4 AFFECTED ENVIRONMENT

Because this PEIS provides an assessment of environmental, social, and economic issues at a programmatic level and not at the site-specific level, the descriptions of the affected environment presented in this chapter do not provide detailed information about conditions that exist at specific project locations. Rather, these descriptions provide the level of detail needed to support the programmatic impact assessment presented in Chapter 5. Information needed to assess the range of potential impacts that may occur because of wind energy development on BLM-administered lands and to identify effective mitigation measures that may be applicable at individual sites is presented. In addition, the many site-specific factors that must be evaluated at the project level are identified.

4.1 GEOLOGIC RESOURCES AND SEISMIC SETTING

Any type of construction or industrial activity has the potential to impact soil, sand and gravel resources, and other sources of rock. These impacts can occur within the specific area of construction as a result of excavation, grading, and so forth, or regionally as a result of extraction and the use of building materials. In addition, construction activities can impact or be impacted by local seismic and geologic hazard conditions. The impacts would vary by location and depend on the local geology. Detailed studies of soil, sand, gravel, and other aggregate resources, as well as the seismic setting, would need to be conducted, as discussed in the following sections, to define the affected environment for an individual project.

4.1.1 Geologic Resources

The type and distribution of soils vary widely across the western states and also may vary considerably within a specific wind energy project site. Specific soil types and thicknesses at a given site will determine the degree of potential erosion and/or compaction problems and the associated engineering requirements for activities that could disturb soils (e.g., excavations, grading and clearing surfaces, road construction, structural foundations). Detailed soil surveys may be required wherever extensive soil disturbance is possible at a site.

Sand and gravel deposits and rocks suitable for use in construction occur throughout the western states. These resources may be present within a specific wind energy project site, in the immediate vicinity, or some distance away. Detailed reviews of the availability of these resources in sufficient quantities to meet the project-specific needs would need to be conducted. Specifically, the location, quality, and potential competing uses of these materials would need to be characterized.

4.1.2 Seismic Setting

Many parts of the western United States are seismically active, with varying degrees of potential for earthquakes. In addition, other geologic hazards exist, such as the potential for landslides and rock falls. The potential for volcanic activity exists as well, although this is less widespread. Detailed reviews of the local geology and seismic setting are required to identify which hazards are present at a specific wind energy project site and, therefore, to determine the need for engineering controls.

4.2 PALEONTOLOGICAL RESOURCES

Paleontological resources are the fossilized remains of plants and animals. Some fossil remains have major scientific value. Greater attention is often given to vertebrate fossils than to invertebrate fossils because of their rarity; however, some invertebrate fossils are also rare. The rarity of such specimens and the unique information that can be gleaned from these items emphasizes the need for their protection. No laws specifically address paleontological resources; some protection is offered, however, through the Antiquities Act of 1906 to specimens of significant scientific value. Two other federal acts, the Archaeological Resources Protection Act of 1979 and the Federal Cave Resources Protection Act of 1988, protect fossils found in primary context and from significant caves, respectively. Fossils on federal lands (e.g., BLM-administered lands) are further protected by laws penalizing the theft or degradation of property of the U.S. government (Theft of Government Property [62 Stat. 764, 18 USC 1361] and FLPMA [Public Law (P.L.) 94-579; 90 Stat. 2743; 43 USC 1701]).

The large number of productive fossil-bearing geological landforms found on federal land in the American West has encouraged the BLM to provide guidance on protecting this resource. Guidance on the treatment of paleontological resources is given in the 2000 Report by the Secretary of the Interior on Fossils on Federal Land (DOI 2000). Further guidance is provided in the BLM Manual titled *8270 — Paleontological Resource Management* (BLM 1998). Procedures for managing this resource are identified in an attachment to BLM Manual 8270, the Paleontological Resources Handbook 8270-1. The goal of the BLM program is to locate, evaluate, manage, and protect paleontological resources on public lands. (See Section 4.7.4 for a description of designated ACECs.)

To date, no comprehensive inventory of fossils and no systematic inventory of fossil-bearing areas on BLM-administered lands have been conducted. Most assessments and inventories of paleontological resources on public lands are conducted on a project-specific basis. BLM Field Offices maintain records of the paleontological finds made on the lands they manage. Often this information is held by the primary state repository for fossil finds in that area. Site-specific information regarding paleontological resources would need to be collected to define the affected environment for an individual project.

4.3 WATER RESOURCES

The availability and quality of water resources are major issues in many portions of the 11-state study area. Large portions of the region have very dry climates, and water availability can become a limiting factor on all kinds of development and, consequently, on population growth. Both surface water and groundwater resources are highly valued commodities; water rights are strictly enforced, and all water use is closely evaluated. Activities that use water resources or have the potential to impact the quality of water resources must be reviewed within the context of local and regional water concerns. Detailed studies of water resources need to be conducted to define the affected environment for an individual project. In this PEIS, Section 3.2 and Appendix E provide discussions of applicable regulations regarding water resources, such as the CWA and the SDWA.

4.3.1 Groundwater

Groundwater quality and availability vary widely across the western states. The availability of groundwater resources to support site construction activities would need to be assessed at the project level, along with other characteristics such as groundwater quality, depth to groundwater, and local groundwater uses. At some sites, the hydrologic regime may need to be characterized to assess the relationship at a specific site between groundwater and surface water resources, including wetlands, if any, and to determine whether groundwater resources are recharged locally.

4.3.2 Surface Water

While surface water resources also vary widely across the western states, they are fairly limited in many areas that are quite arid. The presence of both permanent and ephemeral surface water bodies would need to be assessed at the project level, along with other characteristics such as water quality, water use by both humans and wildlife, surface runoff patterns, and hydrologic connectivity to local groundwater resources, if any.

4.4 AIR QUALITY

Air quality changes over time as economic development occurs and regulatory programs affect the emissions from sources. At the time a site is proposed for wind energy development, the air quality at that site would need to be assessed. The following discussion provides a general picture of air quality in the 11-state study area and comments on the current major regulatory programs. The text box on the next page titled “Air Quality Terms” provides definitions for some of the terms used in this section.

The affected air environment can be characterized in terms of concentrations of the criteria pollutants carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM), nitrogen dioxide (NO_2), ozone (O_3), and lead (Pb). The EPA has established National Ambient Air Quality Standards (NAAQS) for these pollutants. There are two standards for particulate matter, one for particulates less than 10 μm in diameter (PM_{10}) and one for particulates less than 2.5 μm in diameter ($PM_{2.5}$). Table 4.4-1 lists the NAAQS. Some states have additional standards for these pollutants and standards for other pollutants. One of the goals of air quality regulatory programs is to ensure that concentrations of pollutants in the air do not exceed these standards.

Air Quality Terms

National Ambient Air Quality Standards (NAAQS) are established by the U.S. Environmental Protection Agency (EPA) for criteria pollutants. The primary NAAQS specify maximum ambient (outdoor air) concentrations of the criteria pollutants that would protect public health with an adequate margin of safety. Secondary NAAQS specify maximum concentrations that would protect public welfare. Some of the NAAQS for averaging times of 24 hours or less allow the standard values to be exceeded a limited number of times per year.

Ozone (O_3) is formed in the atmosphere by chemical reactions involving nitrogen oxides (NO_x) and volatile organic compounds. The reactions are energized by sunlight. Emissions of NO_x and volatile organic compounds are controlled to reduce ozone levels.

Particulate Matter (PM) is dust, smoke, and other solid particles, and liquid droplets in the air. The size of particulates is important and is measured in micrometers (μm). A micrometer is 1 millionth of a meter (0.000039 in.).

Volatile Organic Compounds (VOCs) are organic vapors in the air that can react with other substances, principally NO_x, to form ozone. VOCs have many sources such as solvents, combustion, and evaporation of fuels.

Areas where air quality exceeds the NAAQS are called nonattainment areas, and states must develop plans for attaining and maintaining the NAAQS. These plans generally include emissions reduction measures, such as limitations on stationary source emissions, and work practice standards. There are no nonattainment areas for NO_2 (EPA 2004a). Tailpipe emissions from mobile sources (cars, trucks, construction equipment, etc.) are regulated by the federal government except in California, which has its own mobile source programs and regulations.

Figures 4.4-1 and 4.4-2 show counties in the 11-state study area containing nonattainment areas for PM_{10}, CO, and O_3 (1-hour standard).[1,2] These pollutants are associated mostly with emissions from construction activities for wind energy projects. In addition, parts of four Arizona counties are nonattainment for SO_2, and part of one county in Montana is nonattainment for Pb; however, neither SO_2 nor Pb is emitted in appreciable quantities by development or operation of wind energy projects. A highlighted county may contain more than one

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1 Nonattainment areas for $PM_{2.5}$ have not been designated; this document concentrates on PM_{10}. The conclusions would be the same for $PM_{2.5}$.

2 On April 15, 2004, the EPA designated nonattainment areas for the 8-hour O_3 standard (EPA 2004b). Both O_3 standards will remain in effect for some time, and states have yet to prepare plans for meeting the 8-hour standard. Since O_3 nonattainment should have little, if any, impact on development and operation of wind energy projects, only the counties containing nonattainment areas under the older 1-hour standard are shown in the figure. A list of the 8-hour nonattainment areas and the associated counties can be found in EPA (2004b).

TABLE 4.4-1 National Ambient Air Quality Standards

Pollutant	Averaging Time	Ambient standard[a] (Value)[b]	Type[c]
SO_2	3 hours	1,300 (0.5)	S
	24 hours	365 (0.14)	P
	Annual	80 (0.03)	P
NO_2	Annual	100 (0.053)	P,S
CO	1 hour	40,000 (35)	P
	8 hours	10,000 (9)	P
O_3	1 hour	235 (0.12)	P,S
	8 hours	157 (0.08)	P,S
PM_{10}	24 hours[d]	150	P,S
	Annual[d]	50	P,S
$PM_{2.5}$	24 hours[d]	65	P,S
	Annual[d]	15	P,S
Pb	Calendar quarter	1.5	P,S

[a] Refer to 40 CFR Part 50 for detailed information on attainment determination and methods for monitoring.

[b] Values that are not in parentheses are in $\mu g/m^3$. Parenthetical values are part(s) per million (ppm) by volume.

[c] P = primary (health-based) standard; S = secondary (welfare-based) standard.

[d] Implementation of the standard has been delayed, and states have not developed attainment plans.

Source: 40 CFR Part 50.

nonattainment area, and a particular nonattainment area may be a small fraction of a highlighted county. Nonattainment areas also change as air quality changes over time. Site-specific air quality would need to be assessed at all sites, even those not located in or close to nonattainment areas.

The NAAQS establish maximum pollutant levels that should not be exceeded. The Prevention of Significant Deterioration (PSD) program limits the deterioration of existing air quality in areas with air cleaner than the NAAQS levels. This program establishes a baseline level of air quality and specifies increments that cap the increases in pollutant levels above that baseline. The program applies to sulfur oxides, PM_{10}, and NO_2 emitted by new or modified major sources. Smaller increments apply in special areas, such as National Parks and Wilderness Areas (Class I areas), than in other areas (Class II areas). An operating wind energy development project would not be a major source.

FIGURE 4.4-1 Counties Containing a PM_{10} Nonattainment Area (Source: EPA 2004a)

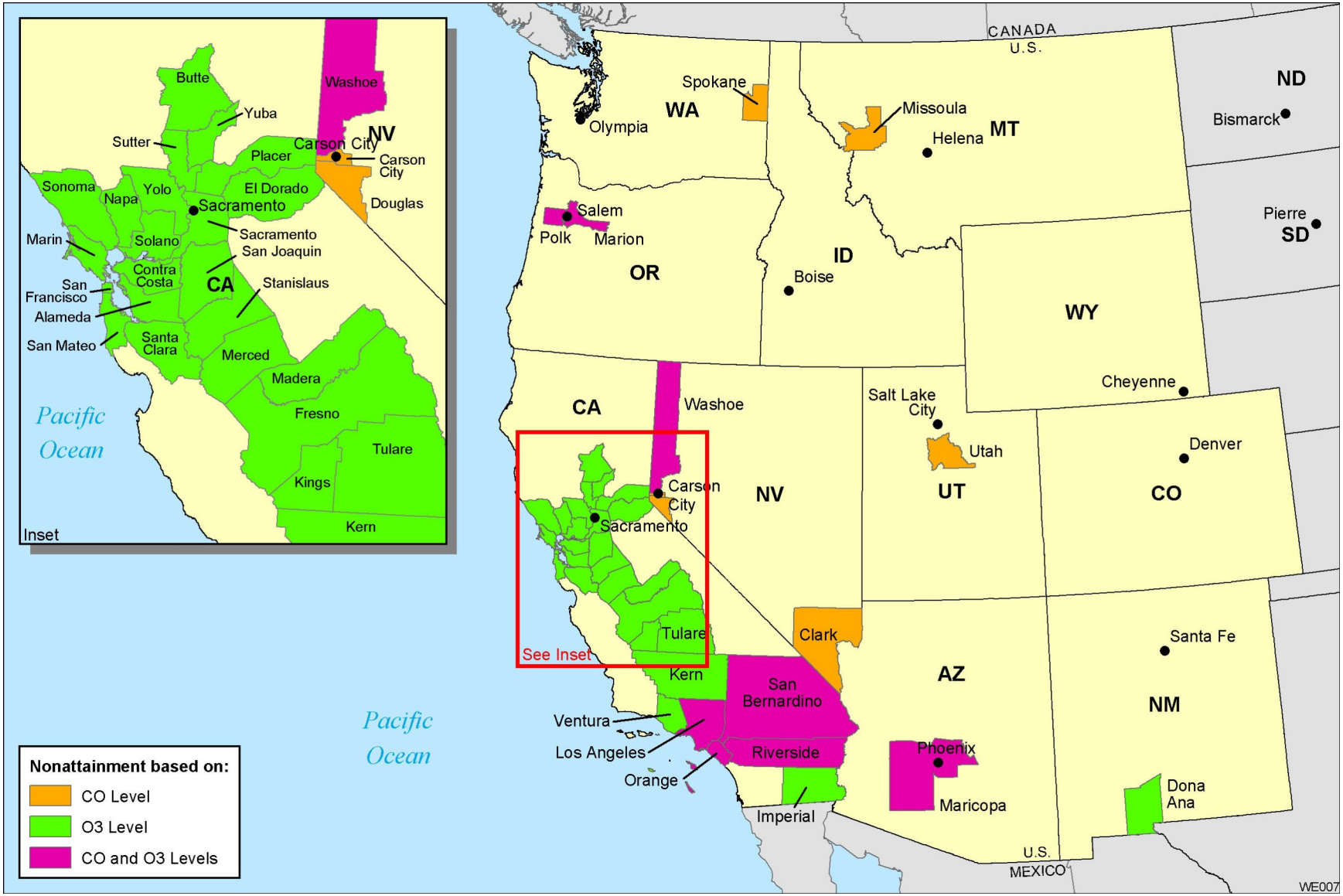

FIGURE 4.4-2 Counties Containing a 1-Hour Ozone or a Carbon Monoxide Nonattainment Area (Source: EPA 2004a)

The EPA and the states also control air toxics or hazardous air pollutants (HAPs), substances judged to have adverse impacts on human health when present in the ambient air. The EPA and some states have issued lists of substances regulated as air toxics. The specific substances listed and the types of regulations applied differ among jurisdictions. Again, given its small emissions, an operating wind energy project would probably not be regulated for emissions of air toxics.

4.5 NOISE

This section presents a brief discussion of environmental noise fundamentals, background noise levels, noise propagation, and noise standards and guidelines.

4.5.1 Fundamentals of Acoustics

Sound can be defined as any pressure variation that the human ear can detect. Noise is defined as "unwanted sound."

The unit used to describe the intensity of sound is the decibel (dB). Audible sounds range from 0 dB ("threshold of hearing") to about 140 dB ("threshold of pain"). The normal audible frequency range is approximately 20 Hz to 20 kHz. The A-weighted scale, denoted as dB(A), approximates the range of human hearing by filtering out lower frequency noises, which are not as damaging as the higher frequencies. It is used in most noise ordinances and standards. To provide a frame of reference, rustling leaves have a decibel level of 10 dB(A); conversational speech, 60 dB(A); and aircraft takeoff, 120 dB(A).

While A-weighted sound may adequately indicate the level of sound at a given instant in time, it does not account for the duration of the sound or that sound levels can vary with time. In wind turbine assessment, two descriptors (L_{eq} and L_{dn}) are generally used to describe this variation. The equivalent sound pressure level (L_{eq}) is a single number that, if continuous during a specific time period, would contain the same total energy as the actual time-varying sound. The day-night average sound level (L_{dn} or DNL) is the average A-weighted sound level over a 24-hour period, with a 10-dB penalty artificially added to nighttime (10:00 p.m. to 7:00 a.m.) sound levels to account for more noise-sensitive activities (e.g, TV viewing or sleep) during that period.

The effects of noise on people can be classified into three general categories: (1) subjective effects of annoyance, nuisance, and dissatisfaction; (2) interference with activities such as speech, sleep, and learning; and (3) physiological effects such as anxiety or hearing loss. The sound levels associated with environmental noise generally produce effects only in the first two categories.

Whether a noise is objectionable will vary depending on the type of noise (tonal, broadband, low frequency, or impulsive) and the circumstances and sensitivity of the individual

who hears it. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by the hearer.

The human response to changes in decibel levels has the following characteristics (NWCC 1998):

- A 3-dB change in sound level is considered a barely noticeable difference;
- A 5-dB change in sound level will typically result in a noticeable community response; and
- A 10-dB change, which is generally considered to be a doubling of the sound level, almost certainly causes an adverse community response.

Noise containing discrete tones (tonal noise) is much more noticeable and more annoying at the same relative loudness level than other types of noise, because it stands out against background noise.

4.5.2 Characterization of Background Noise Levels

Wind energy projects in the United States are mostly located in undeveloped hilly terrain in rural or remote areas. While these areas have low human population densities, they may have high populations of some animal species. Ambient noise levels at these sites are quite low. Typically, primary noise sources around the project area would include noise caused by wind and vehicular traffic along the major roads. Other noise sources would be farm machinery (e.g., tractors) and animal noise (e.g., dog barking, bird chirping). In general, background noise levels (i.e., noise from all sources not associated with a wind farm) are higher during the day than at night. For a typical rural environment, background noise is expected to be approximately 40 dB(A) during the day and 30 dB(A) at night (Harris 1979), or about 35 dB(A) as DNL (Miller 2002).

4.5.3 Noise Propagation

To predict the noise level at receptor locations from a known power level, a number of sound propagation mechanisms should be considered. Major factors determining noise levels at the receptor (Beranek and Vér 1992) include the following:

- Source characteristics (e.g., sound power, directivity, source height);
- Geometric spreading as the result of the distances from the noise source to the receptor;
- Atmospheric air absorption, which depends strongly on frequency and relative humidity but less strongly on temperature and pressure;

- Ground effects resulting from vegetation (e.g., grass, shrubbery, trees);

- Intervening topography between the source and the receptor or man-made or natural barrier/structures; and

- Meteorological factors resulting from atmospheric inhomogeneities (i.e., refraction because of vertical wind and temperature gradients, and air turbulence).

Sound propagation involves the complicated interactions of many attenuation elements, especially among the factors listed above. In general, noise levels from a point source, such as a compressor or wind turbine, decrease about 6 dB per doubling of distance from the point source because of the way sound spreads. However, noise levels from along a line source, such as highways or transmission lines, decrease about 3 dB per doubling of distance.

The overall effect on noise propagation is a complex site-specific combination of the factors described above. In many screening applications, only the geometric spreading term is assumed to predict noise levels at receptor locations of interest. For a refined analysis, a sound propagation model that integrates most of the sound attenuation mechanisms described above would be required. The effects of two meteorological factors (wind direction and changes in temperature with height) are discussed below.

Sound propagation for horizontal distances less than about 330 ft (100 m) is essentially independent of atmospheric conditions. For locations at greater distances from a given source, wind direction can cause considerable differences in sound levels between upwind and downwind locations. The typical increase of wind speed with height will bend the path of sound to "focus" it in the downwind direction and make a "shadow" in the upwind direction. Upwind sound levels will be lower and downwind levels higher than if there were no wind.

In addition, changes in temperature with height play a major role in sound propagation. During the day, air temperature tends to decrease with height. In contrast, on a clear night, the temperature often increases with height (a condition known as a temperature inversion). Because the speed of sound varies with temperature, sound tends to bend (refract) upward during the day, leading to reduced sound levels on the ground; it bends downward during inversions, leading to higher sound levels on the ground. These temperature effects are uniform in all directions from the source, whereas the wind affects receptors primarily in the upwind and downwind directions.

4.5.4 Noise Standards and Guidelines

The Noise Control Act of 1972, along with its subsequent amendments (Quiet Communities Act of 1978 [42 USC Parts 4901–4918]), delegates to the states the authority to regulate environmental noise and directs government agencies to comply with local community noise statutes and regulations. Although no federal noise regulations exist, the EPA has promulgated noise guidelines (EPA 1974). Similarly, most states have no quantitative noise-limit regulations. Many local governments, however, have enacted noise ordinances to manage

community noise levels. The noise limits specified in such ordinances are typically applied to define noise sources and specify a maximum permissible noise level. They are commonly enforced by the police, but also may be enforced by an agency that issues development permits.

In particular, some state or local governments have set permissible environmental noise limits for regulatory purposes. Nonetheless, complaints about noise from wind energy projects may still occur, even when fixed-level noise criteria or standards are met (NWCC 2002). This is because of the changes between the relative level of broadband turbine and background noises. If tonal components exist, higher levels of broadband background noise are needed to effectively mask the tone(s). In this respect, it is common for community noise standards to incorporate a penalty for pure tones, typically 5 dB(A). Also, the impact of noise depends on what people are doing: lower levels of noise will be objectionable during sleeping hours than during the day. Many European countries (Gipe 1995) and some states in the United States have lower noise standards during night hours.

The EPA guideline recommends an L_{dn} of 55 dB(A) to protect the public from the effect of broadband environmental noise in typically quiet outdoor and residential areas (EPA 1974). This level is not a regulatory goal but is "intentionally conservative to protect the most sensitive portion of the American population" with "an additional margin of safety." For protection against hearing loss in the general population from nonimpulsive noise, the EPA guideline recommends an L_{eq} of 70 dB(A) or less over a 40-year period.

4.6 ECOLOGICAL RESOURCES

The following discussions of the ecological resources that may be affected by wind energy development on BLM-administered lands are presented from an ecoregion and ecological resource perspective.

4.6.1 Ecoregion Distribution and Associated Vegetation in the 11 Western States

Ecoregions delineate areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources present in the area (Omernik 1987). Ecoregions are based on unique combinations of geology, physiography, vegetation, climate, soils, land use, wildlife, and hydrology. A number of individuals and organizations have characterized North America on the basis of ecoregions (e.g., Omernik 1987; CEC 1997; Bailey 1995). The intent of such ecoregion classifications has been to provide a spatial framework for the research, assessment, management, and monitoring of ecosystems and ecosystem components. The ecoregion discussions presented in this PEIS follow the Level III ecoregion classification based on Omernik (1987) and refined through collaborations among EPA regional offices, state resource management agencies, and other federal agencies (EPA 2002).

Existing wind energy projects in the United States can be found in a variety of habitat types, including cultivated agriculture, native grasslands, shrub steppe, desert scrub, and forest (Erickson et al. 2002). The 11 western states in the study area encompass 34 ecoregions

(Figure 4.6.1-1), each of which supports a diverse flora. The number of ecoregions within any one state ranges from 5 in Nevada to 12 in California. The areal coverage of an ecoregion within any 1 state varies greatly among the 11 western states. In some states, ecoregions account for as little as 1 mi^2 (3 km^2) (e.g., the Puget Sound and Colorado Plateau ecoregions in Oregon and New Mexico, respectively [Table 4.6.1-1]). In contrast, the portion of the Central Basin and Range ecoregion within Nevada encompasses about 82,000 mi^2 (213,200 km^2). The general vegetation types that occur in the 34 ecoregions and the states in which the ecoregions occur are discussed in Appendix F.

4.6.2 Wildlife

As discussed in the previous section and Appendix F, the various ecoregions encompassed by BLM-administered lands include a diversity of plant communities and species which, in turn, provide a wide range of habitats that support diverse assemblages of terrestrial wildlife (Table 4.6.2-1). The specific species that may be associated with any particular wind energy development project will depend on the specific location of the project and on the plant communities and habitat present at the site. The following discussions present general descriptions of the wildlife species that may be affected by wind energy development projects on BLM-administered lands.

4.6.2.1 Amphibians and Reptiles

The 11 states in which wind energy development may occur on BLM-administered land support a wide variety of amphibians and reptiles (Table 4.6.2-1), some of which may occur at or in the vicinity of individual wind energy development projects. The number of amphibian species reported from these states ranges from as few as 12 species in Wyoming, upwards to 66 species in California. The amphibians reported from these states include frogs, toads, and salamanders that occupy a variety of habitats, including forested headwater streams in mountain regions, marshes and wetlands, and xeric habitats in the desert areas of the Southwest. The number of reptile species reported from these states ranges from 18 species from Montana, to 143 species reported from New Mexico (Table 4.6.2-1). The reptile species include a wide variety of turtles, snakes, and lizards.

4.6.2.2 Birds

Several hundred species of birds have been reported from the 11 western states where wind energy development may occur (Table 4.6.2-2). The fewest number of species have been reported from Idaho (270 species) and Nevada (283 species); more than 300 species have been reported from each of the other states, and 636 species from California (Grenfell et al. 2003). The coastal states (California, Oregon, and Washington) include oceanic species (e.g., boobies, gannets, frigate birds, fulmars, and albatrosses) that would not be expected to occur in areas of wind energy development. In each of the states, there are also a variety of species that, while

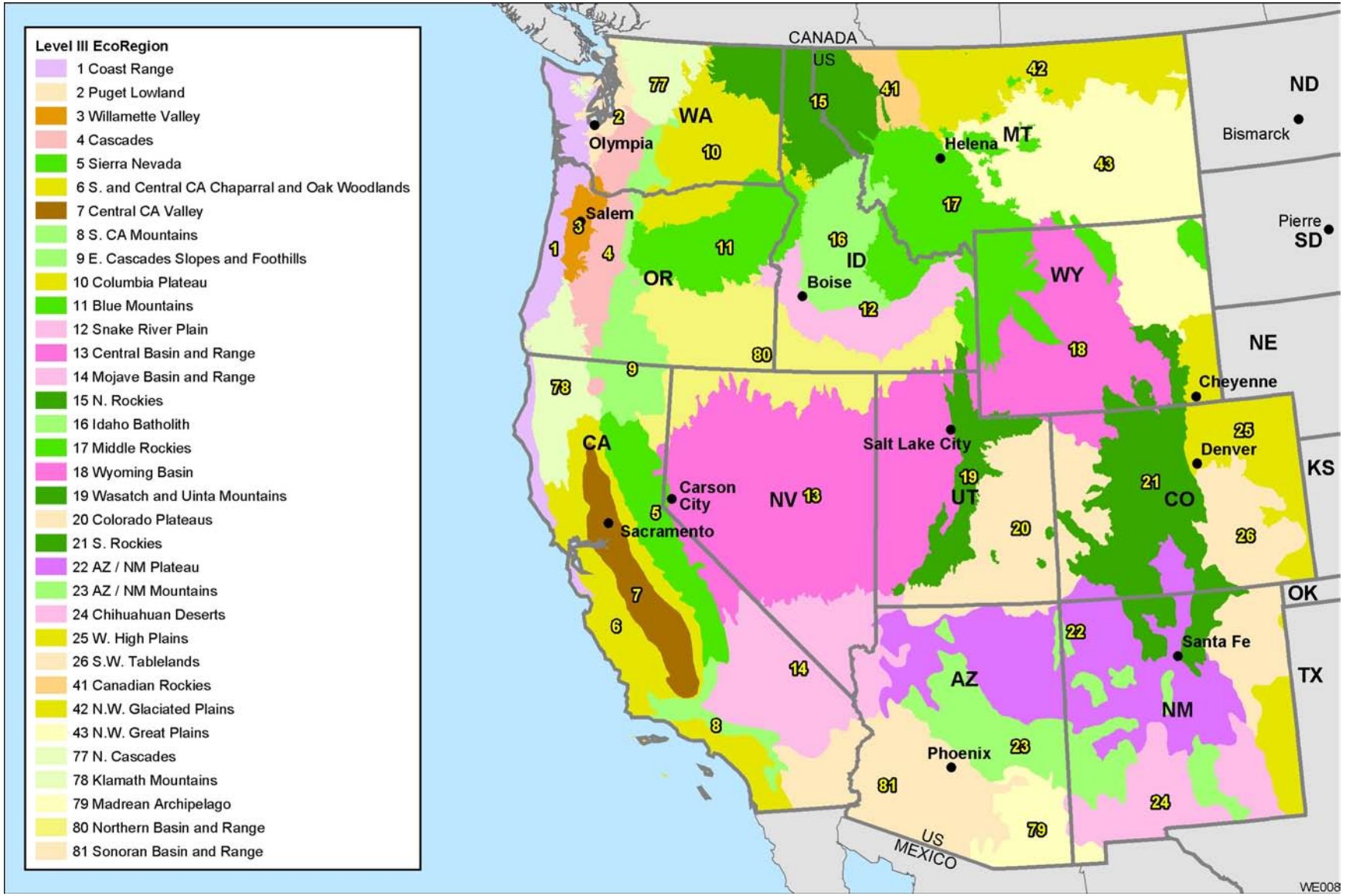

FIGURE 4.6.1-1 Ecoregions of the 11 Western States (Source: EPA 2002)

TABLE 4.6.1-1 Ecoregion Location and Coverage (mi^2) in the 11 Western States

Ecoregion Number and Name	Arizona	California	Colorado	Idaho	Montana	Nevada	New Mexico	Oregon	Utah	Washington	Wyoming
1. Coast Range	–[a]	5,014	–	–	–	–	–	9,037	–	6,607	–
2. Puget Lowland	–	–	–	–	–	–	–	1	–	6,351	–
3. Willamette Valley	–	–	–	–	–	–	–	5,335	–	413	–
4. Cascades	–	572	–	–	–	–	–	11,215	–	6,142	–
5. Sierra Nevada	–	19,976	–	–	–	386	–	–	–	–	–
6. Southern and Central California Chaparral and Oak Woodlands	–	38,657	–	–	–	–	–	–	–	–	–
7. Central California Valley	–	17,761	–	–	–	–	–	–	–	–	–
8. Southern California Mountains	–	6,916	–	–	–	–	–	–	–	–	–
9. Eastern Cascades Slopes and Foothills	–	7,967	–	–	–	–	–	10,561	–	3,161	–
10. Columbia Plateau	–	–	–	1,479	–	–	–	6,826	–	23,791	–
11. Blue Mountains	–	–	–	2,637	–	–	–	23,928	–	815	–
12 Snake River Plain	–	–	–	19,702	–	–	–	992	–	–	12
13. Central Basin and Range	–	5,303	–	545	–	82,060	–	–	31,765	–	–
14. Mojave Basin and Range	6,083	29,498	–	–	–	13,706	–	–	751	–	–
15. Northern Rockies	–	–	–	12,112	11,228	–	–	–	–	8,262	–
16. Idaho Batholith	–	–	–	21,230	2,045	–	–	–	–	–	–
17. Middle Rockies	–	–	–	10,430	30,408	–	–	–	–	–	19,582
18. Wyoming Basin	–	–	3,511	507	435	–	–	–	1,138	–	45,881
19. Wasatch and Unita Mountains	–	–	–	640	–	–	–	–	16,805	–	198
20. Colorado Plateaus	3,427	–	12,299	–	–	–	1	–	33,069	–	–
21. Southern Rockies	–	–	39,323	–	–	–	9,759	–	365	–	5,979
22. Arizona/New Mexico Plateau	31,196	–	5,179	–	–	43	37,474	–	–	–	–
23. Arizona/New Mexico Mountains	23,886	–	–	–	–	–	17,983	–	–	–	–
24. Chihuahuan Deserts	435	–	–	–	–	–	28,874	–	–	–	–
25. Western High Plains	–	–	23,878	–	–	–	10,250	–	–	–	6,825
26. Southwestern Tablelands	–	–	19,902	–	–	–	15,759	–	–	–	–
41. Canadian Rockies	–	–	–	–	7,267	–	–	–	–	–	–
42. Northwestern Glaciated Plains	–	–	–	–	37,018	–	–	–	–	–	–
43. Northwestern Great Plains	–	–	–	–	58,585	–	–	–	–	–	19,338
77. North Cascades	–	–	–	–	–	–	–	–	–	11,713	–
78. Klamath Mountains	–	12,702	–	–	–	–	–	6,039	–	–	–
79. Madrean Archipelago	14,658	–	–	–	–	–	1,436	–	–	–	–
80. Northern Basin and Range	–	2,309	–	14,273	–	14,367	–	22,953	1,002	–	–
81. Sonoran Basin and Range	34,199	10,899	–	–	–	–	–	–	–	–	–

[a] A dash indicates that an ecoregion is not present in the state.

Source: Modified from EPA (2002); see Figure 4.6.1-1 for ecoregion locations.

TABLE 4.6.2-1 Number of Wildlife Species in the 11 Western States

State	Amphibians	Reptiles	Mammals	Birds
Arizona	26	103	134	529
California	66	92	223	636
Colorado	18	49	130	473
Idaho	15	24	111	270
Montana	20	18	122	398
Nevada	16	54	128	283
New Mexico	39	143	274	550
Oregon	31	29	159	484
Utah	17	56	134	426
Washington	26	28	146	456
Wyoming	12	27	121	419

Sources: AGFD (2001); ASM (2004a,b); CDW (2004); Colorado Field Ornithologists (2004); Colorado Herpetological Society (2003); Grenfell et al. (2003); IFG (2004b); MNHP (2003a); NMDGF (2004); NNHP (2002a-d, 2004); Oregon Bird Records Committee (2003); Sonoran Audubon Society (2004); University of Oregon (2004); University of Washington (2000, 2001); Utah Conservation Data Center (2004a-c); Utah Ornithological Society (2004); Washington Ornithological Society (2002); WGFD (2004b).

reported, are considered transient, irregular visitors. These species occur only infrequently and are typically considered to be wayward individuals whose presence is due in part to storms or other weather conditions.

4.6.2.2.1 Migratory Routes. Many of the bird species identified from the 11 western states are seasonal residents within individual states and exhibit seasonal migrations. These birds include waterfowl, shorebirds, raptors, and neotropical songbirds. The 11 western states where wind energy development may occur on BLM-administered lands fall within two of the four major North American migration flyways (Lincoln et al. 1998) — the Central Flyway and the Pacific Flyway (Figure 4.6.2-1). Birds migrating north from wintering areas to breeding areas use these pathways in the spring, and birds migrating southward to wintering areas use them in the fall. Each flyway encompasses broad geographic areas and includes many specific routes and subroutes, the use of which varies by species. Consideration of these more specific routes will be an important parameter for identifying site-specific concerns related to migratory birds (see Section 5.9).

The Central Flyway includes the Great Plains-Rocky Mountain routes (Lincoln et al. 1998). These routes extend from the northwest Arctic coast southward between the Mississippi River and the Rocky Mountains, and encompass all or most of the states of

TABLE 4.6.2-2 Number of Bird Species, by Order, Occurring in the 11 Western States

Order	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
Gaviformes – Loons	4	5	4	7	1	2	4	5	4	5	4
Podicipediformes – Grebes	7	7	6	–[a]	6	5	6	6	6	6	6
Procellariiformes – Albatrosses, Fulmars, Shearwaters, Petrels, and Storm-Pertrels	5	31	–	–	–	–	1	19	–	18	–
Pelicaniformes – Tropic Birds, Boobies, Gannets, Pelicans, Cormorants, Anhingas, and Frigate Birds	10	16	6	2	2	3	6	6	4	8	3
Ciconiiformes – Bitterns, Herons, Egrets, Ibises, Spoonbills, and Storks	17	17	17	7	6	9	18	12	15	11	15
Ciconiiformes – Vultures	3	3	1	1	1	1	2	1	1	1	1
Anseriformes – Swans, Geese, Ducks	38	50	39	27	31	26	38	44	37	43	39
Falconiformes – Kites, Eagles, Hawks, and Osprey	22	18	18	11	11	11	21	14	18	14	14
Falconiformes – Caracaas and Falcons	6	6	6	4	5	4	6	6	3	7	6
Galliformes – Chachalacas, Pheasants, Grouse, Ptarmigan, Turkeys, and Quail	9	12	14	13	11	6	11	12	13	13	11
Gruiformes – Rails, Gallinules, Coots, Limpkins, and Cranes	8	9	10	5	6	6	8	6	6	5	8

TABLE 4.6.2-2 (Cont.)

Order	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
Charadriiformes – Auks, Murres	–	16	2	–	–	–	1	12	1	14	2
Columbiformes – Pigeons, Doves	8	9	7	2	2	4	8	4	8	5	7
Psittaciformes – Parrots	1	10	–	–	–	–	–	–	–	–	–
Cuculiformes – Cuckoos, Roadrunners, and Anis	4	4	4	1	2	2	4	1	3	2	2
Strigiformes – Owls	23	14	14	13	15	9	13	15	14	15	15
Caprimulgiformes – Nightjars	5	6	4	2	2	4	6	2	3	2	2
Apodiformes – Swifts	4	5	3	3	4	2	3	3	4	3	2
Apodiformes – Hummingbirds	18	12	10	4	5	6	16	8	8	6	7
Trogoniformes – Trogans	2	–	–	–	–	–	1	–	–	–	–
Coraciiformes – Kingfishers	2	1	1	1	1	1	1	1	1	1	1
Piciformes – Woodpeckers	15	17	12	10	10	12	14	14	12	13	14
Passeriformes – Flycatchers, Kingbirds, Phoebes	34	30	23	11	12	17	32	21	19	18	18
Passeriformes – Shrikes	2	3	2	2	2	2	2	2	2	2	2
Passeriformes – Vireos	12	12	10	4	4	5	12	8	9	5	6
Passeriformes – Jays, Crows	11	11	10	8	8	8	11	9	9	10	9
Passeriformes – Larks	1	2	1	1	1	1	1	1	1	2	1
Passeriformes – Swallows	8	8	7	6	6	7	9	7	7	7	7
Passeriformes – Chickadees, Titmice	5	5	3	5	4	3	5	5	3	4	3
Passeriformes – Verdin, Bushtits, and Wrentits	2	2	1	1	–	2	2	2	2	1	1
Passeriformes – Nuthatches and Creepers	4	4	4	4	4	4	4	4	4	4	4
Passeriformes – Wrens	8	8	8	6	6	7	9	6	7	6	8
Passeriformes – Dippers	1	1	1	1	1	1	1	1	1	1	1

TABLE 4.6.2-2 (Cont.)

Order	AZ	CA	CO	ID	MT	NV	NM	OR	UT	WA	WY
Passeriformes – Mockingbirds and Thrashers	9	10	7	11	4	5	8	5	8	4	4
Passeriformes – Starlings and Accentors	1	1	1	1	1	1	1	1	1	2	1
Passeriformes – Wagtails and Pipits	4	8	2	1	2	1	2	3	1	5	2
Passeriformes – Waxwings	2	2	2	2	2	2	2	2	2	2	2
Passeriformes – Silky Flycatchers	1	2	1	–[a]	–	1	1	1	1	–	–
Passeriformes – Wood Warblers	50	46	46	13	16	14	47	40	38	30	40
Passeriformes – Tanagers	5	4	4	1	1	3	4	3	3	2	4
Passeriformes – Towhees, Sparrows, and Longspurs	40	38	35	19	26	22	38	31	33	29	33
Passeriformes – Cardinals, Grosbeaks, Bunting, Dickcissel	11	10	10	3	4	8	10	7	7	5	8
Passeriformes – Blackbirds and Orioles	18	17	15	9	11	7	17	16	15	15	13
Passeriformes – Finches	12	16	14	11	14	7	14	16	15	11	17
Passeriformes – House Sparrow	1	1	1	1	1	1	1	1	1	1	1

[a] A dash indicates that the order has not been reported in the state.

Sources: Sonoran Audubon Society (2004); Grenfell et al. (2003); Colorado Field Ornithologists (2004); IFG (2004b); MNHP (2003a); NNHP (2002b); NMDGF (2004); Oregon Bird Records Committee (2003); Utah Ornithological Society (2004); Washington Ornithological Society (2002); WGFD (2004b).

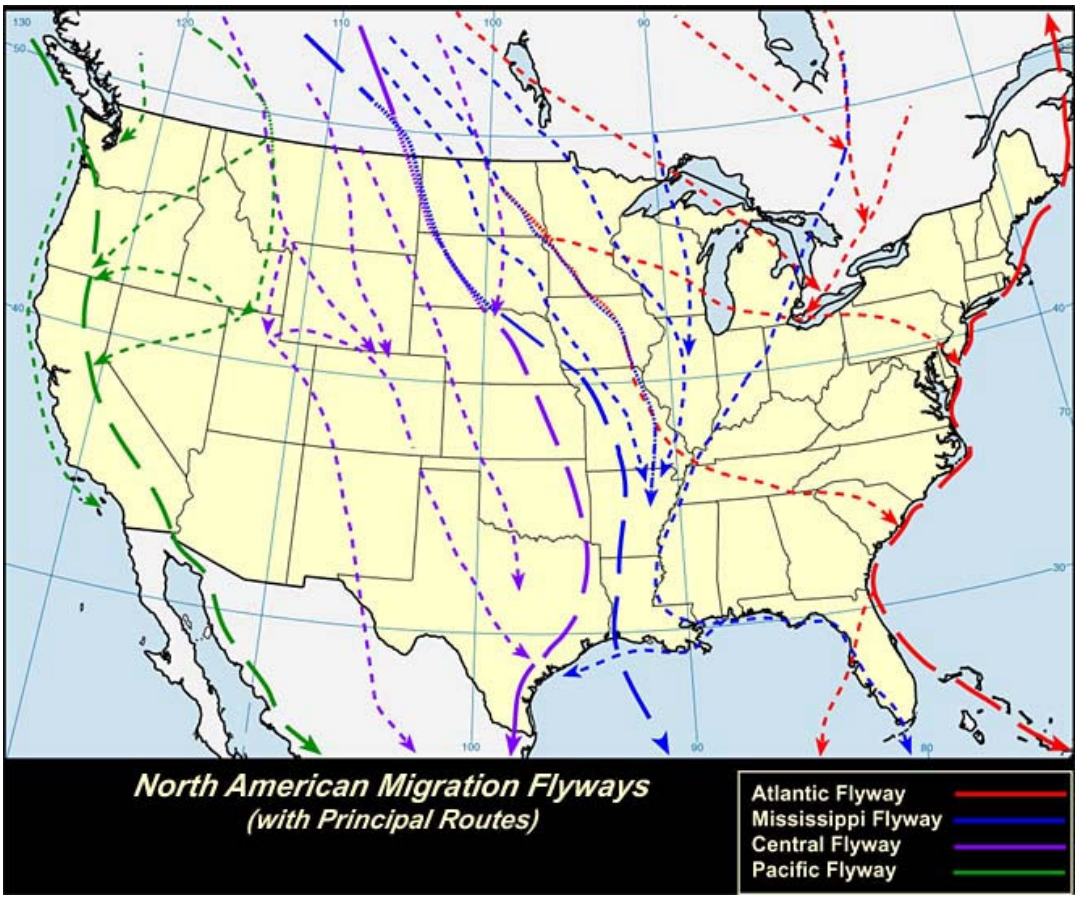

FIGURE 4.6.2-1 North American Migration Flyways (Used with permission of copyright@birdnature.com, April 14, 2004)

Wyoming, Colorado, and New Mexico, and portions of Montana, Idaho, and Utah (Figure 4.6.2-1). The westernmost route in Montana crosses the continental divide and passes through the Great Salt Lake Valley before turning eastward. This flyway is relatively simple; the majority of birds make relatively direct north and south migrations between northern breeding grounds and southern wintering areas.

The Pacific Flyway includes the Pacific Coast Route, which occurs between the eastern base of the Rocky Mountains and the Pacific coast of the United States. This flyway encompasses the states of California, Nevada, Oregon, and Washington, and portions of Montana, Idaho, Utah, Wyoming, and Arizona (Figure 4.6.2-1). Birds migrating from the Alaskan Peninsula follow the coastline to near the mouth of the Columbia River, then travel inland to the Willamette River Valley before continuing southward through interior California (Lincoln et al. 1998). Birds migrating south from Canada pass through portions of Montana and Idaho and then migrate either eastward to enter the Central Flyway, or turn southwest along the Snake and Columbia River valleys and then continue south across central Oregon and the interior valleys of California (Birdnature.com 2004). This route is not as heavily used as some of the other migratory routes in North America (Lincoln et al. 1998).

4.6.2.2.2 Waterfowl and Shorebirds. Waterfowl (ducks, geese, and swans) and shorebirds (plovers, sandpipers, and similar birds) represent two of the most abundant groups of birds reported from the 11 western states (Table 4.6.2-2). The number of reported waterfowl species ranges from 26 species from Nevada to 50 species from California; the number of reported shorebird species ranges from 11 species from Nevada to 63 species in California (Table 4.6.2-2). Many of these species exhibit extensive migrations from breeding areas in Alaska and Canada to wintering grounds in Mexico and southward (Lincoln et al. 1998). While many of these species nest in Canada and Alaska, a number of species, such as the avocet, willet, spotted sandpiper, gadwall, and blue-winged teal, also nest in many of the western states where similar habitats are present (National Geographic 1999). Most are ground-level nesters, and many forage in flocks (sometimes relatively large) on the ground or water.

4.6.2.2.3 Songbirds. Songbirds (also referred to as passerines or perching birds) of the order Passeriformes represent the most diverse category of birds; the warblers and sparrows represent the two most diverse groups of passerines (Table 4.6.2-2). The greatest number of warbler species are reported from California and Colorado (46 species each), New Mexico (47 species), and Arizona (50 species). These same states also have the greatest number of reported sparrow species, with 35 species from Colorado, 38 species from California and from New Mexico, and 40 species from Arizona (Table 4.6.2-2).

The passerines exhibit a wide range of seasonal movements; some species are year-round residents in some areas and migratory in others, and still other species migrate hundreds of miles or more (Lincoln et al. 1998). Nesting occurs in vegetation from near ground level to the upper canopy of trees. Some species, such as the thrushes and chickadees, are relatively solitary throughout the year, while others such as swallows and blackbirds, may occur in small to large flocks at various times of the year. Foraging may occur in flight (i.e., swallows and swifts), in vegetation, or on the ground (i.e., warblers, finches, thrushes).

4.6.2.2.4 Gallinaceous Birds. Gallinaceous birds (sometimes referred to as upland gamebirds) of the order Galliformes include grouse, turkeys, pheasants, quail, and prairie-chickens. The number of species of gallinaceous birds in the 11 western states ranges from 6 in Nevada, 9 in Arizona, and between 11 to 14 species in the other 9 states (Table 4.6.2-2). All of the gallinaceous birds within the 11 western states are year-round residents. They are ground-dwelling birds, and their flight is generally brief but strong. The males perform elaborate courting displays, which for some species occur yearly at the same strutting grounds, known as leks (National Geographic 1999).

A number of the western gallinaceous bird species inhabit forested or open forest habitats; these species include the wild turkey (*Meleagris gallopavo*), ruffed grouse *(Bonasa umbellus*), spruce grouse (*Falcipennis canadensis*), blue grouse (*Dendragapus obscurus*), and California quail (*Callipepla californica*). The gallinaceous bird species that inhabit sagebrush, prairies, and grasslands include the lesser prairie-chicken (*Tympanuchus pallidicinctus*), sharp-tailed grouse (*Tympanuchus phasianellus*), Gunnison sage-grouse (*Centrocercus*

minimus), and greater sage-grouse (*Centrocercus urophasianus*). The last two species are often discussed together and referred to as simply sage-grouse.

4.6.2.2.5 Birds of Prey and Vultures. The birds of prey include the raptors (hawks, falcons, eagles, kites, osprey), owls, and vultures, and many of these species represent the top avian predators in many ecosystems. The number of species of raptors ranges from 15 species reported from Idaho and Nevada, to 27 species reported from New Mexico and 28 species reported from Arizona (Table 4.6.2-2). Common species include the sharp-shinned hawk, red-tailed hawk, northern harrier, Swainson's hawk, American kestrel, and the golden eagle. The number of species of owl ranges from 9 from Nevada to 23 from Arizona, with most states reporting 13 or more species (Table 4.6.2-2); these include the great horned owl, short-eared owl, and burrowing owl. The raptors and owls vary considerably among species with regard to their seasonal migrations; some species are nonmigratory (year-round residents), others are migratory in the northern portions of their ranges and nonmigratory in the southern portions of their ranges, and still other species are migratory throughout their ranges.

The raptors forage on a variety of prey, including small mammals, reptiles, other birds, fish, invertebrates, and at times, carrion. They typically perch on trees, utility posts, highway signs, and other high structures that provide a broad view of the surrounding topography; they may soar for extended periods of time at relatively high altitudes. These raptors forage from either a perch or on the wing (depending on the species), and all forage during the day. The owls also perch on elevated structures and forage on a variety of prey, including mammals, birds, and insects. Forest-dwelling species typically forage by diving on a prey item from a perch, while open country species hunt on the wing while flying low over the ground. While generally nocturnal, some owl species may be active during the day (Owl Research Institute 2004).

The vultures are represented by three species; the turkey vulture, which occurs in each of the western states; the black vulture, which is reported from Arizona, California, and New Mexico; and the endangered California condor, reported from Arizona and California. These birds are large soaring scavengers that feed on carrion.

4.6.2.2.6 Regulatory Framework for Protection of Birds. The regulatory framework for protecting birds includes the ESA, the MBTA, Bald and Golden Eagle Protection Act of 1940 (BEPA), and E.O. 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds" (U.S. President 2001). The ESA is discussed in Section 4.6.5.1; the other regulations are discussed below:

- The MBTA implements a variety of treaties and conventions among the United States, Canada, Mexico, Japan, and Russia. This treaty makes the take, killing, or possession of migratory birds, their eggs, or nests unlawful, except as authorized under a valid permit. ("Take" includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb.) Most of the bird species reported from the 11 western states are classified as migratory under

this act. The USFWS maintains a list of migratory birds protected by the MBTA (USFWS 2004c).

- The BEPA provides for the protection of both bald and golden eagles by prohibiting the take, possession, sale, purchase, barter, offer to sell, purchase or barter, transport, export or import, of any bald or golden eagle, alive or dead, including any part, nest, or egg, unless allowed by permit.

- Under E.O. 13186, each federal agency that is taking an action that has or is likely to have negative impacts on migratory bird populations must work with the USFWS to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions.

4.6.2.3 Mammals

More than 100 species of mammals have been reported from each of the 11 western states where wind energy development may occur on BLM-administered lands; some of these species may be present at or in the vicinity of areas of potential wind energy development. The greatest number of mammal species has been reported from New Mexico (274) and the fewest from Idaho (111). Game species include squirrel, deer, elk, antelope, and bear, while a number of species such as the mustelids (mink), beaver, and fox are trapped for their fur. Nongame species include a wide variety of mice, moles, and shrews.

The coastal states of California, Oregon, and Washington also support a variety of marine mammals, including seals, dolphins, and whales. These species would not be affected by wind energy development projects on BLM-administered lands.

One group of mammals that may be especially affected by wind energy development projects are the bats (Erickson et al. 2002). The bats that occur in the western United States may overwinter in caves, mines, or hollow trees, and in summer roost in similar habitats as well as in man-made structures (e.g., buildings and bridges) (Harvey et al. 1999). Several species migrate up to 800 mi (1,300 km) from winter roosts in Mexico to caves in the southwestern United States. Bats are primarily nocturnal, although some species fly early in the evening (sometimes before sunset); occasionally, they will fly during daylight hours (Harvey et al. 1999).

The number of bat species reported from each of the states ranges from 14 species in Idaho to 28 in Arizona (Table 4.6.2-3). Four families of bats occur in the United States (Bat Conservation International 2002a), and of the 11 western states with BLM-administered lands, only Arizona has reported bat species from all four families. In contrast, all bat species reported from Idaho, Montana, and Washington belong to the same family, Vespertilionidae (the vesper bats).

The vesper bats represent the majority of bat species reported from the 11 western states (Table 4.6.2-3) and are also the most widespread of the bats. Twenty-five species of vesper bats

TABLE 4.6.2-3 Number of Bat Species, by Family, in the 11 Western States

State	Phyllostomidae (Leaf-nosed bats)	Vespertilionidae (Vesper bats)	Molossidae (Free-tailed bats)	Mormoopidae (Ghost-faced bats)
Arizona	3	19	5	1
California	2	18	4	–[a]
Colorado	–	16	2	–
Idaho	–	14	–	–
Montana	–	15	–	–
Nevada	2	17	3	–
New Mexico	3	21	3	–
Oregon	–	14	1	–
Utah	–	16	2	–
Washington	–	15	–	–
Wyoming	–	15	1	–

[a] A dash indicates that no species of the family has been reported from that state.

Sources: ASM (2004a,b); Bat Conservation International (2002b,c); CDW (2004); Grenfell et al. (2003); IFG (2004b); NNHP (2002c); NMDGF (2004); Utah Conservation Data Center (2004c); WGFD (2004b).

have been reported from the western states; 13 species have been reported from each of the 11 western states. Species include pallid bat, big brown bat, little brown myotis, and hoary bat (Table 4.6.2-4). The Vesper bats roost in rocky crevices, buildings, and trees (under bark or in foliage) (Harvey et al. 1999). These bats are insectivores and typically forage after sunset.

Four species of leaf-nosed bats have been reported from only 4 of the 11 western states; California, Arizona, New Mexico, and Nevada. These species are the Mexican long-tongued bat, the lesser long-nosed bat, the California leaf-nosed bat, and the long-nosed bat (Table 4.6.2-4). The leaf-nosed bats inhabit caves, mines, buildings, bridges, culverts, and occasionally trees. These bats generally emerge in late evening, with some species foraging on fruit, nectar, and pollen, and others on insects (Harvey et al. 1999).

Five species of free-tailed bats have been reported from the western states (Table 4.6.2-4), with one species reported from eight states and another species from six states. The free-tailed bats typically roost in trees and high crevices (such as under roof shingles, bridges, and caves), and many species need to drop 26 to 33 ft (8 to 10 m) from a roost before they can fly. Some species, such as the greater mastiff bat, may fly up to 990 ft (300 m) above ground (Harvey et al. 1999). The free-tailed bats feed on insects.

Only one species of ghost-faced bats has been reported from the western states, and this species (Peter's ghost-faced bat, *Mormoops megalophylla*) has been reported only from Arizona (Bat Conservation International 2002b). This bat usually occurs in lowland areas, roosting in

TABLE 4.6.2-4 Bat Species Reported from the 11 Western States

Phyllostomidae (Leaf-nosed bats)	Vespertillionidae (Vesper bats)	Molossidae (Free-tailed bats)	Mormoopidae (Ghost-faced bats)
Mexican long-tongued bat	Western red bat	Greater bonneted bat (greater mastiff bat)	Ghost-faced bat
Lesser long-nosed bat	Eastern red bat	Underwood's bonneted bat (mastiff bat)	
California leaf-nosed bat	Pallid bat	Pocketed free-tailed bat	
Long-nosed bat	Townsend's big-eared bat	Big free-tailed bat	
	Big brown bat	Mexican (Brazillian) free-tailed bat	
	Spotted bat		
	Allen's big-eared bat		
	Silver-haired bat		
	Desert red bat		
	Red bat		
	Hoary bat		
	Western yellow bat		
	Southwestern myotis		
	Keen's myotis		
	Northern long-eared myotis		
	California myotis		
	Western small-footed myotis		
	Long-eared myotis		
	Little brown bat		
	Fringed myotis		
	Cave myotis		
	Long-legged myotis		
	Yuma myotis		
	Western pipistrelle		
	Eastern pipistrelle		

Sources: ASM (2004a,b); Bat Conservation International (2002b,c); CDW (2004); Grenfell et al. (2003); IFG (2004b); NNHP (2002c); NMDGF (2004); Utah Conservation Data Center (2004c); WGFD (2004b).

caves and mine shafts and occasionally buildings; this bat emerges in late evening and feeds on insects (Harvey et al. 1999).

4.6.3 Aquatic Biota and Habitats

The 11 western states contain a variety of aquatic habitats, which in turn support a wide diversity of aquatic biota. These habitats include small desert springs in the southwest that support unique and endemic fish species such as the desert pupfish; the blue ribbon trout waters of the Colorado, Green, and Snake Rivers; thousands of lakes and reservoirs; the salmon rivers of California, Oregon, and Washington; and the coastal marine habitats of the Pacific coast. Sport fish throughout the 11 western states include a variety of species, including trout and salmon, catfish, sunfish, bass, suckers, perch, walleye, and pike. Nonsport fish include numerous species of minnows, shiners, dace, and other species. In addition to the fish, the aquatic habitats

also support a tremendous variety of aquatic invertebrates, including molluscs, crustaceans, and insects.

4.6.4 Wetlands

Wetlands are considered a valuable ecological resource because of their important roles in providing fish and wildlife habitat, maintaining water quality, and flood control. Total wetland area present within any 1 of the 11 western states, on the basis of estimates from the 1980s, ranges from about 236,349 acres (95,688 ha) in Nevada to 1,393,900 acres (564,332 ha) in Oregon (Table 4.6.4-1). These estimates represent less than 2.5% of the total surface area of any of the 11 western states, and for six of the states less than 1% of the total state surface area. As throughout the United States, wetlands in the western states have experienced a major decline in abundance because of human disturbance, ranging from 27% in Montana to 91% in California (Table 4.6.4-1).

4.6.5 Threatened and Endangered Species

The western states encompassed by this PEIS provide habitat that supports hundreds of species of plants and animals that are threatened, endangered, or of special concern at the national, regional, and state level. Some of these species and their habitats may occur in BLM-administered lands and surrounding areas identified as potentially suitable for wind energy development.

4.6.5.1 Species Listed under the Endangered Species Act

The ESA was passed in 1973 to address the decline of fish, wildlife, and plant species in the United States and throughout the world. The purpose of the ESA is to conserve "the ecosystems upon which endangered and threatened species depend" and to conserve and recover listed species (ESA 1973; Section 2). The law is administered by the USFWS and the Commerce Department's National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the NMFS is primarily responsible for marine species such as salmon and whales.

Under the law, species may be listed as either "endangered" or "threatened." The ESA defines an endangered species as any species that is in danger of extinction throughout all or a significant portion of its range (ESA 1973; Section 3(6)). A threatened species is one that is likely to become an endangered species within the foreseeable future throughout all or a significant part of its range (ESA 1973; Section 3(20)). All species of plants and animals, except pest insects, are eligible for listing as endangered or threatened. The ESA also affords protection to "critical habitat" for threatened and endangered species. Critical habitat is defined as the specific areas within the geographical area occupied by the species at the time it is listed, on which are found physical or biological features essential to the conservation of the species and

TABLE 4.6.4-1 General Status of Wetlands in the 11 Western States

State	Total Wetland Acres (1980s estimate)	Current Wetland Status	Wetland Loss (%) (1780s to 1980s)
Arizona	600,000 (242,915 ha)	Wetlands cover < 1% of the state; most extensive wetlands are in riparian zones.	36
California	454,000 (183,806 ha)	Wetlands cover < 1% of the state; significant economic and environmental value; provide water quality maintenance, flood and erosion control, prevention of saltwater intrusion, and wildlife habitat.	91
Colorado	999,999 (404,858 ha)	Wetlands cover about 1.5% of the state; occur in all areas of the state; include forested wetlands, marshes, alpine snow glades, and wet and salt meadows.	50
Idaho	385,700 (156,154 ha)	Wetlands cover < 1% of the state.	56
Montana	840,298 (340,202 ha)	Wetlands cover < 1% of the state.	27
Nevada	236,349 (95,688 ha)	Wetlands cover < 1% of the state; among the most economically and ecologically valuable state lands; provide flood, erosion control, water quality improvement, and wildlife habitat; desert wetlands include playa lakes and riparian areas; mountain wetlands include fens and glacial lake areas.	52
New Mexico	481,899 (195,101 ha)	Wetlands cover < 1% of the state, most in the east and north; wetland types include forested wetlands, bottom land shrublands, marshes, fens, alpine snow glades, wet and salt meadows, shallow ponds, and playa lakes; riparian and playa lake wetlands are especially important to migratory waterfowl and wading birds.	33
Oregon	1,393,875 (564,332 ha)	Wetlands cover about 2.2% of the state; about 86% freshwater wetlands and 14% tidal wetlands; freshwater wetlands support about one-third of the vertebrate wildlife species in the state.	38
Utah	558,000 (225,911 ha)	Wetlands cover about 1% of the state; include the shallows of small lakes, reservoirs, ponds, and streams, riparian wetlands, marshes, wet meadows, mud and salt flats, and playas; largest wetlands in the state surround Great Salt Lake.	30

TABLE 4.6.4-1 (Cont.)

State	Total Wetland Acres (1980s estimate)	Current Wetland Status	Wetland Loss (%) (1780s to 1980s)
Washington	938,000 (379,757)	Wetlands cover about 2.1% of the state.	31
Wyoming	1,250,000 (506,073 ha)	Wetlands cover about 2% of the state; most diverse ecosystems in the state; Bear River wetland is one of the most productive and diverse bird habitats in the state.	38

Sources: Dahl (1990); Yuhas (1997); Oregon Wetlands Joint Venture (2002).

which may require special management considerations or protection (ESA 1973; Section 3(5)(A and B)). Except when designated by the Secretary of the Interior, critical habitat does not include the entire geographical area that can be occupied by the threatened or endangered species (ESA 1973; Section 3(5)(C)).

Some species may also be candidates for listing (ESA 1973; Section 6(d)(1) and Section 4(b)(3)). The USFWS defines proposed species as any species that is proposed in the *Federal Register* to be listed under Section 4 of the ESA; while candidate species are those for which the USFWS has sufficient information on their biological status and threats to propose them for listing as endangered or threatened under the ESA, but for which development of a listing regulation is precluded by other higher priority listing activities (USFWS 2004a). The NMFS defines candidate species as those proposed for listing as either threatened or endangered or whose status is of concern, but for which more information is needed before they can be proposed for listing. Candidate species receive no statutory protection under the ESA, but by definition these species may warrant future protection under the ESA.

Currently, 1,265 plant and animal species are listed as threatened or endangered under the ESA (USFWS 2004b). The 11 western states where BLM-administered lands may be suitable for wind energy development support 657 listed species, composed of 389 endangered species and 268 threatened species. Among the western states, Montana and Wyoming have the fewest listed species (15 each), while California has the greatest number of species (310) (Table 4.6.5-1).

Table 4.6.5-2 provides a summary of the number of threatened and endangered plants, invertebrates, fish, and wildlife present in each of the 11 western states. For most states, plants and fish represent the categories with the most listed species. For example, plants account for more than 50% of the listed species in California, Utah, and Wyoming, and for more than 30% of all listed species in the other states (Table 4.6.5-2). Fish account for 30% or more of all listed species in Arizona, New Mexico, Nevada, Oregon, and Washington. While some of the listed species, such as the marine mammals and sea turtles, would not occur at locations where wind energy development may take place on BLM-administered lands, other species may be present in areas where wind energy development is possible.

TABLE 4.6.5-1 Number of Threatened, Endangered, and Candidate Species as Designated under the Endangered Species Act in the 11 Western States

State	Endangered	Threatened	Candidate
Arizona	36	19	11
California	210	100	11
Colorado	16	15	11
Idaho	9	14	4
Montana	6	9	5
Nevada	22	15	5
New Mexico	23	16	10
Oregon	22	26	8
Utah	24	19	10
Washington	14	27	12
Wyoming	7	8	3

4.6.5.2 BLM Listed Species

On the lands that it administers, the BLM is required to manage plant and wildlife species that are listed or proposed under the ESA, which has nine sections containing requirements or authorizations that apply to the BLM (ESA Sections 2, 4, 5, 6, 7, 9, 10, 11, and 18). These are addressed in the BLM Manual titled *6840 — Special Status Species Management* (BLM 2001), which establishes Special Status Species policy for plant and animal species and the habitats on which they depend. The Special Status Species policy refers not only to species listed under the ESA, but also to those designated by the State Director as Sensitive. BLM Manual 6840 defines a sensitive species as a species that could easily become endangered or extinct in the state.

Criteria in BLM Manual 6840 for designating a species as sensitive are as follows:

1. The species is under ESA status review by the USFWS or NMFS;

2. The numbers of individuals of the species are declining so rapidly that federal (ESA) listing may become necessary;

3. The species has typically small or widely dispersed populations; or

4. The species inhabits an ecological refugium or other specialized or unique habitat.

TABLE 4.6.5-2 Number of Species, by Taxonomic Category, Listed as Threatened or Endangered under the Endangered Species Act in the 11 Western States

State	Plants	Invertebrates	Fish	Amphibians	Reptiles	Mammals	Birds
Endangered							
Arizona	12	1	10	1	–[a]	8	4
California	134	25	14	8	3	18	8
Colorado	6	1	4	–	–	2	3
Idaho	–	5	2	–	–	1	1
Montana	–	–	2	–	–	1	3
Nevada	2	1	17	1	1	–	1
New Mexico	7	3	6	–	–	4	3
Oregon	11	1	5	–	1	2	2
Utah	11	2	7	–	–	2	2
Washington	4	–	3	–	1	4	2
Wyoming	1	–	3	1	–	1	1
Threatened							
Arizona	7	–	7	1	2	–	2
California	45	6	13	1	7	3	6
Colorado	7	1	1	–	–	3	3
Idaho	4	1	4	–	–	4	1
Montana	3	–	1	–	–	3	2
Nevada	6	1	5	–	–	1	1
New Mexico	6	–	6	1	1	–	2
Oregon	7	2	9	–	2	2	4
Utah	13	–	1	–	1	2	2
Washington	6	1	11	–	1	4	4
Wyoming	3	–	–	–	–	4	1
Candidate							
Arizona	3	4	1	1	1	–	1
California	8	1	–	–	–	1	1
Colorado	5	–	1	1	–	1	3
Idaho	1	–	–	1	–	1	1
Montana							
Nevada	2	–	–	2	–	–	1
New Mexico	–	4	1	–	2	1	2
Oregon	2	1	–	2	–	1	2
Utah	5	3	–	–	–	–	2
Washington	5	1	–	1	–	2	3
Wyoming	–	–	1	–	–	1	1

[a] A dash indicates no species are listed in that category.

Source: USFWS (2004b).

Under BLM Manual 6840, the BLM is required to use other agencies' lists (such as threatened and endangered lists, watch lists, and species of concern lists issued by various state and federal agencies; see Section 4.6.5.3). For example, the BLM Utah State Office currently uses the Utah Division of Wildlife Resources sensitive animals list as the BLM list.

The number of sensitive species varies among the 11 western BLM State Offices (Table 4.6.5-3). Similarly, which species may occur at a wind energy development project would depend on the particular state in which the project is located, the species list for that state, and the specific location (and associated habitats) of the proposed project, and would need to be addressed in the site-specific environmental analysis.

4.6.5.3 State Listed Species

Each of the 11 western states also has species identified that are of state concern. Some species are listed per a specific definition and afforded protection and/or management under a state regulation. Other species are on some form of watch list; these species are tracked with regard to their abundance and distribution within a state by organizations, such as the state Natural Heritage Program. Table 4.6.5-4 summarizes the numbers of species, within broad taxonomic categories, that are listed within each of the 11 western states. The species that occur

TABLE 4.6.5-3 Number of BLM-Designated Sensitive and Special Status Species in the 11 Western States[a]

State	Plants[b]	Invertebrates	Fish	Amphibians	Reptiles	Mammals	Birds
Arizona	75	21	5	–[c]	16	14	6
California	423	17	3	10	11	17	7
Colorado	81	1	13	5	7	6	13
Idaho	161	21	22	8	7	29	50
Montana	127	–	9	1	2	13	21
Nevada	106	72	25	3	6	31	33
New Mexico	67	11	13	4	6	30	9
Oregon	NA[d]	NA	NA	NA	NA	NA	NA
Utah	100	27	22	4	13	17	18
Washington	NA	NA	NA	NA	NA	NA	NA
Wyoming	38	–	8	4	1	9	15

[a] Those taxa considered sensitive or of special status by the BLM State Office occurring on BLM-administered lands.

[b] For some states, the "Plants" category includes vascular plants, lichens, mosses, bryophytes, and fungi.

[c] A dash indicates no "sensitive or special status" species listed.

[d] NA = information not available.

Sources: AGFD (2003); BLMCA (2004); BLMCO (2000); BLMID (2004); BLMNV (2003); BLMUT (2003); BLMWY (2002), MNHP (2003a,b); NMRPTC (2004); NMDGF (2003); UDWR (1998).

TABLE 4.6.5-4 Number of Species Listed as Threatened, Endangered, Sensitive, or of Special Status under Individual State Classifications in the 11 Western States[a]

State	Plants	Invertebrates	Fish	Amphibians	Reptiles	Mammals	Birds
Arizona	458	40	30	11	34	41	71
California	222	3	19	8	8	17	24
Colorado	647	2	23	7	10	13	19
Idaho	316	–[b]	16	4	4	19	20
Montana	550	83	27	10	11	31	79
Nevada	319	162	64	5	4	28	23
New Mexico	150	87	36	9	23	81	73
Oregon	828	235	68	22	11	41	88
Utah	1,241	27	22	4	13	17	18
Washington	288	25	45	10	8	37	41
Wyoming	505	–	30	12	17	59	97

[a] For specific listing categories and definitions, see AGFD (2003); CDFG (2004a,b); CDW (2003); CNHP (2004); IFG (2004a,b); MNHP (2003a,b); NMDGF (2003); NMNHP (2003); NMRPTC (2004); NNHP (2004); ONHP (2001); UDWR (1998, 2003); WDFW (2004); WDNR (2003a,b); WYNDD (2003).

[b] A dash indicates no "sensitive or special status" species listed.

on BLM-administered lands and that may be affected by a specific wind energy development project would depend upon the location of that particular project, and would need to be addressed in the site-specific environmental analysis.

4.7 LAND USE

This section describes the wide range of typical land uses that may occur on BLM-administered lands that have the potential for wind energy development over the next 20 years. It also describes possible land use on adjacent lands.

4.7.1 Management of BLM-Administered Lands

The BLM manages lands within the 11 western states for a variety of land uses, including recreation, conservation, mining, oil and gas leasing, cattle grazing, communication sites, and ROW corridors (e.g., for roads, transmission lines, and pipelines) (BLM 2003 a-j). BLM-administered lands are managed within a framework of numerous laws, the most comprehensive of which is the FLPMA. The FLPMA established the "multiple use" management framework for public lands, the principal tenets of which are that no single resource or use of public lands would dominate. It is the mission of BLM to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations (BLM 2000).

Under the multiple use framework, BLM's management responsibilities include:

- Recreation opportunities, including interpretation and other visitor education activities;
- Commercial activities, including energy and mineral development and timber sales;
- Wild free-roaming horses and burros;
- Paleontological, archaeological, and historic sites;
- Fish and wildlife habitat;
- Transportation systems, including roads, trails, and bridges;
- Wilderness Areas and Wild and Scenic Rivers;
- Rare and vulnerable plant communities; and
- Public land survey system (BLM 2000).

In managing these responsibilities, the BLM is faced with a number of challenges to address impacts associated with the following:

- *Community growth.* The BLM needs to increase demands for conservation of open space, community expansion and ROWs, sales and permits for sand and gravel, access for recreation, dedication of habitat for special status species, and fire and resource management activities associated with the wildland/urban interface.
- *Sustainable resource decisions.* The BLM needs to enhance its information base on resource assessments, land use plans, and environmental impact analyses to reflect changing resource conditions and emerging demands on the public lands.
- *Special areas.* The BLM must assess the condition of these areas (see Section 4.7.4 for a discussion of the special areas), identify emerging threats, and initiate critical management to protect these at-risk assets.
- *Energy and minerals.* Development of these resources requires new resource assessments, land use plans, and environmental impact assessments to ensure that they are sustainable over time.
- *Habitat conservation.* The BLM must manage the use of public lands for livestock grazing, timber harvesting, and recreation to ensure that the burden

of conserving the recovery of many special status species falls on the public lands and not on adjacent private lands.

- *Safe visits.* The BLM must maintain buildings, recreation and administrative sites, trails, roads, bridges, dams, and other sites in a way that ensures the public's protection (BLM 2000).

Table 4.7.1-1 provides a summary of BLM-administered lands, BLM-administered minerals underlying federal surface lands, Tribal lands where the BLM has trust responsibility for mineral operations, and subsurface mineral estates underlying private or state trust land within each of the 11 western states.

Commercial use activities on BLM-administered lands include livestock grazing; timber sales; oil, gas, geothermal, and coal production; mineral exploration and mining; and ROWs. Table 4.7.1-2 summarizes the best available information on the acreage of commercial use activities for each of the 11 western states for fiscal year (FY) 2002. No acreage was available related to mineral materials (salable) and exploration and mining activities (locatables) for any of the 11 western states. Other commercial uses occur on BLM-administered lands (e.g., guides and outfitters and special uses, such as filming); however, a summary of these uses for the 11 western states was not available.

TABLE 4.7.1-1 Overview of Surface and Subsurface Lands Managed and Administered by the BLM within the 11 Western States (millions of acres)[a]

State	Surface Land	Subsurface Mineral Estates Underlying Federal Surface Lands	Tribal Lands Where the BLM Has Trust Responsibility for Mineral Operations	Subsurface Mineral Estates Underlying Private or State Trust Land
Arizona	11.7	33.0	20.7	3.0
California	15.0	47.0	0.6	2.5
Colorado	8.4	27.1	0.8	5.9
Idaho	11.9	37.0	0.6	1.8
Montana	8.0	27.5	5.5	11.7
Nevada	47.8	56.1	1.2	0.2
New Mexico	13.4	36.0	8.4	9.5
Oregon	16.1	34.2	0.8	1.7
Utah	22.9	33.9	2.3	1.2
Washington	0.4	11.6	2.6	0.3
Wyoming	18.4	30.9	1.9	12.2
Total	174.0	374.3	45.4	50.0

[a] Values provided are in millions of acres. To covert to millions of hectares, multiply by 0.4.

Source: BLM (2003a-j).

TABLE 4.7.1-2 Commercial Use Activity on BLM-Administered Lands in the 11 Western States, FY 2002

State	Commercial Use Activity						
	Grazing Permits (acres)[a]	Timber Sales (acres harvested)	Oil and Gas Leasing (acres in producing status)	Geothermal Production (acres in producing leases)	Coal Production (acres in producing leases)	Nonenergy Leasables (acres under lease)	ROWs (acres)
Arizona	11,418,083	–[b]	–	–	–	4	315,522
California	8,154,155	318	70,361	14,720	–	36,772	216,410
Colorado	7,776,251	27	1,317,236	–	95,095	21,762	181,916
Idaho	11,794,600	1,973	–	–	–	43,274	285,082
Montana	8,161,031	674	1,036,098	–	44,681	1,409	243,382
Nevada	45,689,898	–[b]	15,338	16,640	–	1,560	624,861
New Mexico	12,496,682	–	4,058,953	1,280	60,784	136,396	402,266
Oregon/Washington	13,753,942	23,993	–	–	521	–	2,504,191
Utah	22,069,893	–	895,482	3,840	116,854	87,117	392,048
Wyoming	17,643,076	–	3,580,113	–	192,309	84,286	316,073
Total	158,957,611	26,985	10,973,581	36,480	510,244	412,580	5,481,750

[a] To convert to hectares, multiply by 0.4047.

[b] A dash indicates that the data were not available.

Sources: BLM (2003a-j); Stamm (2004).

Commercial land uses have had varying impacts on the environmental conditions of western lands. For example, grasslands, riparian areas, and other habitats have been greatly influenced by grazing operations. In FY 2002, there were 12.7 million animal unit months[3] allocated on BLM-administered lands in the 11 western states (BLM 2003a-j). Oil and gas leasing, coal production, and mineral extraction also have major impacts, at least locally, on the environment. In FY 2002, more than 390 million tons (354 million metric tons [t]) of coal was mined on BLM-administered lands (BLM 2003a-j). ROWs can also have a major impact by eliminating, fragmenting, and altering existing land conditions. In FY 2002, more than 3,100 new ROWs were authorized on BLM-administered lands within the 11 western states (BLM 2003a-j).

4.7.2 Aviation Considerations

A general air navigation concern is associated with tall structures. Therefore, there could be siting concerns relative to the locations of airports and flight patterns and air space associated with the airports because of the turbines and meteorological towers located at wind energy projects. The FAA has to be contacted for any proposed construction or alteration of objects that may affect navigable airspace within any of the following categories:

- Proposed objects more than 200 ft (61 m) above ground level at the structure's proposed location;
- Within 20,000 ft (6,096 m) of an airport or seaplane base that has at least one runway longer than 3,200 ft (975 m), and the proposed object would exceed a slope of 100:1 horizontally from the closest point of the nearest runway;
- Within 10,000 ft (3,048 m) of an airport or seaplane base that does not have a runway more than 3,200 ft (975 m) in length, and the proposed object would exceed a 50:1 horizontal slope from the closest point of the nearest runway; and/or
- Within 5,000 ft (1,524 m) of a heliport and the proposed object would exceed a 25:1 horizontal slope from the nearest landing and takeoff area of that heliport (FAA 2000).

The FAA could recommend marking and/or lighting a structure that does not exceed 200 ft (61 m) above ground level, or that is not within the distances from airports or heliports mentioned above, because of its particular location (FAA 2000).

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3 An animal unit month, or AUM, is a standardized unit of measurement of the amount of forage necessary for 1 animal for the period of 1 month (an animal is defined as 1 cow and calf, 1 steer, or 5 sheep). Grazing privileges are measured in terms of AUMs.

The numbers of public airports that occur in each of the 11 western states are as follows: Arizona – 82, California – 263, Colorado – 79, Idaho – 120, Montana – 123, Nevada – 55, New Mexico – 62, Oregon – 98, Utah – 49, Washington – 140, and Wyoming – 42 (AirNav.com 2004). This does not include the numerous private and military use facilities that occur in these states.

4.7.3 Military Installations

Navigation concerns also exist where tall structures are located within military airspace, referred to as military operations areas (MOAs), or military training routes (MTRs). An MOA is airspace designated for military training activities, including aerobatics, air combat tactics, formation training, and other activities. An MTR is made up of a series of linked segments of airspace within which various training activities are conducted. Although not required to, military aircraft typically fly an MTR along a defined centerline that governs the plane's height and course. The floor and ceiling for both MOA and MTR airspace are defined and, in either type of space, the floor may extend all the way down to the earth's surface. As a result, wind turbines can intrude upon these airspaces if not located properly. Figure 4.7.3-1 shows the locations of MOAs and MTRs in the western United States. Table 4.7.3-1 summarizes the number of U.S. military installations located within the 11 western states.

4.7.4 Conservation System

A number of designated conservation system units occur within the 11 western states (BLM 2003a-j). These include National Parks, National Historic and Scenic Trails, National Wildlife Refuges, Wild and Scenic Rivers, and federally designated Wilderness Areas. These resources are scientifically, ecologically, culturally, educationally, and recreationally important and represent a significant part of the natural and cultural heritage of the United States (BLM 2000). Some BLM-administered lands require special management to protect historic, natural, cultural, scenic, and fish and wildlife resources.

The BLM has recently established the NLCS to provide an overall framework for managing special areas designated by Congress or the President on public lands (BLM 2000). The NLCS includes BLM's National Conservation Areas (NCAs), National Monuments, National Recreation Areas, Forest Reserves, Outstanding National Areas, Cooperative Management and Protection Areas, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, National Scenic Trails, and National Historic Trails (BLM 2000). A BLM brochure on the NLCS (available at http://www.blm.gov/nlcs) provides links to maps that show the locations of the various NLCS areas and to the individual NCAs and National Monuments. Other areas that have important values, but that are not part of the NLCS, include the ACECs and Wild Horse and Burro Herd Management Areas (BLM 2000). The following is a brief description of the special areas included in the NLCS, ACECs, and Wild Horse and Burro Management Areas.

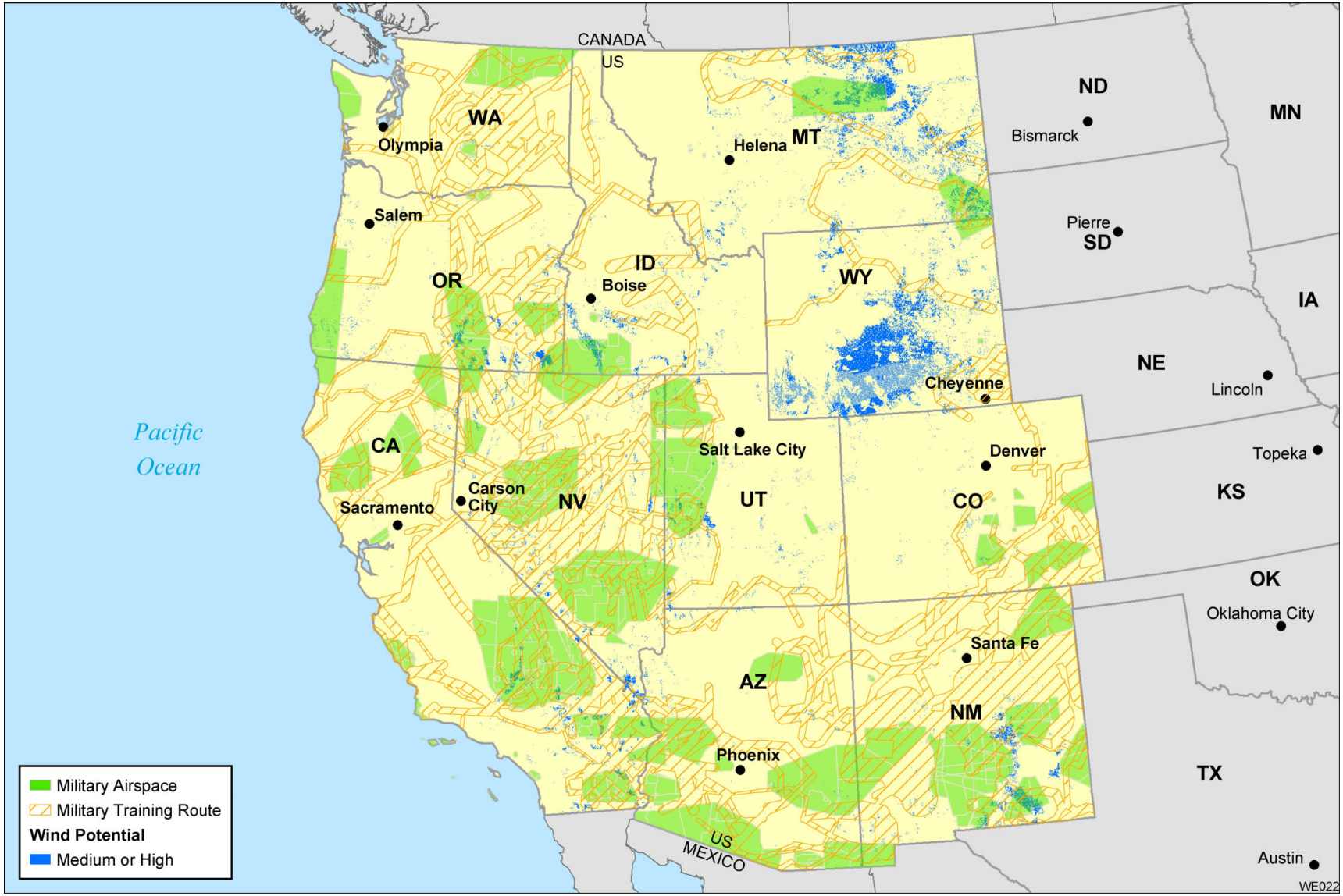

FIGURE 4.7.3-1 Locations of MOAs and MTRs in the Western United States

TABLE 4.7.3-1 Number of Military Installations Located in the 11 Western States

State	Army	Army Guard	Navy	Air Force	Marines	Total
Arizona	2	3	0	5	1	11
California	12	3	29	12	6	62
Colorado	4	1	0	5	0	10
Idaho	0	1	0	2	0	3
Montana	0	1	0	2	0	3
Nevada	1	1	1	3	0	6
New Mexico	1	0	0	3	0	4
Oregon	1	1	0	2	0	4
Utah	3	1	0	2	0	6
Washington	3	0	7	4	0	14
Wyoming	0	1	0	2	0	3

Source: Military World (2002).

The NCAs are designated by Congress to conserve, protect, enhance, and manage public land areas for the benefit and enjoyment of present and future generations. NCA features may include natural, recreational, cultural, wildlife, aquatic, archaeological, paleontological, historical, educational, and/or scientific resources. National Monuments are designated to protect objects of scientific and historic interest by public proclamation by the President (under the Antiquities Act of 1906) or by Congress as historic landmarks, historic and prehistoric structures, or other objects of historic or scientific interest on public lands (BLM 2003m).

Wilderness Areas are designated by Congress and are areas that are part of the National Wilderness Preservation System to ensure preservation and protection of their natural conditions. They are generally 5,000 acres (2,023 ha) or more in size, offer outstanding opportunities for solitude or primitive and unconfined types of recreation, and may also contain ecological, geological, or other features that have scientific, scenic, or historical value. Wilderness Study Areas are areas designated by a federal land-management agency (i.e., BLM, U.S. Forest Service [USFS], National Park Service [NPS], and USFWS) as having wilderness characteristics, thus making them worthy of consideration by Congress for wilderness designation. While Congress considers whether to designate the Wilderness Study Areas as permanent Wilderness Areas, the federal agency managing the Wilderness Study Area does so in a manner to prevent impairment of the area's suitability for wilderness designation (BLM 2003m).

A river or river section is designated as a Wild and Scenic River by Congress or the Secretary of the Interior, under the authority of the Wild and Scenic Rivers Act of 1968. These special areas are managed to protect outstanding scenic, recreational, geologic, fish and wildlife,

historic, cultural, or other values, and to preserve the river or river section in its free-flowing condition. The law recognizes three classes of rivers: wild, scenic, and recreational (BLM 2003m).

National Historic and Scenic Trails are designated by Congress under the National Trails System Act of 1968. National Historic Trails follow as closely as possible the original trails or routes of travel with national historical significance. Such designation identifies and protects historic routes and their historic remnants and artifacts for public use and enjoyment (BLM 2003m). National Scenic Trails are extended trails that offer maximum outdoor recreational potential and provide enjoyment of the various qualities through which they pass (e.g., scenic, historical, natural, and cultural).

Designated ACECs include public lands where special management attention and direction are needed to protect and prevent irreparable damage to important historic, cultural, and scenic values, fish, or wildlife resources or other natural systems or processes; or to protect human life and safety from natural hazards. ACEC designation indicates that the BLM recognizes the significant values of the area and intends to implement management to protect and enhance the resource values. Land use plans outline management objectives and prescriptions for each ACEC. All ACECs are considered land use authorization avoidance areas since they are known to contain resource values that will pose special constraints for and possibly denial of applications for land uses that cannot be designed to be compatible with the management objectives and prescriptions for the ACEC (BLM 2003m).

There are 197 Wild Horse and Burro Herd Management Areas in the western states that encompass close to 33.2 million acres (13.4 million ha) of public land. To protect the herds, as well as the environment in which they live, Congress enacted the Wild Free-Roaming Horse and Burro Act of 1971, as amended. This act requires the protection and management of wild horses and burros to assure a thriving, natural ecological balance and a multiple-use relationship on their ranges. The BLM is responsible for implementing this act and for assuring healthy, viable wild horse and burro populations within the Herd Management Areas (BLM 2000).

Table 4.7.4-1 summarizes the lands discussed above (plus other areas considered “public land treasures”) that are under BLM stewardship for the 11 western states at the end of FY 2002.

4.7.5 Recreation Land Uses

Table 4.7.5-1 lists the number of recreational areas within the 11 western states that are managed by various federal agencies (i.e., the BLM, Bureau of Reclamation [BOR], USFWS, NPS, U.S. Department of Transportation (DOT), National Ocean Service [NOS], U.S. Army Corps of Engineers (USACE), and Smithsonian Institution Affiliations Program [SIAP]) (Recreation.Gov 2003). The types of recreational areas are quite diverse. Those managed by the BLM include National Monuments and Natural Landmarks; Wilderness Areas; Wilderness Study Areas; Natural Conservation, Recreation, and Protection Areas; ACECs, National Historic and Scenic Trails; Research Natural Areas; and Wild and Scenic Rivers (Table 4.7.4-1). In addition,

TABLE 4.7.4-1 Public Land Treasures under BLM Stewardship in the 11 Western States

State	Public Land Treasure[a]					
	National Monuments	Cultural Resources	Wilderness Areas	Wilderness Study Areas	Natural Conservation, Recreation and Protection Areas	Areas of Critical Environmental Concern
Arizona	5 monuments (1,774,290 acres)[b]	27,454 acres inventoried (276 properties recorded)	47 areas (1,396,466 acres)	3 areas (63,974 acres)	3 areas (120,407 acres)	51 areas (808,181 acres)
California	3 monuments (291,390 acres)	29,618 acres inventoried (314 properties recorded)	75 areas (3,591,996 acres)	79 areas (976,145 acres)	2 areas (10,728,368 acres)	129 areas (1,421,263 acres)
Colorado	1 monument (163,852 acres)	45,788 acres inventoried (1,482 properties recorded)	4 areas (139,524 acres)	55 areas (623,021 acres)	2 areas (179,907 acres)	66 areas (621,589 acres)
Idaho	1 monument (273,847 acres)	43,469 acres inventoried (549 properties recorded)	1 area (802 acres)	66 areas (1,491,446 acres)	1 area (484,873 acres)	95 areas (563,261 acres)
Montana	2 monuments (375,027 acres)	22,100 acres inventoried (229 properties recorded)	1 area (6,000 acres)	40 areas (452,563 acres)	–[c]	41 areas (164,246 acres)
Nevada	–	98,364 acres inventoried (1,921 properties recorded)	11 areas (758,286 acres)	99 areas (4,394,760 acres)	2 areas (993,929 acres)	36 areas (1,356,464 acres)
New Mexico	1 monument (4,148 acres)	40,891 acres inventoried (1,159 properties recorded)	3 areas (140,555 acres)	55 areas (958,964 acres)	1 area (226,000 acres)	139 areas (568,204 acres)
Oregon/ Washington	1 monument (52,947 acres)	58,148 acres inventoried (471 properties recorded)	5 areas (193,863 acres)	90 areas (2,745,537 acres)	2 areas (425,650 acres)	169 areas (612,852 acres)
Utah	1 monument (1,870,000 acres)	77,550 acres inventoried (1,133 properties recorded)	3 areas (27,720 acres)	95 areas (3,260,130 acres)	–	58 areas (1,267,164 acres)
Wyoming	–	84,623 acres inventoried (1,676 properties recorded)	–	42 areas (577,504 acres)	–	38 areas (696,894 acres)
Total	15 monuments (4,805,501 acres)	528,005 acres inventoried (9,210 properties recorded)	152 areas (6,255,182 acres)	624 areas (15,524,044 acres)	13 areas (13,159,134 acres)	822 areas (8,080,118 acres)

TABLE 4.7.4-1 (Cont.)

State	Public Land Treasure[a]						
	National Historic Trails	National Recreation Trails	National Scenic Trails	National Natural Landmarks	Research Natural Areas	Wild and Scenic Rivers	Wild Horse and Burro Population
Arizona	1 trail (56 mi)[d]	1 trail (1 mi)	–	2 areas (4,398 BLM acres)	9 areas (12,588 acres)	–	220 horses 2,331 burros
California	2 trails (139 mi)	8 trails (90 mi)	1 trail (189 mi)	9 areas (76,997 BLM acres)	14 areas (36,832 acres)	6 rivers, 78 mi (24,800 acres)	2,465 horses 997 burros
Colorado	–	–	–	2 areas (1,036 BLM acres)	3 areas (477 acres)	–	840 horses 0 burros
Idaho	4 trails (439 mi)	5 trails (20 mi)	1 trail (13 mi)	5 areas (212,640 BLM acres)	39 areas (26,977 acres)	–	690 horses 0 burros
Montana[e]	2 trails (313 mi)	2 trails (39 mi)	1 trail (30 mi)	3 areas (14,227 acres)	–	1 river, 149 mi (89,300 acres)	159 horses 0 burros
Nevada	2 trails (666 mi)	1 trail (1 mi)	–	2 areas (9,600 acres)	–	–	18,999 horses 866 burros
New Mexico[f]	1 trail (90 mi)	5 trails (36 mi)	1 trail (202 mi)	6 areas (9,927 BLM acres)	12 areas (27,976 acres)	2 rivers, 71 mi (22,720 acres)	54 horses 0 burros
Oregon/ Washington	2 trails (24 mi)	3 trails (201 mi)	1 trail (42 mi)	7 areas (6,714 BLM acres)	57 areas (99,111 acres)	23 rivers, 811 mi (259,552 acres)	2,411 horses 15 burros
Utah	2 trails (243 mi)	1 trail (12 mi)	–	3 areas (33,760 BLM acres)	4 areas (2,690 acres)	–	2,972 horses 110 burros
Wyoming	5 trails (1,262 mi)	1 trail (2 mi)	1 trail (164 mi)	6 areas (48,130 BLM acres)	–	–	5,686 horses 0 burros
Total	21 trails (3,232 mi)	27 trails (402 mi)	6 trails (640 mi)	45 areas (417,429 BLM acres)	138 areas (206,651 acres)	32 rivers, 1,109 mi (396,372 acres)	34,496 horses 3,526 burros

Footnotes on next page.

TABLE 4.7.4-1 (Cont.)

[a] See the glossary in Chapter 10 for a description of each of the public land treasures.

[b] To convert acres to hectares, multiply by 0.4047.

[c] A dash indicates not listed on BLM-administered lands for that state.

[d] To convert miles to kilometers, multiply by 1.609.

[e] The recreation use for Montana includes North and South Dakota. The BLM-administered surface acres in Montana are about 96% of the total for all three states.

[f] The recreation use for New Mexico includes Oklahoma, Texas, and Kansas. The BLM-administered surface acres in New Mexico are about 95% of the total for all four states.

Source: BLM (2003a-j).

TABLE 4.7.5-1 Number of Recreational Areas within the 11 Western States Managed by Federal Agencies

	Managing Agency[a]									
State	BLM	BOR	DOT	USFWS	NOS	NPS	SIAP	USACE	USFS	Total
Arizona	110[b]	14	1	14	0	27	10	1	45	222
California	130[c]	36	3	26	6	39	12	23	66[d]	341
Colorado	25[b]	34	6	8	0	17	2	5	41[e]	138
Idaho	56[f]	17	0	7	0	10	1	4	14	109
Montana	8[b]	12	0	22	0	8	2	2	21	75
Nevada	62[g]	4	2	6	0	10	7	0	13	104
New Mexico	34	11	4	10	0	17	4	7	24	111
Oregon	57[d]	24	6	13	1	8	0	19	52	180
Utah	89	25	2	6	0	16	0	0	19	157
Washington	12	19	2	22	2	16	2	13	34	122
Wyoming	40	23	0	9	0	11	0	0	20	113

[a] Abbreviations: BLM = Bureau of Land Management, BOR = Bureau of Reclamation, DOT = U.S. Department of Transportation, USFWS = U.S. Fish and Wildlife Service, NOS = National Ocean Service, NPS = National Park Service, SIAP = Smithsonian Institution Affiliations Program, USACE = U.S. Army Corps of Engineers, USFS = U.S. Forest Service.

[b] Includes one area comanaged with the USFS.

[c] Includes 12 areas comanaged with the USFS.

[d] Includes two areas comanaged with the USFS.

[e] Includes one area comanaged with the USFWS and one area comanaged with the NPS.

[f] Includes one area comanaged with the NPS.

[g] Includes four areas comanaged with the USFS and four comanaged with the NPS.

Source: Recreation.Gov (2003).

the BLM manages more than 3,500 recreation sites and facilities. The BOR and USACE primarily manage reservoirs, lakes, and dams. Recreational areas managed by the USFS are mostly associated with National Forests and Wilderness Areas. The USFWS-managed recreational areas include National Wildlife Refuges, Wildlife Management Areas, Wilderness Areas, waterfowl production areas, and hatcheries. Areas managed by the NPS include National Monuments, National Parks, recreational areas, and national historic sites. The DOT-managed recreational areas are the America's Byways. This is an umbrella term used for the 96 distinct and diverse roads designated by the U.S. Secretary of Transportation, which include the National Scenic Byways and the All-American Roads. The NOS manages national marine sanctuaries and estuarine research reserves; while the SIAP manages various historical, natural, and art museums.

In addition to the federally managed recreational areas, there are a number of state parks, recreational areas and sites, or points of interest within the 11 western states. For example, Table 4.7.5-2 lists the number of state parks in each of the 11 states and the Web addresses for each state. Most of the Web sites have maps showing the locations of the state parks and links to each park.

Generally, the BLM provides recreational opportunities where they are compatible with other authorized land uses, while minimizing risks to public health and safety and maintaining the health and diversity of the land (BLM 2000). Specific BLM-administered lands and the various recreational opportunities available on those lands can be obtained by either state or recreational activity (Recreation.Gov 2003). Table 4.7.5-3 provides the estimated recreational use in visitor days for BLM-administered lands within the 11 western states for FY 2002.

The Recreation Opportunity Spectrum (ROS) is one of the means that the BLM uses to inventory, plan, and manage recreational opportunities. Seven elements provide the basis for inventorying and delineating recreational settings: access, remoteness, naturalness, facility and site management, visitor management, social encounters, and visitor impacts. On the basis of these elements, six recreation opportunity classes have been developed:

1. *Primitive:* Large areas of about 5,000 acres (2,023 ha) or more located at least 3 mi (5 km) from the nearest point of motor vehicle access;

2. *Semiprimitive nonmotorized:* Areas of about 2,500 acres (1,012 ha) located at least 0.5 mi (0.8 km) from the nearest point of motor vehicle access;

TABLE 4.7.5-2 Number of State Parks Located within the 11 Western States

State	Number of State Parks	Web Site
Arizona	29	http://www.pr.state.az.us/parksites.html
California	279	http://www.parks.ca.gov/parkindex/results.asp
Colorado	40	http://www.parks.state.co.us/default.asp
Idaho	27	http://www.idahoparks.org/parks/parks-atoz.html
Montana	42	http://parks.fwp.state.mt.us/parks/default.aspx
Nevada	24	http://parks.nv.gov/parkmap.htm
New Mexico	31	http://www.emnrd.state.nm.us/nmparks
Oregon	181	http://www.oregonstateparks.org/searchpark.php
Utah	40	http://parks.state.ut.us/visiting/tour.htm
Washington	117	http://www.parks.wa.gov/alpha.asp
Wyoming	12	http://wyoparks.state.wy.us/Sphslist.htm

TABLE 4.7.5-3 Estimated Recreational Use (Visitor Days) on BLM-Administered Lands within the 11 Western States, FY 2002

	Recreational Activity							
	Boating – Motorized	Boating – Row, Float, or Paddle	Swimming and Other Water Activities	Camping and Picknicking	Fishing	Hunting	Driving for Pleasure	Interpretation, Education, and Viewing Land Resources
Arizona	1,876,634	43,939	743,321	9,752,558	57,712	283,286	75,025	417,176
California	9,003	169,595	105,538	8,864,551	92,925	205,436	466,519	354,616
Colorado	3,982	91,922	8,959	956,287	75,870	533,151	243,982	361,942
Idaho	165,881	534,522	51,171	1,221,756	438,416	663,603	239,583	276,755
Montana[a]	60,007	104,925	17,678	950,496	213,292	465,706	69,678	185,782
Nevada	20,297	21,419	31,221	1,872,354	179,843	972,140	410,212	284,928
New Mexico[b]	6,300	18,236	2,674	420,888	79,927	304,986	147,024	163,170
Oregon/Washington	158,240	330,291	126,629	2,458,284	540,977	693,062	586,408	582,154
Utah	40,177	410,794	43,214	2,417,647	57,106	176,623	727,616	1,648,140
Wyoming	507	93,966	878	695,379	173,242	402,901	235,495	175,059

	Recreational Activity						
	Nonmotorized Travel	Off-Highway Vehicle Travel	Specialized Motor Sports, Events, and Activities	Specialized Nonmotor Sports, Events, and Activities	Snowmobile and Other Winter Motorized Travel	Nonmotorized Winter Activities	Total
Arizona	541,836	356,591	56	280,060	–[c]	344	14,428,538
California	1,003,840	2,760,845	6,643	2,741,271	4,142	2,381	16,787,305
Colorado	550,859	400,637	11,758	246,326	11,758	11,371	3,497,128
Idaho	257,914	271,472	958	253,360	57,926	299,482	4,732,799
Montana[b]	167,028	137,386	–	51,844	22,400	21,690	2,467,912
Nevada	421,839	382,991	102,018	445,564	14,805	26,126	5,185,757
New Mexico[c]	308,875	173,428	2,475	159,980	68	128	1,788,159
Oregon/Washington	514,506	331,068	3,856	388,413	4,062	21,961	6,739,551
Utah	1,591,086	579,718	2,719	180,361	1,498	2,490	7,879,189
Wyoming	187,452	172,162	30	118,183	34,122	6,100	2,295,476
Total							65,801,814

Footnotes on next page.

TABLE 4.7.5-3 (Cont.)

[a] The recreation use for Montana includes North and South Dakota. The BLM-administered surface acres in Montana are about 96% of the total for all three states.

[b] The recreation use for New Mexico includes Oklahoma, Texas, and Kansas. The BLM-administered surface acres in New Mexico are about 95% of the total for all four states.

[c] A dash indicates not listed on BLM-administered lands for that state.

Source: BLM (2003a-j).

3. *Semiprimitive motorized.* Areas of about 2,500 acres (1,012 ha) located within 0.5 mi (0.8 km) of primitive roads and two-track vehicle trails;

4. *Roaded natural.* Areas near improved and maintained roads;

5. *Rural.* Areas characterized by a substantially modified natural environment; and

6. *Urban.* Areas located near paved highways where the landscape is dominated by human modification.

Management of these lands to provide a natural-appearing environment with minimal evidence of humans and on-site controls increases from urban to primitive classes (USFS 2001).

The BLM also distinguishes recreational use on the basis of the level of use and management requirements. Special Recreation Management Areas require recreation activity plans and a major investment in facilities or supervision of more intensive activities. Extensive Recreation Management Areas, however, offer mostly unstructured, dispersed, and low-intensity recreational opportunities that require a minimum amount of facilities and management (PBS&J 2002).

4.8 VISUAL RESOURCES

4.8.1 Introduction

Visual resources refer to all objects (man-made and natural, moving and stationary) and features (e.g., landforms, waterbodies) that are visible on a landscape. These resources contribute to the scenic or visual quality of the landscape, that is, the visual appeal of the landscape. A visual impact is the creation of an intrusion or perceptible contrast that affects the scenic quality of a landscape. A visual impact can be perceived by an individual or group as either positive or negative, depending on a variety of factors or conditions (e.g., personal experience, time of day, weather/seasonal conditions).

The BLM's responsibility for managing visual (scenic) resources of public lands is established by law. NEPA requires that measures be taken to "assure for all Americans…aesthetically pleasing surroundings" and the FLPMA states that "public lands will be managed in a manner which will protect the quality of scenic values of these lands."

Methods have been developed to assist federal agencies responsible for visual resource planning and assessing visual resource impacts. The BLM conducts visual inventories and analyses within the guidelines established in its VRM System (BLM 1986a,b). BLM uses the procedures and methods to support decision making for planning activities and reviews of proposed developments on BLM-administered lands. Since 1980, the BLM has used the system to evaluate thousands of projects on public lands while minimizing their visual impacts.

Approximately 90% of the oil, gas, and electric transmission ROWs in the western United States are dependent, in part, on passages across federal lands. The BLM alone administers nearly 85,000 ROWs, constituting approximately 25,000 mi (40,234 km) of pipelines and 75,000 mi (120,701 km) of electric transmission corridors. The BLM processes applications for solar, wind, geothermal, and fossil fuel energy exploration and production. In addition, the BLM manages off-highway vehicle (OHV), mountain bike, horseback riding, hiking, rafting, and other recreational uses that also have the potential for adverse visual impacts.

The VRM system consists of three phases: (1) inventory of scenic values; (2) establishment of BLM VRM objectives (i.e., VRM Classes); and (3) design, mitigation, and evaluation of the project to meet established VRM classes. To arrive at a visual resource classification, the procedure for inventorying scenic values looks at the intrinsic scenic quality of a view, the level of public concern (sensitivity) to changes in that view, and the distance between viewers and the view. The text box on the next page discusses the BLM's VRM system for inventorying scenic values. The final result of the inventory process is the assignment of a Visual Resource Class that portrays the relative value of visual resources and provides a tool for managing visual objectives. These Visual Resource Classes and the associated objectives are used to provide the basis for the consideration of visual resources in the BLM's resource management planning process.

Once visual resources are inventoried and visual management classes are delineated, then potential impacts of a proposed project can be evaluated relative to management objectives for the affected area. The vulnerability of visual resources to impact-producing visual contrasts then determines the need for adjustments or mitigation of the proposed wind energy development.

The BLM's visual resource contrast rating is a systematic process to analyze potential visual impacts of proposed projects and activities (BLM 1986b). Its purpose is to assist BLM staff not trained in the design arts to apply basic design principles to resolve visual impacts. Simulation methods should be used to inform contrast rating and should therefore be integrated to reach final contrast rating decisions.

Contrast rating is the BLM's measure of the degree to which management activity affects the visual quality of a landscape. It depends on the visual contrast created between a project and the existing landscape. Contrast is assessed by comparing project features (explained in a detailed project description) with the major features of the existing landscape (contained in the VRM classes/objectives). The basic design elements of form, line, color, and texture are used to make this comparison and to describe the visual contrast created by the project. Comparisons are made from key observation points, critical viewpoints, typical views of representative landscapes, and views of special features. The contrast rating process is a means of determining impacts and of identifying measures to mitigate those impacts. If visual simulations are to be used, contrast ratings should not be completed until simulation results can be considered.

The BLM regards simulation, or visualization, as a valuable tool for effectively evaluating the impacts of a proposed project. Visual simulations are an important means of portraying the relative scale, extent, and other characteristics of a project. They are strongly recommended for potentially high-impact projects in order to better represent views from key

The BLM VRM System: Inventory of Scenic Values

Scenic Quality Evaluation. BLM inventory guidelines rate the apparent scenic quality of discrete areas of land as A, B, or C on the basis of their landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications (BLM 1986a). A-rated areas have outstanding or distinctive diversity or interest, B-rated areas have common or average diversity or interest, and C-rated areas have minimal diversity or interest.

Sensitivity Level Analysis. Sensitivity levels measure public concern for scenic quality. Areas are assigned a high, medium, or low sensitivity level by analyzing indicators of public concern: types of users, amount of use, public interest, adjacent land users, special areas, and other factors that may be indicators of visual sensitivity. Special areas such as Wilderness Study Areas, Wild and Scenic Rivers, and Scenic Roads or Trails require special consideration for protection of their scenic quality.

Distance Zone Delineation. The visual impact of a particular project will become less perceptible with increasing distance between the viewer and the project. The BLM VRM system uses three distance zones to account for this effect. It looks at locations (routes) such as highways, rivers, or other viewing locations from which a viewer could observe a particular site. The foreground-middleground zone includes areas at a distance of less than 3 to 5 mi (5 to 8 km) from the viewer. Viewed areas beyond the foreground-middleground zone but usually less than 15 mi (24 km) from the viewer are in the background zone. Areas hidden from view in the foreground-middleground zone or background zone are in the seldom-seen zone.

Visual Resource Classification. Areas are assigned to one of four classes based on the scenic quality, visual sensitivity, and distance zones. Each class has an objective that determines the management objectives for that area:

- Class I Objective: Preserve the existing character of the landscape. The level of change should be very low and must not attract attention.
- Class II Objective: Retain the existing character of the landscape. Allow a low level of change that should not attract the attention of a casual observer.
- Class III Objective: Partially retain the existing character of the landscape. Allow a moderate level of change that may attract attention but should not dominate the view of a casual observer.
- Class IV Objective: Provide for management activities that require major modifications of the existing character of the landscape. The level of change may be high and may dominate the view and be the major focus of viewer attention.

observation points during the contrast rating procedure. The BLM acknowledges in its guidance that simulations help public groups visualize and respond to development proposals. However, no specific guidance is provided in the VRM or land use planning processes for public participation mechanisms in the contrast rating process. Basic standards, methods, and techniques for visual simulation are described in the BLM's visual simulation training courses.

4.8.2 BLM Visual Resource Management in the Western United States

Landscapes and their visual qualities, like other public resources, exist in a dynamically changing physical, social, and economic context resulting in shifting and competing demands for

their use. The following summary of the BLM's challenges in managing landscape, visual, and scenic resources is adapted from *Great American Landscapes* (Cownover and Dawson-Powell 2003). It describes the context within which the BLM manages the visual resources of western lands.

The BLM administers more land than any other federal agency. It is responsible for "multiple use" of approximately 264 million acres (107 million hectares). Most of these lands are located in the West, the fastest growing region of the United States, and many are near growing communities. Relative to the East, much of the western United States is an expansive and diverse place of open vistas, dry and desert lands, rugged and mountainous terrain, complex vegetation zones, wild and rural landscapes, extensive coastlines, and, until recently, sparse population. Emerging trends pose increasing challenges to the BLM's efforts to preserve scenic character and open space while balancing ever-increasing local, regional, and national resources demands. The FLPMA gave the BLM its multiple use mandate to manage public lands and resources for the benefit of present and future generations in a manner that protects the range of resource values on public lands; and scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values.

As the West has changed over the past two decades, its rapidly expanding population, shifting demographics, and residential growth have placed increasing demands and expectations on the BLM's multiple-use management of visual resources on public lands. Towns and cities have expanded outward to reach once-remote BLM-administered lands. More than 4,100 communities, with a combined population of 22.2 million people, now live within 25 mi (40 km) of BLM-administered lands and waters. More than 40% of the BLM-administered lands are close to major population centers in the West. Western recreation activities such as OHV use, hunting, hiking, and camping, have increased simultaneously with increases in traditional uses of public lands for grazing, mining, and energy development, thus creating an environment in which the BLM-administered lands are often the center of both conflict and opportunity.

National Register Criteria for Evaluation (36 CFR 60.4)*

The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

A. that are associated with events that have made a significant contribution to the broad patterns of our history; or

B. that are associated with the lives of persons significant in our past; or

C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. that have yielded or may be likely to yield, information important in prehistory or history.

* Additional *criteria considerations* are also provided in 36 CFR 60.4.

4.9 CULTURAL RESOURCES

Cultural resources include archaeological sites and historic structures and features that are protected under the NHPA, as amended (P.L. 89-665). Cultural resources also include traditional cultural properties, that is, properties

that are important to a community's practices and beliefs and that are necessary for maintaining the community's cultural identity. Cultural resources refer to both man-made and natural physical features associated with human activity and, in most cases, are finite, unique, fragile, and nonrenewable.

Cultural resources that meet the eligibility criteria for listing on the NRHP are considered "significant" resources and must be taken into consideration during the planning of federal projects (see text box). Federal agencies are also required to consider the effects of their actions on sites, areas, and other resources (e.g., plants) that are of religious significance to Native Americans[4] as established under the American Indian Religious Freedom Act (P.L. 95-341). Native American graves and burial grounds are protected by the Native American Graves Protection and Repatriation Act (P.L. 101-601).

The NHPA is the overarching law concerning the management of cultural resources. Numerous other regulatory requirements, however, pertain to cultural properties and are presented in Table 4.9-1. These laws are applicable to any wind energy development project undertaken on federal land or requiring federal permitting or funding. The NHPA created the framework within which cultural resources are managed in the United States. The law required that each state appoint an SHPO to oversee the management of cultural resources that state, and it created the Advisory Council on Historic Preservation, which provides national oversight and dispute resolution. The SHPO is also designated as the repository for all cultural resource information in each state. Section 106 of the NHPA, defines the process for the identification of a cultural resource and the process for determining if a project will adversely affect the resource. The NHPA establishes the processes for consultation among interested parties, the agency conducting the undertaking, and the SHPO, and for government-to-government consultation between U.S. government agencies and Native American Tribal governments. The NHPA, in Section 106, also addresses the appropriate process for mitigating adverse effects. The NHPA applies to federal undertakings and undertakings that are federally permitted or funded.

Cultural resources on BLM-administered land are managed primarily through the application of the above identified laws. Guidance on the application of the laws is provided through PAs developed among the BLM, the National Council of SHPOs, and the Advisory Council on Historic Preservation, and through state-specific PAs concerning cultural resources. Further guidance is provided through the 8100 Series manuals and handbooks, which outline cultural resource management on BLM-administered land.

BLM offices have been actively engaged in inventorying the property they manage for cultural resources as required by Section 110 of the NHPA. The offices also conduct project-specific surveys in areas that were not previously surveyed. Once an area is surveyed and cultural resources are identified, an assessment of the relative importance of the resources must be made. The laws protect only those sites that are eligible for the NRHP. Guidance on how to apply the NRHP criteria is provided in numerous NPS documents. Guidance is also provided in the BLM 8100 Series manuals.

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4 These acts refer specifically to Native Americans, Native Alaskans, and Native Hawaiians.

TABLE 4.9-1 Cultural Resource Laws and Regulations

Law or Order Name	Intent of Law or Order
Antiquities Act of 1906	This law makes it illegal to remove cultural resources from federal land without permission. It also allows the president to establish historical monuments and landmarks.
E.O. 11593, Protection and Enhancement of the Cultural Environment (1971)	E.O. 11593 requires federal agencies to inventory their cultural resources and to record, to professional standards, any cultural resource that may be altered or destroyed.
Archaeological and Historic Preservation Act (1974) (AHPA)	The AHPA directly addresses impacts to cultural resources resulting from federal activities that would significantly alter the landscape. The focus of the law is the creation of dams and the impacts resulting from flooding, worker housing, creation of access roads, etc.; however, its requirements are applicable to any federal action.
Archaeological Resources Protection Act of 1979 (ARPA)	The ARPA established civil and criminal penalties for the destruction or alteration of cultural resources and established professional standards for excavation.
American Indian Religious Freedom Act of 1978 (AIRFA)	The AIRFA protects the right of Native Americans to have access to their sacred places. It requires consultation with Native American organizations if an agency action will affect a sacred site on federal lands.
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA)	The NAGPRA requires federal agencies to consult with the appropriate Native American tribes prior to the intentional excavation of human remains and funerary objects. It requires the repatriation of human remains found on the agencies' land.
E.O. 13006, Locating Federal Facilities on Historic Properties in our Nation's Central Cities (1996)	E.O. 13006 encourages the reuse of historic downtown areas by federal agencies.
E.O. 13007, Indian Sacred Sites (1996)	E.O. 13007 requires that an agency allow Native Americans to worship at sacred sites located on federal property.
E.O. 13287, Preserve America (2003)	E.O. 13287 encourages the promotion and improvement of historic structures and properties to encourage tourism.
E.O. 13175, Consultation and Coordination with Indian Tribal Governments (2000)	E.O. 13175 requires federal agencies to coordinate and consult with Indian Tribal governments whose interests might be directly and substantially affected by activities on federally administered lands.

As of April 2004, 317 cultural resources had been determined eligible on BLM-administered land in the western United States. Across all lands in these 11 states, a total of 12,778 cultural resources are either eligible for listing on the NRHP or listed on the NRHP (ParkNet 2004). Because this number includes only known sites that have been reported to the NPS, it is likely that a considerable number of cultural resources that have been identified as potentially eligible have not yet been listed on the NRHP. Moreover, the majority of BLM-administered land in the 11 western states has yet to be surveyed for cultural resources. More than 9,000 properties have been recorded during inventories of slightly more than 500,000 acres (202,344 ha) out of a total of 174 million acres (70.4 million ha) of BLM-administered land, as indicated in Table 4.7.4-1. As a result, it is quite likely that the number of eligible sites on BLM-administered lands is greater than currently recorded. The types of sites listed on the NRHP in the western United States include archaeological sites, historic buildings, bridges, historic trails, prehistoric dwellings, historic districts, water features (e.g., canals, ditches), and cultural landscapes. (See also Section 4.7.4 for a brief discussion of National Historic and Scenic Trails and other conservation areas established under the NLCS.)

Traditional cultural properties and other areas of concern to Native Americans and other cultural groups can include a wide range of tangible and intangible resources (e.g., archaeological sites, funerary objects, medicinal plants, and sacred landscapes). Government-to-government consultation is the only means of identifying the affected environment for a particular site-specific project. It is difficult, if not impossible, to place boundaries on locations of traditional significance. Where boundaries might be defined, Tribal members may not be willing to disclose such information for a variety of reasons. Cultural sensitivity to the need to protect important places is required. Types of valued traditional resources may include, but are not limited to, archaeological sites, burial sites, traditional harvest areas, trails, certain prominent geological features that may have spiritual significance (i.e., sacred landscapes), and viewsheds of sacred locations (including all of the above).

4.10 ECONOMICS

In this section, the contribution of wind energy development to electricity production capacity in the 11-state study area is briefly described. In addition, five key measures of economic development are described: population, gross state product (GSP), personal income, employment, and tax revenues (sales and state income). For each development measure, data are presented for five 10-year intervals; the years 2005, 2015, and 2025 to describe the period during which impacts are assessed, and 1990 and 2000 to describe historical trends in the preceding period. Forecasts for each measure are based on annual growth rates over the period 1980 to 2003 and the U.S. Bureau of Census population forecast for the period 1995 to 2025 (U.S. Bureau of the Census 2001).

4.10.1 Wind Energy Contributions to Electricity Production Capacity

On the basis of data forecasting the development of electricity production capacity by fuel type in each of the 11 western states, as presented in the *Annual Energy Outlook 2004*

(DOE 2004a) and State Electricity Profiles (DOE 2004b), renewable energy sources are expected to provide an important share of energy capacity growth in a number of states over the period 2005 through 2025. This is the case particularly in Idaho, Montana, Oregon, and Washington, where renewables are expected to equal or exceed the share of fossil fuel generating capacity in these states. California also is expected to have a large share of capacity dedicated to renewable energy. The importance of renewable energy sources in these states is largely due to the contribution of hydropower resources. In contrast, wind energy contributions to overall electricity production capacity over the same time period are expected to be of minor importance, making up less than 10% of new capacity in most states.

Energy market forecasts, such as those described above, can be impacted by legislative actions. For example, if the federal Production Tax Credit (PTC) for wind is extended by Congress, wind energy development is likely to accelerate in the near term. Also, renewable portfolio standards (RPSs) can increase renewable energy development, including wind energy development, in a given state. To date, RPSs have been established in Arizona, California, Nevada, and New Mexico and are also being considered in other western states. RPS laws require investor-owned utilities to produce or otherwise procure a minimum amount or percentage of their electricity from renewable energy sources, including wind. The percentage requirements vary among the states. Some states have adopted other types of policies to support greater renewable energy development, such as financial incentives, establishment of renewable energy development funds, or requirements that utilities offer "green power" purchase options to their customers. These policies are likely to increase interest in wind energy development on BLM-administered and other lands. IREC (2004) lists state renewable energy incentives.

4.10.2 Population

Total population in the 11 states stood at 61.4 million in 2000 and is expected to reach 65.5 million by 2005 and 87.1 million by 2025 (Table 4.10.2-1). Population in the 11 states is concentrated in California, which had more than 55% of the total regional population in 2000. The population in California is expected to increase from 35.6 million to 50.8 million between 2005 and 2025.

Population in the 11 states grew at an annual average rate of 2.3% over the period 1990 to 2000. Growth within the region was fairly uneven over the period, with relatively high growth rates in Nevada (5.2%) and Arizona (3.4%). Growth rates in Colorado, Idaho, and Utah were all close to the average for the region, with lower than average rates in the remaining states.

4.10.3 Gross State Product

GSP, or the total value of goods and services produced in a state, amounted to a total of $2.4 trillion for the 11 states in 2001 and is expected to reach $2.5 trillion by 2005 and almost $3.4 trillion at the end of the forecast period in 2025 (Table 4.10.3-1). Almost 60% ($1.4 trillion) of GSP in the 11 states was produced in California in 2001. California GSP is expected to reach $2.1 trillion by 2025.

TABLE 4.10.2-1 Total Population (millions) in the 11 Western States

State	1990	2000	Growth Rate 1990–2000 (%)	2005	2015	2025
Arizona	3.7	5.1	3.4	5.7	6.3	7.0
California	29.8	33.4	1.3	35.6	42.5	50.8
Colorado	3.3	4.3	2.7	4.7	5.1	5.4
Idaho	1.0	1.3	2.5	1.4	1.6	1.7
Montana	0.8	0.9	1.2	1.0	1.0	1.1
Nevada	1.2	2.0	5.2	2.3	2.4	2.6
New Mexico	1.5	1.8	1.8	2.0	2.3	2.6
Oregon	2.8	3.4	1.9	3.7	4.0	4.4
Utah	1.7	2.2	2.6	2.5	2.7	3.0
Washington	4.9	5.9	1.9	6.3	7.1	7.9
Wyoming	0.5	0.5	0.8	0.5	0.6	0.7
Total	51.2	61.4	2.3	65.5	75.7	87.1

Source: U.S Bureau of the Census (2001).

TABLE 4.10.3-1 Total Gross State Product ($ billions 2003) in the 11 Western States

State	1990	2001	Growth Rate 1990–2001 (%)	2005	2015	2025
Arizona	96.9	166.9	5.1	179.4	200.0	221.1
California	1,124.7	1,412.1	2.1	1,474.6	1,763.4	2,105.1
Colorado	105.2	180.5	5.0	191.4	207.8	223.2
Idaho	25.0	38.3	4.0	41.5	45.8	49.2
Montana	18.9	23.5	2.0	24.7	26.3	27.7
Nevada	44.5	82.3	5.7	89.9	95.4	101.0
New Mexico	38.3	57.6	3.8	61.5	70.3	79.9
Oregon	81.3	124.7	4.0	131.2	145.2	158.5
Utah	44.1	73.2	4.7	78.7	87.7	94.9
Washington	162.6	231.6	3.3	244.3	276.0	306.0
Wyoming	18.9	21.2	1.0	22.6	25.6	27.9
Total	1,760.4	2,412.2	3.7	2,539.8	2,943.6	3,394.4

Sources: U.S Bureau of the Census (2001); U.S. Department of Commerce (2003a).

The annual average growth rate in GSP for all 11 states was 3.7% over the period 1990 to 2001. Growth rates were quite varied across the states, with higher than average rates for Nevada (5.7%), Arizona (5.1%), and Colorado (5.0%). Below-average growth rates occurred in California (2.1%), Montana (2.0%), and Wyoming (1.0%).

4.10.4 Personal Income

Growth rates in personal income were highest in Nevada over the period 1990 to 2002 at 5.5% (Table 4.10.4-1). With the exception of California (2.1%), personal income growth rates in the remaining states were within one percentage point of the 11-state average rate of 3.4%.

Despite low growth in personal income during the 1990s, California generated almost 60% of personal income in the 11 states, producing almost $1.2 trillion in 2002. The state is expected to generate $1.5 trillion in 2015 and $1.7 trillion in 2025. For the 11 states as a whole, personal income is expected to increase from $2.0 trillion in 2002 to $2.4 trillion in 2015 and $2.8 trillion in 2025.

TABLE 4.10.4-1 Total Personal Income ($ billions 2003) in the 11 Western States

State	1990	2002	Growth Rate 1990–2002 (%)	2005	2015	2025
Arizona	89.1	14.6	4.2	153.7	171.4	189.4
California	922.9	1,181.6	2.1	1,223.0	1,462.7	1,746.0
Colorado	91.6	152.9	4.4	159.3	173.1	185.9
Idaho	22.6	34.4	3.5	36.3	40.1	43.1
Montana	17.5	23.2	2.4	24.0	25.6	26.9
Nevada	35.5	67.1	5.5	71.2	75.6	80.1
New Mexico	32.0	45.4	2.9	47.6	54.4	61.8
Oregon	73.5	102.8	2.8	106.7	118.0	128.8
Utah	36.5	57.2	3.8	60.3	67.2	72.7
Washington	138.2	202.7	3.2	210.9	238.5	264.2
Wyoming	11.5	15.6	2.6	16.3	18.5	20.1
Total	1,471.0	2,028.7	3.4	2,109.5	2,444.7	2,819.0

Sources: U.S Bureau of the Census (2001); U.S. Department of Commerce (2003b).

4.10.5 Employment

Over the period 1990 to 2003, employment growth rates were higher in Nevada (4.4%) and Arizona (3.4%) than elsewhere in the 11 states (Table 4.10.5-1). At 1.1%, growth rates in California were somewhat less than the average rate of 2.5%.

Almost 53% (14.4 million) of all employment in the 11 states (27.2 million) is concentrated in California. Employment in Washington, Arizona, and Colorado in 2003 stood at 2.7 million, 2.3 million, and 2.2 million, respectively; the remaining states support less than 2 million jobs. Employment in the 11 states as a whole is projected to increase to 32 million in 2015 and to 37 million in 2025. California is projected to have almost 60% (21.1 million) of all jobs in the 11 states by 2025.

4.10.6 Sales Tax Revenues

There were fairly wide variations in trends in sales tax revenues across the 11 states (Table 4.10.6-1). During the 1990s, higher-than-average annual growth in sales tax revenues occurred in Nevada (7.1%), Wyoming (6.3%), Colorado (5.2%), Arizona (4.9%), and Oregon (4.9%). The average annual growth rate for the 11 states as a whole during the period 1992 to 2000 was 3.7%.

TABLE 4.10.5-1 Total Employment (millions) in the 11 Western States

State	1990	2003	Growth Rate 1990–2003 (%)	2005	2015	2025
Arizona	1.5	2.3	3.4	2.4	2.6	2.9
California	12.5	14.4	1.1	14.8	17.7	21.1
Colorado	1.5	2.2	2.7	2.2	2.4	2.6
Idaho	0.4	0.6	3.1	0.6	0.7	0.7
Montana	0.3	0.4	2.3	0.4	0.4	0.5
Nevada	0.6	1.1	4.4	1.1	1.2	1.3
New Mexico	0.6	0.8	2.3	0.8	0.9	1.0
Oregon	1.2	1.6	1.7	1.6	1.8	1.9
Utah	0.7	1.1	3.1	1.1	1.2	1.3
Washington	2.1	2.7	1.7	2.7	3.1	3.4
Wyoming	0.2	0.3	1.8	0.3	0.3	0.3
Total	21.7	27.2	2.5	28.0	32.3	37.0

Source: U.S Bureau of Labor Statistics (2004).

TABLE 4.10.6-1 Total Sales Taxes ($ billions 2003) in the 11 Western States

State	1990	2000	Growth Rate 1990–2000 (%)	2005	2015	2025
Arizona	4.5	6.5	4.9	7.2	8.0	8.9
California	34.6	42.4	2.6	44.6	53.3	63.6
Colorado	3.4	5.1	5.2	5.6	6.0	6.5
Idaho	0.9	1.2	3.1	1.3	1.4	1.6
Montana	0.3	0.3	2.5	0.3	0.4	0.4
Nevada	2.2	3.8	7.1	4.4	4.6	4.9
New Mexico	2.1	2.6	2.5	2.8	3.2	3.6
Oregon	0.7	1.0	4.9	1.0	1.1	1.2
Utah	1.7	1.5	-1.8	1.6	1.8	2.0
Washington	9.7	12.3	3.0	13.2	14.9	16.5
Wyoming	0.4	0.6	6.3	0.7	0.8	0.9
Total	60.5	77.4	3.7	82.6	95.6	110.0

Source: U.S Bureau of the Census (2004).

Sales tax revenues are projected to grow for the 11 states as a whole, from $82.6 billion in 2005 to $110.0 billion in 2025. Growth is also expected for each individual state over the period 2005 through 2025, with revenues in the largest generating state, California, projected to reach $63.6 billion in 2025.

4.10.7 State Income Tax Revenues

The majority of the 11 states experienced moderately large annual increases in state income tax revenues during the 1990s (Table 4.10.7-1). Growth rates in California (8.3%), Colorado (7.9%), New Mexico (7.9%), and Utah (7.1%) were all higher than the average for the 11-state region (6.6%). Montana (3.9%) experienced relatively slow growth in revenues.

The share of overall income tax revenues generated in California (74%) was significantly higher than the shares for sales tax revenues. California produced $42.3 billion in income taxes in 2000, compared with $57.4 billion for the 11-state region. Oregon is the second largest state income tax producer, with $4.4 billion in 2000. Revenues for the entire region are projected to increase from $57.4 billion in 2000 to $71.2 billion in 2015 and $83.1 billion in 2025. Revenues in California are expected to reach $53.1 billion in 2015 and $63.4 billion in 2025.

TABLE 4.10.7-1 Total Income Taxes ($ billions 2003) in the 11 Western States

State	1990	2000	Growth Rate 1990–2000 (%)	2005	2015	2025
Arizona	1.6	2.5	5.7	2.7	3.0	3.3
California	22.3	42.3	8.3	44.4	53.1	63.4
Colorado	2.1	3.8	7.9	4.2	4.5	4.9
Idaho	0.7	1.1	6.3	1.2	1.3	1.4
Montana	0.4	0.5	3.9	0.6	0.6	0.6
Nevada	–[a]	–	–	–	–	–
New Mexico	0.5	1.0	7.9	1.0	1.2	1.4
Oregon	2.9	4.4	5.4	4.7	5.2	5.7
Utah	1.0	1.8	7.1	2.0	2.2	2.4
Washington	–	–	–	–	–	–
Wyoming	–	–	–	–	–	–
Total	31.5	57.4	6.6	60.8	71.2	83.1

[a] A dash indicates that there are currently no state income taxes in Nevada, Washington, and Wyoming.

Source: U.S. Bureau of the Census (2004).

4.11 ENVIRONMENTAL JUSTICE

E.O. 12898 (U.S. President 1994) formally requires federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations.

The analysis of potential environmental justice issues associated with wind energy development projects followed guidelines described in the CEQ's *Environmental Justice Guidance under the National Environmental Policy Act* (CEQ 1997b). The analysis method has three parts: (1) the geographic distribution of low-income and minority populations in the affected area is described; (2) an assessment of whether the impacts of construction and operation of the wind turbines would produce impacts that are high and adverse is conducted; and (3) if impacts are high and adverse, a determination is made as to whether these impacts would disproportionately impact low-income or minority populations.

A description of the geographic distribution of low-income and minority population groups was based on demographic data from the 2000 Census (U.S. Bureau of the Census 2001). The following definitions of individuals were used to define low-income and minority populations:

- *Minority*. Persons are included in the minority category if they classify themselves as belonging to any of the following racial groups: Hispanic, Black or African American, American Indian or Alaska Native, Asian, Native Hawaiian or Other Pacific Islander.

  Beginning with the 2000 Census, where appropriate, the census form allows individuals to designate multiple population group categories to reflect their ethnic or racial origin. In addition, persons who classify themselves as being of multiple racial origin may choose up to six racial groups as the basis of their racial origins. The term minority includes all persons, including those classifying themselves in multiple racial categories, except those who classify themselves as not of Hispanic origin and as White or "Other Race" (U.S. Bureau of the Census 2001).

  A minority population exists where the percentage of minority persons for any given geographic unit, a state, for example, is more than 20 percentage points higher than the percentage of minority persons for the reference geographic unit, the 11-state region, for example. A minority population also exists in any geographic unit where the number of minority persons exceeds 50% of the total population.

- *Low-Income*. Low-income individuals are defined as individuals who fall below the poverty line. The poverty line takes into account family size and age of individuals in the family. In 1999, for example, the poverty line for a family of five with three children below the age of 18 was $19,882. For any given family below the poverty line, all family members are considered as being below the poverty line for the purposes of analysis (U.S. Bureau of Census 2001).

  A low-income population exists where the percentage of low-income persons for any given geographic unit, a state, for example, is more than 20 percentage points higher than the percentage of low-income persons for the reference geographic unit, the 11-state region, for example. A low-income population also exists in any geographic unit where the number of low-income persons exceeds 50% of the total population.

The data in Table 4.11-1 show the minority and low-income composition of total population for each of the 11 states and for the 11-state region based on 2000 Census data and CEQ guidelines. Individuals identifying themselves as Hispanic or Latino are included in the table as a separate entry. However, because Hispanics can be of any race, this number also includes individuals identifying themselves as being part of one or more of the population groups listed in the table.

Large numbers of minority individuals occur in some of the 11 states potentially hosting wind energy developments on BLM-administered land. In New Mexico, 55% of the population

TABLE 4.11-1 Minority and Low-Income Composition for the Populations in Each of the 11 States and the 11-State Region

Parameter	Arizona	California	Colorado	Idaho	Montana	Nevada
Total population	5,130,632	33,871,648	4,301,261	1,293,953	902,195	1,998,257
White, Non-Hispanic	3,274,258	15,816,790	3,202,880	1,139,291	807,823	1,303,001
Hispanic or Latino	1,295,617	10,966,556	735,601	101,690	18,081	393,970
Non-Hispanic or Latino Minorities	560,757	7,088,302	362,780	52,972	76,291	301,286
One race	484,385	6,185,307	290,059	34,711	62,523	252,055
Black or African American	149,941	2,181,926	158,443	4,889	2,534	131,509
American Indian or Alaskan Native	233,370	178,984	28,982	15,789	54,426	21,397
Asian	89,315	3,648,860	93,277	11,641	4,569	88,593
Native Hawaiian or Other Pacific Islander	5,639	103,736	3,845	1,200	425	7,769
Some other race	6,120	71,681	5,512	1,192	569	2,787
Two or more races	76,372	903,115	72,721	18,261	13,768	49,231
Total minority	1,856,374	18,054,858	1,098,381	154,662	94,372	695,256
Low-income	698,669	4,706,130	388,952	148,732	128,355	205,685
Percent minority	36.2	53.3	25.5	12.0	10.5	34.8
Percent low-income	13.6	13.9	9.0	11.5	14.2	10.3

TABLE 4.11-1 (Cont.)

Parameter	New Mexico	Oregon	Utah	Washington	Wyoming	11-State Region
Total population	1,819,046	3,421,399	2,233,169	5,894,121	493,782	61,359,463
White, Non-Hispanic	813,495	2,857,656	1,904,265	4,652,490	438,799	36,210,708
Hispanic or Latino	765,386	275,314	201,559	441,509	31,669	15,226,952
Non-Hispanic or Latino Minorities	240,165	288,469	127,345	800,122	23,314	9,921,803
One Race	214,372	205,736	96,037	624,196	17,150	8,466,411
Black or African American	30,654	53,325	16,137	184,631	3,504	2,917,493
American Indian or Alaskan Native	161,460	40,130	26,663	85,396	10,238	856,835
Asian	18,257	100,333	36,483	319,401	2,670	4,413,399
Native Hawaiian or Other Pacific Islander	992	7,398	14,806	22,779	264	168,853
Some other race	3,009	4,550	1,948	11,989	474	109,831
Two or more races	25,793	82,733	31,308	175,926	6,164	1,455,392
Total minority	1,005,551	563,783	328,904	1,241,631	54,983	25,148,755
Low-income	328,933	388,740	206,328	612,370	54,777	7,867,671
Percent minority	55.3	16.5	14.7	21.1	11.1	41.0
Percent low-income	18.1	11.4	9.2	10.4	11.1	12.8

Source: U.S. Bureau of the Census (2001).

is classified as minority, with 53% in California, 36% in Arizona, and 35% in Nevada. While the percentage of minority individuals in any of the 11 states does not exceed the regional average of 41.0% by 20 percentage points or more, the number of minority persons in New Mexico and California exceeds 50% of the total population, meaning that these states have minority populations according to CEQ guidelines. The number of low-income individuals does not exceed the regional average of 12.8% by 20 percentage points or more in any of the states, and does not exceed 50% of the total population in any of the states, meaning that there are no low-income populations in these states when assessed at a state-wide level.