

**A PROTOTYPE REGIONAL ASSESSMENT OF HABITATS
FOR SPECIES OF CONSERVATION CONCERN
IN THE GREAT BASIN ECOREGION AND NEVADA**

**Summary Results for BLM Field Offices in Nevada
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Field office summaries contained in this report are part of the appendices that will appear in a larger report for the Great Basin and state of Nevada. Work on the larger report is underway, and will be completed later in 2003. The Nevada summary can be cited as follows:

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Introduction

The following summary is a brief compilation of methods and draft results from a prototype assessment for species of conservation concern in the Great Basin ecoregion and state of Nevada. Results included below are for Nevada only, focusing on the eight Bureau of Land Management (BLM) Field Offices in the state. Analyses are not yet completed for vertebrate species by field office, other than Greater Sage-Grouse; thus, results reported here primarily concern vegetation. These include summaries of land cover type by field office, as well as summaries of native vegetation at risk of displacement by cheatgrass (*Bromus tectorum*) and pinyon-juniper (*Pinus* spp. – *Juniperus* spp.) woodlands. Results will be reported more fully in the larger prototype assessment by Wisdom et al. (2003a). The full prototype assessment will be available as a complete report in summer 2003.

Methods

Vegetation Summaries

For our analyses of the amount of habitat, including sagebrush (*Artemisia* spp.) and other land cover types in the study area, we used the recently completed map referred to as “sagestitch” (Comer et al. 2002; map available at <http://sagemap.wr.usgs.gov/>). This map was produced with a 90-m grid and was based on existing vegetation, elevation, and soils data available throughout the range of sagebrush (eastern Washington, Oregon, Nevada, and California, eastward through central Colorado and eastern Wyoming and Montana). Sources for the map included the most recent GAP analysis land cover data for several states (e.g., Colorado, California) and regional land cover characterizations developed by the U.S. Forest Service (Comer et al. 2002). The sagestitch map was developed explicitly for regional habitat assessment in the sagebrush biome of the Intermountain West. Although the 10 sagebrush cover types depicted in sagestitch were the focus of the mapping efforts, 49 other cover types, or land cover themes, also are mapped.

Prior to quantifying the amount of habitat by cover type, areas in Nevada that have experienced large-scale fires since 1994 were updated as “recently burned” to replace the original cover types present before the fires. This update of recent fires was made with a GIS layer from Region 4 of the U.S. Forest Service, was compiled from several sources (e.g., existing historical data, digitized hard copy maps, and aerial photographs), and includes fires from 1981-2001. For our analyses, however, we used only the fire polygon data from 1994-2001, because the sagestitch map accounted for fires prior to 1994. Moreover, the amount of habitat burned in this region, especially sagebrush, increased dramatically beginning in 1994. Any area in a fire polygon from 1994-2001, regardless of existing land cover type, was recoded as “recently burned” and reported as such in our summaries.

Mapping Areas at Risk

A plethora of threats to the sagebrush ecosystem in the Great Basin and elsewhere has been identified (BLM 1999, 2002; Nachlinger et al. 2001; Wisdom et al. 2003b). Among those, threats of displacement of native habitats by cheatgrass and other exotic vegetation, such as medusahead (*Taeniatherum caput-medusae*), are paramount (BLM 2002). In addition, displacement of native sagebrush by the expansion of pinyon and juniper woodlands is accelerating across the Intermountain West, including the Great Basin (Tausch and West 1988,

Miller et al. 1999). Mapping these threats in the sagebrush ecosystem will allow managers to identify areas of sagebrush at high risk of displacement, where active restoration may be required, versus areas at low risk, where conservation of existing habitats may be preferable.

Area at Risk of Displacement by Pinyon-Juniper. A draft model for mapping risk of displacement of sagebrush cover types by pinyon and juniper woodlands has been developed for our prototype assessment. This model applies to any pinyon or juniper land cover type delineated in the sagestitch map, specifically: pinyon-juniper, pinyon pine (primarily single leaf pinyon, *Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), and western juniper (*J. occidentalis*). The model was applied to three ecological provinces in the Great Basin: Bonneville, Central High, and High Calcareous; however, only a very small portion of the Bonneville province lies within Nevada (Figures 1, 2). The decision to apply the model to only three of the 14 ecological provinces that occur in Great Basin ecoregion was based on the less accurate classification of pinyon-juniper woodland types in the sagestitch land cover map in some regions of the Basin. As more accurate land cover maps become available (e.g., the mid-scale map under development; Comer et al. 2000), the pinyon-juniper model will be applied to other portions of the Great Basin.

The model is based on a set of rules that incorporate the following criteria:

- Sagebrush cover type (e.g., low sagebrush [*A. arbuscula*] versus black sagebrush [*A. nova*])
- Ecological province
- Precipitation zone (e.g., 25-30 cm)
- Elevation zone
- Presence of a stand of pinyon or pinyon-juniper that is ≥ 10 ha (24.7 acres) in extent
- Topography (presence of valley floors)
- Proximity of sagebrush to the nearest stand of pinyon-juniper.

Risk was assigned to three categories: low, moderate, or high. All sagebrush pixels were assumed to be at some risk of displacement by pinyon-juniper; thus, the only areas classified as “no risk” were those occupied by other (i.e., non-sagebrush) vegetation cover types. Pinyon-juniper woodlands are not typically found on valley floors, due to lower precipitation, unsuitable soils, and topographic profile. Thus, any sagebrush occurring on valley floors was assigned to the “low” risk category.

Area at Risk of Displacement by Cheatgrass. A draft model of risk of displacement of sagebrush and other native vegetation cover types by cheatgrass was developed for our prototype assessment. This model was applied to the 14 ecological provinces that intersect the Great Basin (Figure 1). In addition to the 8 sagebrush cover types that occur in the Great Basin, the model was also applied to other vegetation types believed to be susceptible to invasion by cheatgrass. These included a variety of types, such as bitterbrush (*Purshia tridentata*), juniper, mixed desert scrub, salt desert scrub, and spiny hopsage (*Grayia spinosa*). The rule set developed for the cheatgrass model is topographically driven and is based on vegetation cover type, ecological province, elevation, aspect, slope, and occurrence of vegetation on valley floors. Risk was assigned to one of three categories, as in the pinyon-juniper model: low, moderate, or high. All susceptible vegetation types were assumed to be at some risk of displacement by cheatgrass;

thus, the only areas with no risk were those occupied by other (i.e., non-susceptible) vegetation cover types.

Field sampling to evaluate both the cheatgrass and pinyon-juniper models will begin in May 2003, with both extensive sampling across three ecological provinces, and more intensive sampling at selected sites.

Vertebrate Species Summaries

Results for the 41 terrestrial vertebrates in our analyses ([Table 1](#)) will include habitat amount within each species' range in each analysis area (e.g., Great Basin ecoregion, state of Nevada, or subbasin) and habitat at risk of displacement by cheatgrass or by pinyon-juniper woodlands, or both. Species range maps were obtained from a variety of sources; the range map for Greater Sage-Grouse used in this report was produced by M. Schroeder (Schroeder 2000), and is currently being revised (M. Schroeder, pers. comm.). Specific land cover types mapped as habitat for each species were determined by species experts, who designated source habitats (see Wisdom et al. 2000) for each species from the 57 available cover types depicted in the sagestitch map. Summaries of habitat amount and habitat at risk were clipped to the species' range within the respective analysis areas, e.g., Nevada.

Results

Area by Land Cover Type

In Nevada, eight sagebrush cover types combined extend across 36%, or >10.1 million ha (24.9 million acres), of the state ([Table 2b](#)). More than 7.2 million ha (17.8 million acres), or 71%, of the sagebrush occurs on BLM lands. The second most abundant type is salt desert scrub, covering 22%, or 6.2 million ha (15.2 million acres) of the state ([Table 2b](#)). Pinyon-juniper cover types are also common, totaling 10%. More than 4% of Nevada--1.2 million ha (3.1 million acres)--has burned since 1994. Most of the fires have occurred in the Winnemucca and Elko Field Offices, where 476,000 ha (1,176,000 acres) and 413,000 ha (1,020,523 acres) have burned, respectively ([Tables 2a, 2b](#)). The recent burns extend over a larger percentage of these field offices than the state as a whole: 11% of the Winnemucca Field Office, and 8% of the Elko Field Office, was coded as "recently burned."

The three largest field offices in Nevada—Battle Mountain, Ely, and Elko—also contain the most sagebrush. The Elko Field Office, though the smallest of the three, has the most abundant sagebrush (3.0 million ha [7.5 million acres]), followed by Ely and Battle Mountain ([Table 2b](#)). This pattern is reflected in the percentage of the field office occupied by sagebrush, which is 61% for Elko, followed by 40% for Ely and 35% for Battle Mountain. The two smallest field offices, Surprise and Eagle Lake, have the largest percentage of total area in sagebrush, 88% and 63%, respectively ([Table 2a](#)).

Statewide, Wyoming/basin big sagebrush (*A. tridentata wyomingensis*/*A. t. tridentata*) is the most abundant sagebrush type (nearly 60% of all sagebrush in the state), followed by black sagebrush and mountain big sagebrush (*A. t. vaseyana*; [Table 2b](#)). This pattern is repeated in most BLM field offices, with Wyoming/basin big sagebrush the dominant sagebrush type in every field office, and mountain big sagebrush or black sagebrush the second or third most

abundant types in four field offices: Battle Mountain, Elko, Ely, and Las Vegas ([Tables 2a, 2b](#)). In the four remaining field offices, low sagebrush replaces black sagebrush as the second (Carson City, Eagle Lake, and Surprise) or third (Winnemucca) most abundant type.

Area at Risk of Displacement by Pinyon-Juniper

Portions of four of the eight BLM field offices in Nevada occur within the three ecological provinces on which the pinyon-juniper model was run, with varying percentages of the sagebrush in each field office falling within the boundaries of these provinces: Ely (85%), Battle Mountain (67%), Elko (15%), and Carson City (2%; [Figure 2](#)). Because of the very small percentage of the Carson City Field Office for which we have results from this model, we have excluded this field office from the following discussion.

Percentages of sagebrush in each of the categories of risk were similar among the three field offices, ranging as follows: low risk, 58.1-63.6%; moderate risk, 3.6-5.5%; and high risk, 32.3-36.4% ([Table 3, Figure 2](#)). The relatively small area at moderate risk of displacement is a reflection of the threshold effect incorporated in the pinyon-juniper model, by which transitioning to high risk is very likely for sagebrush in locations with suitable conditions (e.g., proximity to existing pinyon-juniper, precipitation from 25-40 cm). Otherwise, the likelihood of displacement is generally low.

The degree of risk across the sagebrush cover types varied, a reflection of the rule sets as they applied to different cover types and locations. In general, low sagebrush, whether alone or in combination with mountain big sagebrush, was at highest risk among the sagebrush types ([Table 3](#)). More than 80% of the low sagebrush was at moderate or high risk of displacement from pinyon-juniper, and 65% of the low sagebrush/mountain big sagebrush ([Table 3](#)). This pattern, however, was not universal across field offices. For example, only 58% of the low sagebrush in the Elko Field Office was at moderate or high risk. Note that these types (low sagebrush and low sagebrush/mountain big sagebrush) composed only a small fraction (<2%) of the total sagebrush modeled. Thus, despite having a relatively large proportion of their total extent in moderate or high risk, the absolute amount of sagebrush at moderate or high risk for these types was low (34,700 ha, or 85,700 acres).

Overall, black sagebrush and Wyoming/basin big sagebrush were the types with the least risk, based on proportion of each type at risk, with 64 and 68%, respectively, in the low risk category ([Table 3](#)). Again, this pattern varied across field offices. In Elko Field Office, for example, low sagebrush/Wyoming big sagebrush and mountain big sagebrush had the least risk (79 and 75% in low risk, respectively). Patterns of risk in the Ely Field Office resembled those in Battle Mountain, with black and Wyoming/basin big sagebrush at least risk ([Table 3](#)). Taking into account the total area at moderate or high risk, the Wyoming/basin big sagebrush type was most at risk, with nearly 600,000 ha (1.48 million acres) at moderate or greater risk ([Table 3](#)).

Comparisons among field offices. Across the field offices, Ely had the largest amount of sagebrush at high risk of displacement from pinyon-juniper, with >570,000 ha (>1.41 million acres; [Table 3, Figure 2](#)). Although the majority (57%) of sagebrush at high risk in this district was Wyoming/basin big sagebrush, nearly 26% was black sagebrush. Assuming that the 15% of the field office upon which the model was not run had the same patterns of risk, the total amount of sagebrush at high risk of displacement from pinyon-juniper woodlands in the Ely Field Office

was approximately 670,000 ha (1.66 million acres). Battle Mountain Field Office also had a large absolute amount of sagebrush at high risk, with nearly 470,000 ha (1.16 million acres) in this category. Again, Wyoming/basin big sagebrush composed most (41%) of the sagebrush at high risk; however, mountain big sagebrush contributed nearly as much, with 39% of the high-risk sagebrush in this field office ([Table 3](#)). Once again assuming that the sagebrush in this field office that was not modeled had risk patterns similar to that in the remainder of the field office, altogether about 697,000 ha (1.72 million acres) of sagebrush was potentially at high risk, slightly exceeding the amount in the Ely Field Office.

The Elko Field Office had comparatively less sagebrush at high risk, only 163,000 ha (402,000 acres). However, only 15% of the sagebrush in this field office fell within the area in which the pinyon-juniper model was run. The percentage of sagebrush at high risk, 36.3%, was comparable to that for the other two field offices. Unlike those field offices, black sagebrush composed most (56%) of the sagebrush at high risk ([Table 3](#)).

Comparisons by landowner. Of the sagebrush in the four field offices in Nevada for which we have results from the pinyon-juniper model, 2.8 million ha (6.9 million acres), or 80%, are on public lands managed by the BLM ([Table 3](#)). Because of the predominance of sagebrush occurrence on public lands, patterns of risk of displacement by pinyon-juniper on BLM lands resembled those for all lands, with about 32% in the high risk category, 3% in moderate risk, and 65% in low risk ([Table 3](#)). By contrast, sagebrush on non-BLM lands had relatively higher risk of displacement, with 45% at high risk and only 44% at low risk. One exception to this pattern was seen in the Elko Field Office, where sagebrush on BLM lands was at higher risk than that on other lands ([Table 3](#)). Only a small proportion (15%) of the sagebrush in this field office, however, was within the boundaries of the ecological provinces on which the model was run.

Area at Risk of Displacement by Cheatgrass

The cheatgrass model (risk of displacement of sagebrush and other susceptible native vegetation types by cheatgrass) developed for our prototype was applied in 14 ecological provinces that encompass the entire state of Nevada ([Figure 1](#)). Statewide, risk of displacement of native vegetation from cheatgrass was as follows: no risk (i.e., land cover type not susceptible to cheatgrass) – 21%; low risk – 34%; moderate risk – 19%; and high risk – 27% ([Table 4](#), [Figure 3](#)). Risk for the 8 sagebrush cover types was somewhat less, although no sagebrush was considered to be at no risk (i.e., all sagebrush was modeled as low, moderate, or high risk): low – 57%; moderate – 29%; and high – 14%. For the non-sagebrush susceptible vegetation, risk was considerably higher: low - 31%; moderate – 19%; and high – 50% ([Table 4](#)). This disparity is related primarily to the cheatgrass rule set, in which lower elevations are at higher risk; much of the expansive salt desert scrub and shadscale in Nevada occurs at these lower elevations.

Risk varied among vegetation cover types, both within the sagebrush types and the other native, susceptible types ([Table 4](#)). Among the eight sagebrush types, Wyoming/basin big sagebrush was most at risk, with 22% of this type at high risk. This cover type was also at highest risk in terms of absolute area, with >1.26 million ha (3.11 million acres) in this category. The second largest amount of sagebrush at high risk was in black sagebrush, but with considerably less area (104,000 ha [257,000 acres]). Mountain big sagebrush had the lowest percentage area in high risk (1.1%) among the sagebrush types, with the exception of threetip sagebrush, which occurs in only trace amounts in the state.

As mentioned previously, a larger percentage of susceptible, non-sagebrush vegetation was found to be at high risk compared to sagebrush. Salt desert scrub was most at risk in Nevada (79% at high risk); this type also composed the largest absolute amount at high risk of displacement from cheatgrass, with >4.8 million ha (12.02 million acres; [Table 4](#)). Spiny hopsage had the second highest degree of risk (68% at high risk), but composed only 7% of the non-sagebrush at high risk (94,000 ha [232,000 acres]; [Table 4](#)). Shadscale was also at high risk of displacement, with 48% of this type at high risk, covering >420,000 ha (1.05 million acres).

Comparisons among field offices. Among the eight Field Offices in Nevada, Winnemucca had the highest degree of risk of displacement of native vegetation from cheatgrass, with 41% at high risk, followed by Carson City (31%) and Las Vegas (29%; [Table 5](#)). In terms of absolute amount of vegetation at risk, Winnemucca also had the greatest amount, with 1.83 million ha (4.52 million acres) at high risk, followed by Battle Mountain (1.46 million ha [3.61 million acres]) and Ely (1.24 million ha [3.06 million acres]).

Considering only the sagebrush at risk on BLM lands, Ely had the greatest risk (24% at high risk), followed by Winnemucca (19%) and Elko (14%). In terms of amount of sagebrush, Ely also had the greatest area in the high-risk category (450,000 ha [1.11 million acres]), followed by Elko and Winnemucca ([Table 5](#)).

Comparisons by landowner. For all sagebrush on BLM lands in Nevada (7.2 million ha [17.8 million acres]), the majority (53%) was at low risk, with 15% at high risk, and 32% at moderate risk ([Table 5](#)). By contrast, for the non-sagebrush types considered susceptible to risk of displacement, the majority (51%) was at high risk and only 27% was at low risk ([Table 5](#)). This pattern of risk for sagebrush versus other vegetation resembled that for all lands, as discussed previously.

Compared to other lands, sagebrush on BLM lands was at slightly higher risk of displacement by cheatgrass, with 47% at moderate or greater risk, versus 34% on non-BLM lands ([Table 5](#)). This trend was also seen for other susceptible, non-sagebrush vegetation: 73% was at moderate or greater risk on BLM lands, versus 61% on non-BLM lands.

Habitat for Greater Sage-Grouse

Amount of Habitat. About 8.7 million ha (21.5 million acres) of habitat for Greater Sage-Grouse exists within the species' current range in Nevada ([Table 6](#), [Figure 4](#)). More than 95% of this habitat is sagebrush, primarily Wyoming/basin big sagebrush; however, substantial habitat occurs in mountain big sagebrush and black sagebrush communities ([Table 6](#)). Only a small percentage of sage-grouse habitat is composed of vegetation other than sagebrush (bunchgrass and wet meadows; [Table 6](#), [Figure 4](#)). Most (71%) habitat for sage-grouse in Nevada is on public lands managed by the BLM.

Among the seven field offices within the current range of sage-grouse in Nevada (all but Las Vegas), Elko has by far the most habitat for the species, with >3.1 million ha (7.7 million acres; [Table 7](#)). Battle Mountain, Ely, and Winnemucca also have substantial amounts of sage-grouse habitat (>1.3 million ha [3.2 million acres] each). The percentage of sage-grouse habitat on

BLM lands in each field office mirrored that state-wide, and ranged from 59% in Carson City to 96% in Eagle Lake ([Table 7](#)).

Habitat at Risk. Greater Sage-Grouse habitat at risk of displacement by pinyon-juniper woodlands was evaluated within the current range of sage-grouse in the three ecological provinces on which the model was run: Bonneville, Central High, and High Calcareous ([Figure 2](#)). Of the 3.3 million ha (8.1 million acres) of sagebrush habitat for sage-grouse in this area, 34% was at high risk, 5 % at moderate risk, and 61% at low risk ([Table 8](#)). Among the various sagebrush land cover types used as habitat, Wyoming/basin big sagebrush encompassed the largest amount of habitat at high risk (523,000 ha [1,292,000 acres]; [Table 8](#)). Although separate summaries for sage-grouse habitat at risk of displacement by pinyon-juniper for each field office were not completed, these patterns should resemble those seen in the field office results for all sagebrush at risk ([Table 3](#)), owing to the nearly complete reliance of sage-grouse on sagebrush for habitat.

Across the range of Greater Sage-Grouse in Nevada, the majority of habitat (60%) is at low risk of displacement by cheatgrass ([Table 7](#)). A small percentage (25%) is at moderate risk, 14% is at high risk, and only a trace (in wet meadow) is at no risk. Because most habitat for sage-grouse is sagebrush, these percentages resemble those for sagebrush risk of displacement by cheatgrass as a whole across Nevada ([Table 4](#)). Field offices with the most sage-grouse habitat at high risk were Elko, Winnemucca, and Ely; this pattern is not surprising, given the relative abundance of sage-grouse habitat overall for these areas ([Table 7](#)). In terms of degree of risk, Winnemucca had the highest percentage of sage-grouse habitat at high risk (24%), followed by Elko (16%) and Ely (14%).

Relative degree of risk of displacement of sage-grouse habitat by cheatgrass on BLM lands versus other lands varied across field offices ([Table 7](#)). In Battle Mountain and Ely, risk was substantially lower on other lands versus BLM lands, with about half the percentage of habitat at low risk on BLM lands. In Carson City Field Office, risk was somewhat lower on other lands, and in the remaining field offices, percentage of sage-grouse habitat at low risk was similar between BLM lands and other lands ([Table 7](#)).

Literature Cited

- Bureau of Land Management. 1999. The Great Basin Restoration Initiative: out of ashes, an opportunity. Bureau of Land Management, National Office of Fire and Aviation, Boise, Idaho. 28 pp.
- Bureau of Land Management. 2002. Management considerations for sagebrush (*Artemisia*) in the western United States: a selective summary of current information about the ecology and biology of woody North American sagebrush taxa. U.S. Department of the Interior, Bureau of Land Management, Washington, DC.
- Comer, P., P. Crist, D. Dippon, S. Knick, M. Hilliard, P. Maus, and C. McCarthy. 2000. Proposal for broad and mid-scale mapping of sagebrush ecosystem in the Intermountain West. 11 pp.

- Comer, P., J. Kagan, M. Heiner, and C. Tobalske. 2002. Current distribution of sagebrush and associated vegetation in the Western United States (excluding NM and AZ). Digital map. <http://SAGEMAP.wr.usgs.gov>).
- Miller, R., R. Tausch, and W. Waichler. 1999. Old-growth juniper and pinyon woodlands. Pages 375-384 in Monsen, S. B., and R. Stevens, compilers. Proceedings: ecology and management of pinyon-juniper communities within the Interior West. Proc. RMRS-P-9. U.S. Forest Service, Rocky Mountain Research Station, Ogden, Utah.
- Nachlinger, J., K. Sochi, P. Comer, G. Kittel, and D. Dorfman. 2001. Great Basin: an ecoregion-based conservation blueprint. The Nature Conservancy, Reno, Nevada.
- Schroeder, M. 2000. Current and historic distribution of Greater and Gunnison Sage-grouse in North America. Edition: 1.1. Washington Department of Fish and Wildlife. Olympia, Washington.
- Tausch, R. J., and N. E. West. 1988. Differential establishment of pinyon and juniper following fire. *American Midland Naturalist* 119:174-184.
- West, N. E., R. J. Tausch, and P. T. Tueller. 1998. A management-oriented classification of pinyon-juniper woodlands of the Great Basin. RMRS-GTR-12. U.S. Forest Service, Rocky Mountain Research Station, Ogden, Utah.
- Wisdom, M. J., R. S. Holthausen, B. C. Wales, C. D. Hargis, V. A. Saab, D. C. Lee, W. J. Hann, T. D. Rich, M. M. Rowland, W. J. Murphy, and M. R. Eames. 2000. Source habitats for terrestrial vertebrates of focus in the interior Columbia basin: broad-scale trends and management implications. PNW-GTR-485. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon.
- Wisdom, M. J., L. H. Suring, M. M. Rowland, L. Schueck, R. J. Tausch, R. F. Miller, C. Wolff Meinke, S. T. Knick, and B. C. Wales. 2003a. A prototype regional assessment of habitats for species of conservation concern in the Great Basin Ecoregion and State of Nevada. Unpublished report on file at USDA Forest Service, Pacific Northwest Research Station, 1401 Gekeler Lane, La Grande, OR 97850.
- Wisdom, M. J., M. M. Rowland, L. H. Suring, L. Schueck, C. Wolff Meinke, B. C. Wales, and S. T. Knick. 2003b. Procedures for regional assessment of habitats for species of conservation concern in the sagebrush ecosystem. Unpublished report on file at Pacific Northwest Research Station, 1401 Gekeler Lane, La Grande, OR 97850.

Tables

[Table 1](#). Forty-one species of conservation concern identified for regional assessment in the Great Basin and Nevada and their global and state rankings.

[Table 2a](#). Land cover types within the Carson City, Eagle Lake, Las Vegas, and Surprise Field Offices in the state of Nevada.

[Table 2b](#). Land cover types within the Battle Mountain, Elko, Ely, and Winnemucca Field Offices, and statewide, in Nevada.

[Table 3](#). Risk of displacement of sagebrush cover types by pinyon-juniper woodlands within Bureau of Land Management Field Offices in the state of Nevada, encompassing the High Calcareous, Central High, and Bonneville Ecological Provinces.

[Table 4](#). Risk of displacement of sagebrush and other susceptible native vegetation by cheatgrass, summarized for Nevada.

[Table 5](#). Risk of displacement of sagebrush and other susceptible native vegetation by cheatgrass within Bureau of Land Management Field Offices in Nevada.

[Table 6](#). Habitat for Greater Sage-Grouse in the state of Nevada.

[Table 7](#). Risk of displacement of Greater Sage-Grouse habitat by cheatgrass within Bureau of Land Management Field Offices in the state of Nevada.

[Table 8](#). Risk of displacement of sagebrush habitat for Greater Sage-Grouse by pinyon-juniper woodlands in the state of Nevada, encompassing the High Calcareous, Central High, and Bonneville Ecological Provinces.

Figures

[Figure 1](#). Fourteen ecological provinces used in modeling risk of displacement of native vegetation by cheatgrass and pinyon-juniper woodlands. These provinces are a modification of those described in Miller et al. (1999) and West et al. (1998).

[Figure 2](#). Risk of displacement of sagebrush cover types by pinyon-juniper woodlands within Bureau of Land Management Field Offices in the state of Nevada, encompassing the High Calcareous, Central High, and Bonneville Ecological Provinces. Note that only a small fraction of the Bonneville Ecological Province lies within Nevada (see [Figure 1](#) for location of the Bonneville Ecological Province in Utah and Nevada).

[Figure 3](#). Risk of displacement of sagebrush and other native vegetation by cheatgrass within Bureau of Land Management Field Offices in Nevada. Areas not modeled were land cover types considered not susceptible to displacement by cheatgrass.

[Figure 4](#). Habitat for Greater Sage-Grouse in Nevada.

Table 1. Forty-one species of conservation concern identified for regional assessment in the Great Basin and Nevada and their global and state rankings.^a

Common name	Scientific name	Global rank	State rank		
			CA	NV	UT
Amphibians:					
Great Basin spadefoot	<i>Scaphiopus intermontanus</i>	G5	S5	S4	S4
Reptiles:					
Desert collared lizard	<i>Crotaphytus insularis</i>	G5	S?	S4	S4
Longnose leopard lizard	<i>Gambelia wislizenii</i>	G5	S5	S4	S4
Desert horned lizard	<i>Phrynosoma platyrhinos</i>	G5	S5	S4	S4
Sagebrush lizard	<i>Sceloporus graciosus</i>	G5	S5	S4	S5
Desert spiny lizard	<i>Sceloporus magister</i>	G5	S5	S5	S3S4
Night snake	<i>Hypsiglena torquata</i>	G5	S5	S5	S4
Striped whipsnake	<i>Masticophis taeniatus</i>	G5	S4	S5	S5
Longnose snake	<i>Rhinocheilus lecontei</i>	G5	S5	S5	S3
Ground snake	<i>Sonora semiannulata</i>	G5	S4	S5	S2
Birds:					
Ferruginous hawk	<i>Buteo regalis</i>	G4TU	S3S4	S3	S2N,S2S3B
Swainson's hawk	<i>Buteo swainsoni</i>	G5	S2	S2B	S3B,SRN
Northern harrier	<i>Circus cyaneus</i>	G5	S3	S4	S3N,S4B
Prairie falcon	<i>Falco mexicanus</i>	G5	S3	S4	S4
Greater sage-grouse	<i>Centrocercus urophasianus</i>	G4	S3	S4	S2
Short-eared owl	<i>Asio flammeus</i>	G5	G5	S3	S4
Western burrowing owl	<i>Speotyto cunicularia</i>	G4TU	G4TU	S2	S3B
Gray flycatcher	<i>Empidonax wrightii</i>	G5	G5	S5	S4B
Sage thrasher	<i>Oreoscoptes montanus</i>	G5	G5	S5	S5B
Loggerhead shrike	<i>Lanius ludovicianus</i>	G4	G4	S4	S3
Sage sparrow	<i>Amphispiza belli</i>	G5	G5	S?	S4B,S4N
Black-throated sparrow	<i>Amphispiza bilineata</i>	G5	G5	S?	S5B
Lark sparrow	<i>Chondestes grammacus</i>	G5	G5	S?	S4B
Green-tailed towhee	<i>Pipilo chlorurus</i>	G5	G5	S?	S5B

Common name	Scientific name	Global rank	State rank		
			CA	NV	UT
Vesper sparrow	<i>Pooecetes gramineus</i>	G5	G5	S?	S4B
Brewer's sparrow	<i>Spizella breweri</i>	G5	G5	S?	S4?B
Brewer's blackbird	<i>Euphagus cyanocephalus</i>	G5	G5	S?	S5B
Mammals:					
Merriam's shrew	<i>Sorex merriami</i>	G5	S3	S3	S2?
Kit fox	<i>Vulpes macrotis</i>	G4	S3S4	S4	S3
Pronghorn	<i>Antilocapra americana</i>	G5	S4	S5	S4
Wyoming ground squirrel	<i>Spermophilus elegans nevadensis</i>	G5		S5	S2S3
Merriam's kangaroo rat	<i>Dipodomys merriami</i>	G5	S5	S5	S3
Chisel-toothed kangaroo rat	<i>Dipodomys microps</i>	G5	S4	S5	S3
Ord's kangaroo rat	<i>Dipodomys ordii</i>	G5	S3S4	S4	S5
Dark kangaroo mouse	<i>Microdipodops megacephalus</i>	G5	S3S4	S2	S2
Little pocket mouse	<i>Perognathus longimembris</i>	G5	S5	S5	S3
Northern grasshopper mouse	<i>Onychomys leucogaster</i>	G5	S3S4	S5	S4S5
Pinyon mouse	<i>Peromyscus truei</i>	G5	S5	S5	S4S5
Sagebrush vole	<i>Lemmyscus curtatus</i>	G5	S4	S5	S3S4
White-tailed jackrabbit	<i>Lepus townsendii</i>	G5	S3	S5	S3S4
Pygmy rabbit	<i>Brachylagus idahoensis</i>	G4	S3	S4?	S2S3

^a Rankings are those used by NatureServe (<http://www.natureserve.org/explorer/>) and are as follows: G = Global rank indicator, based on worldwide distribution at the species level; T = Global trinomial rank indicator, based on worldwide distribution at the infraspecific level; S = State rank indicator, based on distribution within the state at the lowest taxonomic level; 1 = Critically imperiled due to extreme rarity, imminent threats, and/or biological factors; 2 = Imperiled due to rarity and/or other demonstrable factors; 3 = Rare and local throughout its range, or with very restricted range, or otherwise vulnerable to extinction; 4 = Apparently secure, though frequently quite rare in parts of its range, especially at its periphery; 5 = Demonstrably secure, though frequently quite rare in parts of its range, especially at its periphery; R = Reported from the state, awaiting firm documentation; U = Unrankable; present and possibly in peril, but not enough data yet to estimate rank; ? = Not yet ranked at the scale indicated (G, T, or S); B = Breeding status within the state; rank for breeding occurrences only; N = Non-breeding status within the state; rank for non-breeding occurrences only.

Table 2a. Land cover types within the Carson City, Eagle Lake, Las Vegas, and Surprise Field Offices in the state of Nevada.

Land cover type	Field Office							
	Carson City		Eagle Lake		Las Vegas		Surprise	
	Ha	% total	Ha	% total	Ha	% total	Ha	% total
<i>Sagebrush:</i>								
Black sagebrush	96,496	3	0	0	708	0	0	0
Low sagebrush	160,310	5	16,475	13	0	0	89,004	12
Low sagebrush - mountain big sagebrush	27,427	1	2,907	2	0	0	5,512	1
Low sagebrush - Wyoming big sagebrush	12,118	0	1,329	1	0	0	2,241	0
Mountain big sagebrush	98,820	3	8,405	7	1,819	0	38,542	5
Silver sagebrush	180	0	448	0	0	0	0	0
Threetip sagebrush	0	0	0	0	0	0	0	0
Wyoming – basin big sagebrush	228,692	6	51,477	40	409,533	10	521,490	70
Total sagebrush	624,043	18	81,041	63	412,060	10	656,790	88
<i>Other vegetation:</i>								
Agriculture	112,205	3	992	1	13,584	0	3,020	0
Ash	0	0	0	0	4,319	0	0	0
Aspen	816	0	0	0	36	0	0	0
Barren/Rock/Lava	220,569	6	919	1	26,657	1	6,476	1
Bitterbrush	125,709	4	5,361	4		0	9,125	1
Black greasewood	242,704	7	9,577	7	14,487	0	13,906	2
Blackbrush	0	0	0	0	649,506	16	0	0
Bunchgrass	41,473	1	943	1	37,155	1	13,375	2
Chaparral	2,438	0	0	0	0	0	0	0
Creosote-Bursage	0	0	0	0	1,241,191	31	0	0
Desert grassland	3,275	0	0	0	0	0	866	0
Dunes	8,573	0	0	0	411	0	0	0
Exotic	484	0	0	0	0	0	0	0
Forbland	467	0	0	0	338	0	0	0
Forest	57,162	2	0	0	27,773	1	0	0

Land cover type	Field Office							
	Carson City		Eagle Lake		Las Vegas		Surprise	
	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Marsh/Wetland	56,487	2	0	0	0	0	279	0
Mesic shrubs	0	0	0	0	0	0	0	0
Mesquite	0	0	0	0	7,313	0	0	0
Mountain mahogany	659	0	0	0	0	0	0	0
Mountain shrub	15,087	0	0	0	61,014	2	9,731	1
Pinyon juniper	58,373	2	0	0	89,461	2	0	0
Pinyon pine	243,335	7	0	0	41,811	1	0	0
Rabbitbrush	18,701	1	0	0		0	0	0
Recently burned	137,671	4	0	0	6,334	0	14,932	2
Riparian	14,894	0	21	0	6,208	0	240	0
Salt desert scrub	1,168,402	33	30,388	24	1,141,002	29	11,680	2
Saltbush	4,167	0	0	0	0	0	0	0
Shadscale	169,123	5	1	0	1,854	0	717	0
Snow/Ice	0	0	0	0	0	0	0	0
Spiny hopsage	39,403	1	0	0	16,952	0	0	0
Urban	75,242	2	0	0	94,869	2	0	0
Utah juniper	11,485	0	0	0	19,920	1	11	0
Water	80,487	2	2	0	32,461	1	1,972	0
Western juniper	0	0	0	0	0	0	0	0
Wet meadow	1,365	0	15	0	0	0	132	0
Winterfat	12,293	0	28	0	0	0	0	0
Total other vegetation	2,927,740	82	48,247	37	3,534,656	89	86,461	12
TOTAL AREA	3,551,783	100	129,288	100	3,946,716	100	743,252	100

Table 2b. Land cover types within the Battle Mountain, Elko, Ely, and Winnemucca Field Offices, and statewide, in Nevada.

Land cover type	Field Office								Nevada	
	Battle Mountain		Elko		Ely		Winnemucca			
	Ha	% total	Ha	% total						
<i>Sagebrush:</i>										
Black sagebrush	545,162	10	488,183	10	449,806	9	43,601	1	1,623,957	6
Low sagebrush	18,649	0	382,372	8	1,924	0	149,959	3	818,693	3
Low sagebrush - mountain big sagebrush	34,010	1	87,069	2	9,556	0	37,343	1	203,824	1
Low sagebrush - Wyoming big sagebrush	10,965	0	62,328	1	360	0	44,160	1	133,503	0
Mountain big sagebrush	384,502	7	518,669	10	264,523	5	256,746	6	1,572,027	6
Silver sagebrush	0	0	1,288	0	0	0	236	0	2,151	0
Threetip sagebrush	0	0	0	0	0	0	467	0	467	0
Wyoming - basin big sagebrush	918,616	17	1,481,876	30	1,360,397	26	830,837	19	5,802,919	20
Total sagebrush	1,911,905	35	3,021,784	61	2,086,566	40	1,363,349	30	10,157,539	36
<i>Other vegetation:</i>										
Agriculture	63,530	1	147,017	3	57,559	1	120,095	3	518,003	2
Ash	0	0	0	0	0	0	0	0	4,319	0
Aspen	10,879	0	74,030	1	7,133	0	9,999	0	102,893	0
Barren/Rock/Lava	92,300	2	27,916	1	31,242	1	346,614	8	752,693	3
Bitterbrush	1,882	0	40,711	1	761	0	10,637	0	194,185	1
Black greasewood	235,476	4	159,034	3	125,578	2	427,264	10	1,228,026	4
Blackbrush	26,371	0	0	0	271,572	5	0	0	947,449	3
Bunchgrass	56,532	1	133,586	3	78,159	1	167,766	4	528,987	2
Chaparral	0	0	0	0	0	0	0	0	2,438	0
Creosote-Bursage	11,321	0	0	0	193,577	4	0	0	1,446,090	5
Desert grassland	228	0	7,595	0	0	0	696	0	12,660	0
Dunes	754	0	0	0	0	0	9,427	0	19,165	0
Exotic	134	0	43	0	0	0	0	0	661	0
Forbland	2,000	0	1,800	0	3,221	0	0	0	7,826	0
Forest	24,465	0	29,292	1	102,719	2	62	0	241,472	1

Land cover type	Field Office								Nevada	
	Battle Mountain		Elko		Ely		Winnemucca			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Marsh/Wetland	1,408	0	22,736	0	17,221	0	16,455	0	114,586	0
Mesic shrubs	2,142	0	58	0	0	0	10	0	2,210	0
Mesquite	0	0	0	0	0	0	0	0	7,313	0
Mountain mahogany	1,831	0	0	0	0	0	0	0	2,490	0
Mountain shrub	38,347	1	126,888	3	121,892	2	29,656	1	402,615	1
Pinyon juniper	355,372	7	158,590	3	721,415	14	329	0	1,383,540	5
Pinyon pine	456,781	8	58,619	1	361,202	7	46	0	1,161,795	4
Rabbitbrush	5,510	0	7,683	0	5,305	0	1,209	0	38,408	0
Recently burned	146,773	3	412,891	8	53,981	1	476,190	11	1,248,772	4
Riparian	7,348	0	27,962	1	7,265	0	14,253	0	78,190	0
Salt desert scrub	1,543,073	28	321,579	6	708,047	13	1,236,147	28	6,160,318	22
Saltbush	18,611	0	7,593	0	11,058	0	833	0	42,262	0
Shadscale	360,589	7	92,596	2	60,286	1	194,006	4	879,172	3
Snow/Ice		0	2,304	0	565	0	7	0	2,877	0
Spiny hopsage	21,919	0	636	0	55,537	1	3,258	0	137,705	0
Urban	14,635	0	23,701	0	8,719	0	15,908	0	233,074	1
Utah juniper	16,006	0	29,350	1	128,657	2	31,631	1	237,060	1
Water	825	0	2,219	0	85	0	3,889	0	121,941	0
Western juniper	0	0	608	0	0	0	0	0	608	0
Wet meadow	523	0	8,925	0	786	0	1,548	0	13,294	0
Winterfat	20,092	0	17,415	0	33,323	1	2,790	0	85,941	0
Total other vegetation	3,537,661	65	1,943,376	39	3,166,864	60	3,120,724	70	18,361,037	64
TOTAL AREA	5,449,565	100	4,965,161	100	5,253,430	100	4,484,073	100	28,523,268	100

Table 3. Risk of displacement of sagebrush cover types by pinyon-juniper woodlands within Bureau of Land Management Field Offices in the state of Nevada, encompassing the High Calcareous, Central High, and Bonneville Ecological Provinces.

Sagebrush cover type	Risk category						Total ^a	
	Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total
<i>Battle Mountain</i>								
Black sagebrush	205,761.9	71.7	3,466.0	1.2	77,755.1	27.1	286,983.0	100.0
Low sagebrush	902.3	10.3	3,485.4	39.9	4,357.8	49.8	8,745.6	100.0
Low sagebrush - mountain big sagebrush	4,091.3	27.1	2,339.3	15.5	8,679.2	57.4	15,109.7	100.0
Low sagebrush - Wyoming big sagebrush	1,686.4	36.1	575.9	12.3	2,415.4	51.6	4,677.8	100.0
Mountain big sagebrush	103,919.0	30.6	51,756.6	15.3	183,701.5	54.1	339,377.0	100.0
Wyoming - basin big sagebrush	430,197.5	68.3	8,994.2	1.4	190,469.1	30.2	629,660.8	100.0
Total sagebrush – BLM lands	574,251.1	68.2	32,659.2	3.9	235,397.3	27.9	842,307.7	100.0
Total sagebrush – other lands	172,307.3	39.0	37,958.2	8.6	231,908.8	52.5	442,246.2	100.0
Total sagebrush – entire field office area	746,558.4	58.1	70,617.4	5.5	467,378.1	36.4	1,284,553.9	100.0
<i>Elko</i>								
Black sagebrush	91,586.7	49.0	2,937.1	1.6	92,423.4	49.4	186,947.2	100.0
Low sagebrush	1,871.9	42.6	1,749.6	39.8	776.8	17.7	4,398.3	100.0
Low sagebrush - mountain big sagebrush	3,389.0	37.1	89.1	1.0	5,658.7	61.9	9,136.8	100.0
Low sagebrush - Wyoming big sagebrush	5,536.4	79.2	156.3	2.2	1,301.7	18.6	6,994.4	100.0
Mountain big sagebrush	35,422.9	75.3	6,225.7	13.2	5,416.5	11.5	47,065.1	100.0
Wyoming - basin big sagebrush	132,700.7	67.7	5,150.0	2.6	58,171.0	29.7	196,021.6	100.0

Sagebrush cover type	Risk category						Total ^a	
	Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Total sagebrush – BLM lands	209,103.9	57.6	9,468.1	2.6	144,438.4	39.8	363,010.4	100.0
Total sagebrush – other lands	61,403.7	70.1	6,839.6	7.8	19,309.6	22.1	87,552.9	100.0
Total sagebrush – entire field office area	270,507.6	60.0	16,307.7	3.6	163,748.0	36.3	450,563.3	100.0
<i>Ely</i>								
Black sagebrush	289,377.4	66.2	1,935.9	0.4	145,520.6	33.3	436,833.8	100.0
Low sagebrush	219.5	11.4	1,068.4	55.5	635.9	33.1	1,923.8	100.0
Low sagebrush - mountain big sagebrush	4,522.2	47.4	77.0	0.8	4,934.5	51.8	9,533.7	100.0
Low sagebrush - Wyoming big sagebrush	92.3	25.6		0.0	268.1	74.4	360.5	100.0
Mountain big sagebrush	106,668.9	40.9	61,792.5	23.7	92,034.6	35.3	260,496.0	100.0
Wyoming - basin big sagebrush	721,989.5	68.4	5,963.2	0.6	327,256.2	31.0	1,055,208.9	100.0
Total sagebrush – BLM lands	1,045,589.3	65.7	41,766.8	2.6	503,240.0	31.6	1,590,596.2	100.0
Total sagebrush – other lands	77,280.5	44.5	29,070.1	16.7	67,409.8	38.8	173,760.4	100.0
Total sagebrush – entire field office area	1,122,869.8	63.6	70,836.9	4.0	570,649.9	32.3	1,764,356.6	100.0
<i>All Field Offices^b</i>								
Black sagebrush	587,556.2	64.4	8,350.3	0.9	316,978.9	34.7	912,885.4	100.0
Low sagebrush	2,993.8	19.9	6,303.4	41.8	5,770.4	38.3	15,067.6	100.0
Low sagebrush - mountain big sagebrush	12,172.7	34.9	2,505.3	7.2	20,160.9	57.9	34,838.9	100.0
Low sagebrush - Wyoming big sagebrush	7,315.1	60.7	732.2	6.1	3,996.5	33.2	12,043.9	100.0
Mountain big sagebrush	246,318.6	37.8	120,724.8	18.5	284,316.5	43.6	651,359.9	100.0
Wyoming - basin big sagebrush	1,291,159.4	68.4	20,107.4	1.1	576,869.9	30.6	1,888,136.7	100.0

Sagebrush cover type	Risk category						Total ^a	
	Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Total sagebrush – BLM lands	1,836,508.1	65.3	84,855.6	3.0	889,278.8	31.6	2,810,642.5	100.0
Total sagebrush – other lands	311,007.6	44.2	73,868.0	10.5	318,814.4	45.3	703,689.9	100.0
Total sagebrush – all field offices	2,147,515.7	61.1	158,723.6	4.5	1,208,093.1	34.4	3,514,332.4	100.0

^a Totals in this column are reported only for the portion of each field office that lies within one or more of the three ecological provinces for which the pinyon-juniper model was applied, and not for the entire field office.

^b Includes sagebrush in the Carson City Field Office which fell within the boundaries of the pinyon-juniper model, but was only 2% of the sagebrush in this field office overall.

Table 4. Risk of displacement of sagebrush and other susceptible native vegetation by cheatgrass, summarized for Nevada.

Land cover type	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
<i>Sagebrush:</i>										
Black sagebrush	0	0.0	966,012	59.5	553,868	34.1	104,077	6.4	1,623,957	100.0
Low sagebrush	0	0.0	598,116	73.1	157,631	19.3	62,922	7.7	818,669	100.0
Low sagebrush - mountain big sagebrush	0	0.0	134,553	66.0	49,244	24.2	20,026	9.8	203,824	100.0
Low sagebrush - Wyoming big sagebrush	0	0.0	91,121	68.3	33,720	25.3	8,661	6.5	133,503	100.0
Mountain big sagebrush	0	0.0	1,440,374	91.7	114,217	7.3	16,629	1.1	1,571,220	100.0
Silver sagebrush	0	0.0	1,981	92.1	3	0.2	167	7.8	2,151	100.0
Threetip sagebrush	0	0.0	335	71.7	132	28.3	0	0.0	467	100.0
Wyoming - basin big sagebrush	0	0.0	2,554,224	44.0	1,982,111	34.2	1,265,099	21.8	5,801,433	100.0
Total sagebrush	0	0.0	5,786,716	57.0	2,890,927	28.5	1,477,581	14.5	10,155,224	100.0
<i>Other susceptible vegetation:</i>										
Bitterbrush	0	0.0	108,061	56.0	58,097	30.1	26,888	13.9	193,047	100.0
Bunchgrass	0	0.0	142,071	26.9	135,084	25.5	251,667	47.6	528,822	100.0
Desert grassland	0	0.0	4,691	37.1	2,000	15.8	5,970	47.2	12,660	100.0
Mountain mahogany	0	0.0	2,433	98.1	46	1.9	0	0.0	2,479	100.0
Mountain shrub	0	0.0	336,400	85.3	38,425	9.7	19,349	4.9	394,173	100.0
Pinyon juniper	0	0.0	1,176,751	85.1	191,719	13.9	15,043	1.1	1,383,512	100.0
Pinyon pine	0	0.0	1,114,656	96.0	45,492	3.9	1,329	0.1	1,161,477	100.0

Land cover type	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Rabbitbrush	0	0.0	10,080	26.3	14,885	38.8	13,383	34.9	38,347	100.0
Salt desert scrub	0	0.0	182,210	3.0	1,110,397	18.0	4,864,712	79.0	6,157,320	100.0
Saltbush	0	0.0	7,813	18.5	13,486	31.9	20,964	49.6	42,262	100.0
Shadscale	0	0.0	87,278	9.9	367,798	41.8	424,097	48.2	879,172	100.0
Spiny hopsage	0	0.0	13,204	9.6	30,497	22.1	94,005	68.3	137,705	100.0
Utah juniper	0	0.0	92,969	39.2	101,468	42.8	42,624	18.0	237,060	100.0
Western juniper	0	0.0	606	99.7	2	0.3	0	0.0	608	100.0
Recently burned	0	0.0	494,665	41.9	293,175	24.8	393,044	33.3	1,180,884	100.0
Total other susceptible vegetation	0	0.0	3,773,887	30.6	2,402,569	19.5	6,173,072	50.0	12,349,527	
All vegetation	5,926,811	20.8	9,560,603	33.6	5,293,495	18.6	7,650,653	26.9	28,431,561	100.0

Table 5. Risk of displacement of sagebrush and other susceptible native vegetation by cheatgrass within Bureau of Land Management Field Offices in Nevada.

Field Office	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
<i>Battle Mountain</i>										
Sagebrush - BLM lands	0	0.0	644,492.7	47.1	596,939.2	43.6	127,655.2	9.3	1,369,087.1	100.0
Other susceptible vegetation - BLM lands	0	0.0	602,141.0	24.3	619,402.1	25.0	1,255,752.7	50.7	2,477,295.9	100.0
Total vegetation - BLM lands	383,409.5	9.1	1,246,633.7	29.5	1,216,341.4	28.8	1,383,407.9	32.7	4,229,792.5	100.0
Sagebrush - other lands	0.0	0.0	453,832.5	83.6	76,571.7	14.1	12,413.3	2.3	542,817.5	100.0
Total vegetation in field office	517,927.8	9.5	2,136,886.9	39.2	1,330,429.9	24.4	1,464,320.4	26.9	5,449,565.0	100.0
<i>Carson City</i>										
Sagebrush - BLM lands	0	0.0	205,484.0	54.9	129,287.3	34.5	39,660.0	10.6	374,431.4	100.0
Other susceptible vegetation - BLM lands	0	0.0	274,194.7	20.1	417,117.6	30.5	674,050.4	49.4	1,365,362.7	100.0
Total vegetation - BLM lands	312,021.7	15.2	479,678.8	23.4	546,404.9	26.6	713,710.4	34.8	2,051,815.9	100.0
Sagebrush - other lands	0	0.0	108,418.5	43.8	92,896.5	37.6	45,982.1	18.6	247,297.1	100.0
Total vegetation in field office	840,209.8	24.2	783,686.3	22.6	765,804.8	22.1	1,076,836.7	31.1	3,466,537.6	100.0
<i>Eagle Lake</i>										
Sagebrush - BLM lands	0	0.0	54,419	69.0	19,710	25.0	4,702	6.0	78,831	100.0
Other susceptible	0	0.0	54,419	69.0	19,710	25.0	4,702	6.0	78,831	100.0

Field Office	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total						
vegetation - BLM lands										
Total vegetation - BLM lands	9,028	4.5	112,273	56.0	51,058	25.5	28,052	14.0	200,412	100.0
Sagebrush - other lands	0	0.0	1,529	69.2	668	30.2	12	0.5	2,210	100.0
Total vegetation in field office	11,555	5.6	113,994	54.8	53,155	25.5	29,415	14.1	208,118	100.0
<i>Elko</i>										
Sagebrush - BLM lands	0	0.0	1358378	69.6	323,213	16.6	271,258	13.9	1,952,849	100.0
Other susceptible vegetation - BLM lands	0	0.0	427761	48.4	160,722	18.2	295,929	33.5	884,412	100.0
Total vegetation - BLM lands	160,847	5.4	1786139	59.6	483,935	16.1	567,187	18.9	2,998,109	100.0
Sagebrush - other lands	0	0.0	740341	69.3	152,237	14.2	176,357	16.5	1,068,935	100.0
Total vegetation in field office	555,764	11.2	2820853	56.8	697,259	14.0	891,285	18.0	4,965,161	100.0
<i>Ely</i>										
Sagebrush - BLM lands	0	0.0	638,487	33.5	818,144	42.9	450,352	23.6	1,906,983	100.0
Other susceptible vegetation - BLM lands	0	0.0	885,486	43.2	422,409	20.6	740,091	36.1	2,047,987	100.0
Total vegetation - BLM lands	685,473	14.8	1,523,974	32.8	1,240,553	26.7	1,190,443	25.7	4,640,443	100.0
Sagebrush - other lands	0	0.0	138,508	77.1	22,217	12.4	18,858	10.5	179,583	100.0

Field Office	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Total vegetation in field office	868,934	16.5	1,871,605	35.6	1,277,197	24.3	1,235,693	23.5	5,253,430	100.0
<i>Las Vegas</i>										
Sagebrush - BLM lands	0	0.0	3,263	18.6	12,318	70.2	1,964	11.2	17,545	100.0
Other susceptible vegetation - BLM lands	0	0.0	16,252	4.5	16,174	4.5	329,221	91.0	361,647	100.0
Total vegetation - BLM lands	1,087,679	74.1	19,515	1.3	28,492	1.9	331,186	22.6	1,466,872	100.0
Sagebrush - other lands	0	0.0	129,977	32.9	196,682	49.9	67,855	17.2	394,515	100.0
Total vegetation in field office	2,117,295	53.7	337,451	8.6	364,319	9.2	1,121,190	28.5	3,940,256	100.0
<i>Surprise</i>										
Sagebrush - BLM lands	0	0.0	421,922	97.0	13,267	3.0	0	0.0	435,189	100.0
Other susceptible vegetation - BLM lands	0	0.0	25,445	75.1	8,457	24.9	0	0.0	33,903	100.0
Total vegetation - BLM lands	11,015	2.3	447,367	93.2	21,724	4.5	0	0.0	480,106	100.0
Sagebrush - other lands	0	0.0	214,581	96.8	5,188	2.3	1,832	0.8	221,601	100.0
Total vegetation in field office	26,146	3.5	683,156	91.9	32,117	4.3	1,832	0.2	743,252	100.0
<i>Winnemucca</i>										
Sagebrush - BLM lands	0	0.0	524,160	48.1	361,028	33.1	204,058	18.7	1,089,246	100.0
Other susceptible vegetation - BLM lands	0	0.0	137,662	8.8	277,030	17.8	1,143,354	73.4	1,558,046	100.0

Field Office	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Total vegetation - BLM lands	660,668	20.0	661,822	20.0	638,058	19.3	1,347,412	40.7	3,307,959	100.0
Sagebrush - other lands	0	0.0	148,923	54.3	70,559	25.7	54,622	19.9	274,103	100.0
Total vegetation in field office	988,979	22.1	867,389	19.3	792,922	17.7	1,834,783	40.9	4,484,073	100.0
<i>All Field Offices</i>										
Sagebrush - BLM lands	0	0.0	3,850,606	53.3	2,273,907	31.5	1,099,649	15.2	7,224,162	100.0
Other susceptible vegetation - BLM lands	0	0.0	2,372,377	27.1	1,932,951	22.1	4,457,047	50.9	8,762,375	100.0
Total vegetation - BLM lands	3,310,142	17.2	6,222,984	32.2	4,206,857	21.8	5,556,696	28.8	19,296,679	100.0
Sagebrush - other lands	0	0.0	1,936,110	66.1	617,020	21.1	377,932	12.9	2,931,062	100.0
All vegetation in Nevada	5,926,811	20.8	9,560,603	33.6	5,293,495	18.6	7,650,653	26.9	28,431,561	100.0

Table 6. Habitat for Greater Sage-Grouse in the state of Nevada.

Land cover type	Area	
	Ha	%
<i>Sagebrush:</i>		
Black sagebrush	1,288,607	14.8
Low sagebrush	753,830	8.7
Low sagebrush - mountain big sagebrush	185,191	2.1
Low sagebrush - Wyoming big sagebrush	122,103	1.4
Mountain big sagebrush	1,501,405	17.3
Silver sagebrush	2,092	0.0
Threetip sagebrush	500	0.0
Wyoming/basin big sagebrush	4,418,179	50.8
Total sagebrush	8,271,907	95.1
<i>Other habitat:</i>		
Bunchgrass	416,496	4.8
Wet meadow	12,118	0.1
Total other habitat	428,615	4.9
TOTAL HABITAT	8,700,522	100.0

Table 7. Risk of displacement of Greater Sage-Grouse habitat by cheatgrass within Bureau of Land Management Field Offices in the state of Nevada.^a

Field Office/habitat	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
<i>Battle Mountain</i>										
Sagebrush – BLM lands	0	0	443,550	41.7	501,098	47.1	120,223	11.3	1,064,870	100.0
Total habitat – BLM lands	96	0	4554,718	41.4	512,983	46.7	130,494	11.9	1,098,291	100.0
Sagebrush – other lands	0	0	445,514	83.7	74,603	14.0	12,118	2.3	532,235	100.0
Total habitat	518	0	905,154	55.1	589,257	35.9	146,645	8.9	1,641,563	100.0
<i>Carson City</i>										
Sagebrush – BLM lands	0	0.0	71,221	43.4	71,078	43.4	21,622	13.2	163,921	100.0
Total habitat – BLM lands	30	0.0	74,372	42.8	75,427	43.4	23,916	13.8	173,745	100.0
Sagebrush – other lands	0.0	0.0	65,270	56.2	35,643	30.7	15,166	13.1	116,080	100.0
Total habitat	193	0.1	140,893	48.0	112,251	38.3	39,921	13.6	293,258	100.0
<i>Eagle Lake</i>										
Sagebrush – BLM lands	0	0.0	54,184	70.4	18,999	24.7	3,755	4.9	76,939	100.0
Total habitat – BLM lands	3	0.0	54,472	70.0	19,385	24.9	3,914	5.0	77,774	100.0
Sagebrush – other lands	0	0.0	1,529	69.3	666	30.2	12	0.6	2,207	100.0
Total habitat	15	0.0	56,019	70.0	20,076	25.1	3,932	4.9	80,041	100.0
<i>Elko</i>										
Sagebrush – BLM lands	0	0.0	1,356,039	69.7	318,843	16.4	269,971	13.9	1,944,852	100.0

Field Office/habitat	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Total habitat – BLM lands	1,639	0.1	1,379,832	68.6	332,827	16.5	297,002	14.8	2,011,301	100.0
Sagebrush – other lands	0	0.0	739,263	69.2	152,062	14.2	176,237	16.5	1,067,562	100.0
Total habitat	8,925	0.3	2,137,314	67.7	495,828	15.7	512,838	16.3	3,154,905	100.0
<i>Ely</i>										
Sagebrush – BLM lands	0	0.0	527,521	42.3	530,822	42.6	188,365	15.1	1,246,708	100.0
Total habitat – BLM lands	330	0.0	541,053	41.7	559,588	43.1	197,960	15.2	1,298,930	100.0
Sagebrush – other lands	0	0.0	137,055	81.2	19,659	11.6	12,106	7.2	168,820	100.0
Total habitat	786	0.1	680,202	46.2	580,106	39.4	212,030	14.4	1,473,124	100.0
<i>Surprise</i>										
Sagebrush – BLM lands	0	0.0	421,922	97.0	12,938	3.0	0	0.0	434,860	100.0
Total habitat – BLM lands	41	0.0	428,159	97.0	13,237	3.0	0	0.0	441,437	100.0
Sagebrush – other lands	0	0.0	214,581	96.8	5,161	2.3	1,832	0.8	221,575	100.0
Total habitat	132	0.0	648,068	96.7	19,900	3.0	1,832	0.3	669,932	100.0
<i>Winnemucca</i>										
Sagebrush – BLM lands	0	0.0	496,359	51.4	286,470	29.7	183,003	18.9	965,832	100.0
Total habitat – BLM lands	309	0.0	518,520	48.0	310,972	28.8	250,766	23.2	1,080,567	100.0
Sagebrush – other lands	0.0	0.0	145,688	57.1	57,683	22.6	51,552	20.2	254,924	100.0
Total habitat	1,548	0.1	668,315	48.5	374,739	27.2	332,227	24.1	1,376,829	100.0
<i>All Field Offices</i>										
Sagebrush – BLM lands	0	0.0	3,370,796	57.2	1,740,247	29.5	786,939	13.3	5,897,981	100.0

Field Office/habitat	Risk category								Total	
	None		Low		Moderate		High			
	Ha	% total	Ha	% total	Ha	% total	Ha	% total	Ha	% total
Total habitat – BLM lands	2,449	0.0	3,451,124	55.8	1,824,419	29.5	904,052	14.6	6,182,044	100.0
Sagebrush – other lands	0	0.0	1,748,900	74.0	345,477	14.6	269,025	11.4	2,363,403	100.0
Total habitat – all field offices	12,116	0.1	5,235,966	60.3	2,192,146	25.2	1,249,424	14.4	8,689,652	100.0

^a Habitat includes only those cover types designated as source habitat for Greater Sage-Grouse within the current range of the species in Nevada. See text for further explanation.

Table 8. Risk of displacement of sagebrush habitat for Greater Sage-Grouse by pinyon-juniper woodlands in the state of Nevada, encompassing the High Calcareous, Central High, and Bonneville Ecological Provinces.^a

Sagebrush cover type	Risk category						Total ^a	
	Low		Moderate		High		Ha	%
	Ha	% total	Ha	% total	Ha	% total		
Black sagebrush	546,492	64.1	8,350	1.0	297,340	34.9	852,183	100.0
Low sagebrush	3,914	21.1	8,635	46.5	6,005	32.4	18,553	100.0
Low sagebrush - mountain big sagebrush	11,632	34.3	2,505	7.4	19,762	58.3	33,899	100.0
Low sagebrush - Wyoming big sagebrush	7,309	60.8	732	6.1	3,986	33.1	12,027	100.0
Mountain big sagebrush	256,562	38.3	122,883	18.3	290,913	43.4	670,358	100.0
Wyoming - basin big sagebrush	1,186,938	68.2	30,277	1.7	523,207	30.1	1,740,423	100.0
All sagebrush	2,012,847	60.5	173,383	5.2	1,141,214	34.3	3,327,444	100.0

^a Includes a small portion of sage-grouse habitat in the Bonneville and High Calcareous Ecological Provinces in Utah.

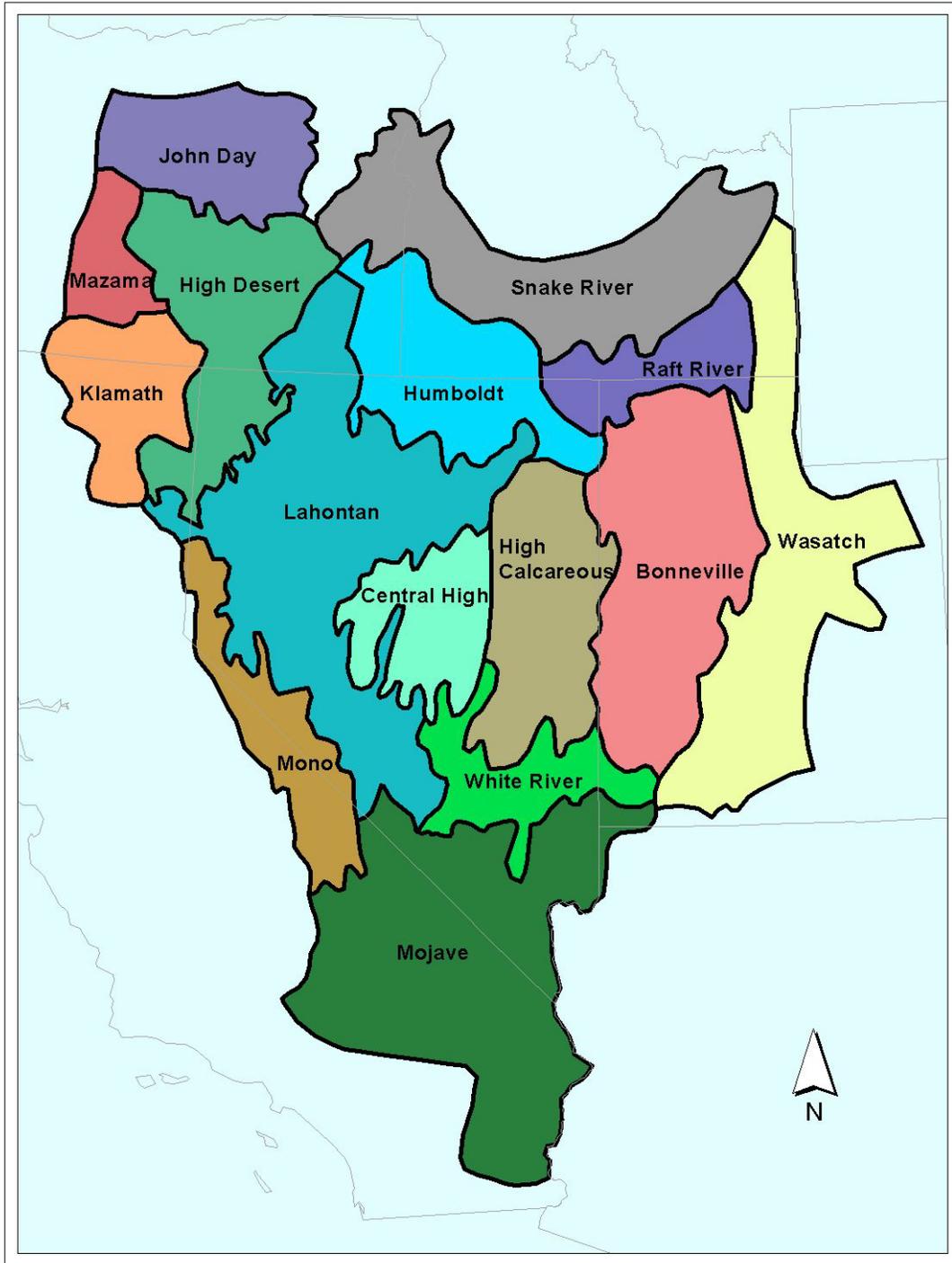


Figure 1. Fourteen ecological provinces used in modeling risk of displacement of native vegetation by cheatgrass and pinyon-juniper woodlands. These provinces are a modification of those described in Miller et al. (1999) and West et al. (1998).

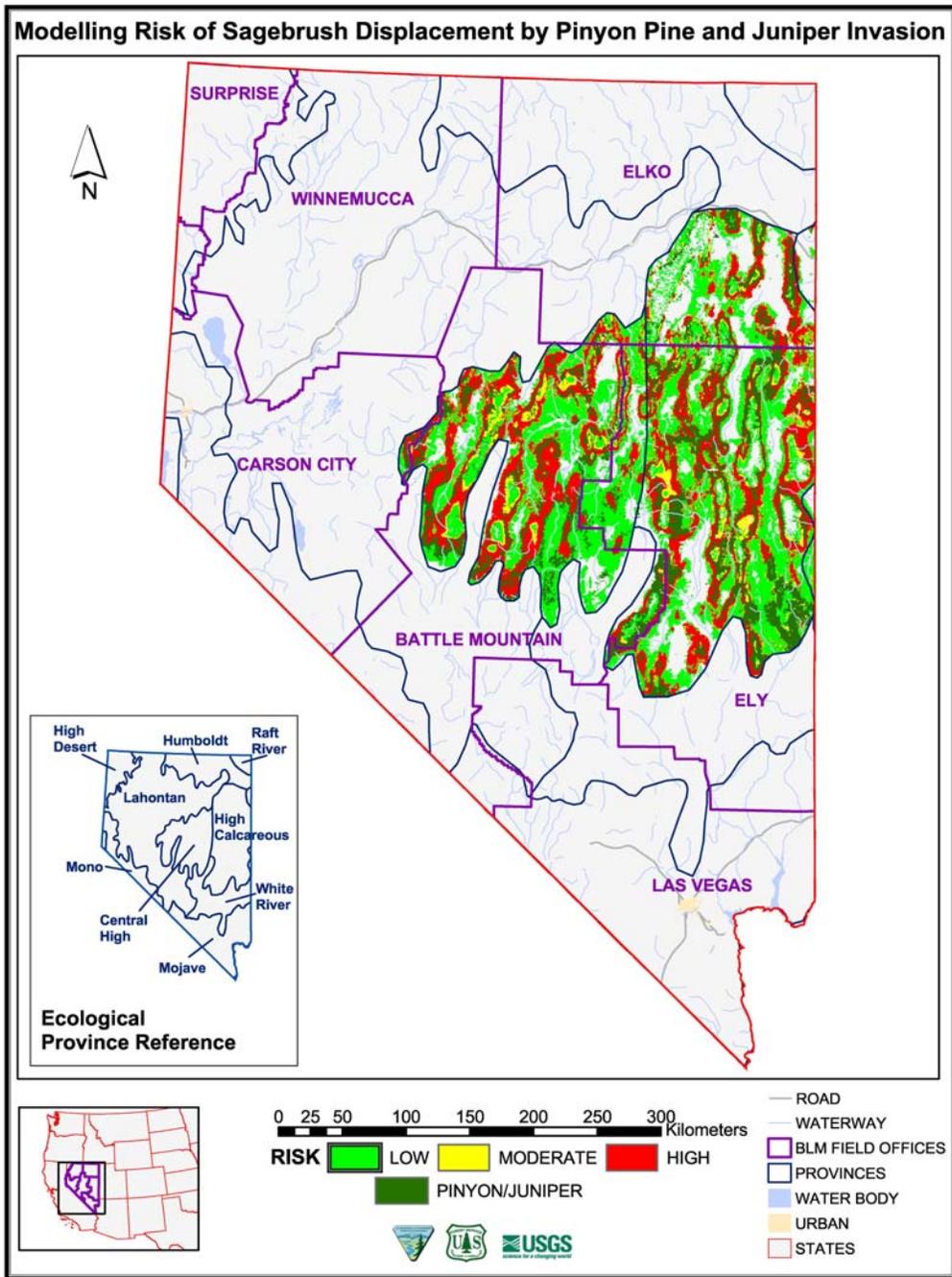


Figure 2. Risk of displacement of sagebrush cover types by pinyon-juniper woodlands within Bureau of Land Management Field Offices in the state of Nevada, encompassing the High Calcareous, Central High, and Bonneville Ecological Provinces. Note that only a small fraction of the Bonneville Ecological Province lies within Nevada (see [Figure 1](#) for location of the Bonneville Ecological Province in Utah and Nevada).

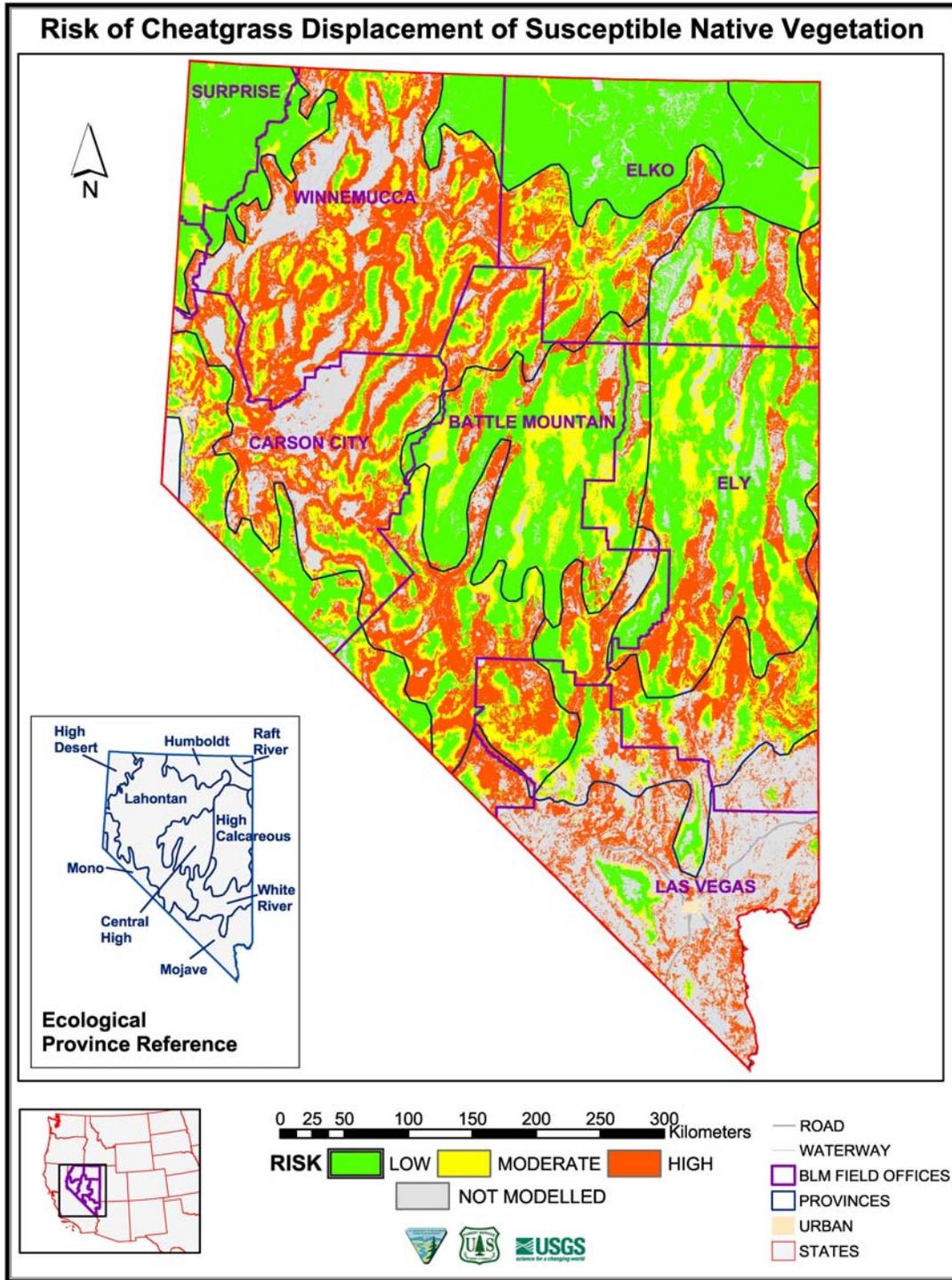


Figure 3. Risk of displacement of sagebrush and other native vegetation by cheatgrass within Bureau of Land Management Field Offices in Nevada. Areas not modeled were land cover types considered not susceptible to displacement by cheatgrass.

Sage Grouse Sagebrush Habitat in Nevada

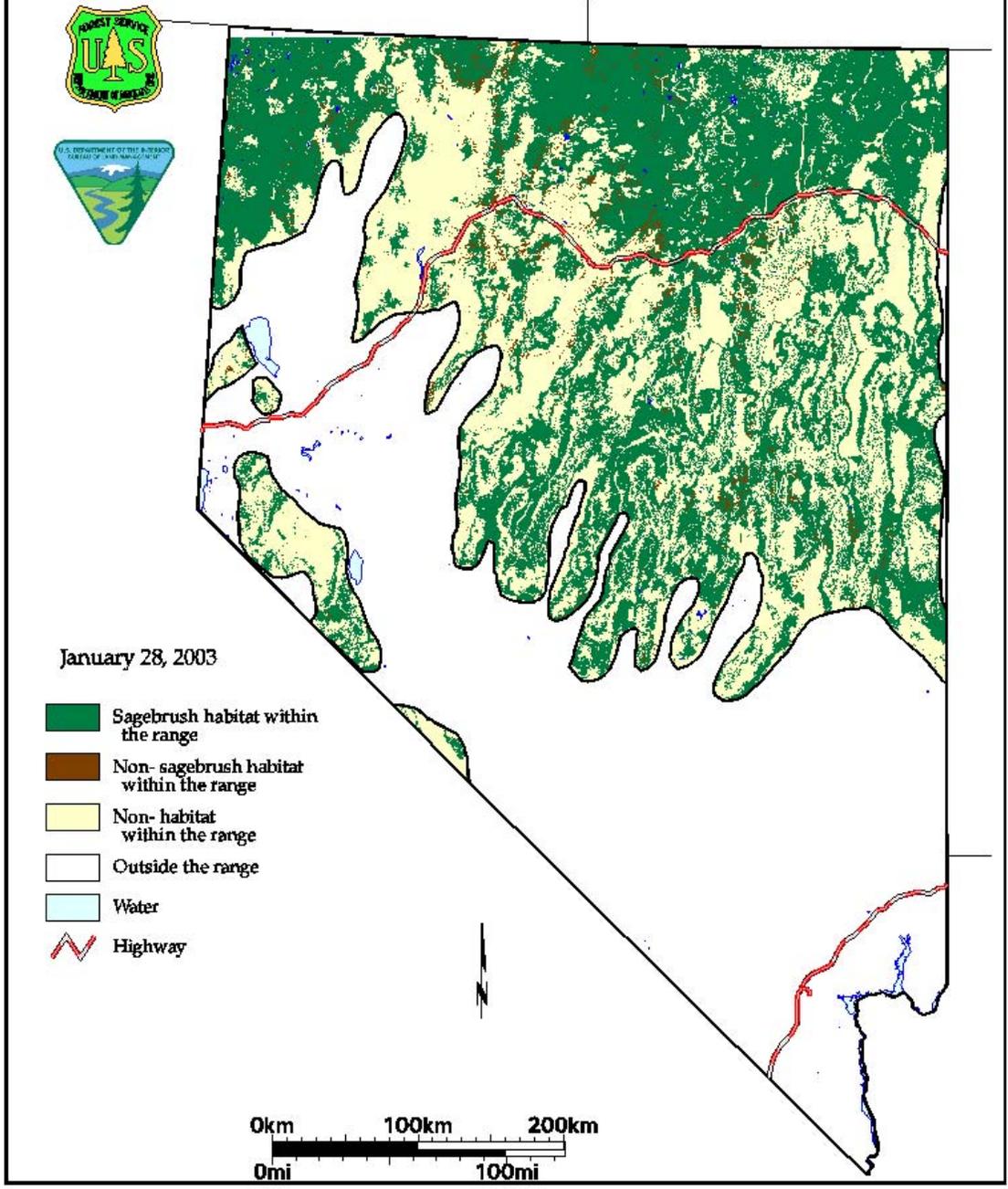


Figure 4. Habitat for Greater Sage-Grouse in Nevada.