

2.4 Wildlife, Fisheries, and Related Habitat Values

2.4.1 Key Issues

The key issues for wildlife, fisheries, and related habitat values in the Wyoming PRB study area as a result of energy-related development can be classified as temporary and long-term. Potential temporary impacts arise from habitat removal and disturbance associated with a project's development and operation (e.g., coal mines, CBNG wells, etc.) and would cease upon project completion and successful reclamation in a given area. Potential long-term impacts consist of permanent changes to habitats and the wildlife populations that depend on those habitats, irrespective of reclamation success, and habitat disturbance related to longer term projects (e.g., power plant facilities, rail lines, etc.). Direct impacts to wildlife populations as a result of energy-related development could include limited direct mortalities, habitat loss or alteration, habitat fragmentation, and animal displacement. Indirect impacts could include increased noise, additional human presence, and the potential for increased vehicle-related mortalities. The severity of both temporary and long-term impacts would depend on factors such as the sensitivity of the species impacted, seasonal use patterns, type and timing of a project's activities, and physical parameters (e.g., topography, cover, forage, and climate).

2.4.2 Study Area

The study area for wildlife, fisheries, and related habitat values includes all or portions of Sheridan, Johnson, Campbell, and Converse counties (**Figure 1-1**). Subwatersheds within the study area also are shown in **Figure 1-1**. The study area includes most of the area administered by the BLM Buffalo Field Office, a portion of the area administered by the BLM Casper Field Office, and a portion of the TBNG, which is administered by the FS (**Figure 1-2**). State and private lands also are included in the study area (**Figure 1-3**).

2.4.3 Current Conditions

2.4.3.1 Wildlife Habitats

Wildlife habitats present in the Wyoming PRB study area include short- and mixed-grass prairie, and shrublands, other shrublands, coniferous forest, riparian/wetland communities, and aquatic habitats.

Common wildlife species that typically occur in short- and mixed-grass prairie habitats include: prairie rattlesnake (*Crotalus viridis*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*), ferruginous hawk (*Buteo regalis*), Swainson's hawk (*Buteo swainsoni*), sharp-tailed grouse (*Tympanuchus phasianellus*), lark bunting (*Calamospiza melanocorys*), horned lark (*Eremophila alpestris*), western meadowlark (*Sturnella neglecta*), lark sparrow (*Chondestes grammacus*), vesper sparrow (*Pooecetes gramineus*), chestnut collared longspur (*Calcarius ornatus*), McCown's longspur (*Calcarius mccownii*), badger (*Taxidea taxus*), coyote (*Canis latrans*), swift fox (*Vulpes velox*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), white-tailed jackrabbit (*Lepus townsendii*), Ord's kangaroo rat (*Dipodomys ordii*), deer mouse (*Peromyscus maniculatus*), western harvest mouse (*Reithrodontomys megalotis*), plains pocket gopher (*Geomys bursarius*), black-tailed prairie dog (*Cynomys ludovicianus*), and pronghorn (*Antilocapra americana*).

Common wildlife species that typically occur in sagebrush shrublands include: eastern short-horned lizard (*Phrynosoma douglasii brevirostre*), prairie rattlesnake, northern harrier (*Circus cyaneus*), Swainson's hawk, greater sage-grouse (*Centrocercus urophasianus*), Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), horned lark, sage thrasher (*Oreoscoptes montanus*), Brewer's sparrow (*Spizella breweri*), vesper sparrow, sage sparrow (*Amphispiza belli*), western meadowlark, desert cottontail (*Sylvilagus auduboni*), white-tailed jackrabbit, thirteen-lined ground squirrel, northern pocket gopher (*Thomomys talpoides*), Ord's kangaroo rat, deer mouse, prairie vole (*Microtus ochrogaster*), pronghorn, and mule deer (*Odocoileus hemionus*).

Common wildlife species that typically occur in other shrublands are similar to those that inhabit sagebrush shrublands, and include: garter snake (*Thamnophis elegans*), chukar (*Alectoris chukar*), sharp-tailed grouse (*Tympanuchus phasianellus*), western kingbird, horned lark, black-billed magpie (*Pica pica*), rock wren (*Salpinctes obsoletus*), sage thrasher, lazuli bunting (*Passerina amoena*), spotted towhee (*Pipilo maculatus*), Brewer's sparrow, lark sparrow, lark bunting, bobolink (*Dolichonyx oryzivorus*), masked shrew (*Sorex cinereus*), desert cottontail, least chipmunk (*Tamias minimus*), Wyoming ground squirrel (*Spermophilus elegans*), thirteen-lined ground squirrel, deer mouse, northern grasshopper mouse (*Onychomys leucogaster*), coyote, western spotted skunk (*Spilogale gracilis*), pronghorn, and mule deer.

Common wildlife species that inhabit coniferous forests include: mountain chickadee (*Poecile gambeli*), mourning dove (*Zenaida macroura*), golden eagle, mountain bluebird (*Sialia currucoides*), northern flicker (*Colaptes auratus*), western tanager (*Piranga ludoviciana*), pinyon jay (*Gymnorhinus cyanocephalus*), chipping sparrow (*Spizella passerina*), lark sparrow, Nuttall's cottontail (*Sylvilagus nuttallii*), mule deer, gray fox (*Urocyon cinereoargenteus*), white-tailed jackrabbit, porcupine (*Erethizon dorsatum*), bushy-tailed woodrat (*Neotoma cinerea*), and mountain lion (*Felis concolor*).

Wildlife species that may occur in riparian areas (including herbaceous, shrubby, and forested riparian areas) include: bull snake (*Pituophis catenifer*), tiger salamander (*Ambystoma tigrinum*), northern leopard frog (*Rana pipiens*), northern harrier, Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), common snipe (*Gallinago gallinago*), short-eared owl (*Asio flammeus*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), savannah sparrow (*Passerculus sandwichensis*), song sparrow (*Melospiza melodia*), red-winged blackbird (*Agelaius phoeniceus*), yellow-headed blackbird (*Xanthocephalus xanthocephalus*), deer mouse, meadow vole (*Microtus pennsylvanicus*), red fox (*Vulpes vulpes*), pronghorn, mule deer, and white-tailed deer (*Odocoileus virginianus*). Wet meadows tend to provide habitats for wildlife species associated with nearby dominant vegetation cover types (such as prairie or sagebrush shrublands), although in areas of large wet meadow complexes species common to riparian habitats also may occur.

A substantial amount of wildlife habitat has been impacted by past and present activities in the Wyoming PRB study area. These disturbances include, but are not limited to, agriculture, mining, roads, railroads, urban areas, oil and gas well development, power plants, and other energy-related development. Where data were available, direct disturbance acreages as of the end of base year 2008 were estimated and presented in the discussions for individual species below. A portion of the land disturbance associated with coal mining and oil and gas development has been reclaimed.

Coal mining, oil and gas development, and other energy-related development within the Wyoming PRB study area have resulted in both temporary and long-term impacts, as well as direct and indirect impacts, to wildlife species as discussed in Section 2.4.1, Key Issues.

Tables 2.3-2 and 2.3-3 summarize the existing development-related disturbance (total and coal mine-related, respectively) to vegetation communities as of the end of base year 2008. Based on this GIS analysis, the cumulative development-related disturbance to associated wildlife habitats in the Wyoming PRB study area totaled 217,647 acres, of which 67,242 acres of disturbance were related to coal mining activities. The primary habitats impacted as a result of coal mine development have included short- and mixed-grass prairies and sagebrush shrublands. Lesser amounts of coniferous forest, riparian/wetland, and aquatic habitats also have been disturbed. As of the end of base year 2008, approximately 39 percent of previously disturbed wildlife habitat had been permanently reclaimed. Specific to coal mines, approximately 32 percent of the previously disturbed wildlife habitat had been permanently reclaimed (AECOM 2011b).

2.4.3.2 Habitat Fragmentation

Considerable research has been conducted regarding the effects of habitat fragmentation on wildlife populations that are caused by a variety of human activities, including energy-related development.

Habitat fragmentation from facilities such as roads, well pads, mines, pipelines, and electrical power lines can result in the direct loss of potential wildlife habitat. Other effects from habitat fragmentation, such as increased noise, increased human presence, dispersal of noxious and invasive weed species, and dust deposition from unpaved road traffic can extend well beyond the surface disturbance boundary. These effects result in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and changes in species composition. However, the severity of these effects on terrestrial wildlife depends on factors such as sensitivity of the species, seasonal use, type and timing of project activities, and physical parameters (e.g., topography, cover, forage, and climate). The following section examines the effects to various groups of species determined from available literature.

Habitat

Roads alter the temperature, humidity, sunlight intensity, moisture content of surrounding soils, and vegetation composition (Vaillancourt 1995). As a result, vegetation adjacent to the roads is dissimilar to surrounding vegetation, as measured by species composition, abundance, dust, amount of bare soil, and litter. Baker and Dillon (2000) summarized the effects on vegetation at a variety of sites and concluded the average depth-of-edge for vegetation effects of roads was 200 feet. Gelbard and Belnap (2003) demonstrated that desert shrub communities located near maintained gravel and paved roads contained a large amount of exotic species, while plant communities near primitive, two-track roads were less disrupted when compared to surrounding native vegetation. As a result, it is assumed that vegetation community composition would be altered for approximately 165 to 200 feet away from the roadsides, despite reclamation with native seed mixtures.

Big Game

Displacement of big game species as a result of direct habitat loss and indirect reduction in habitat quality has been widely documented (Irwin and Peek 1983; Lyon 1983; Rost and Bailey 1979; Ward 1976). Big game species tend to move away from areas of human activity and roads, thereby reducing habitat utilization near the disturbed areas. The distance that big game are displaced is influenced by the level and timing of the human activity, topography, and the presence of vegetation (Lyon 1979), presumably due to noise attenuation and visual cover. Displacement of big game species is greatest for heavily traveled secondary and unpaved roads.

Most research has focused on displacement distances for elk (*Cervus canadensis*) and deer. Displacement distances are defined as the distances from road centerline where animal densities are less than in surrounding areas (i.e., under-utilized habitat). In most circumstances, elk were not observed to habituate to human activities. Lyon (1983) analyzed one study that determined habitat effectiveness for elk within 660 feet from a road was 42.3 percent of surrounding habitat. Deer and pronghorn may be more tolerant of human activities than elk. For deer, displacement distances ranged from 330 feet to 0.6 mile, depending on the presence of vegetative cover (Ward 1976). For evaluation purposes, 660 feet was the most common displacement distance used for deer, especially in areas with minimal vegetative cover. Deer and pronghorn have been observed to habituate to vehicles. Displacement distances decreased when traffic was predictable and moving at constant speeds, and was not associated with out-of-vehicle activities (Ward 1976; Ward et al. 1980). However, in most cases, traffic within areas that experience energy-related development activities is characterized by slow moving traffic, vehicles that stop, and out-of-vehicle activity; thus, acclimation by big game species would not be anticipated.

A long-term monitoring plan was conducted by Western EcoSystems Technology, Inc. (WEST) to assess the potential impacts of natural gas development on mule deer in the Pinedale Anticline Project Area in Sublette County, Wyoming. The results of this study suggest that winter mule deer habitat selection and distribution patterns have been impacted by natural gas development, specifically as a result of construction of road networks and well pads. Assuming selected habitats prior to natural gas development were preferred over other habitats, these results suggest that natural gas development displaced mule deer to less preferred habitats (WEST 2009).

Upland Game Birds

Oil and gas development has been shown to negatively impact greater sage-grouse populations as a result of increased noise and increased human disturbance. Greater sage-grouse have been observed to abandon lek sites in areas with increased road development (Braun 1986). Compared to hens in undisturbed leks, greater sage-grouse hens that used breeding leks within approximately 2 miles from oil and gas development moved farther away from breeding leks to nesting areas and had lower nest initiation rates (Lyon 2000). Furthermore, greater sage-grouse hens that utilized habitats farthest from roads had greater brood survivorship than those hens utilizing habitat near roads (Lyon 2000). Pump noise from oil facilities also appears to reduce the effectiveness of male greater sage-grouse vocalizations on lek sites (Klott 1987). Connelly et al. (2000) recommends that energy-related facilities be located more than 2 miles from active lek sites under ideal habitat conditions, 3 miles when habitat conditions are not ideal, and 11 miles when greater sage-grouse populations are migratory.

Grey partridge (*Perdix perdix*), chukar, and ring-necked pheasant (*Phasianus colchicus*) may experience increased mortality rates due to increased public access. Vehicular traffic may injure or kill individuals, and local populations may experience higher levels of hunting and poaching pressure due to improved public access. These species are relatively tolerant of human activity and are likely to occupy suitable habitat in reasonably close proximity to roads and well pads.

Raptors

For raptor species, habitat fragmentation can result in the loss or alteration of habitat, reduction of prey base, and increased human disturbance. The loss of native habitat to human development has resulted in declines of hawks and eagles throughout the West (Boeker 1974; Schmutz 1984). In some cases, habitat changes have not reduced numbers of raptors but have resulted in shifts in species composition (Harlow and Bloom 1987). Impacts to small mammal populations from habitat loss and fragmentation can reduce the prey base for raptors, resulting in lower raptor densities. Thompson et al. (1982) found that golden eagles had decreased nesting success where native vegetation had been lost and the habitat was unable to support jackrabbit (prey) populations. Furthermore, the increased road network within the Wyoming PRB study area has led to greater public access and increased noise and human activity. As a result, raptors may be disturbed from nests and roosts causing displacement and reduced nesting success (Anderson and Squires 1997; Brown and Stevens 1997; Postovit and Postovit 1987; Stalmaster and Newman 1978). Noise levels and human activity also can preclude otherwise acceptable raptor habitat from use (USFWS 2002a). As with big game species, vehicles that stop cause greater levels of disturbance than continuously moving vehicles (White and Thurow 1985).

Other Non-game Birds

The effects of high daily traffic levels (less than 10,000 vehicles per day) on bird densities located near paved roads are well documented (Reijnen and Foppen 1995; Reijnen et al. 1995, 1996, 1997). These studies showed a reduction in bird densities from approximately 130 to 9,200 feet in forested habitats and approximately 70 to 11,600 feet in grassland habitats, depending on species and traffic volume (LaGory et al. 2001; Reijnen et al. 1997). In grassland habitats, Reijnen et al. (1996) determined that densities were reduced at distances ranging from approximately 70 to 5,600 feet along paved roads traveled by 5,000 vehicles per day, on average. Seven of 12 species in this study showed a substantial negative relationship in population density of more than 10 percent reduction in bird density within 330 feet of the road. Density reduction within 330 feet ranged from 12 to 56 percent. Only 2 of the 12 species showed any further reduction in density greater than 330 feet from a road (Reijnen et al. 1996). A study on the effects of natural gas development in west-central Wyoming on passerine bird species within sagebrush-steppe habitat showed a 60 percent reduction in densities of sagebrush obligate species (e.g., Brewer's sparrow, sage sparrow, sage thrasher) that occurred within 330 feet of both paved and unpaved roads, while horned lark population densities increased slightly within the 330-foot area. Horned larks are grassland species that commonly are observed foraging for windblown seed along dirt roadways and other disturbed areas. The average daily traffic volume within the Wyoming PRB study area ranged from 11 and 444 vehicles per day (Ingelfinger 2001).

Overall, reductions in bird population densities from roads in both open grasslands and woodlands are attributed to reduced habitat quality produced by elevated noise levels (Reijnen et al. 1995, 1997). Although visual stimuli in open landscapes may add to density reduction at relatively short distances, the effects of noise appear to be the most critical factor, since breeding birds of open grasslands (threshold noise range of 43 to 60 decibels on the A-weighted scale [dBA]) and woodlands (threshold noise range of 36 to 58 dBA) respond very similarly to disturbance by traffic volume (Reijnen et al. 1997). Reijnen et al. (1996) determined a threshold effect for bird species to be 47 dBA, while a New Mexico study in a piñon-juniper community found that effects of gas well compressor noise on bird populations were strongest in areas where noise levels were greater than 50 dBA. However, moderate noise levels (40 to 50 dBA) also showed some effect on bird densities in this study (LaGory et al. 2001).

As a result, habitat fragmentation effects have resulted from long-term surface disturbance in the Wyoming PRB study area. Indirect effects from human activity, dispersal of noxious and invasive weeds, and dust effects from unpaved road traffic potentially have further reduced habitat quality and wildlife utilization in the study area. Collectively, it is probable that these effects have resulted in overall changes in habitat quality, habitat loss, increased animal displacement, reductions in local wildlife populations, and incremental changes in species composition. However, the severity of these effects on terrestrial wildlife depends on factors such as sensitivity of the species, seasonal use, type and timing of a project's activities, and physical parameters (e.g., topography, cover, forage, and climate).

2.4.3.3 Terrestrial Wildlife

Big Game Species

Big game species that are expected to occur in suitable habitats throughout the Wyoming PRB study area include pronghorn, white-tailed deer, mule deer, elk, and moose (*Alces alces*). The Wyoming PRB study area includes the following crucial and severe ranges for big game species: crucial winter yearlong and severe winter range for pronghorn, crucial winter and crucial winter yearlong range for mule deer, crucial winter and crucial winter yearlong range for elk, and crucial yearlong and crucial winter yearlong range for moose. No crucial or severe ranges have been identified within the Wyoming PRB study area for white-tailed deer. These and other seasonal ranges are presented below for each species. No big game migration corridors are recognized by the WGFD in this area. Big game range data for this study were obtained from the WGFD (2012a).

Pronghorn. Pronghorn are the most common big game species in the Wyoming PRB study area. They are present in the majority of the study area, except in the foothills of the central portion of the basin (**Figure 2.4-1**). Typical habitat for pronghorn includes grasslands and semi-desert shrublands located in the western and southwestern U.S. This species commonly inhabits short- and mixed-grass prairies and tends to avoid more xeric landscapes. Home ranges can vary considerably in size, ranging from 400 to 5,600 acres. Home range size is influenced by several factors, including season, habitat quality, population characteristics, and local livestock occurrence. Daily movement usually does not exceed 6 miles. Some pronghorn make seasonal migrations between summer and winter habitats. These migrations often are triggered by availability of succulent plants and snow depth (Fitzgerald et al. 1994). The type and distribution of pronghorn ranges by subwatershed are presented in **Table 2.4-1**.

Table 2.4-1 Distribution of Pronghorn Ranges by Subwatershed

Subwatershed	Pronghorn Range (acres)						
	Winter	Winter Yearlong	Crucial Winter Yearlong	Severe Winter	Spring, Summer, Fall	Yearlong	Total ¹
Antelope Creek	0	57,621	0	31,774	218	570,430	660,042
Clear Creek	0	37,934	0	0	489	453,673	492,095
Crazy Woman Creek	0	37,868	0	0	18,470	446,054	502,393

Table 2.4-1 Distribution of Pronghorn Ranges by Subwatershed

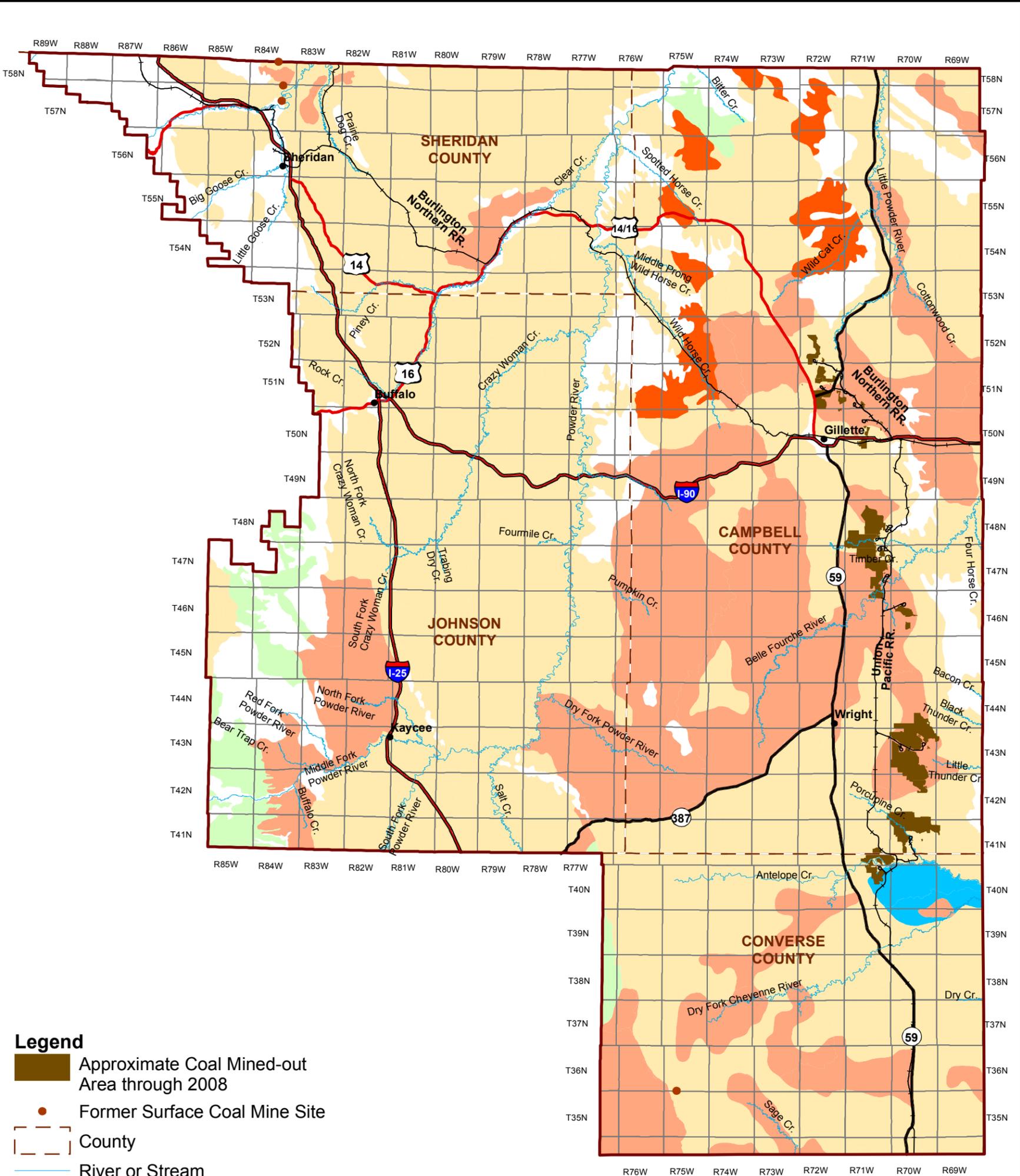
Subwatershed	Pronghorn Range (acres)						
	Winter	Winter Yearlong	Crucial Winter Yearlong	Severe Winter	Spring, Summer, Fall	Yearlong	Total ¹
Dry Fork Cheyenne River	0	83,043	0	19,195	0	207,112	309,349
Lightning Creek	0	59,176	0	0	0	249,126	308,303
Little Bighorn River	0	0	0	0	0	1,029	1,029
Little Missouri River	0	6,506	0	0	0	27,918	34,424
Little Powder River	66,186	218,792	0	0	0	446,107	731,086
Middle Fork Powder River	0	155,217	0	0	109,017	59,418	323,652
Middle North Platte River	0	120,220	114	0	0	91,965	212,299
Middle Powder River	23,723	0	0	0	24,841	124,523	173,088
North Fork Powder River	0	0	0	0	871	17,649	18,520
Salt Creek	0	17,981	0	0	17,215	112,761	147,957
South Fork Powder River	0	57	0	0	0	114,252	114,309
Upper Belle Fourche River	0	491,305	0	0	0	293,162	784,467
Upper Cheyenne River	0	62,910	0	0	0	116,163	179,073
Upper Powder River	67,048	470,705	0	0	126	855,123	1,393,001
Upper Tongue River	0	13,095	0	0	0	527,231	540,326
Total¹	156,957	1,832,430	114	50,969	171,247	4,713,696	6,925,413

¹ Slight differences in totals may occur due to rounding.

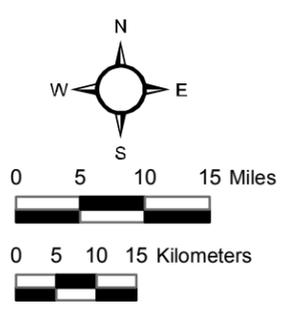
Source: WGFD 2012a.

The WGFD divided pronghorn populations into herd units to estimate population sizes. The following herd units reside entirely or partially within the Wyoming PRB study area: 203, 308, 309, 310, 316, 318, 339, 351, 352, 353, 354, 355, 740, and 748. The WGFD estimated the population size of all herd units within the study area to be 180,844 animals in 2010 (WGFD 2012c). This group of herd units has an overall population goal of 143,500 animals. Therefore, population levels in 2010 were approximately 126 percent of the goal. Among individual herd units, population levels in 2010 ranged from 91 to 1,398 percent of population goals. Harsh winter weather conditions, high fawn mortality, and disease accounted for lower populations in individual units that failed to reach management goals. In several herd units, lack of public access for hunting has resulted in herd numbers that greatly exceed population goals (WGFD 2012c). For pronghorn in the Wyoming PRB study area, the overall population trend has been stable to increasing populations. Herd units 318, 339, 354, 740, and 339 exhibited decreasing trends. This most likely was a result of lower fawn ratios, harsh winter conditions, disease, and increased harvest (WGFD 2012c). Extensive on-going and planned future energy-related development activities were considered potential management concerns for some herd units. For example, increased road density, loss of vegetation, and increased human presence has the potential to adversely affect herd units subject to CBNG development (WGFD 2012c). **Table 2.4-2** presents cumulative disturbance to pronghorn ranges by subwatershed as of the end of base year 2008.

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- Legend**
- Approximate Coal Mined-out Area through 2008
 - Former Surface Coal Mine Site
 - County
 - River or Stream
 - Railroad
- Pronghorn Ranges**
- Winter
 - Winter Yearlong
 - Crucial Winter Yearlong
 - Severe Winter
 - Spring, Summer, Fall
 - Yearlong



Powder River Basin Coal Review

Figure 2.4-1

Pronghorn Ranges

Sources: BLM 2010a; WGFD 2012a.

Table 2.4-2 Cumulative Disturbance to Pronghorn Ranges by Subwatershed

Subwatershed	Pronghorn Range (acres) ¹						
	Winter	Winter Yearlong	Crucial Winter Yearlong	Severe Winter	Spring, Summer, Fall	Yearlong	Total ²
Antelope Creek	0	1,146	0	1,672	1	27,463	30,282
Clear Creek	0	511	0	0	0	3,503	4,014
Crazy Woman Creek	0	44	0	0	0	2,253	2,298
Dry Fork Cheyenne River	0	936	0	107	0	2,045	3,088
Lightning Creek	0	988	0	0	0	2,861	3,850
Little Bighorn River	0	0	0	0	0	0	0
Little Missouri River	0	84	0	0	0	148	232
Little Powder River	767	9,454	0	0	0	13,989	24,211
Middle Fork Powder River	0	834	0	0	0	211	1,045
Middle North Platte River	0	427	0	0	0	400	827
Middle Powder River	850	0	0	0	1,055	3,632	5,536
North Fork Powder River	0	0	0	0	0	0	0
Salt Creek	0	27	0	0	30	741	797
South Fork Powder River	0	0	0	0	0	653	653
Upper Belle Fourche River	0	34,390	0	0	0	21,372	55,762
Upper Cheyenne River	0	20,918	0	0	0	5,150	26,068
Upper Powder River	2,918	15,554	0	0	0	21,063	39,535
Upper Tongue River	0	838	0	0	0	8,498	9,335
Total²	4,536	86,151	0	1,778	1,086	113,982	207,533

¹ Based on GIS analysis of existing development-related disturbance as of end 2008.

² Slight differences in totals may occur due to rounding.

Source: WFGD 2012a.

White-tailed Deer. In Wyoming, white-tailed deer inhabit ponderosa pine forests, riparian woodlands, shrubby riparian areas, and associated irrigated agricultural lands. Due to their dependence on wooded habitats, white-tailed deer are restricted to river and stream drainages throughout the PRB and the riparian areas in the northern foothills of the Big Horn Mountains (**Figure 2.4-2**). White-tailed deer mortality is usually a result of hunting, winter starvation, collision with vehicles, or predation. The type and distribution of white-tailed deer ranges by subwatershed are presented in **Table 2.4-3**.

The following herd units reside entirely or partially within the Wyoming PRB study area: 201, 303, 706, and 707. There is no population model, estimate, or objective for herd units 201 and 707. However, this species has a stable or increasing trend, as populations are suspected to be considerably higher than the goals for each herd unit. Increasing population levels can be accredited to the inaccessibility of habitat in the northwestern portion of the Wyoming PRB study area, which impedes hunting and urbanization. **Table 2.4-4** presents cumulative disturbance to white-tailed deer ranges by subwatershed as of the end of base year 2008.

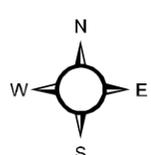
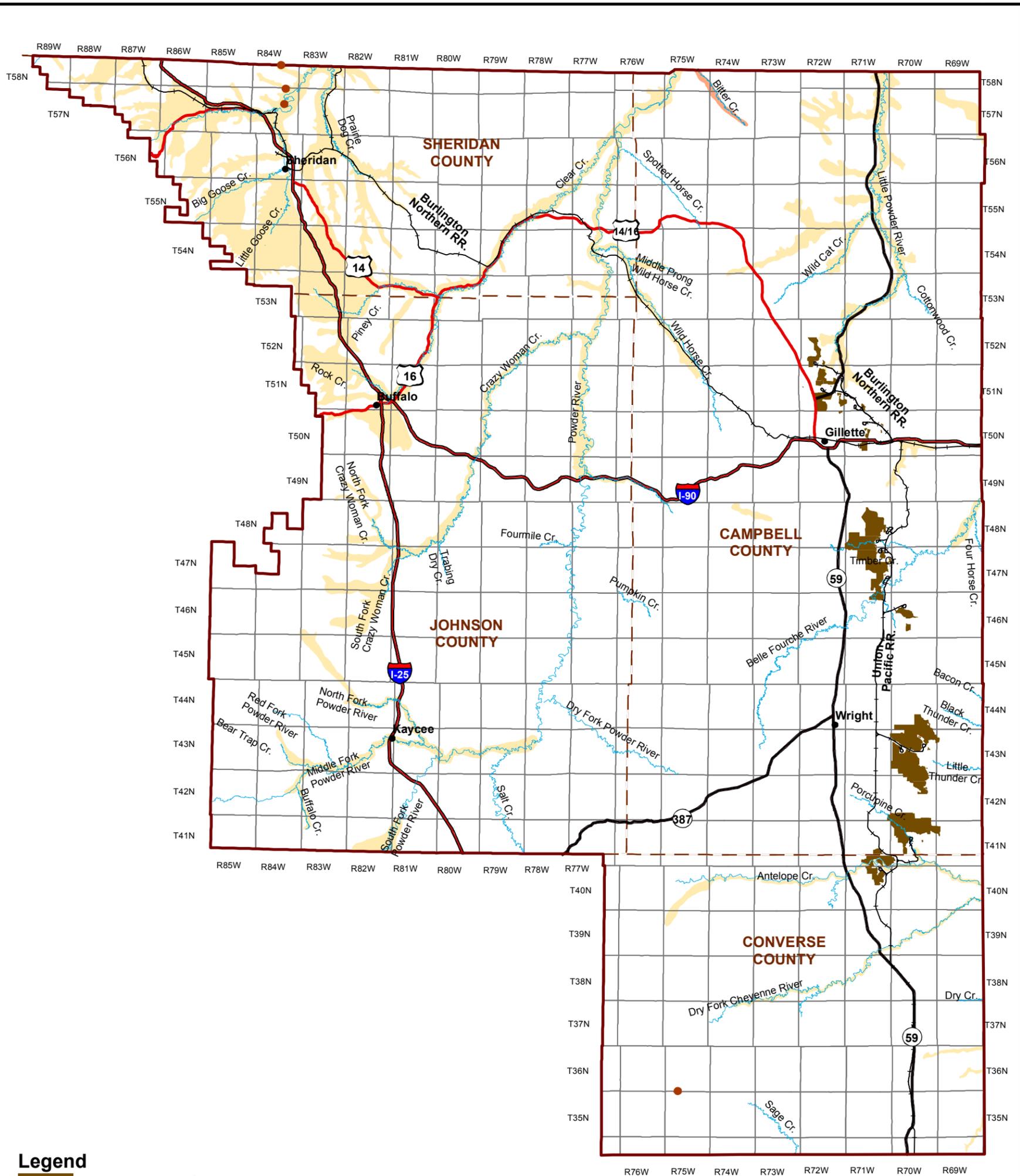
Table 2.4-3 Distribution of White-tailed Deer Ranges by Subwatershed

Subwatershed	White-tailed Deer Range (acres)		
	Winter Yearlong	Yearlong	Total ¹
Antelope Creek	0	17,965	17,965
Clear Creek	0	130,790	130,790
Crazy Woman Creek	0	67,543	67,543
Dry Fork Cheyenne River	0	11,653	11,653
Lightning Creek	0	4,656	4,656
Little Bighorn River	0	16,619	16,619
Little Missouri River	0	4,688	4,688
Little Powder River	0	102,361	102,361
Middle Fork Powder River	0	31,570	31,570
Middle North Platte River	0	0	0
Middle Powder River	4,671	12,597	17,268
North Fork Powder River	0	0	0
Salt Creek	0	316	316
South Fork Powder River	0	9,334	9,334
Upper Belle Fourche River	0	13,586	13,586
Upper Cheyenne River	0	0	0
Upper Powder River	0	71,273	71,273
Upper Tongue River	0	264,869	264,869
Total¹	4,671	759,820	764,491

¹ Slight differences in totals may occur due to rounding.

Source: WGFD 2012a.

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Legend

- Approximate Coal Mined-out Area through 2008
- Former Surface Coal Mine Site
- County
- River or Stream
- Railroad
- White-tailed Deer Ranges**
- Winter Yearlong
- Yearlong

Powder River Basin Coal Review

Figure 2.4-2
White-tailed Deer Ranges

Sources: BLM 2010a; WGFD 2012a.

Table 2.4-4 Cumulative Disturbance to White-tailed Deer Ranges by Subwatershed

Subwatershed	White-tailed Deer Range (acres) ¹		
	Winter Yearlong	Yearlong	Total ²
Antelope Creek	0	694	694
Clear Creek	0	1,795	1,795
Crazy Woman Creek	0	479	479
Dry Fork Cheyenne River	0	65	65
Lightning Creek	0	71	71
Little Bighorn River	0	90	90
Little Missouri River	0	21	21
Little Powder River	0	1,544	1,544
Middle Fork Powder River	0	27	27
Middle North Platte River	0	0	0
Middle Powder River	97	394	491
North Fork Powder River	0	0	0
Salt Creek	0	3	3
South Fork Powder River	0	77	77
Upper Belle Fourche River	0	351	351
Upper Cheyenne River	0	0	0
Upper Powder River	0	2,870	2,870
Upper Tongue River	0	4,919	4,919
Total²	97	13,399	13,496

¹ Based on GIS analysis of existing development-related disturbance as of the end of base year 2008.

² Slight differences in totals may occur due to rounding.

Source: WGFD 2012a.

Mule Deer. Mule deer occur throughout western North America, from central Mexico to northern Canada. In contrast to white-tailed deer, mule deer utilize a wide variety of habitats. Typical habitats include short- and mixed-grass prairies, sagebrush shrublands, other shrublands, coniferous forests, and wooded riparian areas. Mule deer ranges occur throughout the Wyoming PRB study area, with the exception of a few areas located between Wright and Gillette (**Figure 2.4-3**). Mule deer are considered more migratory than white-tailed deer. They migrate seasonally between high elevations in the summer to lower elevations in the winter. Mortality in adult mule deer typically results from hunting, winter starvation, automobile collisions, or predation. The type and distribution of mule deer ranges by subwatershed are presented in **Table 2.4-5**.

Table 2.4-5 Distribution of Mule Deer Ranges by Subwatershed

Subwatershed	Mule Deer Range (acres)					
	Winter Yearlong	Crucial Winter Yearlong	Crucial Winter	Spring, Summer, Fall	Yearlong	Total ¹
Antelope Creek	68,434	0	0	0	517,181	585,615
Clear Creek	459,882	0	6,603	2,163	78,832	547,480
Crazy Woman Creek	317,923	3,395	376	60,708	165,907	548,309
Dry Fork Cheyenne River	67,225	0	0	0	242,124	309,349
Lightning Creek	49,542	0	0	0	258,761	308,303
Little Bighorn River	44,771	0	0	1,427	3,900	50,098
Little Missouri River	38,866	0	0	0	205	39,071
Little Powder River	468,915	0	0	0	291,849	760,764
Middle Fork Powder River	227,326	60,662	0	153,415	22,595	463,998
Middle North Platte River	63,893	0	0	0	148,406	212,299
Middle Powder River	158,889	0	0	0	65,325	224,214
North Fork Powder River	0	0	0	1,593	18,673	20,266
Salt Creek	76,822	0	0	0	74,891	151,713
South Fork Powder River	76,180	859	0	0	37,299	114,338
Upper Belle Fourche River	54,807	0	0	0	636,407	691,214
Upper Cheyenne River	62	0	0	0	145,047	145,109
Upper Powder River	955,147	0	0	0	625,260	1,580,407
Upper Tongue River	589,474	0	0	8,087	135,864	733,425
Total¹	3,718,158	64,916	6,979	227,393	3,468,526	7,485,972

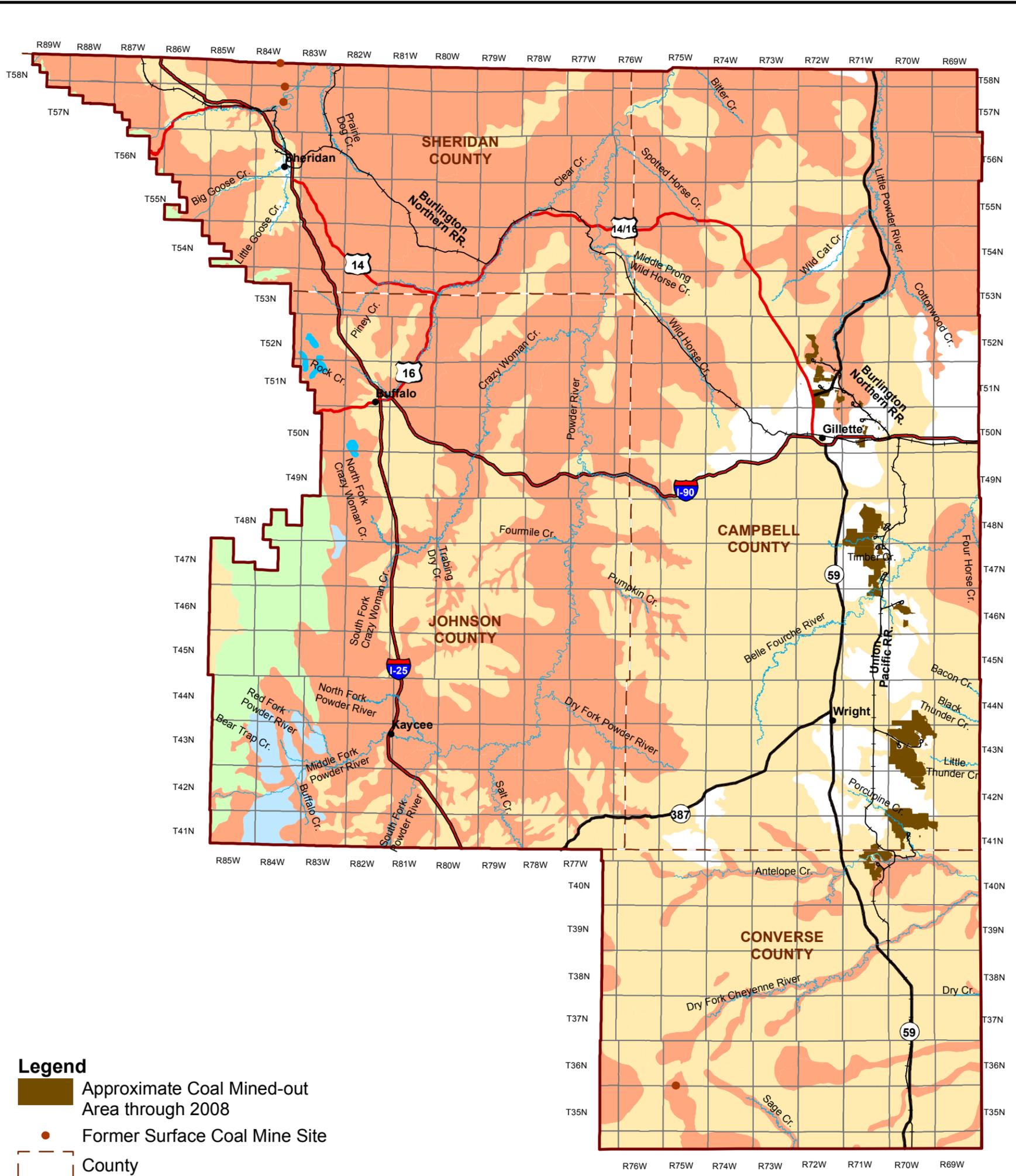
¹ Slight differences in totals may occur due to rounding.

Source: WGFD 2012a.

The WGFD has divided mule deer populations into herd units to estimate population sizes. The following herd units reside entirely or partially within the Wyoming PRB study area: 208, 319, 320, 321, 322, 740, 751, and 755. The WGFD estimated the population of all herd units within the study area to be 152,088 animals in 2010 (WGFD 2012c). This corresponds to a population goal of 201,100 animals; therefore, population levels were at 76 percent of the goal in 2010. Individual herd unit populations ranged from 63 to 98 percent of management objectives. Poor weather conditions, high fawn mortality, and lack of reliable population estimates are the most likely causes. Overall, the mule deer population trend is decreasing. No herd units have demonstrated increasing population trends. Specific details on impacts to mule deer populations are unknown; however, it is suspected that increased road density, loss of vegetation, and increased human presence may cause stress to the herd units in areas that are subject to considerable development.

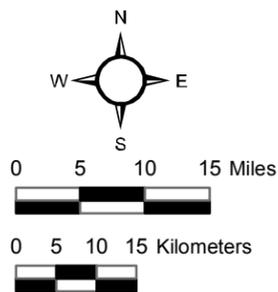
Table 2.4-6 presents the cumulative disturbance to mule deer ranges by subwatershed as of the end of base year 2008.

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Legend

- Approximate Coal Mined-out Area through 2008
- Former Surface Coal Mine Site
- County
- River or Stream
- Railroad
- Mule Deer Ranges**
- Winter Yearlong
- Crucial Winter Yearlong
- Crucial Winter
- Spring, Summer, Fall
- Yearlong



Powder River Basin Coal Review
 Figure 2.4-3
 Mule Deer Ranges

Sources: BLM 2010a; WGFD 2012a.

Table 2.4-6 Cumulative Disturbance to Mule Deer Ranges by Subwatershed

Subwatershed	Mule Deer Range (acres) ¹					
	Winter Yearlong	Crucial Winter Yearlong	Crucial Winter	Spring, Summer, Fall	Yearlong	Total ²
Antelope Creek	3,358	0	0	0	21,236	24,594
Clear Creek	3,730	0	0	0	2,852	6,582
Crazy Woman Creek	1,539	0	0	0	759	2,298
Dry Fork Cheyenne River	1,079	0	0	0	2,009	3,088
Lightning Creek	844	0	0	0	3,006	3,850
Little Bighorn River	34	0	0	0	73	107
Little Missouri River	275	0	0	0	0	275
Little Powder River	7,115	0	0	0	10,423	17,539
Middle Fork Powder River	992	0	0	0	54	1,045
Middle North Platte River	324	0	0	0	503	827
Middle Powder River	4,074	0	0	0	2,325	6,399
North Fork Powder River	0	0	0	0	0	0
Salt Creek	497	0	0	0	313	809
South Fork Powder River	442	0	0	0	211	653
Upper Belle Fourche River	310	0	0	0	37,308	37,618
Upper Cheyenne River	2	0	0	0	9,608	9,610
Upper Powder River	24,125	0	0	0	17,906	42,031
Upper Tongue River	9,732	0	0	0	748	10,480
Total²	58,472	0	0	0	109,332	167,805

¹ Based on GIS analysis of existing development-related disturbance as of the end of base year 2008.

² Slight differences in totals may occur due to rounding.

Source: WGFD 2012a.

Elk. In Wyoming, elk occupy a wide variety of habitats, including coniferous forests, mountain meadows, short- and mixed-grass prairies, and sagebrush shrublands. Elk are seasonal migrants that move between summer and winter ranges. Mortality generally can be attributed to predation on calves, hunting, and winter starvation. Elk are present in the Big Horn Mountains, in the Wyoming PRB study area, in the nearby foothills, the Fortification Creek area west of Gillette, the Pine Ridge area in the southern portion of the study area, and the Rochelle Hills area in the southeastern portion of the study area (**Figure 2.4-4**). The distribution of elk ranges by subwatershed is presented in **Table 2.4-7**.

Table 2.4-7 Distribution of Elk Ranges by Subwatershed

Subwatershed	Elk Range (acres)							Total
	Winter	Winter Yearlong	Crucial Winter Yearlong	Crucial Winter	Spring, Summer, Fall	Yearlong	Undetermined ¹	
Antelope Creek	0	21,472	0	3,401	0	60,971	0	85,844
Clear Creek	0	11,205	21,607	0	6,651	0	0	39,463
Crazy Woman Creek	0	0	25,591	0	48,914	0	0	74,505
Dry Fork Cheyenne River	0	597	0	0	0	4,340	46,866	51,803
Lightning Creek	0	0	0	0	0	0	152,485	152,485
Little Bighorn River	33	2,563	267	4,722	1,752	0	0	9,337
Little Missouri River	0	0	0	0	0	0	0	0
Little Powder River	0	0	0	0	0	0	0	0
Middle Fork Powder River	0	0	76,486	0	46,006	101,864	0	224,356
Middle North Platte River	0	0	0	0	0	0	0	0
Middle Powder River	0	0	0	0	0	0	0	0
North Fork Powder River	0	0	273	0	8,364	11,629	0	20,266
Salt Creek	0	0	0	0	0	18,860	0	18,860
South Fork Powder River	0	0	0	0	0	16,916	0	16,916
Upper Belle Fourche River	0	0	0	0	0	10,643	0	10,643
Upper Cheyenne River	0	9,700	0	3,390	0	69,281	0	82,371
Upper Powder River	0	33,615	37,812	0	0	66,588	0	138,015
Upper Powder River-Fortification Creek Herd Unit ²	0	33,615	37,812	0	0	51,318	0	122,745
Upper Tongue River	842	10	0	27,238	10,068	0	0	38,158
Total³	875	79,162	162,036	38,751	121,755	361,092	199,351	963,022

¹ Undetermined ranges are areas or habitats that are expected to support, or do support, a population or portion of a population of wildlife. The distribution and importance of the area to the population has not been sufficiently documented to designate seasonal range occupancy.

² The entire Fortification Creek Herd Unit is within the Upper Powder River subwatershed.

³ Due to the overlap in the designated ranges for the Fortification Creek Herd Unit, the sum of the acreages for the individual designated ranges is greater than the actual areal extent of designated range within the Fortification Creek Herd Unit. The total reflects the areal extent of the range. Acreages reported for the Upper Powder River were used for the totals because they are inclusive of the Fortification Creek Herd Unit.

Sources: BLM 2011; WGFD 2012a.

The WGFD has divided elk populations into herd units to estimate population sizes. The following herd units reside entirely or partially within the Wyoming PRB study area: 211, 320, 321, 322, 344, and 743. The WGFD has estimated the total population size of four of these herd units at 13,415 in 2010; however, survey data were not adequate to allow a population estimate of the size of herd unit 743. This herd unit is suspected of greatly exceeding the goal of 125 animals (WGFD 2012c). For the other five herd units, population levels are at 178 percent of the 7,550 goal. Each herd unit has greatly exceeded its targeted population level, ranging from 128 to 249 percent of the management objectives. Herd units that have experienced drastic growth have done so as a result of lack of access for hunting, low predation rates, and herd management strategies. Elk in the Wyoming PRB study area are exhibiting an increasing population trend. Similar to mule deer, increased road density, loss of vegetation, and increased human presence have the potential to negatively impact elk herds if development were to occur in important seasonal ranges for elk. **Table 2.4-8** presents cumulative disturbance to elk ranges by subwatershed as of the end of base year 2008.

Table 2.4-8 Cumulative Disturbance to Elk Ranges by Subwatershed

Subwatershed	Elk Range (acres) ¹							Total
	Winter	Winter Yearlong	Crucial Winter Yearlong	Crucial Winter	Spring, Summer, Fall	Yearlong	Undetermined ²	
Antelope Creek	0	441	0	36	0	616	0	1,093
Clear Creek	0	0	0	0	0	0	0	0
Crazy Woman Creek	0	0	0	0	0	0	0	0
Dry Fork Cheyenne River	0	0	0	0	0	0	724	724
Lightning Creek	0	0	0	0	0	0	2,074	2,074
Little Bighorn River	0	0	0	0	0	0	0	0
Little Missouri River	0	0	0	0	0	0	0	0
Little Powder River	0	0	0	0	0	0	0	0
Middle Fork Powder River	0	0	0	0	0	0	0	0
Middle North Platte River	0	0	0	0	0	0	0	0
Middle Powder River	0	0	0	0	0	0	0	0
North Fork Powder River	0	0	0	0	0	0	0	0
Salt Creek	0	0	0	0	0	49	0	49
South Fork Powder River	0	0	0	0	0	330	0	330
Upper Belle Fourche River	0	0	0	0	0	0	0	0
Upper Cheyenne River	0	314	0	643	0	2,049	0	3,007
Upper Powder River	0	277	239	0	0	848	0	1,363

Table 2.4-8 Cumulative Disturbance to Elk Ranges by Subwatershed

Subwatershed	Elk Range (acres) ¹							Total
	Winter	Winter Yearlong	Crucial Winter Yearlong	Crucial Winter	Spring, Summer, Fall	Yearlong	Undetermined ²	
Upper Powder River-Fortification Creek Herd Unit ³	0	277	239	0	0	686	0	1,201
Upper Tongue River	0	0	0	0	0	0	0	0
Total⁴	0	1,032	239	679	0	3,892	2,798	8,641

¹ Based on GIS analysis of existing development-related disturbance as of the end of base year 2008.

² Undetermined ranges are areas or habitats that are expected to support, or do support, a population or portion of a population of wildlife. The distribution and importance of the area to the population has not been sufficiently documented to designate seasonal range occupancy.

² The entire Fortification Creek Herd Unit is within the Upper Powder River subwatershed.

³ Due to the overlap in the designated ranges for the Fortification Creek Herd Unit, the sum of the acreages for the individual designated ranges is greater than the actual areal extent of designated range within the Fortification Creek Herd Unit. The total reflects the areal extent of the range. Acreages reported for the Upper Powder River were used for the totals because they are inclusive of the Fortification Creek Herd Unit.

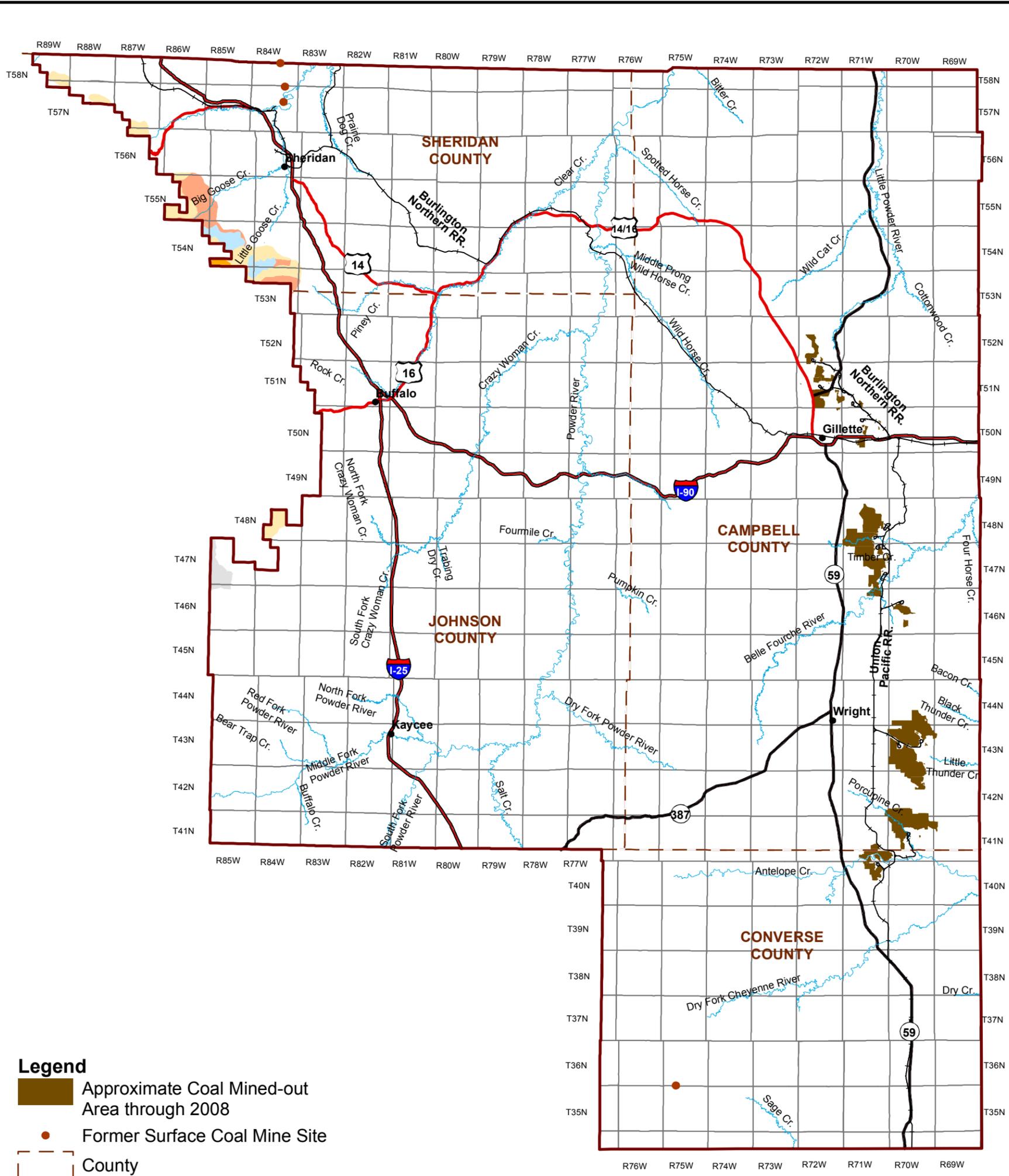
Sources: BLM 2011; WGFD 2012a.

Moose. Moose typically inhabit forested riparian, shrubby riparian, and wet meadow vegetation communities. Moose generally adhere to a specific home range, although they may migrate seasonally in search of more nutritious forage. Mortality is usually due to hunting, starvation, and predation on calves. There is little suitable moose habitat within the Wyoming PRB study area. They primarily are restricted to areas along the western boundary of the study area in the Big Horn Mountains (**Figure 2.4-5**). The WGFD has divided moose into herd units to estimate populations. The Bighorn Herd Unit (313) is the only herd unit that resides within the Wyoming PRB study area. The WGFD estimated the population of this herd unit to be 511 animals in 2010 (WGFD 2012c). This corresponds to a population goal of 500 animals; therefore, the population level was at 102 percent of the goal in 2010. This population appears to be stable. The distribution of moose ranges by subwatershed is presented in **Table 2.4-9**. As of the end of base year 2008, there was no disturbance to moose habitat as a result of energy-related development, agriculture, or urban development within the Wyoming PRB study area.

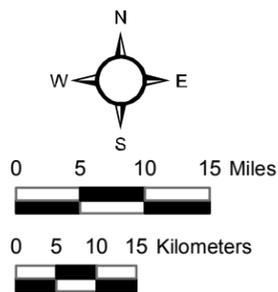
Raptors

Raptor species migrate through and forage in all habitats present in the Wyoming PRB study area. Nesting habitat includes trees, cliffs, grassland, mammal burrows, and manmade structures. In the Wyoming PRB study area, breeding habitat is relatively limited for raptor species that nest exclusively in trees or on cliffs. In addition, wooded riparian areas may provide winter roost habitat for bald eagles. A total of 6,905 raptor nests occur within the Wyoming PRB study area, representing at least 19 species. An additional 2,729 raptor nests occur within the Wyoming PRB study area for which the species is not known. Known raptor nests (active and inactive) are presented in **Table 2.4-10**. In addition, nests identified for common raven (*Corvus corax*), black-billed magpie, Canada goose (*Branta canadensis*), great blue heron (*Ardea herodias*), and turkey vulture (*Cathartes aura*) are included because raptors potentially can utilize these large nests in certain years. General raptor species potentially occurring in the Wyoming PRB study area are discussed below. Special status raptor species are discussed in Section 4.4.3.5, Special Status Species. Habitat fragmentation effects for raptors are discussed in Section 2.4.3.2, Habitat Fragmentation.

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- Legend**
- Approximate Coal Mined-out Area through 2008
 - Former Surface Coal Mine Site
 - County
 - River or Stream
 - Railroad
- Moose Ranges**
- Winter Yearlong
 - Crucial Winter Yearlong
 - Yearlong
 - Crucial Yearlong
 - Underdetermined



Powder River Basin Coal Review
 Figure 2.4-5
 Moose Ranges

Sources: BLM 2010a; WGFD 2012a.

Table 2.4-9 Distribution of Moose Ranges by Subwatershed

Subwatershed	Moose Range (acres)					
	Winter Yearlong	Crucial Winter Yearlong	Yearlong	Crucial Yearlong	Undetermined ¹	Total
Antelope Creek	0	0	0	0	0	0
Clear Creek	3,548	0	1,946	0	0	5,494
Crazy Woman Creek	0	0	4,770	0	0	4,770
Dry Fork Cheyenne River	0	0	0	0	0	0
Lightning Creek	0	0	0	0	0	0
Little Bighorn River	0	0	4,523	0	0	4,523
Little Missouri River	0	0	0	0	0	0
Little Powder River	0	0	0	0	0	0
Middle Fork Powder River	0	0	0	0	97	97
Middle North Platte River	0	0	0	0	0	0
Middle Powder River	0	0	0	0	0	0
North Fork Powder River	0	0	0	0	6,867	6,867
Salt Creek	0	0	0	0	0	0
South Fork Powder River	0	0	0	0	0	0
Upper Belle Fourche River	0	0	0	0	0	0
Upper Cheyenne River	0	0	0	0	0	0
Upper Powder River	0	0	0	0	0	0
Upper Tongue River	15,859	10,124	23,264	1,494	0	50,741
Total	19,407	10,124	34,503	1,494	6,964	72,492

¹ Undetermined ranges are areas or habitats that are expected to support, or do support, a population or portion of a population of wildlife. The distribution and importance of the area to the population has not been sufficiently documented to designate seasonal range occupancy.

Source: WGFD 2012a.

Transmission lines and electrical distribution lines pose collision and electrocution hazards for raptors. Collision potential is dependent on variables such as habitat type, line orientation relative to migratory flyways and foraging flight patterns, numbers of migratory and resident bird species, species' behavioral characteristics, area familiarity, visibility, types of disturbance, and line design (Anderson 1978; Beaulaurier et al. 1982). However, collision for raptor species is infrequently reported due to their slow flight (often soaring or hovering) and high maneuverability (Avian Power Line Interaction Committee [APLIC] 1994). Most bird electrocutions occur on distribution systems at lower voltages with a conductor spacing of 2 to 6 feet, rather than higher voltage transmission lines. Due to their body size and wingspan, raptors and other large birds are big enough to span the distance between the conductors on these lower voltage systems, completing an electrical circuit and resulting in mortality (APLIC 1996).

Golden Eagle. In North America, golden eagles inhabit mountain and grassland regions where medium-sized mammals are abundant (Glinski 1998). The species is classified as a common year-round resident in Wyoming. Foraging habitat includes grasslands, sagebrush, and agricultural lands (Barrett 1998). Golden eagles nest on open cliffs or in larger trees. According to BLM raptor nest data for

2008 and 2012 (BLM 2012a), a total of 519 active and inactive golden eagle nests occur in the Wyoming PRB study area, dispersed among 13 subwatersheds (**Table 2.4-10**).

Osprey. In North America, ospreys (*Pandion haliaetus*) nest from northwestern Alaska across boreal Canada to Labrador and Newfoundland, and south to Baja California, northwestern Mexico, and Central America. The species occurs near lakes and rivers, with tall, woody, riparian vegetation. Nests are placed on a treetop, pole, platform, or cliff near water. Ospreys feed primarily on fish. According to BLM raptor nest data, one osprey nest occurs in the Clear Creek subwatershed (**Table 2.4-10**).

Swainson's Hawk. The Swainson's hawk breeds in North America and spends winters in South America. In Wyoming, this species is considered a summer resident common to grasslands below 9,000 feet amsl (WGFD 2009). Concern for this species throughout its range has increased following reports of substantial habitat loss and exposure to pesticides on wintering grounds in South America. The Swainson's hawk is relatively sensitive to human disturbance near active nests. Breeding pairs construct nests in the tops of isolated trees or use nests built by magpies, crows, ravens, or other hawks (Preston 1998c). According to BLM raptor nest data, 127 Swainson's hawk nests occur in the Wyoming PRB study area, dispersed among nine subwatersheds (**Table 2.4-10**).

Red-tailed Hawk. Red-tailed hawks (*Buteo jamaicensis*) range throughout North America, from Alaska south to Panama and east to Nova Scotia and the Virgin Islands (Preston 1998b). In Wyoming, this species is considered a year-round resident that is common in prairie grassland, riparian, sagebrush, and piñon/juniper woodland habitats below 9,000 feet amsl (WGFD 2009). Typical nest sites include trees and cliffs. This species typically is more tolerant of human activity than other raptors. According to BLM 2008 and 2012 raptor nest data, a total of 1,321 red-tailed hawk nests occur in the Wyoming PRB study area, dispersed among 12 subwatersheds (**Table 2.4-10**).

Rough-legged Hawk. The rough-legged hawk occurs in the northern latitudes of Canada during the summer and in the U.S. from California east to Maine in the winter. In Wyoming, this species is considered a common winter resident (WGFD 2009). The rough-legged hawk occurs in short- and mixed-grass prairies, and in sagebrush and other shrubland habitats. Because most raptor surveys occur during the breeding season when rough-legged hawks are not present in the Wyoming PRB study area no population estimate has been made for this species. The number of wintering hawks in a particular area is highly variable from year to year, depending on weather conditions and availability of prey (Ehrlich et al. 1988).

American Kestrel. The American kestrel (*Falco sparverius*) is found throughout North and South America, from Alaska to the southernmost tip of South America. This species is known to breed in every state of the U.S. except Hawaii, and in each province of Canada. American kestrels prefer open country with sufficient perches (e.g., dead trees, rock outcrops, utility poles, and wires) for hunting (Winn 1998a). Nest sites often include tree cavities, crevices, cliffs, and nest boxes. In Wyoming, the kestrel is a very common summer resident in suitable habitats below 8,500 feet amsl. According to BLM raptor nest data, a total of 112 American kestrel nests occur in the Wyoming PRB study area, dispersed among six subwatersheds (**Table 2.4-10**). Because it usually is not possible to identify an American kestrel nest during aerial raptor nest surveys due to their typical placement within tree cavities and rock crevices, this number is likely much lower than the true number of American kestrel nests present in the study area.

Cooper's Hawk. The Cooper's hawk (*Accipiter cooperii*) ranges throughout southern Canada, the U.S., and into Mexico and Central America. The species occurs in coniferous forest, aspen, cottonwood/riparian, and woodland chaparral habitats. Nests are placed in trees. The Cooper's hawk feeds primarily on birds and small mammals. According to BLM raptor nest data, a total of 19 Cooper's hawk nests occur in the Wyoming PRB study area, dispersed among five subwatersheds (**Table 2.4-10**). Because it often is not possible to identify a Cooper's hawk nest during aerial raptor nest surveys due to their typical placement within thick stands of trees, this number is likely much lower than the true number of Cooper's hawk nests in the study area.

Table 2.4-10 Distribution of Raptor and Other Bird Species Nests by Subwatershed

Subwatershed	Bald Eagle	Golden Eagle	Northern Harrier	Cooper's Hawk	Sharp-shinned Hawk	Unknown Falcon	Red-tailed Hawk	Swainson's Hawk	Ferruginous Hawk	Osprey	Unknown Hawk	American Kestrel	Merlin	Prairie Falcon	Peregrine Falcon	Barn Owl	Short-eared Owl	Long-eared Owl	Great Horned Owl	Eastern Screech Owl	Burrowing Owl	Unknown Owl	Black-billed Magpie	Canada Goose	Common Raven	Great Blue Heron	Turkey Vulture	Unknown Raptor	Total
Antelope Creek	1	44	3				44	26	253		6								16		7							172	572
Clear Creek	14	42	2				64		4	1	3	1		1	4			1	3				2					67	209
Crazy Woman Creek	3	44		1		1	44	1	12			12		4				8	16		19	1	1	1		1	1	130	300
Dry Fork Cheyenne River		1					2	1																				106	110
Lightning Creek																												27	27
Little Bighorn River																													0
Little Missouri River																													0
Little Powder River	2	15	1			1	67	4	45		8	6	1	1			1		11		5		2	1			58	229	
Middle Fork Powder River		13																										1	14
Middle North Platte River																												6	6
Middle Powder River		19	2	8			95	2	25		14	3		3	1			1	21		1		3				108	306	
North Fork Powder River																													0
Salt Creek		1					1																		1		2	5	
South Fork Powder River	2	14		2			13		3																			17	51
Upper Belle Fourche River		38					45	56	492		3			2				1	9		10					1	59	716	
Upper Cheyenne River	3	34					7	4	43										1								15	107	
Upper Powder River	5	221	9	5	1	1	818	27	430		34	85		23		3	6	80	270	1	86	3	6	4		1	2	1,647	3,768
Upper Tongue River	18	33	2	3			121	6			3	5	2	5	1		2	7	19		19	2	2	1			234	485	
Total	48	519	19	19	1	3	1,321	127	1,307	1	71	112	3	39	6	3	9	98	366	1	147	6	16	7	1	3	3	2,649	6,905

Source: BLM 2012a.

Sharp-shinned Hawk. The sharp-shinned hawk (*Accipiter striatus*) ranges throughout western and central Alaska and Canada to South America (NatureServe 2012). This species occurs in coniferous forest, aspen, woodland-chaparral, and cottonwood-riparian habitats. The sharp-shinned hawk forages in a variety of habitats. This species nests in trees and feeds mostly on birds. Some individuals are non-migratory (Orabona et al. 2009). According to BLM raptor nest data, one sharp-shinned hawk nest occurs in the Wyoming PRB study area in the Upper Powder River subwatershed (**Table 2.4-10**). Because it often is not possible to identify a sharp-shinned hawk nest during aerial raptor nest surveys due to their typical placement in thick stands of trees, this number is likely much lower than the true number of sharp-shinned hawk nests in the study area.

Prairie Falcon. The prairie falcon ranges over the western half of North America, from southern Canada to central Mexico (Jones 1998c). In Wyoming, the prairie falcon is considered a common resident, nesting in cliff habitats in open areas (WGFD 2009). Where suitable nesting habitat is available in the Wyoming PRB study area, such as the Pumpkin Buttes area, several pairs can be found nesting in close proximity. According to BLM raptor nest data, a total of 39 prairie falcon nests occur in the Wyoming PRB study area, dispersed among seven subwatersheds (**Table 2.4-10**).

Merlin. The merlin (*Falco columbarius*) nests in boreal forests below treeline from coast to coast and along the western mountains south to Oregon, Idaho, and Montana. It winters from the southern U.S. to South America (Udvardy 1977). In Wyoming, this species occurs in a diversity of habitats below 8,500 feet amsl, including open grasslands, shrublands, and coniferous forests (Orabona et al. 2009). In the Wyoming PRB study area, merlin often lay their eggs in abandoned black-billed magpie nests. This species is a documented breeder throughout much of the state, (Orabona et al. 2009). Data from the Breeding Bird Survey (BBS) Trend Analysis (Sauer et al. 2011) indicate non-significant, negative trends in population change for this species in Wyoming and positive non-significant trends in the U.S. during the period between 2000 and 2010. According to BLM raptor nest data, a total of three merlin nests occur in the Wyoming PRB study area in the Little Powder River and Upper Tongue River subwatersheds (**Table 2.4-10**).

Barn Owl. The barn owl (*Tyto alba*) ranges in the Americas from southern Canada and the northern U.S. to southern South America. There is variable occurrence within this range, with low densities at the northern periphery (NatureServe 2012). This species inhabits basin-prairie shrublands, grasslands, and agricultural areas. The barn owl nests in buildings, caves, or crevices and feeds on rodents and birds (Orabona et al. 2009). According to BLM raptor nest data, a total of three barn owl nests occur in the Wyoming PRB study area in the Upper Powder River subwatershed (**Table 2.4-10**). Because it usually is not possible to identify a barn owl nest during aerial raptor nest surveys due to their typical placement within buildings, caves or crevices, this number is likely much lower than the true number of barn owl nests in the study area.

Eastern Screech Owl. The eastern screech owl (*Megascops asio*) ranges from southern Canada and the northern U.S. to Maine; south through the eastern U.S., southern Texas, the Gulf Coast, and southern Florida; and west to the eastern Front Range of the Rocky Mountains (NatureServe 2012). This species occurs in open woodland, deciduous forest, wooded urban area, and cottonwood-riparian habitats. The eastern screech owl nests in tree cavities or hollow stumps and feeds on insects, small mammals, birds, and reptiles. Winter populations are considerably smaller than populations present during other seasons (Orabona et al. 2009). According to BLM raptor nest data, one eastern screech owl nest occurs in the Wyoming PRB study area in the Upper Powder River subwatershed (**Table 2.4-10**). Because it usually is not possible to identify an eastern screech owl nest during aerial raptor nest surveys due to their typical placement within tree cavities and hollow stumps, this number is likely much lower than the true number of eastern screech owl nests in the study area.

Long-eared Owl. The long-eared owl (*Asio otus*) ranges from southern Canada to northwestern Baja California, southern New Mexico, northern Mexico, Arkansas, and Virginia (NatureServe 2012). This species occurs in most habitats below 8,000 feet amsl, especially in cottonwood-riparian habitats. The long-eared owl nests in abandoned crow, hawk, or squirrel nests and feeds on small rodents and

birds (Orabona et al. 2009). According to BLM raptor nest data, a total of 98 long-eared owl nests occur in the Wyoming PRB study area, dispersed among six subwatersheds (**Table 2.4-10**). Because it usually is not possible to identify a long-eared owl nest during aerial raptor nest surveys due to their typical placement within thick stands of trees, this number is likely much lower than the true number of long-eared owl nests in the study area.

Great Horned Owl. The great horned owl (*Bubo virginianus*) occurs from the northern edge of the boreal forest in Alaska and Canada to the southern tip of South America. This owl typically nests in wooded areas adjacent to open spaces, such as shrublands, grasslands, and agricultural fields that provide a sufficient prey base (Boyle 1998b). In Wyoming, this species is considered a common resident of most habitats below 9,000 feet amsl, especially in riparian areas dominated by cottonwood (WGFD 2009). Great horned owls are tolerant of human activity and nest in a variety of structures, including industrial facilities. According to BLM raptor nest data, a total of 366 great horned owl nests occur in the Wyoming PRB study area, dispersed among 9 subwatersheds (**Table 2.4-10**).

Upland Game Birds

Several species of upland game birds occur within the Wyoming PRB study area, including ring-necked pheasant, chukar, gray partridge, wild turkey (*Meleagris gallopavo*), mourning dove, greater sage-grouse, and sharp-tailed grouse (WGFD 2009). The greater sage-grouse is discussed in detail in Section 2.4.3.5, Special Status Wildlife Species. Mourning doves are abundant in a variety of habitats that occur in the Wyoming PRB study area. Both the gray partridge and ring-necked pheasant occur locally near agricultural lands and along river bottomland. Wild turkeys occur locally in ponderosa pine and wooded riparian areas. None of these species is specifically monitored or managed, other than through normal hunting seasons.

The sharp-tailed grouse occurs in a variety of habitats including short- and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is locally common where grasslands are interspersed with other shrublands, especially in wooded draws, shrubby riparian areas, and wet meadows (WGFD 2009). Species of shrubs that produce berries, such as chokecherry (*Prunus virginiana*) and Russian olive (*Elaeagnus angustifolia*) provide important winter forage for the sharp-tailed grouse. Lek sites typically are located on hilltops, ridges, or other high points in open grassland habitats.

Sharp-tailed grouse leks primarily occur in the northern portion of the Wyoming PRB study area, where preferred habitats are most common. Based on existing data, there are 104 documented lek sites in the study area, dispersed among nine subwatersheds (BLM 2012a). Past surveys have not covered the entire Wyoming PRB study area because of the amount of private land present; therefore, the actual number of leks is likely to be higher. No estimate has been made of sharp-tailed grouse populations in the study area.

As a result of past and continuing human activities in the Wyoming PRB study area, substantial areas of sharp-tailed grouse habitat have been altered from their natural conditions. Human-related disturbance includes, but is not limited to, agriculture, mining, roads, urban areas, oil and gas development, and other energy-related facilities (e.g., power plants, railroads, etc.). **Table 2.4-11** presents the number of sharp-tailed grouse leks with existing disturbance within their protective 0-5-mile buffer by subwatershed.

Table 2.4-11 Sharp-tailed Grouse Lek Sites, Protective Buffers, and Existing Impacts to Protective Buffers by Subwatershed

Subwatershed	Total Number of Leks	Number of Lek Sites With Development-related Disturbance Within the 0.5-mile Buffer^{1,2}
Antelope Creek	0	0
Clear Creek	10	0

Table 2.4-11 Sharp-tailed Grouse Lek Sites, Protective Buffers, and Existing Impacts to Protective Buffers by Subwatershed

Subwatershed	Total Number of Leks	Number of Lek Sites With Development-related Disturbance Within the 0.5-mile Buffer ^{1,2}
Crazy Woman Creek	5	0
Dry Fork Cheyenne River	0	0
Lightning Creek	0	0
Little Bighorn River	12	3
Little Missouri River	1	0
Little Powder River	17	11
Middle Fork Powder River	0	0
Middle North Platte River	0	0
Middle Powder River	3	3
North Fork Powder River	0	0
Salt Creek	0	0
South Fork Powder River	0	0
Upper Belle Fourche River	1	1
Upper Cheyenne River	0	0
Upper Powder River	15	10
Upper Tongue River	40	9
Total	104	37

¹ Based on GIS analysis of existing development-related disturbance as of the end of base year 2008.

² The BLM Casper Field Office uses a 0.25-mile buffer. However, because the subwatersheds in the Casper Field Office management area do not contain any leks, the more conservative 0.5-mile buffer used by the BLM Buffalo Field Office is reported.

Source: BLM 2012a.

Waterfowl

Suitable waterfowl habitats within the Wyoming PRB study area include major rivers, streams, creeks, draws, lakes, and ponds. These features provide stopover habitats for migrating waterfowl, as well as breeding habitats. Waterfowl species that occur in the Wyoming PRB study area include Canada goose, wood duck (*Aix sponsa*), mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), green-winged teal (*Anas crecca*), American widgeon (*Anas americana*), northern pintail (*Anas acuta*), northern shoveler (*Anas clypeata*), blue-winged teal (*Anas discors*), cinnamon teal (*Anas cyanoptera*), canvasback (*Aythya valisineria*), and redhead (*Aythya americana*). Wading birds and shorebirds in the study area utilize similar habitats and include the great blue heron, killdeer (*Charadrius vociferus*), American avocet (*Recurvirostra americana*), black-necked stilt (*Himantopus mexicanus*), spotted sandpiper (*Actitis macularia*), and Wilson's phalarope (*Phalaropus tricolor*) (National Geographic 1999).

The occurrence and distribution of these species vary and are influenced by local conditions, such as aquatic habitat, adjacent upland habitat, season, and land use practices. Waterfowl, wading bird, and shorebird species are expected to occur in suitable habitats in the Wyoming PRB study area during their respective nesting, migration, and wintering seasons. No estimates of population sizes within the study area are available for these species.

Existing impacts to waterbird species are related to the various methods of CBNG water handling. As of the end of base year 2008, approximately 98 percent of the CBNG-produced water in the Wyoming PRB study area was discharged to on-channel impoundments/ephemeral drainages or headwater reservoirs/off-channel impoundments (approximately 69,700 and 13,100 acre-feet, respectively) (AECOM 2011a). Most of the CBNG discharge water is lost through infiltration (72 to 80 percent), evaporation, or evapotranspiration (AECOM 2011b). Although much of this water evaporates or infiltrates, substantial quantities remain on the surface and have resulted in the expansion of wetlands, stock ponds, and reservoirs, potentially increasing waterfowl breeding and foraging habitats. Produced water in some parts of the Wyoming PRB study area is disposed of in containment reservoirs, which also may provide waterfowl habitats, although in many cases appropriate vegetative cover and foraging areas have not developed around these reservoirs. It is possible for salts to accumulate in some CBNG water containment reservoirs. As water evaporates, salinity increases and may result in mass production of salt-tolerant invertebrates such as brine shrimp, a major food source attractive to birds (Pennak 1989; Tribbey 1988). Waterfowl mortalities resulting from salt crystallization and/or toxicity have been documented in hypersaline wetlands in North Dakota and California, where sodium concentrations exceeding 17,000 milligrams per liter (mg/L) were reported and alternative freshwater sources were not available nearby (Gordus et al. 2002; Windingstad et al. 1987). Similarly, in Canada, lake concentrations of sodium in excess of 30,900 mg/L were reported to cause mortality in Canada geese. Moving salt-stressed geese to freshwater resulted in full recovery (Wobeser and Howard 1987).

The median sodium concentration of Fort Union Formation CBNG-produced water is 270 mg/L (BLM 2003a). If sodium concentrations are maintained below 17,000 mg/L in the evaporation ponds, the potential for adverse effects to waterfowl would be minimal. Further, presence of freshwater sources in the Wyoming PRB study area, including the Upper Tongue River; Upper, Middle, and Little Powder Rivers; and Crazy Woman Creek, would decrease the potential for sodium toxicity to migratory waterfowl (Kantrud and Stewart 1977; Swanson et al. 1983).

Migratory Birds

Migratory birds are integral to natural communities and act as environmental indicators based on their sensitivity to environmental changes caused by human activities. Migratory birds are protected by the Migratory Bird Treaty Act (16 USC 703-711) and Executive Order (EO) 13186 (66 FR 3853), that makes it unlawful to take, kill, or possess migratory birds. EO 13186 was enacted in part to ensure that environmental analyses of federal actions evaluate impacts of actions and agency plans on migratory birds. Specific measures to protect migratory bird species and their habitats have not been identified within EO 13186, but instead, the EO provides guidance to agencies to promote best management practices for the conservation of migratory birds.

A wide variety of migratory birds utilize the Wyoming PRB study area during migration or the breeding season, potentially utilizing all habitat types. The highest level of use by the most species occurs in the more productive and diverse habitats (e.g., forested riparian areas). Shrub-steppe habitats (sagebrush shrublands and other shrublands, in part) and short-grass prairie habitats are common in the Wyoming PRB study area and are critically important to some species (Rothwell 1992). Many species that are of high concern to management because of declining populations utilize shrub-steppe and short-grass prairie as their primary breeding habitats (Saab and Rich 1997). The annual State of the Birds Report is produced by a partnership of government wildlife agencies and conservation groups. The first comprehensive analysis of the state of the nation's birds reports that grassland birds are among the fastest and most consistently declining birds in North America; 48 percent are of conservation concern and 55 percent are showing significant declines (North American Bird Conservation Initiative, U.S. Committee 2009).

In response to concerns about migratory birds, the Wyoming Bird Conservation Plan (Nicholoff 2003) has identified high-priority species in Wyoming. These species are categorized according to priority level. Level I species are those that require conservation action. They include species for which Wyoming has a high percentage of, and responsibility for, the breeding population. All but one, the Wilson's phalarope,

are discussed in Section 2.4.3.5, Special Status Wildlife Species. The focus for Level II species is monitoring, rather than active conservation. Forty-two Level II species are identified as potentially occurring in the Wyoming PRB study area. Of these, seven are discussed in Section 2.4.3.5, Special Status Wildlife Species. Level III species are of local interest but do not require conservation action or monitoring (Nicholoff 2003); these species are not discussed in this document. **Table 2.4-12** presents the Levels I and II bird species not otherwise designated as special status species that could be expected to occur in the Wyoming PRB study area.

Few data are available on population numbers of these species; however, BBS data (Sauer et al. 2011) can be used to determine population trends in a geographic area. There are 20 active BBS routes in the Wyoming PRB study area, for a total of approximately 430.6 miles. This number of BBS routes is too few to support statistically valid estimates of population. Even at the state scale, estimates for many species are not statistically robust (Sauer et al. 2011). Loss and degradation of habitats has likely occurred, as has disturbance to individual birds resulting from construction and production activities. In areas of concentrated development, breeding density of some species may have been reduced because of these and other effects. Species that are specific to grassland and shrub-steppe habitats, and that are sensitive to disturbance and habitat fragmentation likely have been the most affected.

Table 2.4-12 Migratory Bird Species of Management Concern Potentially Occurring in the Wyoming PRB Study Area

Species ¹	Wyoming Bird Conservation Plan Designation
Common loon	Level II
American white pelican	Level II
Wilson's phalarope	Level I
Merlin	Level II
Black-billed cuckoo	Level II
Western screech owl	Level II
Eastern screech owl	Level II
White-throated swift	Level II
Black-chinned hummingbird	Level II
Calioppe hummingbird	Level II
Broad-tailed hummingbird	Level II
Rufous hummingbird	Level II
Williamson's sapsucker	Level II
Red-naped sapsucker	Level II
Willow flycatcher	Level II
Dusky flycatcher	Level II
Cordilleran flycatcher	Level II
Ash-throated flycatcher	Level II
Cassin's kingbird	Level II
Western scrub jay	Level II
Bushtit	Level II

Table 2.4-12 Migratory Bird Species of Management Concern Potentially Occurring in the Wyoming PRB Study Area

Species ¹	Wyoming Bird Conservation Plan Designation
Pygmy nuthatch	Level II
Brown creeper	Level II
Marsh wren	Level II
American dipper	Level II
Golden-crowned kinglet	Level II
Western bluebird	Level II
Townsend's solitaire	Level II
Plumbeous vireo	Level II
Townsend's warbler	Level II
MacGillivray's warbler	Level II
Wilson's warbler	Level II
Vesper sparrow	Level II
Lark sparrow	Level II
Dickcissel	Level II
Lark bunting	Level II
Bobolink	Level II

¹ Occurrence potential based on WGFD 2009.

Sources: Nicholoff 2003; WGFD 2009.

2.4.3.4 Fisheries

The study area for fisheries consists of perennial streams and standing water environments (ponds, lakes, and reservoirs) within the 18 fourth order watersheds (subwatersheds) in the Wyoming PRB (**Figure 1-1**). The subwatersheds are part of eight basins: Powder River, Little Powder River, Tongue River, Belle Fourche River, Cheyenne River, North Platte River, Little Bighorn River, and Little Missouri River. The basin and subwatershed boundaries are based on the U.S. Environmental Protection Agency (USEPA) Watershed Profile for the State of Wyoming (USEPA 2002). Additional information concerning hydrological characteristics of the subwatersheds is provided in the Task 1B Report for the PRB Coal Review, Water Resources (AECOM 2012 [in progress]).

Published journals, agency records (e.g., USFWS, BLM, WGFD, and WYNDD), and other available peer-reviewed scientific literature were examined for information on fish species found in the Wyoming PRB study area subwatersheds. Primary data sources for the Phase I Task 1D report (ENSR 2005) included the Final EIS for the PRB Oil and Gas Project (BLM 2003a), WGFD's Basin Management Plans, and WGFD Annual Fisheries Reports (2001 through 2003). Under Phase II, this information has been updated based on data in the Wyoming State Wildlife Action Plan (WGFD 2012c).

Fish resources within the Wyoming PRB study area include a mixture of coldwater and warmwater species. Species that are managed by the WGFD include game or sports fish and special status species. Eighteen game fish species representing five families (sturgeons, trout, perches, catfishes, and sunfishes/bass) occur in one or more of the subwatersheds (**Table 2.4-13**). Habitat and spawning

information also is provided in **Table 2.4-13**. Federally listed and WGFD sensitive species are discussed in Section 2.4.3.5, Special Status Wildlife Species. The following information provides a summary of fish resources in the water bodies within the Wyoming PRB study area.

Powder River Basin

The PRB includes eight subwatersheds: Clear Creek, Crazy Woman Creek, Middle Fork Powder River, Middle Powder River, North Fork Powder River, Salt Creek, South Fork Powder River, and Upper Powder River. The number of perennial streams in this basin is limited to portions of the South Fork Powder River, Salt Creek, Crazy Woman Creek, and Clear Creek. The WGFD has identified fish habitat priority areas in the Powder River watershed as shown in **Figure 2.4-6**.

The Powder River is a low-gradient meandering stream that contains highly fluctuating flows, high turbidity, and a very unstable sand bottom (Hubert 1993). The river is naturally turbid and saline because it flows through erodible sedimentary material. Although the river occasionally runs clear, it typically is very turbid during spring runoff and after storms. The river generally is shallow and contains portions of shifting streambeds composed of fine sands and clays that provide minimal habitat for aquatic invertebrates. Low light penetration through the turbid water also contributes to low aquatic invertebrate production by inhibiting vegetation growth (Bradshaw 1996a).

The Powder River is the most extensive plains cottonwood floodplain in Wyoming. The expansion of invasive species such as tamarisk, Russian olive, leafy spurge, and knapweed within the riparian corridor is a substantial problem. Virtually all of the bottomland and riparian areas of the PRB are privately owned. Public lands, usually composed of sagebrush or grasslands in uplands adjacent to the river, are managed by the BLM and are concentrated in the PRB about midway down the Powder River and in the upper reach of the South Fork Powder River (Bradshaw 1996a). Historically, the PRB was used extensively and almost exclusively for cattle and sheep grazing. Oil and gas developments and coal mines have become dominant land uses over the past 80 years (Bradshaw 1996a).

The Powder River and its tributaries support 28 known fish species of which 20 are native. Most of these species are tolerant of widely fluctuating environmental conditions, such as turbidity, salinity, and water temperature. The common species in the river include flathead chub, sturgeon chub, goldeye, river carpsucker, stonecat, common carp, longnose dace, and channel catfish (**Appendix A, Table A-1**) (Hubert 1993). The game species in the Powder River and its tributaries include black bullhead, channel catfish, stonecat, smallmouth bass, rock bass, green sunfish, sauger, and walleye (**Table 2.4-13**) (Hubert 1993). Although rare, the shovelnose sturgeon also has been reported in the Powder River. Trout species (e.g., brook trout and brown trout) are found in the headwaters of the Crazy Woman Creek, Middle Fork Powder River, North Fork Powder River, Salt Creek, South Fork Powder River, Upper Powder River, Willow Creek, and Sanchez Creek.

Smith and Hubert (1989) divided the Powder River and Crazy Woman Creek fisheries into four groups: creek residents, creek-river migrants, river residents, and creek-river residents. Creek residents included residents found only in Crazy Woman Creek such as fathead minnow, white sucker, and longnose sucker. River residents occurred only in the Powder River and included shovelnose sturgeon, sturgeon chub, burbot, and sauger. Creek-river residents occurred at all life stages and in all seasons in both the creek and river. These residents included flathead chub, longnose dace, sand shiner, stonecat, and walleye. Creek-river migrants move into Crazy Woman Creek from the Powder River to spawn and then return to the river before summer periods of low discharge. They include goldeye, common carp, river carpsucker, and channel catfish (Smith and Hubert 1989).

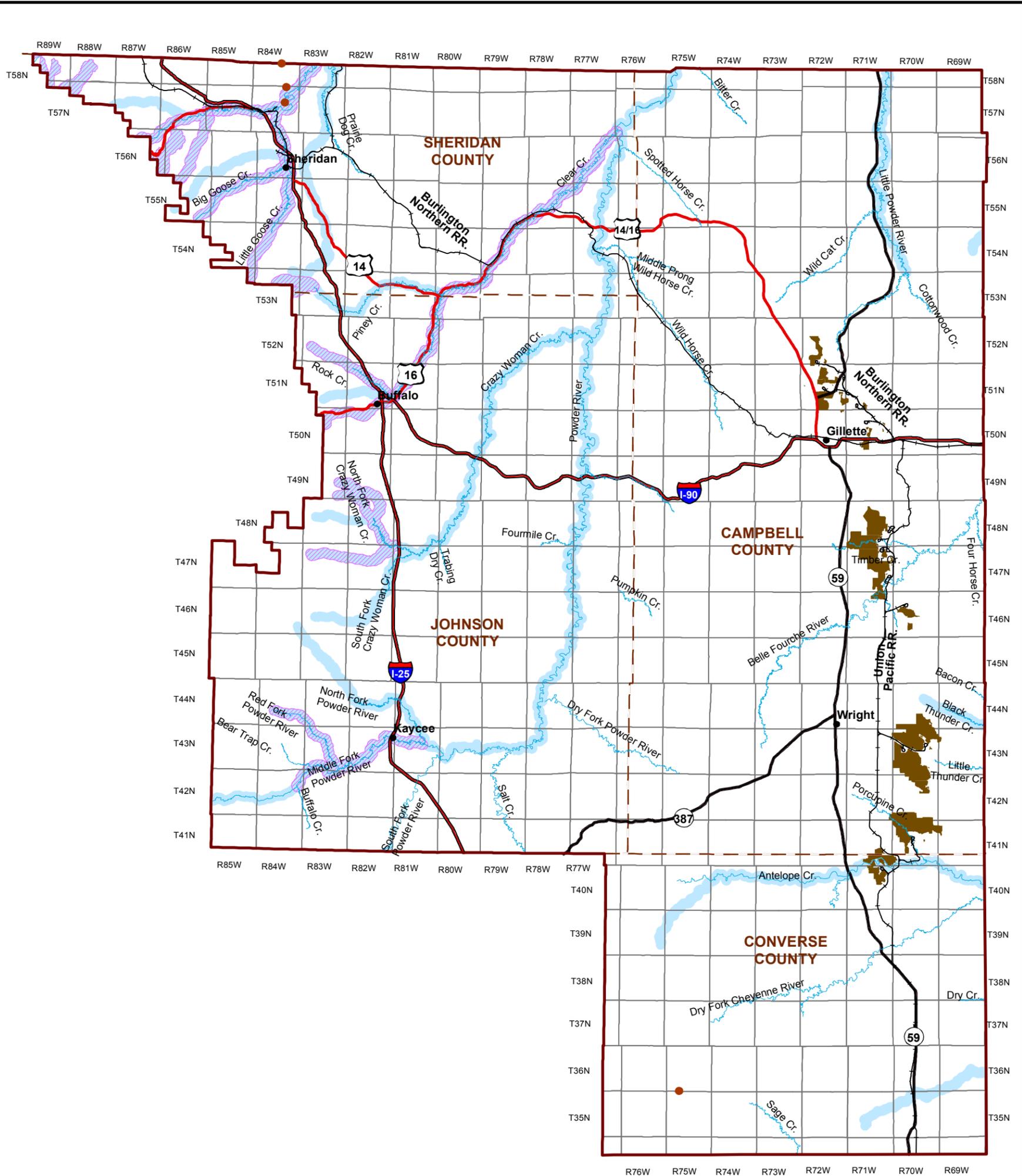
Standing waters in the PRB mainly consist of relatively small (less than 10 acres) reservoirs and farm ponds. Various trout species, channel catfish, and largemouth bass are the primary stocked species. Since 1995, most of the stocking has been done by private landowners.

Table 2.4-13 Game Fish Occurrence, Habitat Use, and Spawning

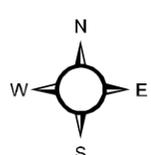
Species	Subwatershed Occurrence	Habitat	Spawning Period
Sturgeons			
Shovelnose sturgeon	Upper Powder River and Crazy Woman Creek	Inhabits bottom areas of large rivers with moderate or high river velocities.	Spring
Trout			
Rainbow trout	Little Bighorn River, Little Powder River, and Upper Tongue River	Inhabits both streams and lake/ponds that are cool and clear.	Spring
Cutthroat trout	Little Bighorn River	Prefers cool streams.	Spring
Snake River cutthroat	Upper Tongue River	Prefers cool streams.	Spring
Yellowstone cutthroat trout	Upper Tongue River	Prefers cool streams.	Spring
Brown trout	Clear Creek, Crazy Woman Creek, Little Bighorn River, Middle Fork Powder River, North Fork Powder River, South Fork Powder River, Upper Powder River, and Upper Tongue River	Prefers larger foothill streams with slow-moving velocities and an abundance of cover.	Fall
Mountain whitefish	Upper Tongue River	Mainly inhabits large, clear rivers and streams in relatively deep and fast currents.	Fall
Perches			
Sauger	Clear Creek, Upper Powder River, and Upper Tongue River	Prefers relatively large rivers and reservoirs.	Spring
Walleye	Upper Tongue River	Inhabits clear, cold reservoirs, lakes, and rivers.	Spring
Yellow perch	Upper Tongue River	Inhabits both lakes, reservoirs, ponds, and slow-moving streams.	Spring
Catfishes			
Black bullhead	Antelope Creek, Little Missouri River, Little Powder River, Middle Powder River, Upper Belle Fourche River, Upper Cheyenne River, Upper Powder River, and Upper Tongue River	Occurs in ponds, small reservoirs, or pool habitat in streams that are often turbid.	Late spring/early summer
Channel catfish	Crazy Woman Creek, Little Missouri River, Little Powder River, Middle Powder River, Upper Cheyenne River, Upper Powder River, and Upper Tongue River	Inhabits streams, rivers, reservoirs, and lakes in both clear and turbid waters.	Late spring/early summer
Bass and Sunfishes			
Largemouth bass	Little Powder River and Upper Cheyenne River	Prefers larger lakes and backwaters of slow-moving streams or rivers with an abundance of cover.	Spring
Smallmouth bass	Clear Creek, Little Missouri River, and Upper Tongue River	Prefers cools, clear rivers or lakes	Spring
Rock bass	Clear Creek, Upper Powder River, and Upper Tongue River	Inhabits pool habitat in streams with cobble-dominated substrate.	Late spring/early summer
White crappie	Upper Tongue River	Prefers larger ponds, reservoirs, and rivers with an abundance of woody debris or aquatic vegetation.	Late spring/early summer
Green sunfish	Antelope Creek, Little Missouri River, Little Powder River, Middle Powder River, Upper Belle Fourche River, Upper Cheyenne River, and Upper Tongue River	Inhabits small to medium-sized streams, small lakes, ponds, and sloughs.	Late spring/early summer

Sources: Barrineau et al. 2007; Baxter and Simon 1970; McGree et al. 2011; Woodling 1985.

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- Legend**
- Approximate Coal Mined-out Area through 2008
 - Former Surface Coal Mine Site
 - Aquatic Crucial Habitat Priority Area
 - Aquatic Enhancement Habitat Priority Area
 - County
 - River or Stream
 - Railroad



**Powder River Basin
Coal Review**

Figure 2.4-6
Aquatic Habitat
Priority Areas

Sources: BLM 2010a; WGFD 2012b.

Little Powder River Basin

The Little Powder River Drainage Basin contains the entire Little Powder River subwatershed. The WFGD has identified one fish habitat priority area in the Little Powder River (**Figure 2.4-6**). Flowing water in this basin is restricted to three stream reaches, all of which are on private land. The Little Powder River and a short reach of the Dry Fork Little Powder River below its confluence with Moyer Springs Creek are perennial. The only coldwater habitat in the drainage is Moyer Springs Creek, a 0.5-mile reach of stream that contains a wild brook trout population with flows usually less than 1 cubic foot per second. There is no perennial water in any of the other tributary streams in the drainage. Only one small standing lake, Weston Reservoir (Little Powder Reservoir) is suitable for game fish and is on accessible public land (Stewart 1996). Based on surveys conducted in 2008 and 2009 by McGree et al. (2011), the predominant habitat types are runs and pools. Streambanks typically are unstable with little or no vegetation. Warmwater game fish species that occur in stream segments with more persistent flow include brown bullhead, channel catfish, green sunfish, and largemouth bass. Fish numbers are limited to the relatively small size of the stream segments and low water levels. Other nongame species in this basin are listed in **Appendix A, Table A-1**.

Tongue River Basin

The only subwatershed in the Tongue River Basin that is located in the Wyoming PRB study area is the Upper Tongue River subwatershed. Fish habitat priority areas identified by the WFGD are shown in **Figure 2.4-6**. The types of waterbodies in the Upper Tongue River consist of headwater tributary streams, mainstem portion of the Upper Tongue River, and privately owned ponds. Habitat quality varies throughout the subwatershed. Although coldwater habitat is provided in the headwater tributaries, an absence or scarcity of deep pools in some of the streams limits the development of larger fish (Stewart 1995). Irrigation diversions reduce flows on many streams and form barriers downstream of Interstate 90 (I-90) that impede seasonal upstream fish movements.

Game fish species include the Snake River cutthroat trout and Yellowstone cutthroat trout, as well as the rainbow, brown, and brook trout, which inhabit headwater tributaries. Yellowstone cutthroat trout, which is the only native trout species in the basin, is limited to isolated headwater tributaries. The lower portion of the Upper Tongue River also supports sauger and smallmouth bass (Stewart 1995). Some of the ponds contain warmwater game species such as the brown bullhead, channel catfish, green sunfish, white crappie, and rock bass. Other nongame fish species known to occur in the subwatershed are listed in **Appendix A, Table A-1**.

Yellowstone cutthroat trout and Snake River cutthroat trout have been stocked in Bull Creek and the North Tongue River (WFGD 2003). Based on sampling in the Experimental Pastures Area adjacent to the North Tongue River, trout population estimates (number of fish/mile) were brook trout (148), brown trout (8), rainbow trout (963), rainbow/cutthroat hybrids (1,227), Snake River cutthroat trout (334), and Yellowstone cutthroat trout (15) (WFGD 2003).

Wolfe Creek, a tributary to the Tongue River, also supports brown, rainbow, and brook trout. Several miles of Wolfe Creek are protected by a conservation agreement. This easement represents a potential restoration area for Yellowstone cutthroat trout.

Belle Fourche River Basin

The Upper Belle Fourche River subwatershed, which is part of the Belle Fourche River Basin, is located within the Wyoming PRB study area. Most of the streams in this subwatershed are unsuitable for coldwater fish due to higher water temperatures. None of the streams located in the Upper Belle Fourche River subwatershed support self-sustaining trout populations. Habitat for warmwater fish also is limited as a result of water diversions and relatively small size of the waterbodies (McDowell 1996a). Surveys conducted by McGree et al. (2011) reported that runs are the dominant habitat type throughout the drainage. Undercut banks and woody debris were largely absent, overhanging vegetation typically was sparse, and aquatic vegetation usually was absent or sparse. Private farm ponds and reservoirs

represent the primary type of warmwater habitat. Limited information is available for fish occurrence in the privately-owned waterbodies. Game fish species likely inhabiting many of the ponds and reservoirs include the black bullhead and green sunfish (McDowell 1996a). The Belle Fourche River below Keyhole Reservoir is dominated by native nongame fish species but also contains game species such as channel catfish and smallmouth bass.

Cheyenne River Basin

Subwatersheds in the Cheyenne River Basin include Antelope Creek, Upper Cheyenne River, Dry Fork Cheyenne River, and Lightening Creek. Fish habitat priority areas in this basin are shown in **Figure 2.4-6**. Approximately 45 percent of the basin is located on public land managed by the BLM, FS, or the State Land and Farm Loan Office (Bradshaw 1996b). However, most of the bottomland and riparian areas of the Cheyenne River are privately owned. Streams in these subwatersheds are considered unsuitable by the WGFD as a result of intermittent flows and relatively high summer water temperatures. Surveys conducted by McGree et al. (2011) reported that runs and pools are the most abundant habitat types. Undercut banks, overhanging cover, and woody debris largely were absent at the survey sites. Leafy spurge, Russian olive, and tamarisk were found along the mainstem portion of the Cheyenne River. Standing waters in the basin consist of reservoirs and ponds, most of which are less than 10 surface acres. The WGFD stocks privately owned farm ponds based on their potential to support game fish species and accessibility to public fishing. Limited information is available regarding fish occurrence in the Cheyenne River Basin. However, green sunfish and black bullhead are known to be abundant in some waterbodies (Bradshaw 1996b). Channel catfish and largemouth bass may be present in low numbers in some waterbodies. Native nongame fish species in the basin are listed in **Appendix A, Table A-1**.

North Platte River Basin

The Middle North Platte River subwatershed is contained within a small portion of this basin (northwest corner) and includes watercourses such as Sage Creek and Sand Creek. The area on the north side of the North Platte River is arid with typical plains streams (Deromedi 1996). The streams within this basin generally are small, and flows are intermittent or low throughout the year (Deromedi 1996). They flow through low-gradient sandy and silty soils that generally are not suitable habitat for game fish species. Because fishing pressure is low and access is limited, no trout have been stocked in this basin for many years (Deromedi 1996).

Little Bighorn River Basin

The Little Bighorn River subwatershed is located within the northern portion of this basin and within the northwest portion of the Wyoming PRB study area. Within the Wyoming PRB study area, this subwatershed contains a few perennial streams such as Elkhorn, Gay, East Pass, West Pass, Twin, and East Twin creeks. Fish habitat priority areas in this basin are shown in **Figure 2.4-6**.

The Little Bighorn River Basin is a tributary to the Yellowstone River and historical range for native Yellowstone cutthroat trout (McDowell 1996b). Because of the remoteness of part of the drainage basin, especially the West Fork of the Little Bighorn River Basin, fishery surveys have been limited, and data are lacking to evaluate the presence of endemic populations of Yellowstone cutthroat trout (McDowell 1996b).

Elkhorn Creek enters the Little Bighorn River near the Montana state line. Electrofishing in 1983 collected brook trout and cutthroat trout (McDowell 1996b). Temperature measurements in this stream indicated that it could support Yellowstone cutthroat trout (WGFD 2003).

East Pass and West Pass creeks historically have been stocked with rainbow trout, brook trout, and brown trout. As part of the Yellowstone cutthroat management evaluations, trout population surveys were conducted in East Pass and West Pass creeks in 2002. No Yellowstone cutthroat trout were captured in the creeks. However, other trout species were estimated at the following population levels:

2,146 brown trout per mile in West Pass Creek and 1,030 brown trout per mile and 97 rainbow trout per mile in East Pass Creek (WGFD 2003).

Trout habitat is limited in tributaries to East Pass and West Pass creeks. Gay Creek, a tributary to West Pass Creek, may be capable of supporting trout, but none were found during the last recorded survey in 1982 (McDowell 1996b). Flow in Twin Creek, a tributary to East Pass Creek, is insufficient to support trout. Electrofishing surveys conducted in 1958 found small dace, fathead minnows, and numerous suckers and cyprinids (McDowell 1996b).

Little Missouri River Basin

The Little Missouri River Basin is composed of the Little Missouri River subwatershed in the northeastern portion of the Wyoming PRB study area. Although some state and federal managed land is present, no public access is available to flowing water within the basin (McDowell 1996c). The majority of the drainage basin is contained within Crook County (McDowell 1996c) outside of the Wyoming PRB study area. Fish habitat priority areas in this basin are shown in **Figure 2.4-6**.

The majority of the drainage basin area is composed of sagebrush and grassland, with ponderosa pine along the ridges and breaks of low rolling hills (McDowell 1996c). Livestock production is the primary land use within the drainage basin. Small stock water ponds and irrigation reservoirs in the Hattie Creek, Switzer Draw, Cracker Creek, and Flat Creek drainages provide the majority of fisheries habitat (McDowell 1996c). The WGFD listed the majority of the waterbodies in this drainage basin as unsuitable for sustaining a fishery (McDowell 1996c).

2.4.3.5 Special Status Wildlife Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed, proposed, and candidate species that are protected under the ESA, as well as BLM, FS, and WGFD sensitive species.

In accordance with the ESA, as amended, land management agencies in coordination with the USFWS must ensure that any action that they authorize, fund, or carry out would not adversely affect a federally listed threatened or endangered species. In addition, as stated in Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-151), it also is BLM policy "to conserve listed species and the ecosystems on which they depend, and to ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species, either under the provisions of the ESA or other provisions" identified in the 6840 Policy.

One federal candidate species, 28 FS sensitive species, 24 BLM sensitive species, and 38 WGFD species of greatest conservation need were identified as potentially occurring in the Wyoming PRB study area (**Table 2.4-14**). Species were analyzed according to the following hierarchy of protection levels: federal candidate, FS, Wyoming BLM, and WGFD Species of Greatest Conservation Need.

Federal Candidate Wildlife Species

Greater Sage-grouse. The greater sage-grouse is dependent upon sagebrush for food and cover (USFWS 2011). During the winter, over 99 percent of their diet is sagebrush leaves and buds. Outside of the winter months, forbs and insects are an important component of greater sage-grouse diet, with insects in particular providing critical protein for chicks during their first month of life.

The greater sage-grouse is a native game bird closely tied to sagebrush-dominated landscapes in the western U.S. and Canada. According to Schroeder et al. (2004), the species originally occurred in 12 states and 3 Canadian provinces; however, they have been extirpated from Nebraska and British Columbia. Due primarily to alteration or elimination of sagebrush, greater sage-grouse currently occupy only a small portion of their pre-European distribution (Schroeder et al. 2004). In Wyoming, the greater

sage-grouse occurs throughout the state in appropriate habitat (Cerovski 2004). Potentially suitable habitat for this species in the Wyoming PRB study area is shown in **Figure 2.4-7**.

Since 1986, greater sage-grouse populations have stabilized and even increased in some areas. However, there is still concern over the long-term viability of the greater sage-grouse because of continuing loss and fragmentation of habitat, as well as new threats, such as the West Nile virus (Connelly et al. 2004). More recently, a study was conducted by Taylor et al. (2012) to evaluate both the effects of oil and gas development on the greater sage-grouse population in northeastern Wyoming and the current viability of the population. As reported, the greater sage-grouse population has experienced an 82 percent decline within the oil and gas fields (Walker et al. 2007). Small populations of greater sage-grouse are vulnerable to extirpation by a catastrophic event (Soule and Mills 1998), and the effect of a West Nile virus outbreak-year alone could cut a population by more than half (Taylor et al. 2012).

On February 26, 2008, the USFWS initiated a status review to determine whether the greater sage-grouse warranted protection under the ESA (73 FR 10218). On March 5, 2010, the USFWS determined that the greater sage-grouse warranted protection under the ESA; however, proposing the species for protection was precluded by the need to take action on other species facing more immediate and severe extinction threats. The USFWS determined that the greater sage-grouse would be added to the candidate species list. Conservation efforts for this species in Wyoming currently are coordinated by the WGFD in cooperation with the USFWS, BLM, and regional greater sage-grouse working groups in an attempt to increase population levels and avoid federal listing under the ESA.

In order to protect greater sage-grouse populations, Wyoming developed a Greater Sage-grouse Management/Conservation Plan that outlines goals and objectives for managing the species. Additionally, the Wyoming BLM and the State of Wyoming have issued several regulations regarding management of greater sage-grouse. Current guidance is contained in BLM IM WY-2012-019, which includes specific protection measures to be implemented for development in greater sage-grouse habitat (e.g., specified buffer areas around lek sites), specifically in core population areas. The WGFD recently completed a revised map (version 3) of greater sage-grouse core population areas in Wyoming. Greater sage-grouse core population areas include areas with the highest densities of breeding greater sage-grouse in the state, as well as areas important for connectivity between populations. The core population areas cover approximately 25 percent of the state; however, they support approximately 83 percent of the greater sage-grouse population in the state. The acreage of potentially suitable habitat for this species and the number of active lek sites by subwatershed are summarized in **Tables 2.4-15** and **2.4-16**, respectively.

The center of breeding activity for the greater sage-grouse is referred to as a strutting ground or lek. Leks are characterized as flat, sparsely vegetated areas within large tracts of sagebrush (Connelly et al. 2004). Males begin to appear on leks in March, with peak attendance at Wyoming leks occurring in April (WGFD 2003). Greater sage-grouse nesting habitat typically is centered on active leks and consists of medium to tall sagebrush with a perennial grass understory (Connelly et al. 2000). Studies have shown that taller sagebrush with larger canopies and more residual understory cover usually lead to higher nesting success (Connelly et al. 2000, 2004).

During the late spring and summer, hens and broods typically are found in more lush habitats consisting of a high diversity of grasses and forbs that attract insects. These habitats include wet meadows, riparian areas, and irrigated farmland within or near sagebrush (Connelly et al. 2004). In many greater sage-grouse populations, high quality brooding habitat is often the limiting factor due to drought, invasive weeds, and overgrazing associated with improper range management.

Depending on the severity of the winter, greater sage-grouse move to south- and east-facing slopes that maintain exposed sagebrush. Studies have shown that south-facing slopes with sagebrush at least 10 to 12 inches above the snow level are required for both food and cover. Windswept ridges, draws, and

Table 2.4-14 Special Status Wildlife Species

Species	Scientific Name	USFWS Status	FS Sensitive Species	Wyoming BLM Sensitive Species	WGFD ¹	Comments
Mammals						
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>		X	X	Tier I	
Spotted bat	<i>Euderma maculatum</i>		X	X	Tier II	
Long-eared myotis	<i>Myotis evotis</i>			X	Tier II	
Fringed myotis	<i>Myotis thysanodes</i>		X	X	Tier II	
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	Threatened		X	Tier II	Documented in the southwestern quadrant of the state and is not suspected to occur in the Wyoming PRB study area (BLM 2012b; WGFD 2009).
Black-footed ferret	<i>Mustela nigripes</i>	Endangered			Tier I	Considered but eliminated from further analysis because black-tailed prairie dog colonies (habitat for black-footed ferret) in the Wyoming PRB study area have been block-cleared by the USFWS (2004a,b).
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>		X	X		
White-tailed prairie dog	<i>Cynomys leucurus</i>			X		Distributed in the western and central portions of Wyoming, in areas mostly dominated by sagebrush (BLM 2010b). Not suspected to occur in the Wyoming PRB study area (BLM 2012b).
American pika	<i>Ochotona princeps</i>				Tier II	Distributed mainly in the western half of Wyoming (WGFD 2009). Does not occur at lower elevations and is not suspected to occur in the Wyoming PRB study area (BLM 2012b).

Table 2.4-14 Special Status Wildlife Species

Species	Scientific Name	USFWS Status	FS Sensitive Species	Wyoming BLM Sensitive Species	WGFD ¹	Comments
Bighorn sheep	<i>Ovis canadensis</i>				Tier II	Native herds occur in northwestern Wyoming; re-established herd via transplant on the western slope of the northern Big Horn Mountains. Inhabits higher elevations (WGFD 2012c). Not suspected to occur in the Wyoming PRB study area (BLM 2012b).
Moose	<i>Alces alces</i>				Tier II	See the Big Game Species subsection under Section 2.4.3.3, Terrestrial Wildlife.
Swift fox	<i>Vulpes vulpes</i>		X	X	Tier II	
Birds						
American bittern ²	<i>Botaurus lentiginosus</i>		X		Tier II	
White-faced ibis	<i>Plegadis chihi</i>			X	Tier II	
Trumpeter swan ²	<i>Cygnus buccinator</i>		X	X	Tier II	
Harlequin duck ³	<i>Histrionicus histrionicus</i>				Tier II	In Wyoming, the only known occurrences are in the northwestern portion of the state (WGFD 2012c). Does not occur at lower elevations and is not suspected to occur in the Wyoming PRB study area (BLM 2012b).
Mountain plover ²	<i>Charadrius montanus</i>		X	X	Tier I	
Long-billed curlew ²	<i>Numenius americanus</i>		X	X	Tier II	
Upland sandpiper ²	<i>Bartramia longicauda</i>				Tier II	
Franklin's gull ²	<i>Larus pipixcan</i>				Tier II	
Forster's tern ²	<i>Sterna forsteri</i>				Tier II	
Black tern ²	<i>Chlidonias niger</i>		X		Tier II	
Bald eagle ²	<i>Haliaeetus leucocephalus</i>		X	X	Tier I	

Table 2.4-14 Special Status Wildlife Species

Species	Scientific Name	USFWS Status	FS Sensitive Species	Wyoming BLM Sensitive Species	WGFD ¹	Comments
Northern harrier	<i>Circus cyaneus</i>		X			
Northern goshawk ²	<i>Accipiter gentilis</i>		X	X	Tier I	
Swainson's hawk ²	<i>Buteo swainsoni</i>				Tier II	
Ferruginous hawk ²	<i>Buteo regalis</i>		X	X	Tier I	
Peregrine falcon ²	<i>Falco peregrinus</i>		X	X	Tier II	
Western yellow-billed cuckoo ³	<i>Coccyzus americanus</i>		X	X	Tier III	
Short-eared owl ²	<i>Asio flammeus</i>		X		Tier II	
Boreal owl ³	<i>Aegolius funereus</i>				Tier II	Inhabits high elevation mature and old growth forests (WGFD 2012c). Does not occur at lower elevations and is not suspected to occur in the Wyoming PRB study area (BLM 2012b)
Western burrowing owl ²	<i>Athene cunicularia</i>		X	X	Tier I	
Greater sage-grouse ²	<i>Centrocercus urophasianus</i>	Candidate	X	X	Tier I	
Lewis' woodpecker ³	<i>Melanerpes lewis</i>		X		Tier II	
Black-backed woodpecker ³	<i>Picoides arcticus</i>				Tier II	Inhabits mature and old growth montane coniferous forests (WGFD 2012c). Does not occur at lower elevations and is not suspected to occur in the Wyoming PRB study area (BLM 2012b).
Olive-sided flycatcher ³	<i>Contopus cooperi</i>		X			
Loggerhead shrike ³	<i>Lanius ludovicianus</i>		X	X		
Sage thrasher ³	<i>Oreoscoptes montanus</i>			X	Tier II	
Grasshopper sparrow ³	<i>Ammodramus savannarum</i>		X		Tier II	
Baird's sparrow ²	<i>Ammodramus bairdii</i>			X		

Table 2.4-14 Special Status Wildlife Species

Species	Scientific Name	USFWS Status	FS Sensitive Species	Wyoming BLM Sensitive Species	WGFD ¹	Comments
Sage sparrow ²	<i>Amphispiza belli</i>		X	X	Tier II	
Brewer's sparrow ²	<i>Spizella breweri</i>		X	X	Tier II	
McCown's longspur ²	<i>Calcarius mccownii</i>		X		Tier II	
Chestnut-collared longspur ³	<i>Calcarius ornatus</i>		X		Tier II	
Reptiles						
Northern rubber boa	<i>Charina bottae</i>				Tier II	
Smooth greensnake	<i>Opheodrys vernalis</i>				Tier II	
Plains garter snake	<i>Thamnophis radix</i>				Tier II	
Plains hog-nosed snake	<i>Heterodon nasicus</i>				Tier II	
Pale milksnake	<i>Lampropeltis triangulum multistriata</i>				Tier II	
Amphibians						
Northern leopard frog	<i>Lithobates pipiens</i>		X	X	Tier III	
Columbia spotted frog	<i>Rana luteiventris</i>			X	Tier II	

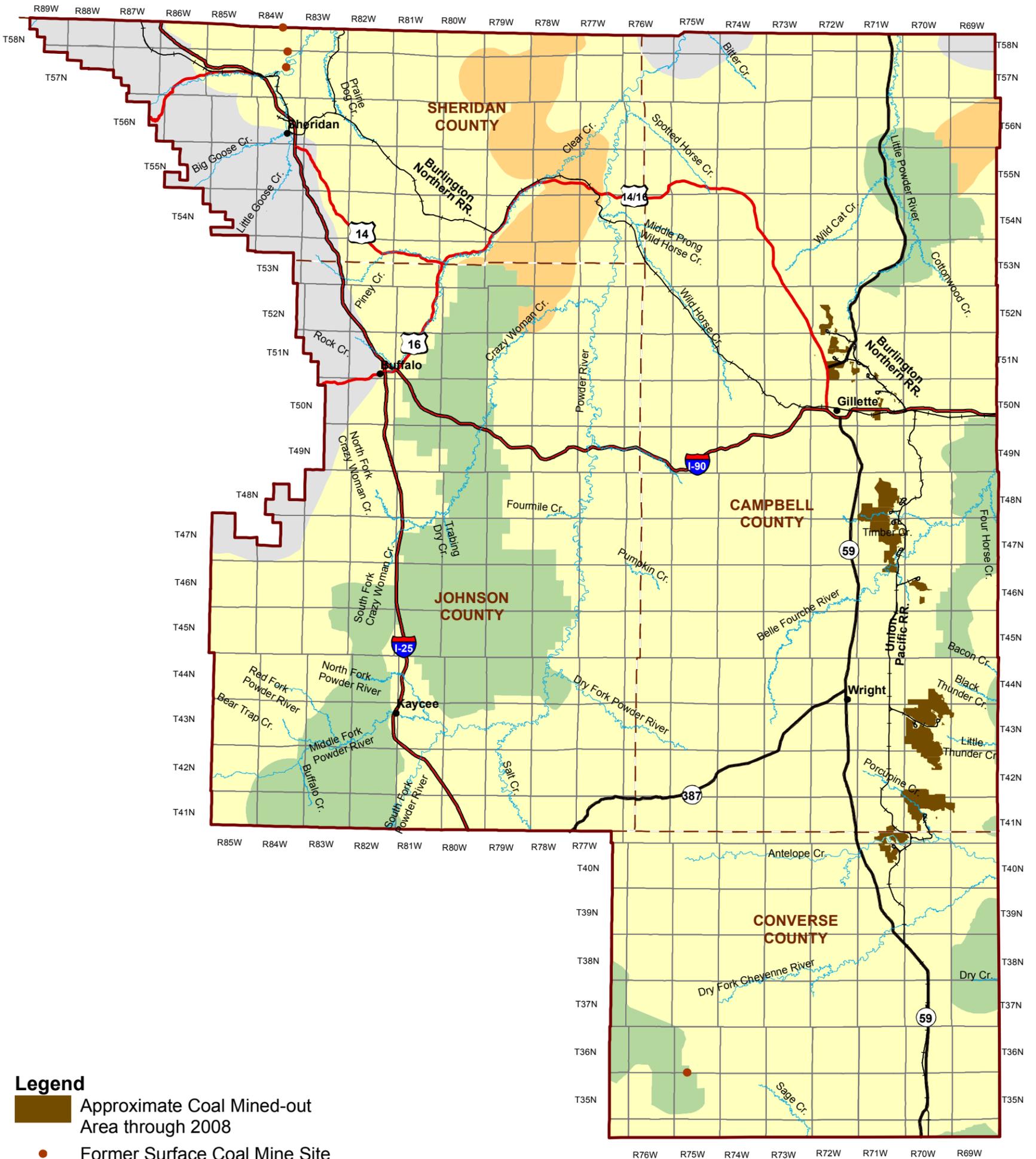
¹ Represents species listed on the 2010 Wyoming State Wildlife Action Plan (WGFD 2012c) as refined by BLM (2012b) for the Wyoming PRB study area. Tier I includes species with the highest conservation need, Tier II includes species with moderate conservation need, and Tier III includes species with the lowest conservation need.

² Also a Level I species as listed in the 2003 Wyoming Bird Conservation Plan, Version 2.0 (Nicholoff 2003) (see Migratory Birds subsection above).

³ Also a Level II species as listed in the 2003 Wyoming Bird Conservation Plan, Version 2.0 (Nicholoff 2003) (see Migratory Birds subsection above).

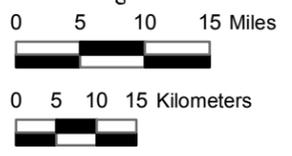
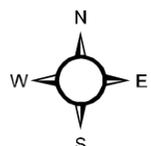
Sources: BLM 2010b; FS 2012; USFWS 2011; WGFD 2012c.

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Legend

- Approximate Coal Mined-out Area through 2008
- Former Surface Coal Mine Site
- County
- River or Stream
- Railroad
- Greater Sage-grouse Habitat**
- Core Habitat
- Connectivity Habitat
- General Distribution
- Non-habitat



Sources: BLM 2010a; WGFD 2011; USGS 2012.

Powder River Basin Coal Review
 Figure 2.4-7
 Greater Sage-grouse Habitat

Table 2.4-15 Greater Sage-grouse Potential Habitats

Subwatershed	Core Habitat		Connectivity Habitat		General Distribution		Non-habitat		Total Habitat	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Antelope Creek	2,131	0.03	0	0.00	657,975	8.32	0	0.00	660,106	8.34
Clear Creek	37,511	0.47	119,661	1.51	288,436	3.65	101,873	1.29	547,480	6.92
Crazy Woman Creek	234,415	2.96	28,236	0.36	248,099	3.14	37,559	0.47	548,309	6.93
Dry Fork Cheyenne River	23,641	0.30	0	0.00	285,708	3.61	0	0.00	309,349	3.91
Lightning Creek	40,147	0.51	0	0.00	268,156	3.39	0	0.00	308,303	3.90
Little Bighorn River	0	0.00	0	0.00	1,108	0.01	49,600	0.63	50,708	0.64
Little Missouri River	7,435	0.09	7,963	0.10	20,745	0.26	2,928	0.04	39,071	0.49
Little Powder River	114,393	1.45	32,210	0.41	703,821	8.89	15,409	0.19	865,833	10.94
Middle Fork Powder River	157,338	1.99	0	0.00	292,271	3.69	14,388	0.18	463,998	5.86
Middle North Platte River	54,100	0.68	0	0.00	158,200	2.00	0	0.00	212,300	2.68
Middle Powder River	0	0.00	518	0.01	183,397	2.32	40,398	0.51	224,313	2.83
North Fork Powder River	0	0.00	0	0.00	15,482	0.20	4,784	0.06	20,266	0.26
Salt Creek	8,642	0.11	0	0.00	143,071	1.81	0	0.00	151,713	1.92
South Fork Powder River	56,068	0.71	0	0.00	58,271	0.74	0	0.00	114,338	1.44
Upper Belle Fourche River	85,257	1.08	0	0.00	760,340	9.61	0	0.00	845,597	10.69
Upper Cheyenne River	19,300	0.24	0	0.00	188,087	2.38	0	0.00	207,387	2.62
Upper Powder River	231,270	2.92	31,540	0.40	1,340,689	16.94	0	0.00	1,603,497	20.26
Upper Tongue River	0	0.00	63,606	0.80	436,061	5.51	240,486	3.04	740,153	9.35
Total¹	1,071,648	13.54	283,734	3.59	6,049,915	76.46	507,424	6.41	7,912,721	100.00

¹ Slight differences in totals may occur due to rounding.

Sources: USGS 2012; WGFD 2011.

swales also may be used, especially if these areas are in close proximity to exposed sagebrush (Connelly et al. 2004). In years with severe winter conditions (i.e., deep snow), greater sage-grouse often gather in large flocks in areas with the highest quality winter habitat. It is suggested that high quality winter habitat is limited in portions of the greater sage-grouse's range (Connelly et al. 2000).

As a result of past and on-going human activities in the Wyoming PRB study area, substantial areas of greater sage-grouse habitats have been altered from their natural conditions. Human disturbances include, but are not limited to, agriculture, mining, roads, urban areas, and oil and gas development. Cumulative habitat loss in the Wyoming PRB study area as a result of energy-related development for base year 2008 is summarized in **Table 2.3-2**. Habitat loss associated with coal mining is summarized in **Table 2.3-3**. Disturbance-related impacts to lek sites are summarized in **Table 2.4-16**. Specific data on roads are not available in sufficient detail to allow comparison with these data. Road density is discussed in Section 2.4.3.2, Habitat Fragmentation.

Table 2.4-16 Greater Sage-grouse Lek Sites and Existing Impacts to Protection Buffers by Subwatershed

Subwatershed	Total Number of Leks	Number of Leks With Development-related Disturbance Within the 2.0-mile Buffer ¹
Antelope Creek	9	9
Clear Creek	18	14
Crazy Woman Creek	31	26
Dry Fork Cheyenne River	7	7
Lightning Creek	2	2
Little Bighorn River	0	0
Little Missouri River	0	0
Little Powder River	34	27
Middle Fork Powder River	12	7
Middle North Platte River	10	9
Middle Powder River	4	4
North Fork Powder River	0	0
Salt Creek	3	3
South Fork Powder River	7	0
Upper Belle Fourche River	28	26
Upper Cheyenne River	5	5
Upper Powder River	108	105
Upper Tongue River	17	14
Total	295	258

¹ Based on GIS analysis of existing development-related disturbance as of the end of base year 2008.

Source: WGFD 2011.

Forest Service Sensitive Wildlife Species

The FS Region 2 Sensitive Species list for the TBNG (FS 2012) was used to identify sensitive wildlife species potentially occurring in the Wyoming PRB study area (**Table 2.4-14**). The TBNG is the only public land within the Wyoming PRB study area that is administered by the FS. Therefore, only sensitive species identified as potentially occurring within the TBNG were considered in this analysis. These species are discussed below, with the exception of the greater sage-grouse. The greater sage-grouse also is a federal candidate species and is discussed in the Federal Candidate Wildlife Species subsection.

Mammals

Townsend's Big-eared Bat. Townsend's big-eared bat occurs throughout the western half of North America, south into central Mexico. Although Wyoming forms part of the core of the range for this species, it is sparsely distributed in the state (Clark and Stromberg 1987). Suitable habitats include deciduous forests, dry coniferous forests, sagebrush and other shrublands, short- and mixed-grass prairies, and juniper woodlands. This species uses caves, buildings, and rock outcrops for day and night roosts and hibernation sites (WGFD 2012c). Townsend's big-eared bat has been observed within the Wyoming PRB study area, although no breeding has been reported (WGFD 2012c).

Spotted Bat. The spotted bat occurs in western North America from Mexico to the southern border of British Columbia. Wyoming is on the northeast periphery of its range (Welp et al. 2000). Suitable habitat in Wyoming includes juniper and sagebrush shrublands and short- and mixed-grass prairies (WGFD 2012c). Roosting sites in rock crevices and cliff complexes are known to be important (Welp et al. 2000). This species is often described using cliffs over perennial water (Clark and Stromberg 1987). In Wyoming, occurrence records are restricted to the Big Horn Mountains and the southwestern portion of the state (WGFD 2012c). This species is very rare in North America.

Fringed Myotis. The fringed myotis occurs throughout most of western North America, from British Columbia south to southern Mexico (NatureServe 2012). This species is considered a rare, year-round resident in Wyoming (WGFD 2009). Suitable habitat includes coniferous forests, woodlands, grasslands, and shrublands, although it is probably most common in xeric woodlands, such as juniper, ponderosa pine, and Douglas fir (NatureServe 2012). During summer, the fringed myotis utilizes a variety of roosts, including rock crevices, tree cavities, caves, abandoned mines, and buildings (Schmidt 2003). In Wyoming, all known winter roost sites are in caves (Friday and Luce 1999). The fringed myotis has been reported to migrate, although little information is known about the specifics; consequently these may reflect altitudinal movements in pursuit of suitable roosts (NatureServe 2012). The species is rare in Wyoming, but may occur in the Wyoming PRB study area in suitable habitat.

Black-tailed Prairie Dog. The black-tailed prairie dog is a highly social, diurnally active, burrowing mammal. Aggregations of individual burrows, known as colonies, form the basic unit of prairie dog habitat. The species is common throughout the Great Plains in short- and mixed-grass prairie areas (WGFD 2012c). The black-tailed prairie dog has declined in population and range because of habitat destruction or disturbance and pest control. In Wyoming, this species primarily is found in isolated populations in the eastern half of the state (Clark and Stromberg 1987). Many other wildlife species, such as the black-footed ferret, swift fox, mountain plover, ferruginous hawk, and burrowing owl depend on the black-tailed prairie dog for prey or utilize the burrows and associated barren ground as habitat (USFWS 2000). Active and inactive prairie dog colonies are known to occur within the Wyoming PRB study area; however, specific data on population and occurrence patterns are not available.

Swift Fox. The swift fox occurs throughout the Great Plains in short- and mixed-grass prairie habitats with flat to gently rolling terrain. Dens generally are located along slopes or ridges that offer good views of the surrounding area (Fitzgerald et al. 1994). Where they are abundant, they occur at a density of one pair per 1,200 to 2,000 acres. Individuals may roam over 2,000 to 2,500 acres during a night of hunting (Clark and Stromberg 1987). In Wyoming, this species is considered a common resident in grasslands on the eastern plains, agricultural areas, irrigated native meadows, and along the banks of roads and

railroads (WGFD 2012c). This species may occur in suitable habitats within the Wyoming PRB study area.

Birds

American Bittern. The American bittern breeds from south-central British Columbia to Newfoundland. In the U.S., this species nests in all western and northern states. This species inhabits marshes and swamps and feeds on fish, aquatic invertebrates, and insects. In Wyoming, the American bittern is an uncommon summer resident occurring throughout much of the state, including the Wyoming PRB study area (WGFD 2009). Data presented in the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, negative trend for American bittern populations in Wyoming and the U.S. during the period between 2000 and 2010.

Trumpeter Swan. The trumpeter swan breeds in southern Alaska, northern British Columbia, western Alberta, Oregon, Idaho, Montana, and Wyoming. As a result of habitat destruction and over-hunting, this species was close to extinction. Suitable habitats for the trumpeter swan include lakes and ponds with developed aquatic vegetation for feeding and nesting materials (Terres 1980). CBNG reservoirs occasionally are used during migration; however, in many cases, appropriate vegetative cover and foraging areas have not developed around these reservoirs. This species has been observed throughout the state, including the PRB study area. No confirmed nesting has been reported for this species in the Wyoming PRB study area (WGFD 2009). Population trend data for this species were not included in the BBS Trend Analysis (Sauer et al. 2011). In 2000, the total North American population was approximately 24,000 birds (USFWS 2003).

Mountain Plover. The mountain plover occurs in high, dry, short-grass prairies with vegetation typically shorter than 4 inches in height. Within this habitat, areas of blue grama and buffalo grass are most often used, as well as areas of mixed-grass associations dominated by needle-and-thread and blue grama (Dinsmore 1983). Suitable mountain plover habitat is expected to occur throughout the Wyoming PRB study area. Nests consist of a small scrape on flat ground in open areas. In Wyoming, this species is a common breeding resident (WGFD 2009) and is expected to occur in suitable habitats within the PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, negative trend for populations of this species in Wyoming and the U.S. during the period between 2000 and 2010.

Long-billed Curlew. The long-billed curlew occurs from southern British Columbia to Manitoba, southeast to Wisconsin, Illinois, and Kansas, south to northern California and northern Texas (Nelson 1998a). The species nests in short-grass prairie and feeds on insects and aquatic invertebrates (NatureServe 2012). In Wyoming, suitable habitat may include sagebrush shrublands, wet meadows, irrigated meadows, and agricultural areas (WGFD 2009). This species is a common summer breeding resident throughout much of central and western Wyoming. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, positive trend in population change for this species in Wyoming during the period between 2000 and 2010. During the same period the trend across the U.S. was significant and positive.

Black Tern. In North America, the black tern breeds from southern Canada to northern California, southern Colorado, and southern New England. This species occupies two distinct habitats during the year. During the nesting season, nests are constructed along ponds and reedy and cattail wetlands where this species feeds on insects that are picked from the air and from the surface of the water. Large wetland complexes of at least 50 acres are preferred nesting habitats for the black tern. In the winter, this species occurs along marine coasts, where it feeds on small fish that it captures from the surface (Nelson 1998b). This species is expected to occur within the Wyoming PRB study area, and some evidence of black tern breeding exists within the study area (WGFD 2009). Data from the BBS Trend Analysis (Sauer et al. 2011) were not presented for this species in Wyoming. During the same period across the U.S. the trend was non-significant and negative.

Bald Eagle. The bald eagle was removed from the federal list of threatened species in 2007. Bald eagles occur throughout North America from Alaska to Newfoundland, and from the southern tip of Florida to southern California. This species is an uncommon breeding resident in Wyoming, utilizing mixed coniferous and mature cottonwood-riparian areas near large lakes or rivers as nesting habitat. This species is a documented breeder and winter resident of suitable habitats within the Wyoming PRB study area (WGFD 2009). Feeding areas, diurnal perches, and night roosts are fundamental elements of bald eagle winter habitats. Although eagles can fly as far as 15 miles to and from these elements, they primarily occur where all three elements are available in comparatively close proximity (Swisher 1964). Winter roost sites typically are associated with large cottonwood galleries or coniferous trees located along rivers, streams, or reservoirs. In Wyoming, the diet of bald eagles is more varied than in other regions where fish are the primary food source. Wyoming grassland and shrubland habitats include a variety of suitable bald eagle prey species, including prairie dogs, jackrabbits, and big game and livestock carrion. Fish and waterfowl also are preyed upon, when available. According to BLM raptor nest data, a total of 48 bald eagle nests occur within the Wyoming PRB study area, dispersed among eight subwatersheds (**Table 2.4-10**). Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant positive trend for populations of this species in Wyoming during the period between 2000 and 2010. The trend for the U.S. during the same period was non-significant and positive.

Northern Harrier. The northern harrier occurs throughout North America, with densities being the highest in prairie regions. Nesting habitat for this species includes native and non-native grasslands, agricultural lands, emergent wetland marshes, and mountain sagebrush (Carter 1998a). The northern harrier is a common summer resident in Wyoming (WGFD 2009). According to BLM raptor nest data, a total of 19 northern harrier nests occur within the Wyoming PRB study area, dispersed among six subwatersheds (**Table 2.4-10**). This number is likely much lower than the true number of northern harrier nests in the Wyoming PRB study area. It is not possible to identify a northern harrier nest during aerial raptor nest surveys due to their placement on the ground in heavy vegetation. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant positive trend for populations of this species in Wyoming during the period between 2000 and 2010. The trend for the U.S. during the same period was non-significant and negative.

Northern Goshawk. The northern goshawk occurs from Alaska through the Rocky Mountains to New Mexico, and in the mountains and forests of Washington, Oregon, and interior California (NatureServe 2012). Goshawks typically prey on squirrels, grouse, and other birds. This species nests in a variety of habitats, including conifer and aspen forests, and occasionally cottonwood trees (Barrett 1998). The northern goshawk is a documented breeding resident of Wyoming (WGFD 2009). No northern goshawk nests are reported within the Wyoming PRB study area and suitable habitat is extremely limited (BLM 2012a). It is not possible to identify a northern goshawk nest during aerial raptor nest surveys, due to their placement within thick stands of trees. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, positive trend for populations of this species in Wyoming during the period between 2000 and 2010. The trend for the U.S. during the same period was non-significant and positive.

Ferruginous Hawk. The ferruginous hawk is uncommon and locally distributed in grassland, sagebrush, and desert scrub habitats in the Great Plains and Great Basin regions. In Wyoming, this species is a common breeding resident in shrubland and short-grass prairie (WGFD 2009). This hawk nests in trees, on transmission line towers and similar structures, on cliffs and rock outcrops, and also will nest on the ground (Preston 1998a). According to BLM raptor nest data, a total of 1,307 ferruginous hawk nests occur within the Wyoming PRB study area, dispersed among nine subwatersheds (**Table 2.4-10**). Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, positive trend for populations of this species in Wyoming and the U.S. between 2000 and 2010.

Peregrine Falcon. The peregrine falcon was removed from the federal list of endangered species in 1999 (USFWS 1999c). This species occurs throughout North America and utilizes a variety of habitats. The peregrine falcon typically is associated with open country near rivers, marshes, and coasts. Cliffs are the preferred nesting substrate; however, tall man-made structures also may be used. Peregrine

falcons typically prey on birds, such as waterfowl, shorebirds, grouse, and pigeons. In Wyoming, this species is a rare resident with most breeding records from the western portion of the state (WGFD 2009). According to BLM raptor nest data, a total of six peregrine falcon nests are known to occur within the Wyoming PRB study area, dispersed among three subwatersheds (**Table 2.4-10**). Data from the BBS Trend Analysis (Sauer et al. 2011) indicate non-significant, positive trends for populations of this species in Wyoming and the U.S. between 2000 and 2010.

Western Yellow-billed Cuckoo. The western yellow-billed cuckoo once ranged throughout the U.S., southern Canada, and Mexico. The range of the western subspecies has been dramatically reduced and is mostly limited to California and Arizona (Carter 1998b). In Wyoming, this species is an uncommon summer resident, occupying cottonwood riparian habitats below 7,000 feet amsl and urban areas. This species has been recorded in most areas of the state except for the montane regions (WGFD 2009), and may occur in suitable habitats within the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) were not presented for this species in Wyoming between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was highly significant and negative.

Short-eared Owl. The short-eared owl occurs throughout Canada and the central and northern U.S. In Wyoming, this species is a common year-round resident (WGFD 2009). This owl is a ground-nesting species, in short- and mixed-grass prairies and herbaceous wetlands (Boyle 1998a). The density of nesting short-eared owl pairs appears to be highly variable and is based on the abundance of rodents, which are its primary prey (Seacross 2002). According to BLM raptor nest data, a total of nine short-eared owl nests occur within the Wyoming PRB study area, dispersed among three subwatersheds (**Table 2.4-10**). Data from the BBS Trend Analysis (Sauer et al. 2011) indicate non-significant, negative trends for populations of this species in Wyoming and the U.S. between 2000 and 2010.

Western Burrowing Owl. The western burrowing owl occurs from south-central British Columbia east to southern Saskatchewan and southward through most of the western U.S. Burrowing owls primarily nest in rodent burrows, particularly prairie dog burrows, in grasslands, shrublands, deserts, and grassy urban settings (Jones 1998a). In Wyoming, this species utilizes grasslands, sagebrush, other shrublands, and agricultural areas. This species is a confirmed breeder throughout much of the state (WGFD 2009) and is known to occur as a summer resident in suitable habitats within the study area. Populations of this species can vary considerably within the Wyoming PRB study area, influenced by fluctuations in the availability of prey. According to BLM raptor nest data, a total of 147 western burrowing owl nests occur within the Wyoming PRB study area, dispersed among seven subwatersheds (**Table 2.4-10**). Data from the BBS Trend Analysis (Sauer et al. 2011) indicate non-significant, negative trends in population change for this species in Wyoming. The trend for the U.S. during the same period was non-significant and positive.

Lewis' Woodpecker. Lewis' woodpecker occurs from southern British Columbia and Alberta, south to northern Arizona and south-central California. Suitable habitat for this species includes pine-oak woodlands; oak or cottonwood groves in grasslands; and ponderosa pine forests (Udvardy 1977). In Wyoming, this species principally occurs in open ponderosa and lodgepole pine forests and savannah and recently burned forests with abundant snags or stumps, mainly below 9,000 feet amsl. It also uses aspen, mixed pine-juniper, and cottonwood riparian habitats. Mated pairs may return to the same nest site in successive years (Welp et al. 2000). The species is known to occur throughout most of Wyoming, except for higher elevation mountain regions (WGFD 2009). This species may occur in suitable habitats within the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate non-significant, positive trends in population change for this species in the U.S. between 2000 and 2010.

Olive-sided Flycatcher. The olive-sided flycatcher breeds in boreal forests from Alaska to Newfoundland and in the mountains of the western U.S. (Jones 1998b). Most nesting occurs in coniferous forests from 8,000 feet amsl to timberline (WGFD 2009). In Wyoming, this species is a common summer resident with documented breeding limited to montane habitats of the south, central, and western portion of the state. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, negative trend for populations of this species in Wyoming during the period between

2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and negative.

Loggerhead Shrike. The loggerhead shrike occurs in North America from the coniferous forest region south into Mexico (Udvardy 1977). The loggerhead shrike typically is associated with open vegetation types, including agricultural areas, sagebrush shrublands, desert scrub, piñon-juniper woodlands, and montane meadows (Johnsgard 1986). In Wyoming, this species is a common summer resident utilizing pine-juniper, woodland, short- and mixed-grass prairie, and shrubland habitats. This species is known to breed throughout the state (WGFD 2009) and is known to occur in suitable habitats within the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a significant, positive trend for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and negative.

Grasshopper Sparrow. The grasshopper sparrow breeds from southern British Columbia, east to southern Maine, and south to southern California and central Georgia, although the main population occurs on the Great Plains. This species inhabits short-grass prairies, mixed grasslands, meadows, open sagebrush-grasslands, and agricultural areas. In Wyoming, the grasshopper sparrow inhabits grasslands, mainly in the eastern half of the state, and is considered a common summer resident. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a significant negative trend change for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the United States, the population trend was negative and significant.

Sage Sparrow. The sage sparrow occurs from Washington south to Baja California and throughout the Great Basin (Udvardy 1977). The sage sparrow is a common summer resident in Wyoming, utilizing grasslands and shrubland habitats, typically feeding on insects and seeds (WGFD 2009). This species may occur in suitable habitats within the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate significant positive trend changes for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and positive.

Brewer's Sparrow. The Brewer's sparrow ranges from British Columbia east to Saskatchewan, south to New Mexico, Arizona, and southern California (Udvardy 1977). In Wyoming, this species is a common summer resident occupying sagebrush and other shrubland habitats throughout the state (WGFD 2009). This species may occur in suitable habitats within the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a significant, positive trend for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and positive.

McCown's Longspur. The McCown's longspur breeds from southern Alberta and Saskatchewan, south to north-central Colorado and western Nebraska. The species is considered a common summer resident throughout Wyoming, except for the western edge of the state. The McCown's longspur inhabits open, dry, sparsely vegetated areas. Preferred habitat is short-grass prairie and basin-prairie shrubland; however, agricultural fields, grazed pastures, dry lakebeds, and other sparse, bare, dry ground also are utilized. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant stable trend for populations of this species in Wyoming during the period between 2000 and 2011. For the same period across all BBS routes in the United States, the population trend was significant and positive.

Chestnut-collared Longspur. The chestnut-collared longspur breeds from southern Alberta and Manitoba south to west-central Colorado, and east to Minnesota. The species is considered an uncommon summer resident in Wyoming, mainly in the eastern half of the state, inhabiting short-grass and open mixed-grass prairies. Within mostly arid habitats, it often prefers low, moist areas and wet-meadow zones around wetlands. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant negative trend change for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and negative.

Amphibians

Northern Leopard Frog. The northern leopard frog is found throughout much of the southern half of Canada; south through the upper mid-west and central plains states; and westward into Idaho, Nevada, northern Arizona, and New Mexico (Stebbins 1985). The Northern leopard frog has experienced contractions in its range resulting from local extirpations of breeding populations, particularly in western North America (Wagner 1997). In Wyoming, this species occurs in cattail marshes and beaver ponds from the plains to montane zones as high as 9,000 feet amsl (WGFD 2012c). This species is expected to occur in suitable habitats throughout the Wyoming PRB study area.

Wyoming BLM Sensitive Wildlife Species

Wyoming BLM issued an updated Sensitive Species Policy and List on March 31, 2010 (BLM 2010b). Sensitive wildlife species that potentially occur in the Wyoming PRB study area were identified from the Buffalo and Casper field offices' sensitive species lists and are evaluated in this assessment (**Table 2.4-14**). Species not previously discussed in the Federal Candidate Wildlife Species and FS Sensitive Species sections are described below.

Mammals

Long-eared Myotis. The long-eared myotis occurs throughout the western portion of North America, southward to Baja California. Wyoming is close to the eastern periphery of its range. Clark and Stromberg (1987) reported that this species is distributed throughout Wyoming. Preferred habitats are coniferous forests, including ponderosa pine and spruce-fir; sagebrush shrublands; and grasslands (WGFD 2012c). This species roosts in caves, buildings, and mine tunnels (Clark and Stromberg 1987). The long-eared myotis may occur in suitable habitats within the Wyoming PRB study area.

Birds

White-faced ibis. The white-faced ibis breeds in a range of several discrete populations in South America, Mexico, the western U.S., and along the Gulf Coast. In Wyoming, the species is considered uncommon. The white-faced ibis inhabits marshes, wet meadows, and lakes. It nests in bulrushes, cattails, or reeds; on a floating mat; or in a low tree, and forages close to emergent vegetation. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, positive trend change for populations of this species across the U.S. during the period between 2000 and 2010.

Sage Thrasher. The sage thrasher occurs from southern British Columbia to southern Nevada, Utah, through Texas and Oklahoma, and in the San Joaquin Valley of California (Udvardy 1977). In Wyoming, this species is a common summer resident breeding in sagebrush shrublands throughout the state (WGFD 2009). This species may occur in suitable habitats within the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a significant, positive trend for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and positive.

Baird's Sparrow. The Baird's sparrow occurs from south-central Canada south to the northern Great Plains of the U.S. (InfoNatura 2007). Wyoming is at the southern periphery of its range. This species inhabits short-grass prairies and nests in natural or scratched depressions on the ground. The Baird's sparrow is known to occur and possibly breed in the Wyoming PRB study area. Data from the BBS Trend Analysis (Sauer et al. 2011) indicate a non-significant, positive trend change for populations of this species in Wyoming during the period between 2000 and 2010. For the same period across all BBS routes in the U.S., the population trend was significant and positive.

Amphibians

Columbia Spotted Frog. The Columbia spotted frog occurs throughout much of British Columbia and in Washington, Oregon, Idaho, Montana, Nevada, Utah, and Wyoming (Stebbins 1985). Wyoming is on the eastern edge of the range, where it is known from Park, Teton, Lincoln, Fremont, Sheridan, and

Sublette counties. The primary population is in the northwestern part of the state, where it is contiguous with populations in Idaho and Montana (Welp et al. 2000). A glacial disjunct population occurs in the Big Horn Mountains approximately 100 miles to the east of the primary, contiguous population. It is confined to the headwaters of the South Tongue River drainage and its tributaries in Sheridan County (Garber 1994). In Wyoming, suitable habitats can be found in foothills and montane zones usually near permanent waters such as ponds, sloughs, small streams, and beaver ponds. This species may avoid areas with warm stagnant water and dense cattails. It breeds in old oxbow ponds in which fish are absent, with emergent sedges in wet meadows at the edge of lodgepole pine forests (Garber 1994). The disjunct population of this species associated with the Tongue River is within the Wyoming PRB study area. No other populations are known to exist in the study area.

WGFD Species of Greatest Conservation Need

The WGFD has identified Species of Greatest Conservation Need, which are categorized by conservation priority as Tier I, Tier II, and Tier III. Tier I includes species with the highest conservation need, Tier II includes species with moderate conservation need, and Tier III includes species with lowest conservation need. **Table 2.4-14** presents the Species of Greatest Conservation Need by tier level.

Special Status Fish Species

Nine fish species that potentially occur in the Wyoming PRB study area subwatersheds have special status designations (**Table 2.4-17**). No federally listed, proposed for listing, or candidate fish species occur in the Wyoming PRB study area. However, 9 species have special status by the BLM, FS, or WGFD. All 9 species have one of the 4 highest priority designations (NSS1, NSS2, NSS3, and NSS4) by the WGFD. These four native special status categories are considered Species of Greatest Conservation Need by the WGFD.

Table 2.4-17 Sensitive Aquatic Species in the PRB Study Area

Common Name	Scientific Name	Status¹
Flathead chub	<i>Platygobio gracilis</i>	FSS, NSS4
Plains topminnow	<i>Fundulus sciadicus</i>	FSS, NSS3
Yellowstone cutthroat trout	<i>Oncorhynchus clarki bouveri</i>	FSS, BLM, NSS2
Sauger	<i>Sander canadensis</i>	NSS3
Sturgeon chub	<i>Macrhybopsis gelida</i>	FSS, NSS1
Goldeye	<i>Wiodon alosodies</i>	NSS3
Western silvery minnow	<i>Hybognathes argyritis</i>	NSS2
Plains minnow	<i>Hybognathus placitis</i>	NSS3
Shovelnose sturgeon	<i>Scaphirhynchus platyrhynchus</i>	NSS3

¹ FSS = Forest Service Sensitive; BLM = BLM Sensitive Species; NSS1, NSS2, NSS3, and NSS4 = WGFD sensitive species categories (described in text).

Based on the Wyoming State Wildlife Action Plan (WGFD 2012c), definitions of the native special status categories are provided below:

- NSS1: Population size or distribution is restricted or declining and extirpation is possible (Imperiled). Limiting factors are severe and continue to increase in severity (Extreme Factors).

- NSS2: Population size or distribution is restricted or declining but extirpation is not imminent (Vulnerable Population). Limiting factors are severe and continue to increase in severity (Extreme Factors).
- NSS3: Population size or distribution is restricted or declining but extirpation is not imminent (Vulnerable Population). Limiting factors are severe and not increasing significantly (Severe Factors).
- NSS4: Population size and distribution is stable and the species is widely distributed (Population Stable). Limiting factors are severe and not increasing significantly (Severe Factors).

The following information summarizes the potential occurrence, habitat use, and spawning for the sensitive fish species in the Wyoming PRB study area.

Flathead Chub. In Wyoming, the flathead chub is common in the major river systems east of the Continental Divide, with the exception of the Madison, Yellowstone, Niobrara, and South Platte River systems. It is known to occur in five basins (Powder River, Little Powder River, Tongue River, Cheyenne River, and Little Bighorn River) and 12 subwatersheds within the Wyoming PRB study area (**Appendix A, Table A-1**). Surveys conducted in 2002 collected this species in the mainstem portion of the Powder River and several tributary draws (WGFD 2003). The preferred habitat for this species is relatively large rivers and streams in areas with swift currents and sand or gravel substrates (Baxter and Simon 1970; Woodling 1985). This species is omnivorous, primarily feeding on aquatic and terrestrial insects and vegetation. The spawning period is suspected to occur in the late summer (Baxter and Simon 1970). Primary threats to this species include nonpoint source pollution and mainstem impoundments that greatly alter the natural water flow regimes.

Plains Topminnow. Baxter and Simon (1970) reported plains topminnows occurring in the North and South Platte drainages, Niobrara River, and headwaters of the Cheyenne River System. This species is known to occur in the Antelope Creek and Upper Cheyenne River subwatersheds. In Wyoming, the plains topminnow characteristic habitat is clear, sand or gravel-bottomed streams with considerable vegetation (Baxter and Simon 1970). It often is collected in streams inhabited by plains killifish. Spawning occurs in late spring or early summer in habitat with aquatic macrophytes (Woodling 1985).

Yellowstone Cutthroat Trout. In February 2001, the USFWS concluded that a petition to list the Yellowstone cutthroat trout as a threatened species under the ESA did not provide substantial biological information to indicate that listing may be warranted (USFWS 2001a). This species is native to the Yellowstone River drainage downstream to the Tongue River, including the Big Horn/Wind and Clarks Fork River drainages (Welp et al. 2000). This species also is found west of the Continental Divide in the Snake River drainage below Palisades Reservoir in Idaho and in Pacific Creek and other tributaries of the Snake River above the Gros Ventre River. It has been introduced to waters east of the Continental Divide (Baxter and Simon 1970). The Yellowstone cutthroat trout has been recorded from Teton, Park, Sheridan, Johnson, and Big Horn counties. This species may occur in suitable aquatic habitats of the Upper Tongue River subwatershed within the Wyoming PRB study area. Suitable habitats include coldwater rivers, creeks, beaver ponds, and large lakes. Optimum water temperature generally may be 4.5 to 15.5 degrees Celsius; however, they probably were tolerant of much warmer temperatures historically in larger rivers. The management plan for this species is described in the Status and Management of Yellowstone Cutthroat Trout (WGFD 1999).

Sauger. The sauger is a native game fish species that is common within a limited range in Wyoming (WGFD 2012c). Within the Wyoming PRB study area, sauger occurs in the Clear Creek, Upper Powder River, and Upper Tongue River subwatersheds. The following information on habitat use, spawning, and limiting factors is based on the Wyoming State Wildlife Action Plan (WGFD 2012c). The Powder River provides seasonal habitat for migrating sauger from the Yellowstone River for the purpose of spawning. The Tongue River drainage population is small and of unknown genetic purity. Sauger habitat consists of reservoirs, rivers, or a combination of river and reservoir systems. The key components of sauger habitat in rivers are velocity and depth. In summer and spring, fish prefer low velocity areas with fine substrates.

Pool habitat with low velocities is used in the winter, with depths typically greater than 6 feet. Sauger also prefers low light conditions and often seeks turbid areas for cover. Spawning occurs in the spring (usually May in Wyoming) over gravel and cobble substrates. Spawning migrations can include both upstream and downstream movement and cover distances up to 235 miles. Movements in the Little Wind River and Bighorn River drainages were estimated to be 6 and 28 miles, respectively. Based on observations in the Wind River watershed, adult sauger were very sedentary outside of the spawning period. Limiting factors for this species include significant loss of habitat and population connectivity due to water development and diversion, risk of reduced genetic purity in some Wyoming populations from coexistence with non-native walleye, competition with introduced non-native fish species, and exploitation by anglers in some locations.

Sturgeon Chub. Within the Wyoming PRB study area, the Upper Powder River is the only subwatershed inhabited by sturgeon chub. This species was collected in a 2002 survey in the mainstem portion of the Powder River and several tributary draws (WGFD 2003). This species prefers swift currents in large, turbid rivers with sand or gravel-dominated bottoms (Baxter and Simon 1970; Lee et al. 1980). The primary food consists of bottom-dwelling invertebrates. Spawning is suspected to occur in late spring to mid-summer (Lee et al. 1980).

Goldeye. The goldeye occurs in the Clear Creek, Crazy Woman Creek, Little Powder River, Middle Powder River, and Upper Powder River subwatersheds in the Wyoming PRB study area and the portion of the Little Powder River subwatershed outside of the Wyoming PRB study area. It occurs in lake and stream habitats and can tolerate turbid conditions. Its food sources are insects, small fish, and other invertebrates. The spawning period is May and June (Baxter and Simon 1970).

Western Silvery Minnow. The western silvery minnow occurs in the Little Missouri River, Little Powder River, and Middle Powder River subwatersheds where it prefers relatively large clear streams. This species often occurs in the same streams as the flathead chub. The primary food items are considered to be algae and detritus.

Plains Minnow. The plains minnow is found in 11 of the Wyoming PRB study area subwatersheds (Antelope Creek, Clear Creek, Little Missouri River, Little Powder River, Middle Powder River, Salt Creek, South Fork Powder River, Upper Belle Fourche River, Upper Cheyenne River, Upper Powder River, and Upper Tongue River). This species was collected in a 2002 survey in the mainstem portion of the Powder River and several tributary draws (WGFD 2003). Plains minnow prefers slower-moving water and side-pools in turbid streams. Its diet mainly consists of algae and plant material. The spawning period ranges from late spring into summer (Baxter and Simon 1970).

Shovelnose Sturgeon. The shovelnose sturgeon occurs in the Crazy Woman Creek and Upper Powder River subwatersheds within the Wyoming PRB study area. It has been extirpated from the North Platte and Bighorn drainages but was reintroduced to the Bighorn River (WGFD 2012c). Shovelnose sturgeon typically are sampled from the mainstem portion of the Powder River and its major tributaries between the Montana border and I-90 from mid-May through late June, which represents the spawning migration period. While spawning has not been observed in Wyoming rivers, ripe males and females have been documented in the Powder River and Crazy Woman Creek. This species prefers habitat at or near the bottom of large unregulated, turbid rivers with relatively warm water and gravel substrates (WGFD 2012c).