3.13 PALEONTOLOGICAL RESOURCES

This section addresses the potential impacts from the Proposed Route and Route Alternatives on the known paleontological resources during construction, operation, and decommissioning. The Proposed Route and Route Alternatives pass through areas where paleontological resources are known to exist. The routes, their potential impacts, and mitigation methods to minimize or eliminate impacts are discussed in this section.

3.13.1 Affected Environment

This section describes the mapped geology and known paleontological resources near the Proposed Action. It also describes and compares potential impacts of the Proposed Action and Action Alternatives to paleontological resources. Fossils are important scientific and educational resources because of their use in: 1) documenting the presence and evolutionary history of particular groups of now extinct organisms, 2) reconstructing the environments in which these organisms lived, and 3) determining the relative ages of the strata in which they occur. Fossils are also important in determining the geologic events that resulted in the deposition of the sediments in which they were buried.

3.13.1.1 Analysis Area

The Project area in Wyoming and Idaho consists of predominantly north-south trending mountain ranges separated by structural basins. The eastern portion of the Project (Segments 1 and 2) would be located within the Laramie Mountains and the Shirley Mountains, which consist predominantly of Precambrian granite and gneisses. Moving west in Wyoming, the Project would cross major structural basins created during the Laramide Orogeny, including the Hanna Basin in Carbon County (Segment 2), and the Greater Green River Basin in Sweetwater County (Segments 3 and 4). West of the Green River Basin in western Wyoming, the broad Laramide basins are bounded by the fold and thrust belt of the Sevier Orogeny present along the Idaho-Wyoming border in Segments 4 and 5. In eastern Idaho, the geology transitions from older, compressional thrust fault blocks to the younger, extensional block faulted terrain of the Basin and Range Province. The mountain ranges in southeastern Idaho consist of sedimentary rock. West of Borah Substation (Segments 6 through 10), the routes fall within the Snake River Plain, a broad structural valley which cuts off the Basin and Range Province. The Snake River Plain is dominated by flood basalts, thinly covered with silty, aeolian deposits and interlain with minor clastic sediments. Some of the southern alternatives (Segments 7 and 9) remain within the Basin and Range mountain ranges similar to those in southeast Idaho. The block-faulted ranges of southern and southwestern Idaho have more volcanic features than ranges in the eastern portion of the state. There are no known fossil-bearing formations in northern Nevada where Alternative 7I occurs.

For the purposes of paleontological record searches, a 1-mile-wide corridor (0.5 mile on either side of the centerline) was used. This allowed the delineation of important fossil-bearing formations in most areas that could be affected by the construction of the Project. There may be some access roads located outside the 1-mile corridor that could also affect fossil-bearing formations. These would be examined on a case-by-case basis as they are identified.

3.13.1.2 Issues to be Analyzed

Issues raised by members of the public during public scoping (Tetra Tech 2009a) included the following:

- Whether a full inventory of potentially affected paleontological resources would be carried out,
- Whether fossils would be damaged during construction, and
- Whether fossils would be removed or destroyed by increased access to protected areas.

3.13.1.3 Regulatory Framework

Paleontological resources are recognized as nonrenewable scientific resources and are afforded protection by federal statutes and policies. The BLM has a system of rating the sensitivity of geologic units known as the Potential Fossil Yield Classification (BLM 2008f). This classification system was originally developed by the Forest Service's Paleontology Center of Excellence and the Region 2 (Forest Service) Paleontology Initiative in 1996. Modifications were made by the BLM's Paleontological Resources staff in subsequent years. For consistency, the BLM system was used throughout the Project. The five levels are:

1 Very low – not likely that a geologic unit has recognizable fossil remains.
2 Low – not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils
3 Moderate or unknown - various significance, abundance, and predictable occurrence or unknown fossil potential
4 High – high occurrence of significant fossils
5 Very High – highly fossiliferous and predictable or significant fossils that are at risk of adverse impacts or degradation

Sensitivity ratings for levels 3, 4, and 5 can be further subdivided (using the letters A and B) based on the amount of soil cover generally present on a formation. For example, a subdivision of 3A has less soil cover than 3B. BLM Sensitivity ratings for the geologic units in Wyoming are shown in Table 3.13-1. BLM Sensitivity ratings for the geologic units in Idaho are shown in Table 3.13-2.

Table 3.13-1. BLM Sensitivity Ratings for Geologic Units Encountered in Wyoming

Period	Formation	Sensitivity Rating
Quaternary sediments	Alluvium, colluvium, playa and other lacustrine deposits, dune sand and loess, gravel, pediment, and fan deposits	2
Quaternary landslide debris	The formations involved in Quaternary landslides could be of almost any age, but the disturbances caused by the landslide in most cases preclude recovery of meaningful paleontological resources that might have existed.	1
Pleistocene and/or Pliocene	Terrace gravel	2
Pliocene and Miocene	Salt Lake Formation	3
Upper Miocene	combined formations	5
Miocene	combined formations	3

Table 3.13-1. BLM Sensitivity Ratings for Geologic Units Encountered in Wyoming (continued)

Period	Formation	Sensitivity Rating
Lower Miocene and Upper Oligocene	combined formations	5
Oligocene	White River Group	5
Eocene	Fowkes Formation	3
	Wasatch Formation	5
	Wagon Bed Formation	5
	Bridger Formation	5
	Green River Formation	5
	Wind River Formation	5
Paleocene	Hanna Formation	5
	Fort Union Formation	3
Cretaceous and Paleocene	Evanston Formation	3
	Ferris Formation	5
Cretaceous	Adaville Formation	3
	Almond Formation	3
	Fox Hills Sandstone	3
	Lewis Shale	3
	Lance Formation	3
	Mesaverde Group	3
	Blair Formation	3
	Medicine Bow Formation	3
	Niobrara Formation	5
	Baxter Shale	3
	Frontier Formation	3
	Cody Shale	3
	Steele Shale	3
	Gannett Group	3
	Mowry Shale	3
	Thermopolis Shale	3
	Hilliard Shale	3
	Smiths Formation	3
	Thomas Fork Formation	3
	Cokeville Formation	3
	Quely Formation	3
	Sage Junction Formation	3
	Bear River Formation	3
	Aspen Formation	3
	Cloverly Formation	3
Jurassic	Morrison Formation	3
	Sundance Formation	3 – 5
	Stump Formation	3

Table 3.13-1. BLM Sensitivity Ratings for Geologic Units Encountered in Wyoming (continued)

Period	Formation	Sensitivity Rating
Jurassic	Twin Creek Limestone	3
	Preuss Sandstone	3
	Nugget Sandstone	3
Triassic	Ankareh Formation	3
	Chugwater Formation	3
	Thaynes Limestone	3
	Woodside Shale	3
	Dinwoody Formation	3
Permian	Goose Egg Formation	2
	Phosphoria Formation	3
Permian and Pennsylvanian	Casper Formation	3
	Tensleep Sandstone	2
	Wells Formation	3
Pennsylvanian	Amsden Formation	2 – 3
Mississippian	Madison Limestone	3
Devonian	Darby Formation	2 – 3
Ordovician	Bighorn Dolomite	2 – 3
Cambrian	Gallatin Limestone	2 – 3
	Gros Ventre Formation	2 – 3
	Flathead Sandstone	2 – 3
Precambrian	Archean Granitic Rocks	1
	Granite Gneiss	1

Source: Geologic units: USGS 1994; sensitivity ratings: Wyoming Bureau of Land Management

Table 3.13-2. BLM Sensitivity Ratings for Geologic Units Encountered in Idaho

Period	Formation	Sensitivity Rating
Quaternary sediments	Alluvium, colluvium, playa and other lacustrine deposits, dune sand and loess, gravel, pediment, and fan deposits	3
Quaternary/Tertiary Volcanics	Trio Hill Basalt	2
	Dorsey Butte Basalt	2
	Montini volcanic complex	2
	Conservancy Flats volcanic complex	2
	Nahas Ranch Basalt (upper and lower units)	2
	Basalt of Otter Massacre Site	2
	Basaltic Tuff of Red Trails	2
Holocene and Pleistocene	Playa deposits	3
Pleistocene	Bonneville Flood deposits	3
	Malad Basalt	3
	Fluvial deposits	3
	Cave accumulations	4

Table 3.13-2. BLM Sensitivity Ratings for Geologic Units Encountered in Idaho (continued)

Period	Formation	Sensitivity Rating
Pliocene through Pleistocene	Marsh Valley Formation	3
Pliocene	Tuana Gravels	3
	Glenns Ferry Formation	5
Miocene	Chalk Hills Formation	5
	Poison Creek Formation	5
Miocene through Oligocene	Starlight Formation	4
Miocene through Eocene	Salt Lake Formation	3
Cretaceous	Granite of Silver City Batholith	1
Jurassic	Twin Creek Limestone	3
Triassic through Jurassic	Nugget Sandstone	3
Triassic	Thaynes Limestone	5
Permian	Phosphoria Formation	5
Permian and Pennsylvanian	Oquirrh Group	3
Carboniferous undifferentiated	Manning Canyon Shale	3
Mississippian	Laketown Dolomite	3
	Humbug Formation	3
	Lodgepole Limestone	3
	Great Blue Limestone	3
Devonian	Water Canyon Formation	3
	Bierdneau Formation	3
	Hyrum Dolomite	3
Ordovician	Fish Haven Dolomite	3
	Swan Peak Quartzite	3
	Garden City Formation	3
Cambrian through Ordovician	Saint Charles Formation	3
Cambrian	Nounan Limestone	3
	Worm Creek Quartzite Member	4
Proterozoic	Brigham Quartzite	3
	Granite Gneiss	1
	Archaen Granitic Rocks	1

Source: in part from Idaho BLM records, and in part from estimates.

Federal protection for significant paleontological resources applies to federally owned or managed lands. Federal legislative protection for paleontological resources began with the Antiquities Act of 1906 (P.L. 59-209; 16 U.S.C. § 431 *et seq*.; 34 Stat. 225), which requires protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal land. The Antiquities Act of 1906 forbids disturbance of any object of antiquity on federal land without a permit issued by the responsible managing agency. This act also establishes criminal sanctions for unauthorized appropriation or destruction of antiquities. The Federal Highways Act of

1958 clarified that the Antiquities Act applied to paleontological resources and authorized the use of funds appropriated under the Federal-Aid Highways Act of 1956 to be used for paleontological salvage in compliance with the Antiquities Act and any applicable state laws.

In addition to the Antiquities Act, other federal statutes protect fossils. The Historic Sites Act of 1935 (P.L. 74-292; 49 Stat. 666; 16 U.S.C. § 461 *et seq*.) declares it national policy to preserve objects of historical significance for public use and gives the Secretary of the Interior broad powers to execute this policy, including criminal sanctions. NEPA (P.L. 91-190; 31 Stat. 852; 42 U.S.C. §§ 4321-4327) requires that important natural aspects of the nation's heritage be considered in assessing the environmental consequences of any proposed project. The FLPMA (P.L. 94-579; 90 Stat. 2743; U.S.C. § 1701-1782) requires that public lands be managed in a manner that protects the quality of their scientific values. The most explicit protection for paleontological resources was enacted in 2009. The Paleontological Resources Preservation Act of 2009 regulates who may collect fossils on public lands and where such fossils must be curated.

3.13.1.4 Methods

Paleontological record searches were commissioned from the primary paleontological repositories in Wyoming and Idaho. For the Wyoming portion, the records of the Geological Museum of the University of Wyoming in Laramie were utilized. The records of the Idaho Museum of Natural History, Pocatello, Idaho, were employed for the Idaho portion. The Proposed Route and Route Alternatives for Gateway West were mapped on segments of USGS 7.5-minute topographic maps. These segments of topographic maps were then compared to the paleontological locality maps in the Idaho and Wyoming repositories. The information obtained from the record searches was supplemented by confidential documents provided by the BLM Idaho State Office, geologic maps, paleontological literature, and by discussions with specialists in the paleontology of those two regions. These specialists included staff of the Hagerman Fossil Beds and the Fossil Butte National Monuments.

The following references were used to prepare the summaries of known fossil localities by segment, as presented in Section 3.13.1.5. Wyoming geologic maps utilized include Love and Christiansen (1985) and USGS (1994). The state of Idaho does not have equivalent geologic mapping. The information in the digital version of the geology of the state by Johnson and Raines (1996) was supplemented by numerous other maps. These include 30- x 60-minute and similar smaller-scale maps published by Covington and Weaver (1990), Jenks et al. (1998), Long and Link (2007), Link and Stanford (1999), Bonnichsen and Godchaux (2006a), Scott (1982), and Kauffman et al. (2005). Fifteen-minute and 7.5-minute geologic maps employed include Bonnichsen and Godchaux (2006b), Carr and Trimble (1976), DeVecchio et al. (2003), Gillerman and Kauffman (2005), Kauffman and Orthberg (2004, 2005), Malde and Powers (1972), Matthews et al. (2006), Miller et al. (2008), Mytton et al. (1990), Pierce et al. (1983), Orthberg and Breckenridge (2004a, b, c), Orthberg and Kauffman (2005), Pope et al. (2001), Smith (1982), Stearns (1938), Trimble and Carr (1976), and Williams et al. (1990a, 1990b).

To identify potential effects to paleontological resources, the geologic formations shown in Tables 3.13-1 and 3.13-2 were plotted on a map, and a GIS analysis was used to compare the locations of the geologic formations against the centerlines of the Proposed Route and Route Alternatives in each segment. In some cases, geologic formations were reported in the literature that did not appear on the BLM lists. In those cases, an estimate of fossil sensitivity was made, based on rock type, or whether the sources used mentioned potential for paleontological resources. The distance (in miles) the routes traversed across each geologic formation were multiplied by the sensitivity ratings shown in Tables 3.13-1 and 3.13-2. To disclose the risk to paleontological resources by segment, the route mileage through each geologic formation was multiplied by its sensitivity rating to determine the paleontology risk factor. These risk factors were totaled within each segment of the Proposed Route and Route Alternatives and compared (Appendix D, Table D.13-1). The routes with the highest risk factors would have the greatest potential for effects on paleontology resources. The risk factors were then compared for each segment by alternative.

The total mileage of routes within highly or very highly sensitive formations was also reviewed. To complete this evaluation, the total mileage of each Proposed Route and Route Alternative containing formations with sensitivity ratings of 4 or 5 was evaluated as presented in Table 3.13-3. The total mileage of high or very high sensitivity formations was then compared.

3.13.1.5 Existing Conditions

From east to west, the Project begins within the Great Plains Physiographic Province near Glenrock, Wyoming, and immediately passes into the Southern Rocky Mountain Province, represented by the Laramie Range (the first two-thirds of Segment 1E and the first half of Segment 1W). It traverses the length of the Wyoming Basin and then crosses the Middle Rocky Mountain Province (portions of Segment 4). This province straddles the Wyoming-Idaho border region. Next, the route passes into the Basin and Range Province (Segments 4 and 5) and then into the Snake River Plain, which is part of the Columbia Plateau Province (Segments 7, 8, 9, and 10). The rocks of the Wyoming portion are almost entirely sedimentary, whereas those of the Idaho portion include massive amounts of basalt and other igneous rocks.

Fossil-bearing formations that the Wyoming portion of the Project crosses are listed in Table 3.13-1. One of the most important formations, the Green River Formation, has an international reputation for the exquisite animal and plant fossils quarried from its oil shale layers. Fossil Butte National Monument explores the riches of this formation. The Idaho portion of the Project crosses the potentially fossiliferous formations listed in Table 3.13-2. Among these, the Glenns Ferry Formation is especially well known for the numerous vertebrate fossils it has produced. The Hagerman Fossil Beds National Monument is devoted to fossils from this formation. The Hagerman Fossil Beds National Monument has been designated as a National Natural Landmark. It is internationally significant for its late Pliocene epoch (3 to 4 million years ago) fossil deposits, and over 220 species of plants and animal fossils have been identified.

Known Localities by Proposed Route Segment

Segment 1E, including Alternatives 1E-A, 1E-B, and 1E-C, and Segments 1W(a) and 1W(c), including Alternative 1W-A, are illustrated in Figure A-2. Three recorded paleontological localities were found within the buffer of the Proposed Route near the Aeolus Substation. These are in the Frontier Formation and have produced teeth of sharks, rays, and crocodiles. The NFS lands in Wyoming have a "very low" sensitivity ranking of 1 with no known or likely localities.

The Proposed Route for Segment 2 and Alternatives 2A and 2B are illustrated in Figure A-3 in Appendix A. A large number of recorded localities (approximately 40) lie within the ROW and buffer of the Proposed Route just where it leaves the junction of Segments 1E and 1W. These are in the Hanna Formation (Paleocene) and have produced gars and other fish, crocodiles, lizards, turtles, multituberculates, marsupials, primates, pantolestids, oxyclaenids, phenacodontids, mioclaenids, hyopsodontids, cimolestids, leptictids, arctocyonids, periptychids, pantolambdids, viverrarvids, palaeorictids, and a primitive horse as well as reworked Cretaceous shark teeth. Eight more recorded localities were found farther west on the Proposed Route. Some are from the Wasatch Formation (Eocene) and produced unidentified reptile and mammal remains. Others are from the Fort Union Formation (Paleocene) and produced fish, amphibian, lizard, crocodile, champsosaur, multituberculate, pantolestid, arctocyonid, oxyclaenid, condylarth, mioclaenid, hyopsodontid, primate, pantolestid, cimolestid, and leptictid remains. No recorded localities were found within the ROW or buffer of Alternative 2A.

Figure A-4 in Appendix A illustrates the Segment 3 Proposed Route. Three recorded localities were found near the west end of the Proposed Route. One is in the Wasatch Formation (Eocene) and has produced gar teeth. Two more are in the Fort Union Formation (Paleocene) and have produced gar, turtle, crocodile, insectivoran, primate, arctocyonid, oxyclaenid, pantolestid, and phencodontid remains.

In an area of overlap between Subsegment 3P and Subsegment 4P lies a locality in the Almond Formation (Cretaceous). It has produced oysters, clams, snails, and shark teeth.

The Wyoming portions of the Segment 4 Proposed Route and Alternatives 4A, 4B, 4C, 4D, 4E, and 4F are mapped in Figure A-5 in Appendix A, and the Idaho portion in Figure A-6. No recorded localities were found along the Proposed Route. In the eastern portion common to Alternatives 4B through 4E (between 4b and 4b.1), a concentration of localities have been recorded. Eleven localities occur within the ROW or buffer, and more than 22 occur within a mile of the midline of the ROW. They are from the Bridger Formation and have produced remains of gar, snakes, lizards, turtles, crocodiles, marsupials, insectivorans, rodents, primates, uintatheres, tapiroids, horses, hyaenodonts, and tillodonts.

Figure A-7 in Appendix A illustrates the Segment 5 Proposed Route and Alternatives 5A, 5B, 5C, and 5D. One recorded locality was found within the buffer of the Proposed Route near its eastern end. The only records describe gravels producing bone. However, fossiliferous Miocene and Pleistocene gravels have been reported in the immediate area.

Segment 6 is illustrated in Figure A-8 in Appendix A. Segment 6 connects the Borah and Midpoint Substations. The existing 345-kV line would be energized at 500 kV using existing structures and conductor. The search area for Segment 6 was only 0.5 mile, which represents the estimated disturbance area near the substations.

Figure A-9 in Appendix A depicts the Segment 7 Proposed Route and Route Alternatives 7A, 7B, 7C, 7D, 7E, 7F, 7G, 7H, 7I, and 7J. Only one recorded locality was noted. Pleistocene gravels with bone occur adjacent to the buffer near Rockland.

The Segment 8 Proposed Route and Route Alternatives 8A, 8B, 8C, 8D, and 8E are illustrated in Figure A-10 in Appendix A. No recorded localities were encountered for Segment 8, but one lies within the buffer of Alternative 8A. The Glenns Ferry Formation (Pliocene) contains the potential for significant vertebrate fossils in the vicinity of Alternative 8A. The Hagerman Fossil Beds National Monument (see description below), located south of Alternative 8A and north of Alternative 9B, has been established to preserve the fossil richness in this area.

Figure A-11 in Appendix A shows the Segment 9 Proposed Route and Alternatives 9A, 9B, 9C, 9D, 9E, 9F, 9G, and 9H. No recorded localities were encountered for Segment 9 but several lie within the buffer of Alternative 9A. One is of Miocene age, but the others are from the Glenns Ferry Formation (Pliocene), and produced unspecified vertebrate fossils.

The Proposed Route for Segment 10 is illustrated in Figure A-12 in Appendix A. No recorded localities occur within the buffer of Segment 10 but fossiliferous gravels lie adjacent to that segment.

The Proposed Route and Route Alternatives have been designed to avoid areas designated by the BLM as ACECs. The Proposed Route and Route Alternatives do approach two major federal paleontological preserves.

Description of Fossil Butte National Monument (including Privately Held Quarry Sites)

Fossil Butte National Monument was authorized in 1972. It lies 9 miles west of Kemmerer in Lincoln County, Wyoming. It is dedicated to the paleontology and geology of the Eocene Green River and Wasatch formations in the area of ancient Fossil Lake. The monument preserves 13 square miles (34 square kilometers) of the 900-square-mile (2,330 square kilometer) Fossil Lake. There are two commercial quarries east of the park, two southeast of the park, and eight south of the park. The definitive book on the fossils of the Green River Formation is that of Grande (1984). The Green River Formation contains the best preserved and best documented Eocene freshwater ecosystem known. Alternative 4A passes 5.5 miles north of the monument and Alternatives 4B and 4C pass within a mile of the southern boundary.

Description of Hagerman Fossil Beds National Monument

Hagerman Fossil Beds National Monument was authorized in 1988. It is dedicated to the paleontology and geology of the Glenns Ferry Formation (Pliocene) along the western side of the Snake River just west of Hagerman, Idaho. It occupies approximately 6.8 square miles (17.6 square kilometers). The primary fossil-producing sedimentary unit is the Glenns Ferry Formation. The Hagerman Fossil Beds are the discovery site for the Hagerman Horse, the oldest known representative of the modern

horse genus Equus, which includes horses, donkeys, and zebras. The Hagerman Horse is the state fossil of Idaho. In addition, the list of species collected from this formation within the monument includes 36 plant species, 4 ostracode, 37 mollusk, 2 crustacean, 18 fish, 5 amphibian, 8 reptile, 28 bird, and 53 mammal species. The Glenns Ferry Formation is crossed by many segments of the route, and many of the organisms might be expected to occur within those sediments. Alternative 8A passes within 1,500 feet of the northeastern corner of the monument; it crosses mostly Tuana Gravel with some Glenns Ferry Formation in that area. Alternative 8A passes within 1,500 feet of the northern boundary of the monument and Alternative 9B passes about the same distance from the southern boundary; the geology there is mostly Glenns Ferry Formation with Chalk Hills Formation exposed in one drainage. The closest approaches of the Proposed Route (Segments 8 and 9) are about 5 miles to the northeast and southwest of the monument in that area.

3.13.2 Direct and Indirect Effects

This section is organized to present effects to paleontology from construction, then operations, followed by decommissioning activities for the proposed Project. Route Alternatives are analyzed in detail below in Section 3.13.2.3. There is a Design Variation involving use of two single-circuit structures proposed by the Proponents for Segments 2, 3, and 4 (see Section 2.2 for details), which is analyzed below in Section 3.13.2.4 and a Structure Variation that is analyzed in Section 3.13.2.5. The Proponents have also proposed a Schedule Variation, analyzed in Section 3.13.2.6, in which one of the two single circuits to be constructed in Segments 2, 3, and 4 and a portion of Segment 1W would be built on an extended schedule with construction beginning approximately 2.5 years after completion of the initial construction.

Mitigation measures or EPMs are presented in detail within this section only if it is the first time they have been discussed in Chapter 3; all other measures are referenced or summarized. A comprehensive list of all Proponent-proposed EPMs and Agency-required mitigation measures can be found in Table 2.2-2 of Chapter 2.

Plan Amendments

Proposed amendments are summarized in Table 2.2-1 of Chapter 2 and detailed in Appendices F and G. Amendments are needed to permit the Project to cross various areas of BLM-managed and NFS lands. Effects described for areas requiring an amendment in order for the Project to be built would only occur if the amendment were approved. Amendments that alter land management designations could change future use of these areas. No amendments specific to paleontological resources are proposed for the Project and no impacts to paleontological resources resulting from approving the amendments beyond the impacts of the Project are anticipated.

3.13.2.1 No Action Alternative

No direct or indirect effects to paleontological resources by transmission lines or associated facilities would occur, because the proposed Project would not be constructed.

3.13.2.2 Effects Common to All Action Alternatives

Construction

Direct effects due to construction common to the Proposed Route and Route Alternatives include the possible damage to paleontological specimens and possible loss of associated data. The scientific information provided by fossils is maximized by discovery of fossil specimens preserved in place within the host geologic formations. Construction disturbance activities could result in the discovery of isolated fossil specimens. Further examination in the vicinity of these isolated finds could result in significant fossil discoveries. However, excavation or blasting in fossil-bearing rock formations is more likely to damage intact fossils and reduce the scientific value of the paleontological resource. The likelihood of recovering scientifically important fossil specimens using heavy construction equipment is low. Therefore, use of construction equipment and blasting could have direct negative effects on paleontological resources.

Construction impacts include excavations for the tower foundations and construction of access roads, staging areas, laydown yards, substations, and regen sites. Transmission line tower foundations would consist of drilled piers, 4 to 6 feet in diameter and 15 to 20 feet deep. Blasting may be necessary in bedrock areas not suitable for excavation by standard drilled pier augering. The construction impacts from installation of other features would likely be less than the impacts from the tower excavations because other ground-disturbing activities would be much shallower.

Based on the calculated paleontology risk factors, Segments 4 and 9 have the highest risks, with risk factors of 785 and 550, respectively. Segments 2, 7, and 8 have moderate risk factors of 360, 369, and 375, respectively. The extent of soil cover throughout the Proposed Route and Route Alternatives is not known at this time, though estimates to shallow bedrock are found in Table 3.15-1 (Section 3.15 – Soils). This table indicates that 38 percent of the Segment 4 Analysis Area contains shallow bedrock. Shallow bedrock underlies about 43 percent of Segment 9. Shallow bedrock is present in Segments 2, 7, and 9 at amounts ranging from 0 to 16 percent. Routes with soil cover would protect paleontological resources. Indirect effects due to construction include the unauthorized collecting or destruction of paleontological specimens due to increased access.

To mitigate impacts to paleontological resources, the Proponents intend to cease work until the appropriate person has been notified in situations where fossil materials are discovered. The following EPMs, which are included in Appendix C-1, Attachment D, have been developed by the Proponents and they are committed to implementing them during all applicable construction activities.

CUL-1 All work conducted under the Cultural Resources and Paleontological Monitoring and Mitigation Plan will be performed by qualified paleontologists and archeologists with trained assistants.

CUL-2 An Unanticipated Discovery Plan will be included as part of the Cultural Resources and Paleontological Monitoring and Mitigation Plan. This plan will specify what steps will be taken if a subsurface cultural resource or fossil is discovered during construction, including stopping construction in the vicinity of the find, notification of the appropriate land management

agency, identification of a qualified archeologist or paleontologist to conduct an evaluation of the find, and the development of an approved data recovery program or other mitigation measures.

CUL-3 The Cultural Resources and Paleontological Monitoring and Mitigation Plan will include provisions for the preparation and curation of any fossil collections from federal lands and for the preparation of a final report based on the data recovered for activities on federal lands.

CUL-9 If significant fossil materials are discovered during Project construction, all surface-disturbing activities in the vicinity of the find will cease until notification to proceed is given by the authorized officer. The site will be protected to reduce the risk of damage to fossils and context. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the authorized officer.

To further reduce the impacts on paleontological resources during construction, the Agencies have identified the following mitigation measures where construction is on federal lands, and on state, Indian Reservation, or private lands where requested by the land management agency or landowner.

PALEO-1 The Proponents shall prepare a Paleontological Monitoring Plan for the Project, focusing on Segments 4, 7, 8, and 9 where the potential for adverse impacts is the greatest. This plan shall be submitted to appropriate agencies for review and approval prior to commencing construction. The plan will specify that:

- Monitoring of excavation and grading in sensitive sediments, especially access roads and tower sites, must occur when construction is near or in those geologic formations.
- Monitoring of excavations in sensitive sediments, screening the excavated spoils, and processing of bulk sediment samples for microvertebrate fossils must occur where there is a significant potential for data recovery from those spoils.
- Monitoring must be performed by a qualified paleontologist and in consultation with a designated paleontologist in each state, NF, or BLM district. The Authorized Officer will designate the appropriate paleontologist depending on project location.

PALEO-2 Where fossil-bearing sediments are exposed by construction, the sediments must be covered with a minimum 4-inch layer of soil where feasible to reduce unauthorized removal or disturbance of resources.

PALEO-3 Areas with Fossil Potential Classification sensitivity rankings of 3, 4, or 5 on NFS lands will be surveyed and posted.

Operations

No direct effects to paleontological resources due to operations are foreseen. Possible indirect effects would be the unauthorized collecting or destruction of paleontological specimens due to increased access.

Decommissioning

Very limited effects due to decommissioning are foreseen because the activities would occur within the same footprint as construction. Assuming that concrete footings would not be removed from the ground, only exposed outcrops could be affected. It is possible that a few fossils exposed at the surface could be damaged by vehicles involved in decommissioning.

3.13.2.3 Proposed Route and Alternatives by Segment

Numerous geologic units of moderate to high paleontological sensitivity would be crossed by the centerline of the Project's Proposed Route and Route Alternatives. Therefore, construction of this set of transmission lines, along with the associated access roads, has the potential to impact paleontological resources.

The nature of the paleontological resources in a given rock unit is important. For example, augering has different impacts on resources that consist of numerous isolated teeth or small bones in relatively loose alluvium versus resources that consist of complete skeletons in relatively indurated sediments (e.g., parts of the Green River Formation). Much more information and many more intact specimens can be recovered from the auger tailings from the alluvium containing isolated teeth or small bones than in tailing from the Green River Formation. The comparison of alternatives is also complicated by the possibilities of making minor adjustments in the siting of given structures to avoid discrete resources. Records searches have indicated a few known areas of locality concentrations within the ROW. Table 3.13-3 presents the paleontological risk factors by Proposed Route and Route Alternative.

Segment 1E

Segment 1E, as proposed, would link the Windstar and Aeolus Substations in south-central Wyoming with a 100.6-mile 230-kV single-circuit transmission line. Twenty acres of the expansion of Windstar and Aeolus Substations and 0.5 acre for one regeneration site are attributed to Segment 1E. Alternative 1E-A is a 16.1-mile alternative along the north end of Segment 1E, which was the Proponents' initial proposal before moving the Proposed Route at the suggestion of local landowners to avoid the more settled area around Glenrock. Alternative 1E-B is 21.4 miles longer than the Proposed Route but is being considered by the Proponents because it would avoid a Wyoming-designated sage-grouse core area to the east. The BLM has required the consideration of Alternative 1E-C, which parallels the Segment 1W 230-kV lines into the Aeolus Substation (see Appendix A, Figure A-2).

Approximately 22 miles of the Segment 1E Proposed Route pass through areas of bedrock with a very high potential fossil yield. Another 24 miles would pass through areas with bedrock having a very low potential fossil yield. As mentioned above, the precise amount of impacts the Project would create depends on the amount of soil cover at the various road and tower sites, and on the precise nature and amount of ground modification at those sites. These details are unknown at this time. These limitations apply equally to the following Proposed Route and Route Alternative descriptions.

Table 3.13-3. Paleontology Risk Factor of Proposed and Alternative Routes

Segment	Route	Miles Crossed [1/]	Paleontology Risk Factor [2/]	Highly Sensitive Miles Crossed [3/]
Wyoming Portion				
1E	Proposed – Total Length	100.6	281.6	21.7
	Proposed – Comparison portion for Alternative 1E-A	17.6	51.4	–
	Alternative 1E-A	16.1	45.2	–
	Proposed – Comparison portion for Alternative 1E-B	37.9	109.7	6.9
	Alternative 1E-B	59.3	172.7	12.5
	Proposed – Comparison portion for Alternative 1E-C	75.4	213.4	21.7
	Alternative 1E-C	48.7	169.4	23.0
1W(a)	Proposed – Total Length	76.5	250.8	20.6
	Proposed – Comparison portion for Alternative 1W-A	20.3	55.4	–
	Alternative 1W-A	16.2	47.4	–
1W(c)	Proposed – Total Length	70.6	234.2	25.3
2	Proposed – Total Length	96.7	360.3	41.8
	Proposed – Comparison portion for Alternative 2A	28.8	99.4	8.0
	Alternative 2A	28.4	105.3	11.6
	Proposed – Comparison portion for Alternative 2B	7.0	26.1	2.8
	Alternative 2B	6.2	23.9	3.5
	Proposed – Comparison portion for Alternative 2C	28.4	121.1	18.0
	Alternative 2C	24.4	108.4	17.8
3	Proposed – Total Length	56.4	215.3	27.6
4	Proposed – Total Length	203.0	785.1	100.2
	Proposed – Comparison portion for Alternatives 4A,B,C,D,E,F	90.2	350.6	48.8
	Alternative 4A	85.2	324.4	44.4
	Alternative 4B	100.2	402.9	57.6
	Alternative 4C	101.6	397.3	54.9
	Alternative 4D	100.8	408.6	59.5
	Alternative 4E	102.2	403.0	56.9
	Alternative 4F	87.5	354.7	52.4
5	Proposed – Total Length	54.6	162.9	4.7
	Proposed – Comparison portion for Alternatives 5A,B	25.3	80.1	4.2

Table 3.13-3. Paleontology Risk Factor of Proposed and Alternative Routes (continued)

Segment	Route	Miles Crossed[1/]	Paleontology Risk Factor[2/]	Highly Sensitive Miles Crossed [3/]
5	Alternative 5A	33.7	107.6	3.3
	Alternative 5B	44.4	145.8	6.3
	Proposed – Comparison portion for Alternative 5C	33.2	101.6	2.1
	Alternative 5C	26.1	84.6	6.4
	Proposed – Comparison portion for Alternative 5D	19.4	52.9	0.3
	Alternative 5D	17.5	61.9	10.0
	Proposed – Comparison portion for Alternative 5E	5.8	11.7	–
	Alternative 5E	5.3	10.9	–
6	Proposed – Total Length	0.5	1.0	–
7	Proposed – Total Length	118.1	368.9	14.7
	Proposed – Comparison portion for Alternatives 7A,B	35.2	108.4	2.5
	Alternative 7A	38.0	120.3	3.3
	Alternative 7B	46.4	152.2	6.5
	Proposed – Comparison portion for Alternative 7C	20.1	61.3	1.0
	Alternative 7C	20.3	69.4	8.6
	Proposed – Comparison portion for Alternative 7D	6.2	18.6	–
	Alternative 7D	6.8	20.3	–
	Proposed – Comparison portion for Alternative 7E	3.8	11.5	–
	Alternative 7E	4.5	13.4	–
	Proposed – Comparison portion for Alternative 7F	10.5	31.5	–
	Alternative 7F	10.8	32.3	–
	Proposed – Comparison portion for Alternative 7G	3.1	9.4	–
	Alternative 7G	3.2	9.7	–
	Proposed – Comparison portion for Alternatives 7H,I	118.1	366.1	14.7
	Alternative 7H	127.5	409.5	13.6
	Alternative 7I	173.4	561.0	21.0
	Proposed – Comparison portion 7/9 for Alternative 7J[4/]	143.9	438.1	14.7
	Alternative 7J[4/]	202.1	647.2	21.0
8	Proposed – Total Length	131.0	369.4	23.1
	Proposed – Comparison portion for Alternative 8A	51.4	139.5	8.3

Table 3.13-3. Paleontology Risk Factor of Proposed and Alternative Routes (continued)

Segment	Route	Miles Crossed[1/]	Paleontology Risk Factor[2/]	Highly Sensitive Miles Crossed [3/]
8 (cont.)	Alternative 8A	53.6	152.5	8.7
	Proposed – Comparison portion for Alternative 8B	45.3	143.2	14.5
	Alternative 8B	45.8	123.8	–
	Proposed – Comparison portion for Alternative 8C	6.5	19.6	–
	Alternative 8C	6.4	19.2	–
	Proposed – Comparison portion for Alternative 8D	6.9	13.9	–
	Alternative 8D	8.1	18.7	0.7
	Proposed – Comparison portion for Alternative 8E	7.0	20.0	1.6
	Alternative 8E	18.5	39.4	0.9
9	Proposed – Total Length	161.7	539.0	38.7
	Proposed – Comparison portion for Alternative 9A	7.8	18.9	–
	Alternative 9A	7.7	19.4	–
	Proposed – Comparison portion for Alternative 9B	49.5	155.9	8.4
	Alternative 9B	53.2	189.9	14.7
	Proposed – Comparison portion for Alternative 9C	14.7	37.2	–
	Alternative 9C	15.3	38.5	0.3
	Proposed – Comparison portion for Alternatives 9D,E,F,G,H	57.2	207.6	19.8
	Alternative 9D	58.4	163.7	10.4
	Alternative 9E	68.7	231.6	18.3
	Alternative 9F	63.2	180.4	10.7
	Alternative 9G	56.4	153.8	8.4
	Alternative 9H	61.2	170.5	8.8
10	Proposed – Total Length	33.6	71.5	–

1/ Mileages are rounded to the nearest tenth of a mile; therefore, rows may not sum exactly due to rounding.
2/ The paleontology risk factor is a product of the length of the segment or alternative multiplied by the BLM sensitivity rating of the individual rock formations crossed.
3/ The highly sensitive miles crossed is the mileage per segment of route crossing rock formations with sensitivity ratings of 4 or 5.
4/ Alternative 7J connects with Segment 9 approximately 25.8 miles west of the proposed Cedar Hill Substation, which is the western terminus of Segment 7 and the beginning point for Segment 9. The table above compares 7J (202 miles) with the corresponding portion of Segment 7/9 (118.1 miles of Segment 7 and 25.8 miles of Segment 9, for a total of 143.9 miles). All other Segment 7 alternatives are compared to Segment 7 of the Proposed Route (118.1 miles) only.

Alternative 1E-A would be 16.1 miles long, and would not pass through areas of bedrock with significant fossil yield. Alternative 1E-B would be 59.3 miles long. Approximately 12.5 miles of Alternative 1E-B would pass through bedrock with a very high potential fossil yield and approximately 14 miles would pass through areas with a very low potential fossil yield. The comparison portion of the Proposed Route for Alternative 1E-B would be 37.9 miles long, of which approximately 7 miles would pass through areas with a very high potential fossil yield and approximately 4 miles through areas with a very low potential fossil yield. The comparison portion of the Proposed Route would have a lower paleontology risk factor than Alternative 1E-B and pass through about one-half the miles of highly sensitive rock formations. Alternative 1E-C would have a lower risk factor than the comparison portion of Segment 1E, mostly due to the shorter distance. However, Alternative 1E-C would cross 1.3 miles more highly sensitive formations.

Segment 1W

Segment 1W is composed of two parts, Segment 1W(a) and 1W(c), both of which would consist of a new 230-kV line for part of their length and a reconstruction of an existing 230-kV line for the remaining part. Segment 1W(a) would be about 76.5 miles long, and would extend from the Windstar Substation to the Aeolus Substation. Segment 1W(c) would be about 70.6 miles long, and would extend from the Dave Johnson Power Plant to the Aeolus Substation. Alternative 1W-A is a 16.2-mile alternative located near the town of Glenrock, which was the Proponents' initial proposal before moving the Proposed Route at the suggestion of local landowners in order to avoid the more settled area around Glenrock. Twenty acres of the proposed expansion at the Windstar and Aeolus Substations are attributed to Segment 1W(a) and 3 acres of the expansion at the Difficulty Substation and 17 acres of the expansion at the Windstar and Aeolus Substations are attributed to Segment 1W(c). There are no Route Alternatives proposed south of that point (see Appendix A, Figure A-2).

The Segment 1W(a) Proposed Route would cross 20.6 miles of highly sensitive rock formations. Three separate lines in this area would pass through over 16.3 miles of the Wind River and White River Formations, which have very high potential fossil yield ratings. It has one alternative, Alternative 1W-A, which would be 4.1 miles shorter than the comparison portion of the Proposed Route 1W(a) and have a proportionately lower risk factor. Neither Alternative 1W-A nor the comparison portion of the Proposed Route would be located in highly sensitive formations. Proposed Route 1W(c) would cross 25.3 miles of highly sensitive formations.

Segment 2

Segment 2, as proposed, would link the Aeolus and Creston Substations in southeast Wyoming with two 500-kV circuits on one structure. One circuit would be operated at 230 kV during the initial phase of the Project. Its total proposed length is 96.7 miles. Fifty-two acres of the expansion of the Aeolus Substation and the construction of the Creston Substation and 0.5 acre for one regeneration site are attributed to Segment 2. There are three Route Alternatives, two of which are near the community of Fort Fred Steele. Alternative 2A at 28.4 miles long is being considered by the BLM because it remains in the WWE corridor nearer the town and the state historic site, and Alternative

2B, at 6.2 miles, is closer to the community than the comparison portion of the Proposed Route and was the initially proposed route before the Proponents responded to local suggestions and relocated the Proposed Route farther to the south. Alternative 2C is a 24.4-mile alternative located north of Hanna, Wyoming. It is being evaluated at the recommendation of the Wyoming Governor's office to follow a utility corridor approved by that office for minimizing effects to sage-grouse (see Appendix A, Figure A-3).

The Segment 2 Proposed Route would pass through approximately 42 miles of sediment with a very high potential fossil yield rating. The comparison portion of the Proposed Route for Alternative 2A would have a somewhat lower overall risk factor than Alternative 2A and cross 3.6 miles fewer of highly sensitive formations. The areas with high concentrations of known localities are in the Hanna and Ferris Formations, common to both routes. Alternative 2B would have a somewhat lower risk factor rating than the comparison portion of the Proposed Route but cross slightly more highly sensitive rock formations, including the Cretaceous Niobrara Formation, which, as shown in Table 3.13-1, has a very high potential for paleontological finds. Alternative 2C would be 4 miles shorter than the comparison portion of the Proposed Route. However, the miles of sensitive rock formations crossed would be similar and the paleontological risk factor would be only slightly lower, 108.4 to 121.1.

Segment 3

Segment 3, as proposed, would link the Creston and Anticline Substations in southeast Wyoming with two 500-kV circuits on one structure. One circuit would be operated at 230 kV during the initial phase of the Project. Its total proposed length between those two substations is 46.7 miles. Sixty-nine acres of the construction of the Anticline and Creston Substations are attributed to Segment 3. Segment 3 would also link the Anticline and Jim Bridger Substations with a 4.3-mile 230-kV line and a 5.5-mile 345-kV line and includes the 10-acre expansion of the Jim Bridger 345-kV Substation. There are no alternatives proposed along this segment (see Appendix A, Figure A-4).

Segment 3 would pass through approximately 28 miles of Eocene and Paleocene sediments that possess very high potential fossil yield ratings.

Segment 4

Segment 4, as proposed, would link the Anticline Substation near the Jim Bridger Power Plant in southwestern Wyoming with the Populus Substation in Idaho with two 500-kV circuits on one structure. Its total proposed length is 203 miles. Eighty-nine acres of the construction of the Anticline Substation and the expansion of the Populus Substation and 1.5 acres for three regeneration sites are attributed to Segment 4. It has six Route Alternatives in the middle portion of its route but the first 52 miles to the east and the last 61 miles to the west (in Idaho) do not have any Route Alternatives. The middle section of the Proposed Route is 90.2 miles long, and its Route Alternatives vary from 85 to 102 miles long. These alternatives were proposed by the Wyoming Governor's office (4A, paralleling the existing 345-kV lines throughout); by the BLM Kemmerer FO (4B through 4E, including edits from various cooperating agencies), with the intent to avoid impacts to cultural resources to the extent practical; and by the

Proponents (4F, attempting to avoid impacts to cultural resources while still remaining north of the existing lines) (see Appendix A, Figures A-5 and A-6).

The Segment 4 Proposed Route would cross approximately 100 miles of highly sensitive rock formations. Alternative 4A and the comparison portion of the Proposed Route for Alternatives 4B, 4C, 4D, and 4E would have lower risk factor scores than Alternatives 4B, 4C, 4D, and 4E and cross fewer miles of highly sensitive rock formations. Given that the paths of the Proposed Route and the five alternatives would pass through from 44 to 60 miles of very fossiliferous Eocene sediments, the potential exists to significantly impact paleontological resources. Alternative 4F would share the path of the Proposed Route for Segment 4 along the most sensitive portions of the bedrock path, and then cross less sensitive bedrock units until rejoining the Proposed Route. Farther west, no highly fossiliferous units would be crossed in Idaho.

Segment 5

Segment 5, as proposed, would link the Populus and Borah Substations with a 54.6-mile single-circuit 500-kV line. Forty-four acres of the expansion of the Populus and Borah Substations are attributed to Segment 5. There are five Route Alternatives including two proposed by the BLM to avoid the Deep Creek Mountains (5A and 5B; 8 miles and 19 miles longer than the comparison portion of the Proposed Route), one preferred by Power County that crosses the Fort Hall Indian Reservation (5C; 6 miles shorter than the comparison portion of the Proposed Route), one originally proposed by the Proponents (5D; 2 miles shorter than the comparison portion of the Proposed Route but located within more agricultural lands), and one proposed by Power County as an alternative approach to the Borah Substation (5E) (see Appendix A, Figure A-7).

The Segment 5 Proposed Route would cross 4.7 miles of sensitive rock formations. Of the five possible routes, Alternative 5B would have the highest risk factor score. This is due in part to the fact that it is the longest alternative. The comparison portion of the Proposed Route for Alternatives 5A and 5B is shorter and would have a lower score (80.1) than either Alternative 5A (107.6) or 5B (145.8). The comparison portion of the Proposed Route for Segment 5 for Alternative 5C would have a higher score (101.6) than Alternative 5C (84.6). The comparison portion of the Proposed Route for Alternative 5D would be similar in risk factor to the alternative route (52.9 vs. 61.9). Alternative 5E and the comparison portion of the Proposed Route would also have very similar risks. The Proposed and Alternative Routes would generally cross less than 10 miles of sensitive formations, except Alternative 5D, which would cross 10.0 miles. Overall, the Proposed Route in combination with Alternative 5A would yield the lowest risk factor rating and fewest miles in sensitive formations.

Segment 6

Segment 6 is an existing transmission line linking the Borah and Midpoint Substations; it is now operated at 345 kV but would be changed to operate at 500 kV. This segment has no Route Alternatives. Existing support structures would be used and impacts would be limited to within approximately one-quarter mile from each substation to allow for moving the entry point into the substation to the new 500-kV bay. Thirty-one acres of the expansion of the Borah and Midpoint Substations are attributed to Segment 6. Changes in the two substations would allow it to be operated at 500 kV (see Appendix

A, Figure A-8). The disturbance for Segment 6 is only 0.5 mile, none in sensitive rock formations.

Segment 7

Segment 7, as proposed, would link the Populus and Cedar Hill Substations with a 118.1-mile single-circuit 500-kV line. Forty-two acres of the expansion of the Populus and the construction of the Cedar Hill Substations and 1 acre for two regeneration sites are attributed to Segment 7. In addition to the Proposed Route, which is principally on private lands, Route Alternatives have been proposed by the BLM to avoid the Deep Creek Mountains (7A and 7B; which are 5 miles and 11 miles longer than the comparison portion of the Proposed Route), by local landowners (7C, 7D, 7E, 7F, and 7G, which all represent minor adjustments proposed to address local issues), by local landowners to avoid private agricultural lands (7I or the State Line Route, which is 55 miles longer than the Proposed Route and would require 0.5 acre for an additional regeneration site), and by the Proponents to avoid the State Line Route (7H, which is 10 miles longer than the Proposed Route). Alternative 7J, which is a variant of the State Line Route also proposed by local landowners, would not terminate at the Cedar Hill Substation. This alternative, referred to as the Rogerson Alternative, would require a different substation be constructed near a 345-kV existing transmission line (approximately 24 miles southwest of the Cedar Hill Substation; see Appendix A, Figure A-9). The tables and discussion in this document compare 7J (202 miles) with the corresponding portion of Segment 7/9 (118.1 miles of Segment 7 and 25.8 miles of Segment 9, for a total of 143.9 miles). All other Segment 7 alternatives are compared to Segment 7 of the Proposed Route (118.1 miles) only.

The Segment 7 Proposed Route would cross 14.7 miles of sensitive rock formations. Alternative 7B is would be longer than Alternative 7A, which in turn would be longer than the comparison portion of the Proposed Route. Their risk factor scores (152.2, 120.3, and 108.4, respectively) show that the Segment 7 Proposed Route would have the lowest risk factor and cross the fewest miles of sensitive formations. Alternative 7C and the comparison portion of the Proposed Route would be of approximately equal length. Alternative 7C would have a higher risk factor rating (69.4 versus 61.3) and cross 7.6 miles more sensitive formations. Alternatives 7D, 7E, 7F, and 7G would be slightly longer than the comparison portions of the Proposed Route, and their risk factor scores would be also slightly higher. No sensitive rock formations would be crossed. Alternatives 7H and 7I would be both longer than the comparison portion of the Proposed Route. Alternative 7H would have a higher risk factor rating (409.5) than the comparison portion of the Proposed Route (366.1), but cross 1.1 mile less sensitive rock formations. Alternative 7I would have a risk factor of 561.0 and cross 21.0 miles of sensitive formations. Alternative 7J, the longest alternative, would have the highest risk factor (647.2); it would also cross 21.0 miles of sensitive formations, the same areas as in Alternative 7I.

From a paleontology perspective, the Segment 7 Proposed Route would be preferred over any of the Route Alternatives. The comparison portions of the Proposed Route have lower risk factor ratings than any of the Route Alternatives. The comparison portions of the Proposed Route either do not cross sensitive rock formations or cross less miles than all of the Route Alternatives except 7H.

Segment 8

Segment 8, as proposed, would link the Midpoint and Hemingway Substations. This 131-mile single-circuit 500-kV transmission line would stay north of the Snake River until crossing through the SRBOP parallel to an existing 500-kV transmission line before ending at the Hemingway Substation. Thirteen acres of the expansion of the Midpoint Substation and 0.5 acre for a regeneration site are attributed to Segment 8. There are five Route Alternatives: 8A, which follows the WWE corridor but crosses the Snake River and I-84 twice (while the Proposed Route would stay north of this area); 8B and 8C, which represent the old routes originally proposed by the Proponents but that have now been changed to avoid the cities of Kuna and Mayfield, respectively; 8D, which represents a small revision involving a rebuild of the existing transmission line to move both away from the National Guard Maneuver Area; and 8E, which was proposed by the BLM in order to avoid crossing the Halverson Bar non-motorized portion of the Guffey Butte-Black Butte Archaeological District (see Appendix A, Figure A-10).

The Segment 8 Proposed Route would cross 23.1 miles of sensitive rock formations. The Glenns Ferry Formation, the host rock for the fossils at Hagerman Fossil Beds National Monument, is present in the segment. The Yahoo Clay Formation, a late-Pleistocene lacustrine sedimentary formation deposited within Lake McKinney, a lake that developed when basalt temporarily dammed the Snake River near Bliss, Idaho, is also present in the Hagerman Valley (Janssen 2010). The Yahoo Clay does not appear on the BLM lists for paleontologically significant units. However, Malde (1982) reports the presence of mollusks (species are modern, but indicative of cooler, wetter climate) and pollen within the Yahoo Clay. The comparison portion of the Proposed Route is somewhat shorter and has a lower risk factor rating than Alternative 8A (139.5 vs. 152.5). In addition, Alternative 8A would pass within less than 1 mile from the northern boundary of Hagerman Fossil Beds National Monument. Alternative 8B would have a lower risk factor rating than the comparison portion of the Proposed Route (123.8 vs. 143.2). The Alternative 8C risk factor rating would be similar to the comparison portion of the Proposed Route (both between 19 and 20). Alternative 8D would be slightly longer than the comparison portion of the Proposed Route and have a higher risk factor rating (18.7 vs. 13.9). Alternative 8E would be over 11 miles longer than the comparison portion of the Proposed Route and have a higher risk factor (39.4 vs. 20). Sensitive rock formations would not be present in Alternative 8C. In summary, the Proposed Route would have less impacts to fossil resources than Alternatives 8A, 8D, and 8E. Alternatives 8B and 8C would possess lower risk factor ratings than the comparison portions of the Proposed Route.

Segment 9

Segment 9, as proposed, would link the Cedar Hill and Hemingway Substations with a 161.7-mile single-circuit 500-kV transmission line which skirts the Jarbidge and Owyhee Military Operating Areas to the north, then follows the WWE corridor just north of the Saylor Creek Air Force Range, passing through Owyhee County before entering into the Hemingway Substation. Fifteen acres of the construction of the Cedar Hill Substation and 1 acre for two regeneration sites are attributed to Segment 9. There are eight Route Alternatives proposed, including 9A, which was the Proponents' Proposed Route until moving to avoid the Hollister area; 9B, which is being considered by the BLM

because it follows the WWE corridor and parallels existing utility corridors; 9C, which was the Proponents' Proposed Route until moving to avoid the Castleford area; and 9D and 9E, proposed by the Owyhee County Task Force, that cross more public lands north and south of the Proposed Route, respectively, than the Proposed Route. Most of Alternative 9D would be within the SRBOP. Alternatives 9F, 9G, and 9H were proposed to avoid crossing the non-motorized area south of C.J. Strike Reservoir. Alternatives 9G and 9H provide an alternate route location south of Alternative 8E (see Appendix A, Figure A-11).

The Segment 9 Proposed Route would cross 38.7 miles of sensitive rock formations. The comparison portion of the Proposed Route would be essentially the same length as Alternative 9A, and their risk factor ratings would be the nearly the same. Neither would cross sensitive formations. Alternatives 9B, 9C, 9D, and 9E would largely follow existing transmission lines and utility corridors. The risk factor ratings for the comparison portions of the Proposed Route would be lower than for Alternatives 9B, 9C, and 9E. The risk factor rating for Alternative 9D would be lower than the comparison portion of the Proposed Route (163.7 vs. 207.6), while the rating for Alternative 9E is higher (231.6 vs. 207.6), respectively. Alternatives 9F, 9G, and 9H are of similar distance to the comparison portion of the Proposed Route, and all alternatives have a lower risk factor rating. Overall, the route with the lowest risk factor rating would be the Proposed Route in combination with Alternatives 9D, 9F, 9G, and 9H. Alternative 9B would also pass near the southern boundary of the Hagerman Fossil Beds National Monument and that makes it more likely to impact paleontological resources.

Segment 10

Segment 10, as proposed, would link the Cedar Hill and Midpoint Substations with a 33.6-mile single-circuit 500-kV line, following a WWE corridor for most of its distance. Twenty-eight acres of the expansion of the Midpoint Substation and of the construction of the Cedar Hill Substation are attributed to Segment 10. There are no Route Alternatives proposed along this segment (see Appendix A, Figure A-12).

Segment 10 has a low risk factor rating because of extensive basalt flows. Segment 10 would also avoid all sensitive rock formations.

3.13.2.4 Design Variation

A Design Variation is being considered that would consist of constructing two single-circuit lines in Segments 2 through 4 instead of a single double-circuit line (which is the design assessed above). The disturbance footprint of the two single-circuit towers is greater than that of the double-circuit tower, in part because the requested ROW would be wider, but also because helicopter-assisted construction could be implemented in these areas due to the lighter weight of the towers, which would require additional fly yards. The additional ROW space and the fly yards would cause additional temporary disturbance during construction. Across Segments 2, 3, and 4, the additional disturbance of the single-circuit tower alternative ranges from 25 to 30 percent greater than the comparable portions of the double-circuit tower disturbance under the proposed design. The two single circuits require more ground disturbance, but would be designed and constructed to the same standards as the Proposed Action.

Impacts on paleontological resources under the Design Variation would be proportionately greater due to larger structure construction footprints. The risk factor ratings would be the same as shown in the previous analysis.

3.13.2.5 Structure Variation

The proposed guyed Structure Variation would add four guy wires about 140 feet long from a point about 100 feet up in each tower to four guy anchors spaced in a square around the tower (Appendix B, Figure B-6). This would not change the amount of disturbance during construction or operation appreciably.

The use of guyed structures for part of the single-circuit 500-kV segments would not alter risk factor ratings by route segment or alternative.

3.13.2.6 Schedule Variation

The Schedule Variation uses the two single-circuit Design Variation described above but extends construction over a longer timeframe. Initially only one of the eventual two single-circuit lines would be constructed with the second to be constructed at a later date. The Schedule Variation proposes that the first single-circuit transmission line in Segments 2, 3, and 4 would be built as soon as a ROW grant is issued, but that the second line would not begin construction until late 2018. This would mean nearly 2 years between the end of construction for the first line and beginning of construction for the second line. Any staging areas and fly yards that had been used for the first stage would have been revegetated after construction was complete and would have to be cleared again. There would be two sets of construction disturbances adding movement, noise, and dust to the area of construction in two instances in any given area. A longer construction schedule would create no difference in impacts from those previously described.

3.13.3 Mitigation Measures

To minimize or avoid impacts on paleontological resources, the Proponents have committed to EPMs that would be implemented Project-wide as outlined in this section and in Appendix C.

The following mitigation measures identified by the Agencies are required on federally managed lands. The Agencies recommend that the Proponents incorporate the measures into their EPMs and apply them Project-wide.

PALEO-1 The Proponents shall prepare a Paleontological Monitoring Plan for the Project, focusing on Segments 4, 7, 8, and 9 where the potential for adverse impacts is the greatest. This plan shall be submitted to appropriate agencies for review and approval prior to commencing construction. The plan should specify that:

- Monitoring of excavation and grading in sensitive sediments, especially access roads and tower sites, must occur when construction is near or in those geologic formations.
- Monitoring of augering in sensitive sediments, screening the excavated spoils, and processing of bulk sediment samples for microvertebrate

fossils must occur where there is a significant potential for data recovery from those spoils.

- Monitoring must be performed by a qualified paleontologist and in consultation with a designated paleontologist in each state, NF, or BLM district. The Authorized Officer will designate appropriate paleontologist depending on project location.

PALEO-3 Areas with Fossil Potential Classification sensitivity rankings of 3, 4, or 5 on NFS lands will be surveyed and posted.

In addition, the following mitigation measure was proposed by the Agencies and has been adopted by the Proponents.

PALEO-2 Where fossil-bearing sediments are exposed by construction, the sediments must be covered with a minimum 4-inch layer of soil where feasible to reduce unauthorized removal or disturbance of resources.