

# Bureau of Land Management Southern Idaho

## Infrastructure Development Conflict Map: Overview

October 2009 Version

### Background

Expanding interest in new infrastructure development on public land in southern Idaho has increased the likelihood for conflict with key biological, cultural or land designations for which BLM also has management responsibilities or mandates. To date, however, a broad-scale evaluation of the spatial relationship of key resource concerns and their relative compatibility with potential infrastructure development in Idaho has not been attempted.

For purposes of this analysis, infrastructure is defined as power transmission lines, communication facilities/towers, airports, paved roads, railroads, and energy development such as wind, geothermal, coal, nuclear, and solar. In 2009, Idaho BLM staff from the Branch of Resource Sciences and the Branch of Engineering and Geographic Sciences collaborated to develop a composite “Conflict Map” based on selected key resource concerns in southern Idaho. This map shows zones where infrastructure development is precluded due to law, regulation or policy, as well as zones of anticipated high, moderate or low conflict with new infrastructure development, based on pre-defined assumptions.

### Methods

1. Preparatory work and supporting base maps: To construct the Conflict Map, a matrix was developed first, documenting the concerns, rationale and assumptions for key resources of interest, as well as appropriate analysis buffers. See the separate document titled *Bureau of Land Management Southern Idaho Infrastructure Development Conflict Map: Priority Biological, Cultural and Land-Use Concerns and Assumptions*. Resource themes (base maps) used in the analysis included:

<b>Category</b>	<b>Resource</b>
Botanical	Slickspot peppergrass
Big game winter range/ habitat	Elk, mule deer, pronghorn, bighorn sheep.
Designated Lands	Designated wilderness, Wilderness Study Areas, Areas of Critical Environmental Concern, Birds of Prey National Conservation Area, Craters of the Moon National Monument and Preserve, Jim Sage Special Recreation Management Area, Military Special Use Airspace, Military Operating Areas, Military Training Routes, and FAA Delta Class airspace
Visual Resource Management Classes	VRM Classes I and II

Priority Restoration Areas	Areas within the Idaho Falls and Twin Falls BLM Districts where substantial habitat restoration activities and expenditures have occurred, are ongoing, or planned.
Sensitive Grouse	Sage-grouse (See Appendix A), Columbian sharp-tailed grouse
Small Mammals	Pygmy rabbit (see Appendix A), Southern Idaho ground squirrel, Northern Idaho ground squirrel
Raptor Nests	Bald eagle, golden eagle, ferruginous hawk
Rare Insects	Idaho dunes tiger beetle, Bruneau Dunes tiger beetle
Cultural and Historic Resources	National Scenic and Historic Trails, National Register of Historic Places Districts.

In the matrix, each resource (and in some cases, applicable buffers) was then assigned a conflict category of low, moderate, or high based on species biology, spatial analysis, policy, law or regulation, literature, or professional judgment of interdisciplinary team members. Certain lands in which development is precluded by law, regulation or policy, such as wilderness areas, were also separately identified. The categories of low, moderate and high were then assigned a numerical “Conflict Category Value” of 1.0, 2.0 or 3.0 respectively. Areas precluded from development were assigned a conflict category value of 100. Conflict category definitions used in the matrix were as follows:

Low Conflict: Areas where adverse impacts from infrastructure development are expected to be minimal or can be reduced through minor siting adjustments and/or implementation of appropriate conservation or avoidance measures. In general, there are multiple options or wide latitude for reducing or minimizing conflict with the resource. In the Conflict Map model, resources of Low Conflict are assigned a conflict category value of 1.0.

Moderate Conflict: Areas where adverse impacts from infrastructure development are likely but there are options for avoidance or reduction of impacts, including, in some cases, the use of timing or seasonal constraints. In the Conflict Map model, resources of Moderate Conflict are assigned a conflict category value of 2.0.

High Conflict: Areas where adverse impacts from infrastructure development are likely and options for reducing or minimizing impacts are limited or non-existent. In the Conflict Map model, resources of High Conflict are assigned a conflict category value of 3.0.

Development Precluded: Areas where infrastructure development is precluded by law, regulation or policy. In the Conflict Map model, areas where development is precluded are assigned a conflict category value of 100.0.

Corresponding base maps for key resources driving the conflict map, were then prepared, using available GIS data and spatial analysis techniques. Due to a greater availability of long term observational data

and/or past statewide habitat mapping efforts, a more detailed spatial analysis was completed for the sage-grouse and pygmy rabbit, using state-of-the-art landscape ecology and GIS methods. See Appendix A for additional details regarding these analyses.

2. Preparation of the composite Conflict Map: After preparation of the resource base maps, a composite, southern Idaho Conflict Map was developed in ArcGIS showing general areas of relative conflict with infrastructure development. Data layers for each resource theme were rasterized in ArcGis, and conflict category values summed across the themes overlying specific areas. The resulting product is a composite map showing a color gradient encompassing low, moderate and high conflict zones, and areas where development is precluded. Conflict areas are displayed as:

**Low:** Summed Conflict Category Value total = 1.0-1.9. One area of “low” conflict. Beige/ light yellow color.

**Moderate:** Summed Conflict Category Value total = 2.0-2.9. One area of “moderate” conflict. Vivid yellow color.

**High:** Summed Conflict Category Value total = 3.0- 99.9. Colors grade from orange to deeper shades of red, as the summation of conflict category values increase due to multiple, overlapping high conflict areas or combinations of multiple resource issues. For example, an area of high conflict sage-grouse habitat alone would score 3.0, and be displayed as a lighter shade of red. In contrast, a specific area harboring combinations of Conflict Category Values, such as a high conflict sage-grouse area (conflict category value 3.0) overlaying both a high conflict pygmy rabbit area (conflict category value 3.0) and a moderate conflict area of mule deer winter range (conflict category value 2.0), would yield a composite Conflict Category Value of 8.0, and be displayed in a darker shade of red suggesting a relatively higher degree of potential conflict.

**Development Precluded:** Conflict Category Value total = 100.0. or more For simplicity, development precluded areas are shown as a single shade of gray, though there may be multiple reasons why development is precluded, such a VRM Class 1 overlying designated wilderness. Development precluded areas may also simultaneously contain areas of low, moderate, or high conflict resources such as sage-grouse habitat, big game winter range and others.

Finally a separate overlay and GIS layer of currently proposed infrastructure projects and wind potential was developed, as an aid to viewing the spatial context of the proposed projects with the conflict map and/ or the base maps.

### **Use of the Conflict Map.**

The conflict map is to be used as a coarse-scale information tool and it is subject to change as information is added or updated. Users of the Conflict Map should be aware that the purpose of the map is to provide a broad-scale overview of southern Idaho, showing zones of relative conflict with infrastructure development proposals, across a subset of key resources of concern to

Idaho BLM. It is intended to help managers, resource specialists and project proponents in understanding the challenges of siting projects on public lands in southern Idaho, and may therefore help foster creative solutions in avoiding or reducing conflicts early in the planning process. **The Conflict Map is not a decision map**; it is an attempt to spatially present existing information. Users of the conflict map should review the supporting resource base maps for additional context and should also consider more detailed local information or analyses as appropriate.

Furthermore, the conflict map, by design, is not comprehensive with respect to all species, issues, agencies or land-use decisions. Nor is the map intended to supersede finer scale data, previous fine-scale decisions or local knowledge that may arise during National Environmental Policy Act analyses. It is readily noted that the map portrays most of southern Idaho as potentially high conflict for infrastructure development, due to the nature of the resources and assumptions used to frame the model. As an educational tool, the map suggests then, that caution should be exercised in siting such projects.

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## Appendix A: Analytical Methodology

### Pygmy Rabbit and Greater Sage-grouse Base Maps

#### 1. Pygmy Rabbit Spatial Likelihood Analysis

**Preparers:** Don Major, Ph.D., Fire & Landscape Ecologist, Great Basin Restoration Initiative and National Interagency Fire Center; Paul Makela, Wildlife Biologist, Idaho BLM State Office; Christa Braun, Geographic Information Systems Specialist, Idaho BLM State Office.

**Introduction:** The purpose of this analysis was to evaluate 1) spatial associations (spatial autocorrelation and associated error likelihood) among point locations for Pygmy Rabbits, and 2) identify coarse-level vegetation systems (Shrubmap 2005) with high potential to provide habitat for this species. The resulting data are not intended to present a “habitat model” for pygmy rabbits, but rather to identify general areas of potential vegetation communities in the context of quantified likelihood error resulting from spatial configuration of high confidence “core areas” based on animal point locations.

**Methodology and Results:** A Geostatistical Analysis (Ordinary Kriging) was conducted using animal point locations. A multi-year dataset on pygmy rabbit locations was obtained from the Idaho Department Fish and Game (IDFG) in February 2008 (IDFG unpublished data-Pygmy rabbit status in Idaho). IDFG had previously developed a criteria set to assign a confidence ranking (Category 1-5) to the data.

Using ArcGIS Spatial analysis – Geospatial toolkit, an ordinary kriging analysis was performed on the complete pygmy rabbit dataset. As kriging requires a true continuous value, we generated a continuous variable (0 – 1.0) and assigned lower confidence IDFG Category 1,2 rankings as 0.0 and higher confidence IDFG Category 3,4,5 rankings as 1.0 (Table 1). Ordinary kriging outputs both prediction and associated prediction standard error surfaces. Only likelihood error surfaces were included in subsequent classifications as the intent of this analysis was to quantify likelihood error resulting from spatial characteristics of the high confidence animal locations.

Table 1. Pygmy rabbit observations with IDFG and BLM ranks.

IDFG Data Category	Type of Observation/ Record	BLM Kriging rank
1	Based on observation of burrows or pellets or uncertain identification	0.0
2.	Based on a combination of pellets and burrows; pellets and tracks; or burrows and tracks	0.0
3.	Based on a combination of burrows, pellets and tracks	1.0
4.	Based on an actual animal identification	1.0
5.	Based on DNA data or captured animals, including museum specimens and radio-tracked animals	1.0

Shrubmap (2005) served as the base landcover for this analysis. Shrubmap identifies vegetation using the ecological systems hierarchy *sensu* Natural Heritage Program. Pygmy rabbit point locations were used to identify Shrubmap vegetation systems for each point. In addition pygmy rabbit literature was examined to identify other likely vegetation types not identified by the point location evaluation. A total of eight vegetation systems were selected as potentially suitable habitat for this rabbit species (Table 2).

Table 2. Shrubmap vegetation systems used in the pygmy rabbit spatial likelihood analysis.

50 CES304.722 Inter-Mountain Basins Mountain Mahogany Woodland & Shrubland	71 CES304.785 Inter-Mountain Basins Montane Sagebrush Steppe	149 CES304.777 Inter-Mountain Basins Big Sagebrush Shrubland-Spp. Tridentata
54 CES304.777 Inter-Mountain Basins Big Sagebrush Shrubland	78 CES304.778 Inter-Mountain Basins Big Sagebrush Steppe	154 CES304.080 Columbia Plateau Low Sagebrush Steppe
55 CES304.774 Great Basin Xeric Mixed Sagebrush Shrubland	90 CES304.787 Inter-Mountain Basins Semi-Desert Grassland	

To facilitate analysis in ArcMap, the eight vegetation systems were recoded to a value of 1, all other shrubmap systems were coded to 0. This dataset served as the potential pygmy habitat coverage (Layer 1). For the kriging generated point location predicted standard error data, the surface was transformed to a raster dataset and cell-size adjusted to align with shrubmap. Layer 1 and Layer 2 were summed to create a raster dataset that depicts potential pygmy rabbit habitat based on the likelihood proximity of the high confidence animal location information (Figure 1). The resulting core area likelihood surface (pygmy\_value\_poly.shp) was integrated as a layer file into the Idaho BLM resource value/conflict assessment.

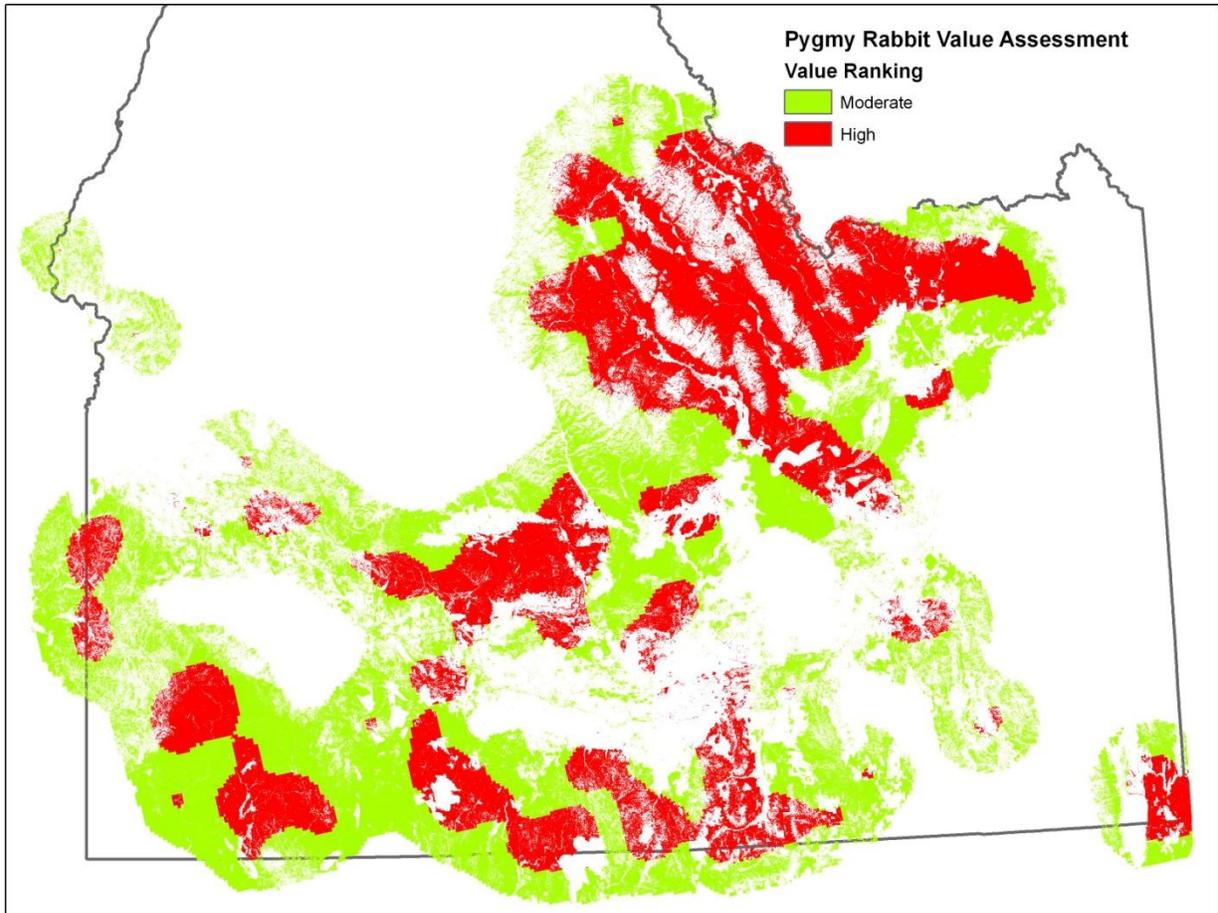


Figure 1. Pygmy Rabbit value ratings from animal occurrence likelihood analysis<sup>1</sup>. Pygmy rabbit data source: 2008 IDFG.

Conflict categories for pygmy rabbit were as follows:

**High:** Areas with a high likelihood of core habitat based on the kriging analysis were assigned a rank of high conflict. Conflict Category Value 3.0.

**Moderate:** Areas with a moderate likelihood of core habitat were assigned a moderate conflict rank. Conflict Category Value 2.0.

<sup>1</sup>Pygmy Rabbit Occurrence Likelihood Analysis (PLA). The PLA combines spatial kriging of IDFG-NHP “High Confidence” locations with vegetation systems in USGS Shrubmap 2005 landcover map. Potential pygmy rabbit vegetation systems were defined by associating Shrubmap vegetation system with the high confidence point occurrence data. The resulting map denotes areas of *High* and *Moderate* likelihood core habitat based on spatial autocorrelation error from the kriging analysis. Breakpoint delineation was determined using standard statistical methods (natural ‘jenks’). See the pygmy rabbit spatial likelihood analysis discussion in Appendix A of the readme document for additional details.

## 2. Greater Sage-grouse Analysis

**Preparers:** Christa Braun, Geographic Information Systems Specialist , Idaho State Office, Bureau of Land Management; Paul Makela, Wildlife Biologist, Idaho State Office, Bureau of Land Management; Don Major, Fire & Landscape Ecologist, Great Basin Restoration Initiative/ National Interagency Fire Center.

**Introduction:** The purpose of this analysis was to portray sage-grouse habitat in the context of potential conflict with infrastructure development. For simplicity we assumed Key and Potential Restoration Area areas delineated on the Idaho Sage-grouse Habitat Planning Map could serve as reasonable surrogates for areas of high, moderate or low conflict depending on the specific habitat type. Incorporation of sage-grouse “core habitat” areas or other approaches may be considered in future iterations of the analysis.

**Methodology and Results:** We used the 2008 Idaho Sage-grouse Habitat Planning map as a foundation for the analysis, due largely to widespread acceptance of this dataset by agency biologists, managers and sage-grouse Local Working Groups for conservation planning.

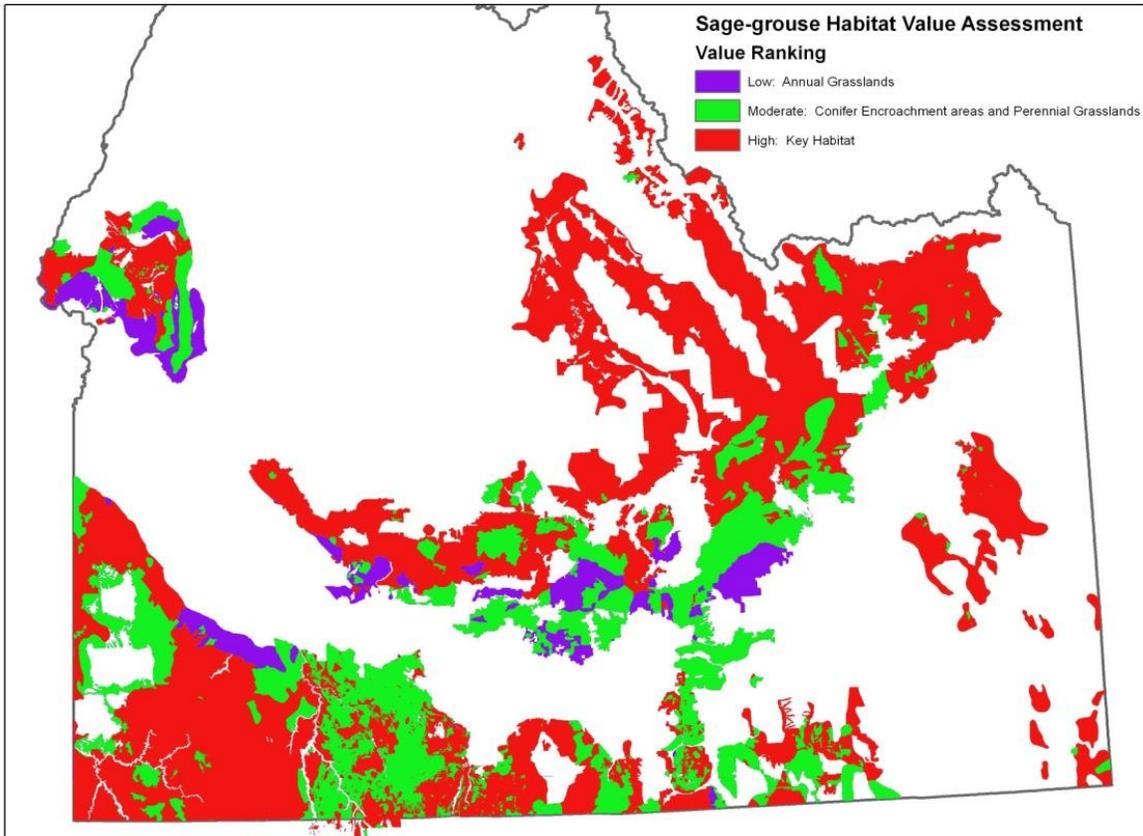


Figure 2. Sage-grouse value ratings given to key and potential restoration habitats from the 2008 Idaho Sage-grouse habitat dataset

Conflict category definitions are as follows:

**High:** This category includes all areas delineated as Key sage-grouse habitat on the latest version (currently 2008) of the Idaho Sage-grouse Habitat Planning Map. These are areas of generally intact sagebrush that provide habitat for sage-grouse at some portion of the year. It may be able to site infrastructure in a manner to avoid specific leks or habitats, however possible impacts from avian predators associated with new infrastructure, uncertainty of predation risk, potential for avoidance of infrastructure by sage-grouse, and impacts of human disturbance suggest potential for high conflict. Conflict Category Value 3.0.

**Moderate:** This category includes all areas delineated as Potential Restoration Area Type 1 (Perennial Grasslands) and/or Potential Restoration Area Type 3 (Conifer Encroachment areas) on the latest version (currently 2008) of the Idaho Sage-grouse Habitat Planning Map. As sagebrush cover may be minimal (perennial grasslands) or compromised by conifer encroachment (conifer encroachment areas), these areas are assumed to be of moderate conflict in terms of infrastructure development in comparison with the higher value Key habitat. It must be recognized however, that subsequent restoration (seeding to sagebrush, conifer removal) may lead to these areas being Key habitat in the future, however timeframes are uncertain. Conflict Category Value 2.0.

**Low:** This category includes all areas delineated as Potential Restoration Area Type 2 (Annual Grasslands) on the latest version (currently 2008) of the Idaho Sage-grouse Habitat Planning Map. These areas are generally dominated or strongly influenced by cheatgrass or other annuals. Restoration is uncertain however there is potential for recovery to perennial grasslands and Key habitat over the longer term. Conflict Category Value 1.0.

The categories above denote the relative conflict value based on broad vegetation characteristics. However land managers have expended considerable effort and resources in attempts to restore or improve habitat conditions in portions of these areas over the past twenty years or more. In order to capture this information, a separate dataset, titled "Priority Restoration Areas" was prepared, based on shapefiles provided by the Idaho Falls and Twin Falls BLM Districts. This dataset was then incorporated into the Conflict Map model as a separate input to ensure the Conflict Map does not under-represent the potential conflict within these areas.