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# Vegetation Specialist Report

## Garkane Energy Cooperative, Inc. Tropic to Hatch 138 kV Transmission Line

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Prepared For:

U.S. Forest Service – Dixie National Forest  
National Park Service – Bryce Canyon National Park  
Bureau of Land Management – Kanab Field Office  
Bureau of Land Management – Grand Staircase-Escalante National Monument

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# VEGETATION SPECIALIST REPORT

## 1.1. INTRODUCTION

Garkane Energy Cooperative, Inc. (Garkane) proposes to construct a 138 kV circuit transmission line supported by wood pole H-frame structures between the communities of Tropic and Hatch in Garfield County, Utah. The proposed new transmission line would replace portions of an existing 69 kV transmission line between the Tropic and Hatch Substations that currently provides service west of Tropic.

### 1.1.1. Purpose of Specialist Report

The purpose of this Specialist Report is to characterize existing vegetation within the Project Area and to analyze and disclose potential environmental effects on vegetation that would occur under the Proposed Action and Alternatives as described below. These data and impact analyses will be used to develop an Environmental Impact Statement (EIS) for the Garkane 138 kV Transmission Line proposal.

### 1.1.2. Proposed Action and Alternatives

#### 1.1.2.1. Alternative A: Proposed Action

Alternative A would be constructed within a right-of-way crossing public lands administered by the U.S. Forest Service (USFS) Dixie National Forest (DNF), Bureau of Land Management (BLM) Kanab Field Office (KFO), and the Grand Staircase-Escalante National Monument (GSENM); Utah State lands administered under the State Institutional Trust Lands Administration (SITLA); and private lands.

The Alternative A 100-foot-wide right-of-way would extend 30.41 miles. The route would begin at the proposed East Valley Substation located east of Tropic and extend northeast to adjoin the Rocky Mountain Power/PacifiCorp 230 kV transmission line right-of-way. The route would then parallel the west side of the Rocky Mountain Power/PacifiCorp transmission line route to the northwest across GSENM land and through Cedar Fork Canyon through a planning window for a utility right-of-way identified in the 1986 Land Resource Management Plan (LRMP). The route would diverge from the 230 kV line access route and extend west across John's Valley and skirt just to the north of the Bryce Canyon Airport. The route would continue west for approximately 4 miles and turn south, crossing SR 12, and extend southwest across the Johnson Bench area, passing to the south of Wilson Peak. The route would continue west down Hillsdale Canyon through a planning window for a utility right-of-way identified in the 1986 LRMP and turn north for approximately 0.5 mile. The route would continue to the west, crossing private property (Sunset Cliffs), and extend west to cross U.S. 89 where it would turn to the southwest for approximately 2 miles to the Hatch Substation. The proposed route would cross 17.35 miles of DNF, 3.31 miles of KFO, 3.68 miles of GSENM, 4.23 miles of SITLA, and 1.84 miles of private lands.

In addition to construction of the proposed transmission line, the proposed project includes the development of a new substation (East Valley) east of Tropic and the expansion of the Hatch Substation. Garkane's existing 69 kV transmission line between the Bryce Canyon Substation and Hatch Mountain Switch Station would be unnecessary once the proposed 138 kV transmission line is operational and would be removed (approximately 16.23 miles) and the right-of-way rehabilitated.

The Proposed Action would involve the development of overland access routes in portions of the right-of-way where a suitable route is not available and where development of an access route is permitted by the authorizing agency. Access to the Rocky Mountain Power/PacifiCorp 230 kV transmission line in the

Cedar Fork Canyon area would need to be improved. In *limited access areas*, the alignment would be accessed via helicopter and/or foot, and there would be no centerline access.

Implementation of the Proposed Action would also require the amendment of the GSENM Management Plan (2000) by changing the designation of a 100-foot-wide 3.68-mile stretch (44.58 acres) of the Primitive Zone to Passage Zone, and within this area, changing the existing Visual Resource Management (VRM) Class designation from Class II to Class III.

#### **1.1.2.2. Alternative B: Parallel Existing 69 kV Route**

The Alternative B 100-foot-wide right-of-way would be constructed within a right-of-way crossing public lands administered by the DNF and KFO, National Park Service (NPS) Bryce Canyon National Park (BRCA), and SITLA and private lands. This route would have no surface impacts on the GSENM.

Alternative B would extend 29.11 miles. This alternative route would begin at the proposed East Valley Substation located east of Tropic and extend west through the Tropic Substation (the Tropic Substation would be decommissioned) and then cross SR 12 and continue across BRCA (deviating slightly from the existing right-of-way for approximately 1.5 miles) to a point near the current Bryce Canyon Substation near Bryce Canyon City. For this Alternative, the Bryce Canyon Substation would be decommissioned and a new replacement substation would be built at a new location approximately 1 mile to the west to allow for needed expansion. The route would extend approximately 0.5 mile to the north around Bryce Canyon City, west across SR 63 and then parallel Garkane's existing 69 kV line right-of-way predominately across private and SITLA lands. The alternative route would parallel the existing right-of-way just to the south across the plateau in a northwest direction to Red Canyon, where it would generally follow the existing right-of-way through Red Canyon into Long Valley where it would cross U.S. 89 and continue to the Hatch Mountain Substation. From there the route would follow the existing line south to the Hatch Substation. This route would cross 5.58 miles of DNF, 8.29 miles of KFO, 2.81 miles of BRCA, 3.63 miles of SITLA, and 8.80 miles of private lands.

The proposed project includes the development of a new substation (East Valley) east of Tropic and the expansion of the Hatch Substation. The Tropic Substation would be removed. One new substation would be required in Bryce Valley. The existing Bryce Canyon Substation would be decommissioned, and a new replacement substation to the west of Ruby's Inn would be built. It would be located in one of two new locations (Option 1 on DNF land or Option 2 on private land). Once the proposed 138 kV transmission line is operational, the entire existing 69 kV line from approximately 1 mile east of the existing Tropic Substation to the Hatch Mountain Substation would be removed (approximately 21.57 miles) and the right-of-way rehabilitated.

In addition, under Alternative B approximately 9 miles of distribution lines would need to be constructed primarily on private and SITLA lands in 50-foot rights-of-way in conjunction with the new substations.

A 22.75-mile long two-track access route along the centerline of the proposed right-of-way would provide construction access. Centerline access would not be developed within *limited access areas*, including BRCA and portions of Red Canyon.

Under this alternative the GSENM Management Plan would not be amended.

#### **1.1.2.3. Alternative C: Cedar Fork Southern Route**

Like Alternative A, Alternative C would be constructed within a right-of-way crossing public lands administered by the DNF, KFO, GSENM, SITLA, and private lands.

The Alternative C 100-foot-wide right-of-way would extend 29.78 miles. This alternative route would begin at the proposed East Valley Substation located east of Tropic and extend northeast to adjoin the Rocky Mountain Power/PacifiCorp 230 kV transmission line right-of-way. The route would then parallel

the west side of the Rocky Mountain Power/PacifiCorp transmission line access to the northwest across GSENM land and through Cedar Fork Canyon through a planning window for a utility right-of-way identified in the 1986 LRMP. The route would diverge from the 230 kV line access and extend west across John's Valley and follow the south side of State Route (SR) 22 for just under 2 miles and then follow the western boundary of BRCA for approximately 1 mile. The route would then extend west to the north of Bryce Canyon City and across SR 63. The route would continue west across the southern portion of Johnson Bench and to the upper reaches of Right Fork Blue Fly Creek. The route would drop off the plateau at this point and traverse an unnamed canyon to Hillsdale Canyon and would extend south of private property and continue west, crossing U.S. 89, where it would turn to the southwest for approximately 2 miles to the Hatch Substation. This route would cross 13.58 miles of DNF, 3.43 miles of KFO, 3.68 miles of GSENM, 2.06 miles of SITLA, and 7.03 miles of private lands.

In addition to construction of the proposed transmission line, the proposed project includes the development of a new substation (East Valley) east of Tropic and the expansion of the Hatch Substation. Garkane's existing 69 kV transmission line between the Bryce Canyon Substation and Hatch Mountain Switch Station would be unnecessary once the proposed 138 kV transmission line is operational and would be removed (approximately 16.23 miles) and the right-of-way rehabilitated.

The Proposed Action would involve the development of overland access routes in portions of the right-of-way where a suitable route is not available and where development of an access route is permitted by the authorizing agency. Access to the Rocky Mountain Power/PacifiCorp 230 kV transmission line in the Cedar Fork Canyon area would need to be improved. In *limited access areas*, the alignment would be accessed via helicopter and/or foot, and there would be no centerline access.

Alternative C would also require the amendment of the GSENM Management Plan (2000) by changing the designation of a 300-foot-wide 3.68-mile stretch (133.81 acres) of the Primitive Zone to Passage Zone to accommodate both the proposed right-of-way and the existing 230 kV Rocky Mountain Power/PacifiCorp transmission line, as well as provide for future utility needs; and within this area, changing the existing VRM Management Class designation from Class II to Class III.

#### **1.1.2.4. Interconnect Options**

The purpose of the interconnect route options is to provide flexibility to decision makers to combine segments of the action alternatives to select the most appropriate route among the various alternatives to minimize impacts to resource values.

The North-South Interconnect option would extend 1.84 miles across DNF land west of Johnson Bench and could connect segments of Alternatives A and C together.

The East-West Interconnect option would extend 3.70 miles across DNF land south of Johnson Bench and could connect segments of Alternatives A and C together.

#### **1.1.2.5. Alternative D: No Action**

Though it does not meet the purpose and need statement, the No Action alternative is required under Council of Environmental Quality regulations for implementing the National Environmental Policy Act (NEPA) [40 CFR 1502.14(d)]. For this analysis, the No Action alternative is considered to be the continued operation of the existing 69 kV transmission line and future circumstances that would occur without federal approval of Garkane Energy's proposal to construct and operate a 138 kV transmission line from Tropic to Hatch. Specifically, it means that "no action" would be achieved by any one of the federal agencies declining to grant Garkane permission to build in the agency's respective jurisdiction. Thus, in the case of DNF, "no action" means denying the transmission line easement; for BLM, "no action" means denying approval of the proposed plan amendment and granting of a right-of-way permit for BLM lands; and, for BRCA, "no action" means denying a right-of-way permit. Each agency makes its decision independent of the others, so it is possible that one or more agencies could grant permission for

the proposal while another could deny permission. Thus, if any agency denied permission for the proposed transmission line, it would not be built.

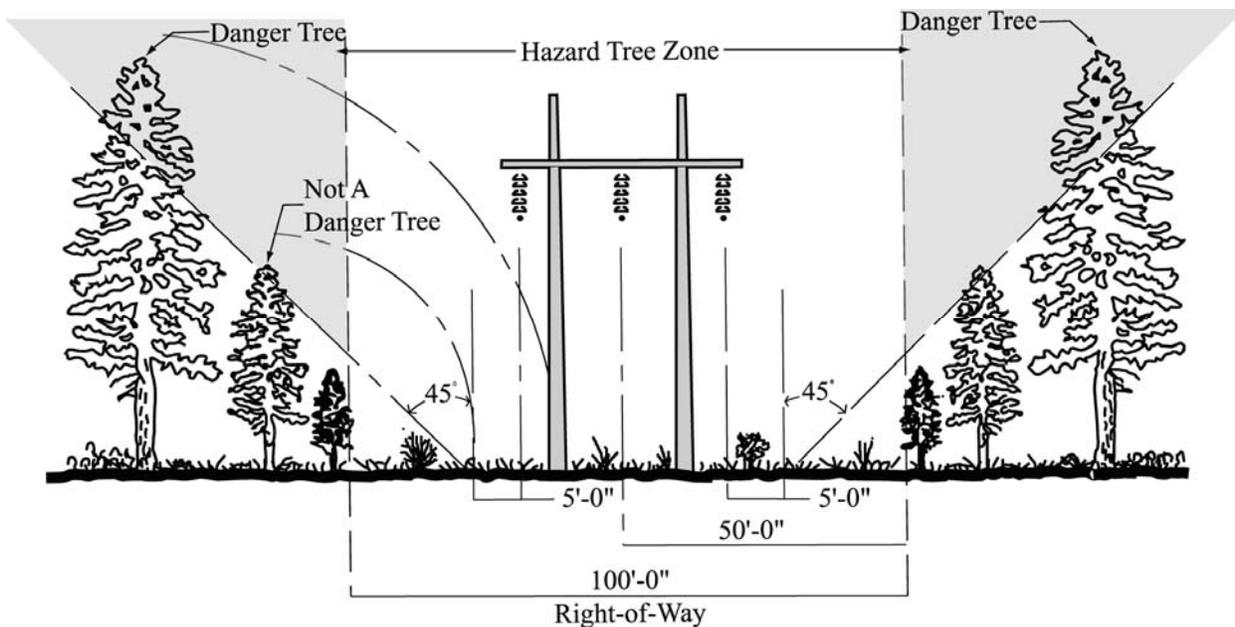
The existing 69 kV transmission line has already passed its life expectancy. To maintain system stability and reliability, Garkane would need to overhaul the line within its existing right-of-way and permit conditions. Overhaul of the existing 69 kV transmission line would involve replacement of conductor and poles. Each pole would be inspected; Garkane estimates as much as 90 percent of the poles would need to be replaced. Overhaul would involve disturbance to the centerline access outside *limited access areas* using vehicles and equipment. Overhaul would require the use of temporary disturbance areas identified in conjunction with Alternative B, as the sites would be needed for pulling and splicing of wire and overall project staging. Total cost would range from 1.4 to 2.1 million dollars.

These activities would increase the amount of trucks, heavy equipment, and crews within the right-of-way far above average annual activity levels.

### 1.1.3. Impact-Inducing Activities on Vegetation Resources

The right-of-way would need to be cleared of trees. During construction of the transmission line, trees would be removed from the right-of-way in two distinct zones: the right-of-way zone and the hazard tree zone. **Figure 1.1-1** depicts vegetation and tree clearances.

**Figure 1.1-1. Vegetation removal zones (not to scale)**



The following activities could cause impacts to vegetation resources, and other habitat resources.

- The actual right-of-way width, and subsequently the vegetation management area, may vary, particularly at mid-span, to accommodate the maximum sway of the conductors.
  - This zone would be kept clear of trees that can grow into the lines and cause power interruptions and wildfires. The second vegetation management area is called the hazard tree zone (shaded area in **Figure 1.1-1**). This zone is variable in width and extends out from the edge of the right-of-way.
- The width of the hazard tree zone is determined by terrain, tree height, and sway of the transmission line. Any tree that can fall and hit the line is a potential hazard.

- Hazard trees would be felled or topped to avoid outages and to reduce fire hazard to the surrounding forest. Trimming would be required for branches within 10 to 15 feet of conductors.
- Vegetation would be disturbed at pole structure sites and substation construction sites.
  - An approximate radius of 80 feet would be disturbed around each structure by the movement of vehicles and assembly of structure elements.
  - An area of 10 feet around each structure location would be treated with an herbicide approved for use, except for structures located within 300 feet of any riparian areas or BRCA.. Substation sites would be cleared of all vegetation.
- Vegetation would also be disturbed at all temporary construction sites, including lay down areas and pulling and tensioning sites.
  - These sites may have to be cleared of vegetation and would be disturbed by the movement of vehicles and other activities.
  - These areas and disturbed areas within the right-of-way would be reseeded if necessary and monitored for weed infestation.

#### **1.1.4. Vegetation Resource Issue Statements**

*Transmission line construction activities could directly impact vegetative communities.*

Disturbance to vegetation would include: crushing and compaction caused by personnel and the operation of equipment, trimming and removal, and disruption of the current plant succession regime.

*Transmission line construction activities could increase the potential for the introduction and spread of noxious and invasive plant species.*

Surface disturbance associated with construction of the transmission line and temporary and permanent access roads could result in the spread of noxious and undesirable plant species. The potential also exists for increased risk of wildfire associated with cheatgrass invasion.

## **1.2. DESCRIPTION OF AFFECTED ENVIRONMENT**

### **1.2.1. Project Area**

The Project Area is in Garfield County, between the communities of Tropic and Hatch in southern Utah. The Project Area includes the following:

- Proposed Action and alternative transmission line right-of-way.
- Temporary work areas.
- Proposed substation sites.
- Proposed access roads and routes, and access improvements.
- Existing 69 kV transmission line right-of-way.

### **1.2.2. Data Sources**

The DNF, BLM, and Utah Division of Wildlife Resources (UDWR) were consulted to identify biological resources issues and concerns. In addition, the U.S. Fish and Wildlife Service (USFWS) Mountain Prairie Region website was accessed to assemble a list of species protected under the Endangered Species Act for Garfield County. The UDWR list of sensitive species was used to identify any sensitive species in the Project Area. Habitat requirements of these species and their known range were compiled. Special status species are discussed in the Special Status Species Specialist Report.

Transcon performed pedestrian surveys of the Project Area between April and June, 2008, to document vegetation, snags, and invasive species occurring in the action area (Transcon 2008). Baseline GIS data were generated from existing KFO, GSENM, DNF, BRCA, NRCS, USGS, and State of Utah vegetation data (including noxious or invasive species). Southwest Regional GAP Analysis Project GIS data were used to characterize vegetation types within the Project Area (USGS 2007).

### **1.2.3. Resource Management Direction**

#### **1.2.3.1. Resource Protection Measures**

- A complete listing of resource protection measures for the project is contained in **Appendix A**.

#### **1.2.3.2. U.S. Forest Service**

The guidelines listed below were taken from the 1986 Final EIS and LRMP for the DNF (USFS 1986). The EIS/LRMP provides guidance for project and activity implementation to help achieve desired conditions and objectives of DNF. None of the standards and guidelines listed in the 1986 LRMP are specific to vegetation resources in general. There are, however, numerous guidelines that are applicable to timber, silviculture, and wildlife habitat. These standards and guidelines have been included in the Wildlife, Timber, and Range Specialist reports.

The 1986 LRMP identifies some adverse effects that cannot be avoided in any of the alternatives. The intensity of these adverse effects may be mitigated to acceptable levels, but they cannot be avoided entirely. Two of these unavoidable impacts to vegetation resources are summarized below.

- Unavoidable vegetation loss and soil compaction from construction and reconstruction activity.
- Visual character changes of the Forest scene from management activities including... energy development.

Mitigation measures included in the management area prescriptions in Chapter IV of the 1986 LRMP (USFS 1986) are intended to minimize the adverse unavoidable effects.

#### **1.2.3.3. Bureau of Land Management**

##### **Kanab Field Office**

The guidelines listed below were taken from the KFO Resource Management Plan and Final EIS (BLM 2008). They provide guidance for project and activity implementation to help achieve desired conditions and objectives.

- A mosaic of non-invasive perennial and annual vegetation communities would be present across the landscape with diversity of species, canopy, density, and age class in accordance with ecological site potential.
- Protect, enhance, and/or restore ecological processes and functions by allowing tools that are necessary and appropriate to mitigate adverse impacts of allowable uses and undesirable disturbances and which contribute to meeting the Utah BLM Standards for Rangeland Health (BLM 1997).
- Sustain or reestablish the integrity of the sagebrush communities to provide the quantity, continuity, and quality of habitat necessary to maintain sustainable populations of Greater sage grouse and other sagebrush obligate species.
- Manage rangelands to prevent net loss of properly functioning sagebrush steppe habitat.
- Contain or reduce invasive plant species from existing extent; prevent establishment of new invasive species through early detection and rapid response actions.

- Restore native species to meet desired plant community objectives where appropriate.
- Maintain health of ponderosa pine stands within the decision area.
- Maintain and/or restore riparian areas to proper functioning condition, or to making significant progress toward proper functioning condition, where BLM-managed or authorized activities have been identified as contributing to riparian impairment.
- Ensure water availability for multiple-use management and functioning, healthy riparian and upland systems.

### **Grand Staircase–Escalante National Monument**

The guidelines listed below were taken from the GSENM Management Plan (BLM 2000). They provide guidance for vegetation restoration methods as well as project and activity implementation to help achieve desired conditions and objectives.

- All proposed developments or surface disturbing activities will be required to include a site assessment for impacts to vegetation. Appropriate strategies will be used to avoid sensitive vegetation associations, and restoration provisions will be included in projects.
- All machinery that has been used outside the Monument will be cleaned prior to use in the Monument. This provision generally applies to contract equipment used for projects such as construction of facilities and firefighting equipment. Both of these provisions will help reduce the introduction and spread of noxious weed species in the Monument.
- In keeping with the overall vegetation objectives and Presidential EO 11312, native plants will be used as a priority for all projects in the Monument.
- All projects proposed in the Monument will contain a restoration or revegetation component and will budget for the cost of seeding with native species. All planning for projects, in all except limited, emergency situations, will use native species, and the use of non-native species will not be analyzed as an alternative.
- Many factors will be considered when deciding to implement a revegetation or restoration strategy. Each project and area to be treated will be evaluated to determine the appropriate strategy. The following general guidelines can be applied to determine which strategy is the most appropriate and how it will be implemented in order to be consistent with the overall vegetation management objectives.
  1. Restoration will be the goal whenever possible (i.e., an attempt will be made to return disturbed areas to conditions which promote a natural array of native plant and animal associations).
  2. Species used in both restoration and revegetation projects will comply with the non-native plant policy described above (i.e., native plants will be used as a priority).
  3. Revegetation strategies will be used in areas of heavy visitation, where site stabilization is desired.
  4. Restoration provisions will be included in all surface disturbing projects including provisions for post restoration monitoring of the area. Costs for these activities will be included in the overall cost of the project and will come out of the entire project budget.
  5. Priority for restoration or revegetation will be given to projects where Monument resources are being damaged. These sites will likely be in areas near development and/or heavy visitor use. Although these areas are more likely to be candidates for revegetation projects, careful evaluation of disturbed sites needs to be conducted to include desired

future condition of an area. Restoration or revegetation of areas receiving heavy use may include limits on visitor use in order to promote recovery.

In addition to these guiding principles, the BLM recommends that the BLM Vegetation Treatments Using Herbicides Final Programmatic EIS (BLM 2007) be employed when ground disturbing activities are being considered or carried out.

#### **1.2.3.4. National Park Service**

The guidelines listed below were taken from the 2006 NPS *Management Policies* (NPS 2006). They provide guidance for project and activity implementation to help achieve desired conditions and objectives of lands administered by the NPS.

The NPS will maintain as parts of the natural ecosystems of parks all plants and animals native to park ecosystems. The NPS will successfully maintain native plants and animals through the following:

- Preserve and restore the natural abundances, diversities, dynamics, distributions, habitats, and behaviors of native plant and animal populations and the communities and ecosystems in which they occur;
- Restore native plant and animal populations in parks when they have been extirpated by past human-caused actions; and
- Minimize human impacts on native plants, animals, populations, communities, and ecosystems, and the processes that sustain them.
- To the maximum extent possible, plantings will consist of species that are native to the park or that are historically appropriate for the period or event commemorated. The use of exotic plant species is restricted to situations that conform to the exotic species policy in section 4.4.4 of NPS 2006. Irrigation to maintain exotic plantings will be avoided, except when it is part of an approved management program essential to achieve park objectives and when adequate and dependable supplies of water are available. Low water use practices that measure soil moisture content and other technologies (such as drip irrigation and appropriate timing of water applications) should be employed.
- Prior to using soil fertilizers or other soil amendments in park natural or altered landscapes, parks must develop a prescription to ensure that the amendments will not unacceptably alter the physical, chemical, or biological characteristics of the soil, biological community, or surface or groundwater.
- Wherever practicable, soils and plants affected by construction will be salvaged for use in site restoration. Any surplus soils and plants may be used, as appropriate, for the restoration of other degraded areas in the park. Surplus soils not used in this way should be stockpiled for future use. If additional soil and plants are needed to restore disturbed sites, they may be obtained from other sites in the park if it is determined that the use of an in-park source will not significantly affect cultural or natural resources or ecological processes. In any case, imported soils must (1) be compatible with existing soils, (2) be free of undesired seed and organisms, and (3) fulfill the horticultural requirements of plants used for restoration.
- The NPS may intervene to manage individuals or populations of native species only when such intervention will not cause unacceptable impacts to the populations of the species or to other components and processes of the ecosystems that support them. The Service may also manage native species in order to accommodate intensive development in portions of parks appropriate for and dedicated to such development.

#### 1.2.4. Vegetative Cover Types in the Project Area

General project acreages are detailed in **Appendix B**. Calculations supporting data presented in this section can be found in **Appendix C**.

**Figure 1.2-1** illustrates the vegetation cover types within the Project Area. Vegetative landcover types present in the Project Area were derived from NatureServe's Ecological System concept. Forty-one landcover classes were consolidated into 11 types (**Table 1.2-1**) based on a variety of shared characteristics. The original 41 cover types that were identified and a detailed summary for each cover type are located in **Appendix D**.

**Table 1.2-1. Vegetative Cover Types Present within the Project Area**

TYPE	DESCRIPTION
Grass	grassland or meadow
Mixed conifer	mixed conifer, includes aspen/conifer forest
Other	developed areas, agricultural, recently burned or logged
Pinyon/Juniper	pinyon, juniper, includes recently chained areas
Ponderosa Pine	ponderosa pine
Rock/Dune	cliff, canyon, volcanic, badland, dune, etc.
Sagebrush	Sagebrush
Shrub/Scrub	any other shrub or scrub category, including mountain mahogany and oak
Spruce/Fir	spruce, fir
Wetland/Riparian	wetland, wet meadow, or riparian

#### 1.2.5. Field Survey Results

The DNF, BLM, and UDWR were consulted to identify biological resources issues and concerns. In addition, the USFWS Mountain Prairie Region website was accessed to assemble a list of species protected under the Endangered Species Act (ESA) for Garfield County. The UDWR was also consulted and their list of sensitive species was used to identify any sensitive species in the Project Area. Habitat requirements of these species and their known range were compiled.

Three Transcon biologists performed a field pedestrian survey of the action area between April and June, 2008 to document wildlife, vegetation, habitats, snags, invasive species, biotic soils, migratory birds, and raptors occurring in the action area. All proposed alternatives, the East Valley Substation, and lay down areas were reviewed during field investigations. USGS quadrangle maps, aerial photos, and GPS units were used for navigation. Data were recorded using Trimble and Garmin Global Positioning System (GPS) units. All GPS data collected were in the UTM Zone 12 NAD 27 datum (Transcon 2008).

The following descriptions of vegetative communities and regional biomes within the Project Area were taken from Transcon's Biological Field Review Technical Report (Transcon 2008). **Appendix D** contains more detailed descriptions of the vegetative cover types mentioned below.

**Figure 1.2-1. Vegetation Cover Types within 0.5 Mile of Potential Transmission Lines**

### **1.2.5.1. Tropic Valley**

All alternatives originate in the Tropic Valley, which consists of greasewood-salt scrub vegetation on the east end of the valley and transitions into sagebrush-perennial grassland habitat on the west side of the valley. The vegetation transitions into pinyon-juniper on the very western edge of the valley. The majority of the valley is rolling hills and flats dominated by alkaline soils and salt tolerant species. The elevation in the valley ranges from approximately 6,000 to 6,500 feet above mean sea level (amsl).

### **1.2.5.2. Cedar Fork Canyon and Bryce Canyon**

The alignments for Alternatives A and C would exit the Tropic Valley and travel through Cedar Fork Canyon, which includes both pinyon-ponderosa pine and mixed conifer vegetation communities. The Alternative B alignment exits Tropic Valley and travels through the north side of BRCA, which consists of mixed conifer vegetation communities. The topography of both of these canyons is characterized by steep slopes and red rock cliff faces of the Tertiary Claron Formation. The elevation ranges from 6,500 to 7,500 feet amsl in both of these canyons.

### **1.2.5.3. Paunsaugunt Plateau**

All alternatives cross the Paunsaugunt Plateau from east to west after exiting the canyons. The majority of the plateau consists of sagebrush-perennial grassland habitat. However, across the plateau the alternatives travel through large and small stands of ponderosa pine communities. On the west side of the plateau all alternatives travel from sagebrush into ponderosa pine communities. The topography of the plateau is flat with rolling hills. Elevations on the plateau range from 7,500 to 8,000 feet amsl.

### **1.2.5.4. Hillsdale/Blue Fly Canyon and Red Canyon**

Alternatives A and C would both travel down Hillsdale/Blue Fly Canyon on the west side of the plateau. These canyons consist of mixed conifer and ponderosa pine vegetation communities. The topography can be characterized as steep slopes, cliff faces, and rock formations of the Claron Formation. Alternative B passes into ponderosa pine vegetation as it approaches Red Canyon. It then enters mixed conifer forest as it travels through Red Canyon. Red Canyon also has steep-sloped topography and rock formations of the Claron Formation. The elevation ranges from 7,500 to 6,500 feet amsl as the alternatives descend the canyons into the Hatch Valley.

### **1.2.5.5. Hatch Valley**

The habitat transitions into pinyon-juniper habitat at the bottom of Red Canyon, and then turns to sagebrush-perennial grassland as Alternative B enters the Hatch Valley. Alternative B is in sagebrush habitat until it crosses SR 89, and then it passes through sections of sagebrush and pinyon-juniper habitat until it reaches the Hatch Substation. Both Alternatives A and C pass through ponderosa pine communities as they exit Hillsdale/Blue Fly Canyon and transition into pinyon-juniper habitat. At the USFS boundary the habitat transitions into sagebrush-perennial grassland. The alternatives are in sagebrush-perennial grass habitat to the Hatch Substation. The topography of the Hatch Valley consists mainly of rolling hills characterized by sagebrush and pinyon-juniper vegetation communities. Elevations in the Hatch Valley range from 6,000 to 6,500 feet amsl.

## **1.2.6. Existing Weed Infestations**

The weeds listed on **Table 1.2-2** are officially designated and published as noxious for the State of Utah, as per the authority vested in the Commissioner of Agriculture under Section 4-17-3, Utah Noxious Weed Act. The noxious weeds that occur on this list were given special attention during the field review. **Figure 1.2-2** illustrates weed infestations that were observed within the Project Area during baseline surveys. Salt cedar (*Tamarix* spp.) was observed in the riparian areas in Cedar Fork Canyon. No GPS points were taken because salt cedar occurred intermittently throughout Cedar Fork Canyon in riparian areas.

**Figure 1.2-2. Weed Infestations Identified During Baseline Surveys**

Scotch thistle (*Onopordum acanthium*) and Canada thistle (*Cirsium arvense*) were observed during surveys in several locations within the Project Area. Thistle was observed intermittently throughout Cedar Fork Canyon and Blue Fly Canyon and along the Sevier River. No GPS points were taken for these areas, because thistle occurred intermittently throughout these areas. One thistle location on the Paunsaugunt Plateau and one near the Tropic Substation are indicated on the Biologically Sensitive Areas map in Appendix B of Transcon’s Biological Field Review Technical Report. Hoary cress (*Cardaria draba*) was observed by surveyors intermittently along the length of the alternative through the GSENM area during field reviews, no GPS points were taken. **Table 1.2-3** summarizes the presence or absence of noxious weed species by alternative. UTM coordinates for the noxious weed locations, where there are distinct populations, can be found in the biological field survey data set on the GIS Field Data CD prepared for the project (Transcon 2008).

In addition to the listed noxious weeds, there are several plant species that occur in the planning area that are considered undesirable. A plant is usually labeled undesirable when it presents a poisoning threat to livestock. Some undesirable plants occur as part of the natural vegetative community. Others invade or increase as a result of poor rangeland conditions. It is not feasible to attempt control of most undesirable species because they are common and widespread (BLM 2008). Cheatgrass (*Bromus tectorum*) was observed intermittently throughout the entire Project Area along all alternatives; a few areas dominated by cheatgrass on the Paunsaugunt Plateau are indicated on the Biologically Sensitive Areas map in Appendix B of the Biological Field Review Technical Report (Transcon 2008).

**Table 1.2-2. State of Utah Noxious Weeds List**

COMMON NAME	SCIENTIFIC NAME
Bermudagrass	<i>Cynodon dactylon</i>
Black henbane	<i>Hyoscyamus niger</i>
Canada thistle	<i>Cirsium arvense</i>
Dalmatian toadflax	<i>Linaria dalmatica</i>
Diffuse knapweed	<i>Centaurea diffusa</i>
Dyers woad	<i>Isatis tinctoria L.</i>
Field bindweed (Wild Morning Glory)	<i>Convolvulus arvensis</i>
Hoary cress	<i>Lepidium Spp.</i>
Houndstongue	<i>Cynoglossum officinale</i>
Johnsongrass	<i>Sorghum halepense</i>
Leafy spurge	<i>Euphorbia esula</i>
Medusahead	<i>Taeniatherum caput-medusae</i>
Musk thistle	<i>Carduus nutans</i>
Ox-Eye daisy	<i>Chrysanthemum leucanthemum</i>
Perennial pepperweed	<i>Lepidium latifolium</i>
Perennial sorghum	<i>Sorghum halepense L. &amp; Sorghum alnum</i>
Poison hemlock	<i>Conium maculatum</i>
Purple loosestrife	<i>Lythrum salicaria L.</i>
Quackgrass	<i>Agropyron repens</i>
Russian knapweed	<i>Centaurea repens</i>
Saltcedar	<i>Tamarix ramosissima</i>
Scotch thistle	<i>Onopordum acanthium</i>

COMMON NAME	SCIENTIFIC NAME
Spotted knapweed	<i>Centaurea maculosa</i>
Squarrose knapweed	<i>Centaurea squarrosa</i>
St. John's wort	<i>Hypericum perforatum</i>
Sulfur cinquefoil	<i>Potentilla recta</i>
Yellow starthistle	<i>Centaurea solstitialis</i>
Yellow toadflax	<i>Linaria vulgaris</i>

Source: Utah Department of Agriculture and Food, October 2008 [http://ag.utah.gov/plantind/noxious\\_weeds.html](http://ag.utah.gov/plantind/noxious_weeds.html)

**Table 1.2-3. Noxious and Weeds Observed in the Alternative Project Areas**

ALTERNATIVE	THISTLE	HOARY CRESS	SALT CEDAR	CHEATGRASS
Alternative A	YES	YES	YES	YES
Alternative B	YES	NO	NO	YES
Alternative C	YES	YES	YES	YES
N/S Interconnect	NO	NO	NO	YES
E/W Interconnect	NO	NO	NO	YES

Source: Transcon 2008

### 1.2.7. Existing Conditions for Alternative A: Proposed Action

The total acreage of vegetative cover type that the Proposed Action's Project Area would occupy is listed in **Table 1.2-4** below. It is important to note that these acres only represent existing vegetative conditions within the Project Area and do not represent any level of disturbance.

**Table 1.2-4. Total Acres of Existing Vegetation within the Project Area for Alternative A**

DESCRIPTION	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Grass	0.00	0.00	0.00	0.24	1.02	0.00	<b>1.26</b>
Mixed conifer	0.00	0.00	0.00	0.00	0.00	0.00	<b>0</b>
Other	2.85	0.00	2.95	0.00	0.05	0.00	<b>5.85</b>
Pinyon/Juniper	1.37	0.38	9.64	1.71	49.60	0.00	<b>62.70</b>
Ponderosa Pine	10.17	1.14	0.00	0.00	91.34	0.00	<b>102.65</b>
Rock/Dune	0.68	5.61	0.00	0.16	14.28	0.00	<b>20.73</b>
Sagebrush	47.43	41.13	47.20	34.27	88.61	0.00	<b>258.64</b>
Shrub/Scrub	0.00	11.54	0.00	14.18	1.25	0.00	<b>26.97</b>
Spruce/Fir	0.00	0.00	0.00	0.00	1.05	0.00	<b>1.05</b>
Wetland/Riparian	0.03	0.00	0.00	0.00	0.73	0.00	<b>0.76</b>
<b>Totals</b>	<b>62.53</b>	<b>59.80</b>	<b>59.79</b>	<b>50.56</b>	<b>247.93</b>	<b>0.00</b>	<b>480.61</b>

**1.2.8. Existing Conditions for Alternative B: Parallel 69 kV Line Route**

The total acreage of vegetative cover type that the Alternative B Project Area would occupy is listed in **Table 1.2-5** below. It is important to note that these acres only represent existing vegetative conditions within the Project Area and do not represent any level of disturbance.

**Table 1.2-5. Total Acres of Existing Vegetation within the Project Area for Alternative B**

DESCRIPTION	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Grass	0.48	0.00	0.00	0.00	0.00	2.97	<b>3.45</b>
Mixed conifer	0.00	0.00	0.00	0.00	0.00	1.41	<b>1.41</b>
Other	13.33	0.00	4.29	0.00	0.05	0.15	<b>17.82</b>
Pinyon/Juniper	7.36	1.44	55.92	0.00	6.39	7.43	<b>78.54</b>
Ponderosa Pine	17.07	0.18	0.00	0.00	27.46	11.77	<b>56.48</b>
Rock/Dune	2.40	0.01	21.09	0.00	0.00	9.11	<b>32.61</b>
Sagebrush	97.74	44.19	54.96	0.00	21.31	0.81	<b>219.01</b>
Shrub/Scrub	5.46	0.00	0.00	0.00	0.00	0.78	<b>6.24</b>
Spruce/Fir	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.00</b>
Wetland/Riparian	2.28	0.00	0.40	0.00	0.00	0.00	<b>2.68</b>
<b>Totals</b>	<b>146.12</b>	<b>45.82</b>	<b>136.66</b>	<b>0.00</b>	<b>55.21</b>	<b>34.43</b>	<b>418.24</b>

**1.2.9. Existing Conditions for Alternative C: Cedar Fork Southern Route**

The total acreage of vegetative cover type that the Alternative C Project Area would occupy is listed in **Table 1.2-6** below. It is important to note that these acres only represent existing vegetative conditions within the Project Area and do not represent any level of disturbance.

**Table 1.2-6. Total Acres of Existing Vegetation within the Project Area for Alternative C**

DESCRIPTION	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Grass	0.00	0.00	0.00	0.24	1.54	0.00	<b>1.78</b>
Mixed conifer	0.00	0.00	0.00	0.00	0.00	0.00	<b>0.00</b>
Other	3.97	00.00	2.95	0.00	1.37	0.00	<b>8.29</b>
Pinyon/Juniper	1.61	0.38	11.12	1.71	40.23	0.00	<b>55.05</b>
Ponderosa Pine	22.12	0.00	0.00	0.00	86.57	0.00	<b>108.69</b>
Rock/Dune	2.20	0.00	0.00	0.16	22.15	0.00	<b>24.51</b>
Sagebrush	96.56	32.57	47.98	34.27	62.62	0.00	<b>274.06</b>
Shrub/Scrub	0.00	0.00	0.00	14.18	1.15	0.00	<b>15.39</b>
Spruce/Fir	0.00	0.00	0.00	0.00	0.24	0.00	<b>0.24</b>
Wetland/Riparian	3.25	0.00	0.00	0.00	3.66	0.00	<b>6.91</b>
<b>Totals</b>	<b>129.71</b>	<b>32.95</b>	<b>62.05</b>	<b>50.56</b>	<b>219.53</b>	<b>0.00</b>	<b>494.80</b>

### 1.2.10. Existing Conditions for the Interconnect Options

The total acreage of vegetative cover type that the Interconnect Options Project Areas would occupy is listed in **Tables 1.2-7** below. It is important to note that these acres only represent existing vegetative conditions within the Project Areas designated for the Interconnect Options and do not represent any level of disturbance.

**Table 1.2-7. Acres of Existing Vegetation on DNF-Managed Lands within the Interconnect Options Project Areas**

DESCRIPTION	NORTH-SOUTH	EAST-WEST
Grass	0.00	0.2
Mixed conifer	0.00	0.25
Other	0.00	0.00
Pinyon-juniper	0.2	2.38
Ponderosa pine	15.28	17.27
Rock/dune	0.00	0.00
Sagebrush	11.75	28.5
Shrub/scrub	0.00	0.00
Spruce/fir	0.00	0.00
Wetland/riparian	0.00	0.06
<b>Total</b>	<b>27.23</b>	<b>48.66</b>

## 1.3. IMPACT ANALYSIS

The Proposed Action and Alternatives outlined in previous sections may cause, directly or indirectly, changes in the human environment. This report assesses and analyzes these potential changes for inclusion in the EIS prepared for this proposal.

The terms “effect” and “impact” are synonymous under NEPA. Effects may refer to adverse or beneficial ecological, aesthetic, historical, cultural, economic, social, or health-related phenomena that may be caused by the Proposed Action or Action Alternatives (40 CFR 1508.8). Effects may be direct, indirect, or cumulative in nature. A direct effect occurs at the same time and place as the action (40 CFR 1508.8(a)). Direct and indirect effects are discussed in combination under each affected resource. Indirect effects are reasonably foreseeable effects that occur later in time or are removed in distance from the action (40 CFR 1508(b)). In this report, direct and indirect effects are discussed in combination.

### 1.3.1. Direct and Indirect Effects

#### 1.3.1.1. Indicators and Methods of Analysis

The potential impacts to vegetative resources for each alternative were derived by comparing the relative abundance of each cover type with the estimated acres of disturbance to each vegetation cover type within that alternative’s Project Area. Results of this comparison are presented as a percentage of short-term and long-term disturbances to each vegetation cover type within the Project Area.

The potential impacts that noxious and undesirable weeds present to vegetation resources was determined by the location of certain species and their presence within the Project Area.

Impact indicators include:

- Acres of disturbance by vegetation type and relative abundance of that vegetation type within the Project Area.
- Compliance with *NPS Management Policies* (NPS 2006). Compliance with establishment records for the Red Canyon Research Natural Area.
- Proximity to known noxious weed invasions.
- Proximity to areas with moderate to high risk of introducing or spreading noxious weeds.
- Presence/absence of noxious weeds prior to, and post construction.

**Table 1.3-1** defines the terms used to describe magnitude and duration of effects on vegetation resources.

**Table 1.3-1. Effects to Vegetative Cover Types**

ATTRIBUTE OF EFFECT		DESCRIPTION RELATIVE TO VEGETATION RESOURCES
<b>MAGNITUDE</b>	Negligible	A change in current vegetative conditions that is too small to be physically measured using normal methods or perceptible to a trained human observer. There is no noticeable effect on the natural or baseline setting. There are no required changes in management or utilization of the resource.
	Minor	A change in current vegetative conditions that is just measurable with normal methods or barely perceptible to a trained human observer. The change does not result in a modification in the overall population, or the value or productivity of the cover type. There are no required changes in management or utilization of the resource.
	Moderate	An easily measurable change in current vegetative conditions that is readily noticeable to a trained human observer. The change may lead to modification or loss in viability in the overall cover type, or the value or productivity of the cover type. There are some required changes in management or utilization of the resource.
	Major	A large, measurable change in current vegetative conditions that is easily recognized by all human observers. The change may lead to significant modification in the overall cover type, or the value or productivity of the cover type. There are profound or complete changes in management or utilization of the resource.
<b>DURATION</b>	Short-term	Vegetative integrity restored within 20 years.
	Long-term	Vegetative integrity remains impacted after 20 years.

### 1.3.1.2. Direct and Indirect Effects by Alternative

This section illustrates the short-term and long-term effects that each alternative would have on vegetative conditions. The magnitude of effects ranges from negligible to moderate. The criteria for determining the magnitude of the effect was based on how much of a particular cover type is anticipated to be disturbed, and the relative abundance of the same cover type present within the Project Area. **Tables 1.3-2 to 1.3-6** show the total acreage of disturbance for each alternative and the percent of that cover type within the Project Area. **Appendices C, D and E** include the supporting tables that show the acres of affected vegetation within each alternative's individual segments.

The Red Canyon Research Natural Area and Red Canyon Botanical Area are located near the Project Area. Since none of the transmission line alternative alignments under the Proposed Action or Action Alternatives would pass through the Research Natural Area or Botanical Area, and there would be no anticipated surface disturbance to the vegetation of either area, they will not be part of the impacts analysis below.

## **Impacts Common to All Action Alternatives**

### Construction

*Direct and Indirect Effects to Plant Community Succession.* The plant community types that would be disturbed by construction activities may or may not recover to similar plant communities. If recovery to similar plant communities does occur, rates of recovery would be variable depending on each disturbed site's localized environmental conditions. However, taking into consideration the type of project implementation proposed and environmental conditions within the Project Area, it would likely take at least 10 years or more for full recovery to take place. Short-term (i.e., 20 years or less) recovery of plant communities is expected in the most ecologically resilient sites of the Project Area and would be directly related to the type, intensity, and duration of the disturbance. Long-term (i.e., greater than 20 years) recovery of plant communities may occur in less ecologically resilient sites or it may not occur at all.

Direct and indirect effects to plant succession resulting from vegetation removal and/or disturbance would, in nearly all community types of the Project Area, move each plant community from a later successional stage to an earlier successional stage. In most cases, these effects would be adverse. However, there are some cases, where decadent stands of sagebrush occur or in dense stands of pinyon-juniper, where these effects may be beneficial.

*Direct and Indirect Effects from the Long-Term Use of Herbicides.* Vegetation within an area measuring up to a 10-foot radius of each pole would be adversely affected. The long-term use of herbicides in order to reduce fire hazard and compaction at the base of the poles would limit vegetation growth. These areas would slightly increase soil loss due to the lack of root retention and loss of effective ground cover. Microbial decomposition and nutrient cycling on these small areas around each power pole would be eliminated.

*Direct and Indirect Effects to Plant Communities.* Although environmental interactions are too complex and disturbance regimes too variable for a detailed analysis of effects specific to each community type within the Project Area, general effects from vegetation removal or disturbance can occur that are common to all plant community types present within the Project Area. Direct and indirect effects from vegetation disturbance and removal in the Project Area include the following.

- **Loss of effective ground cover.** Removing vegetation biomass would result in a loss of effective ground cover (vegetation, litter, biotic soil crusts). Reduction of ground cover would make soils more susceptible to splash erosion and reduce soil nutrient cycling. Also, without effective ground cover, nutrient cycling into the soil surface is reduced. Therefore, loss of effective ground cover from vegetation removal or disturbance would have an adverse impact to soils and, ultimately, recovering plant communities within the Project Area.
- **Changes in plant community composition and structure.** Changes in plant community composition and structure would occur from removing or disturbing vegetation because the site would be moved to an earlier successional stage. Immediately following vegetation removal, new plants would be highly competitive pioneering plants. If the new plant community is environmentally favored, it will persist. If it is not favored, the new community would continue to evolve.
- **Introduction and/or perpetuation of invasive and weedy plants.** Generally, bare soil and lack of competition on disturbed areas are ideal for invasive and weedy plants to establish. Noxious or

undesirable weed infestations are found throughout the Project Area. The risk for the spread of these undesirable species is unquantifiable. Therefore, regardless of the alternative, it is assumed that the spread of weeds can and likely would occur. The magnitude of this spread would be directly related to the Resource Protection Measures (**Appendix A**) and BMPs employed by the construction crews and enforced by the managing agencies. Garkane would take specific precautions to limit the spread of noxious or invasive weeds during construction and would monitor for and treat noxious weeds within the right-of-way bi-annually for the first 10 years following the end of construction. This would limit the spread of noxious or invasive weeds as disturbed areas are revegetated.

- **Reduction of reproductive capability and recruitment of perennial plants.** Reproductive capability and recruitment of perennial plants would also be diminished in the Project Area where vegetation is disturbed or removed. This would adversely affect the recovering plant community because new perennial seedlings would germinate and establish at a slower pace in the short term if annuals dominate the site because of competition and lack of a perennial seed source. In the long-term, assuming that a perennial seed bank is present, effects to seedling and young age class perennial plants would be beneficial as early successional annual plants are replaced by mid-successional perennial plants because of the lack of competition from older perennial plants that were removed during construction.
- **Reduction of shrub/tree cover.** Reduction of shrub and tree cover from vegetation removal and disturbance in the Project Area could have both adverse and beneficial effects depending on the resource objectives sought and the plant community where it is implemented. Reducing shrub and tree canopy cover would adversely affect ground cover in all community types in the short term in the Project Area except for pinyon-juniper. However, the effect could be beneficial in the long term if reduced shading from decreased canopy allows for increased perennial plant production and perennial recruitment. The replacing plant community would need to have a naturally higher effective ground cover and be a desirable objective for this to be beneficial. In pinyon-juniper community types, where understory communities are naturally barren, opening the pinyon-juniper canopy up may release the suppressed understory and allow for naturally low effective ground covers (under the pinyon-juniper community) to become higher.

### Operations and Maintenance

- Intermittent use of the centerline access for operation and maintenance activities under all Action Alternatives would continue to compact the soils along the access and crush or break vegetation directly in line with the access route, making it difficult for vegetative communities to recover for the duration of the transmission line. Herbicides would be periodically re-applied to pole locations and would limit revegetation in these areas.
- Vegetation within the right-of-way would be maintained at 4 feet high or less. This would have a slight impact on shrub/scrub species and sagebrush as they may not achieve their normal height, but as a vegetative community, they should still function normally. Effects to pinyon-juniper vegetation would be greater as they normally reach heights well over 4 feet. Trimming to minimize height growth would not eliminate the species from the right-of-way, but would compromise the normal functioning of the community within the right-of-way. Mixed conifer species may survive within the right-of-way with height restrictions, but would function more like smaller shrub/scrub species.
- Overall adverse impacts to vegetation from operations and maintenance of the proposed 138 kV transmission line would be long-term and negligible to moderate commensurate with construction impacts.

## Alternative A: Proposed Action

### Construction

The short-term and long-term disturbance associated with Alternative A is shown in **Table 1.3-2** below.

**Table 1.3-2. Alternative A: Acres of Short- term and Long-term Disturbance to Vegetation Cover Types within the Project Area**

DESCRIPTION	ACRES OF SHORT-TERM DISTURBANCE	ACRES OF LONG-TERM DISTURBANCE
Grass	1.08	0.15
Mixed conifer	0.00	0.00
Other	5.86	0.00
Pinyon/Juniper	30.07	6.05
Ponderosa Pine	49.77	8.59
Rock/Dune	10.94	1.75
Sagebrush	134.66	30.29
Shrub/Scrub	10.03	3.48
Spruce/Fir	0.32	0.03
Wetland/Riparian	0.26	0.09
<b>Total</b>	<b>243.00</b>	<b>50.44</b>

Alternative A would result in minor to moderate short-term effects to ponderosa pine and sagebrush. Minor short-term effects would occur to the remainder of the vegetative cover types. There would be no short- or long-term impacts to mixed conifer as it is not present within the Project Area. Alternative A would result in minor long-term impacts to all vegetative cover types.

### Removal of 69 kV Transmission Line

Removal of the existing 69 kV transmission line would require equipment accessing the centerline route (except for *limited access areas*) to remove the transmission line components. While the centerline route is accessed intermittently for inspection and/or transmission line repair, in general it does not see much use. Removal activities would involve intensive use of the centerline access in the short term, which would crush or break vegetation directly in line with the access route. Intensive short-term use may lead to an outbreak of noxious or invasive species, or expansion of existing populations in the short term. Resource protection measures specified in **Appendix A** would help to limit the spread of noxious or invasive species.

A total of 47.19 acres of vegetation would be impacted in the short term by removal of the existing 69 kV transmission line. Specifically, 4.69 acres of pinyon-juniper, 13.57 acres of ponderosa pine, 0.68 acre of rock/dune, 26.34 acres of sagebrush, 0.03 acre of the wetland/riparian, and 1.88 acres of other cover type would be impacted.

In the long term, the existing 69 kV transmission line right-of-way including the centerline access would be rehabilitated. Herbicides would no longer be applied and vegetation would be allowed to naturalize, potentially returning to native vegetative schemes. With implementation of Resource Protection Measures outlined in **Appendix A**, the spread of noxious or invasive species would be prevented or limited in the long term. The height of vegetation along the right-of-way would no longer be maintained at or below 4 feet high and in the long term vegetation would be expected to return to natural stature. Beneficial long-

term impacts to vegetation from rehabilitation of the existing 69 kV transmission line right-of-way would be minor.

**Alternative B: Parallel Existing 69kV Route**

Construction

The short-term and long-term disturbance associated with Alternative B is shown in **Table 1.3-3** below.

**Table 1.3-3. Alternative B - Acres of Short-term and Long-term Disturbance to Vegetation Cover Types within the Project Area**

DESCRIPTION	ACRES OF SHORT-TERM DISTURBANCE B1 & B2	ACRES OF LONG-TERM DISTURBANCE B1	ACRES OF LONG-TERM DISTURBANCE B2
Grass	0.16	0.13	0.13
Mixed conifer	0.00	0.03	0.03
Other	11.35	1.35	1.54
Pinyon/Juniper	29.64	7.71	7.71
Ponderosa Pine	22.61	2.94	3.42
Rock/Dune	7.57	0.93	0.93
Sagebrush	94.30	29.44	27.70
Shrub/Scrub	1.70	0.70	0.70
Spruce/Fir	0.00	0.00	0.00
Wetland/Riparian	0.80	0.31	0.42
<b>Total</b>	<b>168.14</b>	<b>43.55</b>	<b>42.59</b>

Source: Table derived from land cover GIS data and may not match general disturbance layer.

This alternative would result in moderate short-term impacts to sagebrush. Minor short-term impacts would occur to the remainder of the vegetative cover types. There would be no short- or long-term impacts to spruce/fir as this cover type is not found within the Project Area for Alternative B.

Substation Distribution Lines

Construction of distribution lines in conjunction with elimination of the existing Tropic Substation would impact sage, shrub/scrub, grass, rock/dune, pinyon-juniper, and other vegetation types. Given the relative abundance of these vegetation types in the Project Area, any impacts to vegetation from construction of distribution lines would be minor. Construction of distribution lines in conjunction with either of the new Bryce Substation options would potentially impact ponderosa pine, sage, wetland/riparian, and other vegetation types. Impacts would be similar to those described for **Construction**. Resource protection measures (**Appendix A**) would be employed in wetland/riparian areas to minimize impacts to this sensitive vegetation type.

Removal of 69 kV Transmission Line

Acres of vegetation cover disturbed by removal of the existing 69 kV transmission line under Alternative B are included in the calculations of disturbance under **Construction**, above. Impacts to vegetation would be similar to those described under Alternative A.

## Alternative C: Cedar Fork Southern Route

### Construction

The short-term and long-term disturbance associated with Alternative C is shown in **Table 1.3-4** below.

**Table 1.3-4. Alternative C - Acres of Long-term and Short-term Disturbance to Vegetation Cover Types within the Project Area**

DESCRIPTION	ACRES OF SHORT-TERM DISTURBANCE	ACRES OF LONG-TERM DISTURBANCE
Grass	0.58	0.25
Mixed conifer	0.00	0.00
Other	6.66	0.31
Pinyon/Juniper	29.96	5.30
Ponderosa Pine	58.10	9.79
Rock/Dune	14.35	1.72
Sagebrush	145.52	30.75
Shrub/Scrub	7.52	1.89
Spruce/Fir	0.08	0.03
Wetland/Riparian	2.59	0.79
<b>Total</b>	<b>265.35</b>	<b>50.83</b>

Source: Table derived from land cover GIS data and may not match general disturbance layer.

This alternative would result in minor to moderate short-term impacts to five vegetative cover types: pinyon-juniper, ponderosa pine, rock/dune, sagebrush, and scrub/shrub. Minor short-term impacts would occur to grass, spruce/fir, wetland/riparian, and other vegetative cover types. Minor long-term impacts would occur to all vegetative cover types present in the Alternative C Project Area. There would be no short- or long-term impacts to mixed conifer as it is not present in the Project Area.

### Removal of 69 kV Transmission Line

Impacts to vegetation from the removal of the 69 kV transmission line under Alternative C, including acreage of disturbance, would be the same as those described for Alternative A.

## **Interconnect Options**

### N/S Interconnect

The short-term and long-term disturbance associated with the North-South Interconnect Option is shown in **Table 1.3-5** below. The North-South Interconnect Option would result in short-term negligible effects to all of the vegetative cover types with the exception of sagebrush. Based upon the description of effects defined in **Table 1.3-1** and due to the relative low abundance of sagebrush in the surrounding area, The North-South Interconnect Option would result in a short-term minor level of disturbance to this cover type.

This option would result in negligible impacts to all of the vegetative cover types with the exception of mixed conifer. Based upon the description of effects defined in **Table 1.3-1** and due to the relatively low abundance of mixed conifer within the Project Area for the North-South Interconnect Option, selection of this alternative would result in a minor level of long-term disturbance to this cover type.

**Table 1.3-5. North-South Interconnect- Acres of Short-term and Long-term Disturbance to Vegetation Cover Types within the Project Area**

DESCRIPTION	ACRES OF SHORT-TERM DISTURBANCE	ACRES OF LONG-TERM DISTURBANCE
Grass	0.00	0.00
Mixed conifer	0.00	1.64
Other	0.00	0.00
Pinyon/Juniper	0.07	0.03
Ponderosa Pine	7.36	0.00
Rock/Dune	0.00	0.00
Sagebrush	6.36	1.24
Shrub/Scrub	0.00	0.00
Spruce/Fir	0.00	0.00
Wetland/Riparian	0.00	0.00
<b>Total</b>	<b>13.78</b>	<b>2.91</b>

East-West Interconnect Option

The short-term and long-term disturbance associated with the East-West Interconnect Option is shown in **Table 1.3-6** below. This option would result in negligible short-term disturbance to nine vegetative cover types. Based upon the description of effects defined in **Table 1.3-1** and due to the relatively low abundance of these cover types with the surrounding area, the pinyon/juniper and sagebrush cover types would experience a minor level of short-term disturbance .

This option would result in a negligible level of long-term disturbance to all 11 of the vegetative cover types present within the Project Area.

**Table 1.3-6. East-West Interconnect- Acres of Short-term and Long-term Disturbance to Vegetation Cover Types within the Project Area**

DESCRIPTION	ACRES OF SHORT-TERM DISTURBANCE	ACRES OF LONG-TERM DISTURBANCE
Grass	0.07	0.03
Mixed conifer	0.09	0.03
Other	0.00	0.00
Pinyon/Juniper	1.35	0.26
Ponderosa Pine	7.90	2.17
Rock/Dune	0.00	0.00
Sagebrush	15.53	3.35
Shrub/Scrub	0.00	0.00
Spruce/Fir	0.02	0.00

DESCRIPTION	ACRES OF SHORT-TERM DISTURBANCE	ACRES OF LONG-TERM DISTURBANCE
Wetland/Riparian	0.00	0.00
<b>Total</b>	<b>24.96</b>	<b>5.84</b>

### No Action

Under the No Action Alternative, construction of a new transmission line would not take place and the existing transmission line would continue to function in its current location. The existing transmission line would be overhauled including the possible replacement of conductor wire and the replacement of the majority of the poles. Ground disturbance and resulting impacts to vegetation from overhaul would be similar to, but somewhat less than, that described above under **Construction** for Alternative B as (1) the amount of ground disturbance from pole placement would be less and (2) vegetation within the right-of-way is currently maintained at 4 feet in height or less. Future maintenance and line operations would be similar to current levels. Vegetative communities would continue to function in their current capacity. Noxious or undesirable weeds would continue to be managed in their current capacity and would likely continue to spread nominally through continued normal activities and practices.

#### 1.3.1.3. Summary

**Tables 1.3-7 – 1.3-8** provide a summary of the long-term and short-term disturbance and magnitude of the alternatives presented for consideration. The degree of magnitude was assigned by comparing the acreage of disturbance to each vegetation cover type to the relative abundance of each cover type within the surrounding area of the proposed line. The surrounding area is visually represented in **Figure 1.2-1** and the supporting disturbance acreages can be found in **Appendix E**. While areas of short-term impact represent a large proportion of a given vegetative cover type within the Project Area for each alternative, it should be noted that all of these cover types are common with widespread acreages in the surrounding area. Impacts to all cover types would be minor as the relative proportion of the disturbance area to the abundance in the larger geographic area would be measurable but small, and would not affect the overall population, or the value or productivity of the cover type.

Of the three Action Alternatives, Alternative B would result in the fewest acres of short-term and long-term disturbance to all vegetation cover types. Alternative A and Alternative C are similar in both total acreage of short-term and long-term disturbance and magnitude.

**Table 1.3-7. Comparison of Short-Term Disturbance to Vegetative Cover Types by Alternative**

VEGETATION COVER TYPE	ACRES, PERCENTAGE OF PROJECT AREA AND IMPACT				
	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	NORTH-SOUTH INTERCONNECT	EAST-WEST INTERCONNECT
Grass	1.08 Minor	0.16 Minor	0.58 Minor	None	Min - Mod
Mixed conifer	0.00 None	0.00 None	0.00 None	None	Minor
Other	5.86 Minor	11.35 Minor	6.66 Minor	None	None
Pinyon-Juniper	30.07 Minor	29.64 Minor	29.96 Minor	Min - Mod	Min - Mod
Ponderosa Pine	49.77	22.61	58.10	Min - Mod	Min - Mod

VEGETATION COVER TYPE	ACRES, PERCENTAGE OF PROJECT AREA AND IMPACT				
	ALTERNATIVE A	ALTERNATIVE B	ALTERNATIVE C	NORTH-SOUTH INTERCONNECT	EAST-WEST INTERCONNECT
	Min - Mod	Minor	Moderate		
Rock/Dune	10.94 Minor	7.57 Minor	14.35 Minor	None	None
Sagebrush	134.66 Moderate	94.30 Moderate	145.52 Moderate	Min - Mod	Min - Mod
Shrub/Scrub	10.03 Minor	1.70 Minor	7.52 Minor	None	None
Spruce/Fir	0.32 Minor	0.00 None	0.08 Minor	None	None
Wetland/Riparian	0.26 Minor	0.80 Minor	2.59 Minor	None	None
<b>Total Acres</b>	<b>243.00</b>	<b>168.14</b>	<b>265.35</b>	<b>13.78</b>	<b>24.96</b>

**Table 1.3-8. Comparison of Long-Term Disturbance to Vegetative Cover Types by Alternative**

VEGETATION COVER TYPE	ACRES, PERCENTAGE OF PROJECT AREA AND IMPACT					
	ALTERNATIVE A	ALTERNATIVE B		ALTERNATIVE C	NORTH-SOUTH INTERCONNECT	EAST-WEST INTERCONNECT
		B1	B2			
Grass	0.15 Minor	0.13 Minor	0.13 Minor	0.25 Minor	None	Minor
Mixed conifer	0.00 None	0.03 Minor	0.03 Minor	0.00 None	None	Minor
Other	0.00 None	1.35 Minor	1.54 Minor	0.31 Minor	None	None
Pinyon-Juniper	6.05 Minor	7.71 Minor	7.71 Minor	5.30 Minor	Minor	Minor
Ponderosa Pine	8.59 Minor	2.94 Minor	3.42 Minor	9.79 Minor	Minor	Minor
Rock/Dune	1.75 Minor	0.93 Minor	0.93 Minor	1.72 Minor	None	None
Sagebrush	30.29 Minor	29.44 Minor	27.70 Minor	30.75 Minor	Minor	Minor
Shrub/Scrub	3.48 Minor	0.70 Minor	0.70 Minor	1.89 Minor	None	None
Spruce/Fir	0.03 Minor	0.00 None	0.00 None	0.03 Minor	None	None
Wetland/Riparian	0.09 Minor	0.31 Minor	0.42 Minor	0.79 Minor	None	None
<b>Total Acres</b>	<b>50.44</b>	<b>43.55</b>	<b>42.59</b>	<b>50.83</b>	<b>2.91</b>	<b>5.84</b>

### 1.3.2. Cumulative Effects

#### 1.3.2.1. Cumulative Effects Area

The general cumulative effects area (**Figure 1.3-1**) for the project for all resources except wildlife, special status species, and socioeconomics includes all HUC 12 (6<sup>th</sup> level) watersheds that come within 0.5 mile of the project components. The cumulative effects area encompasses 237,010 acres (**Table 1.3-9**). Land management agencies responsible for managing a range of uses on 204,559 acres of public land are the DNF Powell and Escalante Ranger Districts, the KFO and GSENM, BRCA, and SITLA. Private land ownership accounts for 13.7 percent (32,451 acres) of land within the cumulative effects area.

**Table 1.3-9. Cumulative Effects Area – Acreage by Land Ownership/Management**

LAND OWNERSHIP/MANAGEMENT	ACRES
U. S. Forest Service - DNF	121,852.4
Bureau of Land Management – KFO	35,133.9
Bureau of Land Management – GSENM	11,981.5
National Park Service – BRCA	17,067.3
SITLA	18,524.1
Private	32,450.9
<b>Total</b>	<b>237,010.1</b>

#### 1.3.2.2. Past, Present, and Reasonably Foreseeable Actions

National Forest lands and BLM lands administered by KFO are managed for multiple resource values and uses. In the cumulative effects area, past and present uses include timber and woodland product harvest; livestock grazing; and recreation uses including hunting, fishing, camping, picnicking, hiking, back country driving, and mountain biking. Lands are also available for mining, oil and gas development, and production of mineral materials (building stone and sand and gravel). Roads, transmission lines, pipelines, and communication sites are located on National Forest and other public lands. While these types of uses have resulted in an unknown amount of surface or subsurface disturbance and placement of human-made structures on the landscape, the National Forest and public lands still retain a largely undeveloped appearance. These lands are not characterized by urban or commercial development that is typical of cities and towns.

The GSENM is managed for a variety of resource values and uses, with a mandate from the Presidential Proclamation that established the Monument to protect myriad historic and scientific resources. To meet this objective, BLM manages the Monument to protect its primitive frontier state and safeguard its remote and undeveloped character. Further, BLM manages the Monument to provide opportunities for study of scientific and historic resources. Within this management focus, past and present uses of public lands in the Monument include livestock grazing, recreation, and realty actions. While the Monument is closed to mining and oil and gas development, roads, transmission lines, pipelines, and communication sites are located on these public lands. These uses have resulted in an undetermined amount of surface and subsurface disturbance and placement of human-made structures on the landscape, but public lands in the Monument still retain a largely undeveloped appearance.

**Figure 1.3-1. General Cumulative Effects Area**

BRCA, on the other hand, is managed with an emphasis on protection and enhancement of its unusual scenic beauty and its value for science and education, and for the benefit and enjoyment of the public. Even with this focus on protection and preservation, some past and present development has occurred in the Park for management of visitor use and the protection of Park resources. A paved access road runs the length of the Park, providing access to many sites and facilities, including administrative offices and buildings, Bryce Canyon Lodge, campgrounds, trails, interpretive sites, and others. Other infrastructure, including transmission lines, is also present. Garkane's existing 69 kV transmission line crosses the northern end of the park, as does SR 12. However, even with this development, the vast majority of the Park in the cumulative effects area is undeveloped, and presents a natural landscape.

State lands in the cumulative effects area are managed by SITLA to produce revenue for the State school system. State lands are managed for a variety of uses that produce revenue, and past and present uses include livestock grazing, recreation uses, roads, highways, utility lines, and other commercial uses. Lands are occasionally sold for private development. As with federal lands, these uses result in surface disturbances, but generally, State lands retain an undeveloped appearance. The current amount of surface and subsurface disturbance is unknown.

Private lands in the cumulative effects area are used and developed for a variety of purposes, including residential, commercial, and industrial development in and adjacent to cities and towns. Many acres of private land are in farmland production, including irrigated pastures, range pastures, and hay, grain, and alfalfa.

Reasonably foreseeable future actions within the cumulative effects area that are currently planned or under review include activities that fall into several broad categories:

- Energy and communications
- Transportation
- Vegetation and fire fuels management
- Habitat improvement
- Land use and management
- Recreation
- Mining
- Miscellaneous

**Table 1.3-10** shows activities currently planned, under review, or in permitting in Garfield County that may be pertinent to cumulative effects for one or more resource areas. Projects within Garfield County but outside the cumulative effects area for all resources (except socioeconomics) are labeled "socio only." The table is organized generally by project type (energy, transportation, forest fuels management, etc.), but many of the entries could easily fit into more than one classification.

**Table 1.3-10. Reasonably Foreseeable Future Actions in the Cumulative Effects Areas**

PROJECT (LEAD AGENCY)	LOCATION	DESCRIPTION	ESTIMATED DISTURBANCE (IF AVAILABLE)
<b>Energy &amp; Communications</b>			
Designation of Energy Corridors (USFS)	Forest-wide	Would designate energy corridors on the DNF and other federal land in 11 western states. Corridor 116-206 would be west of U.S. 89 in the cumulative effects area.	
Geothermal Leasing Programmatic EIS (USFS)	Forest-wide	USFS and BLM are preparing a joint programmatic EIS to analyze leasing of federal lands with moderate to high potential for geothermal resources in 11 western states	
Oil and Gas Leasing Analysis (USFS)	Forest-wide	EIS to evaluate all BLM and USFS administered lands for oil and gas leasing	
Panguitch Lake Power Line Realignment (DNF)	Cedar City RD (Socio only)	Authorization to PacifiCorp for the relocation of 1.2 miles of 12.5 kV power line. Work would involve construction of a new overhead power line and removal of the old line. Area is approximately 17 miles southwest of Panguitch.	
South Central Utah Telephone Association (SCSRA) I-15 to U.S. 89 Fiber Optic Line (BLM)	(Socio only)	Fiber optic line from I-15 in Iron County to U.S. 89 in Garfield County 7.5 miles north of Panguitch requiring BLM right-of-way	
Oil and Gas Lease Sales (BLM)	BLM	Ongoing BLM program to lease lands suitable for oil and gas development, including lands in Garfield County classified as having high potential for oil & gas development	
<b>Transportation</b>			
DNF Motorized Travel Plan (DNF)	Forest-wide	To identify changes to the motorized travel system (roads) to meet administrative, fire, recreational, and resource needs; will generally prohibit cross-country (off-road) motorized travel on the Forest, but would remain open to hiking, horseback riding, cross-country skiing, and snowmobile use.	
Mammoth Highway Easement (DNF)	Cedar City RD (Socio only)	Issuance of a right-of-way easement to Garfield and Kane Counties for Mammoth Highway (Forest Road 068), northeast of Duck Creek Village, between State Highways 14 and 143.	

<b>PROJECT (LEAD AGENCY)</b>	<b>LOCATION</b>	<b>DESCRIPTION</b>	<b>ESTIMATED DISTURBANCE (IF AVAILABLE)</b>
Tropic Canyon Highway Stabilization Project (BRCA)	BRCA	Repair and stabilize SR 12 and introduce water diversion into Tropic Wash, west of Tropic	210 linear feet of road shoulder; 5 stream barbs in Tropic Wash
SR-12 Environmental Study (UDOT, FHWA, GSENM)	Escalante to Boulder (Socio only)	EA for project to obtain over 14 miles of right-of-way from BLM and generally upgrade SR 12	
SR-12 Scenic Byway Improvements (UDOT, GSENM)	SR 12 throughout Garfield County	Improve overlooks, interpretive sites, and gateway features	
SR-12 Corridor Management Plan Implementation (UDOT, GSENM)	SR 12 throughout Garfield County	Corridor Management Plan Implementation	
US-89 from SR-14 to Hatch (UDOT)	SR-14 to Hatch	Bituminous pavement, reconstruction, widen shoulders	
Notom Road (UDOT)	(Socio only)	Engineering and environmental study, preparatory to road improvements	
<b>Vegetation and Fire Fuels Management</b>			
Aerial application of fire retardant (DNF, KFO, GSENM)	Forest-wide	The USFS proposes to continue the aerial application of fire retardant to fight fires on National Forest System lands, including the DNF.	
Right-of-way Lakes Timber Management (DNF)	Freemont River RD (Socio only)	Fuels Management Reduction on approximately 600 acres of forested land to reduce the impacts of insects and disease	600 acres
Stump Springs Fire Treatments (DNF)	Escalante RD (Socio only)	Project uses prescribed fire treatments to disturb vegetation, slowly moving heterogeneous patches towards a fine-grained landscape that is more resistant and resilient to fire and other disturbance.	Approximately 5,400 acres over 9 years
Clayton Salvage (DNF)	Escalante RD (Socio only)	Timber salvage of 248 acres of dead and dying spruce on the Griffin Top Plateau.	248 acres (2008)

PROJECT (LEAD AGENCY)	LOCATION	DESCRIPTION	ESTIMATED DISTURBANCE (IF AVAILABLE)
Pockets Vegetation Management (DNF)	Escalante RD (Socio only)	The Project is designed to reduce bark beetle risk and improve habitat for northern goshawk. It would include commercial timber harvest, pre-commercial stand treatment, fencing, and travel management. The Project covers an area of 8,564 acres and would include commercial timber harvest on 4,721 acres of conifers and 2,647 acres of aspen, including 82 acres along the Antimony Creek drainage. Smaller areas would receive additional treatments. In addition, 9 miles of new roads would be required, 7.0 miles of unauthorized roads would be designated NFS roads, and 13.4 miles of existing NFS roads would be improved.	8,564 acres 9 miles of new roads 7.0 miles added to system roads
Toad Salvage (DNF)	Escalante RD (Socio only)	Salvage of dead and dying ponderosa pine within the perimeter of a Wildland Fire Use burn area. September 2007, 1400 acres burned.	230 acres
Boulder Town Fire Protection (DNF)	Escalante RD (Socio only)	Boulder was identified as a community at risk and a Community Wildland Fire Protection Plan was developed. 65 acres of prescribed burns and 186 acres of vegetative treatments are planned to provide community protection.	251 acres
Bug Lake Salvage Project (DNF)	Escalante RD (Socio only)	Timber Salvage of dead and dying spruce on the Aquarius plateau will use existing Forest roads with approximately 1 mile of road reconstruction.	228 acres (2007)
Dugout/Tarantula Mesa Veg. Project (BLM)	Richfield FO (Socio only)	Utilize mechanical (chainsaw, handsaws, etc.) to cut, lop, and scatter the pinyon and juniper trees that have encroached into the existing chainings that were established in the 1960s	
North Wash Tamarisk Control Project (BLM)	Richfield FO (Socio only)	Removal and chemical control of 20 acres of tamarisk (salt cedar) approximately 30 miles southeast of Hanksville in the Fiddler Butte Wilderness Study Area	
Bear Creek Fire Salvage and Reforestation, DNF, CE	Garfield County (Socio cumulative effects area only)	Salvage fire killed and damaged trees within the 1400-acre Bear Creek burn area	
Corn Creek Salvage and Reforestation, DNF, EA	Garfield County (Socio cumulative effects area only)	Salvage dead and dying timber and reforest areas within burn with inadequate stocking in a 2270-acre burn	

<b>PROJECT (LEAD AGENCY)</b>	<b>LOCATION</b>	<b>DESCRIPTION</b>	<b>ESTIMATED DISTURBANCE (IF AVAILABLE)</b>
Paunsaugunt Aspen Vegetation Management, DNF, EA	Powell Ranger District	Manage aspen stands to increase aspen regeneration, reduce conifer encroachment, and develop multi-aged aspen stands	
GSENM Plan Amendment & Rangeland Health EIS	GSENM	The GSENM Management Plan Amendment and Rangeland Health EIS describes and analyzes alternatives for management of livestock grazing on public lands administered by the BLM.	2,168,726 acres (GSENM, Glen Canyon NRA, KFO)
<b>Habitat Improvement</b>			
Cooperative Fisheries Enhancement Projects (DNF)	Powell RD	In cooperation with UDWR, re-establish native trout populations in 2 streams on the DNF (also 8 streams on the Fishlake National Forest)	
Marshall Canyon Pinyon-Juniper Removal (DNF)	Powell RD (Socio only)	The Proposed Action is to treat up to 900 acres within an existing chained area to improve wildlife habitat on the western portion of the Sevier Plateau (Mt. Dutton). The Proposed Action consists of the following actions: Remove pinyon pine and juniper mechanically on approximately 900 acres using a skid steer (bobcat) or other tractor type device, or through hand thinning with chainsaws. Broadcast seed into seedbed using forbs and grass mixture. Where needed, native seed will be part of this mixture.	900 acres
Antelope Springs Draw Sagebrush Steppe Habitat Enhancement (DNF)	Escalante RD <sup>1</sup> (Socio only)	Mow or brushbeat 500 acres of dense even-aged sagebrush and interseed a native grass and forb mixture.	500 acres
Dipping Vat Habitat Improvement Project (DNF)	Escalante RD	Project would include the thinning of pine forests and the mechanical treatment of sagebrush for habitat improvement and fuels reduction in Johns Valley, approximately 7 miles north of Tropic. The Project would affect approximately 1,132 acres.	1,132 acres (2010)
Boulder Creek Wildlife Habitat Improvement (DNF)	Escalante RD (Socio only)	Removing encroaching conifers to restore Aspen Grove wildlife habitat	
Aquatic Monitoring Amendment, DNF	Forest-wide	Proposal to amend the Aquatic Management Indicator Species (MIS) in the DNF LRMP	

<b>PROJECT (LEAD AGENCY)</b>	<b>LOCATION</b>	<b>DESCRIPTION</b>	<b>ESTIMATED DISTURBANCE (IF AVAILABLE)</b>
East Fork Boulder Creek Fish Passage Improvement DNF, CE	Garfield County (Socio cumulative effects area only)	Replace a culvert that is inhibiting fish passage on Road 166 with a new span designed for high and low flow maintenance of all aquatic species	
<b>Land Use and Management</b>			
Resources Management Plan (BLM)	Richfield Field Office BLM (Socio only)	Comprehensive Resource Management Plan for public lands and resources managed by the BLM Richfield Field Office	
Resources Management Plan (KFO)	KFO	FEIS and Resource Management Plan for public lands and resources managed by the KFO	
First Annual Centennial Strategy for Bryce Canyon National Park (BRCA)	BRCA	Reduce private vehicle use by providing public transportation for park visitors; planning addition of a bicycle transportation system in park; restore historic buildings; treat 193 acres of exotic weed infestation; inventory and assess condition of 224 identified archaeological sites	
Panguitch Lake Resort	Panguitch Lake (Socio only)	RV timeshare resort around Panguitch Lake that is under development	
Incorporation of Ruby's Inn	Ruby's Inn	Ruby's Inn was incorporated as Bryce Canyon City. Ruby's Inn has a single land owner. The intention of incorporating is to prepare for subdivision and growth.	
<b>Recreation</b>			
Red Canyon bike trail extension (DNF)	Powell RD	Extend existing bike trail along SR 12 3.1 miles east to the East Fork of the Sevier River Road.	
Canaan Mountain Reroute (DNF)	Escalante RD (Socio only)	The Canaan Mountain Loop Trail approximately 14.5 miles southwest of Escalante would be rerouted to move it off a waterline, reduce its grade, and provide for improved maintenance.	
Mossy Cave Trail Rehabilitation and Resource Protection (BRCA)	BRCA	Large boulders from Water Canyon adjacent to the trail will be moved to stabilize areas where the trail has eroded and footbridge abutments	
Grandview Trail Re-route (DNF)	Powell Ranger District	Construct several sections of non-motorized trail to eliminate dual use by motorized and non-motorized recreationists	

<b>PROJECT (LEAD AGENCY)</b>	<b>LOCATION</b>	<b>DESCRIPTION</b>	<b>ESTIMATED DISTURBANCE (IF AVAILABLE)</b>
King Creek Campground Non-commercial Thinning DNF, CE	Powell Ranger District	Thin heavily stocked ponderosa pine to improve vigor and forest health in a developed recreation area	
<b>Mining</b>			
Boulder Gravel Pit (DNF)	Escalante RD (Socio only)	A gravel pit will be developed and managed to provide gravel for county and Forest needs.	< 5 acres
Troy M Mine Phase Two (BLM)	Richfield FO, near Ticaboo (Socio only)	Extend existing underground workings; construct mine shaft and waste rock storage area; construct ventilation shafts and expand existing evaporation pond for mine dewatering	
Phase II, Abandoned Mine Reclamation, (GSENM)	GSENM	EA to address potential environmental impacts associated with the Phase II Abandoned Mine Reclamation Project, which includes the Henrieville Prospect Site east of Tropic	
Reopening of Ticaboo uranium mill and mine	Ticaboo/Bullfrog (Socio only)	Garkane has been contacted regarding service to the Ticaboo/Bullfrog area for planned re-opening of the uranium mill; the mine has been re-opened and is supplying its own power with diesel generators	
<b>Miscellaneous</b>			
Wild and Scenic River Suitability Study – Utah (USFS)	Pine Valley, Cedar City, and Escalante RDs	A draft EIS has been prepared analyzing the suitability of 86 Utah river segments, including 8 on the DNF in Garfield County, for inclusion in the National Wild and Scenic River System	
West Dixie Water Improvement (DNF)	Powell RD	No Information	3,000 acres (2007) 2,000 acres (2008) 2,000 acres (2009) 2,000 acres (2010)
West Deer Creek Grazing Allotment (DNF)	Escalante RD (Socio only)	Proposal to re-authorize livestock grazing on the West Deer Creek Allotment north of Boulder, Utah east of SR 12	
Ohio University Dinosaur Collection (GSENM)	GSENM	Proposal to excavate and remove remains of a horned dinosaur from GSENM	

PROJECT (LEAD AGENCY)	LOCATION	DESCRIPTION	ESTIMATED DISTURBANCE (IF AVAILABLE)
McGath Lake Dam (DNF)	Escalante RD (Socio only)	The McGath Lake Dam is deteriorating and in need of repair. Without action the dam is likely to fail and destroy an important fishery. McGath Lake is located approximately 16 miles north of Escalante.	
Dinosaur Documentary Film (BLM)	GSENM & BLM	Various locations within the GSENM, Wolverine Petrified Forest, The Blues Area, Red Canyon, Cocks Comb Road, etc,	

### 1.3.2.3. Cumulative Effects

Cumulative effects on vegetation in the cumulative effects area as a result of any of the Action Alternatives are likely to be similar in type to the direct and indirect effects previously discussed in the analysis of potential impacts resulting from the Proposed Project. Of the reasonably foreseeable projects in **Table 1.3-10**, development of utility corridors, has the greatest potential for adverse effects to vegetation resources as broad swaths of trees and brush could be cut and maintained at a low level for many years. Compaction of soils and direct disturbance to vegetation would also occur. Disturbed areas are also more susceptible to weed infestations.

The Action Alternatives would make a minor to moderate contribution to adverse cumulative effects to vegetation due to short-term disturbance within utility corridors and long-term suppression of natural vegetation schemes within utility corridors by maintaining vegetation at or below 4 feet in height. The magnitude of these adverse effects could be partially mitigated through planning for corridors to route through areas that have been previously disturbed, or in areas that have soils and vegetation more tolerant of disturbance and compaction. Employment and enforcement of BMPs and mitigation measures would greatly reduce the spread of weeds and help facilitate recovery in reseeded areas. Efforts toward fire prevention and suppression, and timber stand improvements offer the opportunity for long-term beneficial effects to vegetation resources. Vegetative clearing would not affect the overall plant species composition or productivity in the Project Area within the cumulative effects area.

Vegetation within the right-of-way for the existing 69 kV transmission line is maintained at 4 feet high or lower and ongoing maintenance has some impact on vegetative growth along the centerline access. Overhaul of the transmission line under the No Action Alternative would result in damage or destruction of additional vegetation in the right-of-way, which would contribute to cumulative impacts. Cumulative impacts would be similar to those described for any of the Action Alternatives, but somewhat less due to the existing conditions within the right-of-way.

## 1.4. PLAN CONSISTENCY

**Section 1.2.2** identifies desired conditions and resource protection measures developed by each agency that are intended to avoid, reduce or eliminate undesirable impacts and achieve desired conditions with regard to vegetation resources. Based upon the information available at the time in which this specialist report was created, the project alternatives analyzed within this specialist report are consistent with the plans policies and directives outlined in **Section 1.2.2**.

## 1.5. COMPLIANCE WITH OTHER LAWS AND REGULATIONS

*The National Forest Management Act of 1976* (16 U.S.C. 1600(note)) Public Law 94-588. This act provides the basis for the modern USFS planning process, including the requirement to create forest plans, requirements for public involvement in the planning process, and the use of research and field assessments to evaluate forest health. This specialist report is written in compliance with this law.

*The Federal Land Policy and Management Act (FLPMA) of 1976*, Title II, Section 202. This act consolidated and articulated BLM's management responsibilities. Many land and resource management authorities were established, amended, or repealed by FLPMA. This specialist report is written in compliance with this law.

*Executive Order 13112* (3 February 1999) - This Executive Order requires that the USFS prevent the introduction of invasive species and provide for their control in order to minimize the economic, ecological, and human health impacts of invasive species. Construction activities implemented with applicable BMPs and mitigation measures would minimize the potential for introducing invasive species and would comply with this Order.

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## **Appendix A**

### **Resource Protection Measures**

## Resource Protection Measures

The following resource protection measures are considered part of the Proposed Action and other Action Alternatives and would be carried out in the course of construction, operation, and maintenance activities as specified below.

### Soils

- Ingress and egress to pole locations would be on the same path to minimize disturbance to soil and biological soil crusts, especially in sparsely vegetated areas.
- Soil from pole and guy wire hole excavations would be used to refill the hole and any remainder evenly distributed over the disturbance area around the hole. In sensitive visual areas where different soil colors could distract from the view, excess soils would be removed from the site.
- Herbicide use would be applied in accordance with label requirements and comply with the BLM Vegetation Treatments Using Herbicides Final Programmatic EIS (BLM 2007) and the DNF Environmental Assessment for Noxious Weed Management (USFS 2000).
- Where temporary minor changes in contours occur during construction along the route, the area would be returned to near pre-construction contours through reshaping, as required by the authorizing agency. On BRCA lands, the soil would be re-contoured using hand tools to minimize erosion.
- If any areas outside the *limited access areas* have slopes greater than 35 percent, tractor/equipment operation would not be permitted. This measure limits surface disturbance and keeps surface runoff water from concentrating. This practice restricts tractor operation to slopes where corrective measures for proper drainage such as water bars are easily installed and effective. Criteria that may be used to determine slope restrictions are soil stability, mass stability, infiltration rate, and soil water holding capacity. These data may be interpreted from soil and land type inventories, geologic maps, and climatic and hydrologic information. Subsequent field verification may be necessary.
- Tractor/equipment operation would be limited during times of high soil moisture levels to minimize soil compaction, puddling, rutting, and gulying with resultant sediment production and loss of soil productivity. This measure minimizes surface disturbance during high soil moisture conditions which would result in compaction, puddling, rutting, and gulying problems. This practice reduces the need to correct these soil and water resource problems later. High soil moisture conditions will be defined and evaluated during construction by USFS Contract Inspectors in concert with representatives from affected cooperating agencies.

### Weeds

- A pre-construction weed inventory would be required, and early treatment of weeds would occur prior to construction vehicles entering infested areas.
- To minimize the potential for the spread of noxious weeds, all equipment used during construction would be power washed off-site to remove all soil and plant material prior to entering the Project Area.
- Ongoing monitoring and treatment of noxious and invasive species would be incorporated into the Operation and Maintenance Plan. Garkane would bi-annually (during the growing season) survey and treat, if necessary, the right-of-way for noxious weeds for the first 10 years following end of construction, and submit bi-annual reports to lead and cooperating agencies as requested.
- Control and follow-up treatment of invasive species specific to this project within the right-of-way would be the responsibility of Garkane.

- If chemical weed control is used, only agency-approved chemicals would be used by certified applicators.

### Revegetation

- Where re-contouring is not required, vegetation would be left in place wherever possible to avoid excessive root damage and allow for re-sprouting.
- Re-vegetation of the Project Area, where necessary, would be Garkane's responsibility and would be coordinated with the appropriate affected agency's resource division.
- Areas identified by the agency or landowner would be seeded following construction activities using an agency-approved seed mixture and adhering to standards recommended by the specific agency for that portion of the right-of-way. Seed mixes used for rehabilitation purposes would be certified noxious weed free. Revegetation of the Project Area would be subject to agency monitoring and inspection (at agency discretion) to ensure adequate revegetation establishment. Based on these findings, the affected agency may require additional revegetation from Garkane if agency revegetation objectives are not adequately met. Agencies would provide revegetation objectives to Garkane prior to project initiation.
- Reseeded areas within grazing allotments may require additional measures to assure effective revegetation. Reseeded areas around structures and other disturbances within grazing allotments may attract cattle to graze on new growth. Herding, salting, and placement of water sources may be used to attract cattle away from revegetated areas to allow vegetation to mature and become established. Larger reseeded areas (such as lay-down yards or pulling sites) may require temporarily fencing cattle out to allow for effective revegetation.

### Fire

- Blasting along with use of mechanical equipment may be limited/restricted during drought conditions if fire restrictions are implemented. A waiver may be granted if Garkane can provide required mitigation measures such as hours of work, available water, and fire lookouts.

### Wildlife

- If a federally listed species is located within the Project Area, work would be immediately halted to allow the appropriate federal agency to respond. Consultation with the USFWS would be initiated immediately upon species discovery and additional mitigation measures may be applied where necessary.
- Construction, demolition, and maintenance activities would be subject to species-specific temporal restrictions to address wildlife concerns. These restrictions would be set based on consultation and coordination with the USFWS and UDWR.
- Pre-construction/demolition raptor/nesting bird surveys may be required if project implementation occurs more than 2 years from the decision in accordance with USFS and other agency guidelines.
- With the exception of emergency repair situations, right-of-way construction, demolition, restoration, maintenance, and termination activities in designated areas would be modified or discontinued during sensitive periods (e.g., nesting and breeding periods) for candidate, proposed, threatened, endangered, or other sensitive animal species. The list of sensitive periods would be approved in advance by the authorized officer of the appropriate land management agency.
- Timing limitations for timber clearing and right-of-way vegetation maintenance would be in agreement with Migratory Bird Treaty Act (MBTA) protocol.

- Construction and demolition activities within active raptor nesting areas would be allowed in compliance with the appropriate temporal and spatial buffers as set forth by the management agency.
- Structures would be designed in accordance with the Avian Protection Plan Guidelines developed by the USFWS' Avian Power Line Interaction Committee (2006) to minimize avian conflicts.
- Raptor perch deterrents/discouragers would be used on poles to minimize perching in areas inhabited by Utah prairie dogs, greater sage grouse, and pygmy rabbits as required by each land management regulating agency.
- Additional wildlife mitigation measures may be required if areas where habitat improvement projects have been conducted would be disturbed.

### Cultural Resources

- Should any of the following be discovered during construction, such activities would cease in the immediate area of discovery and the appropriate agency representative would be notified immediately: (1) previously unidentified surface or subsurface cultural resources and/or (2) human remains and/or objects or materials subject to the Native American Graves Repatriation and Protection Act, as amended. An evaluation of the discovery would be made by the lead USFS authorized officer or relevant cooperating agency representative to determine appropriate actions and avoidance measures that would prevent the loss of any significant cultural or scientific values. The authorized officer would make any decisions pertaining to mitigation measures after consulting with appropriate agencies. No operations would resume in the immediate area of the discovery until written authorization to proceed is issued by the USFS or appropriate agency.
- Cultural resources would be protected by limiting access to known archaeological sites, educating employees about the importance of cultural resources, and implementing a strict management policy restricting collection of artifacts.

### Paleontology

- Construction- or maintenance-related activities that require significant ground disturbance (greater than 12 inches deep) should be surveyed and monitored when conducted in areas of bedrock outcrop for the following geologic units: Tropic Shale, Dakota Formation; the Tibbet Canyon, Smoky Hollow and John Henry members of the Straight Cliffs Formation; and the Wahweap and Kaiparowits formations.
- Should any paleontological resources be found during construction, work would be halted and the appropriate agency representative would be notified immediately. The authorized officer would make any decisions pertaining to mitigation measures after consulting with appropriate agencies. No operations would resume in the immediate area of the discovery until written authorization to proceed is issued by the USFS or appropriate agency.

### Visual

- To the extent possible, placement of access routes and points of ingress and egress would be situated to minimize visual intrusion and to obscure views from local highways and county roads.
- No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate limits of survey or construction activity.
- Non-reflective wire would be used within USFS High SIO areas, BLM VRM Class II areas, and in the GSENM as required by the Management Plan.
- When use of wood pole structures is not practicable, and the use of fiberglass or steel structures is approved, dark colored, non-reflective surfaces would be used.

- To the extent practicable, siting of individual structures would take advantage of both topography and vegetation as screening devices to restrict views of structures from visually sensitive areas.
- Where practicable, the siting of structures would avoid ridgelines, summits, or other prominent locations and use topography as a backdrop to avoid skylining.
- The transmission line alignment would cross linear features (e.g., trails, roads, rivers) at right angles whenever possible to minimize viewing area and duration.
- Vegetation openings for facilities, structures, routes, etc., would mimic the size, shape, and characteristics of naturally occurring openings to the extent practicable.
- Vegetation clearing design in highly visible forested areas could include feathering of right-of-way edges, i.e., progressive, selective thinning of trees from the edge of the right-of-way inward, mixing tree heights from the edge of the right-of-way, and creation of an irregular vegetation outline.
- Lighting for facilities would not exceed the minimum required for safety and security while not affecting wildlife behavior, and designs would be selected that minimize upward light scattering (light pollution).
- Visual impact mitigation objectives and activities would be discussed with equipment operators prior to commencement of construction activities.
- Methods for disposal of slash from vegetation removal would be site dependent. Slash may be mulched and spread to cover fresh soil disturbances (preferred), hauled off site for disposal, or buried.
- Restoration activities specified here or in project-related documents would be undertaken by Garkane immediately after disturbances.
- Disturbed areas would be covered with stockpiled topsoil or mulch and revegetated using a mix of native species selected for visual compatibility with existing vegetation.
- Edges of revegetated areas would be feathered (strategically removing vegetation along the margins of the right-of-way at agency direction) to reduce form and line contrast with existing landscape.
- Excess fill material would not be wasted down slope to avoid color contrast with existing vegetation/soils.

### Water

- Water needed during construction would be limited to that needed for dust control. The conditions of the Storm Water Pollution Prevention Plan would be imposed on all construction activities to avoid or limit sedimentation to surface waters.
- Equipment operation would be excluded from wetlands, floodplains, stream channels, and wet meadows to limit soil damage, turbidity, and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion. This practice is designed to prevent soil puddling, compaction, and displacement, and the concentration of surface water and soil erosion, which may lead to rill or gully erosion and subsequent water quality degradation. This measure is intended to prevent or reduce the need for corrective measures to solve water concentration problems due to equipment use.
- When applying pesticides, an untreated 300-foot buffer strip from each side of surface water, wetlands, or riparian areas will be left to minimize the risk of a pesticide entering surface or subsurface waters or affecting riparian areas, wetlands, and other non-target areas.

## Land Use

- Range improvements (e.g., fences, water developments, corrals, cattle guards) would be identified and protected from any damage associated with project activities.
- Proper signage would be posted in affected areas prior to and during construction if temporary road closures or restricted access were anticipated.
- In the event of property damage caused by construction and operations activities, Garkane and/or the agency would quickly investigate and reasonably attempt to settle with the party who incurred property damages.

## **Additional Construction and Operations Standards (as required by BRCA)**

The following construction and operations standards would be in addition to those listed above and would be implemented during construction, operation, and maintenance activities in BRCA for Alternative B.

## General

- If a reclamation bond is posted, holes within BRCA would be dug primarily by a mini-excavator that would be flown to within 50 feet of the hole location. Hand tools (e.g., hand auger, shovels, picks) may also be used. As noted below, all equipment would be transported in by helicopter or foot. Use of generators and gasoline-powered hand augers would be allowed. Precautions to prevent gasoline spills, such as a tray to hold equipment, must be implemented.
- In BRCA, wheelbarrow use is only allowed at pole locations to transport soil within a 100-foot radius. Any visible tracks must be raked out.
- The Park Superintendent must approve the use of explosives to excavate holes within BRCA. The Superintendent must be notified at least three days before explosives use is planned.
- Collection of plants, rocks, fossils, wildlife, artifacts, or any items or materials from BRCA is prohibited.
- If the 69 kV transmission line is de-energized and removed from BRCA, the guy wires would be removed, the poles would be “flush cut” at or slightly below ground level, the portion of the pole remaining in the ground would be covered with soil, and the area where the pole was removed would be re-vegetated. Poles would be removed by helicopter.
- Garkane would provide BRCA with informational material (project overview and activities) for distribution to the public during periods of project construction.

## Access

- *Limited access areas* would also include all of BRCA.
- No road building would occur within BRCA.
- Construction access would be allowed for the rim pole on the west boundary of BRCA.

## Helicopter Use

- All equipment used in BRCA would be transported by helicopter or foot.
- Helicopter use within BRCA must follow the terms and conditions stipulated in the existing Right-of-Way Permit (RW 1330-05-001) for the approved transmission lines.
- When work is conducted within BRCA, Garkane would notify the Chief Ranger at the beginning of each week regarding the work plan for the week and approximate number of overflights expected.

- Helicopter flights over trails and heavily used areas within BRCA would be limited to the right-of-way. Flights over the Mossy Cave Trail would be limited to the extent practicable. Garkane would provide public notice of proposed times and places in local newspapers or other media outlets.
- A “Letter of Authorization to Use Bryce Canyon Radio Frequencies” would be required prior to helicopter use in BRCA.

### **Additional Resource Protection Measures**

The following resource protection measures would be in addition to those listed above and would be implemented during construction, operation, and maintenance activities for Alternative B as specified below.

#### Soils/Vegetation

- All trees cut within BRCA would be left on the ground. Stumps would be “flush cut” as close to ground as possible.
- Herbicide would not be used within BRCA.

#### Wildlife

- A pre-construction raptor/nesting bird survey would be required within BRCA.

## **Appendix B**

### **General Project Acreage Tables**

**Project Area Calculations (Acres)**

Alt Segment	Acres						
	Private	State	BLM	GSENM	USFS	NPS	TOTAL
A-1	21.19	41.48		50.58	153.14		266.39
A-2					26.65		26.65
A-3	13.93	14.4	51.45		61		140.78
<b>A TOTAL</b>	<b>35.12</b>	<b>55.88</b>	<b>51.45</b>	<b>50.58</b>	<b>240.79</b>	<b>0</b>	<b>433.82</b>
B Removal	27.44	3.94	8.37		9.89		49.64
<b>A TOTAL + B Removal</b>	<b>62.56</b>	<b>59.82</b>	<b>59.82</b>	<b>50.58</b>	<b>250.68</b>	<b>0</b>	<b>483.46</b>
B	146.04	45.84	115.61	0	76.33	34.44	418.26
C-1	118.44	14.63		50.58	92.86		276.51
C-2					38.71		38.71
C-3	4.97	14.4	53.71		78.5		151.58
<b>C TOTAL</b>	<b>123.41</b>	<b>29.03</b>	<b>53.71</b>	<b>50.58</b>	<b>210.07</b>	<b>0</b>	<b>466.80</b>
B Removal	6.35	3.94	8.37		9.89		28.55
<b>C TOTAL + B Removal</b>	<b>129.76</b>	<b>32.97</b>	<b>62.08</b>	<b>50.58</b>	<b>219.96</b>	<b>0</b>	<b>495.35</b>
E-W					48.65		48.65
N-S					27.24		27.24

**Total Long-Term Disturbance\* Area (Acres)**

Alternative	Long-Term Disturbance (Acres)						
	Private	State	BLM	GSENM	USFS	NPS	Total
A-1	5.31	5.01	0.00	6.74	17.72	0.00	34.78
A-2	0.00	0.00	0.00	0.00	2.87	0.00	2.87
A-3	2.67	1.68	5.23	0.00	5.88	0.00	15.47
<b>A Total</b>	<b>7.97</b>	<b>6.70</b>	<b>5.23</b>	<b>6.74</b>	<b>26.47</b>	<b>0.00</b>	<b>53.12</b>
<b>B (Bryce 1 Substation on USFS land)</b>	<b>19.36</b>	<b>5.74</b>	<b>13.12</b>	<b>0.00</b>	<b>6.59</b>	<b>1.04</b>	<b>45.85</b>
<b>B (Bryce 2 Substation on Private land)</b>	<b>21.30</b>	<b>(same)</b>	<b>(same)</b>	<b>(same)</b>	<b>4.52</b>	<b>(same)</b>	<b>45.62</b>
C-1	13.97	1.58	0.00	6.74	9.12	0.00	31.41
C-2	0.00	0.00	0.00	0.00	3.92	0.00	3.92
C-3	2.22	1.68	5.42	0.00	7.00	0.00	16.33
<b>C Total</b>	<b>16.19</b>	<b>3.26</b>	<b>5.42</b>	<b>6.74</b>	<b>20.04</b>	<b>0.00</b>	<b>51.66</b>
North-South Interconnect	0.00	0.00	0.00	0.00	2.91	0.00	2.91
East-West Interconnect	0.00	0.00	0.00	0.00	5.85	0.00	5.85

Alternative	Long-Term Disturbance (Acres)						
	Private	State	BLM	GSENM	USFS	NPS	Total
<b>Interconnect Total</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>8.76</b>	<b>0.00</b>	<b>8.76</b>

\*Includes permanent disturbance associated with power poles (estimated), substations, substation access roads, existing access road upgrades, and 10-foot wide centerline access roads.

**Total Short-Term Disturbance Area by Alternative Segments and Land Ownership\***

Alternative	Temporary Disturbance (Acres)						
	Private	State	BLM	GSENM	USFS	NPS	Total
A-1	8.76	18.14	0.00	23.27	70.55	0.00	120.72
A-2	0.00	0.00	0.00	0.00	14.21	0.00	14.21
A-3	9.19	6.96	28.14	0.00	23.08	0.00	67.37
<b>A Total</b>	<b>17.94</b>	<b>25.10</b>	<b>28.14</b>	<b>23.27</b>	<b>107.84</b>	<b>0.00</b>	<b>202.29</b>
<b>B</b>	<b>75.38</b>	<b>20.19</b>	<b>54.08</b>	<b>0.00</b>	<b>18.48</b>	<b>0.78</b>	<b>168.91</b>
C-1	68.72	7.23	0.00	23.27	48.30	0.00	147.52
C-2	0.00	0.00	0.00	0.00	21.69	0.00	21.69
C-3	1.74	6.95	29.34	0.00	36.19	0.00	74.22
<b>C Total</b>	<b>70.47</b>	<b>14.18</b>	<b>29.34</b>	<b>23.27</b>	<b>106.18</b>	<b>0.00</b>	<b>243.44</b>
North-South Interconnect	0.00	0.00	0.00	0.00	13.78	0.00	13.78
East-West Interconnect	0.00	0.00	0.00	0.00	24.97	0.00	24.97
<b>Interconnect Total</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>38.75</b>	<b>0.00</b>	<b>38.75</b>

\*Includes temporary disturbance associated with pulling sites, laydown areas, and power pole (H-structure) installation. Some overlap between disturbance areas exists because a single area could be used for multiple alternatives. "Limited Access" areas not analyzed for temporary disturbance associated with pole installation.

## **Appendix C**

### **Existing Condition Vegetation Acreage Tables**

## Alternative A – Existing Conditions

### Segment A-1

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass				0.24	1.02		1.26
Mixed Conifer							0
Other							0
PJ				1.71	26.64		28.35
Ponderosa pine	0.47	1.14			40.48		42.09
Rock/dune		5.61		0.16	9.83		15.6
Sage	20.72	23.18		34.27	74.37		152.54
Shrub/scrub		11.54		14.18			25.72
Spruce fir							0
Wetland/Riparian					0.73		0.73
<b>Total</b>							<b>266.29</b>

### Segment A-2

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass							0
Mixed Conifer							0
Other							0
PJ					0.65		0.65
Ponderosa pine					17.42		17.42
Rock/dune							0
Sage					8.36		8.36
Shrub/scrub							0
Spruce fir							0
Wetland/Riparian							0
<b>Total</b>							<b>26.43</b>

### Segment A-3

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass							0
Mixed Conifer							0
Other	1.02		2.95				3.97
PJ	1.37	0.38	4.95		22.31		29.01
Ponderosa pine					29.57		29.57
Rock/dune					4.45		4.45
Sage	11.53	14.01	43.53		2.34		71.41
Shrub/scrub					1.25		1.25

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Spruce fir					1.05		1.05
Wetland/Riparian							0
<b>Total</b>							<b>140.71</b>

#### Alternative A – 69 kV Line Removal

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass							0
Mixed Conifer							0
Other	1.83				0.05		1.88
PJ			4.69				4.69
Ponderosa pine	9.7				3.87		13.57
Rock/dune	0.68						0.68
Sage	15.18	3.94	3.67		3.54		26.33
Shrub/scrub							0
Spruce fir							0
Wetland/Riparian	0.03						0.03
<b>Total</b>							<b>47.18</b>

#### Alternative A Total

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL *
Grass				0.24	1.02		<b>1.26</b>
Mixed Conifer							<b>0</b>
Other	2.85		2.95		0.05		<b>5.85</b>
PJ	1.37	0.38	9.64	1.71	49.6		<b>62.7</b>
Ponderosa pine	10.17	1.14			91.34		<b>102.65</b>
Rock/dune	0.68	5.61		0.16	14.28		<b>20.73</b>
Sage	47.43	41.13	47.2	34.27	88.61		<b>258.64</b>
Shrub/scrub		11.54		14.18	1.25		<b>26.97</b>
Spruce fir					1.05		<b>1.05</b>
Wetland/Riparian	0.03				0.73		<b>0.76</b>
<b>Total</b>	<b>62.53</b>	<b>59.8</b>	<b>59.79</b>	<b>50.56</b>	<b>247.93</b>		<b>480.61</b>

\*Includes B Removal

#### Alternative B – Existing Conditions

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS*	TOTAL **
Grass	0.48					2.97	3.45
Mixed Conifer						1.41	1.41
Other	13.33		4.29		0.05	0.15	17.82
PJ	7.36	1.44	55.92	0	6.39	7.43	78.54



**Segment C-3**

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass					1.54		1.54
Mixed Conifer							0
Other	1.02		2.95				3.97
PJ	0.04	0.38	6.43		11.56		18.41
Ponderosa pine					41.93		41.93
Rock/dune					12.67		12.67
Sage	3.91	14.01	44.31		8.09		70.32
Shrub/scrub					1.15		1.15
Spruce fir					0.24		0.24
Wetland/Riparian					1.29		1.29
<b>Total</b>							<b>151.52</b>

**Alternative C – 69 kV Line Removal**

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass							
Mixed Conifer							
Other							
PJ			4.69				4.69
Ponderosa pine	1.41				3.5		4.91
Rock/dune							0
Sage	4.91	3.94	3.67		5.97		18.49
Shrub/scrub							0
Spruce fir							0
Wetland/Riparian	0.03						0.03
<b>Total</b>							<b>28.12</b>

**Alternative C Total**

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL
Grass				0.24	1.54		1.78
Mixed Conifer							0
Other	3.97		2.95		1.37		8.29
PJ	1.61	0.38	11.12	1.71	40.23		55.05
Ponderosa pine	22.12				86.57		108.69
Rock/dune	2.2			0.16	22.15		24.51
Sage	96.56	32.57	47.98	34.27	62.62		274.00
Shrub/scrub				14.18	1.15		15.33



## **Appendix D**

### **NatureServe Ecosystem Types and Characteristics Summaries**

The table below identifies the 41 vegetative cover types present within the area of analysis. The right column lists which of the 11 consolidated classes each were grouped into. The narratives below the table are NatureServe’s ecological system definitions for each cover type.

### Vegetative Cover Types

<b>TYPE</b>	<b>CONSOLIDATED CLASS</b>
Invasive Southwest Riparian Woodland and Shrubland	Altered or Disturbed Land Cover Types
Recently Burned	Altered or Disturbed Land Cover Types
Recently Chained Pinyon-Juniper Areas	Altered or Disturbed Land Cover Types
Recently Logged Areas	Altered or Disturbed Land Cover Types
Colorado Plateau Mixed Bedrock Canyon and Tableland	Barren Land Types
Inter-Mountain Basins Active and Stabilized Dune	Barren Land Types
Inter-Mountain Basins Shale Badland	Barren Land Types
Inter-Mountain Basins Volcanic Rock and Cinder Land	Barren Land Types
Rocky Mountain Alpine Bedrock and Scree	Barren Land Types
Rocky Mountain Cliff and Canyon	Barren Land Types
Rocky Mountain Aspen Forest and Woodland	Deciduous Forest Types
Agriculture	Developed and Agriculture Cover Types
Developed, Medium — High Intensity	Developed and Agriculture Cover Types
Developed, Open Space — Low Intensity	Developed and Agriculture Cover Types
Rocky Mountain Alpine-Montane Wet Meadow	Emergent Herbaceous Wetland Types
Colorado Plateau Pinyon-Juniper Woodland	Evergreen Forest Types
Great Basin Pinyon-Juniper Woodland	Evergreen Forest Types
Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland	Evergreen Forest Types
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	Evergreen Forest Types
Rocky Mountain Ponderosa Pine Woodland	Ponderosa
Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland	Evergreen Forest Types
Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland	Evergreen Forest Types
Inter-Mountain Basins Montane Sagebrush Steppe	Grassland/Herbaceous Types
Inter-Mountain Basins Semi-Desert Grassland	Grassland/Herbaceous Types
Inter-Mountain Basins Semi-Desert Shrub Steppe	Grassland/Herbaceous Types
Rocky Mountain Subalpine Mesic Meadow	Grassland/Herbaceous Types
Southern Rocky Mountain Montane-Subalpine Grassland	Grassland/Herbaceous Types
Inter-Mountain West Aspen-Mixed Conifer Forest and Woodland Complex	Mixed Forest Types
Colorado Plateau Blackbrush-Mormon-Tea Shrubland	Shrub/Scrub Types
Colorado Plateau Mixed Low Sagebrush Shrubland	Shrub/Scrub Types
Colorado Plateau Pinyon-Juniper Shrubland	Shrub/Scrub Types

TYPE	CONSOLIDATED CLASS
Inter-Mountain Basins Big Sagebrush Shrubland	Shrub/Scrub Types
Inter-Mountain Basins Mat Saltbush Shrubland	Shrub/Scrub Types
Inter-Mountain Basins Mixed Salt Desert Scrub	Shrub/Scrub Types
Inter-Mountain Basins Mountain Mahogany Woodland and Shrubland	Shrub/Scrub Types
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	Shrub/Scrub Types
Inter-Mountain Basins Greasewood Flat	Woody Wetland Types
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	Woody Wetland Types
Rocky Mountain Subalpine-Montane Riparian Shrubland	Woody Wetland Types

### Colorado Plateau Mixed Bedrock Canyon and Tableland

The distribution of this ecological system is centered on the Colorado Plateau where it is comprised of barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. Some eroding shale layers similar to Inter-Mountain Basins Shale Badland (CES304.789) may be interbedded between the harder rocks. The vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. Common species includes *Pinus edulis*, *Pinus ponderosa*, *Juniperus* spp., *Cercocarpus intricatus*, and other short-shrub and herbaceous species, utilizing moisture from cracks and pockets where soil accumulates.

### Inter-Mountain Basins Active and Stabilized Dune

This ecological system occurs in the Intermountain western U.S. on basins, valleys and plains. Often it is composed of a mosaic of migrating, bare dunes; anchored dunes with sparse to moderately dense vegetation (<10-30% canopy cover); and stabilized dunes. The system is defined by the presence of migrating dunes or, where the dunes are entirely anchored or stabilized, evidence that the substrate is eolian and not residual, that the vegetation is early- or mid-seral, and that the substrate is likely to become actively migrating again with disturbance or increased aridity. In the Colorado Plateau, there are many small active and partially vegetated dunes along some of the larger washes and playas (where sand is blown out of wash and forms dunes) and some larger dunes such as Coral Pink Dunes in southwestern Utah. Substrates are usually eolian sand, but small dunes composed of silt and clay downwind from playas in the Wyoming Basins (which usually support greasewood vegetation) also are included here. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand) and form patchy or open grasslands, shrublands or steppe, and occasionally woodlands. Vegetation varies and may be composed of *Achnatherum hymenoides*, *Artemisia filifolia*, *Artemisia tridentata* spp. *tridentata*, *Atriplex canescens*, *Ephedra* spp., *Chrysothamnus viscidiflorus*, *Coleogyne ramosissima*, *Ericameria nauseosa*, *Hesperostipa comata*, *Leymus flavescens*, *Muhlenbergia pungens*, *Psoralidium lanceolatum*, *Purshia tridentata*, *Redfieldia flexuosa*, *Sporobolus airoides*, *Sarcobatus vermiculatus*, *Tetradymia tetrameres*, or *Tiquilia* spp. Herbaceous species such as *Achnatherum hymenoides*, *Redfieldia flexuosa*, and *Psoralidium lanceolatum* are characteristic of early-seral vegetation through much of this system's range. Shrubs are commonly dominant on mid- to late-seral stands, and *Ericameria nauseosa* can be found at any stage.

### Inter-Mountain Basins Shale Badland

This widespread ecological system of the Intermountain western U.S. is composed of barren and sparsely vegetated substrates (<10% plant cover) typically derived from marine shales but also includes substrates derived from siltstones and mudstones (clay). In southern Wyoming, the shales are not marine in origin,

but often have bentonite, derived from volcanic ash deposition that occurred during several eruptions of the Yellowstone volcanic fields. Landforms are typically rounded hills and plains that form a rolling topography. The harsh soil properties and high rate of erosion and deposition are driving environmental variables supporting sparse dwarf-shrubs, e.g., *Atriplex corrugata*, *Atriplex gardneri*, *Artemisia pedatifida*, and herbaceous vegetation.

### **Inter-Mountain Basins Volcanic Rock and Cinder Land**

This ecological system occurs in the Intermountain western U.S. and is limited to barren and sparsely vegetated volcanic substrates (generally <10% plant cover) such as basalt lava (malpais), basalt dikes with associated colluvium, basalt cliff faces and uplifted "backbones," tuff, cinder cones or cinder fields. It may occur as large-patch, small-patch and linear (dikes) spatial patterns. Vegetation is variable and includes a variety of species depending on local environmental conditions, e.g., elevation, age, and type of substrate. At montane and foothill elevations scattered *Pinus ponderosa*, *Pinus flexilis*, or *Juniperus* spp. trees may be present. Shrubs such as *Ephedra* spp., *Atriplex canescens*, *Eriogonum corymbosum*, *Eriogonum ovalifolium*, and *Fallugia paradoxa* are often present on some lava flows and cinder fields. Species typical of sand dunes such as *Andropogon hallii* and *Artemisia filifolia* may be present on cinder substrates.

### **Rocky Mountain Alpine Bedrock and Scree**

This ecological system is restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, and west into the highest mountain ranges of the Great Basin. It is composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes, with nonvascular- (lichen) dominated communities. Exposure to desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. There can be sparse cover of forbs, grasses, lichens, and low shrubs.

### **Rocky Mountain Cliff, Canyon and Massive Bedrock**

This ecological system of barren and sparsely vegetated landscapes (generally <10% plant cover) is found from foothill to subalpine elevations on steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous (intrusives), sedimentary, and metamorphic bedrock types. It is located throughout the Rocky Mountains and northeastern Cascade Ranges in North America. Also included are unstable scree and talus slopes that typically occur below cliff faces. In general these are the dry sparsely vegetated places on a landscape. The biota on them reflect what is surrounding them, unless it is an extreme parent material. There may be small patches of dense vegetation, but it typically includes scattered trees and/or shrubs. Characteristic trees includes species from the surrounding landscape, such as *Pseudotsuga menziesii*, *Pinus ponderosa*, *Pinus flexilis*, *Populus tremuloides*, *Abies concolor*, *Abies lasiocarpa*, or *Pinus edulis* and *Juniperus* spp. at lower elevations. There may be scattered shrubs present, such as species of *Holodiscus*, *Ribes*, *Physocarpus*, *Rosa*, *Juniperus*, and *Jamesia americana*, *Mahonia repens*, *Rhus trilobata*, or *Amelanchier alnifolia*. Soil development is limited, as is herbaceous cover.

### **Rocky Mountain Aspen Forest and Woodland**

This widespread ecological system is more common in the southern and central Rocky Mountains but occurs in the montane and subalpine zones throughout much of the western U.S. and north into Canada. An eastern extension occurs along the Rocky Mountains foothill front and in mountain "islands" in Montana (Big Snowy and Highwood mountains), and the Black Hills of South Dakota. In California, this system is only found on the east side of the Sierra Nevada adjacent to the Great Basin. Large stands are found in the Inyo and White mountains, while small stands occur on the Modoc Plateau. Elevations generally range from 1,525 to 3,050 m (5,000-10,000 feet), but occurrences can be found at lower elevations in some regions. Distribution of this ecological system is primarily limited by adequate soil moisture required to meet its high evapotranspiration demand. Secondly, it is limited by the length of the growing season or low temperatures. These are upland forests and woodlands dominated by *Populus*

*tremuloides* without a significant conifer component (<25% relative tree cover). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids or forbs. In California, *Symphotrichum spathulatum* (= *Aster occidentalis*) is a common forb. Associated shrub species include *Symphoricarpos* spp., *Rubus parviflorus*, *Amelanchier alnifolia*, and *Arctostaphylos uva-ursi*. Occurrences of this system originate and are maintained by stand-replacing disturbances such as avalanches, crown fire, insect outbreak, disease and windthrow, or clearcutting by man or beaver, within the matrix of conifer forests. It differs from Northwestern Great Plains Aspen Forest and Parkland (CES303.681), which is limited to plains environments.

### **Rocky Mountain Alpine-Montane Wet Meadow**

These are high-elevation communities found throughout the Rocky Mountains and Intermountain regions, dominated by herbaceous species found on wetter sites with very low-velocity surface and subsurface flows. They range in elevation from montane to alpine (1,000-3,600 m). These types occur as large meadows in montane or subalpine valleys, as narrow strips bordering ponds, lakes, and streams, and along toeslope seeps. They are typically found on flat areas or gentle slopes, but may also occur on sub-irrigated sites with slopes up to 10%. In alpine regions, sites typically are small depressions located below late-melting snow patches or on snowbeds. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. This system often occurs as a mosaic of several plant associations, often dominated by graminoids, including *Calamagrostis stricta*, *Caltha leptosepala*, *Cardamine cordifolia*, *Carex illota*, *Carex microptera*, *Carex nigricans*, *Carex scopulorum*, *Carex utriculata*, *Carex vernacula*, *Deschampsia caespitosa*, *Eleocharis quinqueflora*, *Juncus drummondii*, *Phippsia algida*, *Rorippa alpina*, *Senecio triangularis*, *Trifolium parryi*, and *Trollius laxus*. Often alpine dwarf-shrublands, especially those dominated by *Salix*, are immediately adjacent to the wet meadows. Wet meadows are tightly associated with snowmelt and typically not subjected to high disturbance events such as flooding.

### **Colorado Plateau Pinyon-Juniper Woodland**

This ecological system occurs in dry mountains and foothills of the Colorado Plateau region including the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim, and east into the northwestern corner of New Mexico. It is typically found at lower elevations ranging from 1,500-2,440 m. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture, ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. *Pinus edulis* and/or *Juniperus osteosperma* dominate the tree canopy. In the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico, *Juniperus monosperma* and hybrids of *Juniperus* spp. may dominate or codominate the tree canopy. *Juniperus scopulorum* may codominate or replace *Juniperus osteosperma* at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include *Arctostaphylos patula*, *Artemisia tridentata*, *Cercocarpus intricatus*, *Cercocarpus montanus*, *Coleogyne ramosissima*, *Purshia stansburiana*, *Purshia tridentata*, *Quercus gambelii*, *Bouteloua gracilis*, *Pleuraphis jamesii*, *Pseudoroegneria spicata*, *Poa secunda*, or *Poa fendleriana*. This system occurs at higher elevations than Great Basin Pinyon-Juniper Woodland (CES304.773) and Colorado Plateau shrubland systems where sympatric.

### **Great Basin Pinyon-Juniper Woodland**

This ecological system occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada. It is typically found at lower elevations ranging from 1,600-2,600 m. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of

pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Woodlands dominated by a mix of *Pinus monophylla* and *Juniperus osteosperma*, pure or nearly pure occurrences of *Pinus monophylla*, or woodlands dominated solely by *Juniperus osteosperma* comprise this system. *Cercocarpus ledifolius* is a common associate. On the east slope of the Sierras in California, *Pinus jeffreyi* and *Juniperus occidentalis* var. *australis* may be components of these woodlands. Understory layers are variable. Associated species include shrubs such as *Arctostaphylos patula*, *Artemisia arbuscula*, *Artemisia nova*, *Artemisia tridentata*, *Cercocarpus ledifolius*, *Cercocarpus intricatus*, *Coleogyne ramosissima*, *Quercus gambelii*, *Quercus turbinella*, and bunch grasses *Hesperostipa comata*, *Festuca idahoensis*, *Pseudoroegneria spicata*, *Leymus cinereus* (= *Elymus cinereus*), and *Poa fendleriana*. This system occurs at lower elevations than Colorado Plateau Pinyon-Juniper Woodland (CES304.767) where sympatric.

### **Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland**

This is a highly variable ecological system of the montane zone of the Rocky Mountains. It occurs throughout the southern Rockies, north and west into Utah, Nevada, Wyoming, and Idaho. These are mixed-conifer forests occurring on all aspects at elevations ranging from 1,200 to 3,300 m. Rainfall averages less than 75 cm per year (40-60 cm), with summer "monsoons" during the growing season contributing substantial moisture. The composition and structure of the overstory are dependent upon the temperature and moisture relationships of the site and the successional status of the occurrence. *Pseudotsuga menziesii* and *Abies concolor* are most frequent, but *Pinus ponderosa* may be present to codominant. *Pinus flexilis* is common in Nevada. *Pseudotsuga menziesii* forests occupy drier sites, and *Pinus ponderosa* is a common codominant. *Abies concolor*-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and north- and east-facing slopes which burn somewhat infrequently. *Picea pungens* is most often found in cool, moist locations, often occurring as smaller patches within a matrix of other associations. As many as seven conifers can be found growing in the same occurrence, and there are a number of cold-deciduous shrub and graminoid species common, including *Arctostaphylos uva-ursi*, *Mahonia repens*, *Paxistima myrsinites*, *Symphoricarpos oreophilus*, *Jamesia americana*, *Quercus gambelii*, and *Festuca arizonica*. This system was undoubtedly characterized by a mixed-severity fire regime in its "natural condition," characterized by a high degree of variability in lethality and return interval.

### **Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland**

These are mixed conifer forests of the Rocky Mountains west into the ranges of the Great Basin, occurring predominantly in cool ravines and on north-facing slopes. Elevations range from 1,200 to 3,300 m. Occurrences of this system are found on cooler and more mesic sites than Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland (CES306.823). Such sites include lower and middle slopes of ravines, along stream terraces, moist, concave topographic positions and north- and east-facing slopes which burn somewhat infrequently. *Pseudotsuga menziesii* and *Abies concolor* are most common canopy dominants, but *Picea engelmannii*, *Picea pungens*, or *Pinus ponderosa* may be present. This system includes mixed conifer/*Populus tremuloides* stands. A number of cold-deciduous shrub species can occur, including *Acer glabrum*, *Acer grandidentatum*, *Alnus incana*, *Betula occidentalis*, *Cornus sericea*, *Jamesia americana*, *Physocarpus malvaceus*, *Robinia neomexicana*, *Vaccinium membranaceum*, and *Vaccinium myrtillus*. Herbaceous species include *Bromus ciliatus*, *Carex geyeri*, *Carex rossii*, *Carex siccata*, *Muhlenbergia virescens*, *Pseudoroegneria spicata*, *Erigeron eximius*, *Fragaria virginiana*, *Luzula parviflora*, *Osmorhiza berteroi*, *Packera cardamine*, *Thalictrum occidentale*, and *Thalictrum fendleri*. Naturally occurring fires are of variable return intervals and mostly light, erratic, and infrequent due to the cool, moist conditions.

### **Southern Rocky Mountain Ponderosa Pine Woodland**

This very widespread ecological system is most common throughout the cordillera of the Rocky Mountains, from the Greater Yellowstone region south. It is also found in the Colorado Plateau region,

west into scattered locations of the Great Basin. Its easternmost extent in Wyoming is in the Bighorn Mountains. These woodlands occur at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Elevations range from less than 1,900 m in northern Wyoming to 2,800 m in the New Mexico mountains. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. This ecological system generally occurs on soils derived from igneous, metamorphic, and sedimentary material, with characteristic features of good aeration and drainage, coarse textures, circumneutral to slightly acidic pH, an abundance of mineral material, rockiness, and periods of drought during the growing season. Northern Rocky Mountain Ponderosa Pine Woodland and Savanna (CES306.030) in the eastern Cascades, Okanogan, and northern Rockies regions receives winter and spring rains, and thus has a greater spring "green-up" than the drier woodlands in the central Rockies. *Pinus ponderosa* (primarily var. *scopulorum* and var. *brachyptera*) is the predominant conifer; *Pseudotsuga menziesii*, *Pinus edulis*, *Pinus contorta*, *Populus tremuloides*, and *Juniperus* spp. may be present in the tree canopy. The understory is usually shrubby, with *Artemisia nova*, *Artemisia tridentata*, *Arctostaphylos patula*, *Arctostaphylos uva-ursi*, *Cercocarpus montanus*, *Purshia stansburiana*, *Purshia tridentata*, *Quercus gambelii*, *Symphoricarpos* spp., *Prunus virginiana*, *Amelanchier alnifolia* (less so in Montana), and *Rosa* spp. common species. *Pseudoroegneria spicata*, *Pascopyrum smithii*, and species of *Hesperostipa*, *Achnatherum*, *Festuca*, *Muhlenbergia*, and *Bouteloua* are some of the common grasses. Mixed fire regimes and ground fires of variable return intervals maintain these woodlands, depending on climate, degree of soil development, and understory density.

### **Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland**

Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta, and south into New Mexico and the Intermountain region. They also occur on mountain "islands" of north-central Montana. They are the matrix forests of the subalpine zone, with elevations ranging from 1,275 m in its northern distribution to 3,355 m in the south (4,100-11,000 feet). They often represent the highest elevation forests in an area. Sites within this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late-lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches. Despite their wide distribution, the tree canopy characteristics are remarkably similar, with *Picea engelmannii* and *Abies lasiocarpa* dominating either mixed or alone. *Pseudotsuga menziesii* may persist in occurrences of this system for long periods without regeneration. *Pinus contorta* is common in many occurrences, and patches of pure *Pinus contorta* are not uncommon, as well as mixed conifer/*Populus tremuloides* stands. In some areas, such as Wyoming, *Picea engelmannii*-dominated forests are on limestone or dolomite, while nearby codominated spruce-fir forests are on granitic or volcanic rocks. Upper elevation examples may have more woodland physiognomy, and *Pinus albicaulis* can be a seral component. What have been called "ribbon forests" or "tree islands" by some authors are included here; they can be found at upper treeline in many areas of the Rockies, including the central and northern ranges in Colorado and the Medicine Bow and Bighorn ranges of Wyoming. These are more typically islands or ribbons of trees, sometimes with a krummholz form, with open-meadow areas in a mosaic. These patterns are controlled by snow deposition and wind-blown ice. Xeric species may include *Juniperus communis*, *Linnaea borealis*, *Mahonia repens*, or *Vaccinium scoparium*. In the Bighorn Mountains, *Artemisia tridentata* is a common shrub. More northern occurrences often have taller, more mesic shrub and herbaceous species, such as *Empetrum nigrum*, *Rhododendron albiflorum*, and *Vaccinium membranaceum*. Disturbance includes occasional blowdown, insect outbreaks, and stand-replacing fire. Mean return interval for stand-replacing fire is 222 years as estimated in southeastern British Columbia.

### **Inter-Mountain Basins Montane Sagebrush Steppe**

This ecological system includes sagebrush communities occurring at foothills (in Wyoming) to montane and subalpine elevations across the western U.S. from 1,000 m in eastern Oregon and Washington to over 3,000 m in the southern Rockies. In Montana, it occurs on mountain "islands" in the north-central portion of the state and possibly along the Boulder River south of Absarokee and at higher elevations. In British Columbia, it occurs between 450 and 1,650 m in the southern Fraser Plateau and the Thompson and Okanagan basins. Climate is cool, semi-arid to subhumid. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general, this system shows an affinity for mild topography, fine soils, some source of subsurface moisture or more mesic sites, zones of higher precipitation and areas of snow accumulation. Across its range of distribution, this is a compositionally diverse system. It is composed primarily of *Artemisia tridentata* ssp. *vaseyana*, *Artemisia cana* ssp. *viscidula*, and related taxa such as *Artemisia tridentata* ssp. *spiciformis* (= *Artemisia spiciformis*). *Purshia tridentata* may codominate or even dominate some stands. *Artemisia arbuscula* ssp. *arbuscula*-dominated shrublands commonly occur within this system on rocky or windblown sites. Other common shrubs include *Symphoricarpos* spp., *Amelanchier* spp., *Ericameria nauseosa*, *Peraphyllum ramosissimum*, *Ribes cereum*, and *Chrysothamnus viscidiflorus*. *Artemisia tridentata* ssp. *wyomingensis* may be present to codominant if the stand is clearly montane as indicated by montane indicator species such as *Festuca idahoensis*, *Leucopoa kingii*, or *Danthonia intermedia*. Most stands have an abundant perennial herbaceous layer (over 25% cover, in many cases over 50% cover), but this system also includes *Artemisia tridentata* ssp. *vaseyana* shrublands. Common graminoids include *Danthonia intermedia*, *Festuca arizonica*, *Festuca idahoensis*, *Hesperostipa comata*, *Poa fendleriana*, *Elymus trachycaulus*, *Bromus carinatus*, *Poa secunda*, *Leucopoa kingii*, *Deschampsia caespitosa*, *Calamagrostis rubescens*, and *Pseudoroegneria spicata*. Species of *Achnatherum* are common, including *Achnatherum nelsonii* ssp. *dorei*, *Achnatherum nelsonii* ssp. *nelsonii*, *Achnatherum hymenoides*, and others. In many areas, wildfires can maintain an open herbaceous-rich steppe condition, although at most sites, shrub cover can be unusually high for a steppe system (>40%), with the moisture providing equally high grass and forb cover.

### **Inter-Mountain Basins Semi-Desert Grassland**

This widespread ecological system includes the driest grasslands throughout the Intermountain western U.S. It occurs on xeric sites over an elevation range of approximately 1450 to 2,320 m (4,750-7,610 feet) on a variety of landforms, including swales, playas, mesas, alluvial flats, and plains. This system may constitute the matrix over large areas of intermountain basins, and also may occur as large patches in mosaics with shrubland systems dominated by *Artemisia tridentata* ssp. *tridentata*, *Artemisia tridentata* ssp. *wyomingensis*, *Atriplex* spp., *Coleogyne* spp., *Ephedra* spp., *Gutierrezia sarothrae*, or *Krascheninnikovia lanata*. Grasslands in areas of higher precipitation, at higher elevation, typically belong to other systems. Substrates are often well-drained sandy or loam soils derived from sedimentary parent materials but are quite variable and may include fine-textured soils derived from igneous and metamorphic rocks. The dominant perennial bunch grasses and shrubs within this system are all drought-resistant plants. Dominant or codominant species are *Achnatherum hymenoides*, *Aristida* spp., *Bouteloua gracilis*, *Hesperostipa comata*, *Muhlenbergia* spp., or *Pleuraphis jamesii*. Scattered shrubs and dwarf-shrubs often are present, especially *Artemisia tridentata* ssp. *tridentata*, *Artemisia tridentata* ssp. *wyomingensis*, *Atriplex* spp., *Coleogyne* spp., *Ephedra* spp., *Gutierrezia sarothrae*, and *Krascheninnikovia lanata*. Grasslands in the basins of south-central and southwestern Wyoming, dominated by *Pseudoroegneria spicata* and *Poa secunda* and containing cushion-form forbs and other species typical of dry basins, are included in this system.

### **Rocky Mountain Subalpine-Montane Mesic Meadow**

This Rocky Mountain ecological system is restricted to sites from lower montane to subalpine where finely textured soils, snow deposition, or windswept dry conditions limit tree establishment. Many

occurrences are small patch in spatial character, and are often found in mosaics with woodlands, more dense shrublands, or just below alpine communities. It is typically found above 2,000 m in elevation in the southern part of its range and above 600 m in the northern part. These upland communities occur on gentle to moderate-gradient slopes and relatively moist habitats. The soils are typically seasonally moist to saturated in the spring, but if so will dry out later in the growing season. These sites are not as wet as those found in Rocky Mountain Alpine-Montane Wet Meadow (CES306.812). Vegetation is typically forb-rich, with forbs often contributing more to overall herbaceous cover than graminoids. Some stands are comprised of dense grasslands, these often being taxa with relatively broad and soft blades, but where the moist habitat promotes a rich forb component. Important taxa include *Erigeron* spp., Asteraceae spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Thalictrum occidentale*, *Valeriana sitchensis*, *Rudbeckia occidentalis*, *Balsamorhiza sagittata*, and *Wyethia* spp. Important grasses include *Deschampsia caespitosa*, *Koeleria macrantha*, perennial *Bromus* spp., and a number of *Carex* species. *Dasiphora fruticosa* ssp. *floribunda* and *Symphoricarpos* spp. are occasional but not abundant. Burrowing mammals can increase the forb diversity.

### **Southern Rocky Mountain Montane-Subalpine Grassland**

This Rocky Mountain ecological system typically occurs between 2,200 and 3,000 m elevation on flat to rolling plains and parks or on lower sideslopes that are dry, but it may extend up to 3,350 m on warm aspects. Soils resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acidic, and usually well-drained. An occurrence usually consists of a mosaic of two or three plant associations with one of the following dominant bunch grasses: *Danthonia intermedia*, *Danthonia parryi*, *Festuca idahoensis*, *Festuca arizonica*, *Festuca thurberi*, *Muhlenbergia filiculmis*, or *Pseudoroegneria spicata*. The subdominants include *Muhlenbergia montana*, *Bouteloua gracilis*, and *Poa secunda*. These large-patch grasslands are intermixed with matrix stands of spruce-fir, lodgepole pine, ponderosa pine, and aspen forests. In limited circumstances (e.g., South Park in Colorado), they form the "matrix" of high-elevation plateaus. Small-patch representations of this system do occur at high elevations of the Trans-Pecos where they present as occurrences of *Festuca arizonica* - *Blepharoneuron tricholepis* Herbaceous Vegetation (CEGL004508). These occurrences often occupy sites adjacent to Madrean Oriental Chaparral (CES302.031).

### **Colorado Plateau Blackbrush-Mormon-tea Shrubland**

This ecological system occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments, or bajadas. Elevation ranges from 560-1,650 m. Substrates are shallow, typically calcareous, non-saline, and gravelly or sandy soils over sandstone or limestone bedrock, caliche, or limestone alluvium. It also occurs in deeper soils on sandy plains where it may have invaded desert grasslands. The vegetation is characterized by extensive open shrublands dominated by *Coleogyne ramosissima* often with *Ephedra viridis*, *Ephedra torreyana*, or *Grayia spinosa*. Sandy portions may include *Artemisia filifolia* as codominant. The herbaceous layer is sparse and composed of graminoids such as *Achnatherum hymenoides*, *Pleuraphis jamesii*, or *Sporobolus cryptandrus*.

### **Colorado Plateau Mixed Low Sagebrush Shrubland**

This ecological system occurs in the Colorado Plateau, Tavaputs Plateau, and Uinta Basin in canyons, gravelly draws, hilltops, and dry flats at elevations generally below 1,800 m. Soils are often rocky, shallow, and alkaline. This type extends across northern New Mexico into the southern Great Plains on limestone hills. It includes open shrublands and steppe dominated by *Artemisia nova* or *Artemisia bigelovii* sometimes with *Artemisia tridentata* ssp. *wyomingensis* codominant. Semi-arid grasses such as *Achnatherum hymenoides*, *Aristida purpurea*, *Bouteloua gracilis*, *Hesperostipa comata*, *Pleuraphis jamesii*, or *Poa fendleriana* are often present and may form a graminoid layer with over 25% cover.

### **Colorado Plateau Pinyon-Juniper Shrubland**

This ecological system is characteristic of the rocky mesatops and slopes on the Colorado Plateau and western slope of Colorado, but these stunted tree shrublands may extend further upslope along the low-elevation margins of taller pinyon-juniper woodlands. Sites are drier than Colorado Plateau Pinyon-Juniper Woodland (CES304.767). Substrates are shallow/rocky and shaly soils at lower elevations (1,200-2,000 m). Sparse examples of the system grade into Colorado Plateau Mixed Bedrock Canyon and Tableland (CES304.765). The vegetation is dominated by dwarfed (usually <3 m tall) *Pinus edulis* and/or *Juniperus osteosperma* trees forming extensive tall shrublands in the region along low-elevation margins of pinyon-juniper woodlands. Other shrubs, if present, may include *Artemisia nova*, *Artemisia tridentata* ssp. *wyomingensis*, *Chrysothamnus viscidiflorus*, or *Coleogyne ramosissima*. Herbaceous layers are sparse to moderately dense and typically composed of xeric graminoids.

### **Inter-Mountain Basins Big Sagebrush Shrubland**

This ecological system occurs throughout much of the western U.S., typically in broad basins between mountain ranges, plains and foothills between 1,500 and 2,300 m elevation. Soils are typically deep, well-drained, and non-saline. These shrublands are dominated by *Artemisia tridentata* ssp. *tridentata* (not as common in Wyoming or Montana but possibly on stabilized part of Killpecker Dunes in Wyoming) and/or *Artemisia tridentata* ssp. *wyomingensis* (predominant in Wyoming and Montana). Scattered *Juniperus* spp., *Sarcobatus vermiculatus*, and *Atriplex* spp. may be present in some stands. *Ericameria nauseosa*, *Chrysothamnus viscidiflorus*, *Purshia tridentata* (not commonly in Montana or Wyoming), or *Symphoricarpos oreophilus* may codominate disturbed stands (e.g., in burned stands, these may become more predominant). Perennial herbaceous components typically contribute less than 25% vegetative cover. Common graminoid species can include *Achnatherum hymenoides*, *Bouteloua gracilis*, *Elymus lanceolatus*, *Festuca idahoensis* (not in Montana or Wyoming), *Hesperostipa comata*, *Leymus cinereus*, *Pleuraphis jamesii* (not present in northeastern portions of the range), *Pascopyrum smithii*, *Poa secunda*, or *Pseudoroegneria spicata* (not in Wyoming). Some semi-natural communities are included that often originate on abandoned agricultural land or on other disturbed sites. In these locations, *Bromus tectorum* or other annual bromes and invasive weeds can be abundant. Most *Artemisia tridentata* ssp. *wyomingensis* communities in Wyoming are placed in Inter-Mountain Basins Big Sagebrush Steppe (CES304.778); the shrubland system is more restricted in environmental setting than the steppe. Dunes in the Red Desert have areas of large basin big sage with very dense canopies. In Wyoming, this system is likely to only contain *Artemisia tridentata* ssp. *tridentata*.

### **Inter-Mountain Basins Mat Saltbush Shrubland**

This ecological system occurs on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin on Mancos shale and arid, windswept basins and plains across parts of Wyoming. It is also found in eastern Wyoming in Great Plains areas, and may extend north into Montana and Canada. Substrates are shallow, typically saline, alkaline, fine-textured soils developed from shale or alluvium and may be associated with shale badlands. Infiltration rate is typically low. These landscapes typically support dwarf-shrublands composed of relatively pure stands of *Atriplex* spp., such as *Atriplex corrugata* (in Colorado and Utah) or *Atriplex gardneri* (Wyoming and Montana into Canada). Other dominant or codominant dwarf-shrubs may include *Artemisia longifolia*, *Artemisia pedatifida* (very important in Wyoming, rare in Colorado stands), or *Picrothamnus desertorum*, sometimes with a mix of other low shrubs, such as *Krascheninnikovia lanata* or *Tetradymia spinosa*. *Atriplex confertifolia* or *Atriplex canescens* may be present but do not codominate. *Artemisia tridentata* ssp. *wyomingensis* can occur in patches within this system. The herbaceous layer is typically sparse. Scattered perennial forbs occur, such as *Xylorhiza glabriuscula* and *Sphaeralcea grossulariifolia*; perennial grasses *Achnatherum hymenoides*, *Bouteloua gracilis* (not in Wyoming), *Elymus elymoides*, *Elymus lanceolatus* ssp. *lanceolatus*, *Pascopyrum smithii*, *Poa secunda*, or *Sporobolus airoides* may dominate the herbaceous layer. In less saline areas, there may be inclusions of grasslands dominated by *Hesperostipa comata*, *Leymus salinus*,

*Pascopyrum smithii*, or *Pseudoroegneria spicata*. In Wyoming and possibly elsewhere, inclusions of non-saline, gravelly barrens or rock outcrops dominated by cushion plants such as *Arenaria hookeri* and *Phlox hoodii* without dwarf-shrubs may be present (these are not restricted to this system). Annuals are seasonally present and may include *Eriogonum inflatum*, *Plantago tweedyi*, *Monolepis nuttalliana*, and the introduced annual grass *Bromus tectorum*. In Montana, *Atriplex gardneri* also occurs associated with badlands, and determining which system it falls into may be difficult.

### **Inter-Mountain Basins Mixed Salt Desert Scrub**

This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes and plains across the Intermountain western U.S. This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more *Atriplex* species, such as *Atriplex confertifolia*, *Atriplex canescens*, *Atriplex polycarpa*, or *Atriplex spinifera*. *Grayia spinosa* tends to occur on coppice dunes that may have a silty component to them. Northern occurrences lack *Atriplex* species and are typically dominated by *Grayia spinosa*, *Krascheninnikovia lanata*, and/or *Artemisia tridentata*. Other shrubs present to codominant may include *Artemisia tridentata* ssp. *wyomingensis*, *Chrysothamnus viscidiflorus*, *Ericameria nauseosa*, *Ephedra nevadensis*, *Grayia spinosa*, *Krascheninnikovia lanata*, *Lycium* spp., *Picrothamnus desertorum*, or *Tetradymia* spp. In Wyoming, occurrences are typically a mix of *Atriplex confertifolia*, *Grayia spinosa*, *Artemisia tridentata* ssp. *wyomingensis*, *Sarcobatus vermiculatus*, *Krascheninnikovia lanata*, and various *Ericameria* or *Chrysothamnus* species. Some places are a mix of *Atriplex confertifolia* and *Artemisia tridentata* ssp. *wyomingensis*. In the Great Basin, *Sarcobatus vermiculatus* is generally absent but, if present, does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as *Achnatherum hymenoides*, *Bouteloua gracilis*, *Elymus lanceolatus* ssp. *lanceolatus*, *Pascopyrum smithii*, *Pleuraphis jamesii*, *Pleuraphis rigida*, *Poa secunda*, or *Sporobolus airoides*. Various forbs are also present.

### **Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland**

This ecological system occurs in hills and mountain ranges of the Intermountain West basins from the eastern foothills of the Sierra Nevada northeast to the foothills of the Bighorn Mountains. It typically occurs from 600 m to over 2,650 m in elevation on rocky outcrops or escarpments and forms small- to large-patch stands in forested areas. Most stands occur as shrublands on ridges and steep rimrock slopes, but they may be composed of small trees in steppe areas. Scattered junipers or pines may also occur. This system includes both woodlands and shrublands dominated by *Cercocarpus ledifolius*. *Artemisia tridentata* ssp. *vaseyana*, *Purshia tridentata*, with species of *Arctostaphylos*, *Ribes*, or *Symphoricarpos* are often present. Undergrowth is often very sparse and dominated by bunch grasses, usually *Pseudoroegneria spicata* and *Festuca idahoensis*. *Cercocarpus ledifolius* is a slow-growing, drought-tolerant species that generally does not resprout after burning and needs the protection from fire that rocky sites provide.

### **Rocky Mountain Gambel Oak-Mixed Montane**

This ecological system occurs in the mountains, plateaus, and foothills of the southern Rocky Mountains and Colorado Plateau, including the Uinta and Wasatch ranges and the Mogollon Rim. These shrublands are most commonly found along dry foothills, lower mountain slopes, and at the edge of the western Great Plains from approximately 2,000 to 2,900 m in elevation, and are often situated above pinyon-juniper woodlands. Substrates are variable and include soil types ranging from calcareous, heavy, fine-grained loams to sandy loams, gravelly loams, clay loams, deep alluvial sand, or coarse gravel. The vegetation is typically dominated by *Quercus gambelii* alone or codominant with *Amelanchier alnifolia*, *Amelanchier utahensis*, *Artemisia tridentata*, *Cercocarpus montanus*, *Prunus virginiana*, *Purshia stansburiana*, *Purshia tridentata*, *Robinia neomexicana*, *Symphoricarpos oreophilus*, or *Symphoricarpos rotundifolius*. There may be inclusions of other mesic montane shrublands with *Quercus gambelii* absent

or as a relatively minor component. This ecological system intergrades with the lower montane-foothills shrubland system and shares many of the same site characteristics. Density and cover of *Quercus gambelii* and *Amelanchier* spp. often increase after fire.

### **Inter-Mountain Basins Greasewood Flat**

This ecological system occurs throughout much of the western U.S. in Intermountain basins and extends onto the western Great Plains and into central Montana. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*. Other shrubs that may be present to codominant in some occurrences include *Atriplex canescens*, *Atriplex confertifolia*, *Atriplex gardneri*, *Artemisia tridentata* ssp. *wyomingensis*, *Artemisia tridentata* ssp. *tridentata*, *Artemisia cana* ssp. *cana*, or *Krascheninnikovia lanata*. Occurrences are often surrounded by mixed salt desert scrub or big sagebrush shrublands. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of *Sporobolus airoides*, *Pascopyrum smithii*, *Distichlis spicata* (where water remains ponded the longest), *Calamovilfa longifolia*, *Poa pratensis*, *Puccinellia nuttalliana*, or *Eleocharis palustris* herbaceous types.

### **Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland**

This ecological system of the northern Rocky Mountains and the east slopes of the Cascades consists of deciduous, coniferous, and mixed conifer-deciduous forests that occur on streambanks and river floodplains of the lower montane and foothill zones. Riparian forest stands are maintained by annual flooding and hydric soils throughout the growing season. Riparian forests are often accompanied by riparian shrublands or open areas dominated by wet meadows. *Populus balsamifera* is the key indicator species. Several other tree species can be mixed in the canopy, including *Populus tremuloides*, *Betula papyrifera*, *Betula occidentalis*, *Picea mariana*, and *Picea glauca*. *Abies grandis*, *Thuja plicata*, and *Tsuga heterophylla* are commonly dominant canopy species in western Montana and northern Idaho occurrences, in lower montane riparian zones. Shrub understory components include *Cornus sericea*, *Acer glabrum*, *Alnus incana*, *Betula papyrifera*, *Oplopanax horridus*, and *Symphoricarpos albus*. Ferns and forbs of mesic sites are commonly present in many occurrences, including such species as *Athyrium filix-femina*, *Gymnocarpium dryopteris*, and *Senecio triangularis*.

### **Rocky Mountain Subalpine-Montane Riparian Shrubland**

This system is found throughout the Rocky Mountain cordillera from New Mexico north into Montana, and also occurs in mountainous areas of the Intermountain region and Colorado Plateau. These are montane to subalpine riparian shrublands occurring as narrow bands of shrubs lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Generally it is found at higher elevations, but can be found anywhere from 1,700-3,475 m. Occurrences can also be found around seeps, fens, and isolated springs on hillslopes away from valley bottoms. Many of the plant associations found within this system are associated with beaver activity. This system often occurs as a mosaic of multiple communities that are shrub- and herb-dominated and includes above-treeline, willow-dominated, snowmelt-fed basins that feed into streams. The dominant shrubs reflect the large elevational gradient and include *Alnus incana*, *Betula nana*, *Betula occidentalis*, *Cornus sericea*, *Salix bebbiana*, *Salix boothii*, *Salix brachycarpa*, *Salix drummondiana*, *Salix eriocephala*, *Salix geyeriana*, *Salix monticola*, *Salix planifolia*, and *Salix wolfii*.

## **Appendix E**

### **Vegetation Disturbance Acreage Tables**

### Alternative A – Disturbance Calculations

### Alternative A – Pole Placement Calculations

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL ACRES	% OF ROW	LENGTH (MILES)	SHORT TERM DIST (AC)	LONG-TERM DIST (AC)
Grass				0.24	0.9		1.14	0.31%	0.08	0.35	0.03
Mixed Conifer							0	0.00%	0.00	0.00	0.00
Other	0.04						0.04	0.01%	0.00	0.01	0.00
PJ	0.22	0.38	4.57	1.71	43.18		50.06	13.59%	3.65	15.45	1.35
Ponderosa pine	0.47	1.06			77.64		79.17	21.49%	5.78	24.44	2.14
Rock/dune		3.88		0.16	11.57		15.61	4.24%	1.14	4.82	0.42
Sage	22.62	34.41	34.66	29.96	73.61		195.26	53.01%	14.25	60.27	5.27
Shrub/scrub		11.54		12.49	1.25		25.28	6.86%	1.84	7.80	0.68
Spruce fir					1.05		1.05	0.29%	0.08	0.32	0.03
Wetland/riparian					0.73		0.73	0.20%	0.05	0.23	0.02
<b>Totals</b>							<b>368.34</b>	<b>100.00%</b>	<b>26.88</b>	<b>113.70</b>	<b>9.95</b>

### Alternative A – Short-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST	PLUS REMOVAL	TOTAL S/T DIST
Grass	0.73	0.35	1.08		1.08
Mixed Conifer		0.00	0.00		0.00
Other	3.97	0.01	3.98	1.88	5.86
PJ	9.93	15.45	25.38	4.69	30.07
Ponderosa pine	11.76	24.44	36.20	13.57	49.77
Rock/dune	5.44	4.82	10.26	0.68	10.94
Sage	48.05	60.27	108.32	26.34	134.66
Shrub/scrub	2.23	7.80	10.03	0	10.03

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST	PLUS REMOVAL	TOTAL S/T DIST
Spruce fir		0.32	0.32	0	0.32
Wetland/riparian		0.23	0.23	0.03	0.26
<b>Totals</b>		<b>113.70</b>	<b>195.81</b>	<b>47.19</b>	<b>243.00</b>

\*GIS=laydown/staging areas

#### Alternative A – Long-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL LT DIST
Grass	0.12	0.03	0.15
Mixed Conifer		0.00	0.00
Other		0.00	0.00
PJ	4.7	1.35	6.05
Ponderosa pine	6.45	2.14	8.59
Rock/dune	1.33	0.42	1.75
Sage	25.02	5.27	30.29
Shrub/scrub	2.8	0.68	3.48
Spruce fir		0.03	0.03
Wetland/riparian	0.07	0.02	0.09
<b>Totals</b>	<b>40.49</b>	<b>9.95</b>	<b>50.44</b>

\*GIS=substations, centerline access, roads

## Alternative B – Disturbance Calculations

### Alternative B – Pole Placement Calculations

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS*	TOTAL ACRES	% OF ROW	LENGTH (MILES)	SHORT TERM DIST (AC)	LONG-TERM DIST (AC)
Grass	0.48					2.97	3.45	0.98%	0.22	0.15	0.08
Mixed Conifer						1.42	1.42	0.40%	0.09	0.00	0.03
Other	9.87		0.93			0.15	10.95	3.11%	0.71	3.26	0.26
PJ	6.24	1.44	49.32		6.39	7.23	70.62	20.04%	4.56	19.15	1.69
Ponderosa pine	5.39	0.18			24.29	11.77	41.63	11.81%	2.69	9.02	0.99
Rock/dune	1.71	0.01			21.1	9.11	31.93	9.06%	2.06	6.89	0.76
Sage	75.37	41.97	49.96		15.66	0.72	183.68	52.11%	11.86	55.28	4.39
Shrub/scrub	5.64					0.6	6.24	1.77%	0.40	1.70	0.15
Spruce fir							0	0.00%	0.00	0.00	0.00
Wetland/riparian	2.15		0.4				2.55	0.72%	0.16	0.77	0.06
<b>Totals</b>							<b>352.47</b>	<b>100.00%</b>	<b>22.75</b>	<b>96.23</b>	<b>8.42</b>

\* Includes BRCA Vegetation acres (not ReGAP). No double-counting of ReGAP and BRCA acres.

### Alternative B – Short-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST**
Grass	0.01	0.15	0.16
Mixed Conifer		0.00	0.00
Other	8.09	3.26	11.35
PJ	10.49	19.15	29.64
Ponderosa pine	13.59	9.02	22.61
Rock/dune	0.68	6.89	7.57
Sage	39.02	55.28	94.30

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST**
Shrub/scrub		1.70	1.70
Spruce fir		0.00	0.00
Wetland/riparian	0.03	0.77	0.80
<b>Totals</b>	<b>71.91</b>	<b>96.23</b>	<b>168.14</b>

\*GIS=laydown/staging areas

\*\*Includes 69 kV line removal.

#### Alternative B – Long-Term Disturbance

DESCRIPTION	OPTION B1			OPTION B2		
	GIS*	POLE PLACEMENT	TOTAL LT DIST**	GIS*	POLE PLACEMENT	TOTAL LT DIST**
Grass	0.05	0.08	0.13	0.05	0.08	0.13
Mixed Conifer		0.03	0.03	0	0.03	0.03
Other	1.09	0.26	1.35	1.28	0.26	1.54
PJ	6.02	1.69	7.71	6.02	1.69	7.71
Ponderosa pine	1.95	0.99	2.94	2.43	0.99	3.42
Rock/dune	0.17	0.76	0.93	0.17	0.76	0.93
Sage	25.05	4.39	29.44	23.31	4.39	27.70
Shrub/scrub	0.55	0.15	0.70	0.55	0.15	0.70
Spruce fir		0.00	0.00	0	0.00	0.00
Wetland/riparian	0.25	0.06	0.31	0.36	0.06	0.42
<b>Totals</b>	<b>35.13</b>	<b>8.42</b>	<b>43.55</b>	<b>34.17</b>	<b>8.42</b>	<b>42.59</b>

\*GIS=substations, centerline access, roads

\*\*Includes 69 kV line removal.

### Alternative C – Disturbance Calculations

### Alternative C – Pole Placement Calculations

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL ACRES	% OF ROW	LENGTH (MILES)	SHORT TERM DIST (AC)	LONG-TERM DIST (AC)
Grass				0.24	1.54		1.78	0.49%	0.14	0.58	0.05
Mixed Conifer							0	0.00%	0.00	0.00	0.00
Other	1.16				1.32		2.48	0.69%	0.19	0.81	0.07
PJ	1.06	0.38	5.95	1.71	34.48		43.58	12.06%	3.35	14.18	1.24
Ponderosa pine	12.09				68.4		80.49	22.27%	6.19	26.19	2.29
Rock/dune	0.61			0.16	16.71		17.48	4.84%	1.34	5.69	0.50
Sage	67.93	25.06	34.75	29.96	38.59		196.29	54.32%	15.10	63.88	5.59
Shrub/scrub				12.49	0.08		12.57	3.48%	0.97	4.09	0.36
Spruce fir					0.24		0.24	0.07%	0.02	0.08	0.01
Wetland/riparian	2.79				3.66		6.45	1.78%	0.50	2.10	0.18
<b>Totals</b>							<b>361.36</b>	<b>100.00%</b>	<b>27.80</b>	<b>117.59</b>	<b>10.29</b>

### Alternative C – Short-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST	PLUS REMOVAL	TOTAL S/T DIST
Grass		0.58	0.58		0.58
Mixed Conifer		0.00	0.00		0.00
Other	5.85	0.81	6.66		6.66
PJ	11.09	14.18	25.27	4.69	29.96
Ponderosa pine	27	26.19	53.19	4.91	58.10
Rock/dune	8.66	5.69	14.35		14.35
Sage	63.15	63.88	127.03	18.49	145.52
Shrub/scrub	3.43	4.09	7.52		7.52

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST	PLUS REMOVAL	TOTAL S/T DIST
Spruce fir		0.08	0.08		0.08
Wetland/riparian	0.46	2.10	2.56	0.03	2.59
<b>Totals</b>	<b>119.64</b>	<b>117.59</b>	<b>237.23</b>	<b>28.12</b>	<b>265.35</b>

\*GIS=laydown/staging areas

#### Alternative C – Long-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL LT DIST
Grass	0.2	0.05	0.25
Mixed Conifer		0.00	0.00
Other	0.24	0.07	0.31
PJ	4.06	1.24	5.30
Ponderosa pine	7.5	2.29	9.79
Rock/dune	1.22	0.50	1.72
Sage	25.16	5.59	30.75
Shrub/scrub	1.53	0.36	1.89
Spruce fir	0.02	0.01	0.03
Wetland/riparian	0.69	0.18	0.87
<b>Totals</b>	<b>40.62</b>	<b>10.29</b>	<b>50.91</b>

\*GIS=substations, centerline access, roads

**North-South Interconnect – Disturbance Calculations**

**North-South Interconnect – Pole Placement Calculations**

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL ACRES	% OF ROW	LENGTH (MILES)	SHORT TERM DIST (AC)	LONG-TERM DIST (AC)
Grass							0	0.00%	0.00	0.00	0.00
Mixed Conifer							0	0.00%	0.00	0.00	0.00
Other							0	0.00%	0.00	0.00	0.00
PJ						0.2	0.2	0.88%	0.02	0.07	0.01
Ponderosa pine						12.9	12.9	56.53%	1.04	4.40	0.38
Rock/dune							0	0.00%	0.00	0.00	0.00
Sage						9.72	9.72	42.59%	0.78	3.32	0.29
Shrub/scrub							0	0.00%	0.00	0.00	0.00
Spruce fir							0	0.00%	0.00	0.00	0.00
Wetland/riparian							0	0.00%	0.00	0.00	0.00
<b>Totals</b>							<b>22.82</b>	<b>100.00%</b>	<b>1.84</b>	<b>7.78</b>	<b>0.68</b>

**North-South Interconnect – Short-Term Disturbance**

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST
Grass		0.00	0.00
Mixed Conifer		0.00	0.00
Other		0.00	0.00
PJ		0.07	0.07
Ponderosa pine	2.96	4.40	7.36
Rock/dune		0.00	0.00
Sage	3.04	3.32	6.36
Shrub/scrub		0.00	0.00

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST
Spruce fir		0.00	0.00
Wetland/riparian		0.00	0.00
<b>Totals</b>	<b>6.00</b>	<b>7.78</b>	<b>13.78</b>

\*GIS=laydown/staging areas

#### North-South Interconnect – Long-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL LT DIST
Grass		0.00	0.00
Mixed Conifer		0.00	0.00
Other		0.00	0.00
PJ	0.02	0.01	0.03
Ponderosa pine	1.26	0.38	1.64
Rock/dune		0.00	0.00
Sage	0.95	0.29	1.24
Shrub/scrub		0.00	0.00
Spruce fir		0.00	0.00
Wetland/riparian		0.00	0.00
<b>Totals</b>	<b>2.23</b>	<b>0.68</b>	<b>2.91</b>

\*GIS=substations, centerline access, roads

**East-West Interconnect – Disturbance Calculations**

**East-West Interconnect – Pole Placement Calculations**

DESCRIPTION	PRIVATE	STATE	BLM	GSENM	USFS	NPS	TOTAL ACRES	% OF ROW	LENGTH (MILES)	SHORT TERM DIST (AC)	LONG-TERM DIST (AC)
Grass					0.2		0.2	0.44%	0.02	0.07	0.01
Mixed Conifer					0.25		0.25	0.55%	0.02	0.09	0.01
Other							0	0.00%	0.00	0.00	0.00
PJ					2.11		2.11	4.66%	0.17	0.73	0.06
Ponderosa pine					16.74		16.74	36.99%	1.37	5.79	0.51
Rock/dune							0	0.00%	0.00	0.00	0.00
Sage					25.89		25.89	57.22%	2.12	8.95	0.78
Shrub/scrub							0	0.00%	0.00	0.00	0.00
Spruce fir					0.06		0.06	0.13%	0.00	0.02	0.00
Wetland/riparian							0	0.00%	0.00	0.00	0.00
<b>Totals</b>							<b>45.25</b>	<b>100.00%</b>	<b>3.70</b>	<b>15.65</b>	<b>1.37</b>

**East-West Interconnect – Short-Term Disturbance**

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST
Grass		0.07	0.07
Mixed Conifer		0.09	0.09
Other		0.00	0.00
PJ	0.62	0.73	1.35
Ponderosa pine	2.11	5.79	7.90
Rock/dune		0.00	0.00
Sage	6.58	8.95	15.53
Shrub/scrub		0.00	0.00

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL S/T DIST
Spruce fir		0.02	0.02
Wetland/riparian		0.00	0.00
<b>Totals</b>	<b>9.31</b>	<b>15.65</b>	<b>24.96</b>

\*GIS=laydown/staging areas

#### East-West Interconnect – Long-Term Disturbance

DESCRIPTION	GIS*	POLE PLACEMENT	TOTAL LT DIST
Grass	0.02	0.01	0.03
Mixed Conifer	0.02	0.01	0.03
Other		0.00	0.00
PJ	0.2	0.06	0.26
Ponderosa pine	1.66	0.51	2.17
Rock/dune		0.00	0.00
Sage	2.57	0.78	3.35
Shrub/scrub		0.00	0.00
Spruce fir		0.00	0.00
Wetland/riparian		0.00	0.00
<b>Totals</b>	<b>4.47</b>	<b>1.37</b>	<b>5.84</b>

\*GIS=substations, centerline access, roads

**Addendum to  
Vegetation Specialist Report  
dated December 2009**

Prepared For:

US Forest Service – Dixie National Forest  
National Park Service – Bryce Canyon National Park  
Bureau of Land Management – Kanab Field Office  
Bureau of Land Management – Grand Staircase-Escalante National Monument

Prepared By:



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This addendum updates the Vegetation Specialist Report dated December 2009 by expanding the report to include the Agency Preferred Alternative and providing errata to expand on or correct data previously presented.

## **Agency Preferred Alternative**

The Agency Preferred Alternative was developed through a joint effort of all agencies (USFS, BLM, and NPS) taking into consideration the impacts of all of the resources along the Action Alternatives. Alternative E is the Agency Preferred Alternative because it attains the project's purpose and need while still being sensitive to other resource concerns within the Project Area, and the missions and management objectives of the various land management agencies responsible for the public lands that would be crossed by the Agency Preferred Alternative.

The 100-foot-wide right-of-way for Alternative E, the Agency Preferred Alternative route (**Figure 1**) would begin with Segment C1 (17.36 miles), the East-West Interconnect option (3.70 miles), and a combination of portions of Segments A-3 and C-3 (referred to as E-3). Alternative E contains the segment combining portions of Alternatives A and C called E-3. Segment E-3 begins where the East-West Interconnect joins the Alternative A route and terminates at the Hatch Substation. Segment E-3 would follow Segment A-3 for 1.6 miles to the point where it intersects Segment C-3 and would follow the remainder of Segment C-3, terminating at the Hatch Substation for 6.76 miles. The total length of the preferred route would be 29.41 miles.

Approximately 16.23 miles of the existing 69 kV transmission line infrastructure from the Bryce Canyon Substation to the Hatch Mountain Substation would be removed.

Alternative E, the Agency Preferred Alternative, would also require the amendment of the GSENM MP (BLM 2000) by changing the designation of a 300-foot-wide 3.68-mile stretch (133.74 acres) of the Primitive Zone to Passage Zone, and within this area, changing the existing VRM Management Class designation from Class II to Class III.

**Figure 1. Alternative E, Agency Preferred Alternative Route**

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## Resource Impacts

Alternative E, the Agency Preferred Alternative route, is comprised of segments or portions of segments analyzed under Alternatives A and C, which are fully analyzed in the original Specialist Report dated December 2009. Resource specific disturbance acreages and other data specific to Alternative E, the Agency Preferred Alternative, are provided in the table below.

VEGETATION		ALTERNATIVE E: PREFERRED ALTERNATIVE		69 kV LINE REMOVAL, ALTERNATIVE E
Indicator		Short-term	Long-term	Short-term
Acres of disturbance	Grass	0.17	0.06	0.00
	Mixed conifer	0.08	0.03	0.00
	Pinyon-juniper	29.40	5.75	4.69
	Ponderosa pine	50.94	8.66	13.57
	Rock	7.86	1.13	0.68
	Sage	137.05	32.35	26.34
	Other shrub	7.79	1.91	0.00
	Spruce fir	0.38	0.13	0.00
	Riparian	1.52	0.40	0.03
	Other	6.70	0.31	1.88
Proximity to noxious weeds	Noxious and undesirable weed infestations are common throughout the area of analysis for all alternatives. It is assumed that the spread of weeds can and likely would occur. The magnitude of this spread would be directly related to the diligence with which mitigation measures and best management practices (BMPs) are employed by the construction crews and enforced by the managing agencies.			
General	Impacts to all cover types were determined to be negligible to minor relative to the overall abundance of each cover type in the surrounding area.			

## Errata

Some changes, clarification and updates to resource-specific data and analysis were made as a result of the comments received on the Draft Environmental Impact Statement. The errata below update the original Specialist Report dated December 2009.

### Page 3

The second paragraph under the heading **1.1.2.2 Alternative B: Parallel Existing 69 kV Route** should read:

The Alternative B Route would generally parallel the existing 69 kV line right-of-way, but must be separated from the existing 69 kV line right-of-way for constructability and safety reason, in order to safely build and energize the line prior to removal of the existing line. Alternative B would extend 29.11 miles. This alternative route would begin at the proposed East Valley Substation located east of Tropic and extend west through the Tropic Substation (the Tropic Substation would be decommissioned) and then cross SR 12 and continue across BRCA (deviating slightly from the existing right-of-way for approximately 1.5 miles) to a point near the current Bryce Canyon Substation near Bryce Canyon City. For this Alternative, the Bryce Canyon Substation would be decommissioned and a new replacement substation would be built at a new location approximately 1 mile to the west to allow for needed expansion. The route would extend approximately 0.5 mile to the north around Bryce Canyon City, west across SR 63 and then parallel Garkane's existing 69 kV line right-of-way predominately across private and SITLA lands. The alternative route would parallel the existing right-of-way just to the south across the plateau in a northwest direction to Red Canyon, where it would generally follow the existing right-of-way through Red Canyon into Long Valley where it would cross U.S. 89 and continue to the Hatch Mountain Substation. From there the route would follow the existing line south to the Hatch Substation. This route would cross 5.58 miles of DNF, 8.29 miles of KFO, 2.81 miles of BRCA, 3.63 miles of SITLA, and 8.80 miles of private lands.

Appendix A:

The first bullet after the heading **Water** should read:

Water needed during construction would be limited to that needed for dust control (See Appendix F, Dust Management Plan).

Appendix F, Dust Management Plan should be inserted after Appendix E, Vegetation Disturbance Acreage Tables.

# **Appendix F: Fugitive Dust Management Plan**

A control strategy or strategies for fugitive dust are listed for each activity proposed under the Action Alternatives described in the Environmental Impact Statement. The strategies are listed in a staged approach, meaning that if the first approach of control, Stage 1, is not satisfactory, then the next approach of control, Stage 2 will be attempted.

ACTIVITY	ACTIVITY DETAILS	CONTROL STRATEGIES	
Material Storage	Storage of materials required for road widening.	Stage 1:	Inherent moisture with water sprays only on an as-needed basis.
		Stage 2:	Increase use of water sprays until fugitive dust is controlled.
Material Handling, Transfer, Hauling, Loading or Dumping	Placing fill material along roadside for widening.	Stage 1:	Inherent moisture with water sprays only on an as-needed basis.
		Stage 2:	Increase use of water sprays until fugitive dust is controlled.
Haul Roads, Roadways, or Yard Areas	Existing FS roads, centerline access; pulling, splicing and laydown yards	Stage 1:	Water sprays only on as-needed basis.
		Stage 2:	Increase use of water sprays until fugitive dust is controlled.
Clearing, Leveling	Pulling, splicing, laydown yards; area at pole locations	Stage 1:	Inherent moisture with water sprays only on an as-needed basis.
		Stage 2:	Increase use of water sprays until fugitive dust is controlled.
Earth Moving, Excavation	Foundation construction in certain locations	Stage 1:	Inherent moisture with water sprays only on an as-needed basis.
		Stage 2:	Increase use of water sprays until fugitive dust is controlled.
Construction, Demolition	Constructing and erecting new pole structures; removal of existing pole structures	Stage 1:	Water sprays only on an as-needed basis.
		Stage 2:	Increase use of water sprays until fugitive dust is controlled.

Appendix B:

The tables below detail the land management, and long- and short-term disturbance associated with Alternative E, the Agency Preferred Alternative, and should be added to the tables presented in Appendix B of the Specialist Report of December 2009.

### Agency Preferred Alternative Project Area

ALTERNATIVE E SEGMENTS	PROJECT AREA* (ACRES)						
	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Segment C-1	118.44	14.63	0.00	50.58	92.86	0.00	276.51
East-West Interconnect	0.00	0.00	0.00	0.00	48.65	0.00	48.65
Segment E-3	6.30	14.85	54.24	0.00	52.40	0.00	127.79
69 kV Line Removal – Alternative E	6.35	3.94	8.37	0.00	9.89	0.00	28.55
<b>Alternative E Total</b>	<b>131.09</b>	<b>33.42</b>	<b>62.61</b>	<b>50.58</b>	<b>203.80</b>	<b>0.00</b>	<b>481.50</b>

\*The Project Area contains the 100-foot right-of-way, substation sites and their associated access roads; all temporary work spaces outside the right-of-way; and the disturbance area associated with the existing 69 kV transmission line removal.

### Agency Preferred Alternative 100-foot Right-of-Way Encumbrances\*

ALTERNATIVE E SEGMENTS	RIGHT-OF-WAY (ACRES)						
	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Segment C-1	83.11	12.59	0.00	44.58	70.42	0.00	210.70
East-West Interconnect	0.00	0.00	0.00	0.00	44.99	0.00	44.99
Segment E-3	2.56	12.86	40.71	0.00	44.87	0.00	101.00
<b>Alternative E Total</b>	<b>85.67</b>	<b>25.45</b>	<b>40.71</b>	<b>44.58</b>	<b>160.28</b>	<b>0.00</b>	<b>356.69</b>

\*Buffer of 50 feet on each side of transmission line. Not all acres would be disturbed within the right-of-way, but the right-of-way is considered to be long-term encumbrance for the duration of the permit.

### Agency Preferred Alternative Total Long-Term Surface Disturbance and Land Ownership/Management

ALTERNATIVE E SEGMENTS	LONG-TERM DISTURBANCE* (ACRES)						
	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Segment C-1	13.97	1.58	0.00	6.74	9.12	0.00	31.41
East-West Interconnect	0.00	0.00	0.00	0.00	5.85	0.00	5.85
Segment E-3	2.24	1.68	5.42	0.00	4.19	0.00	13.54
<b>Alternative E Total</b>	<b>16.21</b>	<b>3.26</b>	<b>5.42</b>	<b>6.74</b>	<b>19.16</b>	<b>0.00</b>	<b>50.80</b>

\*Includes long-term disturbance associated with power poles, substations, substation access roads, existing access road upgrades, and a 10-foot-wide centerline access route.

**Agency Preferred Alternative Total Short-Term Surface Disturbance and Land Ownership/Management**

ALTERNATIVE E SEGMENTS	SHORT-TERM DISTURBANCE* (ACRES)						
	PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
Segment C-1	68.72	7.23	0.00	23.27	48.30	0.00	147.52
East-West Interconnect	0.00	0.00	0.00	0.00	24.97	0.00	24.97
Segment E-3	1.74	6.95	30.32	0.00	22.54	0.00	61.55
<b>Alternative E Total</b>	<b>70.46</b>	<b>14.18</b>	<b>30.32</b>	<b>23.27</b>	<b>95.81</b>	<b>0.00</b>	<b>234.04</b>

\*Includes short-term disturbance associated with pulling and splicing sites, lay-down areas, and power pole (H-structure) installation. Some overlap between disturbance areas exists because a single area could be used for multiple alternatives. *Limited access areas* were not analyzed for short-term disturbance associated with pole installation. Alternative B also includes short-term disturbance associated with removal of the existing 69 kV transmission line.

**Short-Term Disturbance Associated with Removal of Existing 69 kV Line (Parallel to Alternative B)**

SHORT-TERM DISTURBANCE* (ACRES)						
PRIVATE	SITLA	KFO	GSENM	DNF	BRCA	TOTAL
27.44	3.94	8.36	0.00	9.89	0.00	49.63

\*This short-term disturbance area includes lay-down yards and pulling and splicing sites needed for the existing 69 kV line removal. For analysis, short-term surface disturbance for line removal is assumed to include all of the short-term disturbance areas (i.e., lay-down areas, pulling/splicing sites) that are included under Alternative B. This effectively reduces the amount of disturbance shown for Alternative B as these areas are the same as those counted for the installation of the 138 kV line. In reality these areas needed for removal would be very similar to, but slightly offset from, the installation sites.

## Consideration of Best Available Science

The techniques and methodologies used in this analysis consider the best available science. The analysis includes a summary of the credible scientific evidence that is relevant to evaluating reasonably foreseeable impacts. In addition, the analysis also identifies the methods used and references the scientific sources relied on. When appropriate, the conclusions are based on a scientific analysis that shows a thorough review of relevant scientific information, a consideration of responsible opposing views, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

Mark Madsen

Name (Printed)



Signature

1-5-11

Date