3.13 Water Resources

3.13.1 Surface Water Resources

The Application Area falls within two water resource regions, as identified by their major river systems: the Missouri River Region and the Upper Colorado River Region (Seaber et al. 1994). These two regions are on opposite sides of the Continental Divide; the Missouri River drains to the east and ultimately the Gulf of Mexico (Atlantic Ocean). The Upper Colorado River drains to the west toward the Pacific Ocean. The Chokecherry site falls entirely within the Missouri River Region, and all but the western-most portion of the Sierra Madre site falls in the same. Only the western-most portion of the Sierra Madre site, including Miller Hill, falls within the Upper Colorado River Region. See **Figure 3.13-1** for a depiction of the Application Area and related surface water resources.

The dominant sources of precipitation in the area are winter and early spring snow storms; however late spring or early summer convective thunderstorms also contribute significant amounts of moisture. Precipitation amounts are affected by both meteorological and topographical conditions. Air masses that are forced to rise over higher elevation features by prevailing winds are cooled by the increased elevation, in turn causing condensation and an increase in precipitation in areas such as along the Continental Divide. Downwind, down-sloping sides of these topographic features and any adjacent low-lying areas do not receive the same amount of precipitation and are said to be within the rain-shadow. Average annual precipitation has been measured for up to 21 years at seven meteorological stations near the Application Area. The stations range in elevation from approximately 6,500 feet amsl near Sinclair to 7,635 feet amsl in the southern portion of the Sierra Madre Area and report annual averages from 6.2 inches to 14.3 inches (BLM 2008e). Bartos et al. (2006) estimates mean annual precipitation from 1961 to 1990 in the Application Area with a range from 8.1 to 10 inches in the North Platte River valley near the northeastern corner of the Bolten Area to 22.1 to 32 inches in the higher elevations of the Miller Hill and Sierra Madre areas that approach 8,500 feet amsl along the Continental Divide. The majority of the precipitation in the Upper North Platte basin and surrounding area occurs in April and May (Curtis and Grimes 2004).

The Analysis Area considered for water resources is defined as all 6th order, 12-digit Hydrologic Unit Code (HUC-12) Sub-watersheds, as delineated by the University of Wyoming (Berelson et al. 2001), that have a portion of the Application Area included within its boundary. The sub-watersheds assessed in this section are depicted in **Figure 3.13-1** and listed in **Table 3.13-1**. The total area encompassed by these sub-watersheds is approximately 640,000 acres, or 1,000 miles^2.

Although every sub-watershed listed contains a portion of the Application Area, a major portion of this area will be located within Hugus Draw, with large portions in Upper Sage Creek-North Platte River, McKinney Creek, and Rassmussen Creek sub-watersheds. **Table 3.13-2** provides a tabulation of the Application Area within each sub-watershed as depicted in **Figure 3.13-1**.

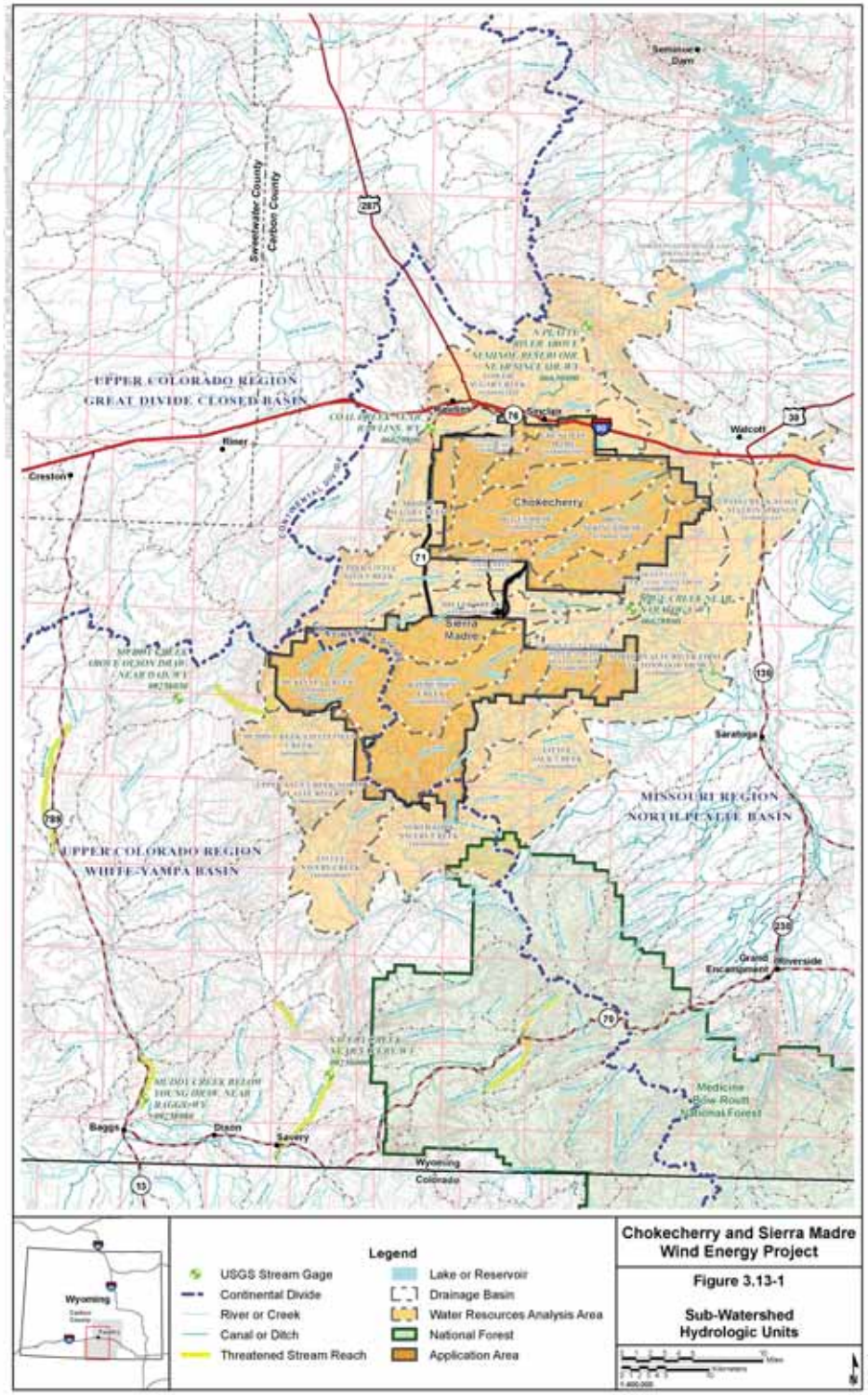
Streamflow in the Water Resources Analysis Area is dominated by snowmelt from higher elevations during the spring months. Other weather systems during the summer, fall, and winter, such as convective thunderstorms and frontal pressure systems may produce increases in discharge which are generally short in duration. This runoff regime is characterized by a great variance in streamflow throughout the year. The spring runoff brings high flows that often times will overtop stream banks. Peak runoff of snowmelt is generally encountered in April or May in the smaller streams with headwaters in the study area. The North Platte River typically attains average peak runoff a month later in May or June due to the fact that its headwaters and contributing area extends to higher elevation areas such as the Sierra Madre, Park, Rabbit Ears, Never-Summer, Medicine Bow, and Snowy mountain ranges, thus delaying the snowmelt and ensuing runoff. During late summer, fall, and winter, periods of very low flows are typical. Often the smaller streams in the area are dry for large portions of this time. **Table 3.13-3** lists statistics for several USGS stream gages near the Application Area (USGS 2010). **Figure 3.13-1** illustrates the locations of USGS stream gages.

Table 3.13-1 Sub-watershed Hydrologic Units Assessed as Water Resources Analysis Area

Region	Sub-region	Basin	Sub-basin	Watershed	Sub-watershed Name	HUC-12 Code
Missouri	North Platte	North Platte	Upper North Platte	North Platte River-Cow Creek	North Platte River-First Cottonwood Draw	101800020607
				Jack Creek	Little Jack Creek	101800020802
				Sage Creek	Upper Sage Creek-North Platte River	101800020901
					Rasmussen Creek	101800020902
					Lower Sage Creek-Upper North Platte River	101800020903
					Miller Creek	101800020904
					Upper Little Sage Creek	101800020905
					Lower Little Sage Creek	101800020906
				North Platte River-Iron Springs Draw	North Platte River-Coal Mine Draw	101800021001
					North Platte River-Lost Springs Draw	101800021002
					Iron Springs Draw	101800021003
					Hugus Draw	101800021004
					Grenville Dome	101800021005
				Pass Creek	Pass Creek-Stage Station Springs	101800021105
				Sugar Creek	Middle Sugar Creek	101800021302
					Lower Sugar Creek	101800021303
					101800021304[1]	101800021304
Upper Colorado	White-Yampa	White-Yampa	Muddy	Savery Creek	North Fork Savery Creek	140500030404
					Little Savery Creek	140500030405
			Little Snake	Upper Muddy Creek	Muddy Creek-Littlefield Creek	140500040101
					McKinney Creek	140500040102

[1] Some 12-digit Sub-watersheds (hydrologic units (HUs) were assigned the HUC-12 number when no Geographic Names Information System (GNIS) name was identified on DRG-Es.

Source: Wyoming Geographic Information System Center (WGISC) 2002.


Seminoe Dam
Sweetwater County
Carbon County
287
UPPER COLORADO REGION
GREAT DIVIDE CLOSED BASIN
Rawlins
Sinclair
76
Walcott
30
Riner
Creston
Chokecherry
71
Sierra Madre
130
Saratoga
MISSOURI REGION
NORTH PLATTE BASIN
789
UPPER COLORADO REGION
WHITE-YAMPA BASIN
230
Grand Encampment
Riverside
70
Medicine Bow-Routt National Forest
Baggs
Dixon
Savery
Wyoming
Colorado
13
Wyoming
Legend
USGS Stream Gage
Continental Divide
River or Creek
Canal or Ditch
Threatened Stream Reach
Lake or Reservoir
Drainage Basin
Water Resources Analysis Area
National Forest
Application Area
Chokecherry and Sierra Madre Wind Energy Project
Figure 3.13-1
Sub-Watershed Hydrologic Units

2.13.3

Table 3.13-2 Application Area Within Sub-watersheds

Sub-watershed	Application Area (acres)			
	Chokecherry	Sierra Madre	Offsite Areas	Total
North Platte River-First Cottonwood Draw	-	6,926	-	6,926
Little Jack Creek	-	8	-	8
Upper Sage Creek-North Platte River	-	28,140	-	28,140
Rasmussen Creek	-	23,140	-	23,140
Lower Sage Creek-Upper North Platte River	-	8,742	-	8,742
Miller Creek	-	15,091	577	15,091
Upper Little Sage Creek	818	2,540	177	3,359
Lower Little Sage Creek	5,718	-	266	5,718
North Platte River-Coal Mine Draw	15,215	-	-	15,215
North Platte River-Lost Springs Draw	3,347	-	-	3,347
Iron Springs Draw	18,851	-	-	18,851
Hugus Draw	35,332	-	-	35,332
Grenville Dome	13,669	-	65	13,669
Pass Creek-Stage Station Springs	53	-	-	53
Middle Sugar Creek	5,563	-	251	5,563
Lower Sugar Creek	1,733	-	-	1,733
101800021304 (Sugar Creek)[1]	8,788	-	104	8,788
North Fork Savery Creek	-	3,380	-	3,380
Little Savery Creek	-	1,178	-	1,178
Muddy Creek-Littlefield Creek	-	2,876	-	2,876
McKinney Creek	-	26,531	-	26,531
Totals[2]	**109,086**	**118,552**	**1,439**	**229,077**

[1] Some 12-digit sub-watersheds (HUs) were assigned the HUC-12 number when no GNIS name was identified on the DRG-Es. The name in parentheses indicates the 10-digit hydrologic unit code (HUC-10) name.

[2] Discrepancies in total acreage due to rounding.

Table 3.13-3 Streamflow Summaries from USGS Gages Near Application Area

Gage Name	Record Period/No. of Years	Flow Range (cubic feet per second [cfs])[1]	Typical Flows (cfs)[1]	Peak Flow Months2	Low Flow Months[2]
North Platte River above Seminoe Reservoir, near Sinclair, Wyoming	1939 - 2010/72	15,700 - 37	1,120	May - Jun	Sep – Feb
Savery Creek near Savery, Wyoming	1941 - 1992/38[3]	2,440 - 0	106	Apr - Jun	Aug – Jan
Sage Creek near Saratoga, Wyoming[4]	1973 - 1981/8	700 - 0	24	Apr - Jun	Sep - n.d.[5]
Muddy Creek below Young Draw, near Baggs, Wyoming	2004 - 2010/7	499 - 0.07	18	Mar - May	Jul – Dec
Muddy Creek above Olson Draw, near Dad, Wyoming[6]	2010/<1	23 - 3.5	7	n.d.	n.d.
Coal Creek near Rawlins, Wyoming[7]	1959 - 1981/22	436 - n.d.	n.d.	n.d.	n.d.

[1] Data summarized from USGS daily mean calculations.

[2] Data summarized from USGS monthly mean calculations.

[3] No data is available for Oct-71 through Mar-72 and Oct-72 through Mar-85.

[4] Data summarized is for Apr-Sep only. No data is available for Oct-Mar.

[5] n.d. = No/not enough data available.

[6] New gage installed July 2010, short data record.

[7] Only peak flow data was collected.

Source: USGS 2010.

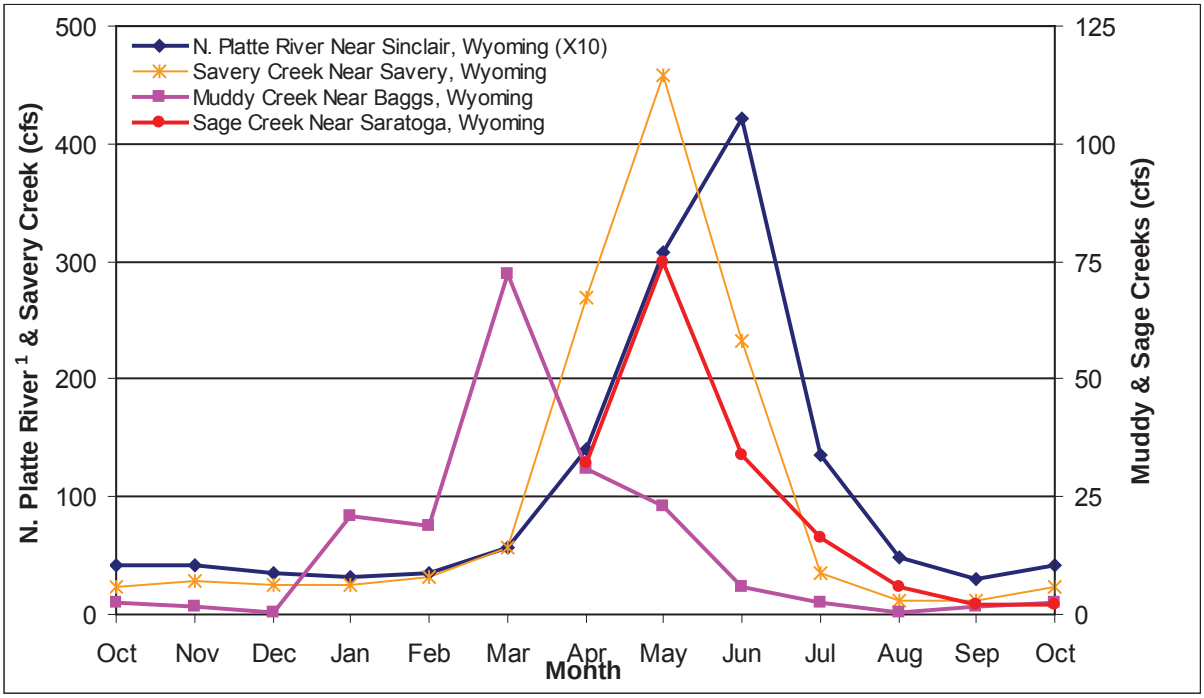
Figure 3.13-2 represents the timing of peak and low flows through the average monthly hydrographs for the reported gages near the Application Area. The actual average monthly values for the North Platte River were reduced by one order of magnitude to facilitate the direct graphic comparison of timing between the large river and the smaller streams in the area.

3.13.2 Surface Water Quality

The CWA, Section 303(c), requires each state to review, establish, and revise water quality standards for all surface waters within the state. To comply with this requirement, Wyoming has developed a beneficial use classification system to describe state-designated use(s). Regulatory programs for water quality standards include default narrative standards, non-degradation provisions, a total maximum daily load regulatory process for impaired waters, and associated minimum water quality requirements for the designated uses of listed surface waterbodies within the state.

Surface water use classifications as set by WDEQ (2001) and which are present in the Application Area are as follows:

- 1 – Outstanding waters - water quality, physical, and biological integrity which existed at the time of designation will be maintained and protected. Uses include drinking water, cold water game fish, non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, and scenic value;



North Platte River discharge (cfs) has been divided by a factor of 10 to fit the scale. The average monthly discharge shown for the North Platte River should be multiplied by 10 for actual value.

Source: USGS 2010.

Figure 3.13-2 Average Monthly Streamflow of USGS Gaged Streams near Application Area

- 2AB – Drinking water, cold water game fish, non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, scenic value;
- 2C – Non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, scenic value; and
- 3B – Other aquatic life, recreation, wildlife, agriculture, industry, scenic value.

Table 3.13-4 is a tabulation of all waterbodies within the Water Resources Analysis Area that are named either in the NHD or in the WDEQ Wyoming Surface Water Classifications (WDEQ 2001). Several of the waterbodies named in the NHD have not been classified by the WDEQ, and are noted within the table as having no classification. Many of the streams in the Application Area have reaches with different flow regimes (e.g., perennial and ephemeral). If any reach of a stream within the subwatershed and Application Area is perennial then the stream is listed as perennial in the table. If all reaches of a stream are ephemeral within the Application Area then the stream is listed as ephemeral in the table. As a result many of the perennial streams listed in the table also have ephemeral reaches within the Application Area.

Section 303(d) of the CWA also requires states to list all streams that do not meet their water use classifications, and are therefore considered impaired streams. One waterbody within the Application Area is currently listed by the State of Wyoming as a threatened stream: McKinney Creek. There are several other stream segments within the Water Resources Analysis Area or downstream from the Sierra Madre site that are listed as having their assigned uses threatened or not supported (WDEQ 2010). **Table 3.13-5** details threatened or not supported stream segments and **Figure 3.13-1** depicts the stream segments within the Water Resources Analysis Area. There is one stream

Table 3.13-4 Named Waterbodies Within Application Area

Sub-Watershed Name	Waterbody Name	Flow Regime of Stream/River, Reservoir or Lake	State Water Quality Classification[1]
North Platte River-First Cottonwood Draw	North Platte River	Perennial Stream/River	1
	Seaverson Reservoir	Perennial Reservoir	-
Little Jack Creek	Beaver Creek[2]	Perennial Stream/River	2AB
	Little Jack Creek[2]	Perennial Stream/River	2AB
	Low Creek[2]	Ephemeral Stream/River	2AB
	Spring Creek	Ephemeral Stream/River	2AB
	Willow Creek[2]	Ephemeral Stream/River	2AB
	Low Reservoir	Perennial Reservoir	-
Upper Sage Creek-North Platte River	Sage Creek	Perennial Stream/River	2AB
	Middlewood Creek[2]	Perennial Stream/River	3B
	Trapper Creek[2]	Perennial Stream/River	2C
	Rawlins Reservoir	Perennial Reservoir	-
	Adams Reservoir[2]	Perennial Reservoir	2AB
Rasmussen Creek	Rasmussen Creek	Ephemeral Stream/River	3B
	Lone Tree Creek[2]	Ephemeral Stream/River	3B
	La Marsh Creek[2]	Ephemeral Stream/River	3B
Lower Sage Creek-Upper North Platte River	Sage Creek	Perennial Stream/River	2AB
Miller Creek	Deadman Creek[2]	Ephemeral Stream/River	3B
	Miller Creek	Perennial Stream/River	2C
Upper Little Sage Creek	Emigrant Creek	Perennial Stream/River	-
	Little Sage Creek	Perennial Stream/River	2C
	Pine Grove Creek	Ephemeral Stream/River	-
	Miller Hill Lake[2]	Perennial Lake/Pond	2AB
	Little Sage Creek Dam	Perennial Reservoir	-
	Teton Reservoir[2]	Perennial Reservoir	2AB
Lower Little Sage Creek	Little Sage Creek	Ephemeral Stream/River	2C
North Platte River-Coal Mine Draw	North Platte River	Perennial Stream/River	2AB
North Platte River-Lost Springs Draw	North Platte River	Perennial Stream/River	2AB
	Seminoe Reservoir	Perennial Reservoir	2AB
Iron Springs Draw	Iron Springs Draw	Perennial Stream/River	3B
	Johnston Number 2 Reservoir	Ephemeral Lake/Pond	-

Table 3.13-4 Named Waterbodies Within Application Area

Sub-Watershed Name	Waterbody Name	Flow Regime of Stream/River, Reservoir or Lake	State Water Quality Classification[1]
Hugus Draw	Hugus Draw	Ephemeral Stream/River	3B
	Smith Draw	Perennial Stream/River	3B
Grenville Dome	No Named Waterbodies	NA	-
Pass Creek-Stage Station Springs	Pass Creek	Perennial Stream/River	2AB
Middle Sugar Creek	Coal Creek	Ephemeral Stream/River	3B
	Sugar Creek	Perennial Stream/River	3B
	Eightmile Lake	Perennial Lake	-
	Rawlins Peaking Reservoir	Perennial Reservoir	-
Lower Sugar Creek	Sugar Creek	Perennial Stream/River	3B
101800021304 (Sugar Creek)[3]	No Named Waterbodies	NA	-
North Fork Savery Creek	Fish Creek[2]	Perennial Stream/River	2AB
	Mill Creek[2]	Perennial Stream/River	2AB
	North Fork Savery Creek[2]	Perennial Stream/River	2AB
	Truckdrivers Creek[2]	Perennial Stream/River	2AB
	Twin Groves Reservoir	Perennial Reservoir	-
Little Savery Creek	Little Savery Creek	Perennial Stream/River	2AB
	McCarty Creek[2]	Perennial Stream/River	2AB
Muddy Creek-Littlefield Creek	Littlefield Creek[2]	Perennial Stream/River	2AB
	Muddy Creek	Perennial Stream/River	2AB
McKinney Creek	Eagle Creek[2]	Ephemeral Stream/River	3B
	Grove Creek[2]	Perennial Stream/River	2AB
	McKinney Creek	Perennial Stream/River	2AB
	Muddy Spring Creek	Perennial Stream/River	-
	Stoney Creek[2]	Perennial Stream/River	2AB

[1] Streams or waterbodies that have not been classified are indicated by an "-."

[2] Water quality classification from Table B (WGFD "Streams and Lake Inventory" database as of June 2000), WDEQ 2001.

[3] Some 12-digit sub-watersheds (HUs) were assigned the HUC-12 number when no GNIS name was identified on the DRG-Es. The name in parentheses indicates the HUC-10 name.

Sources: NHD, WDEQ 2001, and BLM revisions.

Table 3.13-5 Streams Near Application Area with Threatened Designated Uses According to the 2010 Wyoming 303(d) List

Stream Name	Reach Location	Distance from Sierra Madre Site	Uses	Use Support	Cause	Source
McKinney Creek	From Muddy Creek upstream to Eagle Creek	Reach begins within Sierra Madre	Aquatic Life, Cold Water Fish	Threatened	Habitat	Grazing
Muddy Creek	From Alamosa Gulch upstream to Littlefield Creek	Approximately 5 miles downstream on Littlefield Creek	Aquatic Life, Cold Water Fish	Threatened	Habitat	Grazing
Muddy Creek	From below Young Draw upstream to Deep Creek	Greater than 75 miles down Muddy Creek tributaries	Aquatic Life	Not Supporting	Selenium, Chloride	Unknown
Muddy Creek	West of State Hwy 789	Greater than 30 miles down Muddy Creek tributaries	Aquatic Life, Non-game Fish	Threatened	Habitat	Grazing
Savery Creek	From Little Sandstone Creek downstream to Little Snake River	Approximately 23 miles downstream on Little Savery Creek	Aquatic Life, Cold Water Fish	Threatened	Habitat	Grazing

Source: WDEQ 2010.

(Sage Creek) in the Water Resources Analysis Area that was de-listed from the impaired waters list in 2008, and portions of several others (Muddy Creek and Littlefield Creek above their confluence, and McKinney Creek above Eagle Creek) that were delisted in 2000.

The McKinney Creek and Upper Muddy Creek-Littlefield Creek sub-watersheds contain stream reaches listed as threatened for their aquatic life and cold water fish uses within and downstream from the Sierra Madre site. These are reaches of McKinney Creek and Muddy Creek. Two additional reaches of Muddy Creek not within the above-mentioned sub-watersheds, but downstream of these are threatened for aquatic life and one of the two for non-game fish use. The portions of Muddy Creek and Littlefield Creek above their confluence, and McKinney Creek above Eagle Creek also were previously on the 303(d) List, and were removed in 2000. Section 3.13.2.1 addresses the management of these sub-watersheds within the Upper Muddy Creek watershed.

Also downstream of the Sierra Madre site, approximately 23 miles from the Application Area, Savery Creek is threatened for its aquatic life and cold water fish uses. In all the above cases, the cause of the impairment listing is degradation to aquatic and riparian habitat due to unstable stream channels and loss of riparian function mainly from grazing of stock animals in or near these waterways.

Sage Creek flows through the Upper Sage Creek sub-watershed, which is located between the CCSM sites, and borders the southeastern portions of the Sierra Madre site. This creek was removed from WDEQs impaired or threatened waters list in 2008. It had previously been listed due to high sediment loads, but was delisted after a weight-of-evidence analysis indicated there are no impairments or threats to its designated uses (WDEQ 2010).

Another measure of waterway health is through the BLM's Standards and Guidelines Assessments, which include four fundamental principles: 1) watersheds are functioning properly; 2) water, nutrients, and energy are cycling properly; 3) water quality meets State standards; and 4) habitat for special status species is protected (BLM 2009b). See Section 3.6.4 for further details.

3.13.2.1 Special Management Areas

There have been two efforts for watershed improvement with funding through Section 319 of the CWA that have areas overlapping the Application Area. The Upper Muddy Creek watershed and Sage Creek watershed have both had very similar improvement efforts. These efforts have been undertaken by federal and state land managers and agencies, private landowners, and other stakeholders in cooperation to establish BMP's within the watersheds to improve the conditions of the uplands, riparian areas, and waterways. Cooperators in the Application Area include the BLM, NRCS, SERCD, LSRCD, University of Wyoming, WDEQ, WGFD, and TOTCO, among others. Examples of BMPs that have been implemented include modifying grazing distribution, controlling riparian area grazing, cross fencing, off-stream stock tanks, improvements to road-stream crossings, road closures, road drainage improvements, and prescribed burns.

The Upper Muddy Creek watershed improvement project includes the Muddy Creek-Littlefield Creek Basin and the McKinney Creek Basin sub-watersheds within the Analysis Area. This watershed improvement project shares the same boundaries as the Upper Muddy Creek Watershed/Grizzly WHMA in the Application Area. Approximately 840 acres of the Red Rim–Grizzly WHMA is also encompassed within the Application Area. Additional information on these WHMAs can be found in Section 3.4.7.1 and Section 3.6.4.2. Documented reductions of total dissolved solids and increases in macroinvertebrate total taxa have occurred in the Upper Muddy Creek watershed. These changes have been correlated to stabilization of stream channels and increased riparian vegetation densities through cooperative BMP development, implementation and monitoring (Ellison et al. 2009).

The Sage Creek watershed improvement project includes the Upper Sage Creek-North Platte River, Lower Sage Creek-Upper North Platte River, Upper Little Sage Creek, Lower Little Sage Creek, Miller Creek, and Rasmussen Creek sub-watersheds within the Analysis Area. The cooperative BMP development, implementation, and monitoring were factors in the delisting of Sage Creek from the Wyoming threatened and impaired waters list. The Red Rim/Grizzly WHMA has approximately 200 acres that extend into the Upper Sage Creek-North Platte River sub-watershed.

3.13.3 Surface Water Use

Water use in the state of Wyoming is managed by the WSEO. The North Platte River basin's water resources are highly appropriated and have special conditions restricting new uses of water according to stipulations of the Nebraska v. Wyoming Modified North Platte Decree and the Platte River Cooperative Agreement (U.S. Supreme Court 2001). Water in the North Platte Basin has been fully appropriated, and these agreements effectively prevent the development of new uses with the exception of stock, domestic, and municipal uses.

Adjudicated water uses within the Application Area consist mainly of diversions for reservoir supply for the City of Rawlins, municipal supply for the City of Rawlins and the Town of Parco (Sinclair), and for stock watering use. Irrigation, domestic, miscellaneous, recreation and fish propagation are all adjudicated uses within the area (WSEO 2008a).

3.13.4 Floodplains

The Federal Emergency Management Agency (FEMA) has delineated 100-year floodplains throughout the U.S. with its Flood Insurance Rate Maps (FIRMs). FIRMs were available for portions of the Application Area. The northern and eastern areas of the Application Area near the local population centers of Rawlins, Sinclair, and Saratoga had FIRM panels available for review. These maps covered from approximately T20N to the north and from approximately R85W to the east. The remainder of the

area is covered only by the FIRM Index Map for Carbon County, Wyoming, which states that the areas without detailed panels are of undetermined flood hazard (FEMA 1987).

In the portion of the area where detailed FIRM panels were reviewed, there is a 100-year floodplain associated with the North Platte River, generally existing within 100 feet of the river channel and extending up to 0.5 mile between bends in the river. Hugus Draw has a 100-year floodplain that extends approximately 2 miles upstream from its confluence with the North Platte River. Near the Town of Sinclair, the channel of Sugar Creek and several low-lying playas also were identified as 100-year floodplains. These are all within the northern area of the Chokecherry site.

3.13.5 Groundwater

The Application Area is located within the Rocky Mountain Physiographic Region. The Application Area is not directly underlain by a principal aquifer; however Upper Tertiary and Upper Cretaceous aquifers underlie portions of the area (Whitehead 1996). These aquifers are generally separated by shale and siltstone confining units that may act as aquitards if thick enough (Wyoming Water Resources Center [WWRC] 1998). No major alluvial aquifer systems are located near the Application Area. The North Platte River does have an associated major alluvial aquifer downstream near Casper, but it is not present in the Application Area (Zimmerman 1984). Depth to initial groundwater across the Application Area is estimated as ranging from a minimum of under 10 feet along several of the watercourses to a maximum of 50 to 200 feet in the northwestern portion of the Chokecherry site (WWRC 1998).

The Upper Tertiary aquifers generally consist of unconsolidated to semi-consolidated deposits of sand and gravel that may be interbedded with silt and clay layers. The materials composing the Upper Tertiary aquifers in central Wyoming are mostly of the Pliocene or Miocene age deposited by alluvial processes as fill in structural basins surrounded by mountains (Whitehead 1996). These formations are generally known as the North Park-Browns Park-South Pass aquifer systems in this area. They overlie the Upper Cretaceous aquifers (WWRC 1998), and are the surficial and near-surface aquifers in the higher elevations within the Application Area. These aquifers are likely encountered in the southern portions of the Sierra Madre site.

The Upper Cretaceous aquifers consist of sandstone with interbedded shale, siltstone, and small amounts of coal. The aquifers are deeply buried for the most part, with localized exposures around the borders of the Lower Tertiary aquifers. The Mesaverde Formation is the principal water-yielding formations (Visher and Durum 1952). These aquifers are located in strata overlain by the Upper Tertiary aquifers (WWRC 1998), and are surficial in the Chokecherry site on bluffs along the North Platte River.

Although no major alluvial aquifer systems are located near the Application Area (Zimmerman 1984), depth to groundwater estimates indicate localized alluvial aquifers exist in areas associated with many of the small drainages within the Application Area (WWRC 1998). These drainages include Iron Springs Draw, Littlefield Creek, Little Sage Creek, McKinney Creek, Sage Creek, and Sugar Creek.

3.13.6 Groundwater Quality

The Upper Tertiary aquifers generally produce water suitable for domestic and livestock use, but may have its uses limited by high sulfate and dissolved solids concentrations exceeding 500 and 9,000 milligrams per liter (mg/L), respectively (Zimmerman 1984). Freshwater is generally only found near the outcrops of the Upper Cretaceous aquifers, with brine water found at depth (Whitehead 1996). Because of the hydrologic connection between the surface water sources and the alluvial aquifers, the quality of the water within these aquifers is assumed to be similar to that of the surface water.

3.13.7 Groundwater Use

Groundwater use in the state of Wyoming is managed by the WSEO. The North Platte River basin has special conditions restricting new uses of water, including groundwater that is hydrologically connected to surface water. See Section 3.13.3 for further information regarding those restrictions.

The Application Area contains 52 well permits of record filed with the WSEO according to its water rights database (WSEO 2008b). Each of these permits does not necessarily indicate a separate and single well, as many permits are issued as enlargements of existing wells that were previously permitted. All of the well permits of record are for stock water use only, with the exception of 11 permits in the area immediately north and east of Grenville Dome near Sinclair. These 11 wells have permitted uses of domestic, miscellaneous and monitoring. Reported well depths across the Application Area range from 3 to 515 feet, with reported static depths to water of 0 to 180 feet.

The WSEO has a process in place to protect the historic and current uses of groundwater that are in good standing with the agency. Current groundwater permittees/appropriators can file an interference complaint against other water users as outlined in the WSEO Groundwater Regulations and Instructions (WSEO 1974). These regulations prevent the pumping activity at a well from negatively impacting the pumping of water from nearby wells.

3.14 Wildlife and Fisheries Resources

Information regarding wildlife and fisheries resources was obtained from a variety of sources including existing published and unpublished sources (BLM 2006; NatureServe 2008; Parker and Anderson 2001; WGFD 2008b, 2006, 2005a; Wyoming Natural Diversity Database [WYNDD] 2008) and site-specific field surveys (Western EcoSystems Technology, Inc. [WEST] 2009a,b,c, 2008a-j). These surveys examined the existing use of the Application Area by big game, birds, bats, and special status species. Representative wildlife species that may occur in the vicinity of the project based on the Wyoming Atlas (WGISC 2008) distribution maps and habitat descriptions are listed in **Appendix G**. Special status wildlife and fish species are discussed in Section 3.15, as they require additional consideration with the ESA and BLM Policy (BLM Manual 6840).

3.14.1 Habitat

The Application Area (229,076 acres) is located in the Wyoming Basin Ecoregion and is dominated by the Inter-Mountain Basins Big Sagebrush Shrubland ecological system (WGFD 2005a), more fully described in Section 3.11 of this document. The WGFD (2005a) evaluated the quality of habitats throughout the state primarily based on “habitat intactness,” which considers factors including road density, mine presence, oil and gas pipeline presence, oil and gas well presence, residential development, dams, impaired streams, Hilsenhoff’s Biotic Index score, surface water use, and the occurrence of invasive species. The intent was to provide a comprehensive view of ongoing landscape changes in Wyoming. The Inter-Mountain Basins Big Sagebrush scored high within the Wyoming Basins Ecoregion; however, it was noted that this area scored poorly in regards to how much vegetation type was protected.

The Application Area contains portions of two Wildlife Habitat Management Areas (WHMAs), the Red Rim/Grizzly WHMA and the Upper Muddy Creek Watershed/Grizzly WHMA (**Figure 3.4-2**). Approximately 19 percent (7,366 acres) of the Red Rim/Grizzly WHMA and 26 percent (15,443 acres) of the Upper Muddy Creek Watershed/Grizzly WHMA occur with the Application Area. The two areas are managed with specific goals and objectives for wildlife habitat that are different than the remainder of the Application Area.

The Red Rim/Grizzly WHMA is managed in accordance with a cooperative agreement between the Bureau of Land Management (BLM) and the Wyoming Game and Fish Department (WGFD) (BLM and Wyoming Game and Fish Commission [WGFC] 2010; WGFD and BLM 1994) to maintain and enhance wildlife habitat conditions in conjunction with livestock grazing. The Red Rim/Grizzly WHMA consists of two distinct areas, the Red Rim area and the Grizzly area. The Sierra Madre portion of the Application Area includes a portion of the Grizzly area. Priority wildlife species in the Grizzly area include elk, pronghorn, mule deer, greater sage-grouse, Columbian sharp-tailed grouse, several species of raptors, beaver, and Colorado River cutthroat trout (WGFD and BLM 1994).

The Upper Muddy Creek Watershed/Grizzly WHMA was designated in the 2008 Rawlins RMP with goals to promote management of habitat for the Colorado River fish species unique to the Muddy Creek watershed and crucial winter habitat for elk and mule deer, as well as to seek cooperation of land owners of adjacent property in the management of the wildlife habitat (BLM 2008). The Upper Muddy Creek Watershed/Grizzly WHMA overlaps a large portion of the Grizzly area of the Red Rim/Grizzly WHMA. The Upper Muddy Creek Watershed/Grizzly WHMA has been identified in the Rawlins RMP (Rawlins RMP Map 2-33a and Table 2-5) as a wind energy avoidance area.

3.14.2 Wildlife

3.14.2.1 Big Game

Big game species that may be present within the Application Area include mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), and pronghorn (*Antilocapra americana*). White-tailed deer

(*Odocoileus virginianus*) and moose (*Alces alces*) occasionally utilize the area, but the analysis was limited to those species with ranges designated by the WGFD that overlap with the Application Area. Big game seasonal ranges were identified across the Application Area (WEST 2008a) using the big game seasonal ranges designated by the WGFD. Range types included winter, winter-yearlong, crucial winter, crucial winter-yearlong, and spring-summer-fall. Winter ranges are areas where animals congregate during winter months (November through April), whereas winter-yearlong ranges are occupied throughout the year, being more heavily used during the winter as resident and migratory animals mix together. Crucial range describes a seasonal range that consistently receives high levels of use and is considered to be a limiting factor in maintaining population objectives for a herd unit. Spring-summer-fall ranges are areas used by animals outside the winter months.

Mule Deer

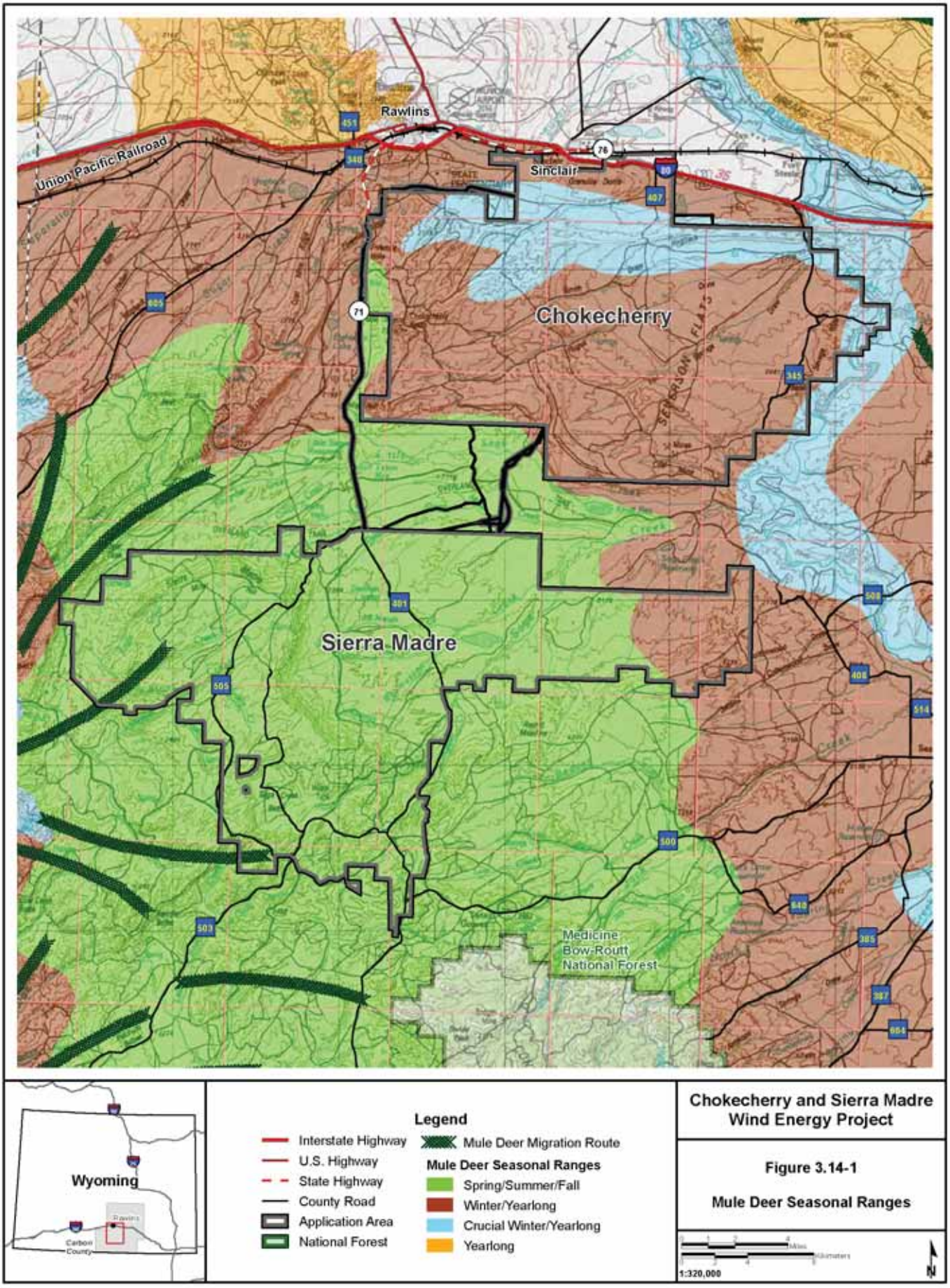
The Application Area overlaps with two Mule Deer Herd Units; the Platte Valley (Unit #541) and the Baggs (Unit #427). The Platte Valley Mule Deer Herd Unit is managed for a population of 20,000 mule deer and provides approximately 20,000 hunter recreation days per year and the Baggs Mule Deer Herd Unit is managed for a population of 18,700 mule deer and provides approximately 13,700 hunter recreation days per year (WGFD 2006).The Application Area contains 24,780 acres of crucial winter-yearlong range, 91,532 acres of winter-yearlong range, and 111,926 acres of spring-summer-fall range (**Figure 3.14-1**). While the Chokecherry area contains both resident and migratory mule deer, most mule deer in the Sierra Madre area are migratory, and travel 25 to 40 miles to winter ranges along Muddy Creek. Migratory routes of mule deer to and from the Sierra Madre area were recently documented by Sawyer (2007) and Sawyer and Kauffman (2008). These mule deer occupy winter ranges that occur in or adjacent to proposed gas developments in the Atlantic Rim Project area (BLM 2006). Additionally, mule deer are identified as a priority wildlife species in the Upper Muddy Creek Watershed/Grizzly WHMA, which overlaps with the western portion of the Sierra Madre area. The management of the crucial winter habitat for mule deer is one of the stated goals for the WHMA (BLM 2008b). Mule deer occur within the exterior boundary of the Grizzly area of the Red Rim/Grizzly WHMA year-round, but concentrate in the southwestern portion of the Grizzly area during the winter (WGFD and BLM 1993).

Management concerns associated with these mule deer populations include the potential impacts of energy development (direct and indirect habitat loss), maintaining functional migration routes, and sustaining native shrub communities.

Although trends in mule deer numbers from 2002 to 2007 indicated populations have grown or remained stable (WGFD 2006), the unusually harsh winter of 2007 to 2008 resulted in significant levels of mortality. Mortality rates estimated for radio-collared mule deer in the Baggs Herd Unit were 30 percent (H. Sawyer, unpublished data). Since then, mule deer numbers have remained below management objectives.

Elk

The Chokecherry area overlaps with the Snowy Range (#533) and Sierra Madre (#425) Elk Herd Units. The Snowy Range Herd Unit is managed for a population of 6,000 elk and provides approximately 32,684 hunter recreation days per year (WGFD 2006) (**Figure 3.14-2**). The Sierra Madre Herd Unit is managed for a population of 4,200 elk and provides approximately 32,000 hunter recreation days per year (WGFD 2006). The Application Area contains 1,060 acres of winter range, 129 acres of crucial winter-yearlong range, 40,817 acres of winter-yearlong range, and 20,863 acres of spring-summer-fall range (**Figure 3.14-2**). Elk are considered a priority wildlife species for the Upper Muddy Creek Watershed/Grizzly WHMA, which overlaps with the western portion of the Sierra Madre area. Management of the crucial winter habitat for elk is one of the stated goals of the Upper Muddy Creek Watershed/Grizzly WHMA (BLM 2008b). Elk are found within the Grizzly area of the Red Rim/Grizzly WHMA year-round with most use occurring in the southern portion of the Grizzly area (WGFD and



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.14-1

Mule Deer Seasonal Ranges

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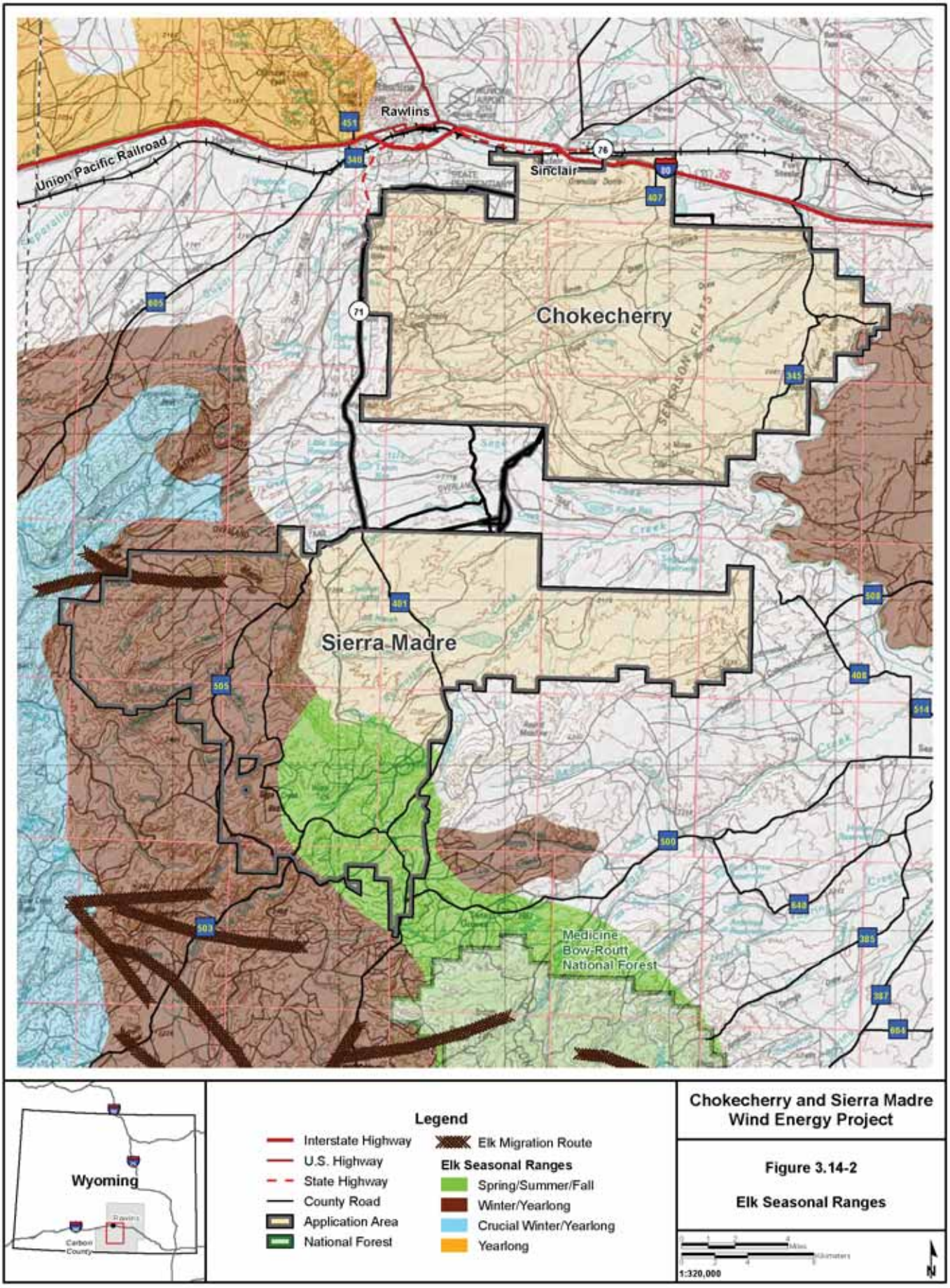

Chokecherry and Sierra Madre Wind Energy Project

Figure 3.14-2

Elk Seasonal Ranges

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BLM 1993). During winter months elk use is the heaviest within the Grizzly area, primarily occurring in the southwestern portion of the Grizzly area on southwest-facing slopes. Elk populations in the region generally have exceeded management objectives, resulting in liberal hunting seasons. Because of their large body size and flexible dietary requirements, elk generally are less susceptible to over-winter mortality compared to mule deer and pronghorn antelope. However, large numbers of elk that occupy winter ranges approximately 10 miles west of the Sierra Madre area, which are elk of the Red Rim Habitat Unit, have died in recent years due to ingesting lichens (WGFD 2004a).

While this unusual phenomenon has not occurred in the Application Area, this type of mortality may be of concern simply because of the close proximity of the Red Rim Habitat Unit. The WGFD initiated a study in 2006 in order to better understand elk movements across this herd unit; however, those results are not yet available as of November 2010 (G. Hiatt, WGFD, personal communication).

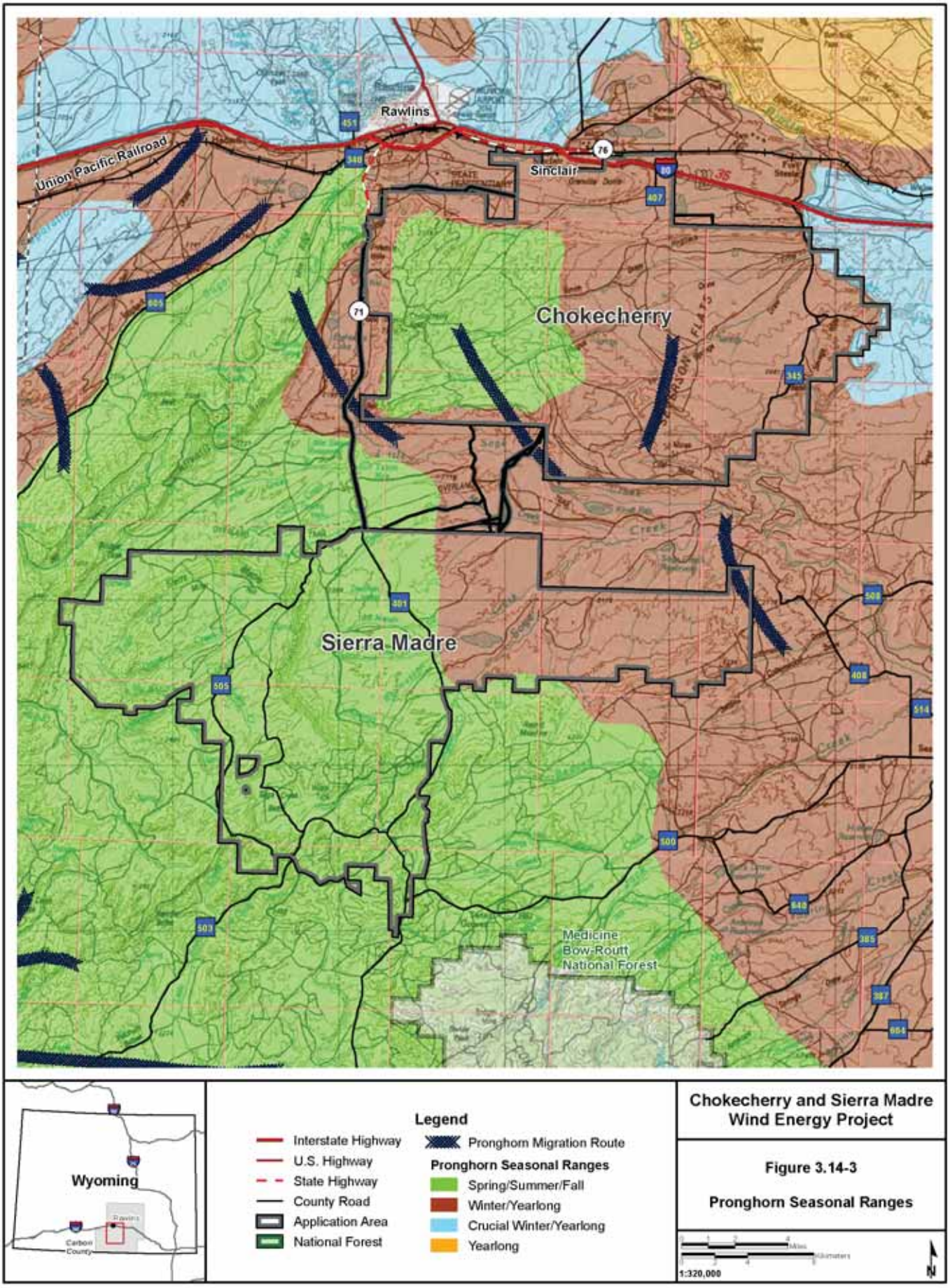
Pronghorn

The Chokecherry area overlaps with the Iron Springs (Unit #630), South Ferris (#637), and Elk Mountain (#528) Pronghorn Herd Units. The Sierra Madre area overlaps with the Iron Springs (Unit #630) and Baggs (#438) Pronghorn Herd Units, The Iron Springs, South Ferris, Baggs, and Elk Mountain Pronghorn Herd Units are managed for 12,000, 6,500, 9,000 and 5,000 pronghorn, respectively. The approximate hunter recreation days per year for the four pronghorn herd units are as follows: Iron Spring 2,200; South Ferris 700; Baggs 3,676; and Elk Mountain 2,286 (WGFD 2006). The Application Area contains 1,265 acres of crucial winter-yearlong range, 116,500 acres of spring-summer-fall range, and 111,312 acres of winter-yearlong range (**Figure 3.14-3**). Pronghorn, a priority species for the Grizzly area of the Red Rim/Grizzly WHMA, occur within the Grizzly area during the summer within the sagebrush dominated habitats and occasionally the riparian areas. Generally, no pronghorn use the Grizzly area of the Red Rim/Grizzly WHMA during the winter (WGFD and BLM 1993).

Pronghorn populations in the Iron Springs Herd Unit have met or exceeded management objectives in recent years, while pronghorn numbers in the South Ferris Herd Unit have been below management objectives since the winter of 1992-1993. However, the unusually harsh winter of 2007-2008 resulted in significant levels of mortality. The WGFD estimated total pronghorn losses at approximately 30 percent (T. Woolley, WGFD, personal communication). Management concerns associated with these pronghorn populations include the potential impacts of energy development (direct and indirect habitat loss), maintaining functional migration routes, and minimizing movement barriers (e.g., fencing).

3.14.2.2 Small Game and Furbearers

Small game species in Wyoming include cottontail rabbits (*Sylvilagus audubonii*, *Sylvilagus floridanus*, *Sylvilagus nuttallii*), snowshoe hare (*Lepus americanus*), and the red squirrel (*Tamiasciurus hudsonicus*). Cottontail rabbits are the most popular with hunters, primarily because cottontails occur throughout the state, but are most abundant in the sagebrush basins, grasslands and agricultural regions (WGFD 2008c). Desert and Mountain (Nuttall's) cottontails (*Sylvilagus audubonii*; *Sylvilagus nuttallii*) are likely to inhabit the Application Area. Snowshoe hares occur within Wyoming mountain ranges but would not likely occur within the Application Area. The red squirrel potentially occurs within the Application Area as they have been documented to utilize areas with a mixture of aspen and sagebrush around Laramie, Wyoming (WGISC 2008). Furbearing species that are permitted for trapping by a license-holder in Wyoming consist of eleven species including: badger (*Taxidea taxus*), bobcat (*Lynx rufus*), marten (*Martes americana*), weasels (*Mustela frenata*, *Mustela nigripes*, *Mustela mivalis*, *Mustela erminea*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), skunks (*Spilogale gracilis*, *Spilogale putorius*, *Mephitis mephitis*), beaver (*Castor canadensis*), mink (*Mustela vison*), and muskrat (*Ondatra zibethicus*). Coyotes, raccoons, red fox, and skunk also are classified as predators and may be taken without a license. Badger, bobcat, weasel, beaver, and muskrat may be taken if damage is being caused. Mink, beaver, and muskrat potentially occur in riparian areas, ponds or lakes in the Application Area (WGISC 2008). Badger, bobcat, long-tailed weasels, coyote, red fox, and striped skunk all have



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.14-3

Pronghorn Seasonal Ranges

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distributions that include the Application Area (WGISC 2008). These species generally are widespread utilizing many habitats, including sagebrush, thus they potentially occur within the Application Area.

3.14.2.3 Nongame

A diversity of nongame species (e.g., small mammals, passerines, raptors, reptiles, and amphibians) occupies the Application Area. Several nongame species potentially found within the Application Area are considered special status species. Special status nongame species such as pygmy rabbit and Wyoming pocket gopher are discussed in Section 3.15.

Bats

An acoustic bat study was conducted in the Chokecherry and Sierra Madre areas to determine the spatial and temporal variation of bat use as well as species composition (WEST 2008j). The study was conducted following the WGFD Wildlife Protection Recommendations for Wind Energy Development in Wyoming (WGFD 2010). The protocol included passive acoustic sampling from eight anabat stations at six locations, including two paired stations with a detector on the ground and one raised on a met tower at one location in each of the Chokecherry and Sierra Madre areas. The stations were located to quantify bat use throughout the Application Area (**Figure 3.14-4**). One of the stations (A3) was placed next to a water tank and stock pond and associated riparian vegetation in Hugus Draw in an area of suspected relatively high bat activity. This station was used to document species composition and relative activity of local bats in the application area. Because its location next to a pond was not representative of likely turbine locations, the activity levels are much higher than would be expected within dry, upland areas typical of where turbines would be located. The units of activity were number of bat passes and defined as a continuous series of less than or equal to two call notes produced by an individual bat with no pauses between call notes of less than one second (Gannon et al. 2003; White and Gehrt 2001).

Spatial Variation

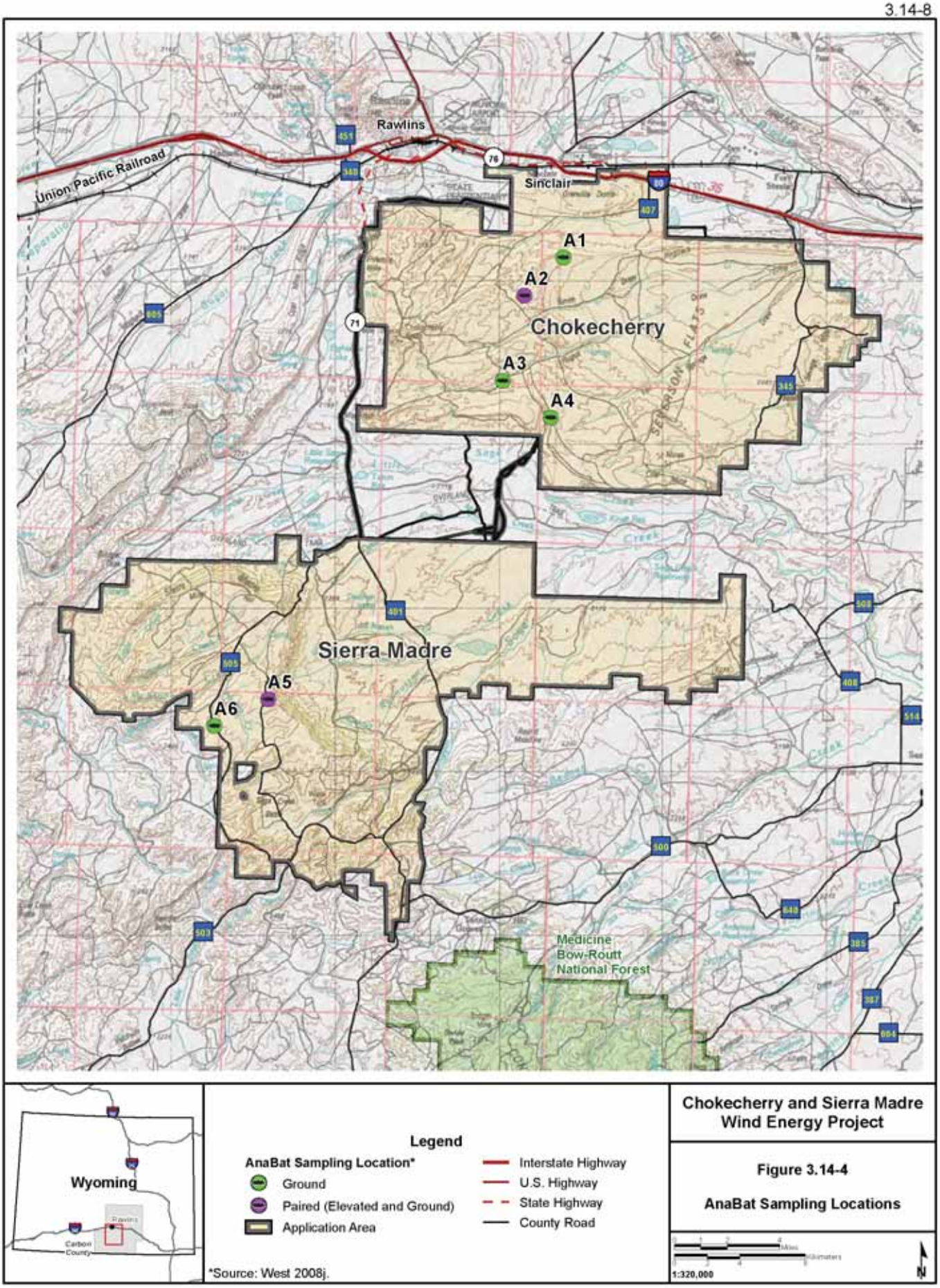
Bat activity was similar within the Chokecherry area for three of the ground-based Anabat units (mean = 3.0 bat passes per detector-night), but higher at A3 located in the southwestern portion of the Chokecherry area (20.6 bat passes per detector-night) (**Table 3.14-1**). Bat passes recorded at unit A3 represent 63 percent of all passes recorded during the study. In the Sierra Madre area, bat activity was relatively low and similar between both ground-based Anabat units (mean = 1.1 bat passes per detector-night).

Temporal Variation

Bat activity was highest from July 13 through the end of August, at which point bat activity abruptly decreased to lower levels through September and October. Peaks of activity occurred on July 27 and August 22 (**Figure 3.14-5**). Temporal patterns were largely consistent among stations, although unit A3 recorded more passes per night. Trends in bat activity also were similar between ground and raised units at paired stations. The number of passes gradually increased until peaking on August 22, then decreased through the end of the study period.

Species Composition

Bat calls were classified as either high-frequency (HF) calls (≥35 kilohertz [kHz]) that generally are given by small bats (e.g., mouse-eared bats [*Myotis* spp.]) or low-frequency (LF) calls (<35 kHz) that generally are given by larger bats (e.g., silver-haired bat [*Lasionycteris noctivagans*], big brown bat [*Eptesicus fuscus*], hoary bat [*Lasiurus cinereus*]). The total number of passes by HF bats (HF; 63 percent of all passes) outnumbered passes by LF bats (LF; 37 percent) in the Application Area. However, the proportion of HF and LF bat passes was similar among Anabat ground stations, with the exception of station A3, which recorded about three times more HF passes than LF passes. At the elevated units, LF bat passes outnumbered HF passes and patterns of activity for HF and LF bats were similar for ground based and elevated units(**Table 3.14-2**). The HF passes outnumbered the LF passes during July, but the



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.14-4

AnaBat Sampling Locations

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Table 3.14-1 Bat Passes for Each Anabat Location for Surveys Conducted in the Application Area, July 13 - October 13, 2008

Anabat Location	Total Bat Passes	Detector- Nights	Bat Passes/Night
A1	215	92	2.34
A2 (ground)	302	85	3.55
A2 (raised)	107	71	1.51
A3[1]	1,897	92	20.62
A4	239	73	3.27
A5 (ground)	98	92	1.07
A5 (raised)	64	71	0.90
A6	99	93	1.06
Total	**3,021**	**669**	**4.29[2]**

[1] This station was placed next to a water tank and stock pond and data are not representative of upland areas typical of where wind turbines would be located.

[2] Average nightly bat passes based on eight anabat locations.

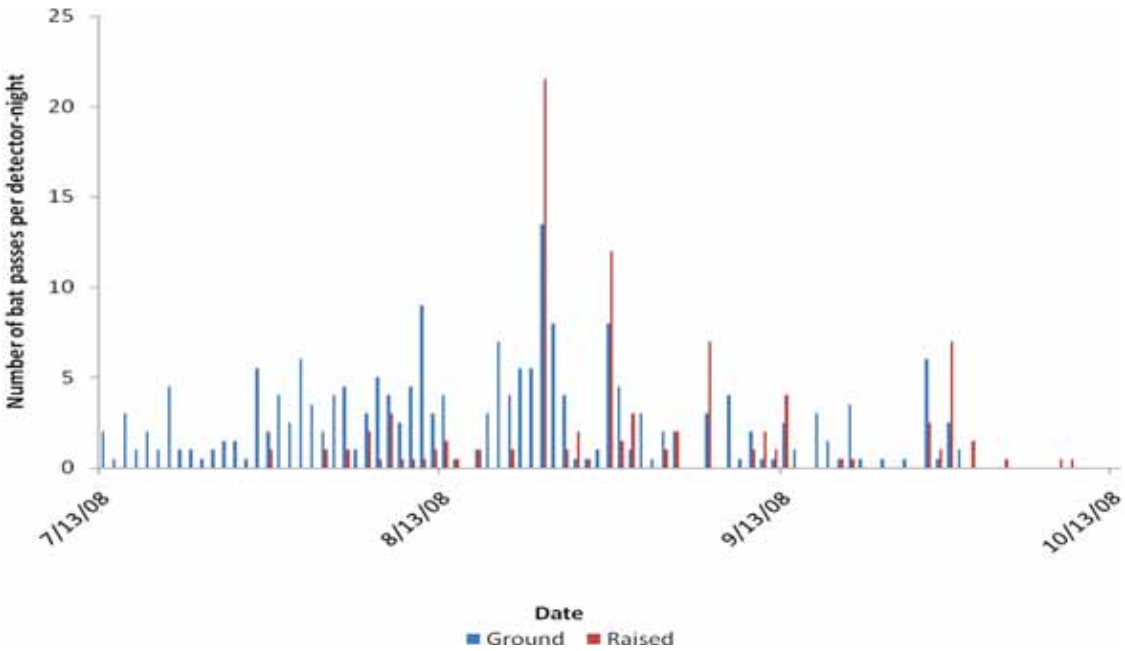


Figure 3.14-5 Nightly Activity Recorded at Ground and Elevated Anabat Units in the Application Area, During the Study Period July 13 - October 13, 2008

Table 3.14-2 Results of Bat Acoustic Surveys Conducted in the Chokecherry and Sierra Madre Areas, July 13 - October 13, 2008

Anabat Location	# of HF Bat Passes	# of LF Bat Passes	# of Hoary Bat Passes*	Detector-Nights	Bat Passes/ Night
A1	76	139	27	92	2.34
A2 (ground)	200	102	17	85	3.55
A2 (raised)	5	102	38	71	1.51
A3	1,404	493	42	92	20.62
A4	143	96	31	73	3.27
A5 (ground)	31	67	22	92	1.07
A5 (raised)	1	63	29	71	0.90
A6	49	50	11	93	1.06
Total	**1,909**	**1,112**	**217**	**669**	**4.29**[1]

[1] Average nightly bat passes based on eight anabat locations.

number of passes was more similar during August, while LF bat passes were more frequent in September and October when overall activity was much lower (**Figure 3.14-6**).

Species identification for specific passes was possible only for the hoary bat, as mouse-eared bat species cannot reliably be separated using anabat data, and big brown and silver-haired bats cannot be distinguished from each other based on call characteristics. Hoary bats composed 7 percent of total passes detected within the Application Area. Hoary bat activity was similar among anabat stations and patterns of hoary bat activity were similar to activity patterns for all bat passes with most passes recorded on August 22.

Birds

A year-long baseline avian use study was conducted in the Application Area to characterize the seasonal, spatial, and temporal bird use of the areas. The study was conducted following the WGFD Wildlife Protection Recommendations for Wind Energy Development in Wyoming (WGFD 2010). The study was initiated June 2008 and concluded June 2009 (WEST 2009b). At the start of the study, 16 points were selected to survey representative habitats and topography of the Application Area, while also providing relatively even coverage (**Figure 3.14-7**). However the original Application Area identified was smaller, specifically the Sierra Madre area which was later extended to the west. Upon review of the Application Area, the BLM determined that the 16 points still were representative of the habitats and topography, therefore no adjustments were made. Although, due to snow conditions which prevented access to much of the study area, three additional points were added north of the Sierra Madre area. Sampling intensity was designed to document bird use and behavior by plant community and season within the Application Area. Surveys were conducted approximately bi-weekly during summer and winter (June 15 to August 31; November 16 to December 31) and weekly during the fall (September 1 to October 15) and spring (March 16 to May 31). For the purpose of this EIS, the BLM assumed survey data from the surveyed portions of the Application Area to be representative of bird use in the entire Application Area.

Bird Use by Type

Fifty unique species were observed during surveys completed for the Application Area (WEST 2009b). A total of 2,005 individual birds within 1,301 separate groups were recorded, of which 230 individuals were

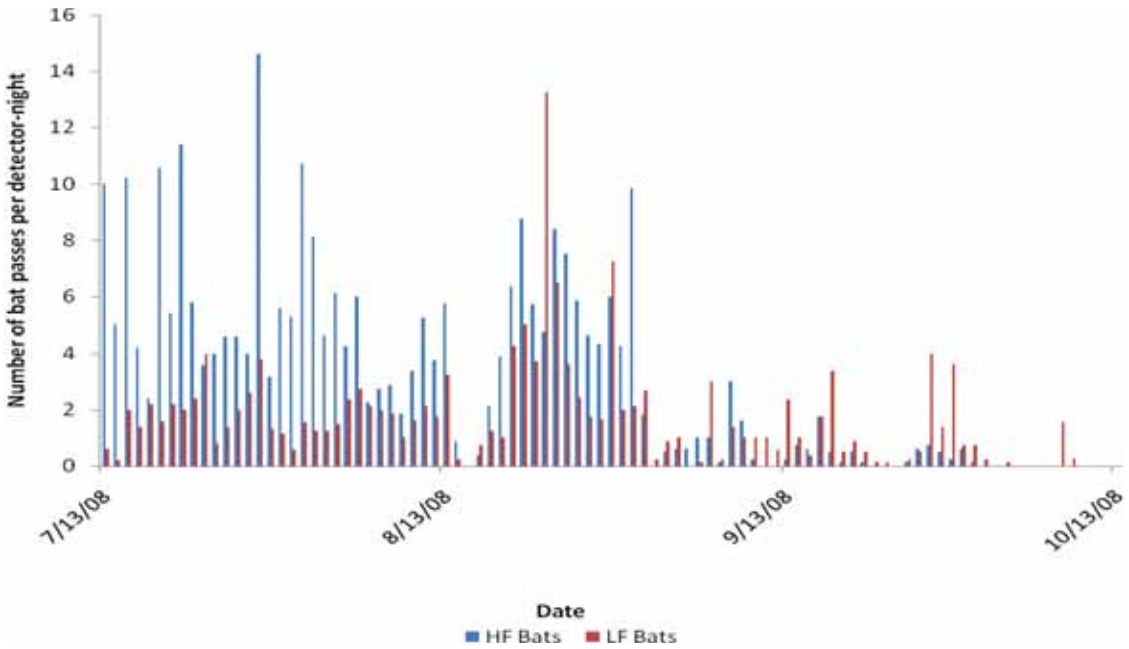
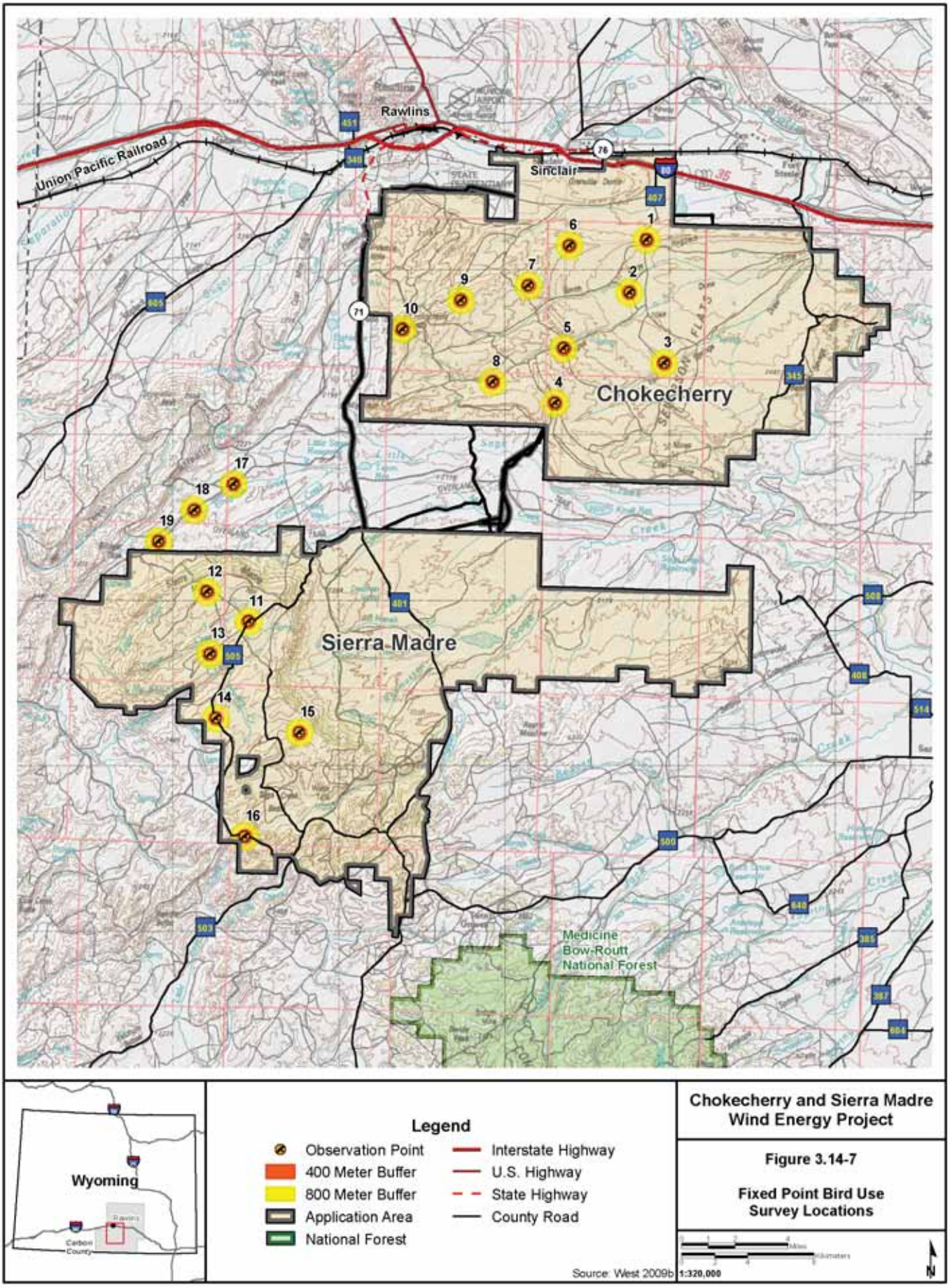


Figure 3.14-6 Nightly Activity by HF and LF Bats in the Application Area, July 13 – October 13, 2008

raptors comprised of 12 species (**Table 3.14-3**). Raptor use was highest in the fall, followed by summer, spring and winter. Higher use in the summer and spring was primarily due to high use of the area by American kestrels (*Falco sparverius*). Higher use in the fall and winter was primarily due to use of the area by golden eagles (*Aquila chrysaetos*) **Table 3.14-4**. Only three raptors were observed in the winter including two golden eagles and one ferruginous hawk (*Buteo regalis*). Mean raptor use in the Application Area was classified as low (0 – 0.5 raptors/plot/20-minute survey). Raptor use at the nine points located in the Sierra Madre area (0.52 bird/plot/20-minute survey) was slightly higher than raptor use at the 10 points located in the Chokecherry area (0.43 bird/plot/20-minute survey) during the summer and fall survey periods.

The USFWS has recently expressed heightened concern over potential impacts of wind energy development on eagles (USFWS 2010a). During the avian baseline study, surveys documented a general lack of suitable roosting and nesting habitat and only two bald eagles were observed, indicating the Application Area receives very little use by this species. However, golden eagles were the most abundant raptor species observed during the surveys, with 62 groups totaling 69 individual eagles observed. Golden eagle use ranged from 0.07/survey in spring to 0.25/survey in fall and averaged 0.14/survey across all seasons. Golden eagles therefore comprised 30.4 percent of all raptor use of the Application Area.

Passerines were by far the most abundant bird type observed in the Application Area during all seasons with the exception of winter (**Table 3.14-3**). However, a 100-m radius viewshed was used for small bird (i.e., passerines except large corvids, woodpeckers, swifts, and hummingbirds) data analysis; therefore, results are not directly comparable to the other large bird and extremely small bird types. The most commonly observed passerine species were horned lark (*Eremophila alpestris*), vesper sparrow (*Pooecetes gramineus*), Brewer's sparrow (*Euphagus cyanocephalus*), western meadowlark (*Sturnella neglecta*), and sage thrasher (*Oreoscoptes montanus).*



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.14-7

Fixed Point Bird Use Survey Locations

Table 3.14-3 Total Number of Individuals and Groups for each Bird Type and Species, by Season and Overall, During the Fixed-point Bird Use Surveys in the Chokecherry and Sierra Madre Areas, June 26, 2008 – June 16, 2009

Species/Type	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Waterbirds		0	0	0	0	0	0	2	16	2	16
American White Pelican	*Pelecanus erythrorhyncos*	0	0	0	0	0	0	1	14	1	14
Great Blue Heron	*Ardea herodias*	0	0	0	0	0	0	1	2	1	2
Shorebirds		0	0	0	0	0	0	1	1	1	1
Killdeer	*Charadrius vociferus*	0	0	0	0	0	0	1	1	1	1
Raptors		77	86	80	88	3	3	51	53	211	230
Accipiters		0	0	5	5	0	0	1	1	6	6
Cooper's Hawk	*Accipiter cooperii*	0	0	2	2	0	0	0	0	2	2
Sharp-shinned Hawk	*Accipiter striatus*	0	0	1	1	0	0	1	1	2	2
Unidentified Accipiter		0	0	2	2	0	0	0	0	2	2
Buteos		23	26	20	21	1	1	11	12	55	60
Ferruginous Hawk	*Buteo regalis*	1	1	2	2	1	1	1	1	5	5
Red-tailed Hawk	*Buteo jamaicensis*	14	16	6	6	0	0	7	8	27	30
Rough-legged Hawk	*Buteo lagopus*	0	0	9	9	0	0	2	2	11	11
Swainson's Hawk	*Buteo swainsoni*	7	8	0	0	0	0	1	1	8	9
Unidentified Buteo		1	1	3	4	0	0	0	0	4	5
Other Hawks		15	15	19	22	0	0	5	5	39	42
Northern Harrier	*Circus cyaneus*	15	15	19	22	0	0	5	5	39	42
Eagles		17	19	33	37	2	2	13	14	65	72
Bald Eagle	*Haliaeetus leucocephalus*	0	0	0	0	0	0	2	2	2	2
Golden Eagle	*Aquila chrysaetos*	17	19	32	36	2	2	11	12	62	69

Table 3.14-3 Total Number of Individuals and Groups for each Bird Type and Species, by Season and Overall, During the Fixed-point Bird Use Surveys in the Chokecherry and Sierra Madre Areas, June 26, 2008 – June 16, 2009

Species/Type	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Unidentified Eagle		0	0	1	1	0	0	0	0	1	1
Falcons		22	26	3	3	0	0	20	20	45	49
American Kestrel	*Falco sparverius*	21	25	2	2	0	0	16	16	39	43
Prairie Falcon	*Falco mexicanus*	1	1	1	1	0	0	4	4	6	6
Other Raptors		0	0	0	0	0	0	1	1	1	1
Osprey	*Pandion haliaetus*	0	0	0	0	0	0	1	1	1	1
Vultures		0	0	1	1	0	0	1	1	2	2
Turkey Vulture	*Cathartes aura*	0	0	1	1	0	0	1	1	2	2
Upland Gamebirds		0	0	1	2	3	24	2	2	6	28
Greater Sage Grouse	*Centrocercus urophasianus*	0	0	1	2	3	24	2	2	6	28
Doves/Pigeons		8	10	0	0	0	0	0	0	8	10
Mourning Dove	*Zenaida macroura*	8	10	0	0	0	0	0	0	8	10
Large Corvids		14	65	62	105	9	15	30	60	115	245
American Crow	*Corvus brachyrhynchos*	4	49	0	0	0	0	2	16	6	65
Black-Billed Magpie	*Pica pica*	0	0	2	3	2	2	0	0	4	5
Common Raven	*Corvus corax*	10	16	60	102	7	13	28	44	105	175
Passerines		467	600	95	255	2	4	379	588	943	1,447
American Robin	*Turdus migratorius*	1	1	0	0	0	0	0	0	1	1
Barn Swallow	*Hirundo rustica*	0	0	0	0	0	0	2	2	2	2
Brewer's Blackbird	*Euphagus cyanocephalus*	8	9	0	0	0	0	2	26	10	35
Brewer's Sparrow	*Spizella breweri*	51	57	5	5	0	0	14	18	70	80

Table 3.14-3 Total Number of Individuals and Groups for each Bird Type and Species, by Season and Overall, During the Fixed-point Bird Use Surveys in the Chokecherry and Sierra Madre Areas, June 26, 2008 – June 16, 2009

Species/Type	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Clark's Nutcracker	*Nucifraga columbiana*	1	1	0	0	0	0	0	0	1	1
Cliff Swallow	*Petrochelidon pyrrhonota*	0	0	0	0	0	0	1	1	1	1
Grasshopper Sparrow	*Ammodramus savannarum*	0	0	0	0	0	0	4	4	4	4
Green-Tailed Towhee	*Pipilo chlorurus*	1	1	0	0	0	0	0	0	1	1
Horned Lark	*Eremophila alpestris*	177	264	48	172	1	1	224	368	450	805
House Wren	*Troglodytes aedon*	8	13	3	3	0	0	0	0	11	16
Lark Bunting	*Calamospiza melanocorys*	3	3	0	0	0	0	1	12	4	15
Lark Sparrow	*Chondestes grammacus*	0	0	2	2	0	0	0	0	2	2
Lincoln's Sparrow	*Melospiza lincolnii*	0	0	0	0	0	0	2	2	2	2
Loggerhead Shrike	*Lanius ludovicianus*	2	2	0	0	0	0	2	2	4	4
Mountain Bluebird	*Sialia currucoides*	3	4	4	16	0	0	7	14	14	34
Rock Wren	*Salpinctes obsoletus*	7	7	0	0	0	0	4	6	11	13
Sage Sparrow	*Amphispiza belli*	7	7	0	0	0	0	48	52	55	59
Sage Thrasher	*Oreoscoptes montanus*	52	55	2	2	0	0	6	8	60	65
Say's Phoebe	*Sayornis saya*	1	1	0	0	0	0	1	1	2	2
Song Sparrow	*Melospiza melodia*	0	0	2	3	0	0	0	0	2	3
Townsend's Solitaire	*Myadestes townsendi*	0	0	1	1	0	0	0	0	1	1
Tree Swallow	*Tachycineta bicolor*	3	3	0	0	0	0	0	0	3	3
Unidentified Blackbird		0	0	1	4	0	0	0	0	1	4
Unidentified Passerine		28	43	16	30	1	3	1	6	46	82
Unidentified Sparrow		9	9	3	5	0	0	0	0	12	14
Unidentified Swallow		4	4	0	0	0	0	0	0	4	4

Table 3.14-3 Total Number of Individuals and Groups for each Bird Type and Species, by Season and Overall, During the Fixed-point Bird Use Surveys in the Chokecherry and Sierra Madre Areas, June 26, 2008 – June 16, 2009

Species/Type	Scientific Name	Summer		Fall		Winter		Spring		Total	
		# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs	# grps	# obs
Unidentified Wren		2	2	0	0	0	0	0	0	2	2
Vesper Sparrow	*Pooecetes gramineus*	65	79	3	4	0	0	32	38	100	121
Western Kingbird	*Tyrannus verticalis*	1	1	1	1	0	0	0	0	2	2
Western Meadowlark	*Sturnella neglecta*	33	34	4	7	0	0	28	28	65	69
Other Birds		10	22	0	0	0	0	3	4	13	26
Common Nighthawk	*Chordeiles minor*	5	6	0	0	0	0	0	0	5	6
Northern Flicker	*Colaptes auratus*	1	1	0	0	0	0	1	1	2	2
Unidentified Hummingbird		2	2	0	0	0	0	0	0	2	2
White-Throated Swift	*Aeronautes saxatalis*	2	13	0	0	0	0	2	3	4	16
Overall		576	783	239	451	17	46	469	725	1,301	2,005

Table 3.14-4 Mean Bird Use (Number of Birds/800-plot/20-min Survey), Percent of Total Composition (%), and Frequency of Occurrence (%) for each Large Bird and Species by Season During the Fixed-point Bird Use Surveys in the Chokecherry and Sierra Madre Areas, June 26, 2008-June 16, 2009

	Use				% Composition				% Frequency			
Species/Type	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Waterbirds	0	0	0	0.10	0	0	0	10.5	0	0	0	1.4
American White Pelican	0	0	0	0.09	0	0	0	9.0	0	0	0	0.6
Great Blue Heron	0	0	0	0.02	0	0	0	1.6	0	0	0	0.8
Shorebirds	0	0	0	0.01	0	0	0	0.8	0	0	0	0.8
Killdeer	0	0	0	0.01	0	0	0	0.8	0	0	0	0.8
Raptors	0.58	0.62	0.17	0.35	53.1	45.2	27.9	36.1	37.2	36.8	16.7	28.6
Accipiters	0	0.03	0	0.01	0	2.3	0	0.6	0	2.4	0	0.6
Cooper's Hawk	0	0.01	0	0	0	0.8	0	0	0	1.0	0	0
Sharp-Shinned Hawk	0	0.01	0	0.01	0	0.5	0	0.6	0	0.7	0	0.6
Unidentified Accipiter	0	0.01	0	0	0	1.0	0	0	0	1.4	0	0
Buteos	0.18	0.15	0.03	0.08	16.8	11.1	4.7	8.0	14.1	8.7	2.8	7.3
Ferruginous Hawk	0.01	0.01	0.03	0.01	0.7	1.0	4.7	1.5	0.7	1.4	2.8	1.4
Red-Tailed Hawk	0.11	0.04	0	0.04	10.3	3.1	0	3.9	8.4	2.9	0	3.8
Rough-Legged Hawk	0	0.07	0	0.02	0	4.8	0	2.0	0	5.1	0	2.0
Swainson's Hawk	0.06	0	0	0.01	5.2	0	0	0.6	4.9	0	0	0.6
Unidentified Buteo	0.01	0.03	0	0	0.6	2.2	0	0	0.7	2.2	0	0
Other Hawks	0.10	0.16	0	0.03	9.0	11.5	0	3.3	8.3	10.1	0	2.4
Northern Harrier	0.10	0.16	0	0.03	9.0	11.5	0	3.3	8.3	10.1	0	2.4
Eagles	0.11	0.26	0.14	0.08	10.4	19.1	23.3	8.3	9.6	20.3	13.9	6.1
Bald Eagle	0	0	0	0.01	0	0	0	1.3	0	0	0	1.3
Golden Eagle	0.11	0.25	0.14	0.07	10.4	18.5	23.3	7.0	9.6	19.6	13.9	5.4
Unidentified Eagle	0	0.01	0	0	0	0.5	0	0	0	0.7	0	0

Table 3.14-4 Mean Bird Use (Number of Birds/800-plot/20-min Survey), Percent of Total Composition (%), and Frequency of Occurrence (%) for each Large Bird and Species by Season During the Fixed-point Bird Use Surveys in the Chokecherry and Sierra Madre Areas, June 26, 2008-June 16, 2009

	Use				% Composition				% Frequency			
Species/Type	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**	**Summer**	**Fall**	**Winter**	**Spring**
Falcons	0.18	0.02	0	0.15	16.8	1.3	0	15.2	14.0	1.8	0	13.4
American Kestrel	0.18	0.01	0	0.12	16.2	0.8	0	12.1	13.3	1.1	0	11.1
Prairie Falcon	0.01	0.01	0	0.03	0.6	0.5	0	3.1	0.7	0.7	0	3.0
Other Raptors	0	0	0	0.01	0	0	0	0.6	0	0	0	0.6
Osprey	0	0	0	0.01	0	0	0	0.6	0	0	0	0.6
Vultures	0	0.01	0	0.01	0	0.5	0	0.8	0	0.7	0	0.8
Turkey Vulture	0	0.01	0	0.01	0	0.5	0	0.8	0	0.7	0	0.8
Upland Gamebirds	0	0.01	0.09	0.06	0	1.1	15.1	5.9	0	0.7	4.9	5.8
Greater Sage Grouse	0	0.01	0.09	0.06	0	1.1	15.1	5.9	0	0.7	4.9	5.8
Doves/Pigeons	0.07	0	0	0	6.4	0	0	0	4.9	0	0	0
Mourning Dove	0.07	0	0	0	6.4	0	0	0	4.9	0	0	0
Large Corvids	0.44	0.73	0.34	0.45	40.5	53.2	57.0	45.9	7.7	29.7	16.0	20.5
Black-Billed Magpie	0	0.02	0.05	0	0	1.7	8.1	0	0	1.5	4.9	0
Common Raven	0.10	0.71	0.29	0.34	9.1	51.5	48.8	35.1	5.7	29.0	13.9	19.1
American Crow	0.34	0	0	0.11	31.4	0	0	10.8	2.1	0	0	1.4
Overall	1.08	1.37	0.60	0.98	100	100	100	100	–	–	–	–

Spatial Use of the Study Area

Survey point 12 within the Sierra Madre area had the highest use by large bird species combined for all 19 survey points, primarily due to large use by large corvids. Raptors were observed at all 19 points and use by point ranged from 0.10 to 0.93 birds/20-minute survey (WEST 2009b). Point 4 had the highest use for raptors at 0.93 birds/20-minute survey at both points. Passerines were observed at all points, with the highest use occurring at points 13 and 6 (5.10 and 4.66 birds/20-minute survey, respectively) and lowest at point 16 (1.81).

Raptor Nest Survey

In addition to the baseline avian use study, an aerial survey to locate and map active and inactive raptor nests within 1 mile of the Application Area was conducted during May 2008 (WEST 2008f). To supplement raptor nest data collected, all raptor nest records for the Application Area maintained by the BLM were obtained. These records include nests located since 1980 (a 28-year period) and therefore do not reflect expected raptor nesting activity for any given year. Prior to 1996, the BLM mapped raptor nest locations opportunistically.

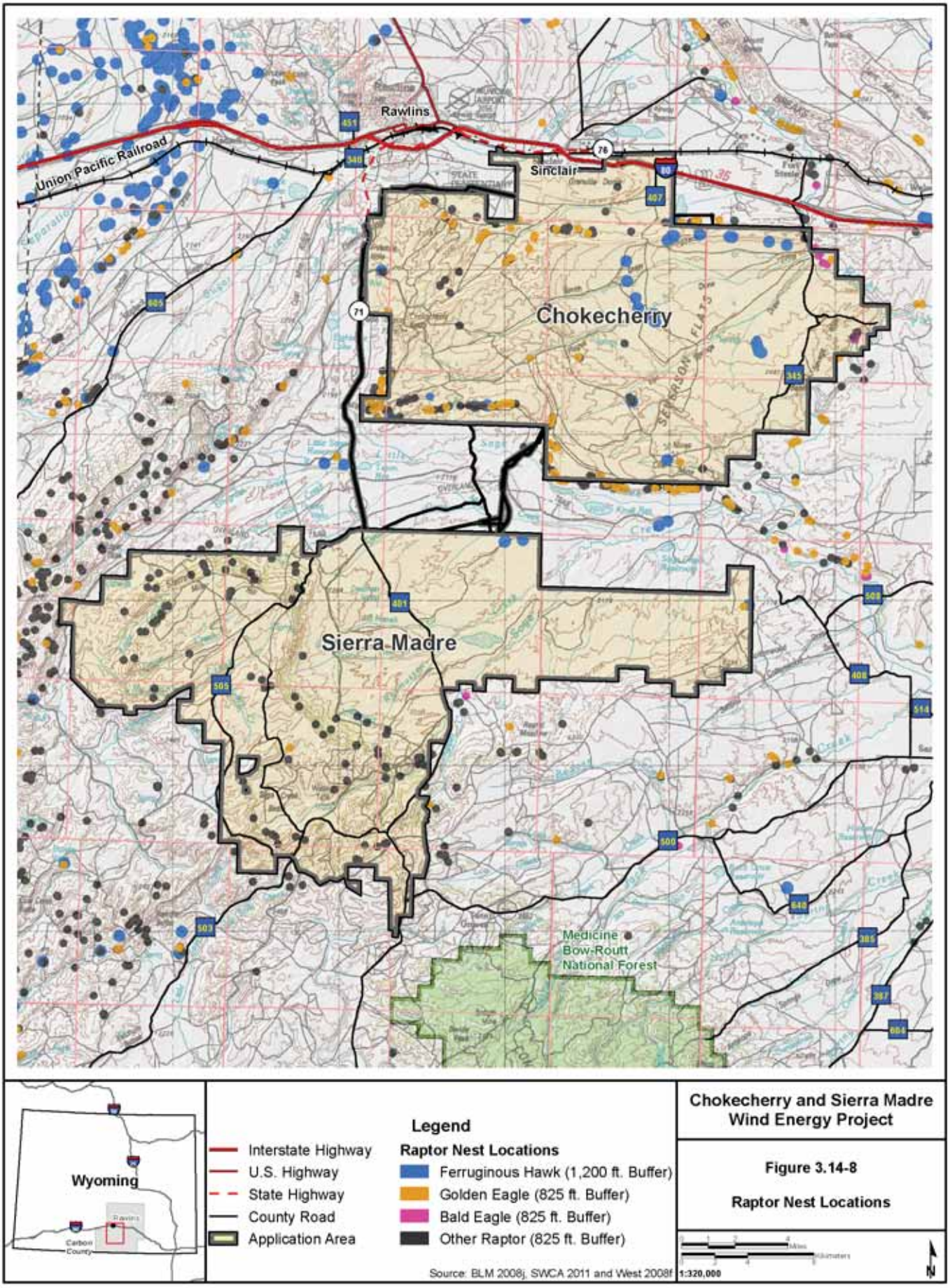
Since 1996, specific surveys have been conducted to map raptor nests in the RFO. These records have been supplemented with raptor nests located as part of the permitting process for development activities such as pipelines and oil and gas developments (H. Cline, BLM, personal communication, 2010).

Twenty-four active raptor nests, consisting of 11 nests of red-tailed hawk (*Buteo jamaicensis*), five of prairie falcon (*Falco mexicanus*), five of great horned owl (*Bubo virginianus*), and three of golden eagle were located during 2008 aerial surveys of the Application Area (WEST 2008f). Active nests contained either eggs or chicks in the nest. Twelve of the active raptor nests were found in or within 1 mile of the Chokecherry area, and 12 were found in or within 1 mile of the Sierra Madre area. A total of 110 inactive nests also were located, with 55 in or within 1 mile of the Chokecherry area and 55 in or within 1 mile of the Sierra Madre area (**Figure 3.14-8**). The BLM surveyed the remainder of the Application Area during the spring of 2009.

Most of the active and inactive raptor nests in the Chokecherry area were located along the extreme southern portion, although several also occurred along a ridgeline that runs east-west through the northern end of the Chokecherry area. Very few active or inactive nests were located within the Sierra Madre area; the vast majority were located just outside the area along steep, wooded slopes that lead away from the area on the north and east face of Miller Hill.

In addition to raptors, seven active common raven (*Corvus corax*) nests and one active Canada goose (*Branta canadensis*) nest were located during aerial surveys. Three of the common raven nests were in trees and four were on cliffs. The Canada goose nest was located in a tree along the North Platte River just east of the Chokecherry area.

Since 1980, the BLM has mapped 555 raptor nests in or within 1 mile of the Application Area, including 342 nests in the Chokecherry area and 213 in the Sierra Madre area. Over this 30-year period, red-tailed hawk nests have been most common, with 116 active nests documented, followed by golden eagle (102), ferruginous hawk (52), Cooper's hawk (52), and prairie falcon (48). Other raptor nests located included 17 bald eagles, 15 great horned owls, 10 American kestrels, seven burrowing owls, four long-eared owls, and three Swainson's hawks. The nest records also include 10 unidentified buteos and 7 unidentified raptors, as well as 105 inactive raptor nests where species could not be determined. Most of the nests in the Chokecherry area occurred along the southern boundary, although several nests were located throughout the area. Most of the nests found at the Sierra Madre area occur along the northern and eastern boundaries.


Rawlins
Union Pacific Railroad
Sinclair
Chokecherry
Sierra Madre
Medicine Bow-Routt National Forest
Wyoming
Carbon County
Legend
Interstate Highway
U.S. Highway
State Highway
County Road
Application Area
Raptor Nest Locations
Ferruginous Hawk (1,200 ft. Buffer)
Golden Eagle (825 ft. Buffer)
Bald Eagle (825 ft. Buffer)
Other Raptor (825 ft. Buffer)
Source: BLM 2008j, SWCA 2011 and West 2008f
1:320,000
Chokecherry and Sierra Madre Wind Energy Project
Figure 3.14-8
Raptor Nest Locations

In May and June of 2011, PCW conducted additional raptor nest surveys within the Application Area and in suitable nesting habitats within a 5-mile buffer (approximately 700 square miles) surrounding the Application Area. The selection of a 5-mile turbine buffer was made through consultation with the USFWS and the BLM. Twenty-three active raptor nests and 158 inactive raptor nests were identified within the surveyed area (**Figure 3.14-8**). Active raptor nests included eight golden eagle, four bald eagle, six red-tailed hawk, three prairie falcon, one unknown *Buteo* (likely red-tailed hawk), and one American kestrel, for a total of 23 raptor nests. No active ferruginous hawk nests were located within the survey area. The findings of the PCW raptor nest survey were very similar to the raptor nest survey data collected by WEST during the 2008-2009 surveys, when 24 active raptor nests and no active ferruginous hawk nests were found. Most active eagle nests were located east and southeast of the Chokecherry portion of the Application Area along cliff bands on the Bolten Rim and the North Platte River. One active eagle nest was located on the Sierra Madre portion of the Application Area. The remaining active eagle nests were located south of Middlewood Hill along Jack Creek and in the south Sage Creek Basin (SWCA 2011).

Reptiles and Amphibians

Reptiles and amphibians are collectively referred to as herptiles. In Wyoming, information about herptile natural history and status generally is extrapolated from what is known about a species or similar species throughout its range and distribution (Parker and Anderson 2001). Four reptiles, the greater short horned lizard (*Phrynosoma douglasi*), the northern sagebrush lizard (*Sceloporus graciosus graciousus*), the intermountain wandering garter snake (*Thamnophis elegans vagrans*), and the prairie rattlesnake (*Crotalus viridis viridis*), are commonly found in sagebrush landscapes and have been observed within the Application Area. Five amphibians, the tiger salamander (*Ambyrtoma tigrinum*), the Great Basin spadefoot toad (*Spea intermontanus*), the northern leopard frog (*Rana pipiens*), the boreal chorus frog (*Pseudacris maculata*), and the boreal toad (*Bufo boreas boreas*) are known to occur or have the potential to occur within the Application Area.

3.14.3 Fisheries

Fish habitats in the Application Area include perennial and intermittent streams, springs, lakes and reservoirs. All named waterbodies within the Application Area are presented in **Table 3.13-4**. The Application Area is located within two water resource regions; Missouri River Region and the Upper Colorado River Region, which are described in detail in Section 3.13.1 of this document. Most of the Application Area (188,725 acres) drains into the North Platte River basin (and to a lesser extent (33,965 acres) the White-Yampa River Basin (**Table 3.13-2**). Fish habitat is related to the hydrologic conditions of the riparian areas and uplands associated with, or contributing to, a specific stream or waterbody, and to stream channel characteristics (BLM 2008b). The Application Area provides habitat for many native and non-native species (**Table 3.14-5**) (BLM 2008b). The management of fisheries within the Application Area is the responsibility of the WGFD and is shared between the Laramie and Green River WGFD fisheries regions. An overview of their management concepts for the fish species present in these waterbodies is presented in **Table 3.14-6**. Additionally, there is a memorandum of understanding between the WGFD and the BLM Rawlins District that establishes cooperative management of the Red Rim-Grizzly WHMA, which includes management of fish populations and habitat (BLM and WGFC 2010).

A portion of the Application Area is within the Upper Muddy Creek Watershed/Grizzly WHMA, which is managed to maintain, restore, and enhance habitat for Colorado River fish species unique to the Muddy Creek watershed (BLM 2008b). The portion of Muddy Creek within the Upper Muddy Creek Watershed/Grizzly WHMA has been identified as a high priority for aquatic habitat protection as it provides the best opportunity to restore native cold and warm water fish species assemblages in southwestern Wyoming (WGFD 2009b). The Upper Muddy Creek Watershed provides habitat for game coldwater fish including Colorado River cutthroat trout, and non-game coldwater fish including mountain suckers, and speckled dace. These species have been successfully restored to promote a population of cold water species above the Weber head cut structure (WGFD 2009b). The lower, warm water reach of

Muddy Creek supports the only viable assemblage of bluehead suckers, roundtail chubs, and flannelmouth suckers known to still exist in Wyoming (WGFD 2008b) and are considered BLM sensitive species. Habitat degradation has been identified as a water quality concern on Muddy Creek (refer to **Figure 3.13-1**) (BLM 2008b). Within the Upper Muddy Creek Watershed/Grizzly WHMA, restoration projects, consisting primarily of deferred grazing, have been implemented to allow willows to reestablish along the riparian corridor to reduce the fish habitat degradation (BLM 2008b). Native fish in the Muddy Creek watershed below the Weber head cut structure are threatened by non-native fish as they hybridize with native fish and compete for habitat and food (BLM 2008b).

Endangered fish species occur downstream from the Application Area, in both the North Platte River basin and the White-Yampa River basin and these species are evaluated elsewhere in this EIS (Sections 3.15 and 4.15).

Table 3.14-5 Native and Non-native Fish Species Potentially Occurring within the Application Area[1]

Common Name	Scientific Name	White-Yampa River Basin	North Platte River Basin
Colorado pikeminnow	*Ptychocheilus lucius*	Native[1]	
Razorback sucker	*Xyrauchen texanus*	Native[1]	
Flannelmouth sucker	*Catostomus latipinnis*	Native	
Humpback chub	*Gila cypha*	Native[1]	
Bonytail chub	*Gila elegans*	Native[1]	
Roundtail chub	*Gila robusta*	Native	
Bluehead sucker	*Catostomus discobolus*	Native	
Creek chub	*Semolitus atromaculatus*	Non-Native	Native
Mountain sucker	*Catostomus platyrhynchus*	Native	
Mottled sculpin	*Cottus bairdii*	Native	
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	Native	
Fathead minnow	*Pimephales promelas*	Non-Native	Native
Mountain whitefish	*Prosopium williamsoni*	Native	
White sucker	*Catostomus commersonii*	Non-Native	Native
Redside shiner	*Richardsonius balteatus*	Non-Native	
Longnose sucker	*Catostomus catostomus*		Native
Lake chub	*Couesius plumbeus*		Native
Iowa dater	*Etheostoma exile*		Native
Johnny darter	*Etheostoma nigrum*		Non-Native
Longnose dace	*Rhinichthys cataractae*		Native
Brook stickleback	*Culaea inconstans*		Non-Native
Brassy minnow	*Hybognathus hankinsoni*		Native
Sand shiner	*Notropis stramineus*		Native

Table 3.14-5 Native and Non-native Fish Species Potentially Occurring within the Application Area[1]

Common Name	Scientific Name	White-Yampa River Basin	North Platte River Basin
Pallid sturgeon	*Scaphirhynchus albus*		Native[1]
Emerald shiner	*Notropis atherinoides*		Non-Native
Snake River cutthroat trout	*Oncorhynchus clarkii*		Non-Native
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*		Non-Native
Lake trout	*Salvelinus namaycush*		Non-Native
Rainbow trout	*Oncorhynchus mykiss*	Non-Native	Non-Native
Brook trout	*Salvelinus fontinalis*	Non-Native	Non-Native
Speckled dace	*Rhinichthys osculus*	Native	
Common carp	*Cyprinus carpio*		Non-Native
Brown trout	*Salmo trutta*		Non-Native
Walleye	*Sander vitreus*		Non-Native

[1] The following species are not found in the Application Area but are included in the analysis because they may be impacted by water depletions downstream of the Application Area in the Colorado River and Platte River watersheds: Colorado pikeminnow, razorback sucker, bonytail chub, humpback chub, and pallid sturgeon.

Source: Lionberger 2012.

Table 3.14-6 Waterbodies within the Water Resources Analysis Area[1] and Associated Fish Species and WGFD Management Concepts

Sub-Watershed Name	Waterbody Name	Intermittent or Perennial Stream/River, Reservoir or Lake[2]	WGFD Trout Stream Classification[3]	Fish Species Present	Management Concept[4]
North Platte River-First Cottonwood Draw	North Platte River	Perennial stream/river	Blue	Brassy minnow, brown trout, creek chub, carp, Iowa darter, longnose dace, longnose sucker, rainbow trout, brook stickleback, walleye, and white sucker	Wild
	Seaverson Reservoir	Perennial reservoir	Not Applicable (NA)	Rainbow trout	Basic yield
Little Jack Creek	Beaver Creek	Perennial stream/river	Green	Brook trout, creek chub, fathead minnow, and longnose sucker	Wild
	Little Jack Creek	Perennial stream/river	Yellow	Brook trout	Wild
	Low Creek	Ephemeral stream/river	Green	Brook trout	Wild
	Spring Creek	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	Willow Creek	Ephemeral stream/river	Green	Brook trout	Wild
	Low Reservoir	Perennial Reservoir	NA	Rainbow trout	No concept – private
Upper Sage Creek-North Platte River	Sage Creek (Section 2 upstream of Highway 71)	Perennial stream/river	Yellow	Brook trout, creek chub, longnose sucker, and white sucker	Wild
	Middlewood Creek	Perennial Stream/river	Green	Brook trout	Wild
	Trapper Creek	Perennial stream/river	Clear	Creek chub	Wild
	Rawlins Reservoir	Perennial reservoir	NA	Brook trout, rainbow trout, and white sucker	Basic yield
	Adams Reservoir	Perennial reservoir	NA	Brook trout	No concept – private
Rasmussen Creek	Rasmussen Creek	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	Lone Tree Creek	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	La Marsh Creek	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent

Table 3.14-6 Waterbodies within the Water Resources Analysis Area[1] and Associated Fish Species and WGFD Management Concepts

Sub-Watershed Name	Waterbody Name	Intermittent or Perennial Stream/River, Reservoir or Lake[2]	WGFD Trout Stream Classification[3]	Fish Species Present	Management Concept[4]
Lower Sage Creek-Upper North Platte River	Sage Creek	Perennial stream/river	Clear	Brassy minnow, creek chub, fathead minnow, Johnny darter, longnose dace, longnose sucker, sand shiner, brook stickleback, and white sucker	Wild
Miller Creek	Deadman Creek	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	Miller Creek	Perennial stream/river	No data – intermittent	No data – intermittent	No data – intermittent
Upper Little Sage Creek	Emigrant Creek	Perennial stream/river	Clear	Creek chub	Wild
	Little Sage Creek	Perennial stream/river	Clear	Creek chub	Wild
	Pine Grove Creek	Ephemeral stream/river	Clear	Creek chub	Wild
	Miller Hill Lake	Perennial lake/pond	NA	Rainbow trout	Basic yield
	Little Sage Creek Dam	Perennial reservoir	NA	Rainbow trout	Basic yield
	Teton Reservoir	Perennial reservoir	NA	Brown trout, creek chub, rainbow trout, and white sucker	Basic yield
Lower Little Sage Creek	Little Sage Creek	Ephemeral stream/river	Clear	Creek chub	Wild
North Platte River Coal Mine Draw	North Platte River	Perennial stream/river	Red	Brassy minnow, brown trout, creek chub, carp, Johnny darter, longnose dace, longnose sucker, rainbow trout, Snake River cutthroat trout, walleye, white sucker, and Yellowstone cutthroat trout	Wild
North Platte River-Lost Springs Draw	North Platte River	Perennial stream/river	Yellow	Brassy minnow, brown trout, creek chub, carp, cutthroat trout, emerald shiner, Iowa darter, longnose dace, longnose sucker, rainbow trout, walleye, and white sucker	Wild

Table 3.14-6 Waterbodies within the Water Resources Analysis Area[1] and Associated Fish Species and WGFD Management Concepts

Sub-Watershed Name	Waterbody Name	Intermittent or Perennial Stream/River, Reservoir or Lake[2]	WGFD Trout Stream Classification[3]	Fish Species Present	Management Concept[4]
	Seminoe Reservoir	Perennial reservoir	NA	Brassy minnow, brown trout, carp, emerald shiner, fathead minnow, Iowa darter, Johnny darter, lake trout, lake chub, longnose sucker, rainbow trout, sand shiner, Snake River cutthroat trout, walleye, and white sucker	Basic yield
Iron Springs Draw	Iron Springs Draw	Perennial stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	Johnston Number 2 Reservoir	Ephemeral Lake/Pond	Location unknown		
Hugus Draw	Hugus Draw	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	Smith Draw	Perennial stream/river	No data – intermittent	No data – intermittent	No data – intermittent
Grenville Dome	No Named Waterbodies	NA			
Pass Creek-Stage Station Springs	Pass Creek	Perennial stream/river	Green	Brassy minnow, brown trout, creek chub, fathead minnow, Iowa darter, Johnny darter, lake chub, longnose dace, longnose sucker, rainbow trout, sand shiner, brook stickleback, and white sucker	Wild
Middle Sugar Creek	Coal Creek	Ephemeral stream/river	No data – intermittent	No data – intermittent	No data – intermittent
	Sugar Creek	Perennial stream/river	No data	No data	No data
	Eightmile Lake	Perennial lake	No data	No data	No data
	Rawlins Peaking Reservoir	Perennial reservoir	No data	No data	No data
Lower Sugar Creek	Sugar Creek	Perennial stream/river	No data	No data	No data

Table 3.14-6 Waterbodies within the Water Resources Analysis Area[1] and Associated Fish Species and WGFD Management Concepts

Sub-Watershed Name	Waterbody Name	Intermittent or Perennial Stream/River, Reservoir or Lake[2]	WGFD Trout Stream Classification[3]	Fish Species Present	Management Concept[4]
101800021304 (Sugar Creek)	No Named Waterbodies	NA			
North Fork Savery Creek	Fish Creek	Perennial stream/river	Green	Brook trout, mottled sculpin, mountain whitefish, mountain sucker, rainbow trout, speckled dace	Wild
	Mill Creek	Perennial stream/river	Green	Brook trout	Wild
	North Fork Savery Creek	Perennial stream/river	Yellow	Brook trout, mottled sculpin, mountain sucker, mountain whitefish, rainbow trout, specked dace	Wild
	Truckdrivers Creek	Perennial stream/river	Green	Brook trout, creek chub, mottled sculpin, rainbow trout, speckled dace	Wild
	Twin Groves Reservoir	Perennial reservoir	No data	No data	No data
Little Savery Creek	Little Savery Creek	Perennial stream/river	Green	Brook trout, brown trout, creek chub, Colorado cutthroat trout, mottled sculpin, mountain sucker, rainbow trout, redside shiner, speckled dace, white sucker	
	McCarty Creek	Perennial stream/river	Green	Brook trout, Colorado cutthroat trout, mottled sculpin	Basic yield
Muddy Creek-Littlefield Creek	Littlefield Creek	Perennial stream/river	Green	Bluehead sucker, Colorado cutthroat trout, flannelmouth sucker, mountain sucker, speckled dace, roundtail chub	Basic yield
	Muddy Creek	Perennial stream/river	Green	Bluehead sucker, creek chub, Colorado cutthroat trout, fathead minnow, mottled sculpin mountain sucker, speckled dace, roundtail chub, white sucker	Unique species

Table 3.14-6 Waterbodies within the Water Resources Analysis Area[1] and Associated Fish Species and WGFD Management Concepts

Sub-Watershed Name	Waterbody Name	Intermittent or Perennial Stream/River, Reservoir or Lake[2]	WGFD Trout Stream Classification[3]	Fish Species Present	Management Concept[4]
McKinney Creek	Eagle Creek	Ephemeral stream/river	Clear	No fish present	No concept
	Grove Creek	Perennial stream/river	Green	Bluehead sucker, brook trout, Colorado cutthroat trout, mountain sucker, speckled dace, roundtail chub, white sucker	Wild
	McKinney Creek	Perennial stream/river	Yellow	Bluehead sucker, brook trout, creek chub, fathead minnow, mountain sucker, speckled dace, roundtail chub, white sucker	Wild
	Muddy Spring Creek (Little Muddy Creek)	Perennial stream/river	Yellow	Brook trout	Wild
	Stoney Creek	Perennial stream/river	Green	Brook trout	Wild

[1] As defined in Section 3.13.

[2] Stream classifications listed reflect the highest flow regime stream reach within the sub-watershed and Application Area. Most streams contain reaches in lower flow regimes as well as the highest listed.

[3] Trout stream classification definitions:

Blue ribbon trout stream is a trout stream of national importance with greater than 600 pounds of trout per mile.

Red ribbon trout stream is a trout stream of statewide importance with 300-600 pounds of trout per mile.

Yellow ribbon trout stream is a trout stream of regional importance with 50-300 pounds of trout per mile.

Green ribbon trout stream is a trout stream of local importance with less than 50 pounds of trout per mile.

[4] Management concepts:

Wild is designated as a self sustaining trout population.

Basic yield is dependent on stocking of fingerlings to sub catchable trout. Basic Yield management does not rely on natural spawning of a trout species.

Source: WGFD 2010.

3.15 Special Status Species

Special status species include federally listed species that are protected under the ESA and species designated as sensitive by the BLM (BLM 2008h). Special status species that occur within the RFO district and their associated habitats are presented in **Appendix K**.

As defined by the ESA, an endangered species is any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is any species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Proposed species are those that are proposed in the FR by the USFWS to be listed as threatened or endangered. The BLM also maintains a list of plant and animal species that are designated as sensitive for which population viability is a concern, as indicated by a downward trend in population numbers, density, or habitat conditions that would reduce a species existing distribution.

In accordance with the ESA, the lead agency 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. As part of the coordination and consultation process with the USFWS, a Biological Assessment will be prepared and submitted to the USFWS. This document and corresponding BO will be included in **Appendix L**. In addition, it is currently the BLM's policy that agency actions do not contribute to the federal listing as threatened or endangered (BLM Manual 6840) any federal candidate species or sensitive species.

3.15.1 Federally Listed Species

Carbon County does not contain ESA critical habitat for any plant or animal species (USFWS 2008a). Notwithstanding, the Application Area potentially provides habitat for one federally listed wildlife species, the black-footed ferret (*Mustela nigripes,* endangered), and two federally listed threatened plant species, the Ute ladies'-tresses orchid (*Spiranthes diluvialus*) and Colorado butterfly plant (*Guara neomexicana* spp. *coloradensis*). It is assumed that a pre-determined amount of water will be required during the construction phase of the proposed project. Depending on the source of water utilized for construction, there could be depletions to the Platte River and Colorado River watersheds. Depletions within the Platte River watershed would potentially impact federally listed species found in the Platte River system in Nebraska including: the whooping crane (*Grus americana,* endangered); interior least tern (*Sterna antillarum*, endangered); piping plover (*Charadrius melodus*, threatened); pallid sturgeon (*Scaphirhyncus albus*, endangered); and western prairie fringed orchid (*Platanthera praeclara*, threatened). Depletions within the Colorado River watershed would potentially impact four federally listed species found in the Colorado River including: the Colorado pikeminnow (*Ptychocheilus luscious,* endangered); bonytail chub (*Gila elegans,* endangered); humpback chub (*Gila cypha,* endangered); and razorback sucker (*Xyrauchen texanus,* endangered). Details regarding the amount of water required for the proposed project are discussed further in Section 4.15.

3.15.1.1 Federally Listed Species Found in Wyoming

<u>Black-Footed Ferret (Federally Endangered)</u>

The black-footed ferret was historically distributed across the western plains of North America wherever prairie dogs occurred (Anderson et al. 1986). Black-footed ferrets are very specialized in their habitat requirements and are dependent on prairie dog colonies for survival (Biggins et al. 1985). Prairie dogs compose more than 90 percent of black-footed ferret diets (Campbell et al. 1987). Because of large-scale reductions in prairie dog populations, black-footed ferrets were nearly extirpated by the 1980s. Recovery and reintroduction programs have established at least six experimental populations in seven states throughout the west including Wyoming.

Surveys were conducted in 2008 to locate and delineate white-tailed prairie dog activity and potential colony complexes that occur within a portion of the Application Area to determine if black-footed ferrets could possibly occur there. The Application Area was extended and a decision to produce a

programmatic EIS was made in 2009. Surveys for black-footed ferret habitat in the extended area were not conducted. Surveys will be completed when the surface disturbance layout has been finalized prior to construction. In 2008 observations and mapping of areas were conducted from aircraft and ground surveys in conjunction with other biological studies being conducted within the Application Area during the months of May through September 2008 (WEST 2008e). Block-cleared areas are defined by the USFWS as areas that no longer require black-footed ferret surveys based on the perception that the potential for an extant population of ferrets in those areas is minimal. There is no physical evidence to suggest that colonies within the non block-cleared areas of the Application Area ever supported anything but small, perhaps ephemeral, scattered pockets of prairie dogs and would be of poor quality for black-footed ferrets. The only active burrows within the Chokecherry area occurred within the block-cleared area on the eastern third of the surveyed portion of the Application Area. A few scattered burrows were located within the Chokecherry area; however, there was no evidence of recent activity. The Sierra Madre area had more active burrows and two live prairie dogs were observed, yet activity was extremely low. There are only two small areas on the Sierra Madre area identified that potentially could provide habitat for black-footed ferrets. The best observed potential ferret habitat with active prairie dog colonies was found along proposed haul road/transmission line corridors that would connect the Chokecherry and Sierra Madre areas. This area supports two small clusters of scattered prairie dog burrows. In addition, there are two general areas of relatively extensive prairie dog colonies (circumscribed by boundaries in excess of 1,500 and 2,000 acres, respectively). However, prairie dog burrows within the two large areas are somewhat scattered in distribution and not contiguous throughout.

Recently, prairie dog towns associated with the Bolten Ranch non-blocked cleared complex have been mapped; however, this information is not currently available. It is anticipated that the mapping information will be available prior to construction and will be utilized for the micro-siting of the proposed development (H. Cline, BLM, personal communication, 2010). Furthermore, black-footed ferret surveys must occur within the year preceding actual site project construction and prior to approval of surface disturbing activities on public lands.

Colorado Butterfly Plant (Federally Threatened)

The Colorado butterfly plant occurs on subirrigated, alluvial (stream deposited) soils on level or slightly sloping floodplains and drainage bottoms at elevations of 5,000 to 6,400 feet. The elevation of the Application Area is higher than the known elevations of Colorado butterfly plant occurrences. Colonies are often found in low depressions or along bends in wide, active, meandering stream channels a short distance upslope of the actual channel. The plant requires early- to mid- succession riparian (river bank) habitat. The Colorado butterfly plant habitat is usually intermediate in moisture between wet, streamside communities dominated by sedges (*Carex* spp.), rushes (*Juncus* spp.), and cattails (*Typha* spp.), and dry, upland shortgrass prairie. Typical habitat is open, without dense or overgrown vegetation. Coyote willow (*Salix exigua*) and Canada thistle (*Cirsium arvense*) may become dominant in habitats that are not periodically flooded or otherwise disturbed. The Colorado butterfly plant occurs on soils derived from conglomerates, sandstones, and tuffaceous mudstones and siltstones of the Tertiary White River, Arikaree, and Ogallala Formations. These soils are common in eastern Colorado and Wyoming (FR Vol. 65, No. 202, October 18, 2000). The Colorado butterfly plant can only be reliably found and identified when it is flowering, which typically occurs sometime during the period from mid-July until the first hard frost of autumn, usually late September or early October.

Species-specific surveys were conducted in 2008 within portions of the Application Area; however, no Colorado butterfly plant individuals or populations were identified. Additional species-specific surveys will be conducted within the remainder of potentially suitable habitat within the Application pending the issuance of the ROD or final surface disturbance layout.

Ute Ladies'-Tresses Orchid (Federally Threatened)

Ute ladies'-tresses orchid is endemic to moist soils near springs, lakes, or perennial streams (USFWS 1995a). The elevation range of known Ute ladies'-tresses orchid occurrences is 4,200 to 7,000 feet. Most of the occurrences are in alluvial substrates along riparian edges, gravel bars, old

oxbows, and moist to wet meadows in the floodplains of perennial streams, but some locations are near freshwater lakes or springs. The Ute ladies'-tresses orchid appears to require moisture in the rooting zone, typically provided by a high groundwater table, through the growing season and into late summer or early autumn. The Ute ladies'-tresses orchid is well adapted to disturbances caused by stream movement through floodplains over time, and is tolerant of other disturbances, such as grazing, that may mimic natural disturbances in their effects on riparian habitat. Suitable potential habitat is typically found along streams that experience heavy spring runoff of sufficient magnitude to create movement and reshaping of the stream channel. Ute ladies'-tresses orchid plants usually occur as small, scattered groups and occupy relatively small areas within the riparian system. It is not known how, under what conditions, and in what time frame the Ute ladies'-tresses orchid is dispersed and how new viable colonies become established. The Ute ladies'-tresses orchid is generally intolerant of deep shade and strongly alkaline or clay soils, and cannot compete with aggressive rhizomatous species or exotic species.

Species-specific surveys were conducted in 2008 within portions of the Application Area; however, no Ute ladies'-tresses orchid individuals or populations were identified. Additional species-specific surveys will be conducted within the remainder of potentially suitable habitat within the Application Area pending the issuance of the ROD or final surface disturbance layout.

3.15.1.2 Platte River System Federally Listed Species

Whooping Crane (Federally Endangered)

The central Platte River provides important stopover habitat along the migration route of the whooping crane, between the wintering grounds in coastal Texas and the summer breeding grounds in north central Canada (National Research Council of the National Academies [NRCNA] 2004). Migrating birds travel through Nebraska twice a year, usually in April and October. The central Platte River provides several important in-channel roosting areas for migrating birds that are not wooded and provide open areas separated from the banks and other visual obstructions by braided channels, increasing security for roosting birds. Wetlands, wet meadows and agricultural fields adjacent to these roosting sites provide important forage for migrating birds. While the North Platte River does not provide habitat for the whooping crane, the roosting sites in the central Platte River are sensitive to reductions in flows during critical periods as defined by the USFWS in their flow targets (Platte River Recovery Implementation Program 2006) and a large portion of the flows come from the North Platte and South Platte rivers in Wyoming and Colorado.

Interior Least Tern (Federally Endangered) and Piping Plovers (Federally Threatened)

The interior least tern is listed as endangered in Nebraska, Colorado, and Montana, but does not occur in Wyoming (USFWS 2008b). The piping plover is considered threatened, in most of the western Great Plains states, however, it is not known to occur in Wyoming (USFWS 2008c). The Great Plains populations of these species are dependent upon the central and lower Platte River for survival and recovery (NRCNA 2004). Piping plovers and interior least terns have similar nesting habitat preferences including open, sandy, beach-like areas (NRCNA 2004). The suppressed variability in flow on the Platte River has reduced sandbars and beaches, and reduced aquatic habitat for invertebrate and fish prey items for the plover and tern, respectively (NRCNA 2004). While the North Platte River does not provide habitat for the two species, their habitat along the central Platte River in Nebraska is sensitive to reductions in flows during critical periods as defined by the USFWS (Platte River Recovery Implementation Program 2006), and a large portion of these flows come from the North and South Platte rivers in Wyoming and Colorado.

Pallid Sturgeon (Federally Endangered)

The pallid sturgeon is listed as an endangered species, which is found in the Platte River near its confluence with the Missouri River. Primarily, this species is found from the headwaters of the Missouri River downstream to the Mississippi River near New Orleans, Louisiana. The lower Platte River

provides a braided channel of warm, sediment-rich waters with shifting sandbars and islands and a sandy substrate which reflects the original, unaltered habitat of pallid sturgeons (NRCNA 2004). While the North Platte River does not provide habitat for the sturgeon, their habitat in the lower Platte River in Nebraska is sensitive to reductions in flows during critical periods as defined by the USFWS (Platte River Recovery Implementation Program 2006), and a large portion of these flows come from the North and South Platte rivers in Wyoming and Colorado.

Western Prairie Fringed Orchid (Federally Threatened)

Western prairie fringed orchid occurs on wet mesic subirrigated prairies and sedge meadows along the floodplain of the Platte River. Alterations to the peak flows of the Platte River have facilitated the conversion of most low-lying areas near the river from grassland to intensive agriculture (Sidle and Faenes 1997). Thus, little habitat remains that is suitable for the fringed orchid along the Platte River. While the North Platte River does not provide habitat for this species, their habitat in the lower Platte River in Nebraska is sensitive to reductions in flows during critical periods as defined by the USFWS (Platte River Recovery Implementation Program 2006), and a large portion of these flows come from the North and South Platte rivers in Wyoming and Colorado.

3.15.1.3 Colorado River System Federally Listed Species

Colorado Pikeminnow, Bonytail Chub, Humpback Chub and Razorback Sucker (Federally Endangered)

The Colorado pikeminnow, bonytail chub, humpback chub, and razorback sucker are endemic species to the Colorado River System (BLM 2008b). These species do not occur within the Application Area; however, actions occurring within the Application Area could affect the downstream habitats of these species, primarily if actions result in water depletions. A recovery plan and Recovery Implementation Program have been approved (BLM 2008b), which requires consultation with the USFWS when potential water depletions might affect these fish species.

3.15.2 BLM Sensitive Species

According to the *BLM Wyoming Sensitive Species Policy and List* (BLM 2010c), potential habitat for several BLM sensitive species occurs within the Application Area, including 6 plants, 6 mammals, 11 bird species, 2 amphibians, and 4 fish (**Table 3.15-1**). The BLM requested that two additional species be considered in this analysis, the North Park phacelia (*Phacelia formosula*), and pale blue-eyed grass (*Sisyrinchium pallidum*).

3.15.2.1 Plants

A review of the BLM and WYNDD plant records concluded that only persistent sepal yellowcress (*Rorippa calycina)* has been documented within 1 mile of the Application Area. The species was located within approximately 1,300 feet of the Chokecherry area in 1981 and again in 1992. Surveys for these plants within the Application Area were conducted during 2008; however, only a portion of the Chokecherry area was surveyed due to time constraints. Because the change to a programmatic approach to the NEPA analysis, further site-specific rare plant surveys were delayed until the issuance of the ROD or the final surface disturbance layout has been identified (WEST 2008g). None of the BLM sensitive plant species were located within the areas surveyed.

3.15.2.2 Mammals

Long-eared Myotis

The long-eared myotis (*Myotis evotis*) has a range that extends from central British Columbia south through much of the western U.S. and south to Arizona and New Mexico (Buseck and Keinath 2004). This species utilizes a wide variety of habitats ranging from grasslands and conifer forests to humid coastal and mountain forests. Little is known about the abundance of this species within Wyoming, but the species has been documented elsewhere and is known to be fairly common if suitable roosting and

Table 3.15-1 BLM Sensitive Species Potentially Occurring in the Application Area

Common Name	Scientific Name	Habitat
Mammals		
Long-eared Myotis	*Myotis evotis*	Varied from grassland to conifer and deciduous forests, humid coastal forests, caves, and mines
Fringed Myotis	*Myotis thysanodes*	Conifer forests, woodland-chaparral, caves, and mines
Pygmy Rabbit	*Brachylagus idahoensis*	Basin-prairie and riparian shrub.
Townsend's Big-eared Bat	*Corynorhinus townsendii*	Forests, basin-prairie shrub, caves, and mines
White-tailed Prairie Dog	*Cynomys leucurus*	Basin-prairie and riparian shrub
Wyoming Pocket Gopher	*Thomomys clusius*	Dry, gravelly, shallow-soil ridge tops within greasewood
Birds		
Bald Eagle	*Halieaeetus leucocephalus*	Riparian areas, lakes, rivers, streams
Ferruginous Hawk	*Buteo regalis*	Basin-prairie shrub, grasslands, rock outcrops
Greater Sage-grouse	*Centrocercus urophasianus*	Basin-prairie shrub, mountain-foothill shrub
Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*	Grasslands, mountain-foothill shrub
Long-billed Curlew	*Numenius americanus*	Grasslands, plains, foothills, wet meadows
Mountain Plover	*Charadrius montanus*	Grasslands, plains, basin-prairie shrub
Burrowing Owl	*Athene cunicularia*	Grasslands, basin-prairie shrub
Sage Thrasher	*Oreoscoptes montanus*	Basin-prairie shrub, mountain-foothill shrub
Loggerhead Shrike	*Lanius ludovicianus*	Basin-prairie shrub, mountain-foothill shrub
Brewer's Sparrow	*Spizella breweri*	Basin-prairie shrub
Sage Sparrow	*Amphispiza belli*	Basin-prairie shrub, mountain-foothill shrub
Amphibians		
Northern Leopard Frog	*Rana pipiens*	Beaver ponds, permanent water in plains and foothills
Boreal Toad	*Bufo boreas boreas*	Wetlands, forests, woodlands, sagebrush, meadows and floodplains
Great Basin Spadefoot Toad	*Spea intermontana*	Spring seeps, permanent and temporary waters

Table 3.15-1 BLM Sensitive Species Potentially Occurring in the Application Area

Common Name	Scientific Name	Habitat
Fish		
Roundtail Chub	*Gila robusta*	Colorado River drainage, mostly large rivers, also streams and lakes
Bluehead Sucker	*Catostomus discobolus*	Bear, Snake, and Green rivers drainages, all waters
Flannelmouth Sucker	*Catostomus latipinnis*	Colorado River drainage, large rivers, streams and lakes
Colorado River Cutthroat Trout	*Oncorhynchus clarki pleuriticus*	Colorado River drainage, clear mountain streams
Plants		
Cedar Rim Thistle	*Cirsium aridum*	Barren, chalky hills, gravelly slopes, and sandy-shaley draws
Colorado Butterfly Plant	*Gaura neomexicana* spp. *coloradensis*	Sub-irrigated alluvial soils of drainage bottoms surrounded by mixed grass prairie
Gibbens' Penstemon	*Penstemon gibbensii*	Pinyon pine/juniper, sagebrush, greasewood-saltbush (sparsely vegetated shale or sandy-clay slopes on Browns Park Formation)
Persistent Sepal Yellowcress	*Rorippa calycina*	Moist, sandy, muddy streambanks (semi-disturbed or recently flooded)
Laramie False Sagebrush	*Sphaeromeria simplex*	Cushion plant communities on rocky limestone ridges

foraging habitat is present (Buseck and Keinath 2004). This species does not aggregate at readily accessible traditional roost sites making it difficult to determine the population status; therefore, no information exists on population status and trend for this species within Wyoming or throughout its range (Buseck and Keinath 2004). It is thought that the long-eared myotis has more restrictive landscape requirements than other bats, as long-eared myotis require major habitat components to be in very close proximity to each other. The reason is unknown, but Buseck and Keinath (2004) suggested such requirements are linked to the energy conservation. A review of the WYNDD records concluded this species has not been documented within the Application Area or within a 1 mile buffer. A description of the general bat activity detected within the Application Area is provided in Section 3.14. Long-eared myotis calls were considered HF for the studies conducted within the Application Area. Both LF and HF calls were detected during the survey efforts; however, a greater percent of the calls overall were HF. Species identification during the surveys was only possible for the hoary bat.

Fringed Myotis

The fringed myotis (*Myotis thysanodes*) is predominately a western species with a range that extends from southern British Columbia south through southern Mexico (Keinath 2003). Fringed myotis occurs west of the Rocky Mountains to the Pacific coast, with the exception of a population in the Black Hills of South Dakota and Wyoming. This species is found throughout Wyoming and does not appear to be substantially influenced by major topographic features such as mountains (Keinath 2003). This species appears to be rare throughout its range, representing only a small portion of the bats detected during

surveying efforts; however, in some areas it can be locally abundant with reasons not fully understood (Keinath 2003). The rarity of this species makes it difficult to determine population status. In Wyoming, it appears as if the population of fringed myotis has declined, as recent survey efforts according to WYNDD (unpublished data), did not record any individuals in northwestern Wyoming where there are historical records (Keinath 2003). A review of the WYNDD records concluded this species has not been documented within the Application Area or within a 1 mile buffer. A description of the general bat activity detected within the Application Area is provided in Section 3.14. Fringed myotis calls were considered LF for the studies conducted within the Application Area; however, a greater number of HF calls were detected. Again, species identification was only possible for the hoary bat.

Townsend's Big-eared Bat

The range of the Townsend's big-eared bat (*Corynorhinus townsendii*) is extensive, including most of the western U.S., British Columbia, central Mexico, and the Baja Peninsula; however, it appears to be relatively uncommon throughout its range (Gruver and Keinath 2003). Townsend's big-eared bats are dependent upon the cave-like structures for shelter during all phases of their life cycle (Gruver and Keinath 2003). Townsend's big-eared bats are sensitive to a variety of intrinsic biological factors, including its habitat specificity, fragmented distribution, low reproductive rates, and intolerance of direct disturbance (Gruver and Keinath 2003). A review of the WYNDD records concluded this species has not been documented within the Application Area or within a 1 mile buffer. A description of the general bat activity detected within the Application Area is provided in Section 3.14. As with the long-eared and fringed myotis, Townsend's big-eared bat calls were considered LF for the studies conducted within the Application Area. Both LF and HF calls were detected during the survey efforts; however, a greater percent of the calls overall were HF and species identification was only possible for the hoary bat.

Pygmy Rabbit

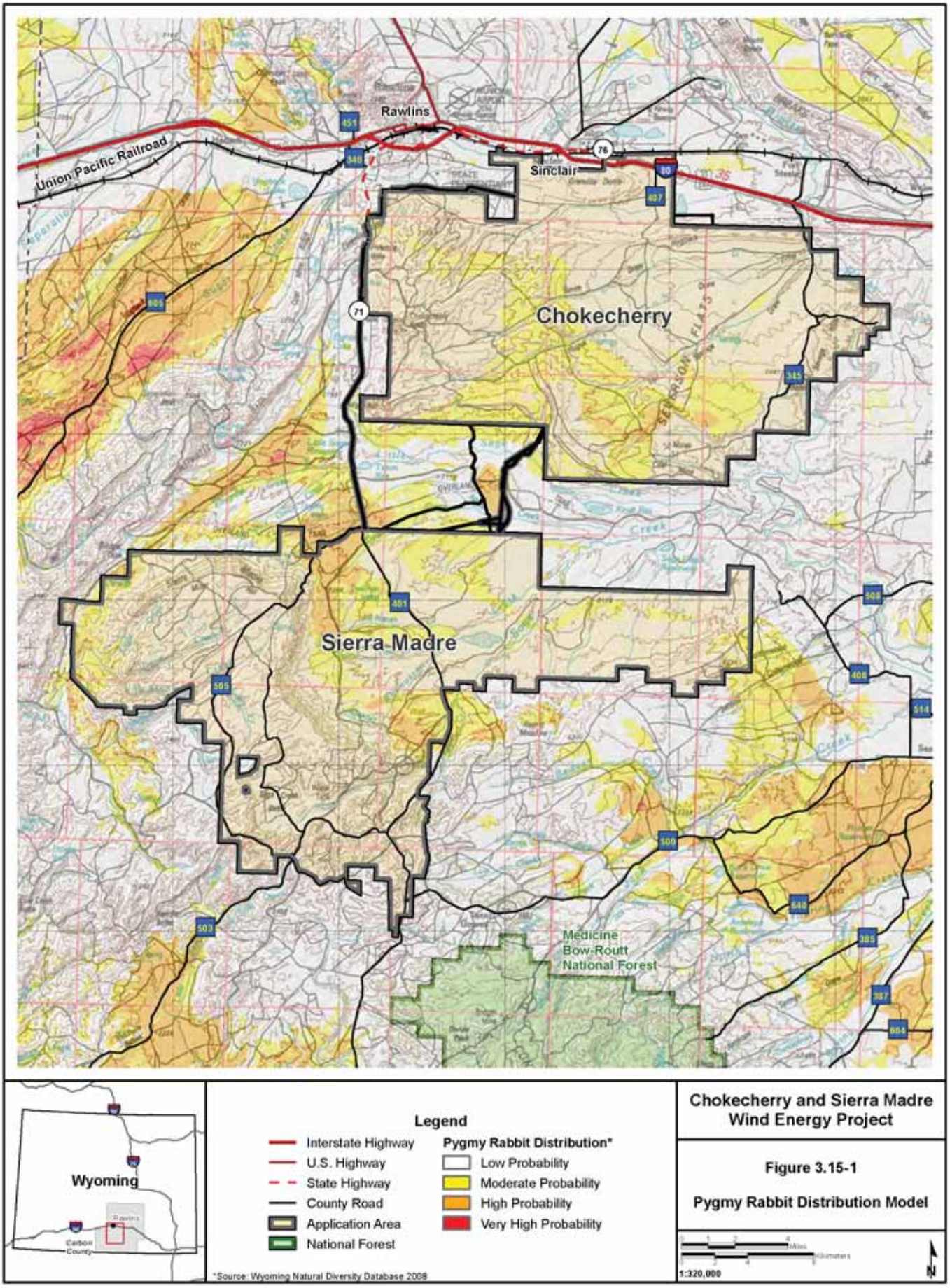
The pygmy rabbit (*Brachylagus idahoensis*), according to recently published range maps (Keinath and McGee 2004; WGFD 2005a), occurs in patches within the Great Basin and is known to occur in the southwestern portions of Wyoming. However, based on unpublished data (WEST 2008i, unpublished) the range for pygmy rabbits in Wyoming has been documented to be considerably larger, extending 116 miles east of the known range. Additionally, the unpublished data also contradicts the characterizations of patchy distribution associated with tall, dense stands of big sagebrush (Keinath and McGee 2004). Rather, the unpublished data recorded high pygmy rabbit use in low sagebrush habitats as well as tall, dense stands of big sagebrush. Pygmy rabbits are dependent upon sagebrush for 99 percent of their winter diet and excavate their own burrows (WGFD 2005a). Therefore, based on the unpublished data it is likely that the Application Area is within the range of and provide suitable habitat for the pygmy rabbit. Additionally, a habitat model developed by WYNDD (2008) shows the probability of occurrence throughout the Application Area (**Figure 3.15-1**).

White-tailed Prairie Dog

The white-tailed prairie dog (*Cynomys leucurus*) activity and habitat within a portion of the Application Area were assessed in conjunction with the black-footed ferret evaluation (WEST 2008e) as described above. Primarily, prairie dog activity was observed within the "block-cleared" area within the eastern third of the Chokecherry area and along the haul road/transmission line corridors between the Chokecherry and Sierra Madre areas. Prairie dog activity was extremely low within the Sierra Madre area.

Wyoming Pocket Gopher

Information regarding the Wyoming pocket gopher (*Thomomys clusius*) is limited (Beauvais and Dark-Smiley 2005; WGFD 2005a), this species is only known to occur in Carbon and Sweetwater counties of Wyoming; however, it is possible populations extend into northern Colorado (Beauvais and Dark-Smiley 2005). Wyoming pocket gophers have been located in dry, gravelly, shallow-soil ridge tops within greasewood (*Sarcobatus vermiculatus*) plant communities (Beauvais and Dark-Smiley 2005). Burrow systems associated with pocket gophers range from 6 inches to 1 foot below the surface, typically consisting of a network of feeding tunnels connected to a smaller and deeper system of



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.15-1

Pygmy Rabbit Distribution Model

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chambers that are used for nesting and food storage (Beauvais and Dark-Smiley 2005). Suitable habitat for Wyoming pocket gophers is found scattered throughout the Application Area and based on a habitat model developed by WYNDD (2008), likely occurs within the Application Area (**Figure 3.15-2**).

3.15.2.3 Birds

Bald Eagle

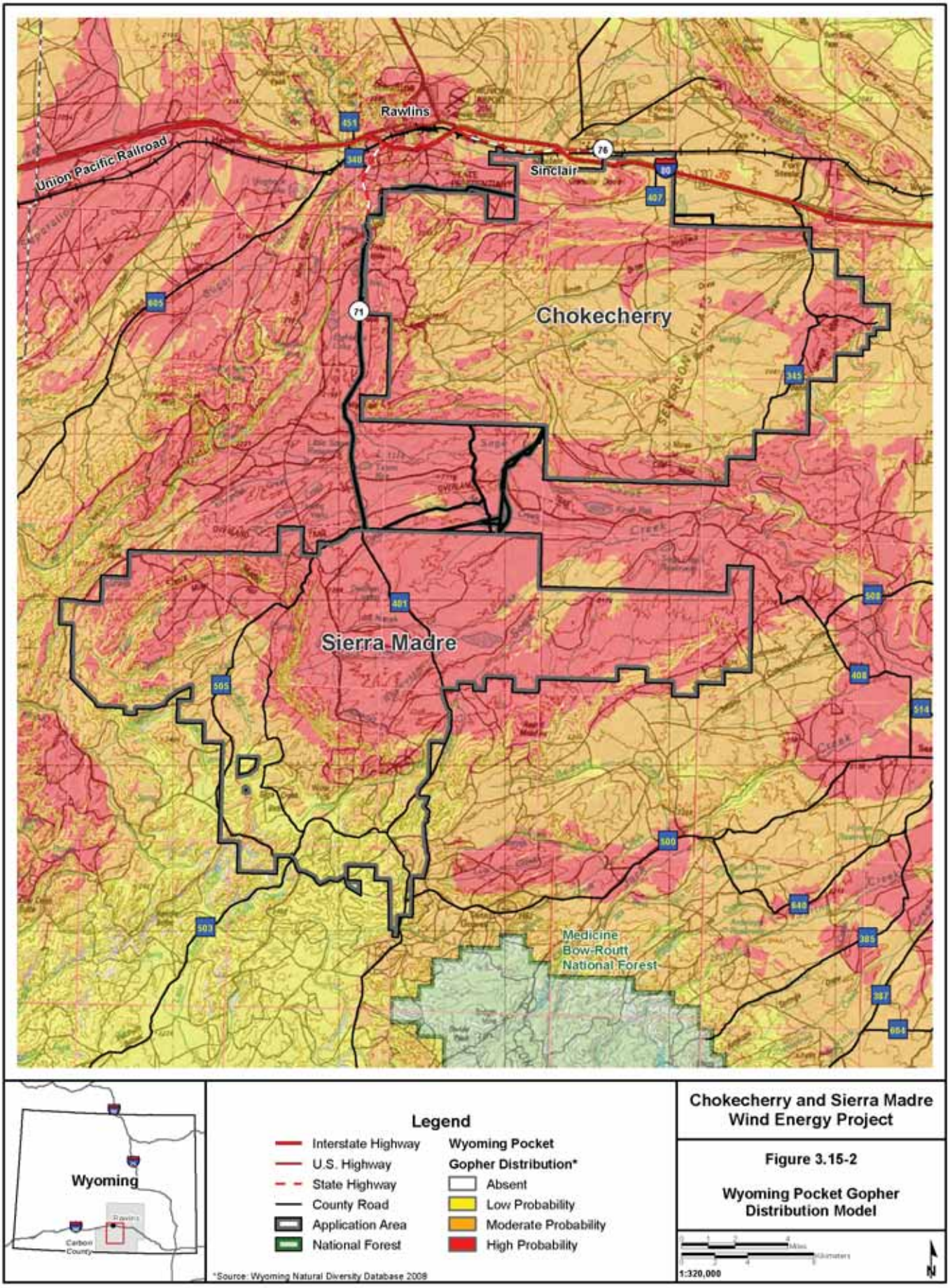
Historically, bald eagles occurred throughout most of North America in a variety of habitats. In Wyoming, the number of bald eagle nesting pairs has increased from 35 in 1980 to over 185 pairs today (Faulkner 2010). Due to increasing populations this species was removed from the list of federally threatened species in 2007. Generally, bald eagles require areas in close proximity to water for nesting and foraging, and most nesting in Wyoming occurs near major river systems, large lakes and reservoirs, while wintering eagles tend to concentrate along major river systems, including the North Platte River (Faulkner 2010). During winter, areas with abundant, readily available food sources and good roost sites are preferred. Roosts are generally old large trees where visibility is good and human disturbances are low (Green 1985). In winter, the population of bald eagles in Wyoming increases due to an influx of migrants from the north (Travsky and Beauvais 2004). During the avian baseline study conducted for the project, only two bald eagles were observed, indicating the Application Area receives very little use by this species (WEST 2008f). The vast majority of the Application Area does not provide suitable nesting or roosting habitat. No active bald eagle nests were found on or within 1 mile of the Application Area during surveys conducted in 2008 and 2009 (WEST 2008f); however, PCW documented four active bald eagle nests within 5 miles of the Application Area during a nest survey in 2011 (SWCA 2011). Of these, only one was within 1 mile of a proposed turbine development area. Over the 30-year period since 1980, the BLM has records of 17 bald eagle nests along the North Platte River just east of the Application Area.

Ferruginous Hawk

Ferruginous hawks (*Buteo regalis*) require large tracts of undisturbed semiarid open country, primarily grasslands, basin-prairie shrublands, and badlands, and are common residents in this type of landscape in Wyoming. This species nests on outcrops, prominences on the ground, cutbanks, cliff ledges, and trees. The western two-thirds of Carbon County have the highest nesting density of ferruginous hawks in Wyoming (BLM 2008g). Ferruginous hawk populations in Wyoming are restricted in distribution and are sensitive to human disturbance (WGFD 2005a). Generally, ferruginous hawk nesting habitat in Wyoming is being utilized for energy development which can potentially decrease prey abundance and/or reduce availability of nesting sites (WGFD 2005a). Five ferruginous hawks were detected during fixed-point bird use surveys conducted as part of a baseline avian study in the Application Area. Additionally, eight ferruginous hawks were recorded outside of the standardized fixed-point surveys. No ferruginous hawk nests were located during aerial or ground nest surveys conducted within 1 mile of the Application Area (WEST 2008f), although during a 28 year period starting in 1980 the BLM recorded 25 active ferruginous hawk nests within 1 mile of the Application Area (WEST 2008f). In 2011, PCW surveyed 40 ferruginous hawk nest sites in the BLM database located within a 5 mile buffer of the project and found that only 15 of these locations still contained nest structures, but none of these nests were active (SWCA 2011).

Burrowing Owl

Burrowing owls (*Athene cunicularia*) are considered uncommon summer residents in Wyoming and utilize a wide variety of arid and semiarid environments characterized by sparse vegetation and bare ground (WGFD 2005a). Burrowing owls are dependent upon burrowing mammals, such as prairie dogs and ground squirrels, for nesting, roosting, and escape cover (WGFD 2005a) and their abundance and distribution is determined by the presence of these species. One burrowing owl was recorded outside of the standardized fixed-point surveys within the Chokecherry area during the baseline avian study (WEST 2009b).



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.15-2

Wyoming Pocket Gopher Distribution Model

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Columbian Sharp-tailed Grouse

Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus)* occur in a broad range of plant communities dominated by grasses and shrubs in steppe, grassland, and mixed-shrub habitats throughout the north-central U.S. and central and south-central Canada (Connelly et al. 1998). The species occurs in scattered pockets in northwestern and south-central Wyoming in the mountain-foothills shrub and sagebrush-snowberry habitat in the transitional zone between sagebrush-grass and forested habitats (WGFD 2005a). Breeding habitat generally consists of dense herbaceous cover and shrubs, but key species of vegetation may vary considerably (Connelly et al. 1998). Leks typically occur on elevated areas with little slope and low, sparse vegetation providing good visibility. Brood-rearing areas require a mosaic of dense shrubs and grasses with rich forb and insect foods (WGFD 2005a). Habitat for this species has been declining due to conversion of habitat to cropland and human development. Columbian sharp-tailed grouse were not detected during the baseline avian use study of the Application Area (WEST 2009b); however, the WYNDD reported an observation in 2002 within 2 miles of the Application Area.

Greater Sage-grouse

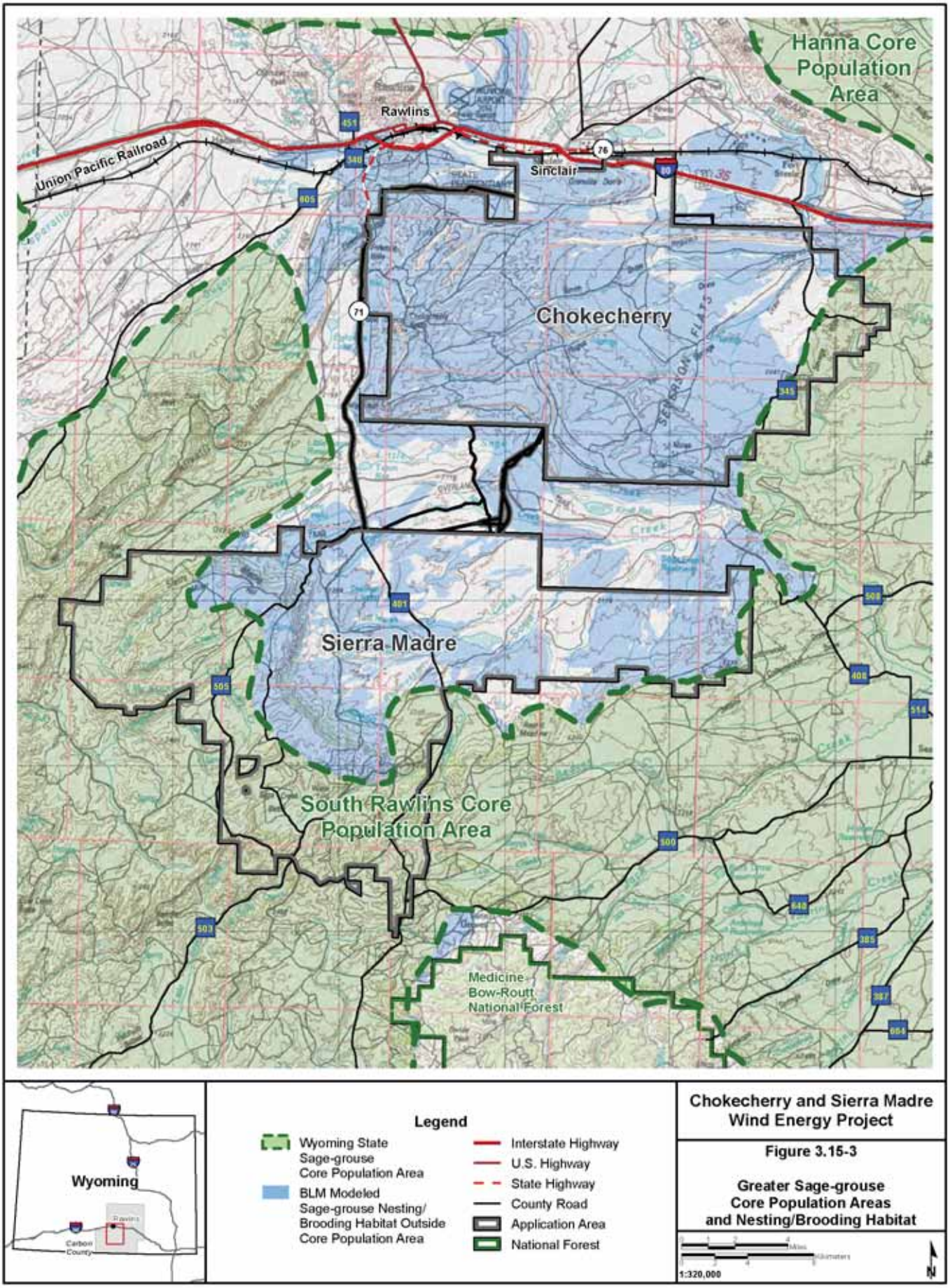
The greater sage-grouse (*Centrocercus urophasianus*) was petitioned for listing as threatened or endangered under the ESA. The USFWS announced on March 4, 2010 (FR 2010) that the greater sage-grouse would not be listed as threatened or endangered, but would be placed on the candidate species list. It was stated that the listing under the ESA was warranted, but precluded by higher priority listing actions.

Four habitats are considered essential to maintaining greater sage-grouse populations: lekking or strutting grounds, nesting, brood-rearing, and winter habitats. Baseline studies were conducted to locate and document leks and brood-rearing habitats within the Application Area in 2008 and 2009. In areas where breeding habitat is uniform and the population is non-migratory, nest habitat is generally within a 2 mile radius of leks, according to several studies (Braun et al. 1977; Connelly et al. 2000). Therefore, the lek survey would likely represent the nesting habitat within the Application Area. Suitable winter habitat found within the Application Area typically includes sagebrush extending approximately 10 to 14 inches above the snow providing leaves and buds for forage, or on southwest facing slopes or relatively flat areas where the snow is routinely blown clear of the sagebrush. Canopy cover associated with winter habitat ranges from 10 to 30 percent.

Lek Surveys

Greater sage-grouse in Wyoming are managed by the WGFD, while most of their habitat is located on federal or private lands. The conservation of the species in Wyoming is currently coordinated by the WGFD in cooperation with regional greater sage-grouse working groups in an attempt to increase grouse population levels and avoid federal listing under the ESA. In an effort to prevent listing of greater sage-grouse, Core Population Areas (Core Areas) were delineated by local citizen Sage-grouse Working Groups based upon habitat maps provided by the WGFD, and approved by the Wyoming Governor's Greater Sage-grouse Implementation Team. The Core Areas include areas with the highest densities of breeding greater sage-grouse in the state, as well as identified areas important for connectivity between populations. The Core Areas include roughly 25 percent of the state but contain 83.1 percent of the greater sage-grouse population. The Application Area includes portions of the South Rawlins Core Area (**Figure 3.15-3**).

Baseline data on greater sage-grouse leks in the Application Area was obtained during the springs of 2008 and 2009 (WEST 2009c, 2008c). The surveys conducted in 2008 were based on the initial Application Area, which was smaller than the current Application Area and the WGFD protocol for lek surveys required a 2-mile buffer around affected areas. By spring of 2009, the Application Area was delineated for the project and the WGFD protocols also were modified to require a 4-mile buffer for lek surveys (Holloran and Anderson 2005). Therefore, surveys in 2009 were conducted to gather baseline information for the expanded Chokecherry and Sierra Madre areas and additional buffer.



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.15-3

Greater Sage-grouse Core Population Areas and Nesting/Brooding Habitat

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The objective of the 2008 and 2009 surveys was to determine the presence of activity at historical leks and to locate, map, and document activity at new leks within the Application Area and a 4-mile buffer area. Surveys consisted of aerial and ground survey efforts. Aerial surveys were conducted to locate and map historic and new leks within the identified Application Area, as well as document activity. Ground surveys were then conducted at the mapped leks to record activity. In accordance with the WGFD biological techniques (Christiansen 2007), a lek was considered active if it had been attended by male greater sage-grouse during the strutting season when the surveys took place, which includes observation of birds using the site or signs of strutting activity.

Based on WGFD records, at least 22 historic and existing greater sage-grouse leks occur within the Application Area and a 4-mile buffer. During the 2008 aerial surveys, a total of 28 leks, including six previously unrecorded leks were mapped within the initial Application Area and 2-mile buffer. Sixteen of the 28 leks were active, including 10 previously documented and the six new leks (WEST 2008c). At two of these leks, Hillside in Chokecherry and New Lek 2 in Sierra Madre, three males were observed during aerial surveys but no males were ever detected during subsequent ground surveys; therefore, the status of these leks is uncertain, but they were treated as active leks for this analysis.

Ground surveys in 2008 were conducted at the 28 leks detected during aerial surveys. During ground surveys a total of 14 of the leks were determined to be active in the Application Area; therefore, with the inclusion of the two active leks observed during aerial surveys a total of 16 active leks were recorded in 2008. Eight of the 16 lek locations within the Chokecherry area were active in 2008 and included two of the six new leks. Using maximum counts for each lek, 161 males and 35 females were counted on these eight leks (**Table 3.15-2**). The number of males on each active lek ranged from 3 to 34 and averaged 22.6. Similarly, 8 of the 16 leks within the Sierra Madre area were active in 2008 and included 4 of the 6 new leks. Using maximum counts for each lek, 123 males and 9 females were counted on these 8 leks (**Table 3.15-2**). The number of males on each active lek ranged from 3 to 31 and averaged 15.4.

Table 3.15-2 Maximum Counts of Greater Sage-Grouse by Sex in the Initial Chokecherry and Sierra Madre Areas and 2-mile Buffer Determined by Ground Counts, Spring 2008

Lek Name	Males	Females	Total
Chokecherry Area			
Hugus Draw	23	7	30
Iron Springs Draw	34	8	42
Wild Horse Canyon	20	3	23
Upper Iron Springs	20	2	22
Junction	29	6	35
Smith Rim	4	5	9
Chokecherry Bench	28	3	31
Hillside[1]	3	1	1
Total	**161**	**35**	**196**
Sierra Madre Area			
Miller Hill	10	0	10
Sage Creek Ranch	31	1	32
Little Beaver	14	0	14
Sage Creek Basin	27	5	32

Table 3.15-2 Maximum Counts of Greater Sage-Grouse by Sex in the Initial Chokecherry and Sierra Madre Areas and 2-mile Buffer Determined by Ground Counts, Spring 2008

Lek Name	Males	Females	Total
Rawlins Reservoir	17	2	19
McKinney Crossing	10	1	11
Grove Meadow	11	0	11
New Lek[2]	3	0	0
Total	**123**	**9**	**132**

[1] Males observed on lek during aerial survey.

[2] Males observed on lek only once during an aerial survey, WGFD has since determined that this is not an occupied lek and therefore this lek has not been named.

Additional baseline data surveys for greater sage-grouse leks were conducted in the spring of 2009 to supplement both the 2008 lek surveys by resurveying the six new leks discovered during 2008 and conducting surveys in portions of the Application Area that had not been surveyed, including the extended buffer area totaling 4 miles around the expanded Application Area. Aerial survey efforts in 2009 located 10 historic leks, all within the extended buffer area with the exception of Deadman Creek, which is located within the Sierra Madre expansion area (**Figure 3.15-3**).

During 2009 ground surveys, the 10 historic leks and the six new leks located during the 2008 surveys were visited to record activity. A total of 10 leks were determined to be active in 2009, including six historic leks and four of the six new leks identified in 2008. Activity within the Chokecherry area consisted of the two new leks from the 2008 surveys with maximum counts of 14 males and 2 females (**Table 3.15-3**). Within the Sierra Madre area two of the four new leks from 2008 and Deadman Creek were active. Using maximum counts for each lek, 74 males, and 12 females were counted at these three leks (**Table 3.15-3**). Nine historical leks were visited during 2009 ground surveys within the extended buffer area. Again, using maximum counts for each lek, a total of 134 males and 6 females were recorded on the 9 historic leks.

Table 3.15-3 Maximum Counts of Greater Sage-Grouse by Sex in the Expanded Application Area and Extended 4-mile Buffer Determined by Ground Counts, Spring 2009

Lek Name	Males	Females	Total
Chokecherry Expansion Area			
Chokecherry Bench	11	2	13
Smith Rim	3	0	3
Total	**14**	**2**	**16**
Sierra Madre Expansion Area			
Rawlins Reservoir	16	4	20
McKinney Crossing	10	0	10
Deadman Creek	48	8	56
Total	**74**	**12**	**86**

Table 3.15-3 Maximum Counts of Greater Sage-Grouse by Sex in the Expanded Application Area and Extended 4-mile Buffer Determined by Ground Counts, Spring 2009

Lek Name	Males	Females	Total
Extended Buffer Area			
1786252	58	2	60
Little Sage Creek	28	2	30
1786163	26	0	26
1785042	17	1	18
1885223	5	1	6
Total	**134**	**6**	**140**

In summary, 22 active leks were recorded throughout the Application Area and the associated 4-mile buffer during surveys conducted in 2008 and 2009. The distribution of the leks was eight within the Chokecherry area, eight within the Sierra Madre area, and six within the 4-mile buffer. A total of 564 greater sage-grouse were detected during both years with 209 observed within the Chokecherry area, 215 within the Sierra Madre area, and 140 within the extended buffer area. Based on the total numbers of male grouse observed on leks, density of male greater sage-grouse during the two breeding seasons was similar between the Chokecherry area (1.6 male grouse/miles^2) and the Sierra Madre area (1.1 male grouse/miles^2), while the buffer area had the lowest density (0.2 male grouse/miles^2). However, lek density was 1.5 times higher on the Sierra Madre area (6/100 miles^2) than the Chokecherry area (4/100 miles^2).

Brood-rearing Habitat Surveys

Two surveys were conducted to determine if the Application Area provides greater sage-grouse brood-rearing habitat, and if so, to document the location of these areas (WEST 2009c, 2008b). The results of the studies indicate that the Sierra Madre area appears to provide higher quality greater sage-grouse brood-rearing habitat than the Chokecherry area. During the two brood rearing surveys, mesic areas were widespread over the Sierra Madre area and vegetation conditions appeared optimal for greater sage-grouse (Connelly et al. 2000), likely due to above-normal precipitation levels in the spring and summer and a lack of livestock grazing in 2008 and 2009. Most sagebrush stands in the Sierra Madre area were robust, and only small areas of decadent sagebrush were observed on the far northern portion of the area.

During the two surveys, a total of 39 discrete groups of greater sage-grouse totaling 192 individual birds were observed in the Chokecherry area, and 325 discrete groups of greater sage-grouse totaling 1,581 individual birds were observed in the Sierra Madre area. For the Application Area, the 1,773 greater sage-grouse observed included 318 adult males, 329 adult females, 666 chicks, 158 unclassified adults, and 302 unclassified adult or young greater sage-grouse (**Table 3.15-4**). Twenty-four (61.5 percent) of the greater sage-grouse groups on the Chokecherry area contained chicks, whereas 171 (49.7 percent) of the 344 greater sage-grouse groups on the Sierra Madre area contained chicks.

Many of the greater sage-grouse broods in the Chokecherry area occurred along Smith Creek and Hugus Creek as well as in the southwest portion. Greater sage-grouse broods were well distributed throughout most of the Sierra Madre area with the exception of its southern-most and northeastern–most extensions.

Table 3.15-4 Composition and Numbers of Greater Sage-Grouse Classified During Brood Surveys in the Application Area from August 18 – September 10, 2008, and July 13 – September 3, 2009

Area	Adult Male	Adult Female	Chicks	Unidentified Adult	Unidentified Adult or Young	Total
Chokecherry	17	33	103	22	17	192
Sierra Madre	301	296	563	136	285	1,581
Total	**318**	**329**	**666**	**158**	**302**	**1,773**

The Chokecherry area was more arid than the Sierra Madre area, and as summer progressed, water was restricted to higher elevation reaches of stream channels, a few associated seeps, and water wells. Compared to the Sierra Madre area, sagebrush appears to be in decline over much of the Chokecherry area and there are extensive areas of decadent sagebrush stands. Much of the potential brood rearing habitat along riparian areas in the Chokecherry area contained vigorous stands of basin wild rye (*Elymus cinereus*). No adult greater sage-grouse or broods were found within those portions of drainages dominated by wild rye, likely because vegetation was too dense and too high to provide good brood-rearing habitat.

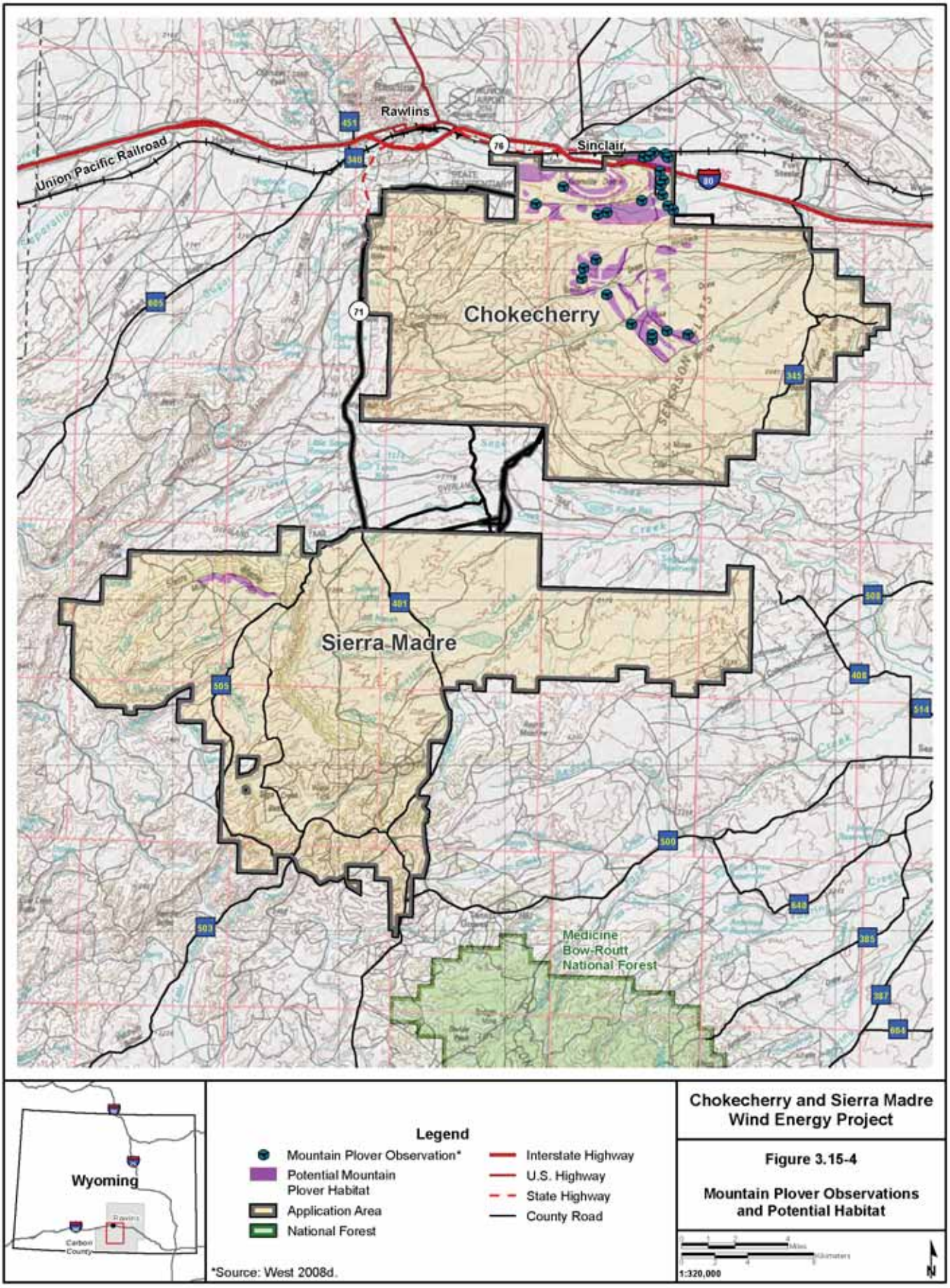
Mountain Plover

The mountain plover (*Charadrius montanus*) was recently considered for federal listing under the Endangered Species Act; however, as of May 12, 2011 the proposed listing was withdrawn as the USFWS concluded that the species is not endangered or threatened throughout all or a significant portion of its range (76 FR 27756). The mountain plover is still considered a BLM sensitive species. The mountain plover is considered a summer resident in Wyoming, however, its population status and trend are unknown, but suspected to be stable (WGFD 2005a). Mountain plovers inhabit open landscapes and nest in large, flat grassland expanses with sparse short vegetation. Specific surveys were conducted to map suitable habitat for mountain plovers within the Application Area and record any observations of individual birds (WEST 2008d). The mapping effort resulted in identifying suitable habitat of approximately 6,654 acres within the Chokecherry area and 402 acres within the Sierra Madre area. Suitable mountain plover habitat in the Chokecherry area is largely confined to the northeast portion; whereas suitable habitat in the Sierra Madre area occurs only along the extreme northern end of the area (**Figure 3.15-4**).

Additionally, a total of 37 mountain plovers at 25 locations were recorded within the Chokecherry area (**Figure 3.15-4**). No mountain plovers were observed in the Sierra Madre area. Because the change to a programmatic approach to the NEPA analysis, further site-specific mountain plover surveys were delayed until the issuance of the ROD or the final surface disturbance layout has been identified. Impacts in surveyed areas will be based on the potential for occurrence in areas identified as suitable based on vegetation maps of the area.

Long-billed Curlew

Long-billed curlews (*Numenius americanus*) breed in the Great Plains, Great Basin, and intermountain valleys of the western U.S. and southwestern Canada. Populations have declined significantly during the past 150 years due to overharvesting during the period 1850-1917, and elimination of suitable habitat (Dark-Smiley and Keinath 2004). Long-billed curlews have been recorded during the breeding season (May through August) throughout Wyoming, except in heavily forested areas. A total of 68 breeding records have been recorded for the state, of which only 19 are considered current (less than 15 years old). Similarly, a total of 155 non-breeding records for the state, of which 80 are considered current, indicating possibly more birds are breeding within the state, but confirmation of breeding is lacking



Chokecherry and Sierra Madre Wind Energy Project

Figure 3.15-4

Mountain Plover Observations and Potential Habitat

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(Dark-Smiley and Keinath 2004). Long-billed curlews were not detected during the baseline avian use study of the Application Area (WEST 2009b) and a review of the WYNDD concluded that long-billed curlews have not been recorded within the Application Area. Long-billed curlews have been documented within the 1 mile buffer around the Application Area; however, the records within the buffer area are greater than 30 years old and not considered current observations.

Loggerhead Shrike

Loggerhead shrikes (*Lanius ludovicianus*) have a wide distribution throughout North America and are closely related to open areas with short vegetation (Cornell Laboratory of Ornithology 2008). They are considered to be opportunistic feeders adjusting their diet to prey availability. Loggerhead shrike populations have experienced a continent-wide decline due to changes in land use and competition with species that are more tolerant of human-induced changes (Cornell Laboratory of Ornithology 2008). Similarly, in Wyoming, population declines are contributed to habitat loss and conversion to cultivation and urbanization, loss of insect prey due to pesticide use, and pesticide contamination (Nickoloff 2003). Loggerhead shrikes were detected four times during the baseline avian use study of the Application Area (WEST 2009b).

Sage Thrasher, Sage Sparrow, and Brewer's Sparrow

The sage thrasher (*Oreoscoptes montanus*), sage sparrow (*Amphispiza belli*), and Brewer's sparrow (*Spizella breweri*) are considered sagebrush obligate species (Paige and Ritter 1999; WGFD 2005a) requiring sagebrush for some part of their lifecycle. These three species are common breeding birds in landscapes dominated by big sagebrush (*Artemisia* spp.), preferring areas of large, undisturbed tracts of tall and dense sagebrush. They are all common summer residents in Wyoming where sagebrush is present. Generally, native sagebrush steppe habitat is vulnerable in the western U.S. (Hansley and Beauvais 2004; WGFD 2005a). For example, in Washington, over half of the native shrubsteppe has been converted to agriculture in the last 150 years (Vander Haegen et al. 2000); however, in Wyoming, there is no ongoing significant loss of habitat (WGFD 2005a). Sixty-five sage thrashers, 80 Brewer's sparrows, and 59 sage sparrows were detected during the baseline avian use study conducted in the Application Area (WEST 2009b).

3.15.2.4 Amphibians

Northern Leopard Frog

Northern leopard frogs (*Rana pipiens*) are found in cooler climates with a geographic range that encompasses most of the northern United States and far north into Canada (Smith and Keinath 2004).The northern leopard frog was previously abundant across its range, but recently has experienced population declines throughout North America (Smith and Keinath 2004). In Wyoming, northern leopard frogs appear to be extinct in the Targhee National Forest of western Wyoming and eastern Idaho and have experienced severe reductions in population in the Laramie Basin; however, in other parts of Wyoming this species remains abundant (Smith and Keinath 2004). The USFWS considered the northern leopard frog for listing under the ESA, but determined that listing of this species is not warranted (76 Fed. Reg. 61896 (October 5, 2011)). Habitat for this species includes swampy cattail marshes on the plains, and beaver ponds in the foothills and montane zones (WGFD 2005a). No single factor has been identified as the cause for the population decline, rather several contributing factors, including disease, introduced species, chemicals, and habitat loss/alteration/fragmentation have all been linked to the decline (Smith and Keinath 2004). A review of the WYNDD concluded that the northern leopard frog has been recorded within the Application Area; however, the most current record was 1995.

Boreal Toad

The boreal toad (*Bufo boreas boreas*) is considered to be declining in abundance and distribution across its range in western North America especially in the southern Rocky Mountains (Wyoming, Colorado, and New Mexico) (McGee and Keinath 2004). In the southern Rocky Mountains, the boreal toad was historically present in the Medicine Bow, Sierra Madre, and Laramie ranges in Wyoming, but is currently

only found in a few isolated areas in Medicine Bow National Forest in Wyoming (McGee and Keinath 2004). Boreal toads have been observed in a variety of habitats including wetlands, forests, woodlands, sagebrush, wet meadows, and floodplains across a wide range of elevations. The following threats have been identified for boreal toads on BLM managed lands in Wyoming: air quality and atmospheric deposition, timber harvest, grazing, fire and fire management activities, non-native species and their management, road and trail development and management of water impoundments, harvest and commerce, and habitat fragmentation and metapopulations impacts (McGee and Keinath 2004). It is assumed that any resource management resulting in a negative impact on wetlands or ponds also will negatively affect breeding habitats for boreal toads (McGee and Keinath 2004). A review of the WYNDD indicated that the boreal toad has been recorded within the Application Area; however, the most current record for the area was 1947.

Great Basin Spadefoot Toad

The Great Basin spadefoot toad (*Spea intermontana*) is found from extreme southern British Columbia south through the Great Basin to northern Arizona and New Mexico between the east base of the Cascade-Sierra Mountain System to the Rocky Mountains (Buseck et al. 2005). In Wyoming, distribution of this species is patchy with most records west of the Continental Divide in the Wyoming Basin and the Green River Basin, and a few records east of the Continental Divide in Natrona and Fremont counties in portions of the Wind River Basin. All records occur at elevations ranging from 6,000 feet to 9,200 feet (WGFD 2005a). Little information exists on the abundance of this species across its range, primarily due its behavior. During non-breeding months it is only active on humid/rainy nights and spends inactive periods within inconspicuous burrows (Buseck et al. 2005). Furthermore, the sporadic breeding habits make it difficult to monitor populations (Buseck et al. 2005). Great Basin spadefoot toads require a network of habitat components to survive including: overwintering burrow sites, temporary breeding ponds, and foraging areas. Lack of data precludes identification of specific threats to the species. A review of the WYNDD did not result in records of this species within the Application Area.

3.15.2.5 Fish

A portion of the Application Area is within the Upper Muddy Creek Watershed/Grizzly WHMA, which is managed to maintain, restore, and enhance habitat for Colorado River fish species unique to the Muddy Creek watershed (BLM 2008b). The portion of Muddy Creek within the Upper Muddy Creek Watershed/Grizzly WHMA has been identified as a high priority for aquatic habitat protection as it provides the best opportunity to restore native cold and warm water fish species assemblages in southwestern Wyoming (WGFD 2009b). The lower, warm water reach of Muddy Creek supports the only viable assemblage of bluehead suckers, roundtail chubs, and flannelmouth suckers known to still exist in Wyoming (WGFD 2008b) and are considered BLM sensitive species. Habitat degradation has been identified as a water quality concern on Muddy Creek (BLM 2008b). Within the Upper Muddy Creek Watershed/Grizzly WHMA, restoration projects, consisting primarily of deferred grazing, have been implemented to allow willows to reestablish along the riparian corridor to reduce the fish habitat degradation (BLM 2008b). Native fish in the Muddy Creek watershed also are threatened by non-native fish as they hybridize with native fish and compete for habitat and food (BLM 2008b).

Colorado River Cutthroat Trout

The Colorado River cutthroat trout (*Oncorhychus clarki pleuriticus*) is a native coldwater fish that was once distributed throughout the Colorado River Basin above the Grand Canyon, but now only occupies a fraction of its range (Young 2008). The introduction of nonnative fish that displace native fish and land management practices that alter the suitability of coldwater stream habitat have been identified as contributing factors relating to the decline in the distribution of this species. Management of the Colorado River cutthroat trout in the Application Area is guided by two efforts: the *Conservation Agreement and Strategy for Colorado River Cutthroat Trout in the States of Colorado, Utah, and Wyoming* for range-wide management and the *Conservation Plan for Colorado River Cutthroat Trout – Little Snake River, southeastern Wyoming* provides actions to be implemented to ensure the persistence of this species in the Little Snake River enclave. The latter document identifies areas where management for

the species will be emphasized, which includes the Upper Muddy Creek watershed. Actions implemented within the Upper Muddy Creek watershed include improving the stream conditions to provide fish habitats, removal of introduced fish, and reintroduction of native fish.

The organization Trout Unlimited developed a management portfolio to ensure the long term persistence of native cutthroat trout (Haak 2011). This approach defines management goals by representation, resiliency and redundancy in relation to the entire population. Management goals specific to the Upper Muddy Creek watershed are:

Representation: Establishing a genetically pure meta-population in the Upper Muddy Creek watershed to ensure that more genetically pure populations persist across that historical range of the subspecies. Large amounts of interconnected habitats also could facilitate development of a small fluvial life history in Muddy Creek.

Resilience: Expanding Colorado River cutthroat into historic habitats and reconnecting tributaries will facilitate meta-population dynamics in the watershed and increase the subspecies' resilience to environmental change. Interconnected habitats will allow re-colonization by individuals from other tributaries into areas disturbed by fires, floods, or human disturbances.

Redundancy: Expanding existing populations and establishing new ones will add redundancy within the Muddy Creek watershed, the Yampa basin, and the entire range of subspecies. Building on this redundancy through restoration will buffer the species against population losses – should they occur – in other parts of the subspecies' range.

Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker

Roundtail chub (*Gila robusta*), bluehead sucker (*Catostomus discobolus*), and flannelmouth sucker (*Catostomus latipinnis*) are native fish of the Colorado River basin, specifically within the Little Snake River drainages and the Muddy Creek watershed (Bower et al. 2008). These native warm water species occur in about half of their historic ranges, thus, are classified as sensitive by the BLM. The primary reason for the declines is anthropogenic, including water diversions that change the flow regimes in both mainstem rivers and tributary streams; physical habitat degradation; construction of diversion dams and reservoirs; and introduction of non-native species that are predators and competitors with the species (Bower et al. 2008; Ptacek et al. 2005; Rees et al. 2005a,b). Conservation planning efforts have been initiated for these species throughout their range (Utah Department of Natural Resources [UDNR] 2006). These efforts have focused on conducting research to better understand the populations of these species so as to develop meaningful conservation actions.

3.16 Noise and Human Health

This section pertains to the fundamentals of background noise, noise propagation, and human health within the Application Area.

3.16.1 Fundamentals of Acoustics

Noise can essentially be classified into three different types: broadband, tonal, and low frequency. Noise that is characterized as broadband is a consistent distribution of sound with frequencies greater than 100 Hertz (Hz). In relation to wind turbines, broadband noise is often caused by contact of the turbine blades with the wind. This creates the familiar whooshing noise associated with wind farms. Tonal noise is defined as noise at discrete frequencies. This noise is often caused by the wind turbine mechanical components, such as gears interacting, or air flow over holes or slits. Low Frequency noise ranges from 20 Hz to 100 Hz. This type of noise sometimes occurs when there is a flow deficiency around a turbine often caused by the air flow wake from a neighboring turbine. This phenomenon is often associated with older downwind turbines (National Wind Coordinating Committee [NWCC] 2002).

3.16.2 Characterization of Background Noise Levels

Ambient noise, or background noise, is defined as an assortment of noise from nearby and distant sources, relatively steady and homogeneous, with no particular source identifiable within it (NWCC 2002). Along the northern boundary of the Chokecherry area, ambient noise is often in the form of noise emitted from the Sinclair refinery, the city of Rawlins, traffic along I-80 and WY 71, and trains operating on the UPRR. In the southern portions of the Application Area which are more rural, background noise typically consists of wildlife and ranching noise such as cattle and ranch vehicles. Increased noise as the result of wind is also a consistent ambient background noise within the Application Area. The Wind Energy Resource Atlas of the United States, produced by the National Renewable Energy Lab (NREL), details the Rawlins area as being within a zone of high wind energy. Rural ambient noise typically has a range within 20 decibels (dBs) to 40 dBs (BWEA 2000). Rural ambient noise will not be spread uniformly throughout the Application Area, as the northern portion of the Application Area is more affected by ambient background industrial activity; while the southern portion primarily experiences rural ambient noise as a product of ranching and ranching associated activity and residences. There are 18 residences within the Application Area. **Figure 3.16-1** portrays the location of these residences.

As noted in **Table 3.16-1**, there are three line noise sources, the UPRR, I-80, and WY 71. There are two point sources, the Sinclair refinery and the City of Rawlins. The refinery is less than 0.5 mile from the northern edge of the Application Area, the UPRR and the City of Rawlins are adjacent to the northern edge of the Application Area, while I-80 and WY 71 are within the Application Area. The railroad runs parallel to the northern border of the Application Area.

3.16.3 Noise Propagation

There are many factors which determine how well and how far noise moves from a certain source. Topography is a factor, especially when ground rises between a noise emitter and a noise receptor. Atmospheric conditions are another contributing factor, specifically humidity, and how sound is absorbed by the air, depending on frequency. Ground cover, which includes shrubs and trees (e.g., wind breaks), is another contributing factor to noise propagation as are meteorological features such as air turbulence.

Wind can have a significant effect on noise travel, especially when the noise receptor is downwind of the noise source. There is a significant difference in how noise is perceived when a receptor is upwind or downwind from the noise source. A receptor downwind from a noise source will be more prone to hear noise than a receptor upwind from a noise source (Uppsala University 2007).

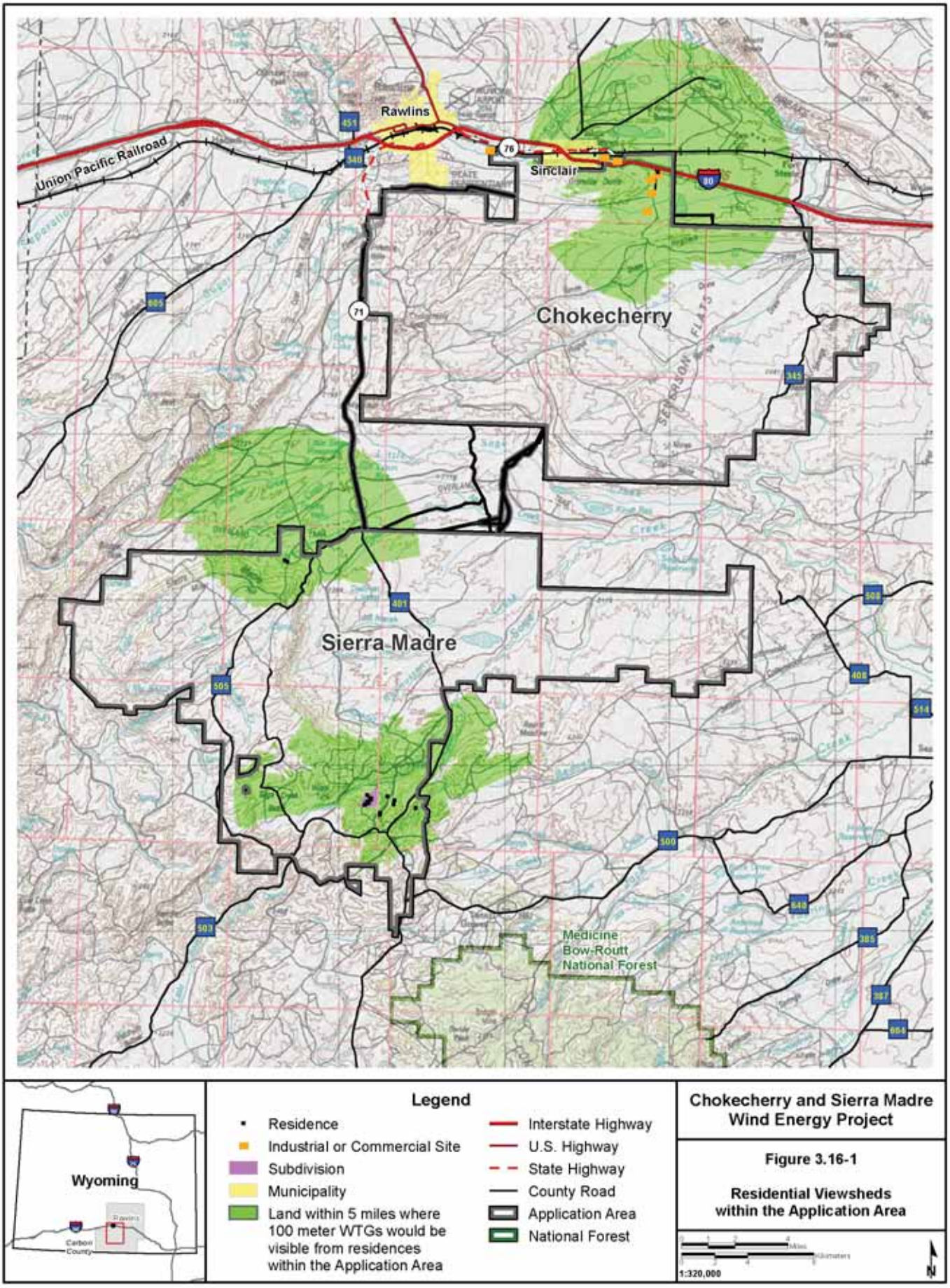
Rawlins
Sinclair
Union Pacific Railroad
Chokecherry
Sierra Madre
Medicine Bow-Routt National Forest
Wyoming
Carbon County
Legend
Residence
Industrial or Commercial Site
Subdivision
Municipality
Land within 5 miles where 100 meter WTGs would be visible from residences within the Application Area
Interstate Highway
U.S. Highway
State Highway
County Road
Application Area
National Forest
Chokecherry and Sierra Madre Wind Energy Project
Figure 3.16-1
Residential Viewsheds within the Application Area
1:320,000
N

Table 3.16-1 Noise Point and Line Sources

Noise Source	Point or Line Source	Type	Proximity to the Application Area
Rawlins	Point	Municipal	Adjacent to northern boundary of the Chokecherry area
Refinery	Point	Developed Industrial	0.4 mile from northern boundary of the Chokecherry area
Railroad	Line	Developed ROW	Adjacent to northern boundary of the Chokecherry area
WY 71	Line	Developed ROW	Adjacent to the western boundary of the Chokecherry area and through Sierra Madre
I-80	Line	Developed ROW	Adjacent and through the northern boundary of the Chokecherry area

The noise level from a point source, such as a wind turbine, will decrease by 6 dBs for every doubling of the distance away from the point source. For a line source, such as a power line or highway, the noise level will decrease by 3 dBs for every doubling of the distance away from the source (Truax 1999). This concept, known as geometric spreading, is based on the inverse square law. This law states that the intensity of the influence at any given radius is the source strength divided by the area of the sphere. The energy twice as far from the source is spread over four times the area, hence the sharp drop off in intensity. Sound intensity follows the inverse square law assuming there are no reflections or reverberations. **Table 3.16-2** displays the human perception of a change in decibel levels, while **Figure 3.16-2** illustrates the inverse square law as it relates to the perception of noise moving away from a point source.

3.16.4 Noise Standards and Guidelines

There are no federal noise regulations, however, municipalities and local governments may adopt laws and regulations that impose a maximum noise limit within a community. These ordinances are often enforced by police or an agency. Despite meeting these locally imposed ordinances, complaints have arose regarding wind turbines (NWCC 2002). Complaints can stem from when there is not enough broadband noise to obscure the tonal noise or, at night when background noise decreases and broadband noise becomes more prevalent.

Table 3.16-2 Human Perception of Noise Level Changes

Change in Decibel Level	Result
1 dB	Cannot be perceived
3 dBs	Barely discernible
5 dBs	Noticeable community response
10 dBs	Causes an adverse community response

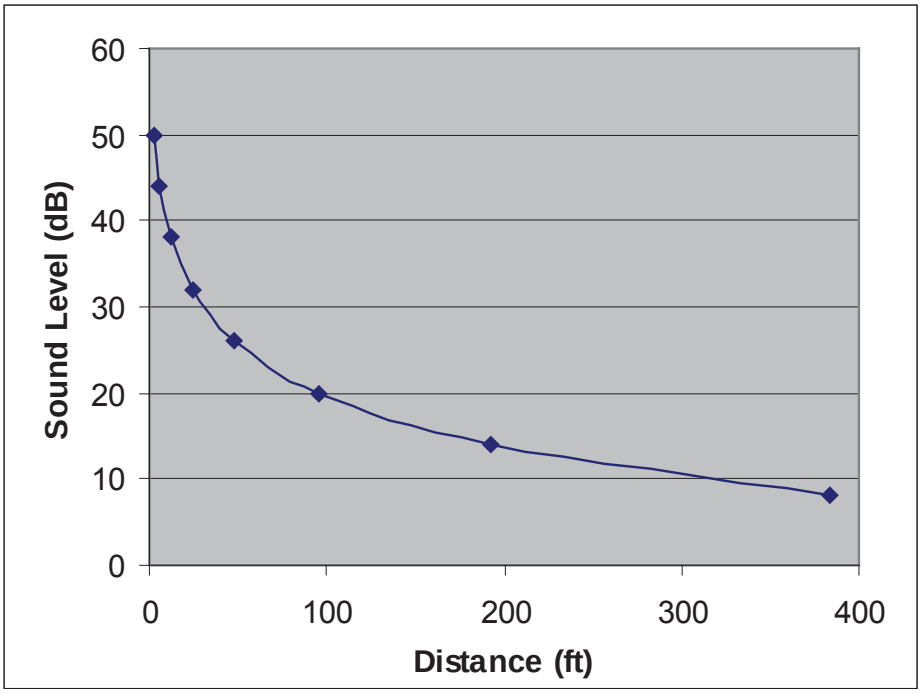

Figure 3.16-2 Perception of Sound from a Point Source

3.16.5 Human Health

A number of adverse health effects have been attributed to wind turbine operations. These potential adverse affects include wind turbine syndrome, shadow flicker, and the 'looming effect'. Wind turbine syndrome asserts that there is a relationship between the noise vibration from operating wind turbines and symptoms such as migraines, motion sickness, vertigo, visual and gastrointestinal sensitivity (Wind Turbine Syndrome 2009). Shadow flicker is a result of shadows through constrained areas such as windows and other openings as the wind turbine blades interact with the angle of the sun. It has been suggested that shadow flicker can initiate epilepsy and cause annoyance resulting in physical and mental stress (Update of Shadow Flicker Evidence Base 2011). A study that evaluated the effects of shadow flicker concluded that the nearest affected receptors should be no closer than 10 rotor diameters from the WTGs (ARM Group Inc. 2009) to the northeast or northwest of the turbines. Lastly, the 'looming effect' causes a psychological reaction from feeling "enclosed" by a tall structure. Studies suggest that the looming effect is dissipated at a distance greater than an estimated 1,640 feet distance between the WTG and the viewer (Oregon Health Authority 2012). Currently, there are no wind turbines in the project area to promote these potential adverse health effects.