Mountain elk	*Cervus elaphus*
6. Moose	*Alces alces*

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