3 WHAT ARE THE POTENTIAL ENVIRONMENTAL CONSEQUENCES OF CORRIDOR DESIGNATION AND LAND USE PLAN AMENDMENT?

3.1 INTRODUCTION

3.1.1 Evaluation of the Environmental Consequences of Corridor Designation and Land Use Plan Amendment

The PEIS evaluates two alternatives: the No Action Alternative and the Proposed Action Alternative. The Proposed Action will designate energy transport corridors on federal lands and develop agency policies on how management and processing of project-specific applications on[1] designated corridors will be implemented. The corridors will be designated through amendment of land use plans or equivalent documents by the affected federal agencies.

Chapter 3 describes the nature and condition of potentially affected resources in the 11 western states as well as descriptions of the types of impacts that are typical during the construction, operation, and decommissioning of energy transport projects, regardless of project location and in the absence of mitigation. In other words, these are the types of impacts associated with clearing a ROW for an energy transport project and building, operating, and ultimately decommissioning a pipeline or electric transmission line within that ROW. In addition to a description of typical project-level impacts, Chapter 3 also identifies resource-specific mitigation measures that may be implemented to avoid or minimize project-specific impacts. This programmatic analysis is therefore applicable not only to the federal lands within the corridors, but to federal and nonfederal lands that might also be affected by any specific ROW and project that extends beyond the designated corridors, or by ROWs and projects proposed under the No Action Alternative.

The decision to designate specific corridors and to amend land use plans would not approve projects within the corridors, nor would it require future energy transport projects to be located within these designated corridors. Future energy transport projects may be proposed to cross federal lands in ROWs that are outside of any designated corridor. Projects crossing state and private lands would be subject on those lands to all applicable state and local environmental regulations, as well as any stipulations required by the applicable state and/or local authorizing agency. Currently, any requested use of federal lands must demonstrate compliance with all applicable federal, state, and local regulations in order to use federal land. Such compliance is considered during the approval process and required prior to use of the federal land. That process would be unchanged by the designation of the Section 368 corridor. Section 368 and the designation of energy corridors on federal lands do not preempt in anyway state authority to make decisions regarding routes with respect to private and state lands. All projects that propose to use Section 368 corridors and that also involve state and private lands would be subject to all current state and local laws and regulations. Projects involving Tribal lands will also need to comply with current processes for obtaining ROWs on Tribal lands.

It is not possible to identify specific impacts from future project development within designated corridors without project-specific location and design details. For example, the effects of a pipeline within a corridor would be different from that of a transmission line; the siting of a transmission line on one side of a corridor would differ in its impacts from that a half-mile away but still within a corridor. Thus,

---

[1] Shaded text indicates portions of the document that underwent revision between the draft and the final PEIS in response to comments received during the public comment period as well as additional information provided by local federal land managers and resource specialists.

the evaluation of environmental consequences presented in this PEIS has focused on those resources most likely to be affected during future energy transport projects. Since project specifics are not known at this time, this analysis takes a programmatic approach. The subsequent analyses of project-specific environmental impacts would be conducted during project-specific NEPA analyses for all projects seeking ROW authorization within a Section 368 energy corridor.

An overview of the energy transport technologies that could be developed and implemented in the future, regardless of the alternatives, is presented in Appendix G. This appendix also presents an example of a hypothetical set of energy transport projects that could be developed within a 3,500-foot wide Section 368 energy corridor. This example provides information on the design parameters for constructing, operating, and decommissioning several different types of energy transport projects. It gives the reader an idea of what future development might look like within a designated corridor and within individual ROWs.

The programmatic evaluation of potential impacts to the environment provides the public and the agencies with useful information for considering the effects of project development under each of the alternatives. The programmatic analyses identifies the types of project activities and resources that would be considered and evaluated at the project level during permitting and authorization (including project-specific NEPA), construction, and operation, and prepares those involved to address these issues. In addition, these analyses provide reference materials for later implementation-level studies and provide standard mitigation measures that, together with the required programmatic IOPs, may be used as appropriate during future development to avoid or minimize project-specific environmental impacts.

3.1.2 Organization of Chapter 3

Information regarding each of the resources evaluated in this PEIS is presented as follows. Each resource is presented separately. For each resource, a description is presented of the resource in the 11 western states that could be associated with the two alternatives considered in this PEIS. Next, a description is provided of the methods used to identify the extent to which the resource would be associated with each of the alternatives. Next, qualitative and quantitative descriptions are provided of the nature and magnitude of the resource that would be directly associated with each alternative and thus may be affected by future project development. A description is then provided of the types of impacts that could be incurred by the resource from the construction and operation of an energy transport project. Resource-specific mitigation measures are also presented that could be used (together with the required IOPs identified in Section 2.4) to minimize, avoid, or compensate for project-specific impacts.

3.2 LAND USE

3.2.1 What Are the Federal and Nonfederal Uses of Land in the 11 Western States?

3.2.1.1 Federal Lands Overview

The federal government owns about 653.3 million acres (about 28%) of the land in the United States (GSA 2005). The majority of this land is administered by four federal agencies: the BLM (261.8 million acres, or 40.1%), the FS (192.7 million acres, or 29.5%), the USFWS (96.3 million acres, or 14.7%), and the NPS (79.0 million acres, or 12.1%) (BLM 2006d; FS 2006a; USFWS 2006a; NPS 2006b). The DOD manages most of the remainder (about 29.2 million acres) (DOD 2006). In the western states, the federal government's ownership of land is much higher, averaging about one-half of the land (Table 3.2-1). Tables 3.2-2 and 3.2-3 present the

TABLE 3.2-1 Acreage and Percentage of Public Lands for the 11 Western States as of FY2005

State	Total State Acreage[a]	Public Land Acreage[b]	Percent Land Federally Owned
Arizona	72,688,000	34,527,965	47.5
California	100,206,720	48,736,912	48.6
Colorado	66,485,760	24,241,592	36.5
Idaho	52,933,120	33,181,787	62.7
Montana	93,271,040	29,567,499	31.7
Nevada	70,264,320	59,564,427	89.8
New Mexico	77,766,400	27,076,008	34.8
Oregon	61,598,720	32,758,177	53.2
Utah	52,696,960	33,813,808	64.2
Washington	42,693,760	13,204,049	30.9
Wyoming	62,343,040	28,100,863	45.1
Total	752,947,840	364,773,087	48.4

[a] State acreages from GSA (2005).

[b] Tallies include land managed by BLM, FS, NPS, USFWS, and DOD.

Sources: BLM (2006d); GSA (2005); NPS (2006b); FS (2006a); USFWS (2006a); DOD (2006).

total acreage and percentage of acreage, respectively, that are managed by the BLM, FS, NPS, USFWS, and DOD in the 11 western states as of FY2005. Maps showing federal land ownership for the 11 western states are provided in the State Base Map Series (Volume II, Part 2, of this document). A complete listing of sites for each of the 11 western states is presented by agency in Appendix M.

Each of the federal agencies manages its lands and resources according to its mission and responsibilities. BLM and FS lands are managed for recreation, timber harvesting, livestock grazing, oil and gas production, mining, wilderness protection (e.g., water and wildlife habitat), and other purposes. The NPS manages lands for the conservation, preservation, protection, and interpretation of the nation's natural, cultural, and historic resources. The USFWS manages its lands for the conservation and protection of fish and wildlife and their habitats (GAO 1996). The DOD manages its land to provide realistic test and training environments for military operations as required by Title 10 (Armed Forces) of the USC.

The designation of energy corridors and land use plan amendments under Section 368 could affect land use on federal lands. The acreages and land uses that could be affected are discussed in Section 3.2.3.

BLM. The BLM was created in 1946 by merging two agencies, the General Land Office and the U.S. Grazing Service. The agency currently manages 261.8 million acres of land, about 11% of the U.S. land area. Lands managed include grasslands, forests, high mountains, Arctic tundra, and deserts. These lands are often intermingled with other federal or private lands. The BLM also manages the 700 million acres of subsurface mineral resources on these federal lands and supervises the mineral operations on about 56 million acres of Indian Trust land. The

TABLE 3.2-2 Acreage of Public Lands Administered by the BLM, FS, NPS, USFWS, and DOD in the 11 Western States as of FY2005

State	BLM	FS	NPS	USFWS	DOD[a]
Arizona	12,218,180	11,263,640	4,760,422[b]	1,725,611	4,560,112
California	15,230,638	20,785,483	8,212,968[c]	468,263	4,039,560
Colorado	8,363,916	14,504,625	727,616[d]	163,130	482,305
Idaho	12,001,817	20,464,466	486,043	92,057	137,404
Montana	7,963,511	16,932,604	3,356,804[e]	1,277,498	37,082
Nevada	47,824,624	5,841,209	77,180	2,416,909	3,404,005
New Mexico	13,372,014	9,420,432	391,029	385,052	3,507,481
Oregon	16,135,761	15,726,114	199,230	578,109	118,963
Utah	22,858,179	8,194,426	855,550	112,482	1,793,171
Washington	408,580	9,279,134	1,965,133	344,963	1,206,239
Wyoming	18,366,584	9,239,172	344,150	102,680	48,277
Total	174,743,804	141,651,305	21,376,125	7,666,752	19,334,599

[a] Numbers represent total acreages of installations that meet the criteria of at least 10 acres in size and a plant replacement value (PRV) of at least $10 million (in some cases, only a portion of the acreage is owned by DOD; see Appendix M).

[b] Includes land shared with Utah and Nevada.

[c] Includes land shared with Nevada.

[d] Includes land shared with Utah.

[e] Includes land shared with North Dakota, Idaho, and Wyoming.

Sources: BLM (2006d); DOD (2006); FS (2006a); NPS (2006b); USFWS (2006a).

agency is responsible for wildland fire management and suppression on about 370 million acres of DOI, other federal, and certain nonfederal land (BLM 2006d; Vincent et al. 2001).

The BLM manages a variety of lands within the 11 western states, including rangelands, forests, wetlands, and lakes (Table 3.2-4). Land uses include livestock grazing; fish and wildlife development and utilization; oil, gas, and mineral exploration and development; ROWs; outdoor recreation; and timber production. These uses 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, so that "public lands and their various resource values … are utilized in the combination that will best meet the present and future needs of the American people" (from Section 103(c) of FLPMA). The FLPMA ensures there is no predominant or single use that overrides the multiple-use concept on any of the lands managed by the BLM. Multiple uses of BLM-administered lands (and resources) are described as follows:

- *Domestic livestock grazing.* The BLM issued 17,940 grazing permits and leases in FY2005, primarily for cattle and sheep. It also issued permits for domestic horses, burros, sheep, goats, bison, and reindeer. Livestock grazing is managed on about 90% of the BLM-administered public lands (about 158.9 million acres) in the 11 western states (BLM 2005f, 2006h).

TABLE 3.2-3 Percentage of State Acreage Administered by the BLM, FS, NPS, USFWS, and DOD in the 11 Western States as of FY2005

State	BLM	FS	NPS	USFWS	DOD
Arizona	16.8	15.5	6.5[a]	2.4	6.3
California	15.2	20.7	8.2[b]	0.47	4.0
Colorado	12.6	21.8	1.1[c]	0.25	0.73
Idaho	22.7	38.7	0.92	0.17	0.26
Montana	8.5	18.2	3.6[d]	1.4	0.040
Nevada	68.1	8.3	0.11	3.4	4.8
New Mexico	17.2	12.1	0.50	0.50	4.5
Oregon	26.2	25.5	0.32	0.94	0.19
Utah	43.4	15.6	1.6	0.21	3.4
Washington	1.0	21.7	4.6[e]	0.81	2.8
Wyoming	29.5	14.8	0.55	0.16	0.077

[a] Includes land shared with Utah and Nevada.

[b] Includes land shared with Nevada.

[c] Includes land shared with Utah.

[d] Includes land shared with North Dakota, Idaho, and Wyoming.

[e] Includes land shared with Alaska.

Sources: Calculated from numbers provided in BLM (2006d); DOD (2006); FS (2006a); NPS (2006b); USFWS (2006a). State acreages from GSA (2005).

- *Fish and wildlife development and utilization.* Fish and wildlife habitat spans all of the lands and waterways managed by the BLM. In FY2005, about 39.12 million acres of BLM land were managed as conservation lands under the National Landscape Conservation System (NLCS) in the 11 western states; another 10.37 million acres were classified as Areas of Critical Environmental Concern (ACECs). The agency works with state wildlife management agencies that are responsible for managing fish and wildlife populations on its lands. It funds many fish- and wildlife-related projects annually and plays an important role in the development and implementation of conservation plans for at-risk species (BLM 2005f, 2006h).

- *Mineral exploration, development, and production.* Energy and mineral resources have the highest economic production values among commercial uses for surface lands and subsurface estates administered by the BLM in the 11 western states (the acreage totals for these resources are summarized in Table 3.2-5). These economic production values include exploration, development, and production of oil and natural gas and the ROWs for oil and gas pipelines; and locatable, leasable, and salable solid minerals. Locatable minerals, defined under the General Mining Law of 1972, can be obtained by locating a mining claim; they include both metallic (e.g., gold, silver, and lead) and nonmetallic (e.g., gemstones, fluorspar, and mica) materials. Leasable

TABLE 3.2-4 Types of Lands Managed by BLM in the 11 Western States

States	Types of Land							
	Rangelands[a] (acres)	Forests (acres)	Woodlands (acres)	Wetlands (acres)	Lakes (acres)	Reservoirs (acres)	Riparian Areas (miles)	Fishable Streams (miles)
Arizona	11,500,045	20,000	1,054,000	22,260	1,164	10,160	882	160
California	8,150,165	204,000	2,004,000	15,081	129	65	2,492	1,071
Colorado	7,732,687	1,069,000	3,041,000	9,818	561	18,149	4,344	2,934
Idaho	11,789,170	512,000	380,000	3,842	687	36,924	4,213	3,350
Montana	8,120,526[b]	783,000	27,000	13,165	3,500	34,000	4,134	1,234
Nevada	45,824,954	5,000	6,269,000	18,655	24,570	11,300	2,614	2,381
New Mexico	12,558,882[c]	44,000	941,000	3,674	21	1,131	458	278
Oregon	13,601,477[d]	2,410,000	931,000	149,913[d]	59,375[d]	14,146[d]	7,856[d]	3,534[d]
Utah	22,089,791	338,000	5,735,000	17,711	2,906	24,828	5,067	2,644
Washington	–[d]	36,000	14,000	–[d]	–[d]	–[d]	–[d]	–[d]
Wyoming	17,494,288	474,000	530,000	14,921	3,573	33,181	4,508	2,475
Total	158,861,985	5,895,000	20,926,000	269,040	96,486	183,884	36,568	20,061

[a] Acreage of rangelands is estimated from the acreage of grazing allotments granted by the BLM.

[b] Includes North Dakota and South Dakota acreage.

[c] Includes Oklahoma acreage.

[d] Washington acreage included with the Oregon tally.

Sources: BLM (2005f); Stamm (2004).

TABLE 3.2-5 Surface and Subsurface Mineral Lands Managed by BLM within the 11 Western States (in millions of acres)

State	Surface Land[a]	Subsurface Mineral Estates Underlying Federal Surface Lands[b]	Tribal Lands Where the BLM Has Trust Responsibility for Mineral Operations[b]	Subsurface Mineral Estates Underlying Private or State Trust Land[b]
Arizona	12.2	33.0	20.7	3.0
California	15.2	47.0	0.59	2.5
Colorado	8.4	27.1	0.80	5.9
Idaho	12.0	37.0	0.59	1.8
Montana	8.0	27.5	5.5	11.7
Nevada	47.8	56.1	1.2	0.25
New Mexico	13.4	36.0	8.4	9.5
Oregon	16.1	34.2	0.78	1.7
Utah	22.9	33.9	2.3	1.2
Washington	0.41	11.6	2.6	0.28
Wyoming	18.4	30.9	1.9	12.2
Total	174.8	374.3	45.4	50.0

[a] Data from BLM (2006d).

[b] Data from FY2002; BLM (2003 a-j).

Sources: BLM (2003a-j, 2006d).

minerals are subject to the Mining Leasing Act of 1920 (MLA) and include energy (e.g., coal) and nonenergy (e.g., sodium, phosphate) resources; leases to these resources are obtained through a competitive bidding process. Salable minerals include basic natural resources such as sand and gravel that the BLM sells to the public at fair market value. The BLM may also grant free-use leases to states, counties, or other government entities for public projects (BLM 2005f).

- *Rights-of-way.* ROWs consist of any easement, lease, permit, or license to occupy, use, or traverse public lands. The BLM has been granted the authority by the FLPMA and MLA to grant, issue, or renew ROWs for reservoirs, pipelines, transmission lines, and transportation routes (e.g., roads, highways, trails, and railways). In FY2005, the BLM had a total of 88,729 ROWs covering an area of about 5.5 million acres in the 11 western states (BLM 2005f, 2006h).

- *Outdoor recreation.* The vast majority of the American public's interaction with BLM-managed lands is through outdoor recreational activities. In FY2005, more than 50 million visitors participated in activities such as rafting, hiking, biking, hunting, fishing, and camping. Other activities include visits to heritage sites, national monuments, wild and scenic rivers, wilderness areas, national trails, and national conservation areas (BLM 2005f).

- *Timber production.* About 55 million acres of BLM land fall under the categories of forests (20%) and

woodlands (80%). In the 11 western states, about 26.8 million acres of BLM land are considered forest (22%) and woodlands (78%) (Table 3.2-4). BLM defines forests as lands with 10% or greater stocking in tree species used in commercially processed wood products (e.g., lumber, plywood, and paper). Woodlands are lands with 10% or greater stocking in tree species not typically used in commercial wood products (such as pinyon pine, juniper, and black spruce). Timber production is just one aspect of the BLM's forest management program. Most of the productive forests managed by BLM are in Oregon, with about 496,000 acres available to be managed for timber production (BLM 2005f).

Table 3.2-6 summarizes the best available information on the acreage used for commercial activities on BLM-administered lands within each 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, statistics on these uses are not available.

FS. Congress established the FS in 1905 to provide quality water and timber for the nation's benefit. Its mission is to sustain the health, diversity, and productivity of the nation's forests and grasslands to meet the needs of present and future generations. The National Forest System (NFS), which consists of 155 national forests (188.0 million acres) and 20 national grasslands (3.8 million acres), makes up most of the lands managed by the FS. The NFS encompasses aquatic and terrestrial ecosystems, including tropical and boreal forests, grasslands, and important wetlands. Other lands, including purchase units, research and experimental areas, and land utilization projects, make up the remainder (884,919 acres) for a total throughout the United States of about 192.7 million acres. More than 70% (about 141.7 million acres) of lands administered by the FS are in the West (FS 2006a, 2006b; Vincent et al. 2001). Another 39.7 million acres (classified as "other acreage") not owned or managed by the FS occur within the boundaries of the NFS. About 14.8 million acres are classified as "other" in the 11 western states.

Table 3.2-7 provides a breakdown of the types of lands managed by the FS in the 11 western states. These include:

- *National forests.* A unit of land formally established and permanently set aside and reserved for national forest purposes (e.g., as rangeland, timberland, and recreation land).

- *National grasslands.* A unit of land designated by the Secretary of Agriculture and permanently held by the Department of Agriculture Title III of the Bankhead-Jones Farm Tenant Act (1937).

- *Land utilization projects.* A unit of land designated by the Secretary of Agriculture for conservation and utilization under Title III of the Bankhead-Jones Farm Tenant Act (1937).

- *Purchase units.* A unit of land designated by the Secretary of Agriculture or previously approved by the National Forest Reservation Commission for purposes of Weeks Law acquisition.

- *Research and experimental areas.* A unit of land reserved and dedicated by the Secretary of Agriculture for forest and range research and experimentation.

- *National preserves.* A unit of land established to protect and preserve scientific, scenic, geologic, watershed, fish, wildlife, historic, cultural, and recreational values, and to provide for multiple use and sustained yield of its renewable resources.

TABLE 3.2-6 Commercial Use Activity on BLM-Administered Lands in the 11 Western States

State	Commercial Use Activity						
	Grazing Allotments (acres)[a]	Timber Harvest (acres)[b]	Oil and Gas Leasing (acres in producing status)[c]	Geothermal Production (acres in producing leases)[d]	Coal Production (acres in producing leases)[d]	Nonenergy Leasables (acres under lease)[b]	ROWs (acres)[b]
Arizona	11,500,045	–[e]	0	2,084	–	4	315,522
California	8,150,165	318	70,339	90,397	–	36,772	216,410
Colorado	7,732,687	27	1,340,546	–	79,050	21,762	181,916
Idaho	11,789,170	1,973	–	2,465	–	43,274	285,082
Montana	8,120,526[f]	674	736,958	–	34,635	1,409	243,382
Nevada	45,824,954	–	15,498	322,239	–	1,560	624,861
New Mexico	12,558,882	–	3,769,487	4,581	25,272	136,396	402,266
Oregon	13,601,477[g]	23,993[g]	–	54,151	–	–	2,504,191[g]
Utah	22,089,791	–	916,106	8,047	106,514	87,117	392,048
Washington	(g)	(g)	0	–	521	–	(g)
Wyoming	17,494,288[d]	–	3,719,919	–	174,746	84,286	316,073
Total	158,861,985	26,985	10,568,853	483,964	420,738	412,580	5,481,751

[a] Data from FY2004.

[b] Data from FY2002.

[c] Data from FY2004.

[d] Data from FY2005.

[e] A dash indicates no activity.

[f] Includes North Dakota and South Dakota acreage.

[g] Washington acreage included with the Oregon tally.

Sources: BLM (2003a-j, 2005f,g, 2006h); Stamm (2004).

TABLE 3.2-7 Types of Lands Managed by the FS in the 11 Western States

	Types of Land (acres)						
State	National Forests	National Grasslands	Land Utilization Projects	Purchase Units	Research and Experimental Areas	National Preserves	Other
Arizona	11,263,640	–[a]	–	–	–	–	–
California	20,752,006	18,425	–	3,996	4,783	–	6,273
Colorado	13,868,484	636,141	–	–	–	–	–
Idaho	20,416,313	47,790	–	363	–	–	–
Montana	16,932,447	–	–	–	–	–	157
Nevada	5,841,209	–	–	–	–	–	–
New Mexico	9,091,897	136,417	240	–	–	89,716	102,162
Oregon	15,548,851	112,357	856	4,982	–	–	59,068
Utah	8,138,796	–	–	–	55,630	–	–
Washington	9,276,196	–	738	2,200	–	–	–
Wyoming	8,691,370	547,802	–	–	–	–	–
Total	139,821,209	1,498,932	1,834	11,541	60,413	89,716	167,660

[a] A dash indicates no acreage.

Source: FS (2006a).

The FS uses a multiple-use land management approach based on the principles outlined in the Multiple Use Sustained Yield Act of 1960 (16 USC 528) to sustain healthy ecosystems, repair damaged ecosystems, and address the need for resources and commodities. Multiple uses include:

- Administering and managing recreation, wilderness, and heritage areas and other congressionally designated areas (e.g., wild and scenic rivers and national recreation areas);
- Restoring, recovering, conserving, and enhancing fish and wildlife and their habitats;
- Managing forest, rangeland, minerals, and water resources in a sustainable manner;
- Conducting resource inventories and assessments of NFS lands; and
- Providing a safe environment for the public and for FS employees (FS 2003).

The agency authorizes and administers the use of public lands by individuals, companies, organized groups, other federal agencies, and state or local levels of government to protect natural resource values and public health and safety. The following are some of the land uses authorized by the FS's Lands and Realty Management Program that relate to infrastructure for generating and transmitting energy resources:

- Electricity transmission facilities,
- Oil and gas pipelines,

- Hydropower facilities, and
- Wind and solar facilities (FS 2004).

The FS also authorizes land uses pertaining to communications, commerce, public health and safety, and homeland security. These include:

- Fiber-optic and wireless telecommunications,
- Water development systems, and
- Federal, state, and local highways (FS 2004).

NPS. The NPS was created in 1916 to protect the national parks and monuments managed by the DOI (35 at that time) and those yet to be established. The agency currently manages a network of about 390 natural, cultural, and recreational sites across the United States, covering about 79 million acres of federal land, including national parks, national monuments, battlefields, military parks, historical parks, historical sites, lakeshores, seashores, recreation areas, reserves, preserves, and scenic rivers and trails. The agency also manages about 5.5 million acres of nonfederal land across the United States, for a total of 84.5 million acres managed, of which about a quarter are located in the West (NPS 2006b,c; Vincent et al. 2001). Of the 21.38 million acres managed in the 11 western states, about 13.67 million acres (64%) are national parks (Table 3.2-8).

USFWS. The USFWS was established in a 1940 reorganization plan when the Department of the Interior consolidated the Bureau of Fisheries and the Bureau of Biological Survey into one agency. The USFWS manages the 96.3-million-acre NWRS, which encompasses 547 national wildlife refuges, thousands of small wetlands, and other special management areas throughout the United States. The Bankhead-Jones Farm Tenant Act, passed in 1937, was the authority used for establishing a number of wildlife refuges across the United States. Today, the NWRS makes up most (7.4 million acres) of the lands managed by the USFWS in the 11 western states (Table 3.2-9). The remaining 10,299 acres are comprised of administrative sites and national fish hatcheries (USFWS 2006a,b). These categories are defined by the USFWS as follows:

- *National wildlife refuge.* Any area of the NWRS, excluding coordination areas and waterfowl production areas. Includes wilderness areas (service land managed in accordance with the terms of the Wilderness Act of 1964) and migratory waterfowl refuges (service land managed for the benefit of migrating waterfowl and other wildlife under the Fish and Wildlife Coordination Act).
- *Waterfowl production area.* Any wetland or pothole area acquired pursuant to the Migratory Bird Hunting and Conservation Stamp Act or other statutory authority and administered as part of the NWRS and identified by county designation.
- *Coordination area.* Any area administered as part of the NWRS and managed by the state under cooperative agreements between the USFWS and the state's fish and wildlife agency.
- *National fish hatchery.* A facility where fish are raised. Hatchery objectives are to replenish depleted stocks, mitigate federal water projects, assist with the management of fishery resources on federal (primarily USFWS) and Tribal lands, and enhance recreational fisheries.
- *Administrative sites.* Land used to support administrative programs, such as maintenance facilities or offices and off-site visitor centers.

TABLE 3.2-8 Designated Lands (both Federal and Nonfederal) Managed by the NPS in the 11 Western States[a]

	Designated Land (acres)											
State	National Historic Park	National Historic Site	National Monument	National Memorial	National Park	National Recreation Area	National Seashore	National Preserve	National Reserve	National Battlefield	Other	Total
Arizona	360	1,160	473,907	4,750	1,530,464	2,749,781[b]	–[c]	–	–	–	–	4,760,422
California	195	1,201	74,553	–	6,258,572[d]	275,897[e]	71,070	1,531,480	–	–	–	8,212,968
Colorado	–	13,382	237,628[f]	–	362,197	41,972[g]	–	41,686	–	–	30,750	727,616
Idaho	3,208	–	53,644	–			–	410,733	14,107	–	4,351	486,043
Montana	–	1,618		–	3,233,113[h]	120,296[i]	–	–	–	1,776	–	3,356,804
Nevada	–	–		–	77,180		–	–	–	–	–	77,180
New Mexico	40,630	–	303,633	–	46,766		–	–	–	–	–	391,029
Oregon	1,574	–	14,432	–	183,224		–	–	–	–	–	199,230
Utah	–	2,735	14,201	–			–	838,614	–	–	–	855,550
Washington	1,752	333		–	1,663,813	279,912[j]	–	–	19,324	–	–	1,965,133
Wyoming	–	833	9,545	–	309,995		–	–	–	–	23,777	344,150
Total	47,719	21,262	1,181,543	4,750	13,665,324	3,467,858	71,070	2,822,513	33,431	1,776	58,878	21,376,125

[a] Designated lands are those lands authorized by the U.S. Congress to be managed by the NPS, beginning with the Act of March 1, 1872, that established Yellowstone National Park. Additions to the National Park System are generally made through acts of Congress; however, the President has the authority under the Antiquities Act of 1906 to proclaim national monuments on lands already under federal jurisdiction.

[b] Acreage includes Lake Mead National Recreation Area (NRA), which is partially in Nevada, and Glen Canyon NRA, which is partially in Utah.

[c] A dash indicates no acreage.

[d] Includes Death Valley National Park (NP), which is partially in Nevada.

[e] Includes only NPS portions of Whiskeytown NRA, which is administered by the FS.

[f] Includes Dinosaur and Hovenweep National Monuments (NMs), which are partially in Utah.

[g] Includes the Curecanti NRA, which is administered under a cooperative agreement with other federal agencies.

[h] Includes Yellowstone NP, which is partially in Idaho and Wyoming.

[i] Includes Bighorn NRA, which is partially in Wyoming.

[j] Includes the Lake Roosevelt NRA, which is administered under a cooperative agreement with other federal agencies.

Source: NPS (2006b).

TABLE 3.2-9 Types of Lands Managed by the USFWS in the 11 Western States

State	Types of Land (acres)				
	National Wildlife Refuges	Waterfowl Production Areas	Coordination Areas	National Fish Hatcheries	Administrative Sites
Arizona	1,718,543	–[a]	6,896	161	11
California	466,521	–	1,250	491	–
Colorado	158,726	–	1,153	3,207	44
Idaho	83,973	1,878	5,790	416	–
Montana	1,186,385	173,897	6,693	416	–
Nevada	2,352,546	–	63,544	818	–
New Mexico	384,290	–	–	760	2
Oregon	570,080	–	7,169	845	14
Utah	105,185	–	6,765	532	–
Washington	324,980	–	17,522	2,461	0.83
Wyoming	86,269	–	16,291	120	–
Total	7,437,498	175,775	133,073	10,227	72

[a] A dash indicates no acreage.

Source: USFWS (2006a).

DOD. The DOD owns and manages 3,748 sites, covering nearly 30 million acres worldwide, of which about 79% are located in the United States or U.S. territories. Sites range in size from the very small, such as unoccupied locations supporting an Air Force navigational aid on less than one-half acre of land, to the very large, including the Army's White Sands Missile Range in New Mexico with more than 2.3 million acres. The majority of the land controlled by the DOD is government-owned or withdrawn public land (about 80%). The Army manages the largest percentage of the DOD's land (52%); the Air Force manages about 33%. In the 11 western states, the DOD owns and manages 611 installations over 19.3 million acres, with the greatest acreages in Arizona, California, New Mexico, and Nevada (DOD 2006). Table 3.2-10 shows a breakdown in the number of installations by military service. The total acreages of military-owned land in each of the 11 western states are provided in Table 3.2-2.

Other Federally Owned Land. The DOE owns and manages about 3.1 million acres in 35 states across the United States. The majority of the land controlled by the DOE is "ingrant" acreage, including withdrawn public land (73%); owned (834,674 acres) and leased (488 acres) acreages make up the remainder (DOE 2006c). Ingrant properties are those acquired for DOE use by lease, license, or permit. There are currently 25 DOE facilities in 9 of the 11 western states, as shown in Table 3.2-11. The largest DOE acreages are in Idaho and Nevada (DOE 2006b).

The DOI's BOR manages a number of federal facilities, including 348 reservoirs (with a storage capacity of 245 million acre-feet of water), 58 hydroelectric power plants, and more than 300 recreation sites, most of which are in the western states. The agency provides water for about 10 million acres of irrigation land in the western region (DOI 2005b).

TABLE 3.2-10 Number of DOD Facilities by Military Service in the 11 Western States in FY2005

	Military Service[a]				
State	Army	Navy	Air Force	Marine Corps	Total
Arizona	11	4	16	2	33
California	70	101	57	15	243
Colorado	14	2	15	0	31
Idaho	8	5	39	0	52
Montana	13	2	14	0	29
Nevada	4	7	21	0	32
New Mexico	12	3	21	0	36
Oregon	10	5	6	0	21
Utah	19	2	13	0	34
Washington	21	43	24	1	89
Wyoming	2	1	8	0	11
Total	184	175	234	18	611

[a] Numbers represent small, medium, and large installations with plant replacement values greater than zero.

Source: DOD (2006).

3.2.1.2 Federal Lands Managed for Conservation

Of the 345.4 million acres managed by the BLM, FS, USFWS, and NPS in the 11 western states, about half are managed primarily for conservation. These lands include national parks, national wildlife refuges, wilderness and wilderness study areas, wild and scenic rivers, areas of critical environmental concern, and roadless areas (GAO 1996). Table 3.2-12 summarizes the number and percentage of acres managed by the four agencies for conservation for each of the 11 western states. The values in this table represent all of the lands managed by the USFWS and the NPS and portions of the lands managed by the BLM and FS.

The BLM's NLCS was established to provide a national framework for managing Congressionally and Presidentially designated special management areas on public lands. The conservation system includes all of BLM's national monuments, national conservation areas, wilderness areas, wilderness study areas, national wild and scenic rivers, national historic and scenic trails, and other sites like the Yaquina Head Outstanding Natural Area in Oregon. These areas encompass 867 units on about 39.12 million acres in the 11 western states (Table 3.2-13).

Other special management areas (non-NLCS) are managed by the BLM to preserve and protect threatened and endangered species; wild free-roaming horses and burros; significant archaeological, paleontological, and historical sites; and ACECs. These areas encompass 1,302 units on about 40.57 million acres in the 11 western states (Table 3.2-14). The acreages presented in Tables 3.2-13 and 3.2-14 overlap with about 56,500 acres of lands designated as globally important bird areas (e.g., Yaquina Head National Outstanding Natural Area). In total, about 74.91 million acres (the total of 79.69 million acres less 4.78 million acres of overlap), or 43%, of BLM lands are managed for conservation purposes (BLM 2005f,g).

TABLE 3.2-11 Land under DOE Administrative Control in the 11 Western States

State	DOE Facility Name	Location
Arizona	–[a]	–
California	Area IV of Santa Susana Field Laboratory	Santa Susana
	General Electric Vallecitos	Pleasanton
	Laboratory for Energy-Related Health Research	Davis
	Laboratory of Biomedical and Environmental Sciences	Los Angeles
	Lawrence Berkeley National Laboratory	Berkeley
	Lawrence Livermore National Laboratory	Livermore
	Sandia National Laboratories – Livermore	Livermore
	Stanford Linear Accelerator Center	Palo Alto
Colorado	Grand Junction Operations Office	Grand Junction
	Rocky Flats Plant	Golden
Idaho	Idaho National Laboratory	Scoville
Montana	–	–
Nevada	Nevada Site Office	North Las Vegas
	Nevada Test Site	Mercury
	Tonopah Test Range	Tonopah
	Yucca Mountain Site Characterization Project	Yucca Mountain
New Mexico	National Nuclear Security Administration Service Center	Albuquerque
	Los Alamos National Laboratory	Los Alamos
	Lovelace Respiratory Research Institute	Albuquerque
	Project Gasbuggy Nuclear Explosion Site (Remediation)	Farmington
	Sandia National Laboratories	Albuquerque
	Waste Isolation Pilot Plant	Carlsbad
	Carlsbad Field Office	Carlsbad
	Los Alamos Site Office	Los Alamos
Oregon	Albany Research Center	Albany
Utah	Moab Uranium Mill Tailings Site	Moab
Washington	Hanford Site	Richland
	Pacific Northwest National Laboratory	Richland
Wyoming	Naval Petroleum Reserve	Casper

[a] A dash indicates no facilities present.

Source: DOE (2006b).

TABLE 3.2-12 Number and Percentage of Acres Managed for Conservation by the BLM, FS, USFWS, and NPS for the 11 Western States as of FY2005

State	Public Land Acreage	Acreage Managed for Conservation	Percentage of Acreage Managed for Conservation
Arizona	29,967,853	15,544,102	51.9
California	44,697,352	40,042,374	89.6
Colorado	23,759,287	10,809,636	45.5
Idaho	33,044,383	18,224,937	55.2
Montana	29,530,417	15,713,485	53.2
Nevada	56,159,922	29,742,976	53.0
New Mexico	23,568,527	5,860,174	24.9
Oregon	32,639,214	12,703,951	38.9
Utah	32,020,637	14,728,428	46.0
Washington	11,997,810	7,082,144	59.0
Wyoming	28,052,586	14,744,185	52.6
Total	345,437,988	180,419,828[a]	52.2[a]

[a] Total and percentage corrected for 4.8 million acres of overlap among BLM lands designated for conservation. State totals are not corrected; as a result, the calculated total and percentage of acreages managed for conservation for each state may be slightly higher than the actual values.

Sources: Based on data provided in BLM (2006d); FS (2006a); NPS (2006b); USFWS (2006a).

The FS's conservation system includes all areas within the NFS designated as national wilderness areas; national scenic areas; national volcanic monument areas; national protection areas; national monument areas; national primitive areas; national recreation areas; game refuges and wildlife preserves; national scenic research areas; national wild, scenic, and recreation rivers; recreation management areas; special management areas; and scenic recreation areas (Table 3.2-15). These areas encompass about 34.69 million acres of land in the 11 western states. An additional 41.78 million acres of the NFS fall under the special conservation classification of "roadless area" (Table 3.2-16). Roadless areas contain critical watersheds, wildlife habitat, and unique ecosystems and are protected by an administrative rule known as the Roadless Area Conservation Rule, issued by the FS in January 2001. In total, about 76.47 million acres, or 54%, of FS lands are managed for conservation purposes (FS 2006c; NRDC 2006).

3.2.1.3 Recreation on Federal Lands

Federal and state government agencies manage a diversity of recreation areas in the 11 western states. Table 3.2-17 lists the number of recreation areas managed by federal agencies for each state; these include national parks and monuments, historic sites, memorials, scenic areas, wild and scenic rivers, scenic and historic trails, and various types of conservation areas (e.g., wildlife refuges, wilderness areas, preserves, primitive areas). The greatest number of recreation sites are managed by the BLM

TABLE 3.2-13 Special Management Areas Managed by the BLM for Conservation under the National Landscape Conservation System in the 11 Western States as of FY2005

State	Special Management Area (acres)							
	National Monuments	National Conservation Areas	Wilderness Areas	Wilderness Study Areas	National Wild, Scenic, and Recreational Rivers[a]	Other[b]	National Historic and Scenic Trails[c]	Totals[d]
Arizona	1,775,017	121,277	1,396,466	63,930	–[e]	–	1,003	3,356,690
California	291,390	10,729,231	3,552,665	974,769	24,800	7,472	1,690	15,580,327
Colorado	163,892	185,773[f]	139,524	621,737	–	–	–	1,110,926
Idaho	274,800	483,706	802	1,341,709	–	–	1,472	2,101,345
Montana	375,027	–	6,000	450,823	89,300	–	–	921,150
Nevada	–	1,043,422[g]	1,758,613	2,877,917	–	–	711	5,679,952
New Mexico	4,124	227,100	139,281	970,532	22,720	–	60	1,363,757
Oregon	52,947	–	186,723	2,337,762	254,438	428,256	–	3,260,126
Utah	1,870,800	–	27,720	3,260,120	–	–	–	5,158,640
Washington	–	–	7,140	5,518	–	–	–	12,658
Wyoming	–		0	575,841	–	–	213	575,841
Total	4,807,997	12,790,837	7,214,934	13,480,658	391,258	435,728	5,149	39,121,412

[a] See Figure 3.5-5 for locations of wild and scenic rivers in the 11 western states. The congressionally authorized wild and scenic study rivers are not included. Appendix O (Table O-2) provides a list of wild and scenic rivers and congressionally authorized wild and scenic study rivers by state.

[b] Includes Steen's Mountain Cooperative Management and Protection Area (Oregon), Yaquina Head Outstanding Natural Area (Oregon), and Headwaters Forest Preserve (California).

[c] Values presented are in units of miles and are, therefore, not included in the totals for each state. Historic and scenic trails cross many states; values are assigned to the first state listed for each trail in Table 5-7 in the source document (BLM 2006d).

[d] Totals include double counted areas; e.g., some wilderness areas are included within a national monument or national conservation area. As a result, the sum total of conservation acres managed is greater than the actual number of acres managed. There are an estimated 4.8 million acres falling in more than one conservation category (BLM 2005f). Also, totals include BLM-administered lands only; excluded are other federal lands, state lands, and private lands within any given special management area.

[e] A dash indicates no acreage.

Footnotes continued on next page.

TABLE 3.2-13 (Cont.)

[f] Acreage includes land in Utah.

[g] Acreage includes land in California.

Source: BLM (2006d).

TABLE 3.2-14 Other Special Management Areas (non-National Landscape Conservation System) Managed by BLM for Conservation in the 11 Western States as of FY2004

	Special Management Area (acres)				
State	Herd Management Areas	Areas of Environmental Concern[a]	National Natural Landmarks	Research Natural Areas	Total
Arizona	1,727,669	638,110	4,398	14,056	2,384,233
California	2,330,943	3,441,407	76,997	43,512	5,892,859
Colorado	364,467	648,166	1,036	4,665	1,018,334
Idaho	397,190	580,973	212,640	45,181	1,235,984
Montana	28,255	248,576	14,227	–[b]	291,058
Nevada	15,827,077	1,358,234	9,600	–	17,194,911
New Mexico	32,701	595,001	9,927	27,852	665,481
Oregon	2,712,172	894,135	600	143,486	3,750,393
Utah	2,413,952	1,267,389	33,760	6,453	3,721,554
Washington	–	–	6,114	–	6,114
Wyoming	3,664,002	696,894	48,130	–	4,409,026
Total	29,498,428	10,368,885	417,429	285,205[c]	40,569,947

[a] Values for areas of environmental concern are from FY2005, as reported in BLM (2006d).

[b] A dash indicates no acreage.

[c] Total reported for FY2005 had increased to 323,350 acres.

Sources: BLM (2005f, 2006d).

(39.9%), FS (9.4%), NPS (10.2%), USFWS (10.8%), and BOR (17.2%). Many of these sites overlap with the conservation sites discussed in Section 3.2.1.2. Table 3.2-18 lists the number of state parks and recreation areas managed by the states; these include historic sites, monuments, and natural areas.

The number of recreation visits on lands administered by the BLM, FS, NPS, and USFWS for each of the 11 western states are presented in Table 3.2-19; the number of recreation visits on lands administered by the FS (by region) are provided in Table 3.2-20. Visitor statistics for lands administered by the BOR are not available.

Recreation and leisure activities on BLM-administered lands center around unstructured recreation and tourism. In FY2005, camping and picnicking accounted for about 43% of recreation and leisure activities on BLM lands. Other important activities included off-highway travel, 10%; non-motorized travel, 10%; water-based activities (e.g., boating, fishing, and swimming), 9%; specialized sports and events, 8%; hunting, 8%; and resource viewing, 4%. Snow-based activities (e.g., snowmobiling) accounted for the smallest percentage of the total, at less than 1% (BLM 2006d).

Between 2000 and 2003, the top five recreation and leisure activities on NFS lands

TABLE 3.2-15 Conservation Areas Managed by the FS in the 11 Western States as of FY2005

State	Conservation Area (acres)											
	National Wilderness Area	National Scenic Areas	National Volcanic Monument Area	National Protection Area	National Monument Areas	National Primitive Area	National Recreation Areas	National Game Refuge & Wildlife Preserves	National Scenic Research Area	National Wild and Scenic Rivers[a]	Other[b]	Total
Arizona	1,345,008	–[c]	–	–	–	173,762	–	612,736	–	11,600	–	2,143,146
California	4,430,849	–	–	–	392,169	–	481,536	18,910	–	148,493	–	5,471,957
Colorado	3,146,310	–	–	27,600	–	–	32,414	–	–	15,141	135,165	3,356,630
Idaho	3,961,709	–	–	–	–	–	866,213	–	–	159,586	–	4,987,508
Montana	3,372,503	–	–	–	–	–	59,119	–	–	38,353	–	3,469,975
Nevada	873,657	–	–	–	–	–	314,367	–	–	–	–	1,188,024
New Mexico	1,388,262	–	–	–	–	–	57,000	–	–	12,593	–	1,457,855
Oregon	2,086,504	43,377	54,822	–	–	–	428,206	–	6,637	318,902	12,645	2,951,093
Utah	772,894	–	–	–	–	–	94,308	–	–	–	–	867,202
Washington	2,569,391	27,225	112,605	–	–	–	8,473	–	–	20,582	–	2,738,276
Wyoming	3,111,232	–	–	–	–	–	2,912,576	22,075	–	9,605	–	6,055,488
Total	27,058,319	70,602	167,427	27,600	392,169	173,762	5,254,212	653,721	6,637	734,895	147,810	34,687,154

[a] See Figure 3.5-5 for locations of wild and scenic rivers in the 11 western states. The congressionally authorized wild and scenic study rivers are not included. Appendix O (Tables O-2 and O-4) provides a list of wild and scenic rivers and congressionally authorized wild and scenic study rivers by state.

[b] "Other" includes recreation management areas, special management areas, and scenic recreation areas.

[c] A dash indicates no acreage.

Source: FS (2006a).

TABLE 3.2-16 Roadless Areas within the National Forest System as of FY2005

State	Roadless Areas (acres)		
	Total Areas within NFS	Areas Allowing Road Construction and Reconstruction[a]	Areas Not Allowing Road Construction and Reconstruction
Arizona	1,174,000	699,000	476,000
California	4,416,000	2,527,000	1,890,000
Colorado	4,433,000	3,498,000	936,000
Idaho	9,322,000	5,666,000	3,656,000
Montana	6,397,000	3,844,000	2,553,000
Nevada	3,186,000	3,166,000	20,000
New Mexico	1,597,000	430,000	1,167,000
Oregon	1,965,000	1,168,000	797,000
Utah	4,013,000	3,567,000	446,000
Washington	2,015,000	716,000	1,299,000
Wyoming	3,257,000	3,085,000	171,000
Total	41,775,000	28,366,000	13,411,000

[a] Includes 2,530,000 million acres recommended as wilderness in regional forest plans.

Source: FS (2006c).

TABLE 3.2-17 Number of Recreation Areas Managed by Federal Agencies within the 11 Western States

State	Managing Agency[a]										
	BLM	FS	NPS	USFWS	BOR	DOT	USACE	NOS	SIAP	NARA	Total
Arizona	94	183	27	13	7	1	1	0	7	0	333
California	128	545	68	44	36	3	41	6	9	4	884
Colorado	25	218	25	9	32	6	5	0	2	1	323
Idaho	54	183	5	10	20	0	8	0	1	0	281
Montana	15	211	7	23	14	0	3	0	2	0	275
Nevada	61	162	10	9	3	2	0	0	2	0	162
New Mexico	63	69	21	10	11	4	10	0	1	0	189
Oregon	63	246	5	21	22	6	22	1	0	0	386
Utah	98	204	18	6	27	2	0	0	0	0	355
Washington	12	176	33	32	18	2	17	2	2	1	295
Wyoming	41	108	6	9	21	0	0	0	0	0	185

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

Source: Recreation.gov (2008).

TABLE 3.2-18 Number of State Parks, Recreation Areas, Historic Sites, Monuments, and Natural Areas Located within the 11 Western States and Related Web Sites for Each State

State	Number of State Parks	Web Site
Arizona	29	http://www.pr.state.az.us/parks/parklist.html
California	280	http://www.parks.ca.gov/parkindex/results.asp
Colorado	43	http://parks.state.co.us/parksquickfind
Idaho	26	http://www.idahoparks.org/parks/index.aspx
Montana	50	http://fwp.mt.gov/lands/searchparks.aspx
Nevada	24	http://www.parks.nv.gov/parkmap.htm
New Mexico	34	http://www.emnrd.state.nm.us/PRD/index.htm
Oregon	181	http://www.oregonstateparks.org/search_urban.php
Utah	40	http://www.stateparks.utah.gov/visiting/tour.htm
Washington	120	http://www.parks.wa.gov/
Wyoming	34	http://wyoparks.state.wy.us/find_parkshistory.htm

TABLE 3.2-19 Number of Recreation Visits to BLM-, NPS-, and USFWS-Administered Lands in the 11 Western States, FY2005

	Recreation Visits, FY2005			
State	BLM	FS	NPS	USFWS
Arizona	5,557,000	14,309,000	10,799,429	360,195
California	9,604,000	29,786,000	33,400,604	2,602,562
Colorado	5,746,000	25,728,000	5,352,839	53,303
Idaho	5,870,000	7,043,000	446,507	198,345
Montana	4,093,000	8,657,000	3,877,478	630,248
Nevada	6,183,000	7,188,000	5,847,070	182,105
New Mexico	2,384,000	2,912,000	1,650,441	206,798
Oregon	7,190,000	17,196,000	901,254	2,004,858
Utah	6,208,000	10,620,000	8,046,646	39,319
Washington	–[a]	7,935,000	7,091,427	976,535
Wyoming	2,050,000	5,094,000	5,453,845	869,892
Total	54,885,000	138,689,000	82,867,540	8,124,160

[a] Washington visits included with the Oregon tally.

Sources: BLM (2006d); NPS (2006b); USFWS (2008).

TABLE 3.2-20 Number of Recreation Visits to FS-Administered Lands by Region, FY2005

	National Forest Lands (millions)			
Region[a]	National Forest	National Forest Site	Wilderness Area	Viewing Corridor
1 (Northern)	13.2	14.9	0.5	2.8
2 (Rocky Mountain)	32.5	38.4	1.2	42.7
3 (Southwest)	20.5	23.8	1.9	23.7
4 (Intermountain)	23.3	26.2	1.0	12.0
5 (Pacific Southwest)	30.7	38.7	1.0	27.0
6 (Pacific Northwest)	28.2	35.1	1.5	25.7
Total[b]	148.4	177.1	7.1	133.9

[a] States covered by each region are as follows: Region 1 = Northern Idaho, Montana, and North Dakota; Region 2 = Central and Eastern Wyoming, Colorado, South Dakota, Nebraska, and Kansas; Region 3 = Arizona and New Mexico; Region 4 = Nevada, Southern Idaho, Utah, and Western Wyoming; Region 5 = California; Region 6 = Washington and Oregon.

[b] Totals do not reflect overlap in visits to the forest lands listed.

Source: FS (2006d).

administered by the FS were viewing natural features, general relaxation, hiking, viewing wildlife, and driving for pleasure. In the West, most forest visits occurred in Regions 2, 5, and 6, which include the states of Wyoming, Colorado, Washington, Oregon, and California. Downhill skiing is a very popular activity, especially in Region 2, which hosted over 9.5 million skier visits each year. The White River National Forest in Colorado received the most national forest visits (9.7 million), 67% of which were skier visits. Excluding skier visits, the Arapaho Roosevelt National Forest (Colorado) and Tonto National Forest (Arizona) received the most visits during this time (FS 2006d).

Recreation and leisure activities on NPS-administered lands center around outdoor visits to national parks and natural areas. In FY2005, well over 60% of recreation visits to NPS lands in the 11 western states took place at national parks. Other sites most often visited include national recreation areas (16%), national preserves (13%), and national monuments (6%) (NPS 2006b).

A national survey of recreation and leisure activities carried out by the U.S. Census Bureau found that about 21.1 million U.S. residents 16 years old and older participated in wildlife-related recreation activities in the 11 western states in 2001; about 7.5 million people fished, 2.1 million hunted, and 16.8 million participated in at least one type of wildlife-watching activity (observing, feeding, or photographing). The survey found considerable overlap in these activities; in general, about 27% of anglers hunted, 58% of anglers and 62% of hunters also participated in wildlife-watching activities, and 33% of all wildlife watchers also participated in hunting and fishing during the year

TABLE 3.2-21 Number of Participants by Recreation Activity in 2001

State	Number of Participants[a]		
	Fishing	Hunting	Wildlife Watching
Arizona	419,000	148,000	1,465,000
California	2,444,000	274,000	5,720,000
Colorado	917,000	281,000	1,552,000
Idaho	416,000	197,000	643,000
Montana	349,000	229,000	687,000
Nevada	172,000	47,000	543,000
New Mexico	314,000	130,000	671,000
Oregon	687,000	248,000	1,680,000
Utah	517,000	198,000	806,000
Washington	938,000	227,000	2,496,000
Wyoming	293,000	133,000	498,000
Total	7,466,000	2,112,000	16,761,000

[a] Numbers of participants by activity do not add up to the totals presented in Table 3.2-19 because these activities relate to all lands, not just USFWS lands.

Source: USFWS and U.S. Census Bureau (2002).

(USFWS 2002). Table 3.2-21 presents a breakdown of the number of participants by recreation activity for each of the 11 western states.

Recreation and leisure activities on BOR-administered lands center around the agency's many reservoirs and dam facilities. Although visitor statistics are not available by state, the BOR estimates that nationwide about 90 million visitors participate in water-based recreation activities on BOR lands and waters each year (DOI 2005b).

3.2.1.4 Nonfederal Lands

Nonfederal lands in the United States include privately owned lands, Tribal and trust lands, and lands controlled by state and local governments. According to the USDA's National Resources Inventory (NRI), about 1.4 billion acres (71%) of land in the contiguous 48 states have a nonfederal, rural land use classification. These lands are predominantly forest land (406 million acres), rangeland (405 million acres), cropland (368 million acres), and pasture land (117 million acres) (NRCS 2007a). A subset of these lands (about 330 million acres) is defined as prime farmland, i.e., lands with the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oil seed crops and are also available for these uses (NRCS 2003). These lands are subject to protection under the Farmland Protection Policy Act (FPPA; P.L. 97–98, 7 USC 4201 et seq.).

A breakdown of the nonfederal rural lands in the 11 western states, based on the 2003 NRI, is provided in Table 3.2-22. There are about 54.95 million acres of cropland, of which about 71% falls under the category "cultivated," with the highest total acreages occurring in Montana (14.5 million acres), California (9.5 million acres), and Colorado (8.3 million acres). About 261.6 million acres are designated for grazing (as cropland, rangeland, and grazed forest land), with the highest total acreages occurring in New Mexico (44.9 million acres), Montana (43.5 million acres), Wyoming (29.4 million acres), and Colorado (27.8 million acres). Forest land (including grazed forest land) covers about 64.8 million acres of the nonfederal rural West, with the highest acreages occurring in California (13.9 million acres), Oregon (12.7 million acres), and Washington (12.7 million acres). The remainder is comprised of developed land (18.4 million acres), other rural land (18.1 million acres), water areas (9.2 million acres), and Conservation Reserve Program (CRP) land (9.1 million acres). Lands under the CRP land use category are private lands undergoing conversion from highly erodible cropland to vegetative cover under a federal program established by the Food Security Act of 1985 (NRCS 2007b).

TABLE 3.2-22 Breakdown of Nonfederal Rural Lands in the 11 Western States

State	Cropland (acres)[a]		Total Grazing Land (acres)[b]			Forest Land (acres)[c]
	Cultivated	Noncultivated	Pastureland	Rangeland	Grazed Forest Land	
Arizona	704,200	229,700	82,000	32,254,700	3,800,800	4,141,400
California	4,892,900	4,575,300	1,188,600	17,758,000	5,315,700	13,903,200
Colorado	6,945,300	1,402,700	1,001,800	24,790,600	2,039,800	3,289,000
Idaho	4,149,800	1,302,800	1,316,600	6,420,700	1,766,900	4,006,900
Montana	11,408,800	3,117,800	3,594,400	36,697,900	3,190,400	5,402,000
Nevada	105,400	530,700	269,500	8,276,600	238,600	314,000
New Mexico	1,125,200	423,500	232,100	39,955,500	4,751,600	5,477,600
Oregon	2,443,900	1,257,100	1,761,300	9,379,400	3,262,100	12,733,600
Utah	922,600	759,500	722,400	10,666,900	1,395,500	1,875,600
Washington	5,407,200	1,086,600	1,080,100	5,861,000	3,128,900	12,707,100
Wyoming	851,600	1,309,500	1,081,000	27,535,500	774,700	948,600
Total	38,956,900	15,995,200	12,329,800	219,596,800	29,665,000	64,799,000

[a] Cropland is an NRI land use category that includes areas used for the production of adapted crops for harvest. Cultivated cropland comprises land in row crops or close-grown crops and other cultivated cropland (e.g., hay land or pastureland) that is in rotation with row or close-grown crops. Noncultivated cropland includes permanent hay land and horticultural cropland.

[b] Total grazing land is comprised of pastureland, rangeland, and portions of forest land designated for grazing. Pastureland is an NRI land use category of land managed primarily for the production of introduced forage plants for livestock grazing; it may consist of a single species in a pure stand, a grass mixture, or a grass-legume mixture. For the NRI, pastureland includes land that has a vegetative cover of grasses, legumes, and/or forbs, regardless of whether or not it is being grazed by livestock. Rangeland is an NRI land use category on which the plant cover is composed mainly of native grasses, grass-like plants, forbs or shrubs suitable for grazing and browsing, and introduced forage species that are managed like rangeland. Grasslands, savannas, many wetlands, some deserts, and tundra are considered to be rangeland. Certain communities of low forbs and shrubs, such as mesquite, chaparral, mountain shrub, and pinyon-juniper, are also included as rangeland. Forested grazing land consists mainly of forest, brush-grown pasture, arid woodlands, and other areas within forested areas that have grass or other forage growth. Estimates of forested grazed land include significant areas grazed only lightly or sporadically.

[c] Forest land is an NRI land use category that is at least 10% stocked by single-stemmed woody species of any size that will be at least 13 feet tall at maturity. Also included is land bearing evidence of natural regeneration of tree cover (cut over forest or abandoned farmland) and not currently developed for nonforest use. The minimum area for classification as forest land is 1 acre, and the area must be at least 100 feet wide.

Source: NRCS (2007a).

Prime farmland covers about 19.7 million acres of nonfederal rural land in the 11 western states, with the highest acreages occurring in California (5.5 million acres), Oregon (3.5 million acres), Idaho (3.3 million acres), and Washington (2.3 million acres). Table 3.2-23 shows the breakdown of prime farmland by land use for 1997 (the latest date for which state figures are available). Between 1982 and 2001, prime farmland acreage has declined by about 3.5% nationwide (NRCS 2003).

The BIA holds in trust and administers about 55.7 million acres of land across the United States; of this total, about 45 million acres are Tribally owned and 10 million acres are individually owned, held in trust status. Another 205,521 acres are "stewardship lands" administered for recreation, conservation, and functions vital to the culture and livelihood of the American Indians. Forests cover about 18 million acres of Indian trust land across 26 states (BIA 2006).

There are about 275 Tribal land areas administered as Indian reservations; the largest of these is the 15.6 million acres Navajo reservation and trust lands in Arizona, New Mexico, and Utah (U.S. Bureau of the Census 2006d). Maps showing their locations by state are provided in the State Base Map Series (Volume III, Part 2 of this document). A complete listing of reservations and trust lands for each state is presented in Appendix M.

3.2.1.5 Aviation Considerations

Because of air navigation concerns associated with tall structures and structures built near airports, the locations of airports (and their related airspaces) and the flight patterns of various aircraft need to be taken into account when siting infrastructure (e.g., electricity transmission towers) along energy corridors. The FAA must be contacted for any proposed construction or alteration of objects within navigable airspace under the following categories:

- Proposed objects more than 200 feet above ground level at the structure's proposed location;
- Within 20,000 feet of an airport or seaplane base that has at least one runway longer than 3,200 feet, and the proposed object would exceed a slope of 100:1 horizontally from the closest point of the nearest runway;
- Within 10,000 feet of an airport or seaplane base that does not have a runway more than 3,200 feet 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 feet 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 feet above ground level, or that is not within the distances from airports or heliports mentioned above, because of its particular location (FAA 2000).

The numbers of public airports that occur in each of the 11 western states are as follows: Arizona, 81; California, 261; Colorado, 77; Idaho, 120; Montana, 122; Nevada, 52; New Mexico, 59; Oregon, 98; Utah, 47; Washington, 140; and Wyoming, 41 (AirNav.com 2006). These numbers do not include the numerous private and military-use facilities that occur in these states.

The U.S. military uses airspace for its operations, some of which occur at low elevations (from 1,000 feet to as low as ground surface). Airspace restrictions under the

TABLE 3.2-23 Breakdown of Prime Farmland Acreage by Land Use in the 11 Western States[a]

State	Cropland	CRP Land	Pastureland	Rangeland	Forest Land	Other Rural Land	State Totals
Arizona	901,000	0	34,500	0	0	0	935,500
California	5,095,800	0	232,800	112,900	11,000	66,000	5,518,500
Colorado	1,572,900	2,000	94,600	5,000	0	3,800	1,678,300
Idaho	2,816,800	100,300	229,100	63,000	30,900	26,100	3,266,200
Montana	836,900	0	117,700	7,300	3,600	19,600	985,100
Nevada	246,300	0	15,300	0	0	0	261,600
New Mexico	124,700	0	19,800	0	0	0	144,500
Oregon	2,171,000	189,000	545,700	252,400	257,400	100,500	3,516,000
Utah	702,600	4,200	93,000	3,500	300	4,500	808,100
Washington	1,293,000	38,800	327,100	28,000	503,200	95,800	2,285,900
Wyoming	306,900	4,000	11,900	6,300	0	700	329,800
Total	16,067,900	338,300	1,721,500	478,400	806,400	317,000	19,729,500

[a] Prime farmland is designated independently of current land use, but it cannot be in areas of water or urban or built-up land as defined by the NRI. Maps showing areas of prime farmland and related data and statistics can be accessed at NRCS's National Cartography and Geospatial Center (http://www.ncgc.nrcs.usda.gov/products/nri/index.html) and the Farmland Information Center (http://www.farmlandinfo.org/farmland_technical_resources).

Source: NRCS (2000).

TABLE 3.2-24 Acreage of Tribal Lands in the 11 Western States[a]

State	Acreage
Arizona	9,755,136
Arizona–California	320,704
Arizona–California–Nevada	32,768
Arizona–New Mexico	2,049,664
Arizona–New Mexico–Utah	14,001,792
California	620,928
Colorado	677,504
Colorado–New Mexico–Utah	568,896
Idaho	1,669,184
Montana	8,364,736
Montana–South Dakota	2,048
Nevada	1,148,992
Nevada–Oregon	34,944
Nevada–Utah	113,536
New Mexico	3,649,280
Oregon	851,584
Utah	4,389,952
Washington	4,579,712
Wyoming	2,221,696
Total	55,053,056

[a] This table presents acreage totals for reservations and trust lands based on U.S. Census Bureau records. It may not coincide with the list of Tribes presented in Appendix C, since single reservations may have more than one Tribe and some federally recognized Tribes do not have reservations. Reservations and trust lands crossing state boundaries are tallied separately from state totals (e.g., the Navajo Reservation which occupies area in Arizona, New Mexico, and Utah).

Source: U.S. Bureau of the Census (2006d).

designations Military Training Routes (MTRs) and Special Use Airspace (SUA), which include Military Operating Areas (MOAs), cover about 37% of federal land in the 11 western states (with about 6% overlap between them). MTRs have the greatest coverages in New Mexico (55%) and Nevada (47%) and the least coverages in Wyoming (5%) and Colorado (4%). SUAs also have the greatest coverages in Nevada (29%) and California (23%) and the least coverages in Wyoming (<10%) and Colorado (2%). The overlap between MTRs and SUAs in New Mexico is 9%. Appendix L provides a listing of proposed energy corridors that would intersect or occur near MTRs and SUAs under the Proposed Action. Development within these corridors would require consultation with the DOD during project planning to ensure projects do not conflict with DOD training activities.

Figure 3.2-1 shows the extent of military airspace restrictions at elevations of 1,000 feet or less (excluding areas that extend offshore). Military operations could be adversely affected by energy transport facilities if they were to penetrate the floor (i.e., the lowest elevation) of a designated restricted airspace. The corridor specifications and proposed land use plan amendments presented in Appendixes F and A, respectively, are based on siting constraints that take into account military airspace restrictions, including those less than 1,000 feet.

Another important consideration is the aircraft operations of BLM's National Office of Aviation and the FS's Office of Fire and Aviation Management, which provide aircraft support for wildfire suppression and resource management missions on public lands.

3.2.1.6 Regional Plan Considerations

Project activities along energy corridors would take into account the goals and monitoring requirements set forth in various regional plans covering federal lands in the 11 western states. As an example, the Northwest Forest Plan (NWFP) was created to facilitate the production of timber products from forests on federal land in the Northwest while at the same time outlining interagency management strategies to protect the northern spotted owl. The NWFP covers 24.5 million acres in Oregon, Washington, and northern California. Most of this land is managed by the FS (79%). The BLM (11%), NPS (9%), and USFWS (<1%) also manage land addressed by the plan (Regional Ecosystem Office 2007).

Other interagency regional plans to consider include (but are not limited to) the following:

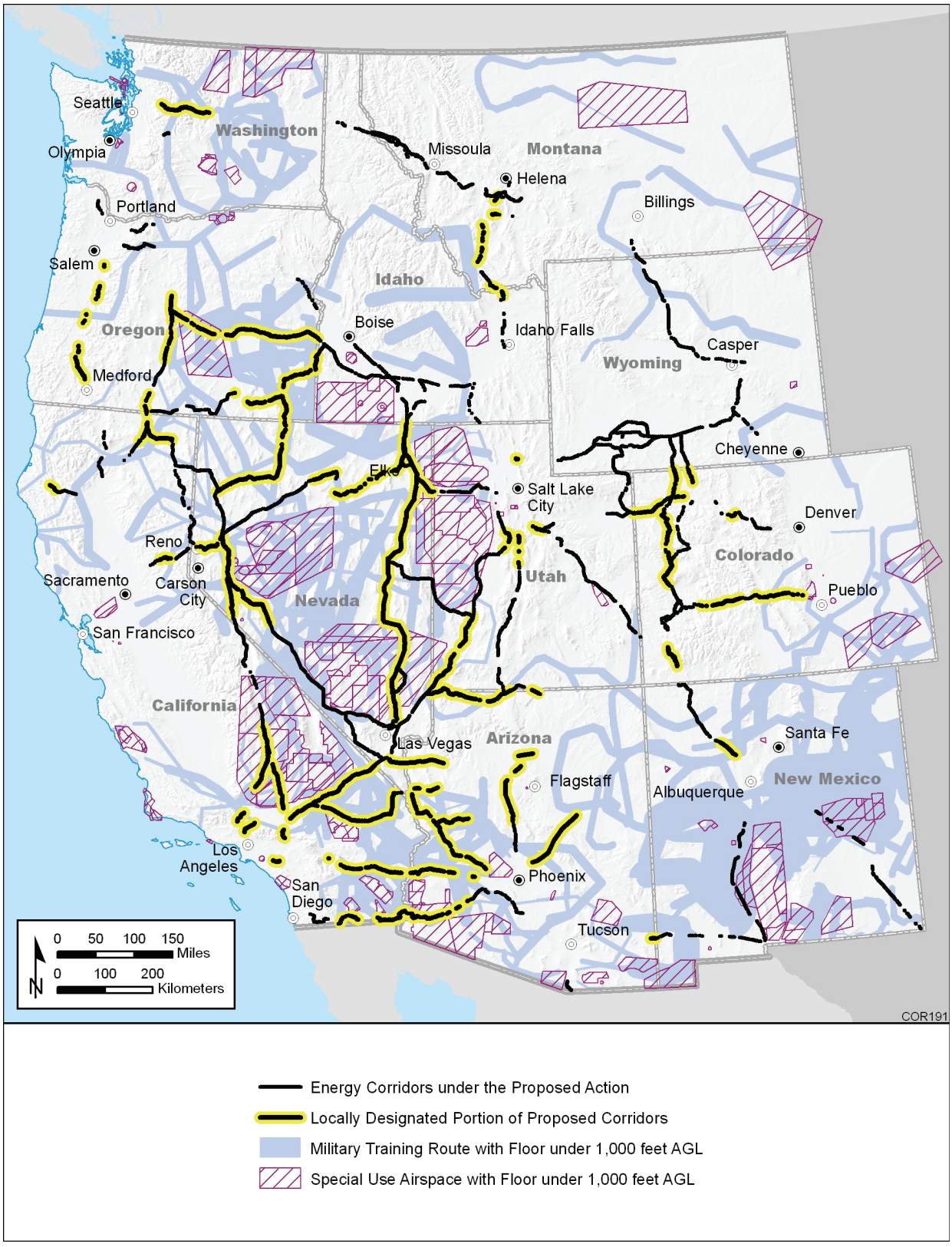

FIGURE 3.2-1 Map Showing Restricted Military Airspace (including MTRs and SUAs) over the 11 Western States

- *The California Desert Conservation Plan (BLM 1980)* – which regulates the use of federal desert land;

- *The Arizona Interagency Desert Tortoise Team* – which was created to protect the desert tortoise species and its natural habitat in Arizona (Arizona Game and Fish 2007); and

- *The DOD Sustainable Ranges Initiative, Western Regional Partnering* – which coordinates activities on military training and testing ranges in the western states while providing good stewardship of the land (DOD 2007).

3.2.1.7 Nonfederal Land Use Plan Considerations

Several field offices of the USFWS have developed habitat conservation plans and other cooperative agreements with various municipal and state organizations in their region. Project activities along energy corridors would take into account the requirements of any existing plans of this nature to ensure compatibility of land use in the areas covered by the plans. Examples include the multiple species habitat conservation plans developed by the Carlsbad Field Office in cooperation with the Coachella Valley Area of Governments, the Aqua Caliente Band of Cahuilla Indians along the I-10 corridor, and the City of San Diego along the I-8 corridor.

3.2.2 How Were the Potential Impacts of Corridor Designation and Land Use Plan Amendment to Land Use Evaluated?

Potential impacts on land use were evaluated for each alternative by examining the location and area of land that would be designated as an energy corridor, the current use of that land, and the compatibility of current land use designations with a proposed energy corridor land use. Because no energy corridors as specified by Section 368 would be designated under the No Action Alternative, land use impacts were evaluated by examining the compatibility of energy transport system ROWs with designated land uses on federal lands. The analysis also considered potential land use impacts that could be incurred during the construction, operation, and decommissioning of projects under each alternative.

3.2.3 What Are the Potential Impacts Associated with Corridor Designation and Land Use Plan Amendment?

Environmental consequences from the designation of Section 368 energy corridors on federal lands and associated land use plan amendments include a change in the designated use of the federal lands that fall within the boundaries of the proposed corridors. Additional impacts to land use would occur under both alternatives as a result of energy transport project development within designated corridors or within No Action ROWs. Because the designation of Section 368 energy corridors does not include project authorization, project-related impacts to land use would not occur until project-specific ROWs are authorized and project development occurs.

As discussed in Section 3.2.1, the BLM and the FS manage their lands within a "multiple use" framework to facilitate resource management in a way that best meets the needs of the American people. Therefore, for this programmatic analysis, the construction, operation, and decommissioning of an energy corridor would be considered to have a potential impact on land use only if it:

- Conflicts with existing land use plans and community goals;

- Conflicts with existing recreational, educational, religious, scientific, or other uses of the area;

- Conflicts with conservation goals for the area; or

- Requires a conversion of the existing commercial land use of the area (e.g., mineral extraction).

Current land uses and public concerns were taken into account during the siting of the proposed corridors and corridor segments, as described in Section 2.2, to minimize these conflicts at the outset. Table 3.2-25 provides a summary of the proposed corridor lengths and acreages for each of the 11 western states under the Proposed Action. Potential impacts to land use are discussed in the following sections.

3.2.3.1 No Action Alternative

Under No Action, federal energy corridors as specified by Section 368 would not be designated on federal lands in the West, although the siting and development of energy transport projects would continue. In general, all public lands unless otherwise classified, segregated, or withdrawn are available for ROW authorization under FLPMA or the MLA by the appropriate land management agency. Current federal agency practices for permitting energy transport ROWs and ensuring maximum consistency with existing land use plans would be followed for each project ROW.

Clearing of a ROW would result in the permanent loss of timber production within and adjacent to the ROW in areas designated for that use. Recreation, livestock grazing, oil and gas leasing, and wildlife habitat conservation could experience short-term disturbance during construction activities. Following completion of

TABLE 3.2-25 Corridor Lengths and Acreage under the Proposed Action

	Locally Designated Corridors		Designated Corridors Under the Proposed Action (Total)[a]	
State	Length (miles)	Area (acres)[b]	Length (miles)	Area (acres)[c]
Arizona	529	314,738	650	386,569
California	527	573,828	823	672,505
Colorado	215	172,508	426	260,955
Idaho	6	21,407	314	123,109
Montana	23	9,217	236	49,308
Nevada	798	572,091	1,622	904,774
New Mexico	18	7,789	2932	121,064
Oregon	333	60,997	565	230,594
Utah	118	49,943	692	370,384
Washington	48	4,450	51	6,198
Wyoming	0	0	438	185,593
Total	2,634	1,765,948	6,132	3,311,055

[a] Values include both locally designated corridors (existing) and corridors not previously designated at the local level for energy transport.

[b] Values take into account a range of corridor widths.

[c] Values are based on an assumed width of 3,500 feet.

the project, the project and its ROW generally would not preclude resumption of many of those activities, although an oil or gas pipeline project might limit oil and gas production and mineral extraction directly within the ROW. Degradation in the quality of the visual landscape for recreational users and tourists as well as changes in accessibility could also occur in some areas (Section 3.9).

In the absence of designated corridors that could support colocated projects, development of energy transport projects may occur independently, with little or no colocation of ROWs. As a result, each transport project would have its own ROW. These individual ROWs could be sited in any number of locations, and each would result in long- and short-term impacts to land use.

3.2.3.2 The Proposed Action

Under the Proposed Action, corridor designation and subsequent project development could affect current land use on about 1.55 million acres along 3,498 miles of federal land not previously designated at the local level for energy transport (Tables 3.2-25 and 3.2-26). Land use and property values on nonfederal land (i.e., privately owned land, Tribal and trust land, and land controlled by state and local governments) could also be affected by the corridor designations under this alternative, either as a result of being adjacent to federal land on which a corridor has been designated or as a consequence of being a nonfederal land "gap" that would connect projects on designated corridors if they were to be built.

An additional 1.77 million acres along 2,634 miles of federal land that are locally designated for energy transport may also be affected, especially in areas where a locally designated corridor width was expanded for Section 368 energy corridor designation. Approximately 71% of the proposed corridor acreage is associated with existing utility or transportation ROWs and infrastructure.

TABLE 3.2-26 Acreages of Public Lands Crossed by Proposed Corridors in the 11 Western States under the Proposed Action, by Agency

	BLM	FS	NPS	USFWS	DOD
Arizona	305,091	76,340	2,652	0	2,382
California	583,835	86,295	0	0	1,663
Colorado	214,672	40,562	590	5,130	0
Idaho	117,756	4,724	0	0	0
Montana	19,553	29,654	0	0	0
Nevada	864,733	10,691	987	10,328	6,028
New Mexico	120,393	0	0	670	0
Oregon	181,200	49,326	0	0	0
Utah	331,429	28,230	0	1,066	9,654
Washington	407	5,791	0	0	0
Wyoming	174,807	1,121	0	0	0
Total	2,914,228 (0.80)[a]	332,734 (0.091)	4,229 (<0.010)	17,195 (<0.010)	19,727 (<0.010)

[a] Number in parentheses represents the percentage of total public lands crossed by designated corridors.

As with No Action, current land uses on federal land could continue until initiation of an energy transport project. Initiation of any transport project would result in land use impacts within and adjacent to the energy corridors similar in nature and duration as those identified for No Action. However, once outside the designated corridor, individual projects may or may not remain colocated as they continue to cross other federal and nonfederal lands. If the project locations diverge into separate project-specific ROWs, land use along these ROWs would be similarly affected.

As discussed in Section 2.2, the siting of potential Section 368 energy corridors considered military requirements; as a result, the corridor designations under the Proposed Action are not expected to affect military training or testing activities or areas. Under the Proposed Action, corridor segments are located across or within close proximity of military facilities in five states: Arizona (Yuma Proving Ground), California (Sierra Army Depot, Edwards Air Force Base, the Naval Air Weapons Station at China Lake, and Twentynine Palms Marine Corps Base), Colorado (Naval Oil Shale Reserve), Nevada (Nellis Air Force Base, Nellis Test and Training Range, and Hawthorn Army Ammunition Depot), and Utah (Tooele Army Depot).

The siting of the proposed energy corridors also considered the locations of sensitive areas (i.e., conservation lands) on federal lands to minimize corridor crossings in these areas (Section 2.2). Of the 11 western states, California has the greatest area of conservation lands affected (589,243 acres) by the corridor designations under the Proposed Action, with most of the acreage occurring on BLM lands (Table 3.2-27).

Corridor segments cross BLM conservation lands in every state but Montana and Washington (Table 3.2-27). FS conservation lands affected include national forests and roadless areas. National forests are crossed by proposed energy corridors in four states: California (Trinity and Shasta), Oregon (Mt. Hood and Fremont), Washington (Wenatchee), and Wyoming (Ashley and Medicine Bow). Roadless areas are crossed by the proposed corridors in California (887 acres), and Wyoming (306 acres).

Corridor segments cross NPS land in three states — the Glen Canyon National Recreational Area in Arizona; the Lake Mead Recreational Area, which spans the Nevada–Arizona border southeast of Las Vegas; and the Curecanti National Recreational Area and Dinosaur National Monument in Colorado. Corridors also run alongside of (but do not cross) the northern and southern borders of the Mojave National Preserve and the southern border of Joshua Tree National Park (California). USFWS land is affected in four states: Colorado and Utah (Colorado River Wildlife Management Area), Nevada (Desert National Wildlife Range), and New Mexico (Sevilleta National Wildlife Refuge).

Text Box 3.2-1
Related Roadless Area Impacts

Generally, roadless areas (as designated by the FS and BLM) would not contain designated energy corridors due to restrictions on road construction, road reconstruction, and timber harvesting. Some roadless areas already contain existing ROWs, structures, and roads that are allowed under existing regulations. Typically, a ROW may be authorized within a roadless area only if it is consistent with applicable laws and regulations. If a proposed corridor becomes an established corridor in a roadless area, the lands within the corridor boundaries can be used only when authorized.

Where a proposed corridor is located in a roadless area in this PEIS, it is because:

- There is already an existing energy ROW;
- The width of a proposed corridor has some portion of its footprint in a roadless area; or
- The scale of mapping in this PEIS is not yet sufficiently detailed to clearly identify the boundaries of a roadless area.

TABLE 3.2-27 Total Acreage of Conservation Lands Crossed in the 11 Western States by Designated Corridors under the Proposed Action, by Agency[a]

State	BLM	FS	NPS	USFWS
Arizona	13,965	0	2,652	0
California	585,299	2,839	0	0
Colorado	918	0	590	5,130
Idaho	2,028	0	0	0
Montana	0	64	0	0
Nevada	37,594	0	987	10,328
New Mexico	213	0	0	670
Oregon	584	712	0	0
Utah	18,005	0	0	1,066
Washington	0	3,035	0	0
Wyoming	1,660	616	0	0
Total	660,264	7,266	4,229	17,195

[a] Values include both locally designated corridors (existing) and corridors not previously designated at the local level for energy transport.

3.2.4 Following Corridor Designation, What Types of Impacts Could Result to Land Use with Project Development, and How Could They Be Minimized, Avoided, or Compensated?

Short-term impacts to recreational land use within and adjacent to the designated corridors could occur as a result of vegetation removal, road construction, noise, and fugitive dust and air emissions generated during energy transport project construction. People engaged in activities such as hiking, camping, birding, and hunting would be most affected by construction activities, but impacts could also be long-term in some places depending on the level of noise, vehicle use, and lights associated with the operations of a particular project. Degradation in the quality of the visual landscape would likely also occur in some areas. Short- and long-term impacts associated with visual resources are addressed in Section 3.9. Following development of projects within designated corridors, some areas may become more accessible, with increased opportunities for recreational activities in previously inaccessible (or less accessible) areas, while other areas may become less accessible.

3.2.4.1 What Are the Usual Impacts to Land Use of Building and Operating Energy Transport Projects?

The designation of energy corridors (under the Proposed Action) and subsequent ROW authorization within the corridors, or the authorization of project-specific ROWs under the No Action Alternative may affect land use if a future ROW conflicts with existing land use plans; conflicts with existing recreational (including visual quality), educational, religious, scientific, military, or other uses of the area; or affects the existing commercial land use

(e.g., mineral production or timber harvest) of the area. The nature, magnitude, and extent of the land use impacts depend directly on the existing land use in the project area and its compatibility with the nature of the proposed ROW and its associated project.

Energy transport projects with above-ground structures (such as electricity transmission towers) could affect military training and testing operations that may occur at low altitudes (e.g., military training routes), and may also result in aircraft radar interference. However, the mandatory IOPs presented in Section 2.4 of this PEIS for ROW authorizations and subsequent project development within Section 368 energy corridors take into account potential conflicts with military operations.

3.2.4.2 What Mitigation Is Available to Minimize, Avoid, or Compensate for Potential Project Impacts to Land Use?

The programmatic evaluations identified potential land use impacts that could be incurred during the construction, operation, and decommissioning of energy infrastructure under both alternatives. The nature, extent, and magnitude of these potential impacts would vary on a site-specific basis and with the specific phase of the project (e.g., construction or operation). The greatest potential for land use impacts would occur as a result of decisions made during the design and siting phases of an authorized project. Under both alternatives, a variety of mitigation measures could be incorporated, as stipulations, into the design and development of energy corridors to reduce potential land use impacts. In addition, the Proposed Action includes the mandatory implementation of IOPs (see Section 2.4) which are intended to help ensure that energy transport projects proposed for Section 368 corridors are planned, implemented, operated, and eventually removed in a manner that protects and enhances environmental resources. However, it may not be possible to mitigate all impacts of a given project (e.g., the development of access roads needed by the project but deemed undesirable by some users). The mitigation measures include:

- Planning projects to mitigate or minimize impacts to other land uses;
- Contacting federal and state agencies, property owners, and other stakeholders as early as possible in the planning process to identify potentially sensitive land uses and issues, rules that govern energy development locally, and land use concepts specific to the region;
- Consulting with the DOD to evaluate the potential impact of a proposed project on military operations in order to identify and address any DOD concerns;
- Limiting the height of corridor towers and other utility infrastructure to no higher than existing infrastructure or below the floor of military low-level airspace;
- Preparing the FAA-required notice of proposed construction as early in the process as possible to identify any air safety issues and required mitigation measures;
- Siting projects on already altered landscapes, when feasible;
- Consolidating infrastructure, taking into account current transport and market access, to optimize the efficiency of land use; and
- Developing restoration plans to ensure that all temporary use areas are restored.

3.3 GEOLOGIC RESOURCES

3.3.1 What Are the Geologic Conditions in the 11 Western States?

3.3.1.1 Geologic Setting

The federal lands in the western 11 states reside in several physiographic provinces (Burchfiel et al. 1992), which are areas having generally similar terrain texture, rock types, and geologic structure and history. From west to east, these physiographic areas include the (1) Pacific Border province, (2) Cascade-Sierra Mountains province, (3) Columbia Plateau, Snake River Plain, Basin and Range, and Colorado Plateaus provinces, (4) Rocky Mountain provinces and Wyoming Basin, and (5) Great Plains province (Figure 3.3-1). Characteristics of the physiographic provinces are summarized in Table 3.3-1.

3.3.1.2 Geologic Resources

Soil Resources. The soils in the 11 western states are diverse because of various climates, parent materials, landforms, vegetation, and the age of the surface materials. All of these factors affect soil formation processes. For the purpose of this PEIS, soil orders (the highest category of soil taxonomy used by Natural Resources Conservation Service [NRCS]) are used to describe the soils in the western states (BLM 2005a; NRCS 1999, 2006a). These soil orders, their distributions in the 11 western states, and general characteristics are described in Table 3.3-2 in order of decreasing predominance.

Sand, Gravel, and Crushed Stone Resources. Sand, gravel, and crushed stone suitable for use in construction occur throughout the western states. These resources are generally mined in river valleys, glacial outwash areas, quarries, and alluvial fans close to project sites.

3.3.1.3 Hazardous Geologic Features

The presence of volcanoes, earthquakes, active faults, and potential liquefaction and landslide areas in the 11 western states can threaten the integrity of an energy transport system, which may include electricity transmission lines and hydrogen, oil, and gas pipelines. Any spills or leaks caused by these geologic hazards would, in turn, affect the environment. See Section 3.14 for an expanded discussion of the potential impacts of these natural events.

In the following sections, the geologic hazardous areas are discussed with respect to their locations in the 11 western states. It is important to note that the scales of the accompanying maps are small, as the maps are used to show the general major locations of the hazardous areas. These locations are closely related to the physiographic provinces described in Section 3.3.1.1.

Volcanoes. Major volcanoes or volcanic fields are distributed primarily in the Western Cascade, High Cascade, and Sierra Nevada Mountains physiographic regions (Figure 3.3-1 shows volcanoes in the western states), following the volcanic belt formed between the geologic North American plate and the Pacific plate. Other volcanoes occur sporadically in the southern Columbia Plateau, southern Colorado Plateau, and the Basin and Range provinces within the North American plate. The volcanoes and volcanic fields in the western states that are younger than 10,000 years old are listed in Table 3.3-3.

Earthquake-Prone Areas. Earthquake-prone areas are subject to various earthquake hazards, such as ground shaking, liquefaction,

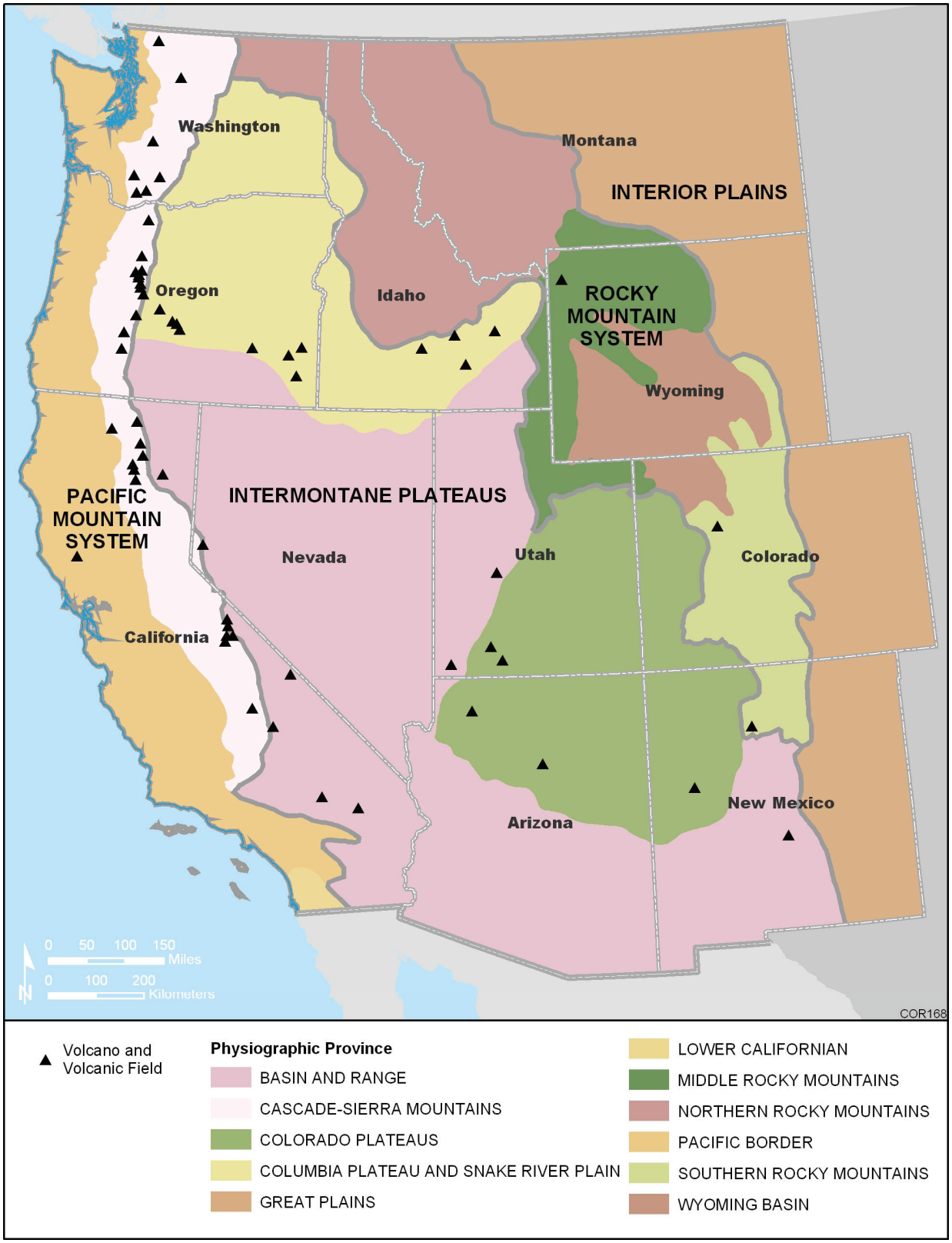

FIGURE 3.3-1 Physiographic Provinces of the 11 Western States (Sources: Modified from Fenneman and Johnson 1946 and National Atlas 2006)

TABLE 3.3-1 Physiographic Provinces in the 11 Western States

Physiographic Provinces	Physiographic Regions	Geographic Location	General Terrain	Rock Types
Pacific Border Province	Pacific Coast Ranges	Coastal mountains and plains bordering the Pacific Ocean, including Olympic Mountains, the Coast Ranges, and the Klamath Mountains in Washington, Oregon, and northern California; narrow coastal plains along much of the California coast, and lowlands such as the Puget Trough in Washington	A geologically active area with rough mountains with elevations ranging from sea level to more than 11,483 feet. Extreme climate contrasts. Earth flows and complex landslides are active in mountainous areas.	Folded and faulted formations of sedimentary, igneous, and metamorphic bedrock are common.
	Great Valley	In central California bounded by the Klamath and Cascade Mountains to the north, the Sierra Nevada Mountains to the east, and the California Coastal Mountains to the west	A flat, geological trough with elevations ranging from sea level to more than 1,000 feet. The region receives sediments derived primarily from the erosion of the Sierra Nevada, Klamath, and Cascade Mountains.	Thick sequence of marine and terrestrial sediments spanning from the Triassic to the Holocene Ages.
Cascade-Sierra Mountains Province	Northern Cascade Mountains	Northern Washington	Many high non-volcanic mountains that receive heavy snowfall and have been glaciated. Resulted from crust uplifted and faulted since late Cretaceous Period.	Characterized by sedimentary, igneous, and metamorphic rocks.
	Western Cascade Mountains	Southern Washington and Oregon	Best known for their high, snow-capped volcanoes. The mountains are part of the circum-Pacific volcanic belt extending from Washington to northeastern California with older and more inactive volcanic mountains.	Volcanic, sedimentary, and metamorphic rocks.
	High Cascade Mountains	Southern Washington, Oregon, and northern California	Best known for their high, snow-capped volcanoes. The mountains are part of the circum-Pacific volcanic belt characterized by younger, active volcanoes (such as Mount St. Helens, Mount Rainer, and Glacier Peak).	Volcanic, sedimentary, and metamorphic rocks.

TABLE 3.3-1 (Cont.)

Physiographic Provinces	Physiographic Regions	Geographic Location	General Terrain	Rock Types
Cascade-Sierra Mountains Province (Cont.)	Sierra Nevada Mountains	Eastern California east of the California Trough	Located near a geologic plate boundary in the Mesozoic Era and evolved from sedimentation, volcanism, granitic intrusions, uplifts, and erosion over geologic time.	Primarily granitic rocks with some older metamorphic rock. Some volcanic rocks in eastern Sierra Nevada Mountains.
Columbia Plateau, Snake River Plain, Basin and Range, and Colorado Plateau Provinces	Columbia Plateau	Southeastern Washington and northern Oregon, bounded by the Cascade Mountain to the west and the Rocky Mountains to the east	A basin-like structure with beds of basaltic rock and sediments. The eastern Columbia Plateau is commonly covered by loess.	Characterized by late Cenozoic basaltic lava, sediments, and loess.
	Snake River Plain	Southern Idaho	A geomorphically featureless area surrounded by mountains and highlands.	The eastern Plain is characterized by rhyolitic volcanic rocks covered by basaltic lava, and the western Plain is a basin filled with sedimentary deposits over a thick slab of basalt.
	Basin and Range	South of the Columbia Plateau, extending from southern Idaho and Oregon through most of Nevada and parts of western Utah, eastern California, western and southern Arizona, southwestern New Mexico, and northern Mexico	Has more than 400 evenly spaced, nearly parallel mountain ranges and intervening basins. The mountain ranges are generally abrupt, steeply sloping, and deeply dissected with relief between 3,000 and 5,000 feet above the intermountain basins. The basins are typically broad, gently sloping, and largely undissected with altitudes from below sea level to about 5,000 feet above sea level. The Basin and Range can be divided into the Great Basin in the north and the Salton Trough, Mojave-Sonoran Desert, Mexican Highlands, and Sacramento Mountains in the south. The province experienced extensional faulting in the middle to late Cenozoic (Dohrenwend 1987).	Complexly deformed Precambrian and Paleozoic rocks. Mesozoic granitic rocks are found in the western province. Cenozoic volcanic rocks are widespread.

TABLE 3.3-1 (Cont.)

Physiographic Provinces	Physiographic Regions	Geographic Location	General Terrain	Rock Types
Columbia Plateau, Snake River Plain, Basin and Range, and Colorado Plateau Provinces (Cont.)	Colorado Plateau	Intersection of Colorado, Utah, Arizona, and New Mexico	Separated from neighboring provinces by sharply defined boundaries such as faults, various rock types, and topography, the Plateau can be divided into several sections, each with its own geologic and geomorphologic characteristics. The centrally located Canyon section is dominated by gently folded sedimentary rocks; the Navajo section is largely a sedimentary platform with isolated buttes, mesas, folded mountains, and volcanic plugs. The western High Plateaus section has widespread accumulations of volcanic material. The Uinta Basin section in the north and the Grand Canyon and Datil sections in the south have mountains, cliffs, and dissected terrain (Graf et al. 1987).	Mostly sedimentary rocks. Volcanic rocks and volcanic plugs are common in some areas.
Rocky Mountains Province	Northern Rockies	Western Montana and northern Idaho	The Rocky Mountains include fault-bounded uplifts, folded mountains, and highlands formed by volcanism as a result of the Laramide mountain-building period that occurred between the middle Cretaceous and late Eocene Periods. The uplift also set the stage for the geomorphic evolution of the Rocky Mountains, producing ridges and plateaus high enough to be glaciated, as well as many of the streams and canyons of the region. The Northern Rockies are characterized by low mountains with summits between 6,900 and 7,874 feet above sea level. Block faulting is common.	Precambrian sedimentary rocks dominate. Mesozoic igneous intrusive rocks are common in central Idaho.

TABLE 3.3-1 (Cont.)

Physiographic Provinces	Physiographic Regions	Geographic Location	General Terrain	Rock Types
Rocky Mountains Province (Cont.)	Middle and Southern Rockies	Northwestern Wyoming and Colorado	Before the Laramide mountain-building period, the Middle and Southern Rockies were part of a stable platform composed of Precambrian crystalline rocks. The platform received sediments that were transformed into sedimentary rocks, which were then uplifted and eroded during the mountain-building period. Later, volcanic activities produced mountains and high plateaus in many places. Separated from the Middle Rockies by the Wyoming Basin in Wyoming, the Southern Rockies have high summits between 10,827 and 14,436 feet (Madole et al. 1987).	Sedimentary, metamorphic, and volcanic rocks.
Great Plains	Great Plains	Located east of the Rocky Mountains and the Basin and Range in the eastern parts of Montana, Wyoming, Colorado, and New Mexico	Except for northern Montana, where it has been glaciated, the Great Plains is a large region of generally low relief sloping eastward from the Rocky Mountains. Near the base of the Rocky Mountains, a few basins, such as the Williston, Powder River, and Denver-Julesburg Basins, received sediments from the Rockies during the Laramide mountain-building period.	Glacial deposits in northern Montana and Cretaceous and Tertiary sediments in most of the Great Plains. Some older bedrock is found in small areas in central Montana and the Black Hills in eastern Wyoming (Wayne et al. 1991).

Sources: Burchfiel et al. (1992); Dohrenwend (1987); Wayne et al. (1991).

TABLE 3.3-2 Soil Orders in the 11 Western States in Order of Decreasing Predominance

Soil Order	Geographic Area	Characteristics
Aridisols	Arizona, southeastern California, Colorado, southern Idaho, Nevada, New Mexico, Utah, and central Wyoming.	Low in organic material and light in color. Subsurface accumulations of soluble calcium carbonate, salts, and gypsum result in hardpans that impede water infiltration.
Mollisols	Arizona, western California, Colorado, eastern Oregon and Washington, central Idaho, Montana, New Mexico, Utah, and Wyoming.	Have a very dark brown to black surface horizon, mostly formed under grass or savanna vegetation. In eastern Oregon and Washington and Idaho, the soils are developed on basalt and loess parent material.
Entisols	Extensively distributed in Arizona, southern California, Colorado, eastern Montana, Nevada, New Mexico, eastern Utah, and Wyoming.	Young soils with little or no development of diagnostic soil horizons. Found in young alluvium, sands, and soils on steep slopes and in basins of arid and semiarid environments.
Alfisols	Primarily in the mountains of western Montana, Colorado, and California in semiarid to moist areas.	A layer of clay minerals and other constituents leached from a surface layer into the subsoil. Formed under forest or savanna vegetation.
Inceptisols	In Arizona, northern California, Colorado, northern Idaho, Montana, New Mexico, and western Washington and Oregon.	Soils occurred in a wide variety of climates and generally exhibit only moderate degrees of soil weathering and development.
Andisols	Distribution limited to areas in northern California and Idaho, Oregon, and Washington.	Formed mostly in volcanic glass in cool areas with moderate to high precipitation. Soils dominated by minerals that have very little orderly crystalline structure.
Vertisols	Scattered in Arizona, California, Montana, New Mexico, and southeastern Oregon.	Soils have high content of expanding clay minerals and slickenslide texture. Develop deep, wide cracks when dry.
Spodosols	Distributed in western Oregon and Washington.	With a characteristic soil B-horizon consisting of an accumulation of black or reddish amorphous material of organic matter combined with aluminum and iron.
Ultisols	Scattered in northern California and western Oregon and Washington.	Show intensive leaching of clay minerals and other constituents, resulting in a clay-enriched subsoil dominated by quartz, kaolinite, and iron oxides.

Sources: BLM (2005a); NRCS (1999).

TABLE 3.3-3 Volcanoes and Volcanic Fields Younger than 10,000 Years Old in the Western States

State	Name	State	Name
Arizona	Sunset Crater	Oregon	Belknap
	Uinkaret Field		Blue Lake Crater
			Cinnamon Butte
California	Amboy		Crater Lake
	Big Cave		Devils Garden
	Brushy Butte		Davis Lake
	Clear Lake		Diamond Craters (Peak)
	Coso Volcanic Field		Four Craters Lava Field
	Eagle Lake Field		Jackies Butte
	Golden Trout Creek		Jordan Craters
	Lassen Volcanic Center		Mount Bachelor
	Lavic Lake		Mount Hood
	Long Valley		Mount Jefferson
	Medicine Lake		Mount Washington
	Mono Craters		Newberry Caldera
	Mono Lake Volcanic Fields		North Sister Field
	Red Cones		Saddle Butte
	Shasta		Sand Mountain Field
	Twin Buttes		South Sister
	Trumble Buttes		Squaw Ridge Lava Field
	Ubehebe Craters		
		Utah	Bald Knoll
Colorado	Dotsero		Black Rock Desert
			Markagunt Plateau
Idaho	Craters of the Moon		Santa Clara
	Hell's Half Acre		
	Shoshone Lava Field	Washington	Glacier Peak
	Wapi Lava Field		Indian Heaven
			Mount Adams
Nevada	Steamboat Springs		Mount Baker
			Mount Rainier
New Mexico	Carrizozo		Mount St. Helens
	Valles Caldera		West Crater
	Zuni-Bandera		
		Wyoming	Yellowstone

Source: National Atlas (2006).

landslides, soil compaction, and surface fault rupture. The ground-shaking risk of the western states is shown in Figure 3.3-2 (ground acceleration of the 11 western states). The peak horizontal ground acceleration ranges from 0 g (insignificant ground-shaking risk) to 1 g (strong ground-shaking risk). The highest ground-shaking risk (0.4 to 1 g) occurs in the Coastal Range physiographic province (Figure 3.3-1) in western and southern California. Moderate ground-shaking risk (0.2 to 0.4 g) occurs in the Coastal Range province (in the western coasts of Washington, Oregon, and California), the Cascade and Sierra Mountains (in southern Oregon and eastern and southern California), and the Rocky Mountains near eastern Idaho and Salt Lake City. The majority of the eastern part of the 11 western states has low ground-shaking risk (less than 0.1 g).

Soils can become liquefied due to intensive ground shaking and lose their support capacity. Liquefaction occurs mostly in saturated loose sediments. A ground-shaking map (Figure 3.3-2) combined with a USGS surficial geology map revealed the major areas with liquefaction potential depicted in Figure 3.3-3. Areas with high liquefaction potential are located near the Bay Area of San Francisco, where ground-shaking risk is high and bay sediments are present. Areas with moderate liquefaction potential are found on the west coasts of California, Oregon, and Washington and along several major river valleys (e.g., the Sacramento River and San Joaquin River valleys in California and the Columbia River valley in Oregon). Areas with low liquefaction potential disperse in various states, such as in the valleys of the Columbia River and Willamette River in Oregon, the Central Valley and Klamath River Valley in California, the Salt Lake Valley in Utah, the Rio Grande Valley in New Mexico, and some major river valleys in the Rocky Mountain region.

Earthquakes can cause movements across faults. Major surface fault lines younger than the late Pleistocene age (i.e., up to 130,000 years before the present) are shown in Figure 3.3-4. Most of the fault lines are located in the Coastal Range province in California and the Basin and Range province in Nevada and Utah. The faults in California are in areas close to the boundary of the Northern American plate and the Pacific plate. The faults in the Basin and Range province reflect the tension in the Earth's crust there.

Landslide-Prone Areas. Landslide-prone areas are generally closely related to high, steep, rugged terrain and high precipitation. In the 11 western states, high landslide incidence and/or susceptibility are mostly found in the west coast of California, central Montana, western Wyoming, western Colorado, and New Mexico (Figure 3.3-5), coinciding with the Coastal Ranges and Rocky Mountains physiographic provinces (Figure 3.3-1). Moderate landslide susceptibility and incidence occur adjacent to the high landslide susceptibility and incidence areas. It is important to note that many alluvial fans proximal to mountain ranges also have high landslide susceptibility, which the map in Figure 3.3-5 does not show because of its small scale. These fan deposits are common in the Basin and Range province (Figure 3.3-1).

3.3.2 How Were the Potential Impacts of Corridor Designation and Land Use Plan Amendment to the Geologic Resources and Hazardous Geologic Features Evaluated?

Neither corridor designation nor land use plan amendment would involve any ground-disturbing activities and removal and uses of sand and gravel. Impacts to geologic resources would occur only with the development of specific energy transport projects. Similarly, geologic hazards could affect project construction, operation, and decommissioning only with the development of specific projects. Therefore, evaluating potential effects of

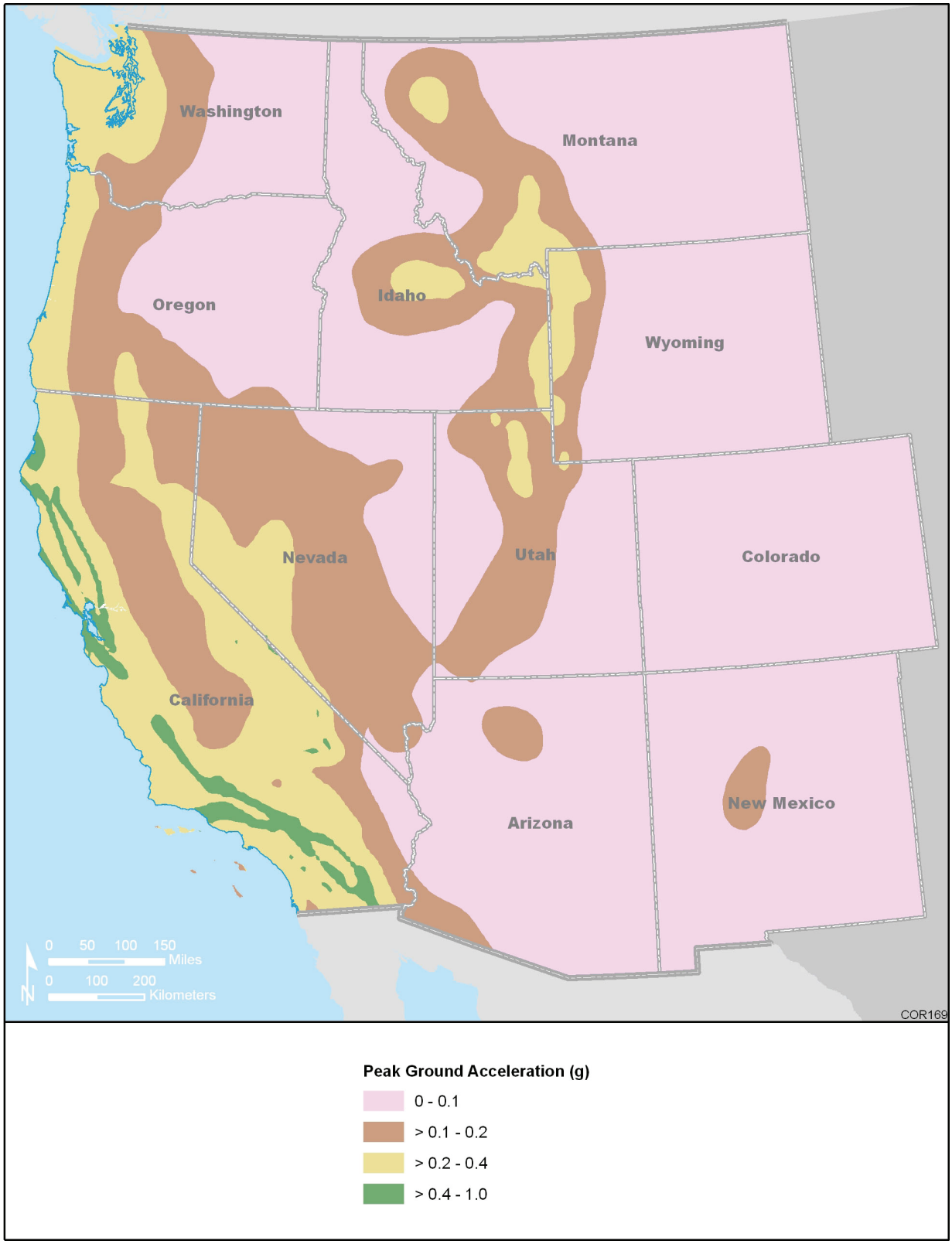

FIGURE 3.3-2 Peak Horizontal Ground Acceleration of the 11 Western States with a 10% Probability of Exceedance in 50 Years (in g) (Source: National Atlas 2006)

FIGURE 3.3-3 Major Areas with Liquefaction Potential in the 11 Western States (Sources: Modified from SCEC 1999 and National Atlas 2006)

FIGURE 3.3-4 Surface Fault Lines in the 11 Western States (Source: National Atlas 2006)

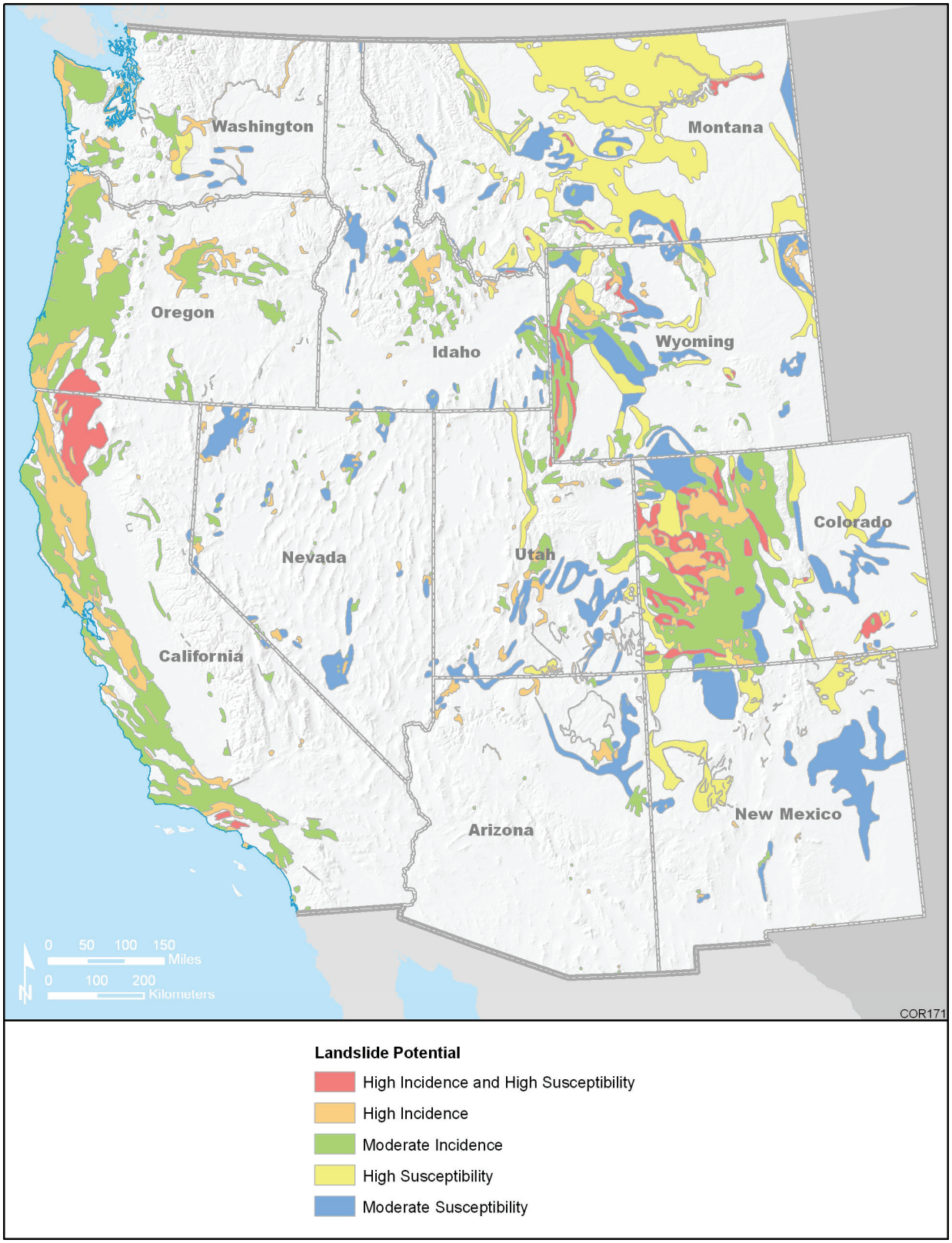

FIGURE 3.3-5 Landslide Hazard Potential Map of the 11 Western States (Source: National Atlas 2006)

corridor designation and land use plan amendment involves the identification of the geologic resources and geologic hazards within or in the vicinity of the project ROWs, whether within Section 368 energy corridors or elsewhere (as under the No Action Alternative).

3.3.2.1 Identifying Geologic Resources

Sand and gravel deposits and rocks suitable for use in the 11 western states are plentiful. Information on their distribution is limited. Therefore, the identification of these resources should be made at the project level. Generally, fluvial and outwash deposits are good sources for sand and gravel deposits. Bedrock exposures are good locations for sources of crush rock.

Soils when disturbed become more erodible, regardless their location. However, their erodibility potential varies widely and depends on local climate, topography, surface cover, and engineering practices (USDA 1996). The identification of soil erosion potential can only be evaluated at the project level.

3.3.2.2 Identifying Geologic Hazards

Geologic hazards depend on the geological setting. Regional geologic hazard maps are available in GIS format for the 11 western states. To identify geologic hazards that could be present in the vicinity of the proposed Section 368 energy corridors, the proposed corridor locations were overlain with the geologic hazard maps to identify various geologic hazards that may be associated with the proposed corridor locations.

Volcanic Hazards. All volcanoes and volcanic fields with eruption records during Holocene geologic time (<10,000 years old) in the 11 western states (Figure 3.3-1) were identified (National Atlas 2006). Among these volcanoes, only those within a certain distance of the energy corridors are likely to have health and safety concerns for potential projects, should they be developed. The distance used in this PEIS is 20 miles. The 20 miles is a distance within which the areas would most likely be affected by various volcanic hazards, including debris flows and tephra falls (Wolfe and Pierson 1995; Miller 1989), although it is important to note that past debris flows, such as those measured at Mount St. Helens have traveled as far as 60 miles (Wolfe and Pierson 1995).

Seismic Hazards. Ground shaking and ground displacement are two major seismic hazards. The hazard of ground shaking is caused by the transient strain in the ground during the traveling of a seismic wave. The damage from ground shaking may occur over a large area, but with relatively low damage rates. Ground displacement is caused by permanent ground deformation induced by earthquakes, such as dislocation across fault lines, liquefaction, and landslides. Ground displacement damage typically occurs in isolated areas of ground failure and has a high damage rate. As landslides can be triggered by other causes besides earthquakes, they are described separately in next subsection.

Ground-shaking potential was calculated using the locations of faults from historical earthquake records, the soil conditions near earthquake sources, and the assumption that seismic waves attenuate with distance, resulting in seismic hazard maps that depict the risk of estimated ground-shaking magnitude (or ground acceleration). This PEIS uses the peak horizontal ground accelerations with a 10% probability of being exceeded in 50 years (National Atlas 2006). In evaluating the ground shaking, the Section 368 energy corridors were superimposed onto the seismic hazard maps, and the areas of various ground-shaking magnitudes crossed by the corridors were calculated using GIS tools. It should be noted that seismic hazards can exist on both federal and nonfederal lands, if an energy transport project crosses seismic hazard zones.

To identify potential liquefaction areas crossed by the corridors, areas were identified having saturated, loose sediments and anticipated earthquake peak ground accelerations of 0.1 g or greater with a 10% probability of exceedance in 50 years (SCEC 1999). Saturated, loose sediments are expected to be near low-lying, perennial surface water bodies, such as river, lake, and coastal areas. Data on alluvial and bay sediments were obtained from the surficial geologic maps prepared by the USGS (National Atlas 2006), and this dataset was superimposed on the seismic hazard maps to identify areas of high, intermediate, and low liquefaction potential. High liquefaction potential was assigned to areas with alluvial and bay sediments and with a ground-shaking risk of between >0.40 and 1 g, while the intermediate potential was assigned where the ground-shaking risk is between >0.2 and 0.4 g. Areas characterized by low ground-shaking risk (>0.1 to 0.2 g) were assigned to low liquefaction potential. Other areas with a ground-shaking risk of less than 0.1 g were considered to have insignificant liquefaction potential.

To evaluate the potential for seismic hazards caused by ground displacement, this PEIS relied on the Quaternary faults data collected by the USGS (National Atlas 2006). These Quaternary faults are believed to be the sources of significant earthquakes with magnitudes of 6.0 or greater during the past 1.6 million years. The data are appropriate for display on maps at a scale of 1:250,000 or less. In evaluating the surface fault rupture hazards for this PEIS, a subset of faults that are less than 130,000 years old (Holocene and Late Quaternary) was used. These younger faults are more likely to be reactivated than older ones if earthquakes occur (Christenson et al. 2003). Using GIS tools, maps were created to identify those faults lying within the energy corridors.

Landslide Hazards. A landslide overview map compiled by the USGS National Landslide Hazards Program (National Atlas 2006) was used to identify potential landslide areas associated with the proposed Section 368 energy corridors designated under the Proposed Action. It should be noted that energy transport projects that lie outside the corridors, whether on federal or nonfederal lands, could be exposed to landslide hazards if they are located in landslide-prone areas.

The USGS map shows areas of landslides and areas that are susceptible to potential landsliding (Radbruch-Hall et al. 1982). Landslides considered in the map include the falling, sliding, or flowing of rock and/or soil, but exclude debris flows that occurred in alluvial fans in arid regions. Areas identified in the map with high and medium landslide incidence (i.e., more than 15% of a map area involved in landsliding and 1.5 to 15% involved in landsliding, respectively) and susceptibility to landsliding were used in the evaluation. The susceptibility to landsliding is defined by the probable degree (in terms of percentage) of landsliding when an area is subjected to natural or artificial cutting or loading of slopes or anomalously high precipitation. The landslide overview map showed that the Coast Ranges of California, the Southern Rocky Mountains, and the Colorado Plateau in the western states contain the most slide-prone terrains in the United States (Radbruch-Hall et al. 1982). It is important to note that the scale of the landslide delineation on the map is 1:2,500,000, and generalization has been made. Assigning areas any designation other than high and medium landslide incidence or susceptibility to landsliding does not imply that the areas have no existing landslides or no susceptibility to landsliding (Radbruch-Hall et al. 1982), because of the small scale of the USGS map. In addition, the map does not show alluvial fans proximal to mountains, which are potential landslide areas.

To identify landslide areas along the corridors, the areas with high and medium landslide incidence/susceptibility were superimposed onto the areas crossed by the corridors using GIS tools. The total areas of various categories of landslide risk could then be

calculated. GIS maps presented the locations of the various landslide risks along the corridors.

Additional discussion of various geologic hazards is provided in Section 3.14.

3.3.3 What Are the Potential Impacts Associated with Corridors Designation and Land Use Plan Amendment

3.3.3.1 No Action Alternative

Under the No Action Alternative, no Section 368 energy corridors would be designated on federal land and there would be no impact from the decision. Under this alternative, future energy transport projects would be sited in a manner similar to that currently used. Project applicants would identify potential project ROWs for crossing federal and nonfederal lands. Geologic resources associated with the selected and authorized ROWs would be most likely to be affected by project development and operation. In the absence of known ROW locations, it is not possible to identify those geologic resources.

3.3.3.2 The Proposed Action

The designation of energy corridors and land use plan amendment under the Proposed Action are not expected to affect geologic resources. These resources would be affected with the development of specific energy transport projects following corridor designation. Under the Proposed Action, about 3.3 million acres of designated corridor footprint would lie on federal land. The total miles and acreage that would be occupied by project-specific ROWs with the corridors and their associated access roads, staging areas, construction sites, and infrastructure are not known. Because soil, gravel, and crushed stone resources have not been mapped completely for the 11 western states, affected environments and future project-specific impacts will need to be addressed at the project level. Soil erosion potential is location-specific and varies dramatically over short distances. Evaluation of the potential is not appropriate at the programmatic level in this PEIS. It should be addressed at the project level.

Geologic hazards are related to safety issues. Their evaluations are presented in Section 3.14.

3.3.4 Following Corridor Designation, What Types of Impacts Could Result to Geological Resources and Hazardous Geologic Features with Project Development, and How Could Potential Impacts Be Minimized, Avoided, or Compensated?

3.3.4.1 What Are the Usual Impacts to Geologic Resources of Building and Operating Energy Transport Projects?

Any type of construction or industrial activity requires the use of sand and gravel and/or crushed rock, including building the infrastructure of energy transport projects. The materials are used in access roads, ROWs, staging areas, stream banks, and other construction sites and are for concrete, gravel pads, road beds, stream bank protection, and building materials. These materials are normally mined in areas close to the corridors to reduce construction cost.

Under either alternative, geologic resources could be affected by the construction, operation, maintenance, and decommissioning of energy infrastructures within the energy corridor ROWs. Impacts originate in the extraction and placement of the geologic material and ground disturbance. Sand and gravel are commonly mined from alluvium in river or stream valleys. When the quality of sand and gravel does not meet requirements, suitable stone is mined from quarries and crushed to proper size for use. Mining operations would disturb the ground