Section III. Assessments of Communities

Chapter 12. Desert Shrublands

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Key Ecological Attributes

Distribution and Ecology

Cold desert shrublands occur throughout the Intermountain West and Great Basin in areas with cold winters, low amounts of precipitation, and saline soils (West and Young, 2000). In the Wyoming Basin, desert shrublands have a short growing season of fewer than 150 frost-free days per year (Beauvais, 2008). Water stress occurs frequently in desert systems because potential annual evapotranspiration can greatly exceed annual precipitation, which is usually less than 25 centimeters (cm) (9.84 inches [in]) (Knight, 1994). Strong and persistent winds can further decrease soil moisture (Beauvais, 2008). During wet periods, water can accumulate in depressions or flat areas, and the high rates of evaporation in desert shrublands can result in high levels of salinity in these areas (Knight, 1994). Most plants that grow in desert shrublands, such as saltbush and greasewood, have adaptations that allow them to tolerate high levels of salinity (known as halophytes) (West and Young, 2000). Furthermore, many cold desert shrubs are evergreen and have root systems that are large relative to their aboveground biomass, both of which are adaptations to drought and short growing seasons (West and Young, 2000). As a result of the combined stresses of high salinity levels and minimal precipitation amounts, species diversity and plant cover, especially for shrubs, is generally lower than it is in the more mesic sagebrush steppe and grasslands (Knight, 1994; Barbour and others, 1999).

Knight (1994) described five characteristic plant communities in desert shrublands of the Wyoming Basin: (1) greasewood desert shrublands, (2) mixed desert shrublands (also known as sagebrush semideserts), (3) saltbush desert shrublands (also known as salt desert scrub), (4) basin grasslands, and (5) saltgrass meadows. The distributions of these communities are strongly influenced by water availability, soil characteristics, and topography (Knight, 1994; West and Young, 2000). Greasewood desert shrublands and saltgrass meadows occur in relatively wet depressions, whereas mixed desert shrublands, saltbush desert shrublands, and basin grasslands occur in dryer upland settings. Greasewood, which does not tolerate prolonged drought, occurs along the edges of playas, rivers, and creeks where the water table usually remains within 1 meter (m) (3.26 feet [ft]) of the surface (West and Young, 2000). Although greasewood can form monoculture stands, it also occurs in association with shadscale, big sagebrush, and grasslands. Greasewood is uncommon, however, in depressions where sodium levels are high enough to result in soil chemical properties that impede the infiltration of water. Like greasewood, saltgrass meadows also occurs in wetter areas, but often where the water table is deeper than 1 m (3.28 ft) (West and Young, 2000). Plant species typical of saltgrass meadows include inland saltgrass, alkaligrass, alkali sacaton, and alkali cordgrass. Halophytic forbs, such as Rocky Mountain glasswort, may form concentric bands surrounding wetlands and topographic depressions.

Mixed desert shrublands, which occur in areas where soil moisture is less dependable, typically include big sagebrush, bud sagewort, shadscale, winterfat, and Gardner saltbush. Although Wyoming big sagebrush is common in mixed desert shrublands, it is typically restricted to areas where the soil is less saline, including ravines and dry washes. In basin grasslands, blue grama and western wheatgrass are among the dominant plants, and shrubs are rare. Saltbush desert shrublands generally occur in the most arid portions of the Basin and consequently vegetative cover is often extremely sparse. Alkali sagebrush, birdfoot, and bud sageworts, Gardner saltbush, and western wheatgrass are some the few species that can tolerate the harsh conditions, which include extreme moisture stress and alkaline soils with low infiltration rates, although the soils can vary in salinity levels.

Landscape Structure and Dynamics

At the ecoregion level, variations in soil condition and moisture availability produce mosaics of desert shrublands and sagebrush steppe across the Intermountain basins. Although sagebrush steppe is generally dominant throughout the Wyoming Basin, there are large areas of desert shrublands in the Bighorn Basin and the Red Desert in the Great Divide Basin. Sharp gradients in soil conditions and moisture can lead to sudden transitions between desert shrublands and sagebrush steppe communities, as well as between different types of desert shrubland communities (Knight, 1994). As a result, the system is heterogeneous across a broad range of spatial scales.

The dynamics of desert shrublands are influenced by drought and herbivory. Due to the prevalence of water stress in desert shrublands, prolonged or severe drought can be a major disturbance agent, and multi-year droughts can lead to die-backs in the shrub canopy (Baisdell and Holmgren, 1984). Herbivory during outbreaks of insects, including grasshoppers, Mormon crickets, borers, and cutworms; irruptions of jackrabbits or other mammals with cyclic population fluctuations; or intense browsing by large ungulates also may cause major disturbances (West and Young, 2000). Desert shrublands seem to be more sensitive to grazing than grasslands of the Great Plains, where bison populations were probably more numerous (Mack and Thompson, 1982). Severe droughts may exacerbate the effects of herbivory (West and Young, 2000).

Historically, fire in most desert shrublands was less common than it was in sagebrush steppe due to the discontinuity of fuels in desert shrublands, although fuel build-ups can occur in greasewood and mixed desert shrublands, especially after years with abundant precipitation (Knight, 1994). Little information is available on historical fire occurrence in desert shrublands of the Wyoming Basin, although likely it varied among vegetation communities. In saltbush desert shrublands where fuels are typically very sparse, the fire-return interval was reportedly on the order of 500–1,000 years (National Interagency Fuels, Fire, and Vegetation Technology Transfer, 2010). Many shrubs of desert shrublands can resprout after fire and other disturbances; however, the harsh environment of cold salt deserts and low productivity of plants can limit recovery rates (Knight, 1994).

Wind also can be an important disturbance agent in arid systems. The erosion of silt and sand from the soil surface can result in a surface known as desert pavement, which is composed of polished, close-fitting pebbles adjacent to small coppice dunes that form around shrubs (Barbour and others, 1999). Vegetation cover is sparse in desert pavements, whereas coppice dunes provide more mesic site conditions, possibly through the accumulation of snow or more infiltration of precipitation (Knight, 1994).

Associated Species of Management Concern

Vertebrate species evaluated as Conservation Elements for this Rapid Ecoregional Assessment (REA) that may use desert shrublands include mule deer, golden eagle, ferruginous hawk, and Great Basin spadefoot. Additional species of management concern that also use desert shrublands include pronghorn, elk, swift fox, white-tailed prairie dog, North American badger, mountain plover, and burrowing owl (Cerovski and others, 2004; Beauvais, 2008; Orabona, 2008). The Wyoming pocket gopher, also a species of management concern, is restricted to the Red Desert (Beauvais, 2008).

Change Agents

Development

Energy and Mineral Development and Infrastructure

Energy development and mineral extraction occur throughout desert shrublands. Although the well pads, mines, and associated infrastructure can fragment the landscape, the contrast between disturbed soils and the extent of naturally bare ground in some desert shrublands can be much less than that in sagebrush steppe. As a result, some animals, such as mountain plovers, may not respond as negatively to surface disturbance in desert shrublands as they might in other systems where surface disturbance creates a greater contrast. Nonetheless, anthropogenic disturbance and other indirect effects of development can have negative consequences in desert shrublands, where the sparse vegetative cover provides little shielding from human activities. Furthermore, many of the soils in the Wyoming Basin are selenium rich, and there is concern that surface disturbance from energy and mineral extraction has the potential to mobilize selenium; in turn, the amount of selenium entering wetlands and waterways or being taken up by plants could increase to levels that are toxic to biota (Knight, 1994).

Agricultural Activities

It is sometimes assumed that livestock grazing over the last century has been an important Change Agent in desert shrublands, but there is a lack of quantitative pregrazing data or floristics to evaluate effects of grazing in this system (West and Young, 2000). Due to the low productivity of plants, relatively unpalatable forage types, and water scarcity, domestic sheep were usually the primary livestock that grazed in desert shrublands (West and Young, 2000). With grazing pressure, palatable species tend to decrease and less palatable species tend to increase (Knight, 1994; West and Young, 2000), although to date the only evidence for this pattern comes from studies in the Great Basin. Grazing seasonality is also important, with early-spring grazing by sheep having less effect than late-winter grazing (Knight, 1994).

Cryptogamic crusts are communities of cyanobacteria, fungi, lichens, and mosses present at the surface of most non-sandy desert soils (States, 2008). These crusts are extremely vulnerable to surface disturbance and have slow recovery times (States, 2008). In Wyoming, studies on cryptogamic crusts have been limited, and currently these communities are documented as continuous and well-developed only in areas that have not been used by livestock (States, 2008).

Altered Fire Regime and Invasive Species

Introduced annual plants are of concern in desert shrublands, specifically cheatgrass, halogeton, and Russian thistle (Knight, 1994). Halogeton may permanently change soil structure, whereas cheatgrass may alter water availability for other plants and promote greater frequency and severity of fire, thereby promoting the persistence and spread of these invasive species (West and Young, 2000). As in other systems, grazing and development also can promote the spread of invasive species (West and Young, 2000).

Climate Change

The amount and seasonality of precipitation, plus the frequency and amplitude of drought, are expected to be key determinants of whether and how desert shrublands are affected by climate change. Tolerance to drought and high temperatures could favor many species in desert shrublands.

Rapid Ecoregional Assessment Components Evaluated for Desert Shrublands

A generalized, conceptual model was used to highlight some of the key ecological attributes and Change Agents affecting desert shrublands (fig. 12–1). Key ecological attributes addressed by this REA include (1) the distribution of desert shrublands, (2) landscape structure (size and structural connectivity of patches), and (3) landscape dynamics (fire occurrence) (table 12–1). The Change Agents evaluated include development and climate change (table 12–2). Ecological values and risks used to assess the conservation potential of desert shrublands by township are summarized in table 12–3. Core and Integrated Management Questions and the associated summary maps and graphs are provided in table 12–4.

Methods Overview

We used desert shrublands LANDFIRE Existing Vegetation Types to map the baseline distribution of desert shrublands. Areas classified as grasslands within 210 m (689 ft) of cells dominated by desert shrubland Existing Vegetation Types also were included in this community.

We assessed development levels in desert shrublands using the Terrestrial Development Index (TDI) map, and used the resulting output to calculate patch size and structural connectivity metrics. We mapped the structural connectivity of relatively undeveloped areas (TDI score $\leq$1 percent) at three interpatch distances derived from connectivity analysis: local (1.35 km; 0.84 mi), landscape (3.15 km; 1.96 mi), and regional (3.33 km; 2.07 mi) levels. Areas that may function as barriers or corridors were derived from development levels and were identified by overlaying relatively undeveloped patches on the TDI map. To assess fire frequency and extent, the perimeters of fires in desert shrublands since 1980 were compiled from several data sources (table 12–1).

To evaluate the potential changes in the distribution of desert shrublands, we used the bioclimatic envelope model for Great Basin desert scrub developed by Rehfeldt and others (2012) for climate scenario I, the Canadian Centre for Climate Modelling and Analysis Model version 3 (emissions scenario A2) in 2030. Current and projected bioclimatic envelopes were used to identify areas where desert shrublands had the potential to increase, decline, or remain the same. We then overlaid the resulting maps with the desert shrublands baseline map to identify existing areas that have the potential to change for climate scenario I.

Landscape-level ecological values (area of desert shrublands) and risk (TDI score) were compiled into an overall index of conservation potential for each township (table 12–3). See Chapter 2—Assessment Framework and the Appendix for additional details on the methods. Landscape-level values and risks, and conservation potential rankings are intended to provide a synthetic overview of the geospatial datasets developed to address Core Management Questions in the REA. Because rankings are very sensitive to the input data used and the criteria used to develop the ranking thresholds, they are not intended as stand-alone maps. Rather, they are best used as an initial screening tool to compare regional rankings in conjunction with the geospatial data for Core Management Questions and information on local conditions that cannot be determined from regional REA maps.

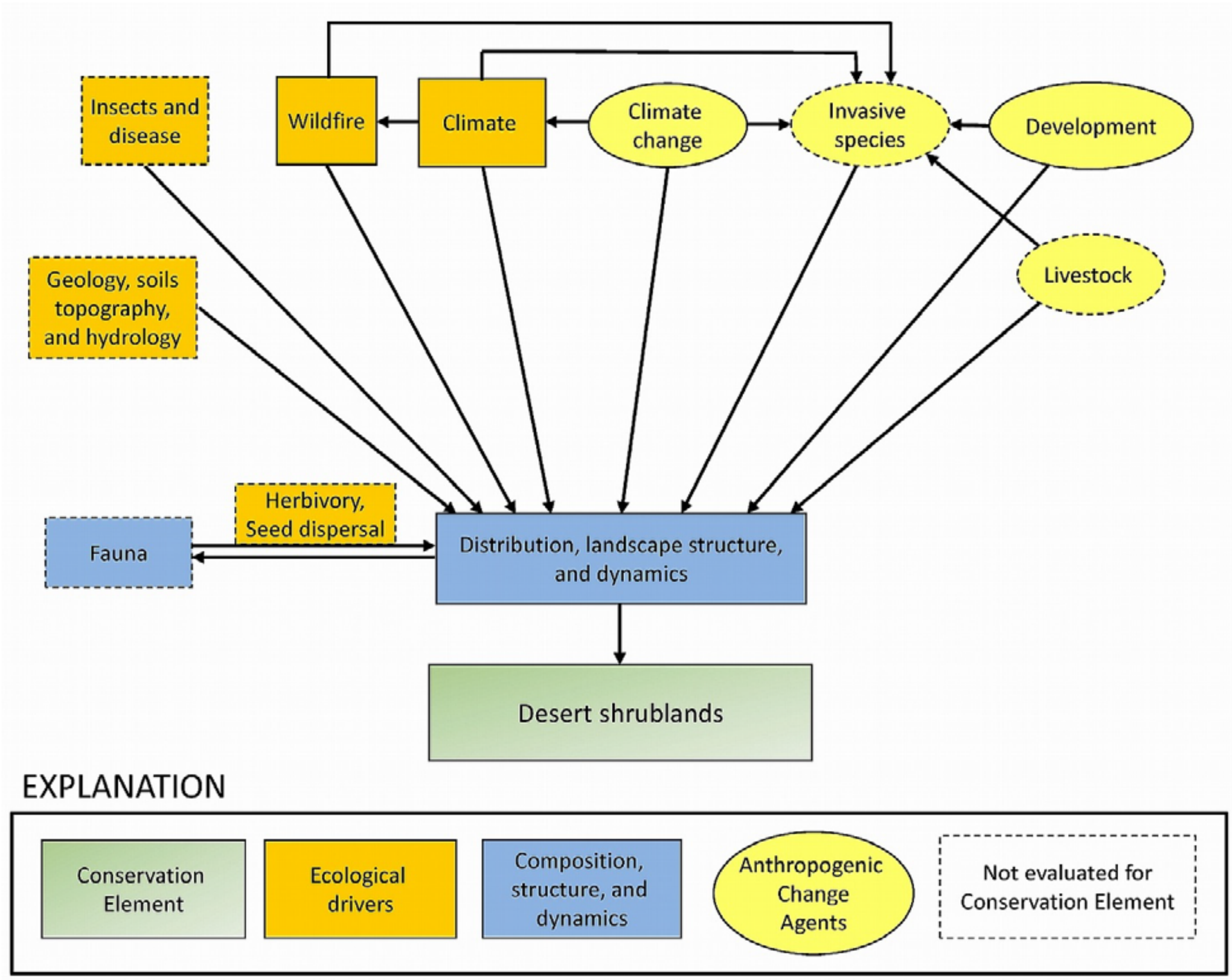

Figure 12−1. Generalized conceptual model of desert shrublands for the Wyoming Basin Rapid Ecoregional Assessment (REA). Biophysical attributes and ecological processes regulating the occurrence, structure, and dynamics of desert shrublands are shown in orange rectangles; additional ecological attributes are shown in blue rectangles; and anthropogenic Change Agents that affect key ecological attributes are shown in yellow ovals. The dashed lines indicate components not addressed by the REA. Livestock and invasive plants are Change Agents that were not evaluated due to the lack of regionwide data.

Table 12‒1. Key ecological attributes and associated indicators of baseline desert shrublands[1] for the Wyoming Basin Rapid Ecoregional Assessment.
[km, kilometer; mi, mile]

Attributes	Variables	Indicators
Amount and distribution	Total area	Distribution derived from LANDFIRE[1]
Landscape structure	Patch size	Patch-size frequency distribution
	Structural connectivity[2]	Interpatch distances that provide an index of structural connectivity for baseline patches at local (0.09 km; 0.06 mi), landscape (0.24 km; 0.15 mi), and regional (0.54 km; 0.34 mi) levels
Landscape dynamics	Fire occurrence[3]	Locations of fires and annual area burned since 1980

[1] Baseline conditions are used as a benchmark to evaluate changes in the amount and landscape structure of desert shrublands due to Change Agents. Baseline conditions are defined as the potential current distribution of desert shrublands derived from LANDFIRE Existing Vegetation Types without explicit inclusion of Change Agents (see Chapter 2—Assessment Framework and the Appendix).

[2] Structural connectivity refers to the proximity of patches at local, landscape, and regional levels but does not reflect species-specific measures of connectivity. See Chapter 2—Assessment Framework.

[3] See Wildland Fire section in the Appendix.

Table 12‒2. Anthropogenic Change Agents and associated indicators influencing desert shrublands for the Wyoming Basin Rapid Ecoregional Assessment.
[km^2, square kilometer; mi^2, square mile; km, kilometer; mi, mile]

Change Agents	Variables	Indicators
Development	Terrestrial Development Index[1]	Percent of desert shrublands in seven development classes using a 16-km^2 (6.18-mi^2) moving window
		Patch-size frequency distribution for desert shrublands that are relatively undeveloped or have low development scores compared to baseline conditions
		Interpatch distances that provide an index of structural connectivity for relatively undeveloped patches at local (1.35 km; 0.84 mi), landscape (3.15 km; 1.96 mi), and regional (3.33 km; 2.07 mi) levels
Climate change	Projected temperature and precipitation	Potential distribution of desert shrublands derived from the projected distribution of the bioclimatic envelope in 20302

[1] See Chapter 2—Assessment Framework.

[2] Bioclimatic envelope represents the climatic conditions conducive for sagebrush shrublands, derived from Rehfeldt and others (2012) for climate scenario I (Canadian Centre for Climate Modelling and Analysis Model, ver. 3, emissions scenario A2).

Table 12–3. Landscape-level ecological values and risks for desert shrublands. Ranks were combined into an index of conservation potential for the Wyoming Basin Rapid Ecoregional Assessment.

[<, less than; >, greater than]

	Variables[1]	Relative rank			Description[2]
		Lowest	Medium	Highest	
Values	Area	<13	13–40	>40	Percent of township classified as desert shrublands
Risks	Terrestrial Development Index (TDI)	<1	1–3	>3	Mean TDI score by township

[1] Township was used as the analysis unit for conservation potential on the basis of input from the Bureau of Land Management. A minimum area threshold of total area per township was established for each Conservation Element to minimize the effects of extremely small areas and put greater emphasis on large areas (see table A-19 in the Appendix).

[2] See tables 12–1 and 12–2 for description of variables.

Table 12–4. Management Questions addressed for desert shrublands for the Wyoming Basin Rapid Ecoregional Assessment.

Core Management Questions	Results
Where are baseline desert shrublands, and what is the total area?	Figure 12–2
Where does development pose the greatest threat to baseline desert shrublands, and where are the relatively undeveloped areas?	Figures 12–3 and 12–4
How has development fragmented baseline desert shrublands, and where are the large, relatively undeveloped patches?	Figures 12–5 and 12–6
How has development affected structural connectivity of desert shrublands relative to baseline conditions?	Figure 12–7
Where are potential barriers and corridors that may affect animal movements among relatively undeveloped desert shrubland patches?	Figure 12–8
Where have recent fires occurred in baseline desert shrublands, and what is the total area burned per year?	Figure 12–9
What is the potential distribution of desert shrublands in 2030?	Figure 12–10
Integrated Management Questions	**Results**
How does risk from development vary by land ownership or jurisdiction for desert shrublands?	Table 12–5, figure 12–11
Where are the townships with the greatest landscape-level ecological values?	Figure 12–12
Where are the townships with the greatest landscape-level risks?	Figure 12–12
Where are the townships with the greatest conservation potential?	Figure 12–13

Key Findings for Management Questions

Where are baseline desert shrublands, and what is the total area (fig. 12–2)?

- Desert shrublands cover 17,088 square kilometers (km^2) (6,597.71 square miles [mi^2]) and are widely distributed throughout low elevations of the Wyoming Basin, but they cover only 9.6 percent of the project area.
- Desert shrublands are locally dominant in the Bighorn and Great Divide Basins.

Where does development pose the greatest threat to baseline desert shrublands and where are the relatively undeveloped areas (figs. 12–3 and 12–4)?

- Relatively undeveloped areas (TDI score ≤1 percent) comprise 36.2 percent of desert shrublands, which is relatively high compared to sagebrush steppe.
- Development is somewhat localized in the largest areas of desert shrubland, especially the Big Horn Basin.
- Approximately 19 percent of desert shrublands had high levels of development, as indicated by TDI scores >5 percent.

How has development fragmented baseline desert shrublands, and where are the large, relatively undeveloped patches (figs. 12–5 and 12–6)?

- Baseline desert shrublands are very heterogeneous, and most patches are very small, with approximately 50 percent occurring in patches smaller than 10 km^2 (3.9 mi^2) and only 6.4 percent occurring in patches >1,000 km^2 (386.1 mi^2) (fig. 12–5).
- Development has fragmented the largest patches to some degree, but patch sizes for areas with a TDI score <3 percent are otherwise quite similar to those in baseline condition (fig. 12–5).
- The largest relatively undeveloped areas are >100 km^2 (38.6 mi^2) and occur in the Bighorn and Great Divide Basins (fig. 12–6).

How has development affected the structural connectivity in desert shrublands relative to baseline conditions (fig. 12–7)?

- Scattered, small patches of baseline desert shrublands contributed to structural connectivity among the largest patches of desert shrublands, and regional-level connectivity occurred at an interpatch distance of 0.54 km (0.34 mi).
- Development diminished the structural connectivity of the largest patches of relatively undeveloped desert shrublands. Relatively undeveloped areas are highly fragmented; local-level connectivity is 1.35 km (0.84 mi), landscape-level connectivity is 3.15 km (1.96 mi), and regional-level connectivity is 3.33 km (2.07 mi).
- Patches of highly connected, relatively undeveloped desert shrubland (local, landscape, and regional connectivity) are distributed throughout the Basin. Areas with high local and landscape connectivity may facilitate dispersal and seasonal movements, whereas desert shrublands with only regional connectivity may have value as stopover sites across developed or otherwise unsuitable habitat.

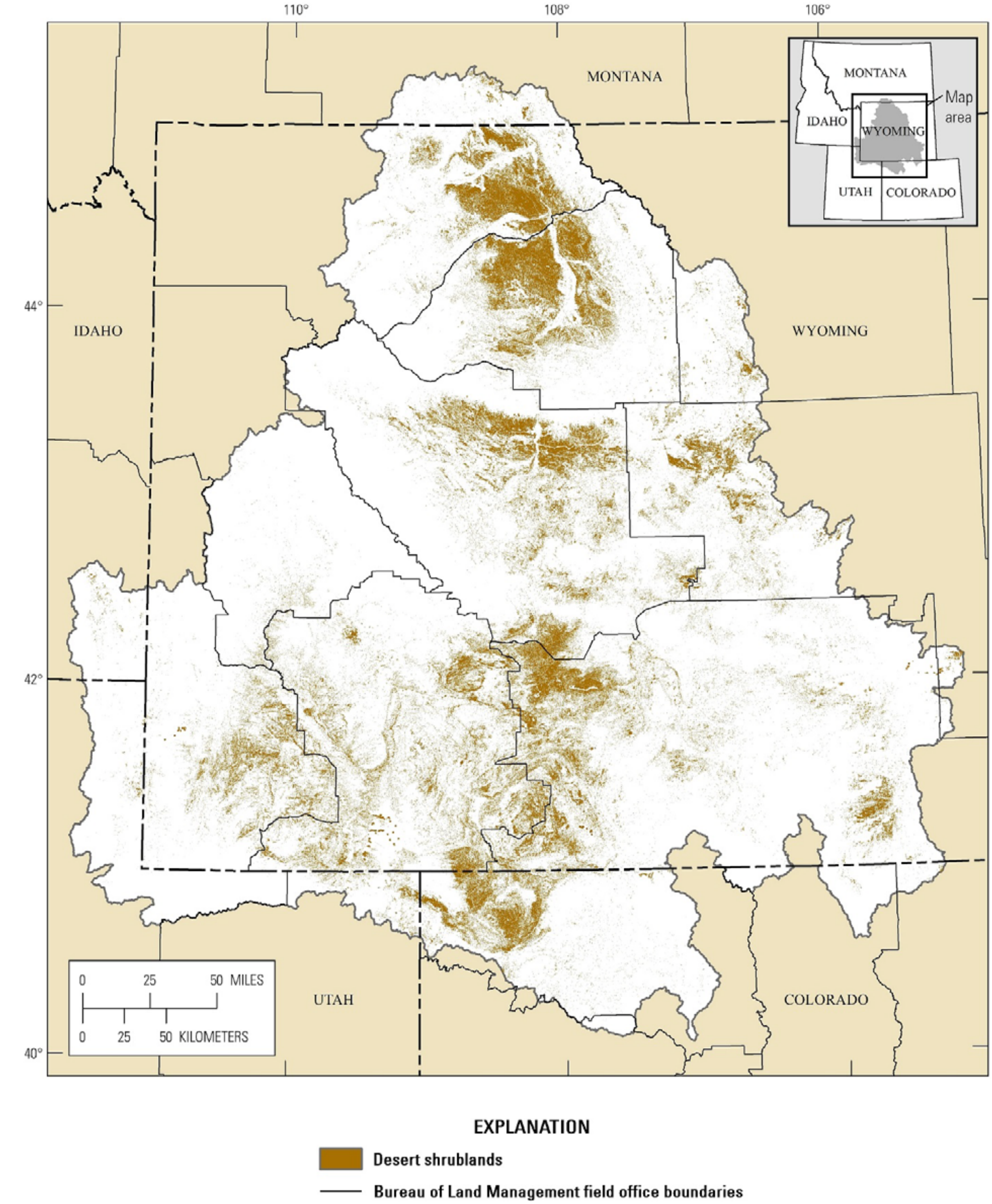

Figure 12−2. Distribution of baseline desert shrublands in the Wyoming Basin Rapid Ecoregional Assessment project area.

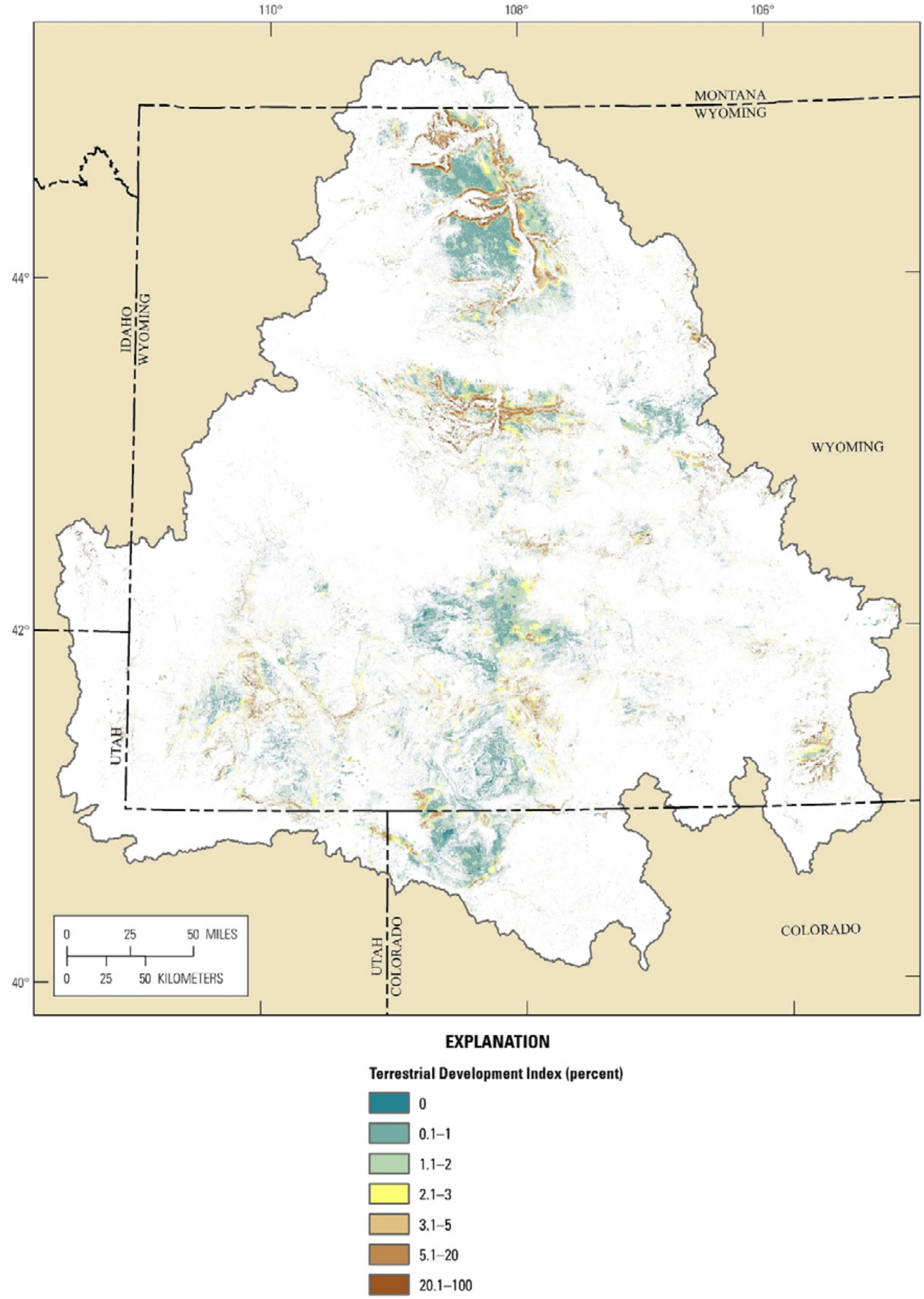

Figure 12−3. Terrestrial Development Index scores for desert shrublands in the Wyoming Basin Rapid Ecoregional Assessment project area.

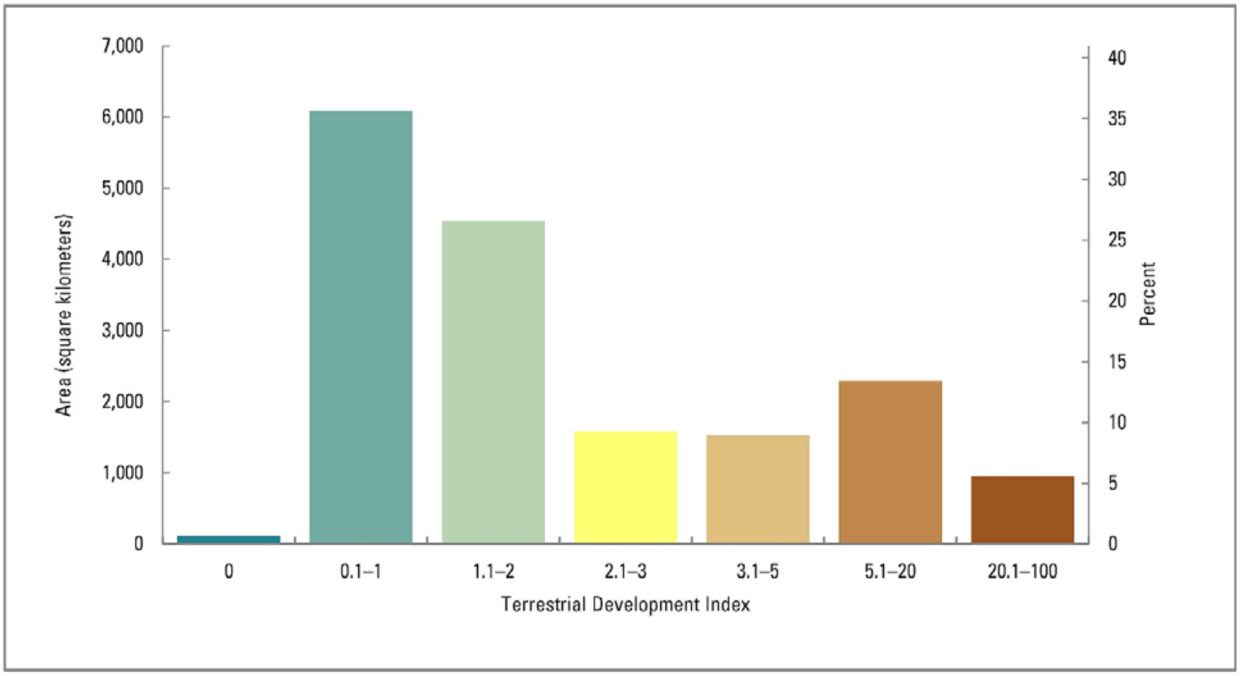

Figure 12−4. Area and percent of baseline desert shrublands as a function of the Terrestrial Development Index in the Wyoming Basin Rapid Ecoregional Assessment project area.

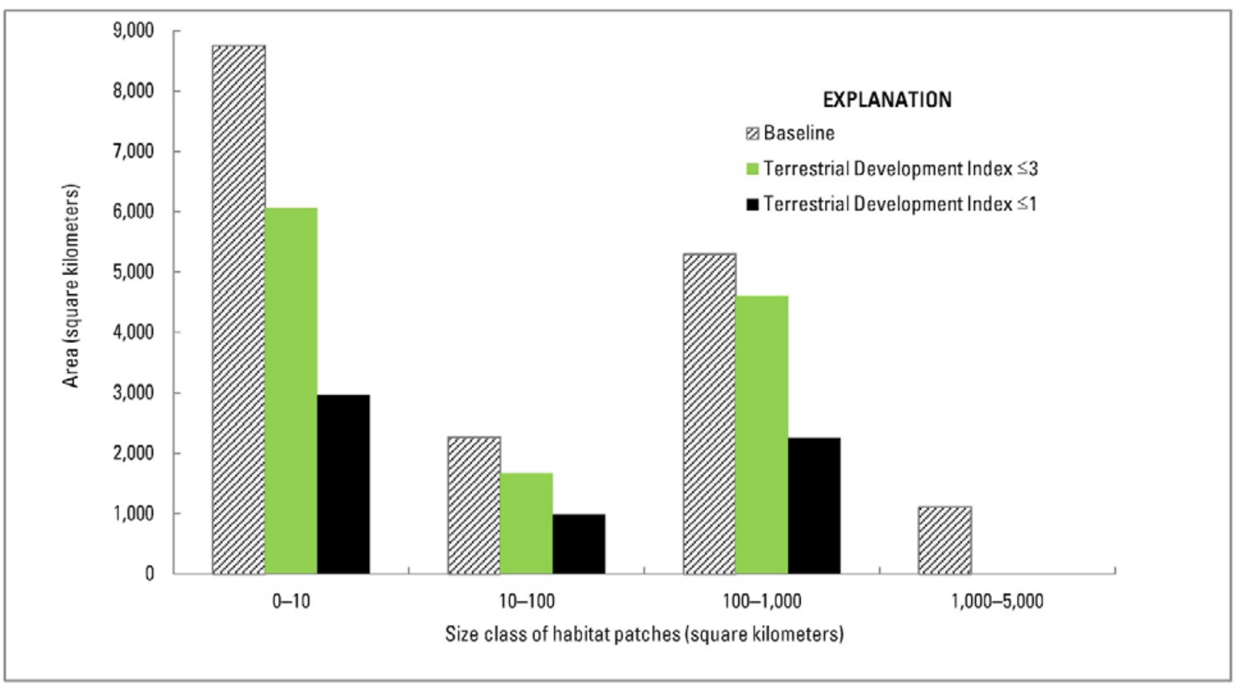

Figure 12−5. Area of desert shrublands as a function of patch size for baseline conditions and two development levels: (1) Terrestrial Development Index (TDI) score ≤3 percent, and (2) TDI score ≤1 percent (relatively undeveloped areas) in the Wyoming Basin Rapid Ecoregional Assessment project area.

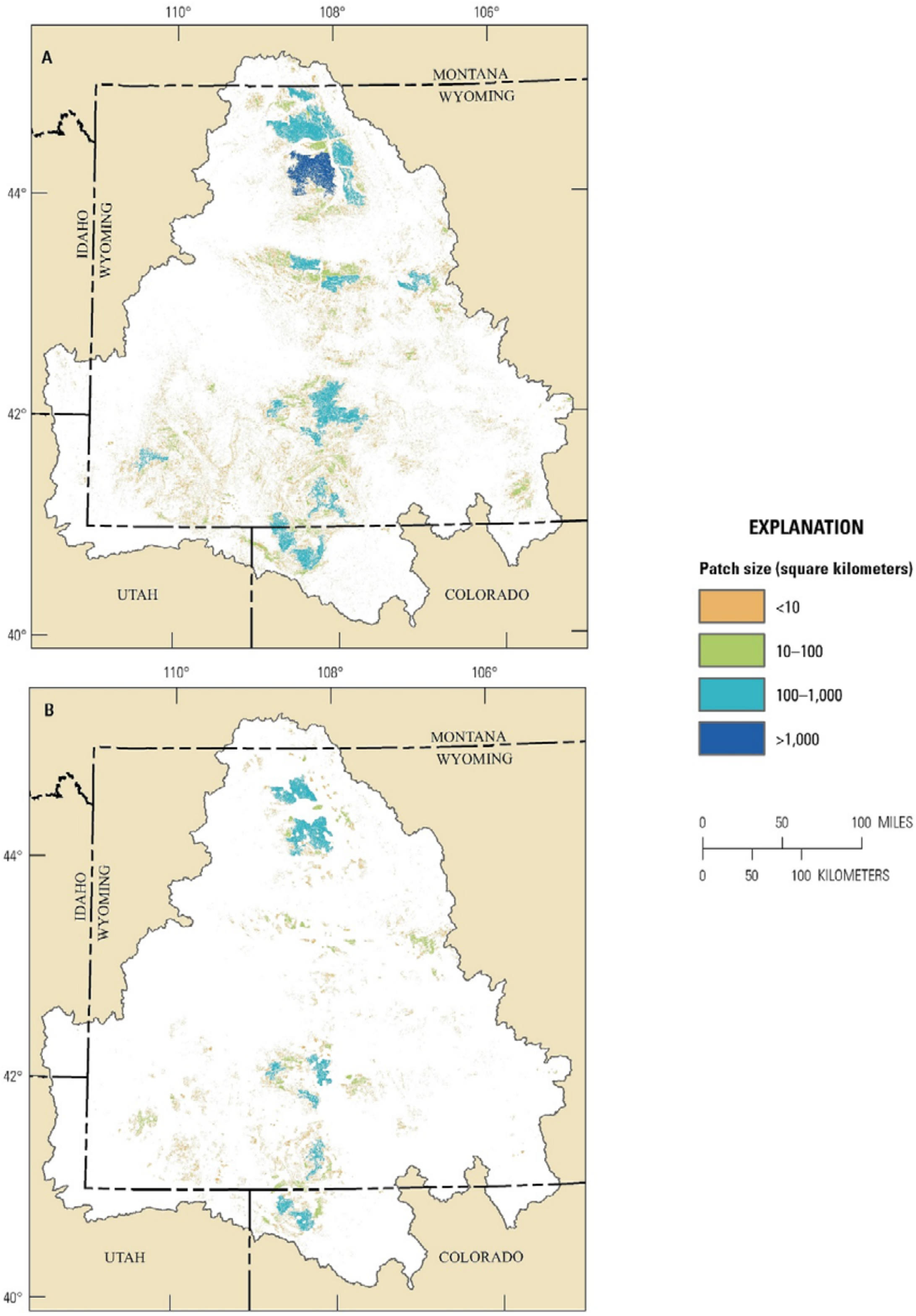

Figure 12−6. Patch sizes of desert shrublands in the Wyoming Basin Rapid Ecoregional Assessment project area for (*A*) baseline conditions and (*B*) relatively undeveloped areas (Terrestrial Development Index score ≤1 percent).

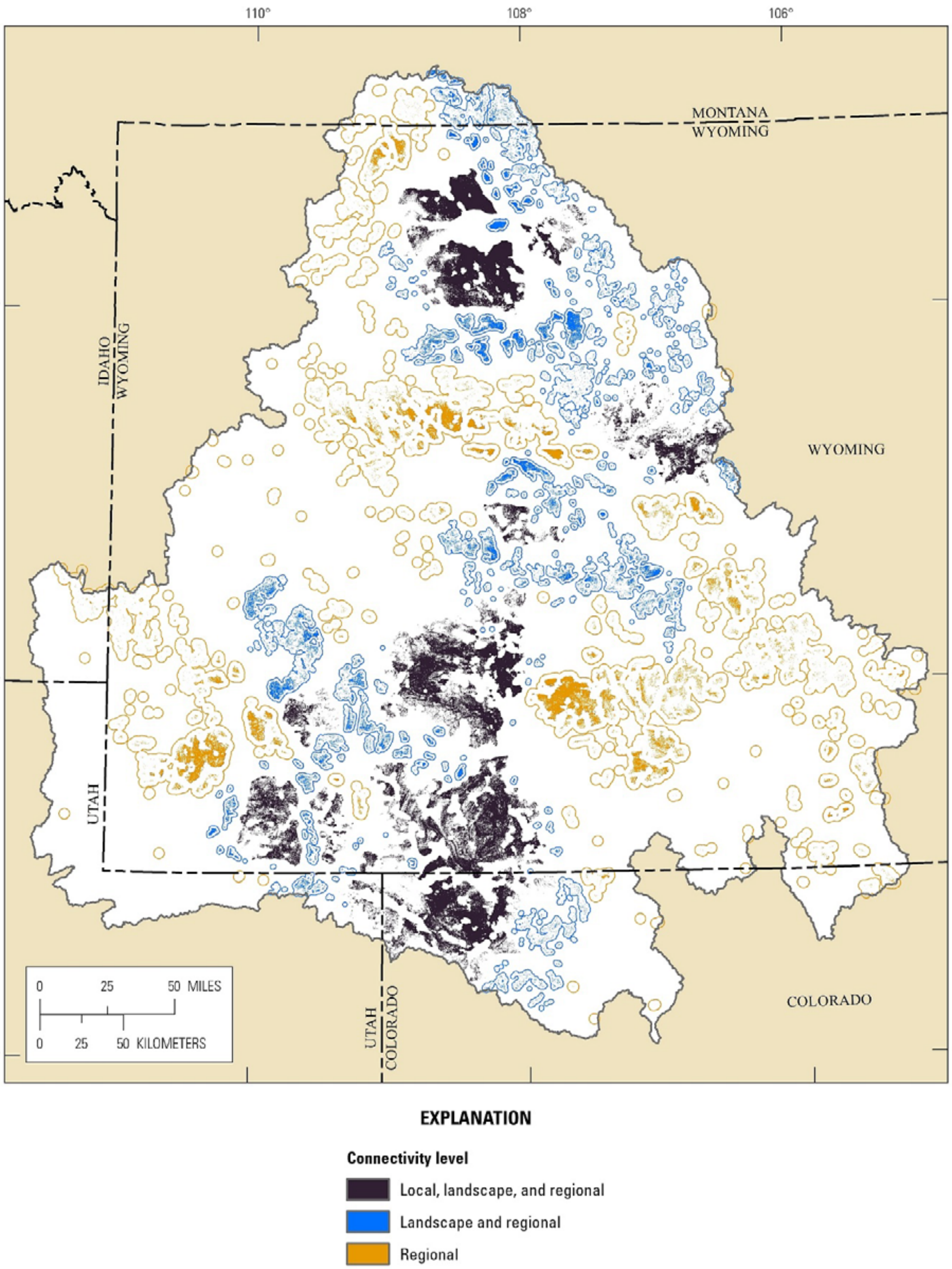

Figure 12−7. Structural connectivity of relatively undeveloped patches of desert shrublands in the Wyoming Basin Rapid Ecoregional Assessment project area. Black polygons include large and highly connected patches. Blue polygons include patches that contribute to both landscape and regional connectivity. Orange polygons represent isolated clusters of patches that are surrounded by developed areas or other cover types.

Where are potential barriers and corridors that may affect animal movements among relatively undeveloped desert shrubland patches (fig. 12–8)?

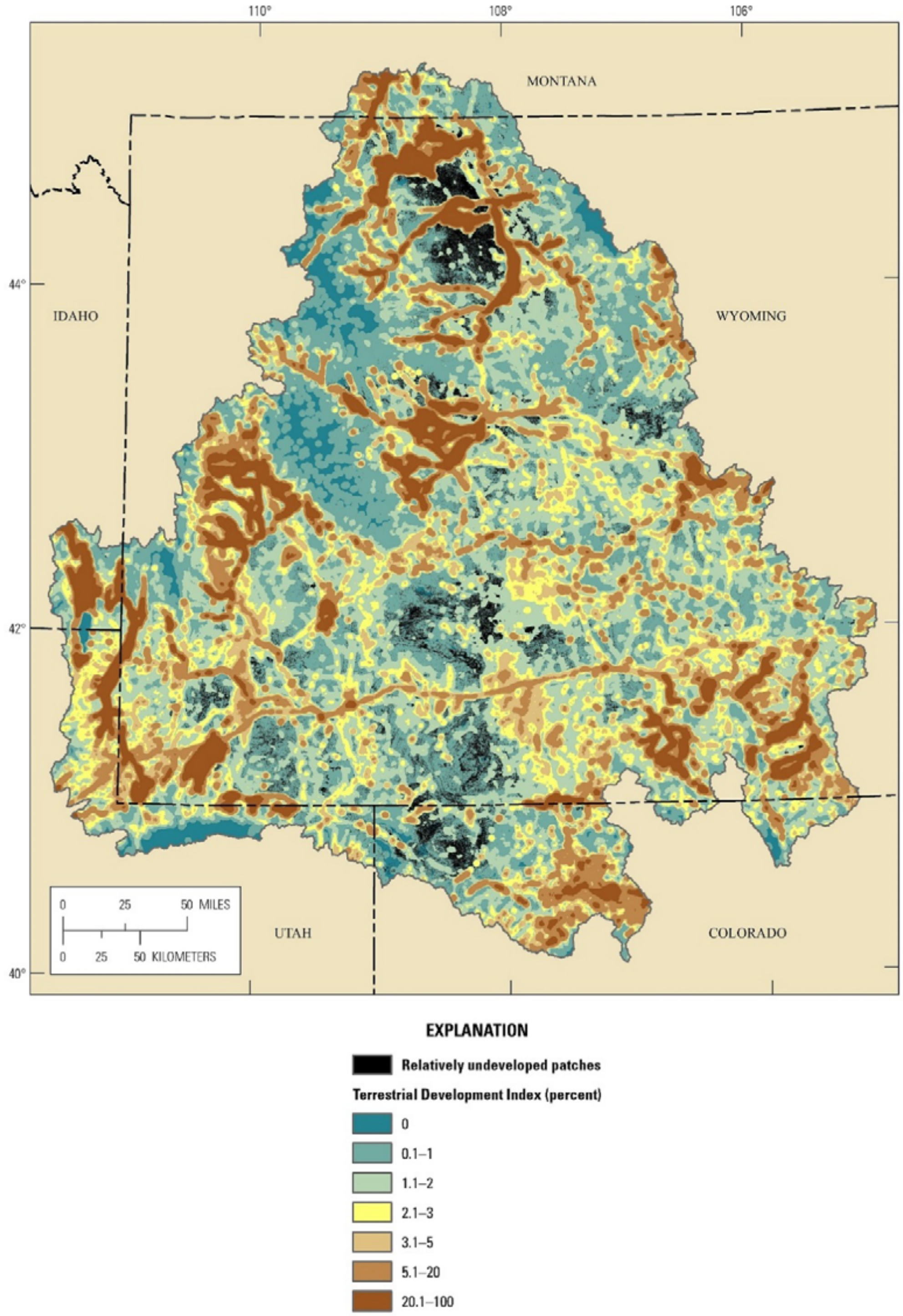

Figure 12−8. Potential barriers and corridors as a function of the Terrestrial Development Index (TDI) score for lands surrounding relatively undeveloped desert shrublands. Higher TDI scores (for example, >5 percent) represent potential barriers to movement among relatively undeveloped patches. Lower TDI scores (for example, <2 percent) represent potential corridors for movements among patches.

Where have recent fires occurred in baseline desert shrublands, and what is the total area burned per year (fig. 12–9)?

- Fires rarely occur in desert shrublands or are typically small, with only a small fraction burning annually on average. Cumulatively, 86 km^2 (33.2 mi^2), or only 0.5 percent, of desert shrubland has burned since 1980.
- Fires are typically small, but in 2000 the Buster Fire accounted for much of the area burned, which was 0.2 percent of desert shrublands.

What is the potential distribution of desert shrublands in 2030 (fig. 12–10)?

- The distribution of bioclimatic conditions conducive for desert shrublands is projected to expand by 2030 for climate scenario I. Projected decreases in precipitation and increases in temperature likely would favor desert shrublands over sagebrush steppe.
- By 2090, all three climate scenarios projected a dramatic increase in the extent of the desert shrublands bioclimatic envelope within the Basin; figure 2−18 includes additional climate scenarios and time periods.

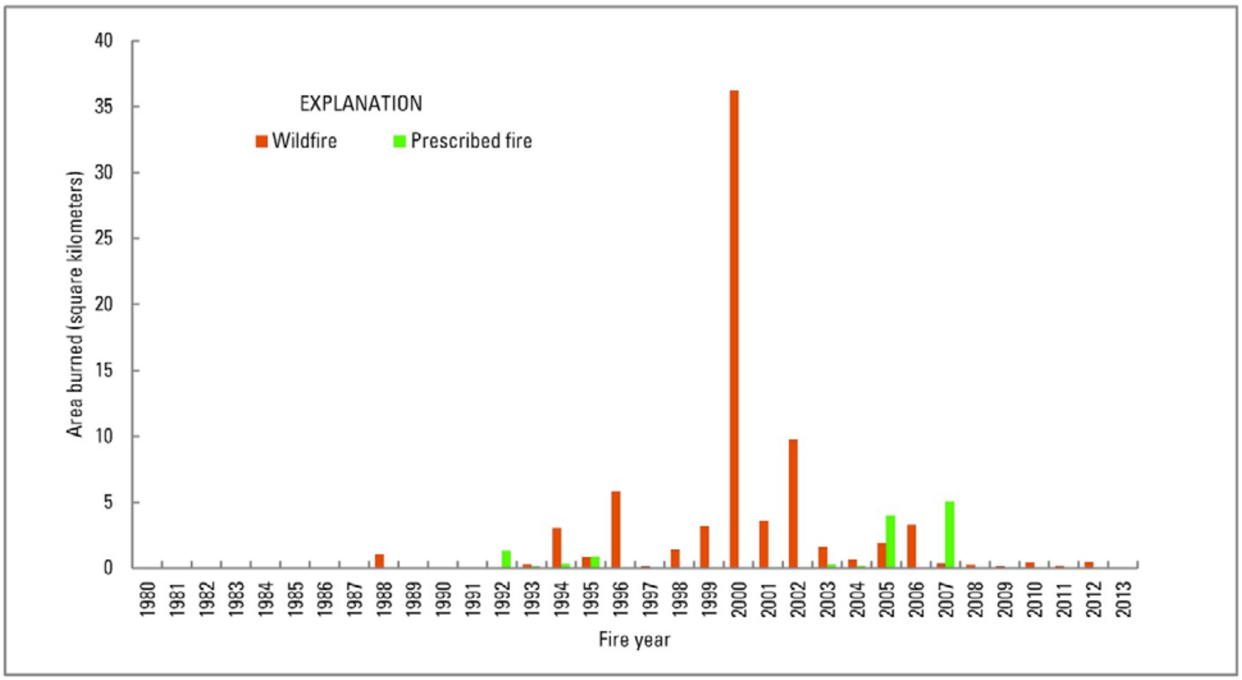

Figure 12−9. Annual area burned by wildfires and prescribed fires in baseline desert shrublands since 1980 in the Wyoming Basin Rapid Ecoregional Assessment project area.

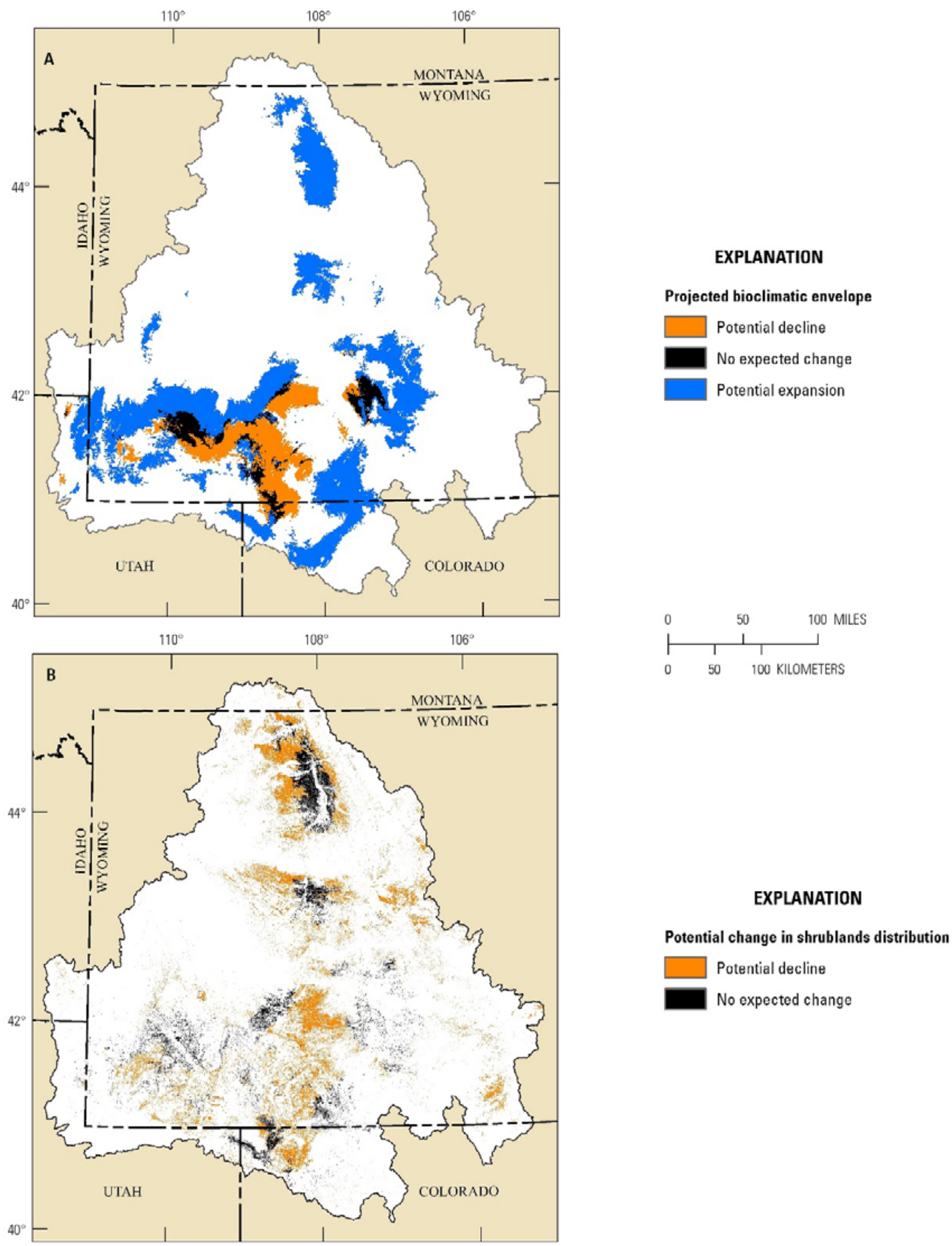

Figure 12−10. Potential effects of climate change on desert shrublands in the Wyoming Basin Rapid Ecoregional Assessment project area. (*A*) Projected changes in the bioclimatic envelope for desert shrublands derived from Rehfeldt and others (2012) for climate scenario I in 2030. Orange indicates areas with potential for decline because current and projected envelope distributions do not coincide. Black indicates areas not expected to change because the current and projected envelope distributions overlap. Blue indicates potential for expansion into areas that are outside the current envelope distribution. (*B*) Potential changes in baseline desert shrublands derived from overlap with the projected climate envelope distribution (as represented in *A*).

How does risk from development vary by land ownership or jurisdiction for desert shrublands (table 12–5, fig. 12–11)?

- The Bureau of Land Management (BLM) manages a majority of desert shrublands in the Wyoming Basin (table 12–5).
- Compared to most other lands, BLM lands encompass the lowest proportion of desert shrublands at high risk from development and the highest proportion with the lowest risk from development (fig. 12–11).

Table 12−5. Area and percent of desert shrublands by land ownership or jurisdiction in the Wyoming Basin Rapid Ecoregional Assessment project area.

[km^2, square kilometer]

Ownership or jurisdiction	Area (km^2)	Percent of Area
Bureau of Land Management	10,749	62.9
Private	3,562	20.9
State/County	1,051	6.1
Tribal	876	5.1
Other Federal[1]	710	4.1
Forest Service[2]	110	0.6
Private conservation	26	0.2

[1] National Park Service, Department of Defense, Department of Energy, Bureau of Reclamation, and U.S. Fish and Wildlife Service.

[2] U.S. Department of Agriculture Forest Service.

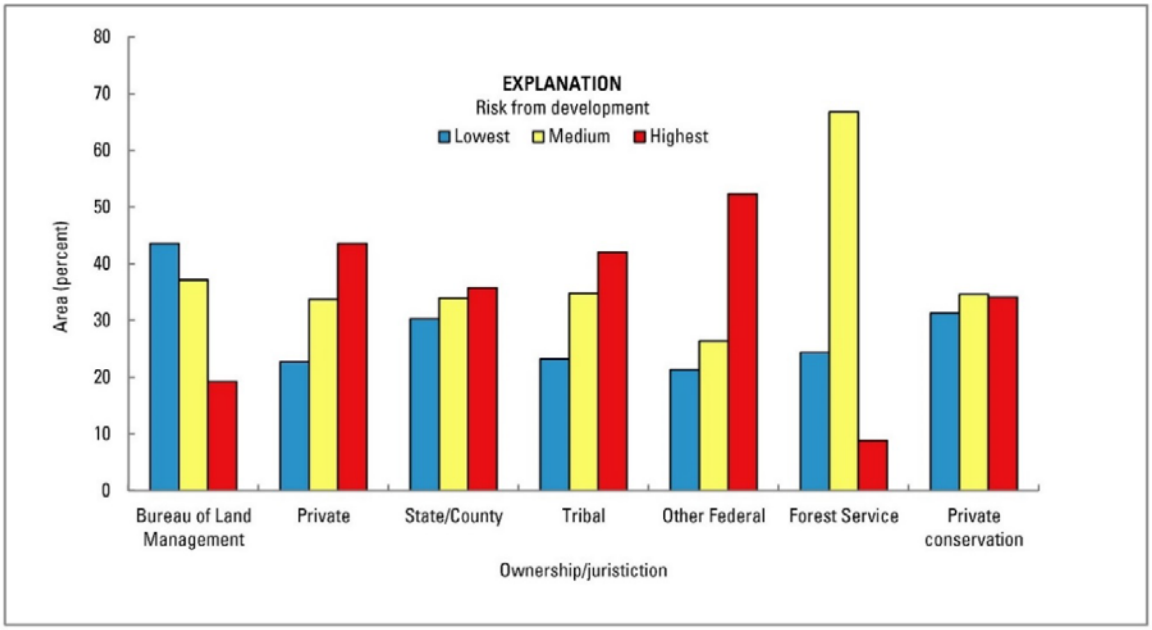

Figure 12−11. Relative ranks of risk from development, by land ownership or jurisdiction, for desert shrublands in the Wyoming Basin Rapid Ecoregional Assessment project area. Rankings are lowest (Terrestrial Development Index [TDI] score <1 percent), medium (TDI score 1−3 percent), and highest (TDI score >3 percent).

Where are the townships with the greatest landscape-level ecological values, and where are the townships with the greatest landscape-level risks (fig. 12–12)?

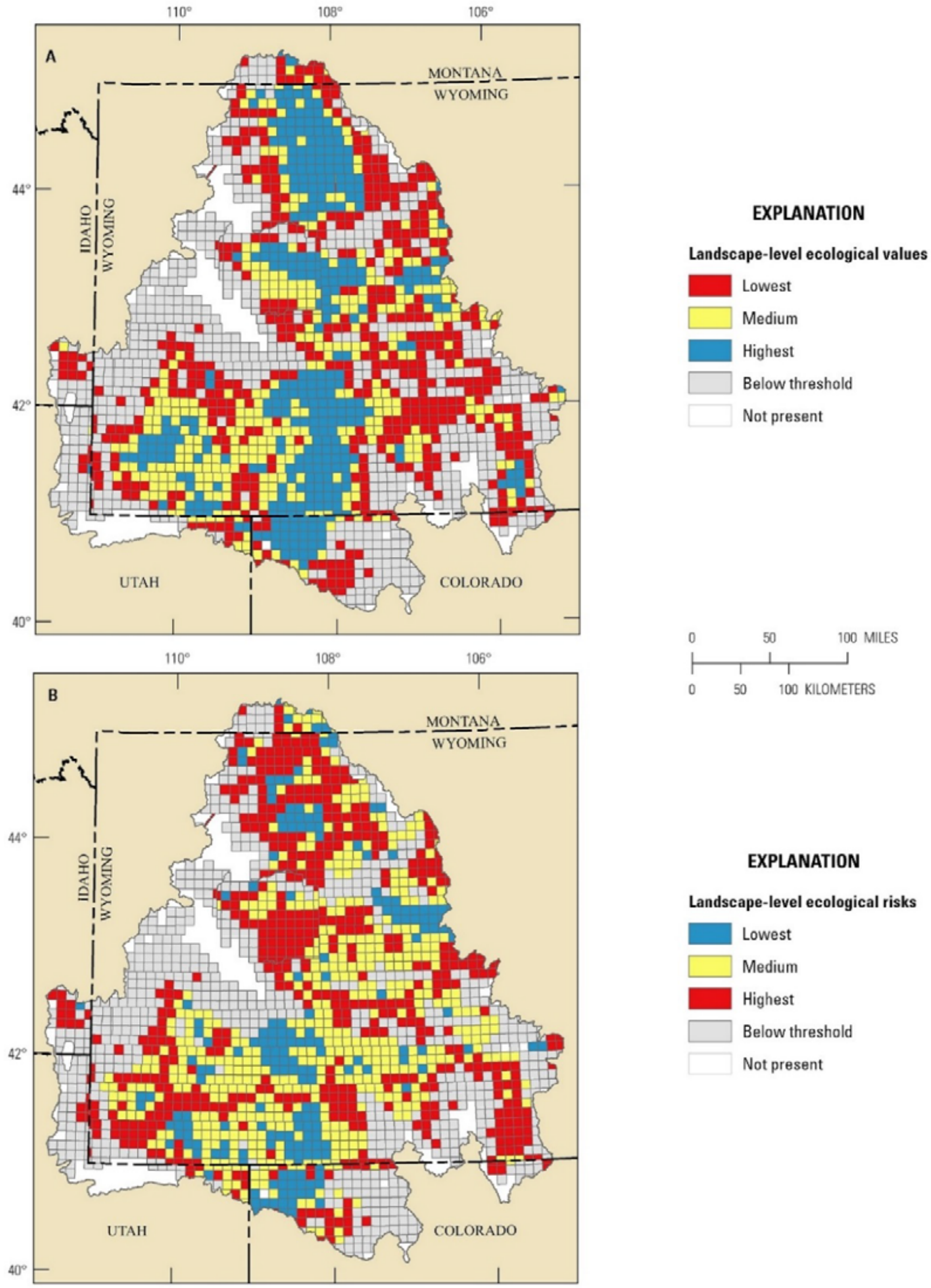

Figure 12−12. Ranks of landscape-level ecological values and risks for desert shrublands, summarized by township, in the Wyoming Basin Rapid Ecoregional Assessment project area. (*A*) Landscape-level values based on area and (*B*) landscape-level risks based on Terrestrial Development Index (see table 12–3 for overview of methods).

Where are the townships with the greatest conservation potential (fig. 12–13)?

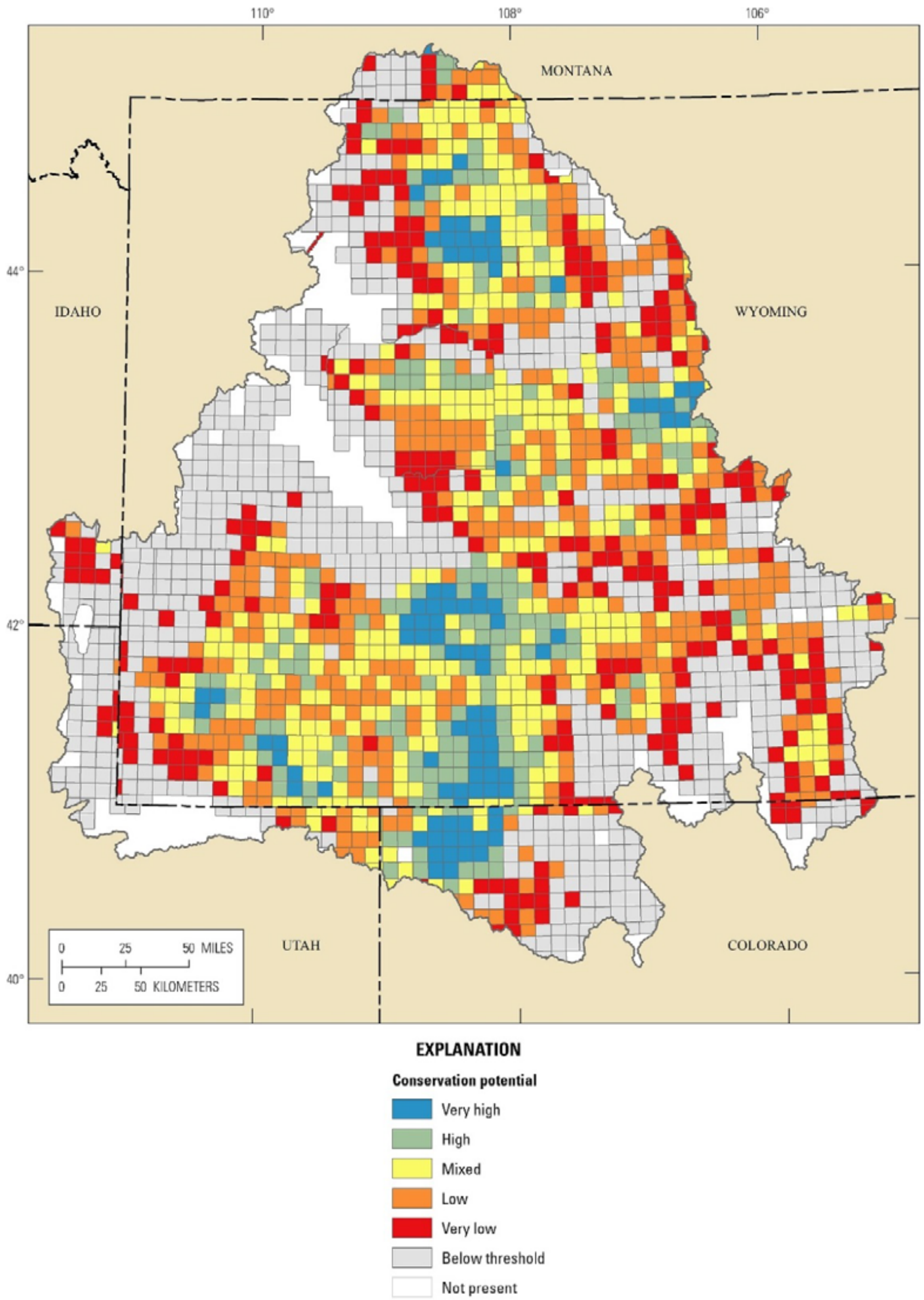

Figure 12−13. Conservation potential of desert shrublands, summarized by township, in the Wyoming Basin Rapid Ecoregional Assessment project area. Highest conservation potential identifies areas that have the highest landscape-level values and the lowest risks. Lowest conservation potential identifies areas with the lowest landscape-level values and the highest risks. Ranks of conservation potential are not intended as stand-alone summaries and are best interpreted in conjunction with the geospatial datasets used to address Core Management Questions.

Summary

Desert shrublands are widely distributed in the Wyoming Basin but cover only 9.6 percent of the land area. Development is pervasive across desert shrublands and has increased fragmentation and decreased structural connectivity. Because development is highly clustered in desert shrublands, 36.2 percent of the desert shrublands are relatively undeveloped. Many of the relatively undeveloped areas are under Bureau of Land Management jurisdiction. Species of management concern, such as mountain plover, are strongly tied to sparsely vegetated habitats prevalent in desert shrublands (Knopf and Wunder, 2006). Vulnerability to climate scenarios evaluated herein is expected to be low relative to other communities because desert shrublands are more tolerant of decreasing precipitation and increasing temperatures than adjacent areas of sagebrush steppe.

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