Western Area Power Administration Reauthorization Project Biological Assessment/Evaluation (BA/BE) for Threatened, Endangered, and Forest Service Sensitive Plant Species on the Medicine Bow-Routt National Forest

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Prepared for:

Medicine Bow-Routt National Forests and Western Area Power Administration, Rocky Mountain Region

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"Integrating species conservation with project planning"

Botany Biological Evaluation/Biological Assessment
Western Area Power Administration Reauthorization Project
Parks, Hahn's Peak, and Yampa Ranger Districts
Medicine Bow-Routt National Forests

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1.0 Introduction

1.1 Purpose of this Biological Evaluation

Western Area Power Administration (Western) owns, operates, and maintains approximately 283 miles of electrical transmission lines on National Forest System (NFS) lands in Colorado, Utah, and Nebraska. Western proposes to improve the way it manages vegetation along its Right of Way (ROW) on NFS lands. Implementing this proposal would require changes in existing Forest Service authorizations. The purpose of this document is to present the analysis and determination of effects of the alternatives on federally listed plant species (endangered and threatened), species proposed for federal listing, and Forest Service (FS) sensitive plant species (Forest Service Manual [FSM] 2670.31-2670.32).

This biological evaluation report (BE) conforms to legal requirements set forth under section 7 of the Endangered Species Act (ESA) (19 U.S.C. 1536 (c), 50 CFR 402.12 (f) and 402.14). Section 7(a) (1) of the ESA requires federal agencies to use their authorities to further the conservation of listed species. Section 7(a) (2) requires that federal agencies ensure any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of federally-listed species, or destroy or adversely modify designated critical habitat.

Forest Service policy requires that a review of programs and activities, through an effects analysis document (referred to in current Forest Service policy as a biological evaluation or BE), be conducted to determine their potential effect on threatened and endangered species, species proposed for listing, and Regional Forester designated sensitive species (FSM 2670.3). Under the ESA, the effects analysis report is called a biological assessment (BA) and must be prepared for federal actions that are "major construction activities" to evaluate the potential effects of the proposal on listed or proposed species and critical habitats. The contents of the BA are at the discretion of the federal proponent (in this case Western and the Forest Service), and will depend on the nature of the federal action (50 CFR 402.12(f)). A BE may be used to satisfy the ESA requirement to prepare a Biological Assessment. Preparation of a Biological Evaluation as part of the National Environmental Policy Act (NEPA) process ensures that threatened, endangered, proposed, and sensitive status (TEPS) species receive full consideration in the decision-making process.

1.2 Current Management Direction

Management direction for federally proposed, threatened, and endangered as well as Forest Service sensitive species on the Medicine Bow-Routt National Forests is found in the following documents:

- Forest Service Manual and Handbooks (FSM 2670).
- National Forest Management Act (NFMA).
- Endangered Species Act of 1973, as amended (ESA).
- National Environmental Policy Act (NEPA).
- 2003 Revision of the Land and Resource Management Plan (LRMP). Medicine Bow National Forest (Forest Service 2003).

- 1997 Revision of the Land and Resource Management Plan (LRMP). Routt National Forest.
- Species specific Recovery Plans which establish population goals for recovery.

1.2.1 Threatened and Endangered Species

Section 7 of the ESA requires federal agencies to use their authorities to carry out programs to conserve endangered and threatened species, and to insure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of listed or proposed species, or result in the destruction or adverse modification of their critical habitats. The contents of the biological assessment/evaluation are at the discretion of the federal proponent (in this case Western and the Forest Service),, and will depend on the nature of the federal action (50 CFR 402.12(f)).

The Forest Service has established direction in Forest Service Manual 2670 to guide habitat management for threatened, endangered, proposed, and sensitive species. Current management direction is to manage FS system habitats for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary (FSM 2670.21). Preparation of a biological evaluation as part of the NEPA process ensures that these species receive full consideration in the decision-making process. FSM 2600, Section 2671.44 (Supplement 2600-94-2), provides direction on the review of actions and programs authorized, funded or implemented by the FS relative to the requirements of the ESA. FSM 2670.31 further defines FS policy for threatened and endangered species:

- Place top priority on conservation and recovery of endangered, threatened, and proposed species and their habitats through relevant National Forest System, state and private forestry, and research activities and programs.
- Establish through the Forest planning process objectives for habitat management and/or recovery of populations, in cooperation with states, the U.S. Fish and Wildlife Service (FWS) and other federal agencies.
- Through the biological evaluation process, review actions and programs authorized, funded, or carried out by the FS to determine their potential for effect on threatened and endangered species and species proposed for listing.
- Avoid all adverse impacts on threatened and endangered species and their habitat except when it is possible to compensate adverse effects totally through alternatives identified in a biological opinion rendered by the FWS; when an exemption has been granted under the act, or when the FWS biological opinion recognizes an incidental taking. Avoid adverse impacts on species proposed for listing during the conference period and while their federal status is being determined.
- Initiate consultation or conference with the FWS when the Forest Service determines that proposed activities may have an effect on threatened or endangered species; are likely to jeopardize the continued existence of a proposed species; or result in the destruction or adverse modification of critical or proposed critical habitat.
- Identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and

proposed species. Protect individual organisms or populations from harm or harassment as appropriate.

FSM 2672.41 describes the objectives for completing biological evaluations for proposed FS programs or activities. These objectives include complying with requirements of the Endangered Species Act to ensure that actions of Federal agencies not jeopardize or adversely modify critical habitat of Federally listed species.

1.2.2 Forest Service Sensitive Species (FSM 2670.32)

Forest Service sensitive species are those plants and animals identified by the Regional Forester (Forest Service 2011b) for which population viability is a concern. Concern is warranted by a downward trend in population numbers, density, or habitat conditions that would reduce a species' existing distribution (FSM 2670.5). Sensitive species are managed so that FS actions ensure that these species do not become threatened or endangered (FSM 2670.22).

The FS is required to "Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands" (FSM 2670.22). Current management direction is to manage FS system habitats for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary (FSM 2670.21).

Region 2 of the FS has developed policy regarding the designation of sensitive species (Forest Service 2011b). Eight criteria are used to determine whether a species should be designated as sensitive:

- Geographic distribution within the Rocky Mountain Region; species with limited habitat are given priority.
- Geographic distribution outside of the Rocky Mountain Region; species endemic to the Rocky Mountains are given priority.
- Capability of the species to disperse; species with limited dispersal capability are given priority.
- Abundance of the species in the Rocky Mountain Region; less abundant species are given priority.
- Population trend in the Rocky Mountain Region; species with a downward population trend are given priority.
- Habitat trend in the Rocky Mountain Region; species with declining habitat quality are given priority.
- Vulnerability of habitats in the Rocky Mountain Region; species in impacted habitats are given priority.
- Life history and demographic characteristics of the species; species with low reproduction or high mortality rates are given priority.

Under FSM 2672.41, the objectives for completing biological evaluations for proposed FS programs or activities:

- To ensure that Forest Service actions do not contribute to loss of viability of any native or desired non-native plant or contribute to animal species or trends toward Federal listing of any species.
- To provide a process and standard by which to ensure that threatened, endangered, proposed, and sensitive species receive full consideration in the decision making process.

The LRMP provides management guidelines, which incorporate regional direction for sensitive status species. General FS direction for sensitive species is summarized below (FSM 2670.32):

- assist states in achieving their goals for conservation of endemic species;
- as part of the NEPA process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species;
- avoid or minimize impacts to species whose viability has been identified as a concern;
- if impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole;
- establish management objectives in cooperation with states when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for federal candidate species, in cooperation with the FWS and the states.

2.0 Description of the Proposal

2.1 Introduction

This chapter describes the No Action Alternative (no changes in vegetation management and maintenance practices) and the Proposed Action (proposed changes in vegetation management and maintenance practices). Section 2.2.1 describes vegetation management and maintenance practices Western now uses. Section 2.2.2 provides a general description of Proposed Action activities on National Forest System lands and follows with specific examples of how Western would implement the Proposed Action in each forest (Section 2.2.2.6).

2.2 Alternatives Considered in Detail

In response to issues raised by regulatory agencies and the public, Western and the Forest Service developed two alternatives – the No Action Alternative and the Proposed Action.

Western's operations and maintenance practices (O&M) ensure the safety and reliability of the electric transmission system. These include the lines listed in Table 2-1 that are located on NFS lands. Western owns, operates, and maintains most of the lines in Table 2-1. As noted in the table, some lines are owned by another utility or ownership is split between Western and other utilities. Western has agreements to maintain the split-ownership lines. Western's No Action Alternative and Proposed Action include maintaining transmission lines and associated infrastructure, including access routes and managing vegetation. The major difference between the No Action Alternative and the Proposed Action is the proposal to change vegetation management practices. Section 2.2.2 describes those proposed changes.

When the Forest Service approves the construction of an electric transmission line on NFS lands, it is a long-term commitment of the area in the permitted ROW. This includes a commitment to allow continuous access for maintenance and emergencies. Although the Forest Service authorizations are not exclusive, subsequent uses within the corridor must be compatible with the designated utility corridor. The electrical transmission facility must routinely be maintained and be able to operate unimpeded for its intended purpose through its full range of anticipated and designed conditions. In the utility corridor, vegetation management objectives focus on reducing the risk associated with transmission lines contacting trees and starting wildfires, ensuring the transmission lines are managed to maximize the opportunity to survive wildfires, ensuring public health and safety, ensuring the safety of electrical workers, and ensuring access.

The vegetation management requirements are an example of the issues Western and the Forest Service encounter with these different types of authorizations. In many cases, ROW maintenance has been guided by Operations and Maintenance Plans that limit removal of trees to those identified as hazardous. In these cases, maintenance practices typically do not address the encroaching vegetation until it becomes a threat that requires immediate attention to ensure no adverse effect to the transmission line or to avoid a threat of fire. This reactive approach to hazardous-vegetation maintenance is not conducive to ensuring the level of operating reliability that is required by today's NERC standards, nor is it efficient or cost effective. Today's stricter maintenance standards require a more aggressive, proactive approach to vegetation management, with the goal of ensuring that there will be no tree-caused transmission line outages or fires. Surveys of the Western transmission-line ROWs in the Colorado, Nebraska, and Utah forests reveal a broad spectrum of vegetation threat conditions. While some ROWs are reasonably clean and secure, many others contain dense slash, heavy live and dead fuel loads, and encroaching trees.

A key factor for ensuring the reliability of the electrical transmission facilities is Western's ability to efficiently maintain the infrastructure. To protect public and worker safety and meet the stricter standards, Western proposes moving from a reactive vegetation management approach to a proactive maintenance strategy that does not let vegetation become an immediate threat.

Transmission line maintenance activities can be categorized as follows:

- Vegetation management (transmission line and access route ROWs). Effective vegetation maintenance ensures that vegetation does not interfere with transmission line conductors, towers, or other hardware; impede access to the transmission line or interfere with work on the transmission lines; or create unsafe conditions for either the public or maintenance crews. Maintenance is performed using a variety of methods, including mechanical (such as hand clearing with chain saws, and self-propelled grinders, mowers, or mulchers) and herbicide applications (used either to selectively or non-selectively kill target vegetation or retard growth).
- Access route maintenance. Access route maintenance includes activities that ensure access routes are in appropriate condition for maintenance crews to efficiently drive to transmission lines and associated work sites. These activities can include vegetation maintenance, including mowing, spraying weeds, or reseeding, grading, surfacing, and erosion control (such as maintaining water diversions like culverts, ditches, and water

bars). Overland travel across access routes with managed low vegetation growth can often serve as acceptable maintenance access.

- Maintenance of transmission lines, including associated structures, hardware, and equipment. This category of activities includes routine aerial and ground patrols of transmission lines and access route ROWs, and repairs to structures, conductors, static wires, insulators, guy wires, foundations, and other hardware.

2.2.1 No Action Alternative (Continue Past Practices)

Under Council on Environmental Quality NEPA implementing regulations, an Environmental Impact Statement (EIS) must include an evaluation of a No Action Alternative (40 CFR 1502.14). Under NEPA, the Lead Agency has the discretion to describe the No Action Alternative as the future conditions without project implementation, which can also include predictable actions by persons or entities other than the federal agency involved in a project, acting under existing management direction or level of management intensity. When the Proposed Action involves updating an adopted management plan or program, the No Action Alternative includes the continuation of the existing management plan or program.

Under the No Action Alternative, Western would continue its infrastructure, ROW, and access road maintenance practices as they have been done in the past, including as they may be defined under existing authorizations and other agreements. The management approach to controlling vegetation, ensuring access, and maintaining equipment is largely need-driven and reactive. Methods to control vegetation are manual, mechanical, and chemical (herbicides). Under the No Action Alternative, the Forest Service would re-authorize the ROWs with no change from current management.

Under the No Action Alternative, Western would continue its need-driven management approach for ROW and transmission line maintenance. Because Western addresses primarily danger trees, as defined in its policy[1], it must review the ROWs at least once a year to ensure that no new danger trees have appeared and remove them. This focus requires annual reentries, and in some areas more frequent reentries, into the ROW to address danger trees that were identified during periodic line patrols or when maintenance forces were in the ROW for other activities. Under a need-driven management approach, Western currently manages vegetation along ROW segments as control needs are identified through periodic line patrols. Western manages vegetation using the mix of manual, mechanical, and chemical methods to control vegetation in transmission line and access route ROWs. The No Action Alternative also includes the practice of spot application of Forest Service-approved herbicides. Western would perform access route repairs as needed. Transmission system maintenance activities would consist of regular aerial and

[1] Danger trees are trees located within or adjacent to the easement or permit area that present a hazard to employees, the public, or power system facilities. Characteristics used in identifying a danger tree include but are not limited to the following: encroachment within the safe distance to the conductor as a result of the tree bending, growing, swinging, or falling toward the conductor; deterioration or physical damage to the root system, trunk, stem or limbs and/or the direction and lean of the tree; vertical or horizontal conductor movement and increased sag as a result of thermal, wind and ice loading; exceeding facility design specifications; fire risk; other threats to the electric power system facilities or worker/public safety (WAPA O 430.1A, dated 03-18-2008).

ground patrols to find problems, scheduling and performing repairs to correct problems, and preventative maintenance.

The primary difference between the No Action Alternative and the Proposed Action is the proposal to change the way Western manages vegetation in ROWs. Section 2.2.2 describes these proposed changes. The following sections describe activities under the No Action Alternative, including methods of vegetation management. Other than the proposed changes described in Section 2.2.2, Western would also carry out the activities summarized below under the Proposed Action.

2.2.1.1 Maintenance Activities

Inspection and Transmission System Management

Western does aerial (usually by helicopter), ground, and climbing inspections of its transmission infrastructure in compliance with its internal policies and guidance. The requirements are updated as needed. Western does the following inspections:

Aerial Inspections

At a minimum, Western does aerial inspections every 6 months, usually by helicopter, over the entire transmission system to check for danger trees or encroaching vegetation, and to find damaged or malfunctioning equipment. Western does aerial patrols between 50 and 300 feet above the transmission line, depending on land use, topography, and weather, and the objective of the patrol. The helicopter generally passes quickly (less than 1 minute) over a span (the area between two structures), but can circle back or hover if issues are found or more documentation is needed.

Ground Inspections

Annual ground-based inspections check access to the structures, tree clearances, fences, gates, locks, and tower hardware, and ensure that each structure would be readily accessible in an emergency. They allow for the inspection of hardware that is more difficult to inspect by air, and find access road issues such as erosion, washed out culverts, and vegetation encroachment. Ground inspections are typically done using pickup trucks, all-terrain vehicles, or sometimes snow cats or snow machines. Access is via designated routes and along the transmission line ROW.

Climbing Inspections

Western could do climbing inspections on transmission line structures if aerial or ground inspections find problems. Typically these inspections involve accessing the structures via existing access routes, or travel along the ROW in pickup trucks or all-terrain vehicles, and could require bucket trucks.

2.2.1.2 Vegetation Management

Manual

Manual vegetation control includes using powered and unpowered tools; installing static barriers (such as weed control mats); and spot, or localized, application of approved herbicides. The primary benefit of manual methods is selectivity – only unwanted vegetation is removed. The

primary disadvantages of manual methods are that they are labor intensive and are more effective and efficient in relatively low-density vegetation in relatively small areas. Manual treatments typically are not efficient for addressing the need to dispose of accumulated biomass, and managing fuels and preventing fire in the ROW.

Western uses the following manual techniques: cutting, trimming, hand-pulling and hoeing, and applying herbicides, as described in the following sections.

Cutting

The most common manual method is cutting with power saws. Western uses this technique on species that do not resprout, when access is limited, or when only a few trees need to be cut, or in sensitive areas where cutting is selective. Cutting would be used as appropriate based on species and site. For species that do resprout, which includes most deciduous trees such as aspen, sprouts can rapidly resurge to original height within a growing season in some cases, to several years and at much greater density in other cases. Access for subsequent manual treatments is thereby hindered, and concerns regarding fire survivability increase in the ROW.

Western sometimes follows its manual cutting operations with some slash disposal techniques designed to hasten natural decomposition and improve aesthetic appeal. The slash is typically lopped and scattered uniformly across the treated area. Small trees are limbed on one side so they lie flat on the ground. Alternatively, branches and small trees might be mechanically chipped and the chips spread over the ROW or deposited in piles. Stems too large for chipping are lopped and scattered in the ROW, as the situation requires. However, the typically arid environment of the Rocky Mountain Region is not conducive to rapid decomposition of woody biomass and leads to the accumulation of fuels in the ROW. After only a few cycles of vegetation treatments, the accumulation of this debris might need to be addressed to control the accumulation of fuel in the ROW and reduce the potential impact of fire on the transmission line.

Trimming

Trimming or pruning is the removal of selected branches from tree trunks to prevent them from growing into transmission lines. Western uses this labor-intensive technique in special situations where it is desirable to leave trees in place as visual screens, or where easement contracts and land and resource management plans dictate trimming criteria. To protect the transmission line, trimmed trees must be cut to the applicable standards. Because of the extreme hazards associated with trimming trees near energized power lines, and Western's experience from several accidents and fatalities, this technique has limited applicability. Selective thinning or removal of excessively tall trees to achieve or retain vegetation screening is often another acceptable approach in sensitive areas.

Hand-Pulling and Hoeing

Noxious weed control along ROWs theoretically can be accomplished by hand-pulling and hoeing. These manual treatments are not practical for large areas. Hand-pulling and hoeing do not control weeds that resprout from rootstocks or root fragments in the soil. Western rarely practices hand-pulling and hoeing, but these techniques could be appropriate in some cases.

Herbicides

Spot application of Forest Service-approved herbicides is a typical technique to control noxious weeds and other undesirable, mostly herbaceous, vegetation. Western applies herbicides on a limited basis to control vegetation in areas around towers. The herbicide is applied directly to the vegetation using a hand or powered sprayer. There will be no aerial application of herbicides.

Western uses herbicides that are approved for use in ROW maintenance and by the Forest Service. Western uses Environmental Protection Agency- and state-registered herbicides, and appropriately licensed or certified applicators apply the herbicides following the label requirements.

Mechanical

Mechanical vegetation control typically uses self-propelled machine platforms with various interchangeable treatment-head attachments to remove or control target vegetation along transmission line and access route ROWs. Depending on the particular equipment attachment and skill of the operator, these methods are selective or nonselective (all plants in the path of the machine are affected). Rubber-tired mechanical equipment platforms are generally limited to operating on slopes less than 30 to 35 percent. Specialized tracked equipment platforms, with articulating control cabins, are typically used on slopes up to 60 percent. Both types of specialized equipment platforms can operate with very low ground pressures. However, site-specific obstacles such as rocks or other extreme terrain can reduce their efficiency. Western uses the following mechanical techniques: mowing/grinding, chipping, and grinding, as described in the following sections.

Mowing/Grinding

Western uses mechanized heavy equipment with high-speed rotary blades to cut, chop, or shred woody vegetation in ROWs. Target vegetation is typically cut off at ground level, encouraging the selection and recovery of low-growing plant communities consisting of grasses, forbs, and other herbaceous plants. Examples of this type of mowing equipment are Fecon, brush-hog, Track-Mack, and Hydro-Ax. Western rarely uses mowing, but the technique has been used where appropriate.

Chipping

Chipping is the process of feeding limbs and other woody debris through a mechanical chipper. The chipper can be used to spread the material back onto the ROW. When strategically placed in the ROW, chipped material keeps nutrients in the ecosystem, helps retain soil moisture, can help control erosion, and can help retard the re-growth of undesirable plant species. This method can be used effectively to control vegetation, improve the aesthetics of the treated area, reduce undesirable fuel loads, and protect soil and water resources.

2.2.1.3 Access Route Maintenance

Western relies on access routes for safe and reliable access to transmission lines and supporting infrastructure. Western typically notifies the Forest Service before work begins on access routes, and complies with applicable specifications, guidelines, and design features. Maintenance activities include grading; blading; surfacing; reseeding; and constructing, repairing, or replacing

water diversions such as culverts, ditches, and water bars. Typically, such activities would involve graders, backhoes, and support vehicles such as pickup trucks.

Inspection and Maintenance of Culverts, Fords and Ditches

With Forest Service approval and in coordination with the Forest Service, Western may maintain installed runoff and small stream controls that protect access roads, such as culverts, ditches, and fords.

Ideally, installed culverts and ditches are kept free of debris and obstructions. Western's goal is to ensure that culverts work properly so that access to the line is not impeded.

Typical access road work can involve the use of backhoes, dump trucks, graders, and pickup trucks. The work is typically confined to the roadbed. Extraordinary work, such as replacing washed out culverts, could require work outside the ROW and would require additional discussions with and approvals from the Forest Service. Western completes environmental reviews before the work if the work is outside previously studied areas. Work in some drainages could require coordination with and permitting from the Army Corps of Engineers or other regulatory agencies.

Water Bars

A water bar is a ridge, typically formed from the road surface material that directs water off of the road. Water bars are constructed across roads at about a 30-degree angle to the direction of travel, where water erosion is a problem, and where water tends to accumulate and soften the surfaces. Adjacent area capacity for receiving surface flows off the road is important in water-bar location, design, and construction. Western maintains existing water bars or can install new water bars where needed. This work typically involves backhoes, graders, and pickup trucks. Western may use blading to maintain water bars.

Grading

Western maintains the surfaces of established dirt access roads using a road grader, and grades areas with excessive potholes and erosion as needed to maintain access. This work typically involves pickup trucks and a road grader hauled in on a lowboy trailer.

Two-Track Access Maintenance

Two-track access is often present in the transmission line ROW itself or as a spur that leads from a maintained access road to a transmission structure or the transmission line ROW. These are overland routes that are not maintained to the same degree as established, graded access. Western does maintenance work when the access becomes almost impassable or when a special job requires access for multiple vehicles or special equipment. Maintenance activities can include filling washouts, removing downed trees, removing large rocks, or cutting dense vegetation that has grown into the access surface and prevents access to the work area.

Overland Access

Western uses primarily overland access inside the transmission line ROWs. Overland access typically is not routinely maintained. Vegetation might need to be cut if it makes the ROW impassable for maintenance vehicles and emergency access. Overland access is typically by all-

terrain vehicles (ATVs), four-wheel drive pickup trucks, snow mobiles, snow cats, and similar vehicles.

2.2.1.4 Transmission Line Maintenance

The need for repairs and preventive maintenance is based on the results of inspections, reliability centered maintenance requirements, and in some cases, routinely scheduled service or actions (e.g., wood pole inspections and treatments). Activities used to maintain transmission lines and associated facilities include periodic aerial and ground patrols; installing, maintaining, and replacing hardware, ground wire, guy wires, and bird guards; replacing wood poles; placing fill or rocks around existing culverts or existing structures; and repairing or replacing conductors, insulators, crossarms, x-braces, and metal supports. Western would do aerial patrols up to three times a year using a helicopter at 60 feet above the conductors for visual inspection. Western would do ground patrols annually, typically using pickup trucks, ATVs, snow cats, or snowmobiles to drive along transmission lines. Either type of patrol could find problems that would require immediate repair or replacement of transmission-line hardware. Equipment and activities needed for repairs would vary greatly. For example, technicians could tighten tower hardware on the spot with hand tools, but repairing a tower footing might require the use of a backhoe. Bulldozers, bucket trucks, or other heavy vehicles could also be used for transmission system maintenance activities.

2.2.1.5 Emergency Actions

In cases of actual system failure or imminent threats to system reliability, public safety, or the environment (e.g., hardware failure, structure failure during ice storms, and trees falling on conductors or structures), Western would take the steps necessary to remedy the situation. These steps include removing problem vegetation from the ROW or nearby areas (trees outside the ROW that could fall on transmission lines) or clearing and repairing access routes to allow repair equipment to access transmission lines or structures. Western would address emergency actions as necessary.

2.2.1.6 Summary of Activities Included in Maintenance

Transmission Line Maintenance

- Ground and aerial patrols
- Ground wire maintenance
- Aircraft warning devices maintenance, including repair and replacement
- Insulator maintenance, including replacements, repairs, or cleaning
- Bird-guard maintenance, including repair and adding bird-guard devices (e.g., anti-perching and anti-fouling devices)
- Bird perching and nesting structure repair and replacement
- Cross-arms maintenance on wood-pole structures, including replacement, repair, and addition
- Steel members of steel lattice transmission line structures, including repair, replacement, and addition

- Hardware on wood and steel transmission line structures, including repair and replacement
- Installation, repair, and replacement of guy anchors and guy lines on wood structures
- Cross-brace and knee-brace maintenance, including repair, replacement, and addition
- Damper maintenance, including repair, replacement, and addition
- Ground-spike maintenance on wood-pole structures, including repair, replacement, and addition
- Ground-rod maintenance, including repair, replacement, and addition
- Armor rod maintenance and clipping-in structures
- Conductor maintenance, including repair and replacement
- Static wire maintenance, including repair, replacement, and addition
- Wood preservative maintenance on wood-pole structures, including inspections and retreatment
- Placement of rocks, mats, and other materials at bases of poles or structures to stabilize erosion
- Remediation of small spills of oil and hazardous materials that occurred incidental to maintenance work (e.g., hydraulic hose failures and overfills)
- Structure mile markers and structure identification number maintenance, including repair, replacement, and addition
- Repair of vandalism such as gunshots to insulators and other structural damage
- Removing soil deposited around tower legs
- Ground-anchors maintenance, including repair, replacement, and addition
- Wood-pole maintenance, including butting, reinforcement, replacement and in-kind replacement of damaged or rotted poles
- Placing fill or rocks around existing towers or structures
- Maintaining identified vehicle and equipment staging areas for work associated with routine maintenance

Access Maintenance

- Installing and repairing fences and gates to control access
- Placing fill or rocks around existing culverts to control erosion
- Repairing erosion on access roads to maintain the existing roadbed
- Grading existing access roads to the existing standard for that road
- Installing rip-rap along creeks and rivers in localized, restricted areas to control erosion, prevent bank degradation, and protect structures and access roads; maintenance and repair, including replacement, of existing culverts
- Vegetation management, including mowing, weed spraying, reseeding, and similar activities
- Manual and mechanical removal or pruning of danger trees or vegetation
- Placing rocks, mats, and other materials at bases of poles or structures to control vegetation growth
- Manual and mechanical removal or pruning of danger trees or vegetation
- Localized applications of herbicides to control weeds and vegetation

2.2.2 Proposed Action

Western proposes to change the way it manages vegetation in the ROWs for the transmission lines it owns, operates, or maintains. As described in Chapter 1, Western manages its transmission line ROWs to ensure the reliability and safety of the transmission lines, ensure adequate access for maintenance, protect the public and ensure worker safety, and manage risk from fire, all while ensuring the protection of environmental resources. The Proposed Action is to issue new authorizations along with the development of new operation and maintenance plans to include managing vegetation along Western ROWs on NFS lands using an integrated vegetation management (IVM) approach. This approach is based on the American National Standard Institute Tree, Shrub and Other Woody Plant Maintenance-Standard Practices (Integrated Vegetation Management, a. Electric Utility ROW (ANSI A300 (Part 7)-2006 IVM). Western would control vegetation growth and fuel conditions that threaten transmission lines. The Proposed Action addresses vegetation management along approximately 273 miles of ROWs, covering a total of approximately 4,055 acres. The Proposed Action would balance the purpose of and need for agency action discussed in Chapter 1 with the need to comply with environmental regulations and Forest Service requirements, protect environmental resources, and incorporate public and agency comments. Western developed design features to protect environmental resources, and will incorporate them into the Proposed Action.

2.2.2.1 Location of the Proposed Action

See Figure 2-1 for the locations of Western transmission line ROWs on NFS lands in Colorado, Nebraska, and Utah. U.S. Forest Service Region 2 manages NFS lands in Colorado and Nebraska, and Region 4 manages NFS lands in Utah. Maps showing the ROWs for the subject forests are included in electronic format. In hardcopy documents, maps can be found on a CD attached to the inside back cover of the EIS.

2.2.2.2 Transmission Line Rights-of-Way

Table 2-1 lists the transmission lines, their ROW widths, and their locations by forest. ROW widths for transmission lines vary by voltage. Each ROW width is designed to ensure that the transmission line is kept a safe distance from other objects and structures, such as trees and buildings. Widths are typically determined by National Electric Safety Codes and engineering and maintenance requirements.

Figure 2-1: Locations of Western Transmission Line ROWs on NFS lands in Colorado, Nebraska, and Utah

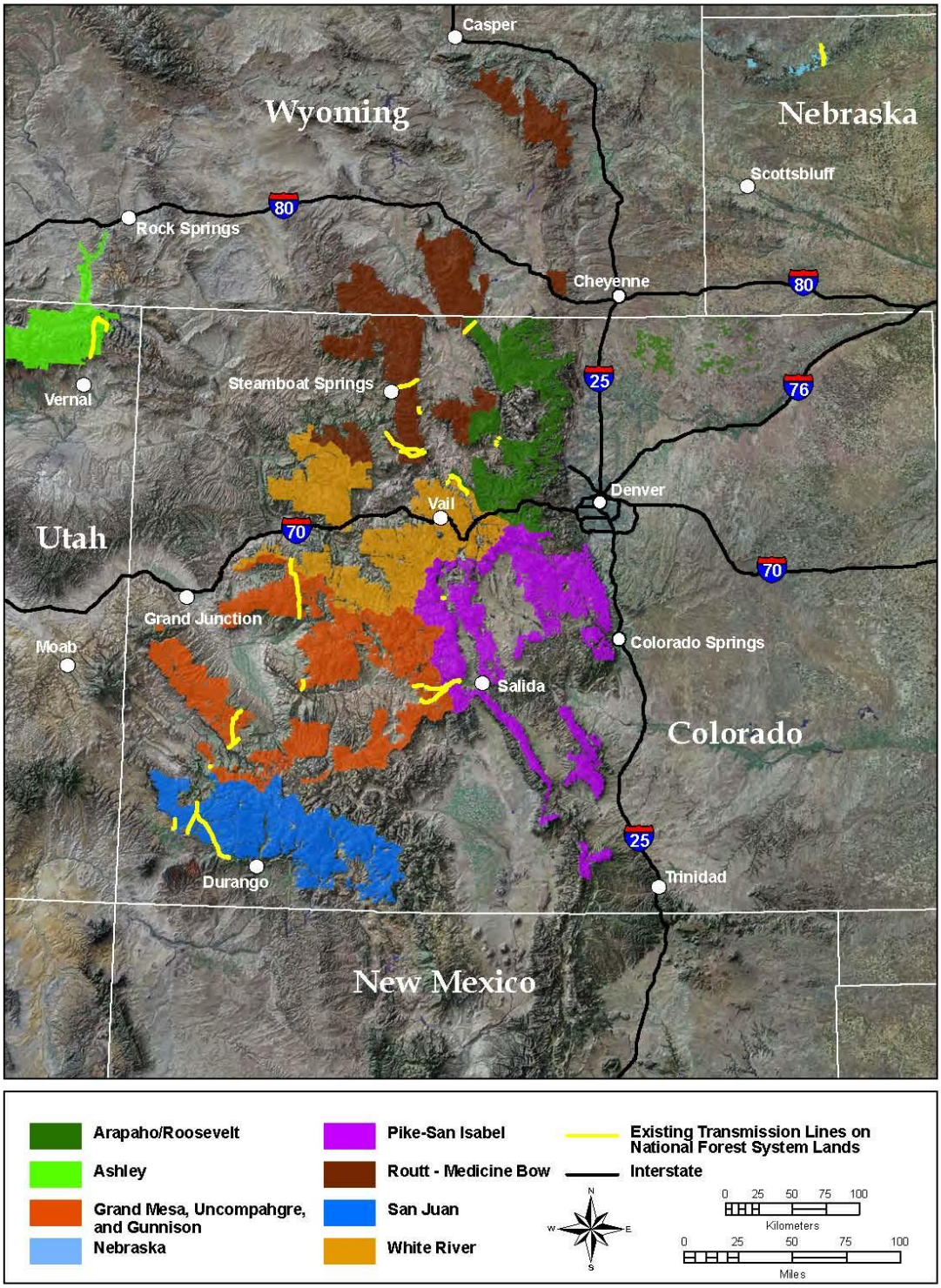


Table 2-1: Transmission Line Rights-of-Way

Transmission Line	National Forest(s) (length)	ROW width (feet)	Length on NFS Lands (miles)	Approximate Acres on NFS Lands
Archer-Hayden 230-kV	Arapaho-Roosevelt (5 miles) Medicine Bow-Routt (13.8 miles)	125	18.8	283.5
Ault-Craig 345-kV	Arapaho-Roosevelt (5.1 miles) Medicine Bow-Routt (13.6 miles)	175	18.7	379
Blue River Gore Pass 230-kV	Arapaho-Roosevelt (6.9 miles) White River (7 miles)	125	13.9	210.4
Box Butte-Chadron [Alliance-Chadron] 115-kV	Nebraska (9.2 miles)	75	9.2	83.4
Curecanti-Lost Canyon [Cortez-Curecanti] 230-kV	Grand Mesa, Uncompahgre, and Gunnison (6 miles) San Juan (14.4 miles)	125	20.4	308.1
Curecanti-Poncha [Curecanti-Midway] 230-kV	Grand Mesa, Uncompahgre, and Gunnison (10.2 miles) Pike and San Isabel (8.4 miles)	125	18.6	281.8
Curecanti-Rifle [Curecanti-Hayden] 230-kV	Grand Mesa, Uncompahgre, and Gunnison (29.7 miles) White River (3.5 miles)	125	33.2	502.5
Flaming Gorge-Vernal #1 138-kV	Ashley (6.6 miles)	80	6.6	62.9
Flaming Gorge-Vernal #3 138-kV	Ashley (19.6 miles)	80	19.6	189.7
Gore-Hayden [Green Mountain-Oak Creek] 138-kV	Medicine Bow-Routt (11.1 miles)	75	11.1	102
Gore Pass- Muddy Pass 69-kV	Medicine Bow-Routt (1.7 miles)	100	1.7	19.7

Table 2-1: Transmission Line Rights-of-Way

Transmission Line	National Forest(s) (length)	ROW width (feet)	Length on NFS Lands (miles)	Approximate Acres on NFS Lands
Great Cut-McPhee 12.5-kV	San Juan (4.9 miles)	30	4.9	17.9
Great Cut Switchyard-Great Cut Tap 115-kV	San Juan (0.2 mile)	30	0.2	0.9
Green Mountain-Blue River 2.4-kV	Arapaho-Roosevelt (1 mile) White River (0.4 mile)	25	1.4	4.4
Green Mountain-Kremmling 69-kV	Arapaho-Roosevelt (2 miles)	100	2.0	24.3
Hayden-Gore Pass 230-kV	Medicine Bow-Routt (21.9 miles)	125	21.9	332.5
Hesperus-Montrose 345-kV	Grand Mesa, Uncompahgre, and Gunnison (18.9 miles) San Juan (31.2 miles)	175	50.1	1,061.8
Malta-Mount Elbert 230-kV	Pike and San Isabel (0.9 mile)	115	0.9	12.5
North Gunnison-Salida 115-kV	Pike and San Isabel (8 miles) Grand Mesa, Uncompahgre, and Gunnison (11.5 miles)	75	19.5	177.6
TOTAL		-	272.7	4,054.9

kV kilovolt
NFS National Forest System
ROW Right-of-way

2.2.2.3 Access

Western needs authorized access routes (see Table 2-2) to maintain transmission lines, including access for vegetation management and routine maintenance, and to ensure worker safety. Western uses a variety of routes to access its transmission line ROWs, including public roads, designated forest roads, trails, and spurs (see Access Map in Figure 2-2). Overland access is generally in the transmission line ROW and provides access to specific structures. Western does not propose new access roads under the Proposed Action; however, the Proposed Action does include access roads and routes as areas that require vegetation management. Western would incorporate design features for access use and maintenance. Under the Proposed Action, Western would maintain access routes using the same methods described under the No Action Alternative.

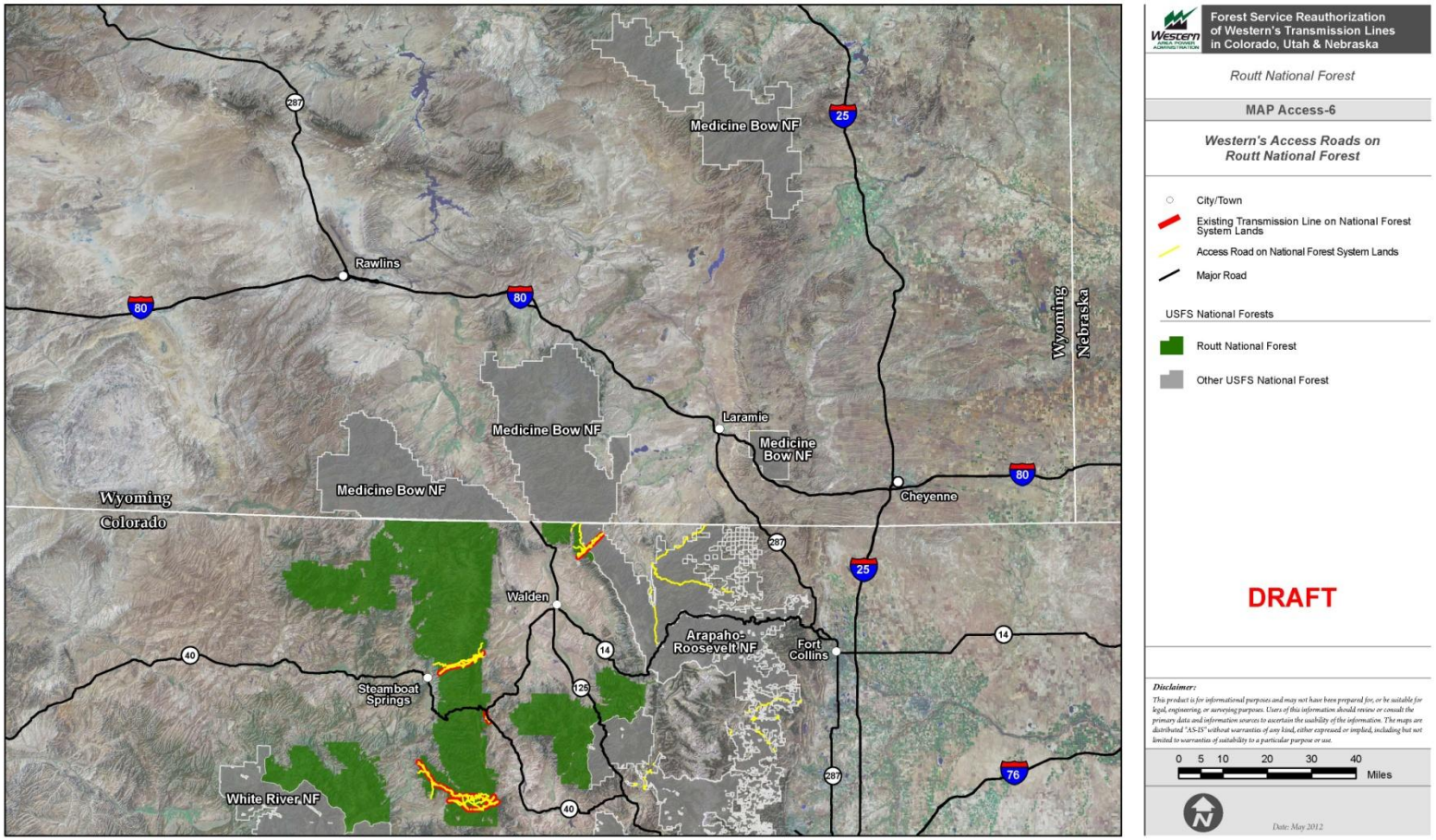
Table 2-2: Access Road Mileage

National Forest	On Forest Service MVUM*	Needs Permitting
Arapaho-Roosevelt National Forests	24.46	10.67
Ashley National Forest	29.45	25.48
Grand Mesa, Uncompahgre, and Gunnison National Forests	181.80	35.39
Nebraska National Forest	13.48	4.0
Pike and San Isabel National Forests	16.46	20.08
Medicine Bow-Routt National Forests	141.67	21.01
San Juan National Forest	0**	40.84
White River National Forest	15.88	14.32
Total	423.20	171.79

*MVUM = Motor Vehicle Use Map
**San Juan National Forest does not have a complete MVUM at this time.

Under the Proposed Action, Western would acquire access authorization from the Forest Service to its structures in the Copper Mountain roadless area on the Arapaho-Roosevelt National Forest. Western would need access by overland travel using four-wheel-drive vehicles such as ATVs or off-road vehicles (ORVs). Access in the roadless area would originate from NFS Road 200 or other NFS roads and proceed as directed by Forest Service representative to minimize unnecessary impacts. Western would incorporate design features into the Operations and Maintenance Plan. The Proposed Action would comply with applicable requirements in roadless areas. Western does not propose to build roads in the roadless area.

Figure 2-2: Access Map



2.2.2.4 Vegetation Management Proposed Practices

Western ROWs are in various conditions concerning vegetation management and fuel loading. For example, there are areas that need relatively little treatment, areas that need significant treatment to bring them to a desirable condition that could then be managed efficiently, and areas with mixed conditions. This is the result of a variety of past actions, including the extent of vegetation clearing along the ROWs when transmission lines were constructed and how these areas were subsequently managed over the years; maintenance practices over many years in a variety of vegetation types that could have contributed to excessive fuel loading in the ROWs; past danger-tree cutting; site conditions (e.g., slope, soil types, rainfall, pine beetle and other beetle attacks, and diseases); tree species distribution; topography; and other variables.
To facilitate the environmental impact analysis for this EIS, Western identified six categories of existing conditions in the ROWs and how it would manage each category to meet the objectives of the Proposed Action. The Proposed Action includes vegetation management options based on the conditions in the ROWs. Table 2-3 summarizes the six categories of existing conditions.

The following definitions help readers understand the Proposed Action and the six categories of existing conditions.

Threshold. Synonyms: action threshold, trigger. The condition of vegetation or fuel load in the ROW that would initiate the need to control it. Factors include maximum desired levels of plant density or height of undesirable vegetation (also called incompatible vegetation), fuel loads, public and worker safety, and the availability of funding and crews.

Maintenance treatments. Vegetation or fuel management methods and activities selected to keep vegetation or fuel in a desirable condition or to restore a desirable condition.

Reentry interval. The estimated length of time to the next vegetation or fuel management treatment. Several variables affect the length of the interval, such as growth rates of undesirable species, availability of human resources to do the treatments, budget constraints, and project priorities.

Initial treatment. The first round of vegetation management activities used to establish a desired condition in the ROW. The initial treatment is typically more equipment- and resource-intensive than maintenance treatments.

Fast-growing undesirable vegetation. A relatively fast-growing species that at mature height typically threatens the transmission line. The species and the site conditions determine growth rate. For example, aspen and lodgepole pine are often fast-growing undesirable species. In less-than-ideal site conditions they might grow more slowly. Conversely, normally slow growing species can be fast growing on high-quality sites.

Slow-growing undesirable vegetation. A species that at mature height typically threatens the transmission line, but it is typically slow growing. Examples are spruce and fir. The growth rate might be a characteristic of the species, or it might be due to a typically faster-growing species on a marginal site, where its growth is much slower.

Fuel load. The amount of fuel, whether dead or alive (green), in the ROW. Undesirable fuel loads could contribute to unacceptable risks to the transmission line from fires. Characteristics that make fuel load undesirable include how easily ignited it is, how hot it burns, how well it sustains fire, how rapidly it burns, how long it will burn, flame lengths, and how much smoke the burn will generate.

Desired vegetation condition. The acceptable or optimal condition of native vegetation in the ROW, which is generally defined by a lack of undesirable species. The species makeup of a desired vegetation condition varies depending on ROW conditions. For example, if a transmission line spans deep ravines high above trees, the desired condition might include tall-growing tree species. In other areas with less power-line-to-ground clearance, the desired vegetation condition would include lower-growth plant species.

Undesirable vegetation. Synonyms: target vegetation, incompatible vegetation, unacceptable vegetation. Vegetation species that present a safety hazard and are unsuitable for the intended use of the ROW, or that at mature height would typically threaten transmission line reliability, operations, or maintenance.

Desirable vegetation. Synonyms: compatible vegetation, acceptable vegetation. Vegetation species that do not present a safety hazard, and are suitable for the intended use of the ROW.

2.2.2.5 Categories of Right-of-Way Conditions and Vegetation Treatment Methods

Western identified six broad categories of ROW conditions on NFS lands. The condition of the vegetation in the ROW determines whether the ROW would need to be treated soon; needs treatment over the longer term, or is unlikely to need treatment for some time. Western routinely monitors ROWs to determine vegetation conditions. Managing fuel loads is also an objective of the Proposed Action covered specifically under Category 6, and Western would manage fuel loads as needed when it treats vegetation in the ROWs.

Table 2-3 lists the six categories of ROW conditions and their treatment methods.

Table 2-3: Categories of Right-of-Way Conditions and Vegetation Treatment Methods

Category	Vegetation	Examples	Frequency of Treatment	Treatment Methods
1	Compatible with the transmission line.	The lines span canyons and there will likely always be adequate clearance between vegetation and the transmission line conductors – even with larger mature trees; a vegetation community that is already a stable, low-growth one (e.g., grasses, forbs, bushes, and shrubs) so that vegetation at mature height is not a threat to the transmission line.	None expected for the duration of the authorization, but ROW monitoring will be needed to ensure conditions have not changed.	None expected.
2	Fast-growing incompatible species that are presently not acceptable, and over the long term, the vegetation is likely to include incompatible vegetation types that would require monitoring and treatment.	Mature lodgepole pine, mature aspen, and other species on high-quality growth sites.	Initial treatment expected within 1 to 5 years. Maintenance treatments are expected to be relatively frequent (expected 2- to 6-year return intervals).	Accessible sites would favor use of mechanized equipment and removal of salvageable material. Inaccessible sites would favor use of hand felling.
3	Fast-growing incompatible species of trees that are in an acceptable condition, but over the long term, incompatible vegetation treatments would be needed.	Immature lodgepole pine and aspen. Other species on high-quality growth sites.	Maintenance treatments are expected to be relatively frequent (expected 2- to 6-year year return intervals, but this will vary depending on site conditions).	Accessible sites would favor mechanized equipment, with removal of salvageable material. Inaccessible sites would favor use of hand felling.

Table 2-3: Categories of Right-of-Way Conditions and Vegetation Treatment Methods

Category	Vegetation	Examples	Frequency of Treatment	Treatment Methods
4	Slow-growing incompatible species of mature vegetation that is not acceptable, and over the long term, treatments for incompatible vegetation would be needed to control re-growth.	Mature spruce and fir. Other species on harsh sites.	Initial treatment is expected within 2 to 5 years, depending on site conditions and vegetation growth. Maintenance treatments are expected to be relatively infrequent on sites with incompatible species with slow growth rates, perhaps 5 or more years, depending on site conditions.	On sites with good access, mechanized equipment would be favored and salvageable material would be removed. On sites with poor access, hand felling and other manual methods would typically be used.
5	These sites have slow-growing incompatible species, and the ROW is in an acceptable condition; but over the long term, the incompatible species would need to be monitored and treated.	Immature spruce and fir. Other incompatible species on harsh sites.	Maintenance treatments are expected to be relatively infrequent, perhaps 5 years or longer, depending on site conditions.	On sites with good access, mechanized equipment would be favored and salvageable material would be removed. On sites with poor access, hand felling and other manual methods would typically be used.

Table 2-3: Categories of Right-of-Way Conditions and Vegetation Treatment Methods

Category	Vegetation	Examples	Frequency of Treatment	Treatment Methods
6	Treatments in these areas of ROW are driven largely by the conditions of the fuel load. Typically, they include areas with low-growing vegetation types characterized by having high fuel loads. Sites are characterized by dense, woody vegetation capable of high-intensity fire, with transmission lines having relatively low conductor-to-ground clearances.	Sagebrush, Gambel oak, dense lodgepole regeneration, and pinion and juniper pine.	Initial treatments are expected. This could include mechanical removal of vegetation near structures and from areas of the ROW. Maintenance treatments as needed. Need is determined from ROW monitoring.	In areas with good access, mechanized treatment such as mowing would be favored. In areas with poor access, manual treatments would typically be used. Gambel oak could be treated with herbicides.

As listed in Table 2-3, actions Western proposes for treating vegetation depend on the species present in the ROW, their growth characteristics, and risks to the transmission line. Western also would consider other factors when determining when and where to implement the treatments, including, but not limited to, the relative risk of the current situation in the ROW to reliability, fire threat, public and worker safety, and availability of funding and crews. The Proposed Action does not impose a single action threshold for all scenarios, nor does it use numerical thresholds (e.g., height of trees).

Table 2-4 summarizes the total acres of ROW conditions in the subject forests.

Table 2-4: Acres of Rights-of-Way in each Vegetation Management Category by Forest

Forest	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Totals
ANF	19.6	2.8	31.1	25.3	59.3	114.5	252.6
ARNF	23.18	47.1	164.3	19.9	17.1	16.6	288.2
GMUG	102.1	111.9	357.7	33.0	123.7	473.3	1,201.7
NNF	79.7	0	0	3.8	0	0	83.5
PSINF	31.4	10.5	55.9	18.3	47.0	48.6	211.7
MBRNF	311.4	113.2	366.9	53.1	69.5	21.4	935.5
SJNF	103.4	46.5	68.7	40.7	356.6	282.4	898.3
WRNF	54.1	35.4	1.9	23.5	0.0	68.5	183.4
Total	724.8	367.4	1,046.5	217.6	673.2	1,025.3	4,054.9

ANF Ashley National Forest
ARNF Arapaho-Roosevelt National Forests
GMUG Grand Mesa, Uncompahgre, and Gunnison National Forests
MBRNF Medicine Bow-Routt National Forests
NNF Nebraska National Forest
PSINF Pike and San Isabel National Forests
SJNF San Juan National Forest
WRNF White River National Forest

Photos 2-1 through 2-17 show areas of ROWs corresponding to the six categories described in Table 2-3. These photos illustrate the types of ROW conditions associated with each category, and represent typical ROW conditions.

Category 1 Conditions - Photo Series 2-1 through 2-3

ROW vegetation is compatible with the transmission line based on topography and presence of natural, stable, low-growing vegetation communities.

Photo 2-1. ROW with natural, low-growing vegetation outside the aspen stands that is compatible with the transmission line.

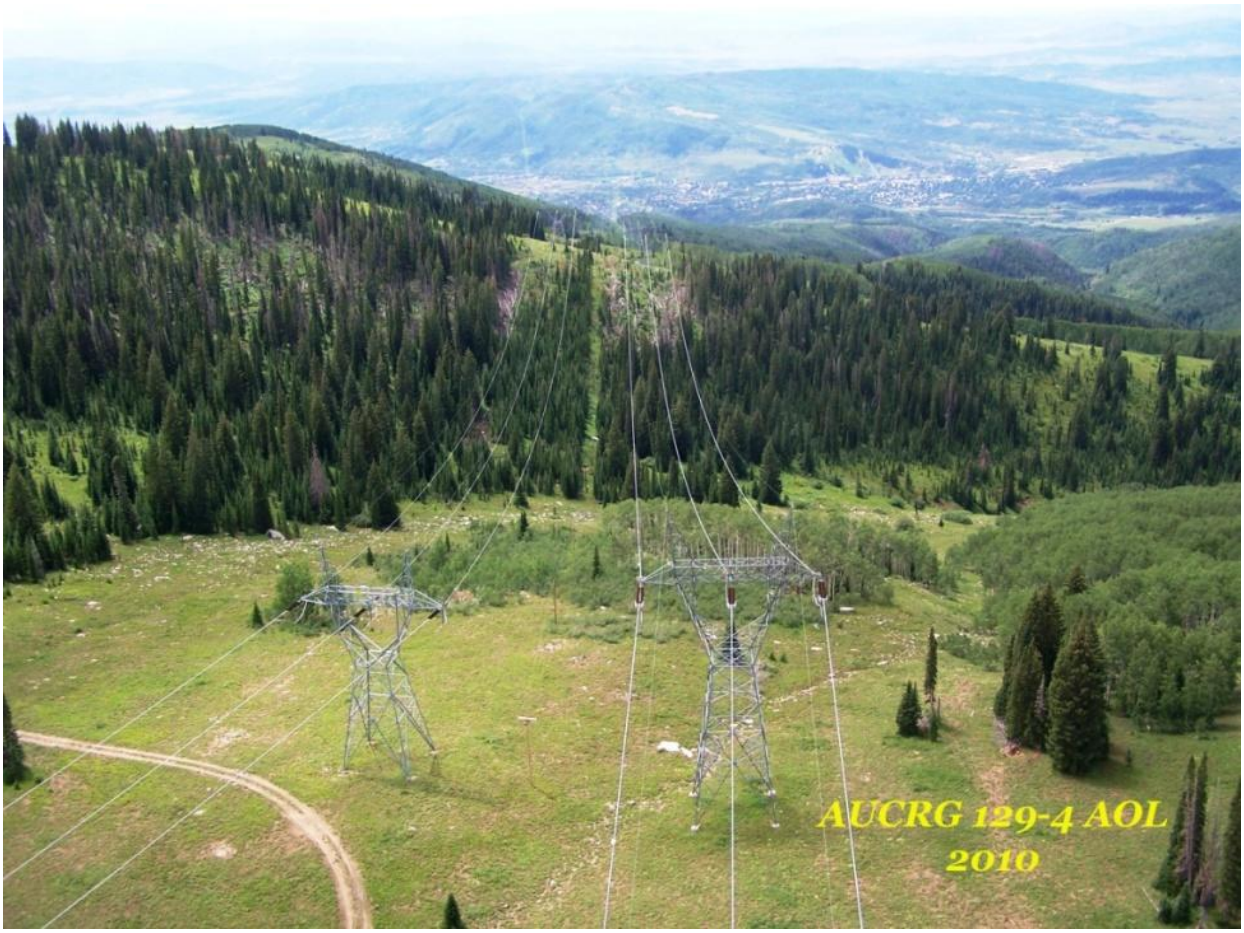


Photo 2-2. The transmission line spans vegetation in a drainage that is unlikely to present a risk to the transmission line, and would not require intensive treatment. Aspen patch immediately behind the foreground towers would require intermittent treatment. Conifers near and in the bottom of the drainage area would not.

Photo 2-3. Transmission line spans vegetation that would not require treatment. However, note that at the structure locations, vegetation is maintained so it would not present problems with access, fuel load, or safety of the structure.

Category 2 Conditions - Photo Series 2-4 through 2-6

Fast-growing incompatible species that are not acceptable; over the long term, the vegetation is likely to include incompatible vegetation types that would require monitoring and treatment.

Photo 2-4. Incompatible conifer and aspen vegetation that would require initial treatment to establish a low-growth condition, which Western would then maintain. In the middle of the photo, note how the aspen in the ROW have vigorously re-grown after numerous treatments.

Photo 2-5. Stands of aspen, a typically fast-growing species, that would need to be cut, after which Western would periodically monitor the site re-treated it as needed.

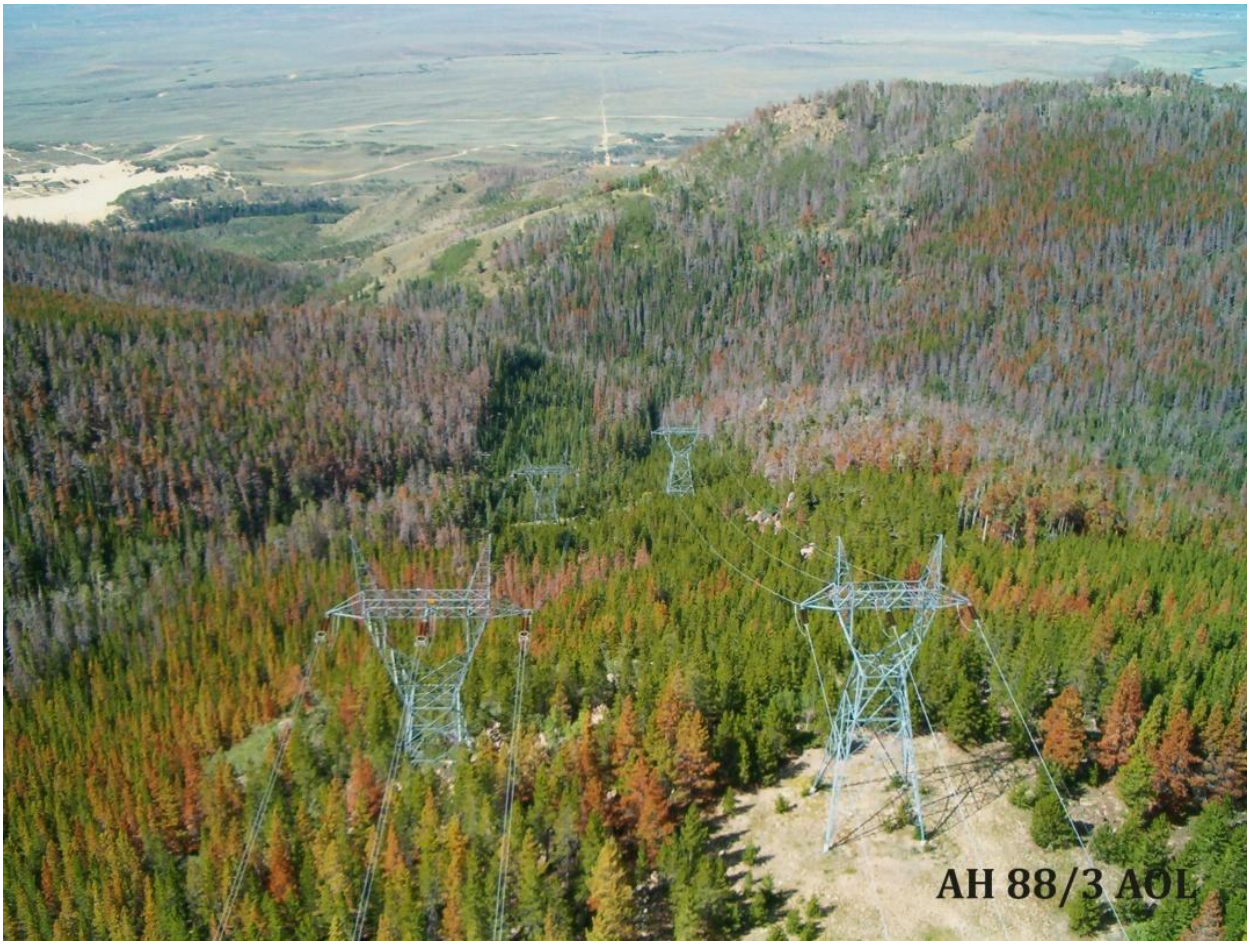


Photo 2-6. The lodgepole pine in the ROW is rapidly re-growing and would need to be treated and maintained.

Category 3 Conditions - Photo Series 2-7 through 2-9

Fast growing incompatible species of trees that are in an acceptable condition, but over the long term, Western would need to treat incompatible vegetation.

Photo 2-7. The ROW was cut when the line was constructed and has been maintained in a desirable condition. Note that aspen and lodgepole pine are the predominant species, with rapid aspen regeneration occurring immediately behind the first transmission line structure. Western would monitor the ROW and treat it as needed to maintain this condition.

Photo 2-8. These parallel ROWs have been maintained in a desirable condition through a stand of predominantly aspen.

Photo 2-9. In the foreground, aspen, a fast-growing incompatible species, would need to be treated and then maintained in a low-growth condition. In the background, slower-growing evergreen species have not become a problem since the line was constructed; this is typical of Category 5 conditions. The photo also illustrates that there can be different types of vegetation conditions in a small section, and underscores the need for routine monitoring of ROWs.

Category 4 Conditions - Photo Series 2-10 through 2-12

Slow-growing incompatible species of mature vegetation that is not acceptable, and in the long-term incompatible; vegetation treatments would be needed to control re-growth.

Photo 2-10. The trees on this site are slower growing, but at maturity would interfere with the transmission line. Western would need to treat the area to establish a lower growth condition, which Western would monitor and maintain as needed.

Photo 2-11. This ROW condition is not acceptable because of the risk the trees pose to the transmission line conductors, and poor access for maintenance.

Photo 2-12. These two parallel lines have different authorizations for vegetation maintenance. The line on the left is in a desirable condition, but Western will monitor it and treat as needed. The line on the right is not in a desirable condition; Western would schedule it for initial treatment and then maintain it in a condition similar to the line on the left.

Category 5 Conditions - Photo Series 2-13 through 2-15

These sites have slow-growing incompatible species, and the ROW condition is acceptable. However, over the long term, Western would need to monitor and treat the incompatible species.

Photo 2-13. Harsher growing site with slower-growing incompatible species that are acceptable, but would require monitoring and longer-term treatment.

Photo 2-14. The condition of this ROW is generally acceptable and relatively stable, but will require monitoring to ensure that the need for treatment can be identified and implemented. Note the low level of aspen re-growth in the lower right corner, which has emerged and must be closely monitored.

Photo 2-15. Although this ROW is generally acceptable, the two larger trees under the transmission line are due for treatment to ensure they do not present a hazard to the line.

Category 6 Conditions - Photo Series 2-16 Through 2-17

Treatments in these areas of ROW are driven largely by the conditions of the fuel load. Typically, they include areas with low-growing vegetation characterized by having high fuel loads. Sites are characterized by dense, woody vegetation capable of high-intensity fire, where transmission lines have relatively low conductor-to-ground clearances.

Photo 2-16. Western would monitor potential fuel loading under the lines and near the structures, and schedule treatment as needed.

Photo 2-17. There are two parallel transmission lines and a pipeline in this utility corridor. This dense vegetation around structures and under the conductors could present a fuel problem. Note the dead vegetation under the transmission line in the foreground.

If the ROW is not in an acceptable condition, the Proposed Action includes an initial treatment to establish a desired ROW condition. If the ROW is in an acceptable condition, Western would maintain it at that state as discussed under the heading Maintain Desired ROW Conditions. During both activities, Western would implement design features to protect resources.

ESTABLISH DESIRED ROW VEGETATION CONDITION

If the vegetation in the ROW does not meet Western's requirements, Western would treat it to reach a desired condition. Western considers the following when developing a proposed desired condition:

- How the existing condition meets or does not meet the purpose of and need for agency action described in Chapter 1.
- Environmental protection requirements and the need to protect resources and incorporate design features.
- The presence, abundance, height, and distribution of woody vegetation that, at mature height, would threaten the transmission line.

- The degree of fuel loading in the ROW and the need to decrease the amount of fuel loading.
- Adequate access to the ROW and structures for vegetation management activities (e.g., presence of woody vegetation, slope, topography, terrain, and soils).

Western would assess current conditions in the ROW to identify areas that need initial treatments based on the categories described above. There are approximately 1,610 acres identified that would need the initial treatment. Treatment of this many acres spread over 273 miles of ROWs requires planning and prioritization to effectively and efficiently accomplish this part of the Proposed Action. Western would prioritize areas that need treatment based on several considerations, including availability of resources, both human and financial; competing priorities; relative risk of the condition to the transmission line; and sensitive or protected species or other sensitive resources.

This proposal includes options for treating the ROW. The initial treatment of ROW vegetation would emphasize the following activities:

- Cut danger trees if any are present.
- Manage slash that has built up in the ROW to reduce fuels density.
- Grind or crush regeneration that has grown in the ROW to reduce the density of live, green fuels.
- Cut tree species that at mature height would threaten safe, reliable transmission-line operation.

If there are no environmental or other issues to be mitigated, Western proposes to remove undesirable vegetation that at mature height would interfere with transmission line safety and reliability. These are typically trees. The desired condition would be a ROW dominated by grasses, forbs, shrubs, and lower-growth tree species that, at maturity, would not interfere with the transmission line.

MAINTAIN DESIRED ROW CONDITION

The vegetation is in a condition that meets Western's purpose and need. Western's proposal includes monitoring and retreating ROW areas at appropriate intervals based on the results of reviews of ROW conditions during line patrols (see Categories 3, 5, and 6 and the discussions under the heading Categories of ROW Condition and Treatment Methods). In ROW areas with relatively low conductor-to-ground clearances, Western would typically retain lower-growth native plant species to maintain the desired vegetation condition. Western would do this through active management to remove tall-growth species. Depending on the specific site conditions, desirable native species could include grasses, forbs, and shrubs, through appropriately sized small or lower-growing tree species. Generally, more selective control methods can be used to maintain this condition along the ROW. ROW maintenance activities and treatment intervals would vary in the ROW depending on the success of previous treatments, vegetation type, rates of vegetation re-growth, environmental protection requirements, and risks to the transmission line.

An important component of ROW maintenance is fuels management to mitigate the risk of wildfires. Western would evaluate the risk to transmission line operations and security from

wildfire and manage fuels in the ROWs. ROW fuel loads associated with vegetation re-growth or control treatments must be evaluated and controlled as needed. All vegetation (dead or live) can be considered fuel because it can contribute to fire intensity and duration. In addition to reducing the risk of incompatible vegetation in a ROW, Western's proposed ROW reclamation and long-term maintenance strategies would address areas where accumulated fuel poses an unacceptable risk.

Western would reduce fuel density in ROWs using mechanical and manual treatment approaches, as described in this section (see Mechanical Fuel Reduction Methods section below). Western would monitor all ROWs. There could be areas that need no or minimal vegetation management – for example, some areas in canyons and drainages or other steep topography in which trees might not grow to heights or densities that would threaten the transmission line that crosses high above (see Category 1). In some of these areas few if any control methods would be needed for years. In other vegetation communities, occasional mowing of vegetation around structures could be needed to ensure access to the structures and to reduce the risk of fire to the transmission line structures (e.g., mowing sagebrush around wooden structures). Regardless, Western would need to monitor all ROWs to continuously evaluate vegetation conditions and ensure they meet the management requirements, and that changed conditions have not resulted in unacceptable threats.

Proposed Vegetation Control Methods

Western proposes several general control methods, individually or in combination, to manage vegetation. These methods include a variety of control methods utilities typically use to manage their ROWs. Section 2.2.1 briefly describes these techniques because Western has been using them in its ROWs as part of routine maintenance. This section provides more information about these techniques. Under the Proposed Action, Western would use the same techniques, but in some areas of its ROWs, Western would use the techniques to alter the vegetation condition so that it can be maintained more efficiently and effectively. The following paragraphs describe the general vegetation-control methods.

Manual Control Methods

Manual vegetation control includes the use of hand-operated powered tools and non-powered hand tools. Manual techniques – mainly using chainsaws – can be used where equipment access is limited by terrain, soil conditions, or other environmental conditions. One or two trucks carrying equipment and workers drive along the access road to the appropriate site. Crews of two or more with chainsaws then hike along the ROW and cut target vegetation. Crews often use ATVs instead of trucks. Crew sizes for this type of activity usually range from two to four.

Using Geotextile Barriers

Geotextile "weed barriers" or landscape fabrics made of synthetic material (actually a physical barrier rather than manual method) can be placed on the ground around plantings in local areas or under gravel yards or surfaces. This is typically done in urban areas where landowners might request it around ornamental plantings. Western may use geotextile barriers under structures with noxious weed problems or where it may control sprouting undesirable species.

Mechanical Control Methods

Mechanical vegetation control uses machine platforms with various interchangeable treatment-head attachments to remove or control target vegetation along transmission line and authorized access route ROWs. Rubber-tired mechanical equipment platforms are generally limited to operating on slopes less than 30 to 35 percent. Specialized tracked equipment platforms, with articulating control cabins, are typically used on slopes up to 60 percent. Both types of specialized equipment platforms can operate with very low ground pressures. However, site-specific obstacles such as rocks or other extreme terrain conditions can reduce their efficiency. Mechanical operations usually involve a crew of two to three.

Feller bunchers. These machines grab trees, cut them at the base, pick them up, and move them to a windrow or onto the back of a truck. The tree is under the machine's control.

Skidders and forwarders. Skidders are tracked or four-wheel drive tractors with winches. They have articulated steering and usually a small, adjustable, push-blade on the front. They are one of the few logging machines capable of thinning or selective logging in larger timber. Forwarders can also haul smaller log lengths than a skidder, but this sometimes limits their range of operation. However, forwarders cause relatively little ground disturbance because material is carried on the back of the forwarder instead of being dragged behind, as with a skidder. Site conditions (e.g., soil moisture and terrain), presence of sensitive environmental resources, and forest conditions dictate the appropriate combination and use of this type of equipment.

Roller-choppers. This technique uses rotating drums towed by a variety of vehicles that roll and chop vegetation and forest debris. A series of blades, steel chains, or other devices attached to the drum chop the vegetation.

Walking brush controllers. These machines have booms, dippers, and other means to manipulate cutting equipment and control vegetation with minimal soil disturbance.

Mowing/grinding. Mechanized heavy equipment with high-speed rotary blades can be used to cut, chop, or shred woody vegetation in ROWs. Target vegetation is typically cut off at ground level, encouraging the selection and recovery of low-growing plant communities consisting of grasses, forbs, and other herbaceous plants. Examples of this type of mowing equipment are Fecon, brush-hog, Track-Mack, and Hydro-Ax.

Herbicides and Growth Regulators

Western would use spot application of herbicides approved for use on NFS lands to treat undesirable, mostly herbaceous vegetation. Western applies herbicides to invasive species. Herbicides are applied directly to the vegetation using a hand or powered sprayer. Herbicides are used on incompatible vegetation that sprouts after initial treatment by cutting or mowing. Herbicide applications typically involve a crew of one to two.

Western uses herbicides that are approved for use in ROW maintenance and by the Forest Service. Western uses Environmental Protection Agency- and state-registered herbicides, and appropriately licensed or certified applicators apply the herbicides following the label requirements.

Herbicides can be applied in different ways, depending on the targeted plants, vegetation density, and site circumstances. Western proposes herbicide treatment either by spot application or localized (site-specific) application.

When making decisions about the use of these methods, Western considers the area being treated, the presence of sensitive plants and other environmental resources, the herbicide label requirements, and whether the method is cost effective and efficient.

Site-Specific Herbicide Application

Site-specific or localized herbicide application is the treatment of individual or small groupings of plants. Western typically uses this application method only in areas of low to medium target-plant density. The application techniques include, but are not limited to, the following:

Basal treatment. Appropriately licensed or certified applicators apply the herbicides using handsprayers or by backpack sprayers. They apply herbicides at the base of the plant (the bark or stem) from the ground up to knee height. The herbicide is usually mixed with an oil carrier to enhance penetration through the bark, and applied to the point short of run-off. These treatments can be done during the dormant season or growing season.

Low-volume foliar treatment. Applicators apply herbicides using a backpack sprayer, or ATVs or tractors with a spray gun. They apply herbicides to the foliage of individual or clumps of plants during the growing season, just enough to wet them lightly. They use a relatively high percentage of herbicide mixed with water. They add thickening agents where necessary to control drift, and might add dyes to see easily what areas have been treated.

Cut stump treatments. Applicators apply herbicide to freshly cut stumps of undesirable vegetation to prevent re-growth by sprouting.

Prescribed Burning

Prescribed fire is a fire intentionally ignited to meet specific land management objectives, such as reducing flammable fuels or prepare an area for new trees or vegetation. Prescribed fire is a management tool that will help manage fuel loads when used under controlled conditions. Prescribed burning is a technique the Forest Service can use for routine maintenance. Energized transmission lines can arc to the ground when smoke is present, which would present potential hazards to persons involved in the burn, and concern for the transmission line and overall electrical system reliability. Any use of fire for vegetation treatment would be conducted by Forest Service or inter-agency fire personnel, and would require a separate site specific NEPA decision. Forest Service fire managers develop detailed fire prescriptions based on weather, moisture content of the fuels, management objectives, public safety, air quality requirements, and other factors before burning is allowed. Although it is a useful tool for vegetation and fuel-loading management in ROWs, many places are not appropriate for prescribe fire.

Burning slash piles could be conducted as part of the maintenance of the ROWs; however, any type of burning would be coordinated through and conducted by the local Forest Service or interagency fire personnel from the local unit.

Livestock or Wildlife Grazing

Western could use targeted grazing to control vegetation in ROWs when appropriate and in coordination with the local Forest Service or managing agency Range Management Specialist and State Wildlife Agency, where applicable.

DEBRIS DISPOSAL

Managing vegetation includes cleanup – the treatment of slash and debris disposal. There are five basic methods of disposing of the vegetation debris generated when vegetation is cut, as follows:

Logging. Marketable timber might be processed and piled for future removal from the ROW.

Chipping. With chipping, a mechanical brush chipping unit cuts brush into chips 10 centimeters (4 inches) or less in diameter. The chips can be spread over the ROW, piled in the ROW, or trucked off the site. Trunks too large to be handled by the chipper are limbed and the limbs chipped. Trunks are placed in rows along the edge of the ROW or scattered, as the situation requires. Spreading chips in the ROW can be an effective ROW management tool to control erosion, reduce soil drying, improve aesthetics in the treated area, control noxious weeds, and control rapid re-growth of undesirable species by sprouting of seeds already in the soil.

Lopping and scattering. With lopping and scattering, some of the branches of a fallen tree are cut off (lopped) by ax or chainsaw, so the tree trunk lies flat on the ground. The trunks are usually cut in 1- to 2-meter (4- to 8-foot) lengths. The cut branches and trunks are then scattered on the ground.

Mulching. Mulching is a debris treatment that falls between chipping and lop and scatter. The debris is cut, shredded, or otherwise broken into 30- to 60-centimeter (1- to 2-foot) lengths and scattered in the ROW.

Pile burning. With pile burning, vegetation debris is piled outside the ROW and burned in small piles. High-intensity burning is a hazard in the ROW and near electric facilities because the smoke can induce flashovers from electrified facilities. Burning also contributes to air pollution and can damage the soil below the burn piles. The fire can escape to other areas if not properly managed. Pile burning in an area outside the ROW would reduce the safety and fire risk issues associated with in-ROW burning. Western would only use burning techniques in partnership with the Forest Service.

MECHANICAL FUEL REDUCTION METHODS

Under the Proposed Action, Western would reduce existing fuel loads through mechanical thinning, mowing, chipping, and debris removal. Western would use site-specific treatments to reduce potential impacts from wildfire on the transmission line by reducing the likely intensity and duration of fires in ROWs. Western would use a range of mechanical and manual methods, depending on site conditions. These include tree removals, mechanical and hand thinning of small-diameter trees to reduce ladder fuels, mechanical mastication (e.g., grinding and chipping), and hand and mechanical piling. The target fuels of these treatments include downed trees, slash, debris from past treatments, green fuels such as regenerated lodgepole pine, and brush such as Gambel oak and sagebrush.

Western would use prescribed burning only under optimum conditions, such as during periods of minimal wind speeds or high moisture content in fuels, to reduce the risk of fire escape and impacts from smoke. Prescribed fire treatments would include mechanical piling and burning and broadcast burns to reduce surface fuels over larger areas. Large pockets of dead and down woody material and slash generated from mechanical treatments would be broadcast burned or piled and burned to further reduce fuel loadings.

2.2.2.6 Proposed Action

NOTE: The Proposed Action addresses each of the eight National Forests individually. To avoid extraneous material Proposed Actions for other Forests have been omitted. These sections are available in the EIS Chapter 2.

This section identifies the ROW conditions in each of the six treatment categories for the affected forest. The text and table identifies the acres of vegetation the Proposed Action would affect by type and category.

Western gathered information about existing conditions along its ROWs and maintained the information in a geographic information system (GIS) database to document baseline conditions. The vegetation data is a modified version of the official Forest Service Region 2 (R2) Vegetation dataset. R2 Vegetation is an infrequently updated broad classification of existing vegetation conditions with minimum mapping units that are too coarse to accurately analyze ROW conditions. Because of this, some areas do not accurately reflect current vegetation conditions. Western modified the R2 Vegetation dataset for all its ROWs to update vegetation polygons and respective species types. Western did this by drawing more detailed vegetation polygons using aerial imagery from the 2009 National Agriculture Imagery Program (NAIP). For the Ashley National Forest, Western used the Ashley National Forest Vegetation dataset and modified it as was done for the R2 Vegetation dataset. Western identified vegetation species using aerial interpretation, field observations and reviewing other vegetation data sources including the Colorado Vegetation Classification Project for national forests in Colorado, and the Southwest Regional Gap analysis data. Western then used the GIS database to record baseline vegetation conditions along the ROWs. Baseline conditions also reflect Western's vegetation management activities through April 2010, including danger-tree removal and other vegetation management to maintain safe and reliable operation of the transmission lines.

Methods for Determining Existing Vegetation Conditions

Western identified 10 vegetation types in Medicine Bow-Routt National Forests. Table 3-31 in the EIS lists baseline vegetation conditions in Medicine Bow-Routt National Forests.

Western used the information in Table 3-31 and the GIS dataset to identify ROW conditions in each of the six treatment categories (see Section 2.2.2.5). Table 2-5 lists the acres of vegetation the Proposed Action would affect by type and category. Maps RNF-1 through RNF-5 display the larger project areas in Medicine Bow-Routt National Forests, and Maps RNF-6 through RNF-35 show the detail associated with each transmission line by project area (maps are located in Appendix 3). Category 1 should require no vegetation treatment, but Western would monitor this category. Categories 2 and 4 would require initial vegetation treatment over the short term. Categories 3 and 5 are areas Western has already treated; however, incompatible species would require continued maintenance. Category 6 identifies areas that could require treatment for fuels reduction.

Table 2-5: Proposed Action in Medicine Bow-Routt National Forests by Transmission Line, Vegetation Type, and Category (acres)

Transmission Line	Species Type	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Total
ARCHER-NORTH PARK								
ARH-NOP / 230kV Maps RNF-6 – RNF-7	Forb	0.8	0.0	0.0	0.0	0.0	0.0	0.8
	Aspen	0.0	0.1	5.2	0.0	0.0	0.0	5.4
	Douglas fir	0.0	0.0	0.0	0.0	0.7	0.0	0.7
	Lodgepole pine	0.0	3.6	19.0	0.0	0.0	0.0	22.6
	Spruce/fir	1.5	0.0	0.0	6.8	1.8	0.0	10.1
	Subtotal	2.3	3.7	24.2	6.8	2.5	0.0	39.5
AULT-CRAIG								
AU-CRG / 345kV Maps RNF-6 – RNF-13	Forb	43.2	0.0	0.0	0.0	0.0	0.0	43.2
	Grass	22.4	0.0	0.0	0.0	0.0	0.0	22.4
	Rock soil	0.2	0.0	0.0	0.0	0.0	0.0	0.2
	Shrub	0.0	0.0	0.0	0.0	0.0	4.0	4.0
	Tufted hairgrass - sedge	3.0	0.0	0.0	0.0	0.0	0.0	3.0
	Willow	5.2	0.0	0.0	0.0	0.0	0.0	5.2
	Aspen	0.0	3.8	42.4	0.0	0.0	0.0	46.2
	Douglas fir	0.0	0.0	0.0	0.0	1.5	0.0	1.5
	Lodgepole pine	0.0	20.3	59.3	0.0	0.0	0.0	79.6
	Spruce/fir	2.0	0.0	0.0	26.0	40.9	0.0	68.9
	Subtotal	76.0	24.1	101.7	26.0	42.4	4.0	274.3
GORE PASS-HAYDEN								
GOT-HD / 138kV Maps RNF-27, RNF-29 – RNF-35	Forb	56.1	0.0	0.0	0.0	0.0	0.0	56.1
	Grass	17.8	0.0	0.0	0.0	0.0	0.0	17.8
	Tufted hairgrass - sedge	5.5	0.0	0.0	0.0	0.0	0.0	5.5
	Willow	2.7	0.0	0.0	0.0	0.0	0.0	2.7
	Aspen	0.0	4.1	0.3	0.0	0.0	0.0	4.3
	Lodgepole pine	0.0	10.6	4.1	0.0	0.0	0.0	14.7
	Spruce/fir	0.0	0.0	0.0	0.8	0.0	0.0	0.8

Table 2-5: Proposed Action in Medicine Bow-Routt National Forests by Transmission Line, Vegetation Type, and Category (acres)

Transmission Line	Species Type	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Total
	Subtotal	82.2	14.7	4.4	0.8	0.0	0.0	102.0
GORE PASS-MUDDY PASS								
GOT-MPS / 69kV Maps RNF-14 and RNF-15	Grass	19.2	0.0	0.0	0.0	0.0	0.0	19.2
	Aspen	0.0	0.5	0.0	0.0	0.0	0.0	0.5
	Subtotal	19.2	0.5	0.0	0.0	0.0	0.0	19.7
HAYDEN-GORE PASS								
HDN-GOT / 230kV Maps RNF-16 – RNF-29	Forb	32.7	0.0	0.0	0.0	0.0	0.0	32.7
	Grass	5.7	0.0	0.0	0.0	0.0	0.0	5.7
	Tufted hairgrass - sedge	10.1	0.0	0.0	0.0	0.0	0.0	10.1
	Willow	9.2	0.0	0.0	0.0	0.0	0.0	9.2
	Aspen	0.0	6.2	16.8	0.0	0.0	0.0	23.1
	Lodgepole pine	11.5	46.8	172.1	0.0	0.0	0.0	230.4
	Spruce/fir	0.0	0.0	0.0	10.6	10.8	0.0	21.4
	Subtotal	69.2	53.0	188.9	10.6	10.8	0.0	332.5
HAYDEN-NORTH PARK								
HDN-NOP / 230kV Maps RNF-8 – RNF-13	Forb	42.5	0.0	0.0	0.0	0.0	0.0	42.5
	Grass	16.4	0.0	0.0	0.0	0.0	0.0	16.4
	Shrub	0.0	0.0	0.0	0.0	0.0	17.4	17.4
	Willow	3.7	0.0	0.0	0.0	0.0	0.0	3.7
	Aspen	0.0	7.9	27.7	0.0	0.0	0.0	35.6
	Lodgepole pine	0.0	9.4	19.9	0.0	0.0	0.0	29.3
	Spruce/fir	0.0	0.0	0.0	8.9	13.7	0.0	22.6
	Subtotal	62.6	17.3	47.6	8.9	13.7	17.4	167.5
ALL LINES								
	Forb	175.4	0.0	0.0	0.0	0.0	0.0	175.4
	Grass	81.4	0.0	0.0	0.0	0.0	0.0	81.4
	Rock Soil	0.2	0.0	0.0	0.0	0.0	0.0	0.2
	Shrub	0.0	0.0	0.0	0.0	0.0	21.4	21.4

Table 2-5: Proposed Action in Medicine Bow-Routt National Forests by Transmission Line, Vegetation Type, and Category (acres)

Transmission Line	Species Type	Category 1	Category 2	Category 3	Category 4	Category 5	Category 6	Total
	Tufted hairgrass - sedge	18.6	0.0	0.0	0.0	0.0	0.0	18.6
	Willow	20.8	0.0	0.0	0.0	0.0	0.0	20.8
	Aspen	0.0	22.6	92.4	0.0	0.0	0.0	115.1
	Douglas fir	0.0	0.0	0.0	0.0	2.2	0.0	2.2
	Lodgepole pine	11.5	90.6	274.4	0.0	0.0	0.0	376.6
	Spruce/fir	3.5	0.0	0.0	53.1	67.2	0.0	123.8
	Total	311.4	113.2	366.9	53.1	69.4	21.4	935.5
Summary (percent)		33	12	39	6	7	2	100

NOTE: Due to rounding and other GIS-related issues, some numbers may not sum correctly.

Proposed Action in RNF

This section describes how Western would implement the Proposed Action in Medicine Bow-Routt National Forests. There are six different transmission lines that cross Medicine Bow-Routt National Forests-managed NFS lands, crossing 59 miles. The ROWs have variable widths and cover approximately 935.5 acres.

The 311.4 acres (33 percent) in Category 1 include a variety of vegetation types (primarily grasses and forbs) that would require no treatment because the vegetation is compatible, and Western expects it to remain so through the duration of the authorization. This total includes approximately 15 acres of lodgepole pine and mixed conifer not identified for treatment due to adequate conductor-to-canopy clearance. Western would monitor the ROWs and document conditions.

Western would treat approximately 113.2 acres (12 percent) of lodgepole pine and aspen in Medicine Bow-Routt National Forests within the first year of authorization because they are currently in an unacceptable condition and are fast-growing species (Category 2). Western would treat approximately 366.9 acres (39 percent) of immature lodgepole pine and aspen, almost half of which is on the Hayden-Gore Pass line, within 2 to 6 years; these trees are in an acceptable condition due to previous vegetation management activities (Category 3). They would require treatment over the short term (within 2 to 6 years). Both of these categories are associated with relatively frequent maintenance treatments, with a return interval of 2 to 6 years.

There are approximately 53.1 acres (6 percent) of spruce/fir not in an acceptable condition; about half of this vegetation type is on the Ault-Craig line (Category 4). Western anticipates initial treatment within 2 to 5 years of the authorization. Because Category 4 includes slow-growing, mature vegetation, Western expects maintenance treatments to be relatively infrequent, with a return interval of 5 or more years.

There are approximately 69.4 acres (7 percent) of immature spruce and fir in Medicine Bow-Routt National Forests that would require treatment within 5 or more years after authorization. These are slow-growing species that are acceptable, but they will eventually require treatment to maintain the desired condition (Category 5). Most of this vegetation is on the Ault-Craig line. Western expects Category 5 maintenance treatments to be relatively infrequent, with a return interval of 5 or more years.

Category 6 identifies areas that could require vegetation management for fuels reduction. Western might treat approximately 21.4 acres (2 percent) of shrubs along the Hayden-North Park and Ault-Craig lines as funding becomes available.

2.2.2.7 Design Features

Table 2-6 lists the Proposed Action design features. Western developed the design features to protect environmental resources, and will incorporate them into the Proposed Action. The Standard Operating Procedures for the No Action Alternative in Table 2-7 are also a part of the Proposed Action if they are at least as stringent and do not conflict with the design features.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
	Air Quality
1	Western shall use practical methods and devices that are reasonably available to minimize emissions of air contaminants. This includes particulates from soil disturbance, excessive exhaust from internal combustion engines, etc.
2	Equipment and vehicles that show excessive emissions of exhaust gases due to poor engine adjustments, or other inefficient operating conditions, shall not be operated until corrective repairs or adjustments are made.
3	Use reasonably available methods to prevent or control emissions of dust and fumes to the air. Dust shall be controlled in areas where nuisance dust could disturb nearby residences, public activities, or other sensitive resources, or where local or state air quality regulations require it. Vehicles and other equipment with internal-combustion engines must be maintained and tuned to limit emissions of fumes and particulates.
	Soils
4	Activities shall be conducted to minimize scarring or defacing of the natural surroundings in the vicinity of the work.
5	Operate heavy equipment only when soil moisture is below the plastic limit or protected by at least 1 foot of packed snow or 2 inches of frozen soil. Soil moisture exceeds the plastic limit if the soil can be rolled into a 3-millimeter (0.12-inch) thread without breaking or crumbling.
6	Organic ground cover shall be maintained so that pedestals, rills, and surface runoff are not increased. Maintain a ground cover of 70 percent or more in the activity areas.
7	Chipped material depth could be limited based on further coordination with the Forest Service. Areas exceeding depth and cover limits should be respread.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
8	If landings, roads, or skid trails are constructed by removing topsoil: Topsoil will be stockpiled for respreading. Inclusion of stumps and woody debris with topsoil will be minimized. Handling topsoil during wet conditions will be avoided. Topsoil piles will be protected from traffic and water erosion, and will not be buried by slash. The consistency of the surface of the respread topsoil will be suitable for the subsequent seeding (if seeding is to be done). Slash will be scattered on the soil surface to provide some erosion control until vegetation is established. Where rehabilitation treatments will include both tillage and topsoil respreading, the sequence of operations will be planned to avoid recompacting tilled areas. Tilling can take place after topsoil is respread with a minimum of mixing.
9	All scarification and other site preparation work should be laid out with the terrain contour.
10	Restrict roads, landings, skid trails, concentrated-use sites and similar soil disturbances to designated sites (REF 3003).
11	Where soils are susceptible to the formation of a significant hydrophobic layer (i.e., those with a surface layer of sandy loam or coarser), conduct prescribed burns so as to avoid high-temperature, long-duration burns. Slash and other woody material to be burned shall be sited on planar or convex slopes to avoid concentrated runoff flowing through the burned area.
12	Water turnoff bars or small terraces shall be constructed across ROW trails on hillsides to prevent water erosion and to help establish natural revegetation on the trails.
13	When work is finished, all work areas except access trails shall be left in a condition that will help with natural revegetation (unless reseeding, mulching, or other specific requirements apply), provide for proper drainage, and prevent erosion. Seeding and mulch requirements will be specified. Seed mix will be approved by the Forest Service. All seed, mulch, and hay approved for use will be properly certified as weed-free.
	Riparian Areas, Aquatic Resources, and Water Quality
14	Equipment staging areas and refueling locations will be at least 250 feet away from streams and wetlands. Spill prevention and containment measures will be used at all staging areas and refueling locations. A Spill Prevention, Control and Containment Plan will be prepared.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
15	Vehicles, including heavy equipment, trucks, and ATVs, will be allowed to cross perennial and intermittent streams with defined beds and banks at open channel crossings (without bridges or culverts) only at locations designated by the Forest Service. If the Forest Service determines that it is needed, open channel crossing locations will be repaired following use to restore the channel to appropriate dimensions, stabilize stream banks and prevent erosion, and allow vegetation to recover.
16	Equipment will not be permitted within 100 feet of the edge of streams or the edge of riparian or wetlands/fens vegetation except as noted below and authorized by the Forest Service. Hand felling of hazardous trees is permitted within the 100-foot buffer.
17	For trees felled within riparian buffers: Trees should be directionally felled away from streams and wetlands in areas immediately next to culverts (within 50 feet) or when trees are too small to be sufficiently anchored and would create problems during high flows by being transported downstream and potentially block culverts. Trees large enough to be anchored and that would provide instream aquatic habitat should be felled directly across the stream. This simulates natural conditions and provides a large woody component to the stream for aquatic organism and fisheries habitat. In perennial streams with fish, the Forest Service will decide which trees will be felled across the stream and used for habitat which will be felled away from the stream. Trees should be removed using at least one-end (partial) suspension. Trees should not be skidded across perennial or intermittent stream courses.
18	For isolated wetlands in the power line corridors, trees within the wetland and wetland buffer should be left standing if the trees will not violate applicable electrical safety standards.
19	For some streams, terrain might limit the extent of riparian vegetation and upland vegetation within the water influence zone. For these streams, conventional logging equipment may be used within the water influence zone with Forest Service approval. Larger trees and woody debris should be kept in the riparian zone and be used for instream aquatic habitat when feasible and consistent with protection of other resources.
20	Burn piles will be located away from perennial streams, lakes, ponds, wetlands, and riparian areas. The minimum distances are 50 feet for handmade piles and at least 200 feet for machine-made piles. For intermittent or ephemeral streams, handmade burn piles would be located 50 feet from or outside of the inner gorge, whichever is less.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
21	Isolated wetlands in the ROW that might occur under tree canopy, or seasonally, might not have been mapped and might not be visible on aerial photos. To avoid or minimize impacts to these areas, ROW corridors will be surveyed to identify and delineate wetlands and riparian areas before using mechanical equipment so that the appropriate design features are planned and implemented.
22	Waste waters from construction-type operations shall not enter streams, water courses, or other surface waters without use of turbidity-control methods, such as settling ponds, gravel-filter entrapment dikes, filter fences, approved flocculating processes that are not harmful to fish, recirculation systems for washing of aggregates, or other approved methods. Waste waters discharged into surface waters shall be essentially free of suspended material. These actions shall comply with all applicable NPDES stormwater permitting requirements.
23	Minimize activities in riparian areas or spanning riparian areas. Avoid disturbance to riparian vegetation whenever practical.
24	Minimize the crossing of riparian areas with equipment and vehicles during maintenance activities. Use existing bridges or fords to access the ROW on either side of riparian areas.
	Winter Logging
25	In areas with soils with high susceptibility for compaction, activities will be limited when soils are "too wet" (as described under Soils). If harvesting during conditions when soil wetness cannot be determined (i.e., when soil is covered with snow), either a soil scientist will be consulted or the following guidelines will be used: Frozen soil is 4 inches deep OR Compactable snow or a combination of compactable snow and frozen soil is 12 inches in thickness. Snow quality should compact and form a running surface for equipment by being moist and non-granular. Designated skidtrails are NOT REQUIRED except for other resource concerns. Conditions that would be monitored closely during operations are soil being "too wet" (as described under Soils); bare soil in trails; and day-time temperatures exceeding 35 °F for an extended period.
26	For soils rated low or moderate for susceptibility to compaction, harvesting will not be done when soils are "too wet" (as described under Soils). These soil types may be harvested on year-round as long they are not wet. Snow or frozen soil is not required to protect soils.
	Noxious Weeds and Invasive Species
27	Noxious weeds will be controlled and managed pursuant to Forest Service Manual 2900 - Invasive Species Management.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
28	Off-road equipment shall not be moved into the project area without having first taken reasonable measures to ensure it is free of soil, seeds, vegetation matter, or other debris that could contain noxious weed seeds. Equipment may also be inspected before moving it from areas infested with invasive species of concern to areas free of invasive species. Reasonable measures include pressure washing or steam cleaning in an off-site location where containment of oil, grease, soil, and plant debris provides optimal protection of project areas. All equipment surfaces should be cleaned, especially drive systems, tracks, and "pinch points" to ensure removal of potentially invasive species.
29	Revegetation might be required in areas where ground cover is disturbed (e.g., landings, burned slash-pile sites, and skid trails). If required, areas will be revegetated using approved certified weed-free seed mixes to prevent soil erosion or noxious weeds.
30	Herbicides selected for use will be registered, approved for ROW application, and applied following the label requirements by appropriately licensed or certified applicators. Herbicides approved by the Forest Service for use on NFS lands will be used. Herbicide use on NFS lands will comply with Forest Service requirements.
31	Staging areas should be located in areas not infested with invasive species.
32	Work in uninfested areas first, and then move to infested areas.
33	Designate travel pathways that are free of invasive plants where possible. If an infested pathway is the only choice, pre-treat that travel corridor with the appropriate herbicide before work activities whenever possible.
34	Project materials such as gravel, sand, and fill would be obtained from weed-free sources to the extent practical and will be maintained weed-free during transport to the project site and while in storage there.
35	Green woody conifer debris under 4-inch diameter can be lopped and scattered to minimize insect populations. Green pine or fir tree debris over 4-inch diameter needs to be removed, burned, chipped or bucked to 4 feet lengths to minimize Ips species in pines or western balsam bark beetles in subalpine fir. Spruce and Douglas-fir tree boles over 8-inch diameter need to be removed, debarked or bucked to 2 feet lengths to minimize risks of spruce beetle or Douglas-fir beetle build-up.
	Rare Plants
36	Before implementing new vegetation treatments and ground-disturbing maintenance activities, the project area will be reviewed using existing data or, if appropriate, surveyed using established protocol, where available, for listed and proposed threatened, endangered, and sensitive plant species and plant species of local concern.
37	The Forest Service will identify activity restrictions and requirements in areas of known declining plant species (e.g., timing and measures to provide connectivity/linkage of habitats) so that the activity would not increase the trend toward federal listing or loss of population viability.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
38	Activities potentially occurring in habitats needed by sensitive species would be modified in coordination with the Forest Service.
	Wildlife (General, including Management Indicator Species)
39	Activities that could occur in areas with sensitive species, sensitive life-cycle needs (e.g., lambing areas, crucial winter ranges, and sensitive nesting areas) would be modified to minimize or avoid adverse impacts based on additional coordination with the Forest Service.
40	Avian nesting surveys would be performed before activities to ensure ground-disturbing activities do not result in the "take" of an active nest or migratory bird protected under the MBTA. If activity occurs during the raptor nesting seasons, surveys would be performed and buffers established to ensure noise and human disturbance do not result in nest abandonment.
41	When treatments occur on or near known amphibian breeding sites, a decontamination protocol could be required to prevent the spread of chytrid fungus. This would be predicated on whether the equipment has been exposed to sites that are known to harbor or are highly suspected of harboring chytrid fungus.
42	The Forest Service will identify activity restrictions (e.g., activity timing and vegetation management prescriptions) so the activity will not result in adverse effects, a trend toward federal listing, or loss of viability in the project area.
	Clean maintenance vehicles and machinery and treat as needed before beginning work or next to waterways in the effort to reduce potential spread of Whirling Disease.
	Slash Disposal/Fuels Treatments
43	Material, including tops, limbs, boles, non-salvageable trees, and other woody material, resulting from tree felling or removal operations should be treated to a fuels profile that promotes surface fire behavior of less than 4-foot flame lengths (maximum fireline intensity of 100 BTU/ft/s) under the average severe fire weather conditions.[1] To achieve the desired surface fire behavior, the resulting fuel bed should show one of the following: Low fuel loading such as that represented under Fuel Models (FM) such as Timber Litter (TL) 3, TL 5, FM8 or FM9. A highly compacted fuel bed (crushed, chipped, masticated[2], or lopped and scattered. For reference to fuel models see (REF 3132) and (REF 3130).
44	For fire prevention, all internal-combustion engines will be equipped with a spark arrester approved in the USDA Forest Service "Spark Arrester Guide" (published by San Dimas Technology & Development Center 2007).
	Cultural Resources

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
45	A Cultural Resource Inventory and consultation, in accordance with appropriate Programmatic Agreement (Appendix E), will be completed prior to individual project implementation.
46	Activities will comply with appropriate Programmatic Agreement or Section 106 and other applicable requirements.
47	If previously unidentified prehistoric or historic materials are found during the course of the proposed activity, work in that area will cease. Work in the area of the cultural resource will not resume until the site has been evaluated for cultural materials and potential effects, and Section 106 is complied with. The discovery must be protected until notified to proceed by the authorized officer.
48	If the SHPO or a Native American tribe so requests, the Forest Service or Western will further consult to identify properties of traditional cultural and religious significance to tribes or other interested parties.
	Transportation
49	Slash and debris will be kept out of road ditches and drainage channels.
50	Hauling that results in excessive road damage and could contribute to possible sediment discharges into stream channels will be suspended on native surface roads during periods of precipitation. Hauling will be suspended until the road subgrade can adequately carry trucks and there would be no road damage.
51	On haul roads, ruts, holes, and washboards shall be removed by scarifying or cutting the bottom of the defects. Such cut material shall be regraded and compacted at suitable moisture content over the traveled way. Fines accumulated while blading roads or from drainage ditches shall not be wasted over fill shoulders.
52	Water bars, out sloping the prism, and cross drains will be installed as needed to remove surface water and stabilize road surfaces. Stumps, rocks, slash, and logs will be placed on the ripped road surface to a density and depth to mimic the surrounding ground. Specific rehabilitative methods would be determined case by case.
53	Gates or other closures will be installed as needed to prevent unauthorized use of access roads that are not open to public travel, and closure signs will be posted.
54	Access to water-related facilities will be maintained.
55	Reclaim abandoned access routes in transmission-line ROWs.
	Visual
56	Clumps or islands of trees will be left in openings of danger tree removal (where sagging lines and ground clearance are not a concern) to break sight distance and to maintain natural-appearing landscape mosaic pattern.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
57	Minimize Visual Effects by: Limit the use of foliar application of herbicide to reduce creation of large areas of browned vegetation. At road crossings, highway or visual overlooks, leave sufficient vegetation, where possible to screen views of the right-of-way. If the area is visually very sensitive consider (1) softening the straight line of corridor edge by cutting some additional trees outside the ROW; or (2) if possible, leaving some low-growing trees within the ROW; or (3) implement a less-aggressive treatment of the ROW and ensuring a higher frequency of monitoring vegetation conditions and scheduling re-treatments when needed. Treating unnatural-appearing soil disturbances. Smooth piles of soil created by machinery or any other soil disturbance from machine piling within 100 feet of areas requiring Partial Retention VQO/Moderate SIO or higher, scenic byways, hiking or multi-use trails, camping areas, other areas of moderate to high use recreation, or any other areas of visual significance. Best Management Practices. BMPs shall be implemented, such as for tractor skidding design, erosion control, and protection of meadows, streamcourses, and aquatic resources may apply to biological, soil, or other resource areas and would also apply to visual resources in that they indirectly protect aesthetics and prevent impacts that would dominate the visual landscape during and after project implementation.
	Developed Recreation Sites, Trails, Trailheads, and Administrative Sites
58	Western would coordinate closure of trailheads, administrative sites, campgrounds, and travel corridors with the local Ranger District to minimize impacts to the public and other permitted users.
59	Western would coordinate closure of motorized or nonmotorized trails with the local Ranger District to minimize impacts to the public. Coordination would include identifying if alternative routes are available for trail closures, unless it would interfere with wildlife travel, interfere with maintenance of the ROW, or impact other resources.
60	Western would coordinate closure of NFS roads with the local Ranger District to maintain access to developed recreation sites, trails, or trailheads outside transmission-line ROWs to minimize impacts to the public. Coordination would include identifying if alternative roads providing access are available, unless it would interfere with wildlife travel, interfere with maintenance of the ROW, or impact other resources.
61	Western will post advance notice of trail closure at trailheads or nearby developed recreation sites or recreation areas. Notices will include duration of the trail closure and whether an alternative route is available. If an alternative route is available, a map of the route will also be posted.

Table 2-6: Design Features for the Western Area Power Administration Proposed Action Alternative

Record Number	Design Features
62	Use of noise-generating equipment next to campgrounds would be limited to daytime hours.
63	Slash and debris will be kept out of motorized and nonmotorized trails.
	Scenic Byways, Special Interest Areas, and Research Natural Areas
64	Tree cutting and clearing should be done by hand in power line corridors that are next to or cross scenic byways, special interest areas, and national recreation areas. Boles will be left in place; slash will be lopped and scattered to a depth of less than 24 inches unless it would result in unacceptable fuel loading, interfere with wildlife travel, interfere with maintenance of the line, or impact other resources.
	Public Safety
65	Maintenance Level 2 roads shall be temporarily closed to general public access during felling, slash treatment, or removal operations. Temporary closures may range from 1 day to 2 weeks.
	Waste Management
66	Sanitary wastes, oils, greases, fuels, refuse, and garbage must be managed and controlled. Oils, fuels, greases, antifreeze, and other liquid chemicals must be controlled to prevent spills. They must not be stored within 250 feet of a drainage, whether wet or dry, or lakes, wetlands, fens, or other surface water. Equipment will not be fueled or serviced within 250 feet of surface water. Spills must be promptly cleaned up and contaminated soils and debris must be properly disposed of in approved landfills or by other approved methods. Solid waste materials must be removed from the area and disposed of appropriately. No chemicals or solid wastes will be buried in the Western ROWs or disposed of in areas not approved as disposal facilities.

[1]Average severe weather conditions (High Percentile or 90th Percentile Weather Conditions) were obtained from the Colorado Wildfire Risk Assessment (Weather Influence Zones) or analysis of the applicable fire weather stations in Nebraska and Ashley national forests. Depending on the locations of the transmission lines, Western will apply a different set of weather conditions. The following table identifies the weather conditions in each national forest:

National Forest(s)	WIZ/Weather Station	1-hour TL	10-hour TL	100-hour TL	Live herbaceous fuels	Live woody fuels	20 Foot Wind Speed	Maximum probable wind gust
Ashley	Cart Creek (Zone 442) Diamond Rim (Zone 443)	2 3	3 3	5 5	30 30	60 60	8 17	23 36
Arapaho-Roosevelt	East-WIZ 3 (Corral Creek) West-WIZ 2 (Dowd)	4 4	6 6	10 10	31 24	80 80	12 15	29 33
Grand Mesa, Uncompahgre, and Gunnison	East-WIZ 5 (Taylor Park) West-WIZ 6 (Morefield)	4 4	5 4	8 7	27 37	76 71	13 12	30 29
Nebraska	Kings Canyon	3	4	9	31	87	7	21
Pike and San Isabel	WIZ 5 (Taylor Park)	4	5	8	27	76	13	30
Medicine Bow-Routt	West-WIZ 2 (Dowd)	4	6	10	24	80	15	33
San Juan	NW Dolores WIZ 6 (Morefield) SE Dolores WIZ 7 (Sandoval)	4 3	4 4	7 6	35 37	71 68	12 9	29 24
White River	WIZ-5 (Taylor Park)	4	5	8	27	76	13	30

[2]If mastication (synonymous with mulching or slash busting) is a selected treatment method, a vertical shaft masticator with sufficient horsepower and hydraulic system performance to perform efficiently is recommended, because the materials would be better distributed (less than 60 percent of surface covered by 4 inches maximum depth of chips) and there is less soil disturbance necessary to achieve the desired fuel profile.

°F degrees Fahrenheit
ATV all-terrain vehicle
BTU/ft/s British thermal unit per feet per second
MBTA Migratory Bird Treaty Act
NFS National Forest System
NPDES National Pollutant Discharge Elimination System
ROW right-of-way
SHPO State Historic Preservation Office
TL timber litter
WIZ Weather Influence Zone

2.2.2.8 Standard Procedures Common to All Alternatives

Table 2-7 lists the standard maintenance procedures common to the No Action Alternative and the Proposed Action.

Table 2-7: Standard Maintenance Procedures for the Western Area Power Administration Reauthorization Project

Record Number	Procedure
	AIR
A-1	Do not use equipment that has excessive exhaust emissions because they are in need of repair.
A-2	Use practical methods and devices to control air emissions. Emissions include dust from soil disturbance and other maintenance activities, and particulates from internal combustion engines. For example, control excessive dust emissions with water, minimizing dust generation on windy days. Use appropriate emissions controls on vehicles. Minimize long idling times on vehicles.
	SOILS
S-1	Minimize maintenance in wet periods and on wet soils to prevent excessive rutting, erosion, and compaction.
S-2	Limit disturbance and removal of soils and vegetation during maintenance activities. Determine well beforehand if a SWPP Plan is required under Section 404.
S-3	Construct water turnoff bars or small terraces across ROW trails on hillsides to prevent water erosion and to help establish natural revegetation.
	WATER
W-1	Water drainages will not be redirected so that the water would follow a shorter course to natural drainages. Rainwater or ground water that collects in an excavation (i.e., a hole dug to replace a damaged structure) will not be drained into surface water (i.e., a wetland, stream) without the appropriate permit.
W-2	All spills will be cleaned up immediately. There will be no refueling, chemical storage, chemical mixing near (e.g., less than 250 feet) surface water.
W-3	Do not stockpile or deposit job materials such as gasoline, chainsaws, garbage containers, and so forth near stream banks, wetlands, lake shorelines, or other surface water. Ensure that project materials are staged away from potential high water areas or storm runoff drainages. Comply with applicable NPDES requirements and obtain required permits.
	HERBICIDES
H-1	All herbicide applicators shall be trained and licensed/certified in the appropriate categories.
H-2	Ensure that protected plant species locations are avoided when applying herbicides.
H-3	All herbicide labels shall be strictly followed.
H-4	If posting and re-entry intervals are specified in the herbicide label, they will be enforced.

Table 2-7: Standard Maintenance Procedures for the Western Area Power Administration Reauthorization Project

Record Number	Procedure
H-5	There will be no aerial application of herbicides for routine maintenance practices.
H-6	Herbicides and application equipment shall be secured and not left unattended in areas with unrestricted access.
H-7	All storage, equipment cleaning, residue disposal, container rinsing, and rinsate disposal requirements shall be followed.
H-8	Herbicides used near surface water such as wetlands, riparian areas or streams and springs would be approved for use near aquatic environments.
	BIOLOGY
B-1	Culverts needed at waterway crossings will be installed during periods of low flow and will not create a barrier to fish or fish populations.
B-2	Excavations over 3 feet deep would be fenced, covered or filled at the end of each working day, or have escape ramps to prevent entrapping wildlife. Inspect trenches and holes to ensure wildlife is not entrapped before filling. Allow wildlife to escape without harassment.
B-3	Pets must be under active restraint and not allowed to harm wildlife. No firearms are allowed at the work site.
B-4	Report mortalities or injuries to any wildlife species that occurs as a result of maintenance activities. Report to Western biologist or Forest Service.
B-5	Protect nesting birds and be aware that nests may occur within the ROW. Whenever practical perform maintenance after the nesting season. Alternatively a qualified biologist will survey for nesting birds no more than a week prior to beginning activities that may disturb nests (e.g., mowing, pesticide application).
B-6	Follow Forest Service identified activity restrictions (e.g., activity timing, vegetation management prescriptions, etc.) so activities will not result in adverse effects, a trend toward federal listing, or loss of fish or wildlife population viability in the project area.
	CULTURAL/ANTIQUITIES
C-1	Upon discovery of potential cultural materials while digging, cease work in the immediate area (within 50 feet) of the find and notify Western's archaeologist or the Forest Service. Western complies with the requirements of the Programmatic Agreement to avoid damage to cultural resources.
C-2	Avoid know cultural resources and follow current agreements. Ensure that crews (Western and Contractors) are informed of the locations of sensitive resources and that the resources are protected. Collection of cultural materials is forbidden.
C-3	Before beginning project activities, project personnel will be instructed on the protection of cultural and environmental resources. The information will address (a) federal and state laws regarding antiquities and plants and wildlife, including disturbance, collection, and removal, (b) the importance of these resources and the purpose and need to protect them, and (c)

Table 2-7: Standard Maintenance Procedures for the Western Area Power Administration Reauthorization Project

Record Number	Procedure
	avoidance areas and special precautions.
	RECREATION SITES
R-1	Western will make necessary arrangements to maintain access to developed recreation sites, trails, or trailheads outside transmission line ROWs to minimize impacts to recreation users.
	GENERAL
G-1	Limit the movement of crews and equipment to ROWs, including access routes when practical.
G-2	When weather and ground conditions permit, obliterate project-caused deep ruts on or off roads. As needed loosen compacted soils by scarifying, harrowing, disking, or other approved methods. Repair damage to ditches, drainages, and access. Restore land and facilities as nearly as practical to the original grade condition.
G-3	Repair fences and gates that may be damaged during maintenance activities. Restore to pre-construction condition.
G-4	When needed, post proper signs or other warnings to minimize impacts to activities by the public.
G-5	Minimize the spread of noxious weeds by cleaning equipment before moving from areas with noxious weeds to those without.
G-6	Equip vehicles with required noise abatement devices.
G-7	Ensure that spark arrestors are installed on chainsaws and other equipment that present a potential for starting fires.
G-8	All spills of hazardous materials (e.g., solvents, gasoline, diesel fuel, etc.) shall be promptly cleaned up and any contaminated soil, rags, absorbents, etc. shall be disposed on in accordance with the state and local waste disposal requirements. Any notifications required by the regulations shall be done.
G-9	Do not burn or bury waste materials (e.g., garbage or other material brought into the site). Remove all waste materials from the project area and dispose of them properly or recycle them.
G-10	When work is finished, ensure that work areas except access trails are left in a condition that will help with natural revegetation (unless reseeding, mulching, or other specific requirements apply), provide for proper drainage, and prevent erosion. Seeding and mulch requirements will be specified. Seed mix will be approved by the Forest Service. All seed, mulch, and hay approved for use will be properly certified as weed-free.
G-11	Comply with applicable federal, state, and local environmental requirements. Before beginning project activities, instruct supervisory Western and contractor personnel on the protection of cultural and environmental resources at the site. Include in work orders and contracts the appropriate precautions related to cultural resources, wildlife, water quality, and other requirements.

Table 2-7: Standard Maintenance Procedures for the Western Area Power Administration Reauthorization Project

Record Number	Procedure
G-12	Locate staging areas to preserve trees and vegetation when practical. Remove materials and debris from the site at the end of the job. As needed regrade and revegetate so that surfaces drain naturally, blend with the natural terrain, and are left in a condition that will help with revegetation, provide for proper drainage, and prevent erosion.
	PUBLIC HEALTH and SAFETY
P-1	Use signs, flags, warning cones, and other devices as applicable in areas of public access to indicate that maintenance activities are ongoing. Ensure that any excavations are protected by fencing, covering, etc.
P-2	Ensure that workers are conspicuous by requiring bright vests and hardhats.
P-3	Ensure that vehicles equipped with catalytic converters are not parked where vegetation could catch on fire.

NPDES National Pollutant Discharge Elimination System
ROW right-of-way
SWPP Stormwater Pollutions Prevention

3.0 Threatened, Endangered, and Proposed Plant Species and Designated Critical Habitat Considered and Analyzed

The U.S. Fish and Wildlife Service's Colorado Field Office June 2009 list (current during preparation for field work) of threatened and endangered species by county (FWS 2009) was used in pre-field research. . Prior to production of this document the new FWS list of federally listed and proposed species by county was again reviewed and no plant species had been added. Note that the FWS Mountain Prairie Region no longer issues a list that is periodically updated; the species by county list is accessed through a website application at www.//fws.gov/mountain-prairie/CO.html. Table 1 displays threatened and endangered species with known or potential occurrences on the Medicine Bow-Routt National Forests (MBRNF) based on county distribution for Jackson, Grand, and Routt counties. All of the threatened, endangered, and proposed plant species are excluded from further analysis based on the rationale stated below.

Table 3-1: Federally Listed Species that may occur on the MBRNF (based on counties).

Common Name	Species	Status	Species Excluded	Reason for Exclusion (see below)
Osterhout milkvetch	*Astragalus osterhoutii*	Endangered	Yes	No plants or suitable habitat in action area
Penland beardtongue	*Penstemon penlandii*	Endangered	Yes	No plants or suitable habitat in action area
North Park phacelia	*Phacelia formosula*	Endangered	Yes	No plants or suitable habitat in action area

Rationale for Exclusion of Threatened, Endangered, and Proposed Species:

Osterhout milkvetch is a Colorado endemic known only from the Troublesome and Muddy Creek drainages of Grand County. The species is a substrate specialist, occupying seleniferous clay soils derived from shales of the Niobrara, Pierre and Troublesome formations (Spackman et al. 1997). Osterhout milkvetch is excluded from further analysis due to lack of known occurrences as well as a lack of suitable habitat. No known occurrences and no suitable habitat; is located within the action area.

Penland beardtongue is endemic to Grand County of Colorado. The species is a substrate specialist, occupying seleniferous clay-shale soils of the Troublesome Formation. Penland beardtongue grows primarily in steep barren areas with little competition from other plant species. The known elevation range is narrow at 7,500 to 7,700 feet. Penland beardtongue is excluded from further analysis due to lack of known occurrences as well as a lack of suitable habitat. No known occurrences and no suitable habitat; is located within the action area.

North Park phacelia is a Colorado endemic known from North Park in Jackson County and from a limited number of occurrences in Larimer County. It is a substrate specialist known from sparsely vegetated habitats of sandy soils derived from the Coalmont Formation. Although the transmission line corridor is not distant from known occurrences, neither plants nor appropriate substrate was located during surveys and the species is excluded from further analysis.

4.0 Consultation to Date

The FWS reviewed Western's Notice of Intent to prepare an Environmental Impact Statement for vegetation management along its ROW on National Forest System lands. In the FWS response (FWS 2010) no specific threatened, endangered or proposed plant issues were raised, although the FWS did note that "*The EIS should identify activity restrictions and conservation measures for proposed, threatened, endangered, and candidate plant species.*" Such measures have been adopted and are summarized in Section 10.0 (Recommended Conservation Measures to Avoid, Minimize, or Mitigate Adverse Effects).

5.0 Field Reconnaissance

5.1 Pre-Field Review

A pre-field review of available information was conducted to assemble occurrence records and assess habitat and ecological requirements of target species. The following sources were used to amass this data:

- U.S. Fish and Wildlife Service's Colorado Field Office list of threatened and endangered species by county, updated in February 2008 and again in June 2009 (FWS 2008 and 2009). During production of this document in 2011–2012 the latest FWS information was reviewed and no changes had occurred that impacted this analysis. Note that the FWS Mountain Prairie Region no longer issues a periodically updated species list; the species by county list is accessed through a website application at www.//fws.gov/mountain-prairie/CO.html.
- Colorado Natural Heritage Program: Rare and imperiled animals, plants and plant community's database (CNHP 2009a) and tracked vascular plant species (CNHP 2009b).
- Colorado Rare Plant Field Guide (Spackman et al. 1997).
- Region 2 Regional Forester's sensitive species list. R2 supplement 2600-2007-01 (Forest Service 2007a, 2009, 2011b).
- Rocky Mountain Region Endangered, Threatened, Proposed, and Sensitive Species: TES Species by Administrative Unit Matrix (Forest Service 2008). This list was updated in 2011 (Forest Service 2011c) to reflect changes in the 19 May 2011 revision of the Region 2 Regional Forester's sensitive species list (Forest Service 2011b). Changes in the list did not impact this analysis.
- Forest Service records obtained verbally from John Proctor (Routt Forest Botanist) on 18 June 2007.

5.2 Previous Investigations and Known Resources

No previous botanical surveys have been documented from the transmission line corridors on the MBRNF. However, the following rare plants have been found in the vicinity of the transmission line corridor.

Hahn's Peak District

Agastache foeniculum
Botrychium multifidum

Eriogonum exilifolium
Iliamna crandallii
Ipomopsis aggregata ssp. *weberi*
Listera convallarioides
Lomatium bicolor var. *leptocarpum*

Parks District East Side:
Penstemon radicosus
Ipomopsis aggregata ssp. *weberi*

Parks District West Side:
Eriogonum exilifolium
Cypripedium fasciculatum

5.3 Survey Dates

Dates and location of field reconnaissance are summarized in Table 5-2. Field surveys were performed for all target species at times when plants were identifiable.

Table 5-2: Summary of Field Reconnaissance on the Medicine Bow and Routt National Forests

District	Power Transmission Line	Surveyor	Survey Dates	Target Species
Parks (east)	Archer-North Park/ Ault-Craig	Brian Elliott	6-16-07, 6-17-07	TEPS plants SOLC
Parks (east)	Archer-North Park/ Ault-Craig	Scott Smith	6-17-07, 6-18-07	*Botrychium* spp.
Parks (west)	Archer-North Park/ Ault-Craig	Ernie Nelson	7-8-07, 7-14-07	TEPS plants SOLC
Parks (west)	Archer-North Park/ Ault-Craig	Lynn Moore	8-1-07, 8-2-07	TEPS plants SOLC
Parks (west)	Archer-North Park/ Ault-Craig	Scott Smith	7-7-07, 7-8-07	*Botrychium* spp.
Hahn's Peak	Archer-North Park/ Ault-Craig	Ernie Nelson	7-7-07, 7-15-07	TEPS plants SOLC
Hahn's Peak	Archer-North Park/ Ault-Craig	Lynn Moore	8-3-07, 8-4-07	TEPS plants SOLC
Hahn's Peak	Archer-North Park/ Ault-Craig	Scott Smith	7-5-07, 7-6-07	*Botrychium* spp.
Yampa	Hayden-Gore 230Kv	Brian Elliott	7-2-07	TEPS plants SOLC
Yampa	Hayden-Gore 230Kv	Scott Smith	6-28-07, 6-29-07, 6-30-07	TEPS plants SOLC
Yampa	Hayden-Gore 230Kv	Lynn Moore	8-6-07, 8-7-07, 8-9-07, 8-11-07, 8-12-07, 8-14-07, 8-15-07	TEPS plants SOLC
Yampa	Gore Pass-Hayden 138Kv	Brian Elliott	6-30-07, 7-1-07	TEPS plants SOLC
Yampa	Gore Pass-Hayden 138Kv	Lynn Moore	8-8-07	TEPS plants SOLC

District	Power Transmission Line	Surveyor	Survey Dates	Target Species
Yampa	Gore Pass-Hayden 138Kv	Scott Smith	6-26-07, 6-27-07	*Botrychium* spp.
Yampa	Gore Pass-Muddy Pass 69kV	Erica Smith-Sokoloski	7-24-09	TEPS plants SOLC

**TES= Threatened, Endangered, and Sensitive.

5.4 Survey Methods

Standard Forest Service botanical survey methods (U.S. Forest Service 2005b) were used in botanical surveys of the transmission line corridors. Different survey protocols were used in different situations. The most commonly used survey technique was a focused or intuitive-controlled survey in which meandering transects were walked through the transmission line corridor. When habitat for one of the target species was identified the search pattern was intensified in that area. In areas where target species had been located a systematic survey was initiated to determine if additional populations could be located. The entire corridor was surveyed; no areas were omitted.

5.5 Survey Results

5.5.1 Summary

Botanical surveys performed in summer 2007 revealed no threatened, endangered, or proposed plant species within the project area. Three new occurrences of *Ipomopsis aggregata* ssp. *weberi* (Weber's scarlet gilia- a Region 2 sensitive species) were discovered during the course of botanical surveys on the MBRNF. Maps and data regarding these occurrences are located in Section 5.5.2 Ten species of local concern were also located from the project area, and these species are addressed in a separate Species of Local Concern Report. Results from field reconnaissance are summarized in Table 5-3.

Table 5-3: Field Reconnaissance Results.

Surveyor	District	Line	TEPS* Species Located	SOLC located**
Brian Elliott	Parks (east)	Archer-Hayden/ Ault-Craig	none	*Lewisia rediviva*
Lynn Moore	Parks (west)	Archer-Hayden/ Ault-Craig	*Ipomopsis aggregata* ssp. *weberi* (5 closely adjacent sites)	*Isoetes bolanderi* *Sparganium minimum* *Listera cordata* *Platanthera sparsiflora*
Ernie Nelson	Hahn's Peak	Archer-Hayden/ Ault-Craig	*Ipomopsis aggregata* ssp. *weberi* (2 closely adjacent sites)	*Athyrium filix-femina* *Polystichum lonchitis* *Cystopteris reevesiana*
Brian Elliott/ Lynn Moore	Yampa	Hayden-Gore 230Kv	none	none
Scott Smith	Yampa	Gore Pass-Hayden 138Kv	none	*Botrychium lanceolatum* *Botrychium hesperium*

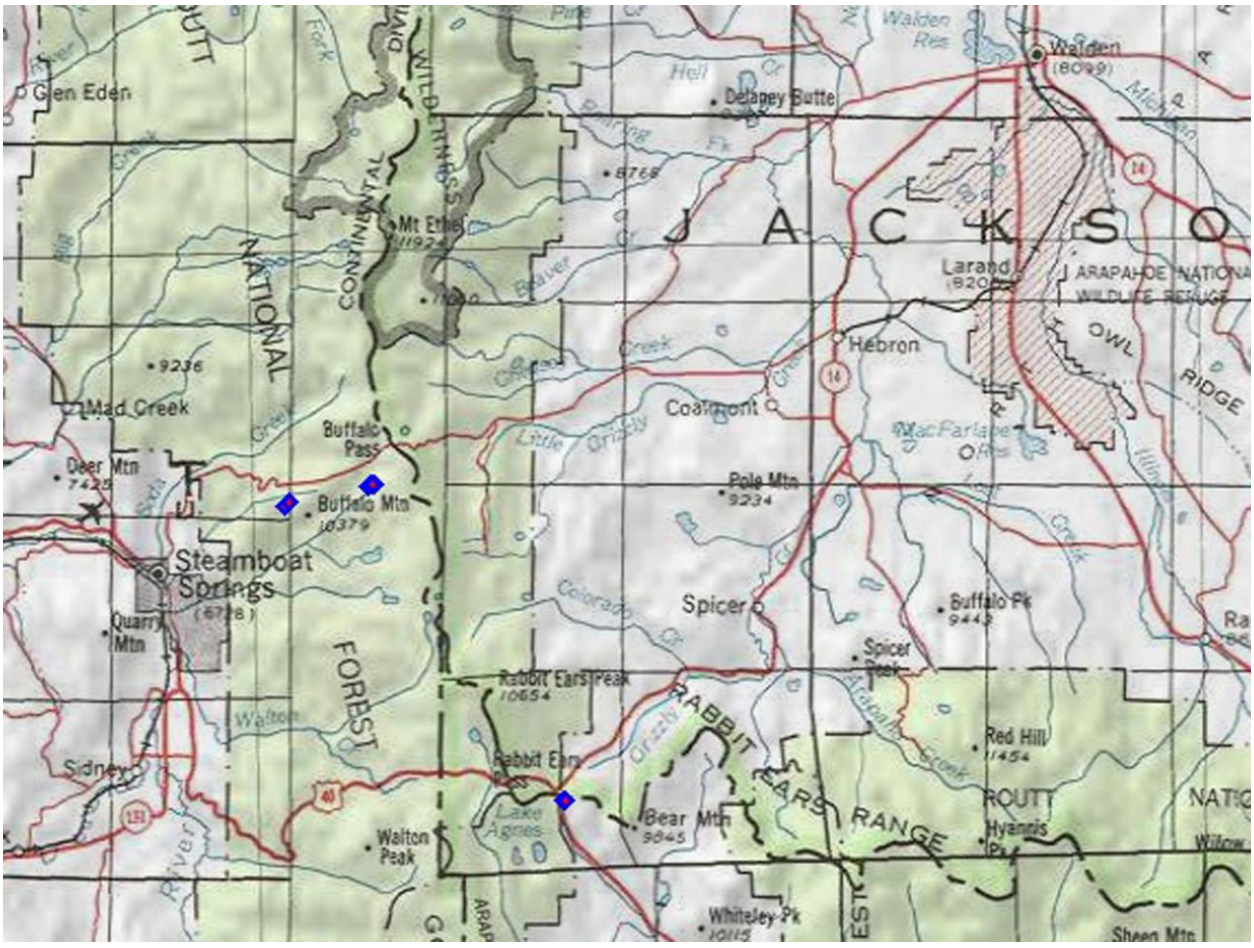
Surveyor	District	Line	TEPS* Species Located	SOLC located**
Erica Smith-Sokoloski	Yampa	Gore Pass-Muddy Pass 69kV	*Ipomopsis aggregata* ssp. *weberi*	none

*TEPS = Threatened, Endangered, Proposed, and Sensitive.
** Species of local concern located in the transmission line corridor are addressed in a separate report.

5.5.2 *Ipomopsis aggregata* ssp *weberi*

Three new occurrences of *Ipomopsis aggregata* ssp. *weberi* (Rabbit Ears gilia, a Region 2 sensitive status species) were discovered during field botanical surveys on the Routt National Forest. These sites are within Western's ROW on the Gore Pass-Muddy Pass, Ault-Craig, and Hayden-North Park power transmission lines. The occurrences will be protected by design features and standard procedures given in sections 2.2.2.7 and 2.2.2.8.

Figure 5-1: Overview of Rabbit Ears gilia sites.

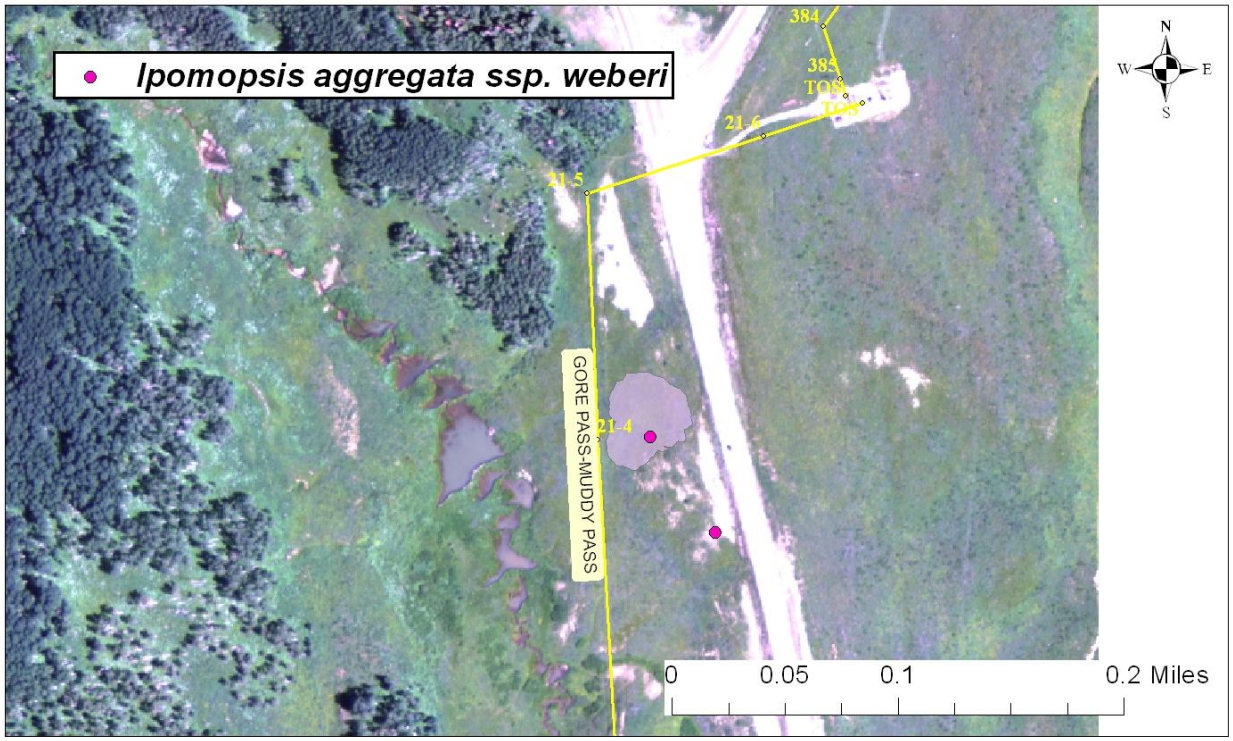


Muddy Pass Occurrence:

The Muddy Pass occurrence is located southwest of the junction of U.S. Highway 40 and Colorado Highway 14 at Muddy Pass. Plants grow immediately adjacent to the Gore Pass-Muddy Pass power transmission line between structures 21-3 and 21-5 (see Figure 2-2). Approximately 200–400 plants grow on about one acre. The area is an open, dry, gravelly meadow dominated by *Wyethia amplexicaulis* and *Astragalus racemosus* at 8,700 feet elevation. Little botanical diversity is found at the site. The occurrence is threatened by:

- highway maintenance
- transmission line maintenance
- recreation, including dispersed camping and ATV use
- livestock grazing

Figure 5-2: Rabbit Ears gilia at Muddy Pass



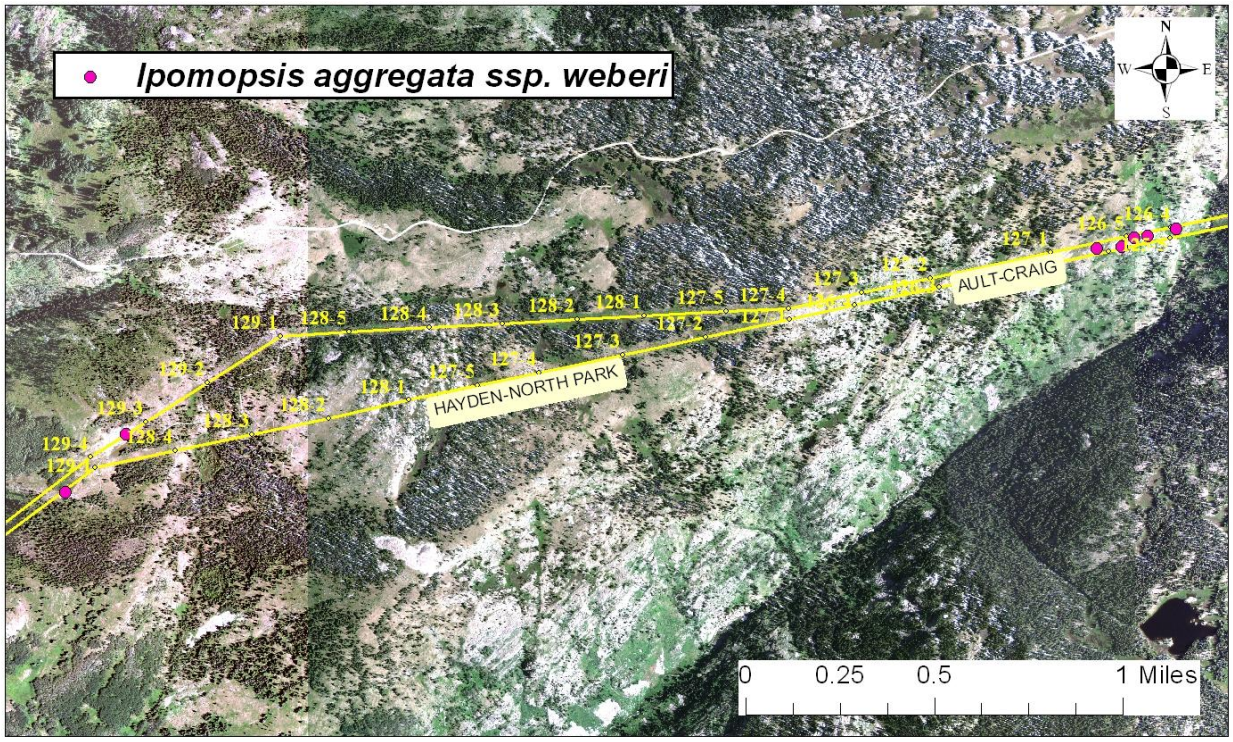
Buffalo Pass Occurrence:

The Buffalo Pass occurrence is located approximately 1.5 miles southwest of Buffalo Pass (see Figure 5-2). The occurrence is located between structures 127-1 and 126-4 of the Ault-Craig transmission line and structures 126-1 and 125-5 of the Archer-North Park transmission line. Between 300 and 500 plants occupy approximately 4 acres within the ROWs. Plants grow in an east-facing subalpine dry, rocky hillside dominated by *Artemisia ludoviciana* 9,800 feet elevation. Associated species include *Ligusticum porteri, Artemisia ludoviciana, Anaphalis margaritae, Sorbus scopulina, Erigeron peregrinus, Aster laevis, Viguiera multiflora, Helianthella quinquenervis, Castilleja miniata, Bromus inermis, Achillea millefolium, Elymus glaucus, Phleum alpinum, Juncus drummondii, Bromus carinatus, Arnica mollis,* and *Arnica parryi*. The occurrence is threatened primarily by livestock grazing. Sheep had removed the tops of many plants and some trampling was observed.

Buffalo Mountain Occurrence:

The Buffalo Mountain occurrence is located approximately 1 mile northwest of Buffalo Mountain and 4.5 miles northeast of Steamboat Springs. The occurrence is located between structures 130-1 and 129-3 of the Ault-Craig transmission line and structures 129-2 and 128-4 of the Archer-North Park transmission line. Between 100 and 500 plants grow on approximately 4 acres withinn the ROWs. Plants grow in an open, dry, gravelly, forb-dominated meadow. Associated species include *Eriogonum umbellatum, Senecio crassulus, Heterotheca villosa, Achillea* sp., *Stipa* sp., *Bromus carinatus,* and *Poa reflexa.* The occurrence is threatened primarily by livestock grazing. Sheep had removed the tops of many plants and some trampling was observed.

Figure 5-3: Rabbit Ears gilia at Buffalo Pass and Buffalo Peak



6.0 Species Information

Species information for all plants carried forth in the impact analysis is given below.

6.1 Threatened, Endangered, and Proposed Species

All threatened, endangered, and proposed species have been excluded from analysis based on the rationale given in Section 3 (above), and none are carried forth in the analysis.

6.2 Forest Service Sensitive Species

The Regional Forester's Region 2 sensitive species list has been updated on several occasions since initiation of plant surveys in 2007, including 2007 (Forest Service 2007a), 2009 (Forest Service 2009), and most recently on 19 May 2011 (Forest Service 2011b). The following list

includes current sensitive species found or suspected to occur on MBRNF lands (Forest Service 2011c). Species noted as excluded in the table below will not be discussed further in this document.

Table 6-1: Region 2 Forest Service Sensitive Species Known or Suspected for the MBRNF.

Species	Potential to Occur	Rationale for Exclusion	Habitat Description and Range in Colorado
Aquilegia laramiensis Laramie columbine		Outside the range of this narrowly endemic species.	igneous and metamorphic rock outcrops, in soil pockets of shaded microsites such as ledges and large crevices; 5,400–10,100 ft.; endemic to the Laramie Mountains in Albany and Converse counties of southeastern WY.
Armeria maritima ssp. *sibirica* sea pink		No potential habitat within project area.	grassy tundra slopes, on wet, sandy, or spongy organic soils; 11,900-13,000 ft; Park & Summit counties.
Astragalus barrii Barr's milkvetch		No potential habitat in the project area; species included on MBRNF list due to presence or potential on the Thunder Basin National Grasslands.	semi-barren slopes with little vegetation on soils derived from shale, sandstone, silts and limestone, usually on badland or badland-like sites; 900–5,700 ft.; known from MT, WY, CO, SD, and Dawes County NB.
Astragalus leptaleus Park milkvetch	✓		moist swales and meadows; South Park to the Wet Mountain Valley; 7,500-10,000 ft; Park, Fremont, and Custer counties
Botrychium campestre prairie moonwort		No potential habitat in the project area; species included on MBRNF list due to presence or potential on the Thunder Basin National Grasslands.	dry, gravelly hillsides, 3,700+ ft (upper elevation is unknown); Yuma and Clear Creek counties
Botrychium furcatum *forked-leaf moonwort*	✓		open meadows, rocky slopes, bare soils, roadsides, disturbed and stabilized areas, typically subalpine areas, found in Chaffee Co and apparently along the continental divide in CO.
Botrychium lineare narrow-leaved moonwort	✓		disturbed sites, grassy slopes among medium height grasses, along edges of streamside forests, alpine areas & aspen forests; 7,900-9,500 ft; Boulder & El Paso counties
Botrychium paradoxum paradox moonwort	✓		grassy meadows, gravelly road sides, low herbaceous cover under small conifer saplings; probably at 5,000–9,000 feet; 2 small sites in Colorado.
Carex alopecoidea *foxtail sedge*		Outside known geographic range; species included on MBRNF list due to presence or potential on the Thunder Basin National Grasslands.	riparian wetlands'; in Region 2 known only from the Black Hills NF at 4,500–6,500 ft.
Carex diandra lesser panicled sedge	✓		wet meadows and subalpine willow carrs; 7,400-9,000 ft; Boulder, Grand, Jackson, and Larimer counties.

Species	Potential to Occur	Rationale for Exclusion	Habitat Description and Range in Colorado
Carex livida livid sedge	✓		fens and wetlands; 9,000-10,000 ft; Jackson, Larimer, and Park counties.
Cuscuta plattensis prairie dodder		No potential habitat in the project area; species included on MBRNF list due to presence or potential on the Thunder Basin National Grasslands.	sand prairie hills; 4,200–4,900 ft; southeastern plains of WY including Converse, Goshen, and Platte counties.
Cypripedium parviflorum (= C. calceolus spp. *parviflorum)* yellow lady's slipper	✓		moist forests and aspen groves; 7,400-8,500 ft; Clear Creek, Custer, El Paso, Huerfano, Jefferson, Las Animas, Park, Pueblo, and Teller counties.
Draba exunguiculata clawless draba		No potential habitat and project area well below species known elevational range.	alpine and subalpine on tundra, gravelly slopes or fell fields; 11,500-14,000 ft; central Colorado, including Chaffee, Clear Creek, Huerfano, and Park counties.
Draba grayana Gray's peak whitlowgrass		No potential habitat and project area below species known elevational range.	alpine on rocky and gravelly slopes or fell fields, usually on granitic substrates; 12,000-14,000 ft; north-central Colorado including Lake, Park, and Summit counties.
Drosera rotundifolia roundleaf sundew		No potential habitat within project area.	amongst *Sphagnum* on the margins of ponds, fens, and floating peat mats; 9,100-9,800 ft; Gunnison and Jackson counties, also, a recent collection from "North Park".
Eleocharis elliptica elliptic spikerush		Known sites geographically distant from project area.	wetlands; widely distributed in North America but with few confirmed CO records.
Eriogonum exilifolium dropleaf buckwheat	✓		sagebrush flats; North and Middle Parks in Jackson and Grand counties at elevations ranging from 7,500-9,000 ft..
Eriogonum visheri Visher's buckwheat		No potential habitat in the project area; species included on MBRNF list due to presence or potential on the Thunder Basin National Grasslands.	badlands, usually in the least vegetated parts, amongst mixed grassland and saltbush communities; 1,886–2,707 ft. in MT, ND, and SD.
Eriophorum altaicum var. *neogaeum* Altai cotton-grass	✓		alpine wetlands; 9500-14,000 ft; Eagle, Gunnison, Hinsdale, La Plata, Park, Saguache, and San Juan counties.
Eriophorum gracile slender cotton-grass	✓		montane and subalpine wetlands, wet meadows and pond edges; 8,100-12,000 ft; Jackson, Las Animas, and Park counties.
Festuca hallii Hall's fescue	✓		alpine and subalpine grasslands and meadows; 11,000-12,000 ft; Huerfano and Larimer counties.

Species	Potential to Occur	Rationale for Exclusion	Habitat Description and Range in Colorado
Ipomopsis aggregata ssp. *weberi* Weber's scarlet-gilia	✓		forb or shrub dominated montane meadows; 6,560-10,500a narrow endemic known from the Park Range in Colorado (Grand and Routt counties) and the Sierra Madre Range in Wyoming.
Kobresia simpliciuscula simple kobresia		No potential habitat within project area.	alpine areas including tundra, fens, moist gravel, and glacial outwash; Park and Clear Creek counties.
Machaeranthera coloradoensis Colorado tansy aster	✓		mountain parks, slopes & rock outcrops & dry tundra; 8,500–12,500 ft; Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Saguache, & San Juan counties
Malaxis brachypoda (= *M. monophyllus* spp. *brachypoda*) adder's-mouth orchid		Geographically distant from project area, being known only from El Paso and Jefferson counties in Colorado; limited or no potential habitat within analysis area.	riparian areas, amongst mosses; 7,200-8,000 ft; El Paso & Jefferson counties.
Mimulus gemmiparus Weber's monkey flower	✓		granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests; 8,500-10,500 ft; Grand, Jefferson, Larimer, and Park counties
Parnassia kotzebuei Kotzebue's grass of Parnassus	✓		alpine and subalpine, in wet rocky areas, amongst moss mats and along streamlets; 10,000-12,000 ft; north-central and southwestern Colorado, including Park and Summit counties
Penstemon harringtonii Harrington beardtongue	✓		known primarily from sagebrush communities, often on calcareous substrates; 6,800-9,000 ft.; endemic to Eagle, Garfield, Grand, Pitkin, Routt, and Summit counties of Colorado.
Ranunculus karelinii (= R. gelidus ssp. *grayi)* ice cold buttercup		No potential habitat and project area well below species known elevational range.	alpine slopes and summits amongst rocks and scree; 12,000-14,100 ft; central Colorado, including Chaffee, Clear Creek, Gunnison, Lake, Park, & Summit counties
Rubus arcticus var. *acaulis (= Cylactis arctica* ssp. *acaulis)* dwarf raspberry	✓		wetlands in willow carrs and mossy streamsides; 8,600-9,700 ft; Clear Creek and Park counties.
Salix candida hoary willow	✓		fens and pond and stream edges in foothill/montane wetlands; 8,800-10,600 ft; Gunnison, Hinsdale, Lake, La Plata, Larimer, and Park counties.
Salix serissima autumn willow	✓		wetland areas including marshes, fens, and bogs; 7,800-10,200 ft; Custer, Park, Larimer, and Routt counties.

Species	Potential to Occur	Rationale for Exclusion	Habitat Description and Range in Colorado
Selaginella selaginoides club spikemoss	✓		marshy areas and wet spruce forests; east side of the Park Range (possibly in Park, Teller, Jefferson, and Douglas counties); previous report from CO is in error.
Sphagnum angustifolium Sphagnum moss		No potential habitat in the project area.	Fens amongst other moss, sedges, and willows; 9,000–10,000 ft.; known from several sites in CO, but the full CO distribution is unknown.
Triteleia grandiflora largeflower triteleia	✓		full sunlight to partial shade in meadows, grasslands, sagebrush, pinyon-juniper woodlands, aspen woodlands, pine forests, and scattered woodlands: in CO at 7,760 ft., in WY at 5,570–7,800 ft., rangewide 300–9,850 ft.; Montezuma County in Colorado and Platte, Lincoln, and Teton counties in WY.
Utricularia minor lesser bladderpod	✓		shallow water of subalpine ponds; 5,500-9,000 ft; north-central and west-central Colorado; little is known about the Colorado distribution of this easily overlooked plant.
Viburnum opulus var. *americana* viburnum		No documented occurrences from Colorado.	wetlands and riparian areas; 4,200–5,500 ft.: northeastern and northwestern WY, no documented CO occurrences.
Viola selkirkii Selkirk violet	✓		forests from montane to subalpine; 6,000-9,100 ft; Douglas, El Paso, and Larimer counties.

6.3 Species Narratives

The following species narratives are intended to give short summaries of the species' life history, habitat affinities, and distribution. The environmental baseline addresses current population trend and activities that are impacting the species. Global ranks are based on NatureServe (2011), while state ranks are based on the Colorado Natural Heritage Program ranks.

***Astragalus leptaleus* - Park milkvetch**

Park milkvetch is a perennial herb of the bean family (Fabaceae) that grows in sedge-grass meadows, swales and hummocks, wetlands, aspen glades, and streamside willow communities between 6,500 and 9,500 feet. *Astragalus leptaleus* flowers and sets fruit from June through August and the flowers are few and inconspicuous. It is known from Idaho, Montana, Wyoming and Colorado. The species is more common in Colorado than in the other states (Moseley, 1991). In Colorado this milkvetch is known from Jackson, Chaffee, Larimer, Summit, Park, and Gunnison counties. Threats to Park milkvetch include habitat loss and degradation associated with grazing, trampling, and non-native species invasion (Ladyman 2006a; Spackman et al. 1997). The species is ranked G4S2, indicating it is secure globally but imperiled in Colorado.

Environmental Baseline
The population trend of Park milkvetch is unknown, but the species appears to be in decline. Historically the species was described as locally abundant and many herbarium records exist; more recently few specimens have been collected and many historic occurrences have not been rediscovered (Ladyman 2006a). Park milkvetch typically produces few flowers and seeds, a trait that may contribute to its rarity. The species is also be weakly rhizomatous, forming weak mats once established.

No occurrences of Park milkvetch have been documented from power transmission line corridors analyzed in this document, although potential habitat exists within the analysis area. Potentially suitable habitat within the project area occurs in the riparian zones and small moist swales scattered throughout the analysis area. Botanical surveys performed in support of the proposed action resulted in no new occurrences of the species in the analysis area, and it is unlikely that the species is found within the transmission line corridor.

***Botrychium* 'furcatum' (sp. nov. in ed.) forked-leaf moonwort**
Forked-leaf moonwort is a perennial herb in the adder's-tongue fern family (Ophioglossaceae) that has not yet been described in the taxonomic literature. Although first reported from the Arapaho National Forest in 2004, collections of the taxon from the San Isabel National Forest were made in 2003. Like other moonworts, forked-leaf moonwort has been found in open sites with little competition. The taxonomy of the *Botrychium campestre* group is currently under revision. The currently undescribed *Botrychium* 'furcatum' is related to *Botrychium campestre* and *Botrychium lineare.* The new species may be described as a form of *Botrchium lineare* (e.g. *Botrychium campestre* var. *lineare* forma *furcatum*). The species has been found in subalpine areas and often in stabilized areas of old disturbance roughly 20 to 60 years after disturbance. The species is endemic to Colorado and has been found in disjuct sites along the continental divide.

Environmental Baseline
Population trend for *Botrychium* 'furcatum' in Colorado is unknown. The species is endemic to Colorado with small and generally disjunct populations. The species was unknown until 2004, and its abundance and full distribution are currently not known. Due to its proximity to old disturbed sites many of the sites are threatened by construction and/or maintenance activities. Although other members of the genus were found during field surveys, no individuals of *Botrychium furcatum* were located. Moonworts are notoriously difficult to locate in the field and it is possible that *Botrychium* 'furcatum' inhabits the transmission line corridor or access roads but went undetected despite focused surveys for members of the genus.

***Botrychium lineare* - Narrow-leaved moonwort**
Narrow-leaved moonwort is a perennial herb in the adder's-tongue family (Ophioglossaceae). Spores are released in late spring to mid-summer. It has been found in a variety of habitats including deep grass and forb meadows, under trees in woods, on shelves of limestone cliffs, and among riparian transition vegetation associated with aspen. It is sometimes associated with previously disturbed ground. In Colorado it is found at elevations ranging from roughly 7,900 to 11,000 feet. According to the Fish and Wildlife Service "*The species is known from 22 sites spread across 8 States (Alaska, Colorado, Minnesota, Montana, Oregon, South Dakota,*

Washington, and Wyoming) and two Canadian Provinces (Alberta and Yukon Territory), with a total geographic range of more than 107,000 square miles" (FWS2007a). However, this information is somewhat dated, and the number of known sites has increased since 2007 (see environmental baseline below). The species is ranked G2? and was previously a candidate for federal listing as an endangered or threatened species (66 FR 30368). In Colorado it is ranked S1 due to the few known sites in the state. Although no longer a candidate for Federal listing it remains rare range-wide with known sites generally small and widely disjunct. Some sites have not been visited recently, and whether they are extant is not known. This plant is small and easily over-looked, and may not produce above ground structures each year. Threats include road maintenance and construction, mining, mine reclamation activities, trampling by hikers or ATVs, over-collection, and alteration of soil and hydrological regimes (Beatty et al. 2003a).

Environmental Baseline

In December 2007 narrow-leaved moonwort was dropped by FWS from further consideration as a candidate species for listing as threatened under the Endangered Species Act (FWS2007a). In Colorado and elsewhere across its range the number of known sites has increased since 2007. According to Steve Popovich, Forest Botanist on the Arapaho-Roosevelt National Forest (pers. comm. 2-14-13) as of 2012 approximately 50 sites of *Botrychium lineare* (in the broad sense, i.e. including *Botrychium* 'furcatum') are now known in Colorado, and threats to its State-wide viability have lessened with increasing numbers of new sites. Roughly 40 of these sites are considered to be what Colorado botanists have provisionally called *Botrychium* 'furcatum', an undescribed taxonomic entity. *Botrychium* 'furcatum' exhibits more forked pinnae than *Botrychium lineare* in the narrow sense and future taxonomic revisions will probably place *Botrychium* 'furcatum' under B*otrychium lineare* (the taxonomy of the *Botrychium campestre* complex, which includes *Botrychium lineare* and *Botrychium* 'furcatum', is currently under revision). Approximately 5-10 sites in Colorado are considered to be *Botrychium lineare* in the narrow sense (i.e. not including the morphological expression accommodated under *Botrychium* 'furcatum').

Although other members of the genus were found in the proposed project area during botanical surveys conducted in support of the proposed action, no individuals of narrow-leaved moonwort were located. Moonworts are notoriously difficult to locate in the field and it is possible that *Botrychium lineare* inhabits the proposed project area but went undetected despite focused surveys for members of the genus.

***Botrychium paradoxum* - paradox moonwort**

Paradox moonwort is a perennial herb in the adder's-tongue fern family (Ophioglossaceae). It is an inhabitant of mesic to wet subalpine meadows. It ranges from southwestern Canada to Montana, Idaho, and Utah. Populations are small and widely scattered. Paradox moonwort is ranked G2, and S1 in Idaho and Utah. Montana ranks the species S2. This rank indicates that the species is considered imperiled to vulnerable globally and in Montana, and is critically imperiled in Idaho and Utah. This plant is small, easily over-looked, and may not produce above-ground structures every year. Threats to the species are similar to those faced by *Botrychium lineare* and include maintenance and construction, mining, mine reclamation activities, trampling by hikers or ATVs, over-collection, and alteration of soil and hydrological regimes.

Environmental Baseline
Paradox moonwort is less widespread than other members of the genus and known populations are small and scattered with Colorado populations at the southern edge of the distribution. It is not known whether the disjunct Colorado populations are a result of relictual populations, long-distance dispersal events, or inadequate knowledge of the true population structure. The species is known from one site in the state with 13 plants counted during a recent survey (Scott Smith, personal communication 2012). However, like many other members of the genus, the plant is considered a habitat generalist and apparently appropriate but unoccupied habitat is present. The current trend in the state is unknown.

***Carex diandra* - lesser panicled sedge**
Lesser panicled sedge is a graminoid of the sedge family (Cyperaceae) that grows in wet meadows and willow carrs. It is found across the northern half of the United States, but reaches its southernmost Rocky Mountain distribution in Colorado. It is known from Boulder, Grand, Jackson, and Larimer counties at elevations ranging from 7,000–9,000 feet. The species is globally secure (ranked G5), but considered critically imperiled in the state of Colorado (ranked S1).

Environmental Baseline
According to Gage and Cooper (2006a) "*there are insufficient data from which to evaluate possible population trends in Region 2 Carex diandra occurrences*." The species occupies a habitat susceptible to impacts, and Gage and Cooper list a variety of threats to the species and its habitat, including hydrological alteration, timber harvest activities, fire, roads and trails, off-road vehicle use, use, peat extraction, livestock, recreation, exotic species, atmospheric deposition of pollution, and climate change. No plants were found during botanical surveys performed in support of the proposed action, although limited potential habitat is found within the power transmission line corridors analyzed in this document.

***Carex livida* - livid sedge**
Livid sedge is a perennial graminoid of the sedge family (Cyperaceae) that flowers and fruits from May to July and inhabits fens and wetlands. The species is widespread in North America, ranging from Alaska and Canada, the Pacific Northwest, Wyoming and Colorado in the west to the upper Midwestern and northeastern states. Like many of Colorado's rare species, it reaches its southern Rocky Mountain distribution in the state. In Colorado it has been found in Boulder, Grand, Jackson and Larimer counties at elevations ranging from 7,400–9,000 feet. Similar to other species with this distribution pattern, it is ranked secure globally (G5) but critically imperiled in Colorado (S1).

Environmental Baseline
According to Gage and Cooper (2006b) "*No reliable region-wide population estimates are available for Carex livida,*" and thus population trends cannot be inferred. Threats to the species and its habitat include hydrological alteration, timber harvest activities, fire, roads and trails, off-road vehicle use, peat extraction, livestock, recreation, exotic species, atmospheric deposition of pollution, and climate change. No plants were found during botanical surveys performed in support of the proposed action, although limited potential habitat is found within the power transmission line corridors analyzed in this document.

***Cypripedium parviflorum* - Yellow lady's-slipper**

Yellow lady's-slipper is a perennial herb of the orchid family (Orchidaceae) that inhabits a variety of shaded, moist habitats, including aspen forests, white spruce/paper birch, paper birch/hazelnut, and ponderosa pine/Douglas fir forests, in rich humus and decaying leaf litter in wooded areas, rocky wooded hillsides on north- or east-facing slopes, on wooded loess river bluffs, and moist creek sides (Mergen 2006; Spackman, et al. 1997). The species is widespread in North America, growing in Alaska and Canada as well as most of the northern and eastern states. It reaches its southernmost Rocky Mountain distribution in Colorado. Although widespread, it is uncommon in most of its range. Populations are widely scattered in Colorado where the species is known from ten counties at a narrow elevation range of 7,400 to 8,500 feet. The species is considered secure globally (ranked G5), reflecting its wide distribution. In Colorado the species is considered imperiled (ranked S2). The species is threatened by habitat alteration (including conifer encroachment), overstory modification, and changes in soil and hydrological regimes, land management activities, unauthorized recreation, and over-collection (Mergen 2006).

Environmental Baseline

Little is known regarding the population trend of *Cypripedium parviflorum*, but it is believed to be in decline due to habitat loss associated with residential development on private lands, over-collection, grazing, and logging (Mergen 2006). No occurrences of *Cypripedium parviflorum* have been documented from power transmission line corridors analyzed in this document, and limited potential habitat exists within the analysis area. Potentially suitable habitat within the project area occurs in the riparian zones and small moist swales scattered throughout the analysis area. Botanical surveys performed in support of the proposed action resulted in no new occurrences of the species in the analysis area, and it is unlikely that the species is found within the transmission line corridor.

***Eriogonum exilifolium* - Dropleaf buckwheat**

Dropleaf buckwheat is a perennial herb of the buckwheat family (Polygonaceae) that grows in sparsely vegetated habitats such as barren hills or sagebrush flats of the mountain parks. It is a regional endemic known only from 26 occurrences in Wyoming and Colorado although it may be locally abundant. In Colorado the plant has been found in North Park and Middle Park of Jackson and Grand counties at elevations ranging from 7,500–9,000 feet. The species is ranked G3 as a result of its restricted range and S2 as a result of the limited number of known occurrences in the state. Anderson (2006a) notes that the threats include "*residential and commercial development, range improvements, off-road vehicle use, other recreational uses, grazing, energy development, reservoir creation, right-of-way management, coal mining, exotic species invasion, effects of small population size, disease, declining pollinators, fire, global climate change, and pollution*". Populations have also been impacted by reservoir expansion at Twin Buttes Lake in Wyoming and possibly at any of the numerous impoundments that have been created in North Park and the Laramie Basin (Anderson 2006a).

Environmental Baseline

According to Anderson (2006a) there are no repeat counts on populations of *Eriogonum exilifolium* and thus population trends cannot be assessed. However, a variety of human activities have impacted populations of the species and it is possible population numbers are

decreasing as a result. These activities include habitat loss from residential development, reservoir expansion, highway construction, conversion of land to irrigated agriculture, and energy exploration and development. The magnitude of these impacts with respect to the amount of habitat available and population size, however, is not known. No plants were found during botanical surveys performed in support of the proposed action, although limited potential habitat is found within the power transmission line corridors analyzed in this document. This habitat is at lower elevations near the Forest boundaries where sagebrush is present.

***Eriophorum altaicum* var. *neogaeum* - Altai cottongrass**

Altai cottongrass, also known as white-bristle cottongrass, is a perennial graminoid of the sedge family (Cyperaceae). It grows in alpine wetlands at elevations of 9500 feet or higher. The species is found in Canada and the Rocky Mountain states of the American west. It reaches its southernmost Rocky Mountain distribution in Colorado where it is found in Eagle, Gunnison, Hinsdale, La Plata, Park, Saguache, and San Juan counties. The species has a global rank of G4?T3T4. G4? indicates that the global status of *Erophorum altaicum* is considered secure, although some uncertainty exists regarding the rank. T3T4 is the status for the variety that is considered apparently secure to vulnerable. The subspecies is secure globally but rare in parts of its range, a common pattern for many of our alpine plants that are rare at the southern end of their range in Colorado but quite common in Canada and Alaska. The species is considered imperiled in Colorado (ranked S2) due to the low number of known occurrences.

Environmental Baseline

Approximately 29 occurrences are known from Colorado, but most of these occurrences are small, isolated, and thus a high priority to conserve. No occurrences of the species have been documented from power transmission line corridors analyzed in this document, and limited potential habitat exists within the analysis area. Botanical surveys performed in support of the proposed action resulted in no new occurrences of the species (nor any other members of the genus) in the analysis area, and it is unlikely that the species is found within the transmission line corridor. Potentially suitable habitat within the project area occurs in high-elevation wet areas.

***Eriophorum gracile* - slender cottongrass**

Slender cottongrass is a perennial graminoid of the sedge family (Cyperaceae) that grows in montane and subalpine wetlands as well as wet meadows and pond edges. The species is found from Alaska, Canada and the northern states south to California and Colorado. It reaches its southernmost Rocky Mountain distribution in Colorado where it is known from elevations of 8,100–12,000 feet. The known sites are widely scattered in Jackson, Las Animas and Park counties. The species is secure globally (ranked G5) but imperiled in Colorado (ranked S2).

Environmental Baseline

According to Decker et al. (2006) population counts for individual occurrences are lacking and thus information is insufficient to allow an assessment of current population trends. However, approximately *one-fourth* of documented occurrences in Region 2 are now considered historical and unlikely to be relocated because of habitat alteration at those sites. Therefore, the trend in Region 2 appears to be dramatically downward. No occurrences of the species have been documented from power transmission line corridors analyzed in this document, and limited potential habitat exists within the analysis area. Botanical surveys performed in support of the

proposed action resulted in no new occurrences of the species (nor any other members of the genus) in the analysis area, and it is unlikely that the species is found within the transmission line corridor. Potentially suitable habitat within the project area occurs in high-elevation wet areas.

***Festuca hallii* - Hall fescue**

Hall fescue is a perennial graminoid of the grass family (Poaceae) that inhabits alpine and subalpine grasslands and meadows. It is found in Canada, Washington, Montana, Wyoming, North Dakota, and Colorado where it reaches its southernmost Rocky Mountain distribution. In Colorado the species is found in Larimer County at 11,000–12,000 feet and Huerfano County at 11,000 feet. The species has a global rank of G4, indicating that the species is considered apparently secure globally but rare in portions of its range. The Colorado rank is S1 due to the low number of occurrences known in the state. Threats include livestock grazing, fire and fire suppression, invasion by exotic species, residential development, recreation, effects of small population size, pollution, and global climate change. Moderate to heavy livestock grazing, in particular, appears to be detrimental to *Festuca hallii* (Anderson 2006b).

Environmental Baseline

Due to the economic importance of fescue grasslands, more information regarding population trends is available for *Festuca hallii* compared to other rare species. A decline of fescue grasslands, in Region 2 and throughout North America, has been documented since the 1930s. The decline has been primarily caused by habitat loss (conversion to agriculture) and historic grazing regimes. Indeed, one observer wrote, "*Already an estimated 90 percent of the fescue grassland has been greatly or moderately modified, and much of the surrounding forest suffers damage to some extent. Unless some suitable areas are placed in Nature Preserves, the time is not far off when the fescue grassland will have followed the true prairie into extinction*." (Looman 1969). *Festuca hallii* is considered a climax species, and recovers slowly from disturbance. How quickly or whether a population could recover from transmission line construction or maintenance is unclear. However, within the analysis area little potential habitat exists, and maintenance of the corridor may create habitat by removing competing vegetation.

***Ipomopsis aggregata* ssp. *weberi* - Scarlet gilia**

Weber's scarlet gilia is a perennial herb of the phlox family (Polemoniaceae) that grows in coarse-textured rocky or gravelly soils of open sites amongst montane shrub communities or coniferous forest. The subspecies is endemic to northern Colorado and southern Wyoming, with most populations located around Rabbit Ears Pass near Steamboat Springs, Colorado. A total of 27 occurrences are known; 24 from Colorado and 3 from Wyoming. Weber's scarlet gilia is ranked G5T2, indicating that the species is secure globally (*Ipomopsis aggregata* is a common species), but that subspecies *weberi* is imperiled globally. It is ranked imperiled (S2) by the Colorado Natural Heritage Program (Ladyman 2004b). Threats include recreational activities, residential development, road construction, grazing (by both livestock and native ungulates), and invasive species. Stochastic events may also be a threat due to small population size.

Environmental Baseline

Inferring population trends for *Ipomopsis aggregata* ssp. *weberi* is difficult for the following reasons (Ladyman 2004b):

- many sites have not been revisited since their discovery,

- an accurate census has not been undertaken at any site,
- occurrences and sub-occurrences have not been mapped, and
- it is not known if local extirpations and colonization events are natural.

Nineteen sites are known from the MBRNF (Ladyman 2004b). However, eight new populations that constitute three new occurrences were located during botanical surveys on the MBNRF.

***Machaeranthera coloradoensis* - Colorado tansy-aster**

Colorado tansy-aster is a perennial herb of the sunflowers family (Asteraceae) that inhabits mountain parks, slopes, rock outcrops and dry tundra at elevations ranging from 8,500 to 12,500 feet. The species is found only in Wyoming and Colorado. In Colorado known occurrences exist in Gunnison, Hinsdale, La Plata, Lake, Mineral, Park, Pitkin, Saguache, and San Juan counties. The species is considered imperiled both globally and in Colorado (ranked G2S2).

Environmental Baseline

The species is known from 24 Colorado occurrences, but no quantitative repeat monitoring has been performed and population trend cannot be determined. A Wyoming population has been revisited several times from 1957 to 1979 and has persisted at the site. Several Colorado botanists have expressed an opinion that the plants population trend is stable and that additional populations remain to be discovered (Beatty et al. 2004).

***Mimulus gemmiparus* - Weber's monkeyflower**

Weber's monkeyflower is a perennial herb of the figwort family (Scrophulariaceae) found in granitic seeps, slopes, and alluvium in open sites within spruce-fir and aspen forests at 8,500 to 10,500 feet. The species is endemic to the mountains of central and northern Colorado where it is known from only eight occurrences in Grand, Jefferson, Larimer, and Park counties. The species has a unique reproductive strategy; the leaf petioles are modified to contain dormant embryos (the specific epithet *gemmiparus* refers to a gemma, an asexual reproductive mechanism often found in mosses). The flowers, if present at all, have sterile pollen. The plant is considered critically imperiled both globally and in Colorado (ranked G1S1). The primary threat to *Mimulus gemmiparus* is the small size of populations; a single disturbance event could feasibly extirpate an occurrence. Activities that could impact an occurrence include recreation, invasion by non-native plant species, trail and road construction and maintenance, wildfires, and forest management activities such as logging, thinning, or prescribed fires (Beatty et al. 2003b).

A petition to list *Mimulus gemmiparus* as a threatened or endangered species has been received by the U.S. Fish and Wildlife Service. On August 29, 2012, the U.S. Fish and Wildlife Service published a 90-day finding on the petition and found "that listing Rocky Mountain monkeyflower may be warranted" (FWS 2012). The Service has initiated a review to determine whether listing is warranted. Due to the potential change in status of the species, a review of the species' occurrences and their proximity to Western's lines was initiated. A GIS analysis of all known occurrences indicated that no *Mimulus gemmiparus* occurrences is within 2 miles of any transmission line analyzed in this document. Based on the distance from Western's transmission lines and the limited potential habitat within the ROWs analyzed in this document, direct or indirect impacts to the species resulting from Western's maintenance activities appear extremely unlikely.

Environmental Baseline
Population trend for *Mimulus gemmiparus* is unknown. In addition to the lack of multi-year monitoring, the species' life-history (it is an annual reproducing by vegetative structures called gemmae) complicates assessment of trend. Populations of annual species fluctuate widely depending on recent weather conditions, and it is difficult or impossible to estimate the size of the seed-bank (or in this case, the gemma-bank) (Bush and Lancaster 2004, Levine et al. 2008). No occurrences of the species have been documented from power transmission line corridors analyzed in this document. Botanical surveys performed in support of the proposed action resulted in no new occurrences of the species in the analysis area, and limited potential habitat was present.

***Parnassia kotzebuei* - Kotzebue's grass-of-parnassus**
Kotzebue's grass-of-parnassus is a perennial herb. Most botanists consider it a member of the saxifrage family (Saxifragaceae), but Dr. Weber (Weber and Wittman 1996) places it in its own family (Parnassiaceae, the grass of Parnassus family). The species inhabits wet rocky areas, especially along small streams and amongst moss mats, in the alpine and subalpine zones. The plant ranges from Alaska and Canada to Washington, Idaho, Montana, Wyoming, Nevada and Colorado. It reaches its southernmost Rocky Mountain distribution in Colorado where it is found at 10,000–12,000 feet. Known occurrences are found in the north-central and southwestern portions of the state, including Clear Creek, San Juan, Park and Summit counties.

Environmental Baseline
The species known from 17 occurrences in Colorado, but no quantitative monitoring has been performed and population trend cannot be assessed. Populations in the state are small, scattered, and disjunct (Panjabi and Anderson 2007). Disjunct populations often differ genetically from populations in the core area of a species' range. They are adapted to different climatic and habitat regimes and are thus often a priority for conservation of the species as a whole.

***Penstemon harringtonii* - Harrington beardtongue**
Harrington beardtongue is a perennial herb of the snapdragon family (Scrophulariaceae). It is endemic to Colorado where it is known primarily from sagebrush communities of Eagle, Garfield, Grand, Pitkin, Routt, and Summit counties. Although 74 occurrences are known, only 20 of these contain 500 or more individuals; most occurrences contain 20-300 individuals (Spackman-Panjabi and Anderson 2006). It is found on sagebrush slopes at elevations ranging from 6,400 to over 9,400 feet. The species is ranked G3S3, indicating vulnerability throughout its range. Threats to the species include habitat loss due to agricultural conversion or residential development, motorized recreation, invasion by non-native plant species, grazing by domestic livestock and native ungulates, oil and gas development, and climate change (Spackman-Panjabi and Anderson 2006).

Environmental Baseline
Penstemon harringtonii is declining in population as a result of the cumulative impacts of the threats listed above (Spackman-Panjabi and Anderson 2006). The magnitude of this decline relative to the total population size is unknown. Botanical surveys performed in support of the proposed action resulted in no new occurrences of the species in the analysis area, and little

potential habitat is present in the project area. Small stands of sagebrush at the lower elevation Forest boundaries are the primary potential habitat.

***Rubus arcticus* var. *acaulis* - dwarf raspberry**

Dwarf raspberry (*Rubus arcticus* var. *acaulis*, also called *Cylactis arctica* ssp. *acaulis*) is an herbaceous perennial plant in the rose family (Rosaceae). It flowers from late June to early July and sets fruit in late July to August; however, the species seldom sets fruit in Colorado. It is a wetland species found in willow carrs and on mossy streamsides that is found at elevations ranging from 8,600 to 9,700 feet. Species that have been found in association with dwarf raspberry include shrubby cinquefoil, dwarf birch, diamondleaf willow, water sedge, and alpine meadow-rue. Dwarf raspberry is circumboreal, ranging south in North America to Oregon, Colorado, Michigan, and Maine. Dwarf raspberry is ranked G5T5 indicating that the species and subspecies are secure globally. The ten populations known from Wyoming and Colorado are at the extreme southern end of the species' range and the species is ranked S1 (critically imperiled) in both states. The primary threat to dwarf raspberry is habitat loss resulting from recreational activities, livestock grazing, and extraction of natural resources such as timber and peat. Activities such as water diversions or impoundment that reduce water availability and change habitat quality are also a threat. Other threats include recreation, forest management activities, invasion by non-native plant species, and climate change. Finally, in Region 2 dwarf raspberry occurs in small and disjunct populations, leaving them vulnerable to stochastic events.

Environmental Baseline

The current population trend for dwarf raspberry is unknown. Ladyman (2006b) notes that although the species is ranked G5, several extirpation events appear to have taken place; the species is now absent from the British Isles and Latvia, and it is now Endangered in Estonia. Clearly, the species is vulnerable to extirpation, particularly in areas such as Region 2 where it is on the edge of its range and less common. No occurrences of the species have been documented from power transmission line corridors analyzed in this document, and limited potential habitat exists within the project area.

***Salix candida* - sageleaf willow**

Sageleaf willow is a woody shrub of the willow family (Salicaceae) found in pond and stream edges as well as in fens of the foothill and montane wetlands. The species is found in Alaska, Canada and across the northern tier of American states. It reaches its southernmost distribution in Colorado where it is found from 8,800-10,600 ft. in Gunnison, Hinsdale, La Plata, Lake, Larimer, and Park counties. Although sageleaf willow is considered secure globally (ranked G5), it is critically imperiled in Colorado with a rank of S1.

Environmental Baseline

According to Decker (2006a) *"Data that would allow a detailed description of population trends are generally lacking. Of the 32 occurrences in Region 2, only 12 have been clearly documented as having been visited multiples times, and none has been counted systematically more than once."* A complicating factor for assessing trend in *Salix candida* populations is the plant's longevity. Their relatively long life span results in difficulty detecting short-term trends. However, populations in Region 2 do not appear to be either stable, slowly increasing, or slowly

decreasing (Decker 2006a). Seven populations (one historic) are known from the Medicine Bow National Forest and none are known from the Routt National Forest.

***Salix serissima* - Autumn willow**

Autumn willow is a woody shrub of the willow family (Salicaceae) that grows in wetland areas including marshes, fens, and bogs. The species ranges from Canada to the northern U.S. In the Rocky Mountains it is found in Montana, Wyoming, and Colorado. In Colorado, where the species reaches its southernmost distribution, autumn willow is known from Custer, Park, Larimer, and Routt counties at elevation ranging from 7,800-10,200 feet. It is apparently secure globally, although it is rare in portions of its range and thus is ranked G4. In Colorado, however, it is critically imperiled (ranked S1).

Environmental Baseline

According to Decker (2006b) *"Only a few Salix serissima occurrences have been censused on more than one occasion, so data that would allow a detailed description of population trends are generally lacking. Moreover, the perennial life span of S. serissima means that detection of population trends may require many more observations over longer time periods."* Populations on the Black Hills National Forest appear stable. However, one Colorado occurrence near Rocky Mountain National Park may have declined to the point of extirpation (Decker 2006b).

***Selaginella selaginoides* - club spikemoss**

Club spikemoss is a perennial, mat-forming herb of the little spike-moss family (Selaginellaceae) that grows in marshy areas and wet spruce forests and produces spores during July and August. Wetland indicator status for this species is FACW in the western mountains, valleys, and coast (WMVC) subregion (Lichvar 2012). Club spikemoss is found in Alaska, Canada, several eastern states, Idaho, Montana, Nevada, and Wyoming. A previously reported Colorado occurrence from the east side of the Park Range in eastern Park County is in error, and the species is not currently known from the state (Heidel and Handley 2006). The species is difficult to identify in the field and this may contribute to the lack of information on the species' Colorado distribution. Club spikemoss is ranked G5 by NatureServe (2011). It is tracked by the Colorado Natural Heritage Program, and is ranked SH (state historical). Populations in the state are at the southern extreme of the species range.

Environmental Baseline

In the western United States, *Selaginella selaginoides* is disjunct and at southern edge of its range. According to Heidel and Handley (2006) the species "*is reported for Colorado in at least two independent sources (i.e., Rydberg [1906], Weber et al. [1979]), there are no known vouchers of the species from Region 2*." Thus, virtually nothing is known about the plants Colorado distribution, habitat affinities, or population size. Population trend is therefore unknown, although the plant appears to have been extirpated at some sites and is in a downward trend at other sites in Wyoming (Heidel and Handley 2006).

***Triteleia grandiflora* - largeflowered triteleia**

Largeflower triteleia is a perennial forb of the Lily family (Liliaceae). This species is more common to the north, and only one occurrence (on the San Juan National Forest) is known in Colorado. This occurrence is found in openings amongst *Pinus ponderosa* (ponderosa pine) and

Quercus gambelii (Gambel oak) at approximately 7,800 feet. In Colorado plants have been observed flowering in June. The species is known primarily from the Pacific Northwest; the Colorado occurrence in Montezuma County is disjunct and represents the southernmost range extension. In Wyoming the species is known from Platte, Lincoln, and Teton counties. The most closely adjacent occurrence to the MBRNF is in Platte County, Wyoming, in the Medicine Bow Mountains approximately 38 miles west of Laramie at the University of Wyoming Summer Camp. However, this occurrence has not been seen since its discovery in 1929. *Triteleia grandiflora* is ranked G4, indicating that it is apparently secure globally, (although it might be quite rare in parts of its range, especially at the periphery), and S1 in Colorado, reflecting the sole occurrence in the state.

Environmental Baseline

According to Ladyman (2007) "*Few records of Triteleia grandiflora exist in Wyoming and Colorado. The occurrences in these states represent the eastern edge of its range. The number of extant occurrences in the states of Region 2 appears to be in decline*." The plant is quite palatable to livestock (both sheep and cattle) and both historic and recent livestock grazing regimes may have contributed to the plants decline. During botanical surveys of the San Juan National Forest power transmission line corridors Lynn Moore stated that the species would be difficult to find there due to the low stubble heights as a result of livestock grazing (Lynn Moore, personal communication 2009).

***Utricularia minor* - lesser bladderwort**

Lesser bladderwort is a perennial herb of the bladderwort family (Lentibulariaceae). Plants are generally aquatic but they may become stranded as water levels fall in the summer and fall. The plants are insectivorous with bladders acting as tiny insect traps. The species is found in Alaska, Canada, across the northern U.S., and south to California along the Pacific Coast and to Colorado in the Rocky Mountains. In Colorado, the species is known from shallow water in subalpine ponds at 5,500-9,000 ft. The plant is often overlooked, partially due to the difficulty of collecting and identifying the species, and little is known about its Colorado distribution. According to Neid (2006) it is known from Boulder, Jackson, La Plata, Larimer, and Montezuma counties in Colorado. The species is ranked G5 by NatureServe (2011), but the Colorado Natural Heritage Program ranks the species S2, meaning that it is considered imperiled to critically imperiled in Colorado.

Environmental Baseline

According to Neid (2006) "*There is no information on trends within individual populations of Utricularia minor and little or no information about trends for the species as a whole throughout its global range.*" Plants are difficult to locate in the field so few population censuses have been performed. It is possible that some Colorado populations have been misidentified and actually represent *Utricularia ochroleuca*, a species at present considered less common in the state of Colorado. Due to the difficulty of survey and identification, the paucity of information, and the sensitivity of the plant's habitat, protecting known occurrences with vigor is likely the most appropriate management.

***Viola selkirkii* - great-spurred violet**

Great-spurred violet is a perennial herb of the violet family (Violaceae) that inhabits cold mountain aspen forests, moist woods, and thickets. The species ranges from Alaska and Canada to the upper Midwest, the northeastern US, and Washington. Disjunct populations are found in New Mexico and Colorado. It flowers during May and June and in Colorado is known from 8,500-9,100 feet elevation. In Colorado, this violet has been verified at five sites (Elliott and Smith 2010):

- Rocky Mountain National Park.
- Near Nederland on the Roosevelt National Forest.
- The base of Devil's Head in the Rampart Range on the Pike National Forest.
- Newlin Creek in the Wet Mountains on the San Isabel National Forest.
- Near Lincoln Ice Falls above Montgomery Reservoir on the Pike National Forest.

The species is considered secure globally, although there is some uncertainty about the ranking (G5?). In Colorado is critically imperiled and receives a rank of S1. Threats to the species include recreation, invasion by non-native plant species, wildlife and livestock grazing and trampling, road and trail construction and maintenance, forest management activities, and climate change. In Region 2, great spurred violet occurs in small and disjunct populations, leaving them vulnerable to stochastic events.

Environmental Baseline

The current population trend for great spurred violet in Colorado is unknown. Little is known regarding population size of the known occurrences. The species blooms quite early and is in a vegetative or fruiting condition when most botanical surveys are performed, and may often escape detection. No occurrences of the species have been documented from power transmission line corridors analyzed in this document, although potential habitat exists within the project area.

7.0. Project Area Description

Western's electrical transmission lines traverse 283 miles on National Forest System lands in Colorado, Utah, and Nebraska. On the Medicine Bow-Routt National Forests are approximately 62.1 miles of power transmission line corridor on approximately 936 acres. These power transmission line corridors are a linear feature and cross numerous habitats as they traverse National Forest lands. On the Parks District of the Routt National Forest, for example, the Archer-North Park and Ault-Craig lines intersect the forest boundary on alluvial skirts of the west slope of the Medicine Bow Mountains in sagebrush parkland, then travel upslope through aspen stands, mid-elevation mixed conifer forest, and spruce-fir forest. They also intersect pockets of wetland habitat, a willow carr, riparian zones, montane meadow, and rock outcrops. As a result of this habitat diversity, describing the project area is challenging. The following sections are intended to give insight on the project area location (Section 7.1) and vegetation types (Section 7.2). Past and current activities in the area are described in the cumulative effects section.

7.1 Project Area Location

The project area for this proposed action includes areas where Western's transmission lines cross the Medicine Bow-Routt National Forests Hahn's Peak, Parks, and Yampa Districts. A total of six power transmission lines are analyzed in this document, and they travel across 62 miles of Forest lands. Locations of these lines are best described by maps, and both overview and detailed maps are located in Appendix 3.

7.2 Vegetation Types

Power transmission line corridors are linear features and cross numerous habitats on their journey across the landscape. Within the project area several vegetation types are present, including subalpine meadows, montane forests and meadows, steep canyons, rocky outcrops, sagebrush steppe, willow carrs, and riparian areas. Elevations range from approximately 8,000 feet to 11,500 feet. Eco-regions for the transmission lines are described below.

The landscape-scale descriptions below are intended to paint a broad picture of the landscapes crossed by transmission line corridors included in the proposed action on the Medicine Bow-Routt National Forests. A recent collaborative effort between the U.S. Environmental Protection Agency, U.S. Forest Service, and several state agencies has produced high-quality ecoregion maps of the United States. The ecoregion descriptions below are adapted from the detailed legends on the Colorado (Chapman et al. 2006) state ecoregions map.

The following ecoregions are located within the power transmission line corridors analyzed in this document:

Archer-North Park 230kV: Crystalline Mid-Elevation Forest, Crystalline Subalpine Forest, Sagebrush Parks, Sedimentary Mid-Elevation Forest.
Ault-Craig 345kV: Crystalline Mid-Elevation Forest, Crystalline Subalpine Forest, Sagebrush Parks, Sedimentary Mid-Elevation Forest.
Gore Pass-Hayden 138-kV: Crystalline Mid-Elevation Forest, Crystalline Subalpine Forest, Sagebrush Parks.
Gore Pass-Muddy Pass 69kV
Hayden-Gore Pass 230-kV: Crystalline Mid-Elevation Forest, Crystalline Subalpine Forest, Sagebrush Parks.
Gore-Hayden 138-kV: Crystalline Mid-Elevation Forest, Crystalline Subalpine Forest, Sagebrush Parks.

Eco-Subregion Descriptions:

Crystalline Mid-Elevation Forest is found at elevations ranging 7,000–9,000 feet. This ecoregion is also typically forested, but dominant species include aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and areas of lodgepole pine (*Pinus contorta*) and limber pine (*Pinus flexilis*). A diverse understory is often present.

Crystalline Subalpine Forest occupies a narrow elevational (approximately 8,500–12,000 feet) band in the mountains. This ecoregion is typically forested, although subalpine meadows are

present. Forests are generally composed of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies bicolor*), although areas of aspen (*Populus tremuloides*) and lodgepole pine (*Pinus contorta*) are present and sometimes locally abundant.

The **Sagebrush Parks** ecoregion contains the large, semiarid, high intermontane valleys that support sagebrush shrubland and steppe vegetation. The ecoregion is slightly drier than the Grassland Parks ecoregion. Summers tend to be hot and winters very cold, with annual precipitation of 10-16 inches. Land use is mostly rangeland and wildlife habitat, with some hay production near streams. The sagebrush provides forage and habitat to many animals and birds. Sandy loam soils are typical, formed in residuum from crystalline and sedimentary rocks, glacial outwash, and colluvial or alluvial materials.

Sedimentary Mid-Elevation Forest occurs in the western and southern portions of the Southern Rockies, generally below Sedimentary Subalpine Forest at elevations ranging from 7,000–9,000 feet. Vegetation of this region is similar to the crystalline mid-elevation forest, consisting largely of aspen (*Populus tremuloides*), ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), and areas of lodgepole pine (*Pinus contorta*) and limber pine (*Pinus flexilis*). A diverse understory is often present.

Riparian Areas:
Although many riparian areas are crossed by the transmission line corridors, riparian areas are not described at the ecoregion level. Within the project area numerous types of riparian vegetation associations are embedded within other ecoregions. The Field Guide to Wetland and Riparian Plant Associations of Colorado (Carsey et al. 2003) lists seven riparian plant associations in Colorado with each of these plant associations further subdivided into numerous sub-types:

- Evergreen Riparian Forests,
- Mixed Coniferous and Deciduous Forests and Woodlands,
- Deciduous Dominated Forests and Woodlands,
- Tall Willow Shrublands,
- Short Willow Shrublands,
- Non- Willow Shrublands, and
- Herbaceous Vegetation.

GIS ANALYSIS:
Extensive GIS analysis of cover types with the power transmission line corridors has been performed. See Appendix 1 for detailed habitat information for each transmission line. A total of 10 cover types on 935.5 acres have been identified within the power transmission line corridors on the MBRNF. These cover types include:

- forb dominated, 175.4 acres or 18.7%
- grass dominated, 81.4 acres or 8.7%
- sedge, 18.6 acres or 2.0%
- rock, 0.2 acres or 0.02%
- shrub, 21.4 acres or 2.3%
- aspen, 22.6 acres or 2.4%
- lodgepole pine, 95.7 acres or 10.2%

- spruce-fir, 56.6 acres or 6.1%
- willow, 20.8 acres or 2.2%
- previously treated, 442.7 acres or 47.3%

8.0 Effects of the Alternatives

Twenty two Region 2 sensitive status plant species are carried forth in this analysis. To facilitate the following effects analysis these species are lumped into groups (or guilds) with similar habitat affinities and the assumption is made that members of these habitat associations will respond similarly to impacts caused by the proposed activities. Exceptions to this assumption are noted in the text. The term guild is used in ecology to mean a group of species that use similar resources in a similar way (Root 1967). Species may be grouped into guilds based on a number of attributes, including habitat affinities, specific edaphic (soil), moisture, canopy closure needs, pollination syndromes, seral stage, or other attributes. Photographs of guild habitats used in this document are given in figures 8–1 through 8–4. Guilds are emphasized in the text through use of capital letters (e.g. MOIST versus moist). For the purpose of this analysis the following spatially defined habitat guilds are used.

- Plants inhabiting moist area such as swales or riparian borders (MOIST habitat guild): *Astragalus leptaleus* and *Cypripedium parviflorum.*
- Plants inhabiting wet or saturated soils, including fens (WET habitat guild): *Carex diandra, Carex livida, Eriophorum altaicum* ssp. *neogaeum, Eriophorum gracile, Mimulus gemmiparus, Parnassia kotzebuei, Rubus arcticus* ssp. *acaulis, Salix candida, Salix serissima, Selaginella selaginoides,* and *Utricularia minor.*
- Plants inhabiting open areas adjacent to forests or amongst open woodlands, including meadows, rock outcrops, sagebrush, and areas of old disturbance (OPEN habitat guild): *Botrychium lineare, Botrychium furcatum, Botrychium paradoxum, Eriogonum exilifolium, Festuca hallii, Ipomopsis aggregata* ssp. *weberi, Machaeranthera coloradoensis, Penstemon harringtonii,* and *Triteleia grandiflora*
- Plants inhabiting forested areas (FOREST habitat guild): *Viola selkirkii.*

Figure 8-1: MOIST Habitat Guild.

This moist swale provides potential habitat for members of the MOIST habitat guild.

Figure 8-2: WET Habitat Guild.

This subalpine pond provides potential for members of the WET habitat guild.

Figure 8-3: OPEN Habitat Guild.

This open meadow provides potential habitat for members of the OPEN habitat guild.

Figure 8-4: FOREST Habitat Guild.

This forested site provides potential habitat for members of the FOREST habitat guild.

8.1 No Action Alternative

Under the no action alternative, no change from existing management is proposed and current power transmission line maintenance and associated impacts to rare plant species would remain approximately the same. Note that the no action alternative does not indicate that vegetation management will not take place; instead it indicates that existing vegetation management activities will continue. Under the no action alternative treatments using biological treatment, prescribed fire, and herbicides would not be implemented. Vegetation management using hand and mechanical treatments would continue.

8.1.1 Direct Effects

Direct impacts resulting from vegetation treatments under the no action alternative result from hand or mechanical treatments associated with existing management. These impacts include trampling of individuals resulting in breaking, crushing, or uprooting plants by driving machinery or skidding material over them. Individuals or populations may also be covered and smothered by slash, chips, or soil, and may have trees fallen on them. Direct effects under the no action alternative are similar in nature to hand and mechanical treatments under the proposed action. However, the impacts are expected to be less intense in nature and will occur on fewer acres. Under the proposed action additional activities will take place to increase the safety and reliability of Western's transmission lines. Those treatments will not take place under the no-action alternative, thus the impacts are expected to be less intense and less widespread. Direct impacts to rare plant species are described in detail under the proposed action below.

8.1.2 Indirect Effects

Indirect impacts resulting from vegetation treatments under the no action alternative result from hand or mechanical treatments associated with existing management. These impacts include changes in vegetation composition, creating layers of wood chips, transporting and creating habitat for competitive invasive plant species, altering local hydrologic patterns, and altering soil characteristics (e.g. soil compaction, erosion). These changes to rare plant habitats may render them less suitable for colonization or occupation by rare plant species. Indirect effects under the no action alternative are similar in nature to hand and mechanical treatments under the proposed action. However, the impacts are expected to be less intense in nature and will occur on fewer acres. Under the proposed action additional activities will take place to increase the safety and reliability of Western's transmission lines. Those treatments will not take place under the no-action alternative, thus the impacts are expected to be less intense and less widespread. Indirect impacts to rare plant species are described in detail under the proposed action below.

8.1.3 Cumulative Effects

For a discussion of cumulative effects applicable to all plant species see the cumulative effects section under the proposed action, below.

8.2 Proposed Action

The proposed action, described in detail under Section 2, consists of several different types of vegetation management including hand (manual) and mechanical treatments, prescribed burning, use of herbicide or growth regulators, and biological treatment. Impacts of these dissimilar types of treatment are discussed separately in the impact analysis.

8.2.1 Direct Effects

Hand (Manual) and Mechanical Treatment

Direct impacts to rare plant species from hand and mechanical treatment are similar and differ mainly in a matter of degree. Impacts specific to each habitat guild are also described in the following paragraphs. Ground disturbance resulting from hand treatment usually occurs on fewer acres and is less intense than ground disturbance resulting from mechanical treatment, and thus is often the preferred method of treatment in sensitive habitats such as wet meadows or inaccessible areas such as rock outcrops or steep slopes. Hand falling, and particularly skidding of hand-felled trees, results in ground disturbance and may break, crush, or uproot plants in these sensitive habitats.

Mechanical treatment results in direct effects when rare plants are physically impacted by activities associated with transmission line maintenance. Direct impacts include trampling of individuals, resulting in the breaking, crushing, or uprooting plants by driving machinery or skidding material over them. Individuals or populations may also be covered and smothered by slash, chips, or soil, and may also have trees fallen on them. Thinning and chipping has been shown to change understory plant communities in ponderosa pine forests (Wolk and Rocca 2009) and may have a similar impact in other habitats. Such impacts may also result in mortality of individuals. Timing of impacts is critical for annual plant species. Management actions taking place in autumn after seed of annual species has matured causes less impact since seed has been produced and dispersed (Bush and Lancaster 2004). Management actions taking place in the spring during flowering and prior to maturation of seed may potentially reduce population numbers by preventing seed production and the production of a new generation. Direct impacts can physically damage plants or the habitats where they grow. Individuals impacted by transmission line maintenance may experience reduced growth and development as well as reduced or eliminated reproduction. As a result, direct impacts to individual plants can reduce the population size and change metapopulation structure.

Members of the WET and MOIST habitat guilds may escape some impacts by mechanized equipment as equipment operators tend to avoid muddy or wet areas. Hand treatment is likely to take place in their habitat with trees being felled and skidded in their habitat. In drier areas on the edge of their habitat or if treatment is essential, however, their habitat may be treated by mechanized means, resulting in direct impacts to members of the guild.

Members of the OPEN habitat guild will be impacted by direct effects. While open sites are usually less in need of treatment, the desire to maintain them as such will lead to treatment and direct impacts. Open sites are often used as staging sites for equipment or as log decks, resulting in locally concentrated impacts. However, plants growing in open but inaccessible areas, such as rock outcrops, are less likely to be directly impacted by mechanical treatment since such areas

are mostly unsuitable for operation of machinery. Hand treatment, however, may take place in these less accessible areas.

Members of the FOREST habitat guild are most likely to be impacted by direct effects from hand or particularly mechanical treatments as they are found in areas considered most in need of treatment and therefore will receive the most intensive treatment.

Figure 8-5: Ground disturbance from maintenance activities.

Herbicide and growth regulators

Application of herbicide or growth regulators may directly impact rare plant species. Potential direct effects from such treatments include:

- crushing or trampling by trucks and/or ATVs during ground applications (described in detail under direct effects from hand and mechanical treatment),
- direct deposition of herbicide,
- herbicide drift,
- accidental spills, and
- surface runoff.

Effects from direct deposition of herbicide are highly variable depending on the type of herbicide, the amount of herbicide deposited, season of treatment, and species of plant. In particular, herbicides vary widely in their mode of action and include plant hormone mimics, amino acid or chlorophyll inhibitors, cell membrane disruptors, and root or shoot inhibitors.

Regardless of their mode of action herbicides are designed to kill plants and their deposition on rare plant species leads to direct effects including mortality and reduced or eliminated growth and reproduction. The magnitude of these impacts varies widely.

Direct effects from herbicide drift pose a potential negative impact to members of all habitat guilds. The impact of offsite drift to plant species has been well documented (Pywell et al. 1996, Marrs and Frost 1997, Marrs et al. 1993) and herbicide drift has been analyzed and modeled to determine the potential and actual effect in a number of studies (Hoerger and Kenaga 1972, Marrs et al. 1993, Williams et al. 1987). The amount of herbicide deposited in a given situation depends on a complex interaction between:

- environmental factors such as wind speed and direction, temperature, and humidity,
- the droplet size spectrum of the spray,
- the herbicide formulation and equipment used,
- the spray height and application pattern, and
- the structure and characteristics of both the plant concerned, including the shape, size, orientation, hairiness and waxiness of the leaf, and the effect of the surrounding vegetation structure (Williams et al. 1987, Marrs et al. 1991).

These factors, along with the varying ability of plants to uptake and metabolize different chemicals and the different modes of action for different classes of herbicides, leads to difficulty in accurately quantifying residue levels and impacts related to drift.

Buffers are commonly used to protect non-target plant species from herbicide drift. However, the appropriate buffer can vary considerably depending on the factors listed above. Several sources suggest buffer widths to protect rare plant species from herbicide drift. Elliott et al. (2009) recommend a buffer of 656 feet (200 meters), while Elliott and Hanson (2002) suggest buffers of 50 to over 300 feet (15.2 to over 91.4 meters) based on the no observable adverse effect level (NOAEL) values. The Bureau of Land Management (BLM 2007) noted adverse effects from herbicide drift at distances ranging from 25–1,200 feet (7.6–365.7 meters). The BLM (2007) tiered to ecological risk assessments (ERAs) produced by the Forest Service (2011a), and noted that "*For* [some] *chemicals, the Ecological risk assessments ERAs did not model spray drift out to a distance at which there would be no risks to TEP plants; therefore, a conservative buffer distance of ½ mile* [2,640 feet or 804.7 meters] *is assumed*." Thus, buffer recommendations range from 25–2,640 feet or 7.6–804.7 meters.

Herbicide spills could potentially impact members of all habitat guilds. A spill would cause intense but localized negative impacts due to contact with concentrated herbicide. Should the spill occur near water, members of the MOIST and WET guilds would be exposed to much higher concentrations of herbicides than could be expected from drift, runoff, or even direct deposition of herbicide at the label concentration.

Surface runoff, subsurface runoff, or a combination of these factors could lead to injury or death of individual plants or populations of species in all habitat guilds. A number of site specific conditions influence the potential effects from these factors. These factors include the chemical degradation properties of the individual herbicides, soil type, ambient and soil temperatures, soil pH, and soil moisture holding capacity.

Surface and subsurface runoff are particularly important in the aquatic environment, potentially posing a greater adverse effect to members of the WET and MOIST habitat guilds than to members of other guilds. Under normal and expected conditions of herbicide use, background concentrations of herbicide would be found in the aquatic environment. The concentration of herbicide in the aquatic environment is highly site specific and depends on many factors, including the mobility of a given herbicide in the soil, soil type, slope, rainfall, and application rate. However, in some cases background herbicide concentrations in the aquatic can reach concentrations exceeding the EC_{50} (half maximal effective concentration, i.e. the concentration at which half the maximal effectiveness of the herbicide is observed) for various physiological processes of herbicide sensitive aquatic macrophytes (Elliott and Hanson 2002). However, the peak concentrations are ephemeral, and recovery may be quick. Impacts could range from short term inhibition of growth or reproduction to mortality.

Members of the OPEN and FOREST habitat guilds could also be impacted by spills. Herbicide spills are more likely in their habitat since operators tend to stage away from water. However, if a spill occurred in the OPEN or FOREST habitats it would likely take place over soil and away from water. Herbicide would move more slowly in soil, and thus impacts would be intensive but localized.

Prescribed burning

The direct effect of fire to rare plants is injury or mortality of individuals or populations from heat generated by the fire. Plant tissues are killed at temperatures between 50–55°C (122–131°F) (Brown and Smith 2000), although the duration of high temperatures and the condition of plant tissues subjected to fire impacts the level of plant mortality. Portions of the plant, such as meristematic tissue in the buds, are more susceptible to high temperatures when actively growing with higher moisture content. Protection of tissues by bark or soil also impacts mortality.

Prescribed fire following chipping or mastication of trees or brush may result in increased plant mortality due to high soil temperatures. Busse et al. (2005) found that prescribed burns of masticated forest residue reached 500–600°C (932–1112°F) in dry soils and 400–500°C (752–932°F) in moist soils compared to 200–300°C (392–572°F) in burns of conifer forest litter and duff. Higher temperatures were found throughout the top 10 cm of soil under burns of masticated forest residues. Thus, prescribed burning of masticated forest residues such as chips creates higher temperatures and consequently higher plant mortality.

Prescribed fire may be either broadcast or pile burning. Impacts from pile burning, while more localized than broadcast burning, are much more severe and negative than from broadcast burning. Korb et al.(2004), for example, found that slash pile burning in ponderosa pine forest led to an elimination of the seed bank and death of mycorrhizae. Adverse impacts to soil properties were also noted. Broadcast burning, by contrast, is much more variable as a result of diverse fuel loading. While broadcast burning may also cause adverse impacts to rare plant species, those impacts are generally less severe as a result of lower fire intensity.

Timing of burns is critical to rare annual species that may not be as seriously impacted by fall burns that take place after their seed has matured and their lifecycle completed. However, annual species may be greatly affected by spring fires that take place while they are germinating,

growing, or flowering. Fire intensity is also a critical factor. Low intensity fire can be beneficial to rare annual plants by removing accumulated plant debris (dead stems, leaves, etc.) and exposing mineral soil for seedling germination and establishment. As fire intensity increases, however, impacts become less beneficial as plant tissues are killed and the seedbank is reduced or eliminated (Busse et al. 2005). Pile burning, in particular, usually eliminates the herbaceous layer below the pile and causes elimination of the seedbank as a result of fire intensity. Brown and Smith (2000) note that fire kills most seeds in the litter layer, and that the temperature and duration of subsurface heating determines the amount of mortality of buried seed. Response of buried seed to fire is species specific, and some plant species respond favorably to fire with stimulated germination. Increased fire intensity could potentially extirpate small populations of plants (Busse et al. 2005), including rare plants.

Figure 8-6: Broadcast prescribed fire and associated mortality

Construction of fire control lines by hand or mechanical means may trample or uproot plants, resulting in direct effects similar to hand or mechanical treatment described above. Firelines are linear features and may be more likely to cross rare plant sites as a result. The level of disturbance created by firelines varies depending on their method of construction with wider and deeper dozer lines causing considerably more impact than narrow and shallow handlines. Broadcast burns are generally detrimental to MOIST and WET guild members, although they often escape impacts from fire if their habitat is moist at the time of the burn. According to Beatty et al. (2003b), for example, although the high intensity Hayman fire burned in the vicinity of a *Mimulus gemmiparus* (a member of the WET guild) occurrence in 2002, several thousand individuals were found in a site visit the next year indicating that at least a portion of the population avoided impacts from the fire. Thus, low intensity prescribed fires are less likely to impact members of the WET or MOIST habitat guilds. A burn during drought when habitat of

WET or MOIST guild species is uncharacteristically dry may cause extensive mortality. *Salix candida* (sageleaf willow, a Region 2 sensitive species), for example, grows in habitat that rarely burns, but the species is not fire resistant and mortality would be high should its habitat burn. Prescribed fire is highly detrimental to members of the FOREST guild due to habitat changes such as increased insolation, reduced humidity, and reduced organic matter on the forest floor. Members of the OPEN guild, by contrast, would suffer impacts during the fire but may benefit from habitat creation in the long term as a result of opening the canopy by fire. It cannot be assumed, however, that members of the OPEN guild are fire adapted as several members of the guild occupy sites with low levels of litter and abundant bare soil. Neither *Ipomopsis aggregata* ssp. *weberi* nor *Eriogonum exilifolium* have been shown to be fire adapted (Ladyman 2004b and Anderson 2006a), and therefore OPEN guild species may also suffer mortality as a result of direct effects from prescribed burns.

Biological treatment

In this document the term biological treatment is used to describe methods designed to attract wild (primarily ungulates such as elk, *Cervus canadensis* and mule deer, *Odocoileus hemionus*) or domestic animals (e.g. cattle and sheep) to the power transmission line corridor in order to control vegetation. Impacts from ungulate grazing are currently occurring as elk and cattle loiter in the power transmission line corridor. Cattle, in particular, prefer the corridor to adjacent areas (B. Elliott personal observation during 2008–2009 helicopter flights over Western's power transmission line corridors).

Impacts may vary based on several factors. First, the type of domestic livestock; sheep tend to graze more forbs and uproot plants while cattle do not graze plants as close to the ground as sheep (although they may still uproot plants) and cause more trampling and hoof shear due to their larger size and weight. Also, cattle tend to loiter in riparian areas and cause concentrated impacts there, while deer and elk tend to utilize upland areas. Impacts also vary based on the timing of grazing with different suites of plant species utilized in the spring versus the fall. Finally, the intensity and frequency of use determines the amount of plant tissue available for photosynthesis and recovery from herbivory.

Livestock grazing is ongoing under permit by the Forest Service in areas crossed by the power transmission lines analyzed in this document, and an environmental analysis of each allotment approved by Forest Service specialists has already been produced. However, encouraging additional use (e.g. through salting or water development) will lead to intense localized impacts within the power transmission line corridor. The direct effects of grazing by either wild or domestic animals include herbivory, trampling, and trailing. The timing and intensity of impact and the species of plant under consideration will determine the plant response which may range from beneficial to lethal.

Belsky et al. (1993) summarizes diverse views on the response of plants to herbivory. These views range from beneficial due to overcompensation to highly detrimental due to loss of photosynthetic tissue. Some grasses, for example, are adapted to respond positively to grazing because new growth originates at the basal meristem close to the soil surface. Plants may regenerate quickly if the root crown is not damaged and if sufficient photosynthesis has taken place to provide for root development and carbohydrate storage. Light or moderate grazing may

stimulate growth in some plants because removal of plant material containing carbohydrate reserves may increase photosynthetic activity to replace the lost material (Humphrey and Merhoff 1958, although Belsky et al. 1993 does not support this view). However, according to Anderson (2006b) two fescue grasses, *Festuca hallii* (a Region 2 sensitive species) and *F. campestris*:

> *"are sensitive to defoliation, and their competitiveness declines when grazed during the growing season (Willms and Fraser 1992). Under 20 percent defoliation, steep declines in top growth and root mass were observed in F. campestris (Johnston 1961, Willms and Fraser 1992)."*

Thus, some species, including graminoids, decline precipitously as a result of herbivory from livestock grazing. Herbivory results in removal of productive photosynthetic tissue and the ability to replace that tissue will vary depending on a number of factors. At some level of tissue removal through herbivory mortality will result (Holechek 1989). At lesser levels of herbivory, reduced growth and reproduction will result.

Figure 8-7: Intense herbivory from cattle grazing in a wet meadow habitat.

Trampling and trailing refers to the breaking, smashing, or shearing of plant tissues as a result of animal movement or loitering. The direct impact is similar to that caused by herbivory; the loss of plant tissues available for photosynthesis. The result is the same with some level of tissue removal resulting in mortality and lesser levels of trampling causing reduced growth and reproduction. Trampling and trailing also leads to soil compaction, an indirect effect described in the indirect effects section.

Members of the WET and MOIST habitat guilds will likely suffer the most severe direct effects due to the tendency of cattle to loiter in wet or riparian areas. Vegetation in these areas is likely

to be more palatable and thus direct impacts from herbivory and trampling are often concentrated in riparian or wet areas.

Members of the OPEN habitat guild grow in the most productive montane habitats where biological treatment will be encouraged. Salt, water developments, and fences will likely be focused in open habitats to prevent encroachment of woody species, and thus members of the guild will be directly impacted.

Members of the FOREST habitat guild will also be directly impacted, but forage is limited in this habitat and animals do not linger as they do in MOIST or WET habitats. However, cattle tend to loiter in forested areas to take advantage of cooler temperatures, water, and shade. Attempts to maintain forested habitat in a more open condition through biological treatment will result in impacts to members of the guild.

8.2.2 Indirect Effects

Hand (Manual) and Mechanical Treatment

Activities associated with power transmission line maintenance may also result in indirect effects to rare plant species. Indirect effects occur later in time (after the action has been completed) and generally result from changes made to rare plant habitats. To complicate indirect effects analysis, rare species show markedly different habitat preferences. Transmission line maintenance may have a beneficial effect on members of the OPEN habitat guild since proposed treatments will maintain areas in a more open, non-forested condition. However, long term beneficial indirect effects are overcome by negative direct and indirect effects such as trampling, excessive soil disturbance (leading to soil erosion or degradation of the seedbed), and noxious weed introduction and spread. By contrast, members of the FOREST guild that inhabit interior forest sites are adapted to closed canopy forests and low light conditions. Such species thrive in cool, moist, and shaded conditions. Changing the vegetation structure to more open, warmer, and drier conditions is detrimental to these species. Furthermore, certain plant species such as the orchids and moonworts (*Botrychium* spp.) have complex mycorrhizal associations. Mycorrhizae require organic matter found in the duff layer, and most mycorrhizal biomass is located in the top 4–6 inches of soil. Mechanical treatment disturbs, disrupts, and diminishes the upper soil horizon where mycorrhizal fungi reside (Trappe and Cromack 2009, Colgan et al.1999).

Habitat modifications often result in shifts of hydrologic, solar, and soil characteristics of rare plant habitats. Indirect impacts can have positive or negative effects and are often species specific, being positive for some species and negative for others. Transmission line maintenance can indirectly impact rare plants by:

- causing changes in vegetation composition and cover.
- creating a layer of wood chips on the soil surface.
- transporting and creating habitat for competitive invasive plant species.
- changing local hydrologic patterns.
- changing localized fire intensity.
- changing soil characteristics of the habitat through compaction, erosion, or sedimentation.

- changing foraging behavior of livestock or wildlife within and adjacent to transmission line corridors.
- impacting pollinators or mycorrhizae associated with rare plants.

Transmission line maintenance results in changes to vegetation structure as a result of removing overstory trees. After removal of overstory trees, treatment areas receive more sunlight and become warmer and drier with lower humidity. Chen et al. (1993) offers a cogent summary of microclimatic differences between clearcut and uncut forest floors in the Pacific Northwest:

> *"Clearcutting and associated forest practices significantly alter the surface thermal properties (e.g. albedo) and energy and material balances (e.g. solar radiation and precipitation) near the ground owing to the removal of forest canopy and ground materials (understory shrubs, coarse woody debris, etc.). Generally, a clearcut receives more direct solar radiation and precipitation, loses more outgoing longwave radiation, and shows higher rates of evapotranspiration than an adjacent forested area. Hence, there is typically a sunnier, warmer, windier, and drier environment outside the forest than in the forest during summer days and a cooler, wetter environment at night."*

Such differences in microclimate impact rare plant species. Few studies have been performed on the changes in understory vegetation after opening the forest canopy. However, several studies have shown that interior forest bryophytes are quite sensitive to such changes and considerable changes in bryophyte diversity have been documented following reduction in forest canopy (Dovčiak et al. 2006). Bryophytes are likely more susceptible to microclimate changes due to their weakly developed cuticle and high surface area to volume ratio which allows water and dissolved material to move more easily into and out of the plant body. Interior forest vascular plant species may show similar, if less drastic, changes as a result of forest canopy changes.

By contrast, if trees are dropped, lopped, and scattered (versus removed) the impact is less clear. Depending on the amount of slash left on the ground, sites may become warmer and drier or if slash load is heavy, the ground may be shaded with an increase in moisture and humidity. Subsequent burning of forest residues such as slash or chips is discussed under direct effects from prescribed burning.

On portions of the power transmission line ROW, heavy fuel loads will be managed through chipping with the depth of chips left on the soil surface dependent on fuel loading. In areas of dense vegetation masticated forest residues may be sufficient to prevent plant growth. This is apparent on previously treated sites within the Ault-Craig/Archer-Hayden power transmission line corridors; chips are 6–12 inches deep and little or no plant growth is penetrating the layer (see Figure 8 below). While this may be considered a positive effect from the viewpoint of transmission line maintenance, any special status plant occurrence within that corridor would likely be extirpated. Forest fuel reduction through mechanical thinning and chipping has been shown to change understory plant communities in ponderosa pine forests (Wolk and Rocca 2009), and likely has similar impacts in other plant communities.

Introduction of competitive invasive plant species poses a negative impact to all native plant species and their habitats, although different habitats may be invaded by different species of noxious weeds. In riparian areas or wet meadows, Canada thistle (*Cirsium arvense*) and

perennial pepperweed (*Lepidium latifolium*) may invade with potentially catastrophic results. Upland areas may be invaded by a host of noxious weeds such as leafy spurge (*Euphorbia esula*), knapweeds (*Centaurea* spp.), or cheatgrass (*Bromus tectorum*).

Figure 8-8: Vegetation management through chipping.

Noxious weeds may be introduced as a result of fire or ground disturbance (from roads, recreation, forest management activities, livestock, or wildlife). Most noxious weeds are early successional species that thrive in open sites with recently disturbed soils (Baker 1986). Roads, in particular, are ideal sites for noxious weed invasion. According to Trombulak and Frissell (2000) "*roads provide dispersal of exotic species via three mechanisms: providing habitat by altering conditions, making invasions more likely by stressing or removing native species, and allowing easier movement by wild or human vectors*." Also, invasive species (such as smooth brome, *Bromus inermis*) may be intentionally introduced for erosion control. According to Belsky and Gelbard (2000) livestock may contribute to alien weed invasions by:

- transporting weed seeds into uninfested sites on their coats and feet and in their guts,
- preferentially grazing native plant species over weed species,
- creating patches of bare, disturbed soils that act as weed seedbeds,
- creating patches of nitrogen rich soils, which favor fast growing weed species,
- reducing concentrations of soil mycorrhizae required by most western native species, and
- accelerating soil erosion that buries weed seeds and facilitates their germination.

Figure 8-9: Diffuse knapweed (*Centaurea diffusa*) site in a power transmission line corridor.

Invasive plant species impact rare plant species in several manners. Most invasive plants are highly competitive early seral species that compete directly with native and rare species for nutrients, light, or water. For example, Harvey and Nowierski (1989) showed that invasion by spotted knapweed resulted in significantly lower soil nutrient levels. Invasive plant species also impact rare species indirectly through allelopathy (the production and release of plant compounds that inhibit the growth of other plants) although as Olson (1999) notes "*it is often difficult to separate the effects of allelopathy from competition.*" For example, Lesica and Shelley (1996) demonstrated that spotted knapweed was responsible for reduced seedling establishment of *Arabis fecunda* (a rare plant endemic to Montana) through either allelopathy or competition. While most studies of allelopathy focus on agricultural crop plants, a few studies have focused on wildlands. Lawrence et al. (1991) documented the presence of plant compounds that inhibit growth in tissues of *Ailanthus altissimus* (tree-of-heaven) as well as in the soils surrounding the plant. Ridenour and Callaway (2001) showed that exudates of spotted knapweed inhibited growth of fescue grass roots. Clearly, both competition and allelopathy from nonnative invasive species have the potential to impact rare plants.

Invasion by non-native species may change fire regimes, including fire return intervals. The best known example of this change is invasion of the Great Basin by cheatgrass (*Bromus tectorum*). Whisenhut (1990) described natural fire regimes in native plant communities of 60–110 years changed to fire return intervals as low as 3–5 years in areas dominated by cheatgrass. Drastic

changes in fire return intervals are highly detrimental to perennial forbs (including rare plants) adapted to a longer fire interval.

Noxious weeds often lead to control efforts such as hand pulling, hoeing, mowing, or herbicide application. These control efforts also negatively impact rare plants by trampling, uprooting, clipping, or killing them. According to Andrew Kratz (2005), Forest Service Regional Botanist in Region 2, management efforts for weeds and rare plants must be coordinated to prevent or lessen these impacts.

Potential changes in hydrologic function resulting from the use of hand or mechanical treatment are similar with the primary difference being intensified soil disturbance resulting from use of mechanical equipment. Some areas, particularly those that are steep or with loose soils, are at more risk than others. Transmission line maintenance produces a more open environment as well as soil disturbance, potentially resulting in increased runoff and erosion in the uplands as well as peak flows, scouring, and sedimentation in the riparian zones. The Forest Service Watershed Management Practices Handbook (Forest Service 2006b) notes that "*If organic ground cover in a watershed is reduced enough to markedly increase the magnitude or duration of high flows, stream channels may erode their banks to damage their stability and aquatic habitat. Heavy soil disturbance exacerbates soil erosion and sedimentation.*" Erosion in the uplands removes organic matter and soil cover leading to altered microclimates. Increased stream flows result in stream downcutting and the subsequent drying of adjacent areas. Sedimentation affects seed germination and recruitment.

Changes in hydrologic function resulting from the use of hand or mechanical treatment could impact members of all guilds. Members of the MOIST or WET guilds are most impacted by either drying of their habitat or sedimentation, while members of the OPEN and FOREST guilds may be more at risk from increased overland flow and removal of organic matter. Heidel and Laursen (2003) note that "*One documented effect of fire at the Swamp Lake Botanical Area is the occurrence of debris flows into the fen from destabilized cliff faces where a crown fire destroyed the forest*."

Transmission line maintenance may also indirectly impact special status plants through modification of soil characteristics. Use of machinery may impact soils through increasing soil compaction, particularly in wet soils. Machinery also causes ground disturbance resulting in erosion and sedimentation.

The primary source of forest soils compaction comes from the use of machinery used to manage and harvest trees. Compaction varies based on soil type, kinds of machinery used, and the type of forest management activity, but is increased when soils are moist or wet. Luckow and Guldin (2007) reported that soil compaction was 20–50% less when timber harvest took place during the dry season. Rawinski and Page-Dumroese (2008) found that in 1992 soil compaction had increased on 21.32% of the area in a harvested unit on the Rio Grande National Forest. Soil compaction had not lessened in the unit when it was resampled in 2007, and studies suggest that 5–40 years are required for recovery from soil compaction (Graeten and Sands 1980).

A number of studies have shown a relationship between increased compaction, decreased infiltration of water, and subsequently increased runoff (e.g. Steinbrenner and Gessel 1955, Hatchell et al. 1970). Decreased infiltration often results in increased runoff and increased erosion, causing loss of organic matter and nutrients that are no longer available to support plant growth. Reduced infiltration may result in less water availability, particularly late in the season. Increased runoff causes erosion that removes organic matter and nutrients and may also deposit sediment in rare plant habitat. Soil compaction also adversely affects seed germination, emergence, and establishment. Compacted soils are denser with small soil pores, and these physical soil properties result in a stronger soil that is more resistant to root growth. Thus, impacts to soil from vegetation management activities reduce plant growth, reproduction, and establishment, and may impact rare plant species of all guilds.

Transmission line maintenance (or any management action resulting in opening of the forest canopy) causes changes in forage condition and quality leading to altered foraging behavior of livestock and wildlife within the transmission line corridor. By opening the forest canopy and allowing additional light to reach the forest floor, transmission line corridors create additional forage for wildlife and livestock. For example, in some areas a dense cover of elk sedge (*Carex geyeri*) has colonized the corridor and livestock and wildlife use there is more intense than in adjacent areas (B. Elliott personal observation 2008). Rare plant sites within or adjacent to the line may be impacted by livestock or wildlife as they graze in or travel the corridor.

Many flowering plants are dependent on pollinators for reproduction. Pollinator declines have been documented in several groups of pollinators and anthropogenic activities (e.g. agriculture, forest management, urbanization, and many others) have been implicated in those declines (Committee on the Status of Pollinators in North America, National Research Council 2007). Vegetation treatment causing a loss of floral hosts is implicated in a reduction of pollinator numbers. However, the indirect effects of transmission line maintenance through hand and mechanical treatment on pollinators are unclear. Native pollinators require nesting sites and a food source. Nesting sites may be in the ground or in plants. Hand or mechanical treatment will negatively impact nesting sites through ground disturbance and tree removal. However, by clearing forested areas, plant diversity and associated floral offerings may increase, offering greater and more diverse pollen sources for pollinators.

Some rare plant species are dependent on mycorrhizal associates essential to obtaining nutrients from the soil. Soil disturbance associated with mechanized equipment is detrimental to these mycorrhizal relationships (Trappe and Cromack 2009, Colgan et al.1999). Treatments that impact soil characteristics, particularly those that reduce or eliminate the duff layer, are likely most detrimental. The indirect effects of transmission line maintenance through a change in overstory characteristics resulting from either hand or mechanical treatment on mycorrhizal associates of rare plants are unknown. However, thinning of trees appears to have a detrimental effect on survival and growth of mycorrhizae associated with them (Outerbridge and Trofymow 2009), and potentially has a similar effect of mycorrhizal associates of rare plant species.

Transmission line maintenance may have a beneficial indirect effect on moonworts (*Botrychium* spp., members of the OPEN guild). These species are often associated with old disturbance such as roadsides, ski runs, reservoirs, mines, and transmission line corridors. Ground disturbance associated with these activities removes the overstory and disturbs the ground, creating habitat

for many moonwort species. While the initial activity may be detrimental and adversely impact individuals, the creation of new habitat for colonization may lead to indirect long-term beneficial effects for these species.

Herbicide and growth regulators

Indirect effects to rare plant species from herbicide treatment are primarily associated with impacts to pollinators. Many plants depend upon invertebrate species such as bees for pollination and indirect negative effects to rare plant species could occur should pollinator populations be reduced. Impacts to pollinators from herbicide treatment are associated with reductions in their food source (i.e. pollen sources are killed) as well as mortality from direct contact with herbicide. Moreby and Southway (1999) showed reduced invertebrate abundance resulting from herbicide application. However, one study of selective herbicide use showed that power transmission lines can be maintained as valuable pollinator habitat (Russell et al. 2005). Thus, the impact to native pollinators resulting from herbicide for vegetation management in power transmission line corridors is complex and neither wholly beneficial nor detrimental.

Members of all guilds could potentially be impacted, but effects depend more on the type of pollination system rather than habitat guild, and little information is available about pollination systems for most rare species. Plants that are pollinated by many species (generalists) would be least at risk while species with specialized pollination systems that depend on one or a few pollinators (such as *Cypripedium fasciculatum*) would be most at risk. Wind pollinated plant species such as grasses would not be impacted.

Invertebrate pollinators could be directly impacted by either lethal or sublethal exposure to herbicides. According to Committee on the Status of Pollinators in North America (2007)

> *"Large-scale herbicide applications, such as are applied in the southwestern United States to remove undesirable scrub and brush (mesquite and Prosopis plants), should be discouraged because they remove not only nesting sites and refuges, but also pollen and nectar sources for native bees, honey bees, and other pollinators (Buchmann and Nabhan 1996)."*

If pollinator populations are diminished as a result of herbicide application, reduced reproduction of rare plant species dependent on those pollinator species can be expected. Few studies have investigated the effects of pollinator loss on rare plant species. However, lack of pollinators has been implicated in reproductive failure in *Cycladenia jonesii* (Jones' cycladenia) (Sipes and Tepdino 1996). Failed reproduction, possibly due to pollinator loss, has had a role in the species' listing as a threatened species (FWS 1985 and 1986). Although little is known regarding the impacts of pollinator loss on other rare plant species, it is undoubtedly negative across all guilds.

Herbicide application can lead to increased erosion when vegetative cover is removed. Soil exposed by vegetation removal is vulnerable to erosion by wind or water. However, herbicide use under the proposed action is intended to reduce growth and cover of shrubs, and is not intended to remove all vegetative cover. Thus, increased erosion is expected to be minimal.

Prescribed burning

Prescribed burning modifies many habitat characteristics and results in indirect effects to rare plant species. These habitat modifications vary widely in magnitude based on the frequency and severity of the fire, season of the fire, the habitat in which the fire occurs, and the sensitivity of different rare plant species to habitat changes. Thus, the impacts range from lethal to mildly negative or beneficial. Indirect effects from prescribed fire can impact rare plant species through:

- injuring and weakening individuals thereby rendering them more susceptible to secondary infection or infestation by insects, bacteria, fungi, or other pathogens,
- changes in vegetation structure,
- enhanced noxious weed invasion,
- changes in local hydrological function,
- new use patterns by livestock and wildlife,
- change of soil characteristics including nutrient availability,
- mortality of soil microorganisms, including mycorrhizae,
- decrease in competition, and
- removal of accumulated dead plant material.

Several of the indirect effects resulting from prescribed fire are similar to those caused by hand or mechanical treatment. Those effects are described in detail above and will not be further discussed here. These similar indirect effects rare plants include:

- changes in vegetation structure,
- noxious weed invasion ,
- changes in local hydrological function,
- new use patterns by livestock and wildlife.

The level of indirect effects from fire varies widely depending on the season and intensity of the fire as well the sensitivity of a particular rare species to fire. While fire is detrimental to some species (particularly those which inhabit the interior forest), fire suppression is detrimental to plants that inhabit forest openings, woodlands, and open forests. No single fire regime (i.e. fire intensity, frequency, timing, and pattern) will be advantageous to all species and thus the response to fire will be highly species dependent with changes being beneficial to some rare plant species and detrimental to others. For example, the Forest Service Fire Effects Information System (Forest Service 2012) noted a positive response to fire from *Aralia nudicaulis* (wild sarsaparilla) and *Equisetum arvense* (field horsetail). Both species were top-killed by fire but resprouted vigorously post-fire. Intense fire kills underground structures and prevents resprouting. Severe negative impacts were noted in *Goodyear repens* (rattlesnake orchid) and *Drosera rotundifolia* (round-leaf sundew). Both species were killed by fire. Unfortunately little empirical data exists regarding the impact of fire on Region 2 sensitive or other rare plant species.

A substantial indirect effect of prescribed fire on plants (including rare plants) is secondary infection or infestation of weakened individuals by insects, bacteria, fungi, or other diseases (Brown and Smith 2000) resulting in reduced growth and reproduction or mortality. Mortality from secondary infection may be delayed several years after the event. Plants weakened by drought or other stresses prior to a fire are more likely to succumb to secondary infection.

Delayed mortality may be extensive. Unfortunately, little research has been conducted on the secondary effects of fire on rare plants, but a study by Stickel and Marco (1936) showed that over half of spruce (*Picea*) trees that had survived a fire had been attacked by insects or disease three years after the fire. While spruce is a fire sensitive species, even fire resistant species such as ponderosa pine (*Pinus ponderosa*) show delayed mortality due to fire injury. Several models to predict such mortality have been developed by the Forest Service (e.g. Thies et al. 2008). Levels of post-fire delayed mortality to Region 2 sensitive or other rare plant species have not been studied.

Prescribed fire alters soil characteristics leading to indirect effects on vegetation, including rare plants. Neary et al. (2005) classify soil properties into three categories with respect to their sensitivity to change by fire:

- relatively insensitive soil properties such as minerals, including calcium, magnesium, potassium, and manganese,
- moderately sensitive soil properties such as sulfur, organic matter, and soil properties dependent upon organic matter, and
- sensitive soil properties such as living microorganisms including bacteria, fungi, mychorrizae, plant roots, and seeds.

Organic matter is an important component of nutrient availability and its presence has a large impact on soil compaction. Organic matter is lost during a fire to volatization and as particulates in smoke. After a burn nutrients and organic matter are easily leached. Fire results in an initial flush of nutrient availability as they are released from organic matter, but nutrients are often soon lost due to leaching, erosion, or other processes. Once lost, nutrients are unavailable for plant growth, resulting in reduced growth and reproduction.

Organic matter has a large influence on soil compaction. Loss of organic matter after a fire leads to collapse of the soil structure and a corresponding increase in soil compaction (Neary et al. 2005). Soil compaction and its impact on rare plants and their habitats are described in detail under indirect effects of hand or mechanical treatment.

Prescribed fires have a potentially large and negative effect on mycorrhizae associated with rare plants such as *Botrychium.* According to Neary et al. (2005):

> *"How do microorganisms respond to fire? Without question, fire is lethal. It also modifies the habitat of microorganisms by destroying organic matter, altering soil temperature and moisture regimes, and changing the postfire vegetation community and rates of organic matter accumulation. Consequently, changes in microbial population size and activity are common following wildfire and prescribed fire (see Ahlgren 1974, Raison 1979, Borchers and Perry 1990, Neary et al. 1999 for reviews)."*

The authors are quick to point out that the impacts are quite variable and unpredictable, depending on conditions during the time of the fire and other factors. However, mycorrhizae critical to the life cycle of some rare species are apparently negatively impacted by prescribed fire.

Finally, prescribed fire can negatively impact rare plants through erosion and sedimentation. Erosion and sedimentation are discussed under indirect impacts from hand and mechanical

treatment. However, Neary et al. (2005) give examples of worst case scenarios for erosion (a gully 50 feet deep) as well as sedimentation ("*the large amount of sediment that filled in a 10 acre (4 ha) lake on the Coronado National Forest after the Rattlesnake Fire of 1996*"). These are worst case scenarios from high intensity wildfire, but demonstrate the potential negative impacts of fire, including prescribed fire.

Indirect effects from fire will impact members of all guilds, although the severity of impacts will vary. Members of the WET and MOIST habitat guilds would be impacted most by changes in local hydrology, particularly if such changes led to extensive sedimentation. Changes in vegetation structure that altered insolation and invasion by noxious weeds, particularly Canada thistle (*Cirsium arvense*) would also impact members of the guild. Secondary infection from injury, changes to soil structure, and new use patterns are less likely to impact members of the guild as fire intensity is expected to be lower within their habitat.

Members of the OPEN habitat guild are most susceptible to soil and hydrological changes (particularly compaction and erosion), noxious weed invasion, new use patterns by herbivores, and in *Botrychium* species mortality of mycorrhizal associates. Changes in vegetation structure (i.e., a more open habitat as a result of overstory removal) would be a beneficial effect.

Members of the FOREST habitat guild would be impacted most by changes to vegetation structure whereby the habitat would become more open, sunnier, and drier. While other indirect effects are also likely to impact members of the guild, they are much less important than changes to the overstory.

Biological treatment

The indirect effects of grazing by either wild or domestic ungulates include species composition changes, changes in forest density, introduction and colonization of invasive plant species, soil compaction and erosion, alteration of water flow regimes, incision of the flood channel, and increased overland flows.

Species composition change

Numerous studies have documented the ability of livestock grazing to change both species composition and habitat type at the local and landscape scale. Direct selection of palatable species by livestock and different levels of sensitivity to livestock grazing by plant species are responsible for shifts in individual species abundance and frequency at the local scale and community conversion at the landscape scale (Fleischner 1994, Humphrey and Merhoff 1958).

The western United States has seen major changes in species composition and habitat type as a result of livestock grazing. The invasion of sagebrush steppe by cheatgrass (*Bromus tectorum*) (Mack 1981) and the conversion of bunchgrass habitats in southern Arizona (Van Auken 2000, Humphrey and Merhoff 1958) to desert scrub are two notable examples. The change in species composition resulting from livestock grazing in southeast Utah is the most dramatic shift in that flora over the last 5,400 years (Cole et al. 1997). Thus, under some circumstances livestock grazing is capable of altering plant species composition.

Figure 8-10: Species composition shifting as a result of livestock grazing.

It must be noted, however, that when managed properly livestock grazing can lead to an increase in biological diversity by maintaining the land in a variety of seral states (Holland et al. 2005). This is the intermediate disturbance hypothesis which states that species diversity is limited by environmental stress (including climatic, herbivory, disease, or any other kind of stress) at one extreme and competition at the other extreme. Species adopt different strategies to thrive at some place on the stress-competition continuum, with some species being stress tolerators and others being strong competitors. In those habitats that have an evolutionary history of grazing (i.e. presettlement), species diversity will be maximized at intermediate levels of grazing. Any increase in biological diversity is reversed if livestock grazing leads to a preponderance of early seral states rather than a variety of seral states on the landscape.

In habitat types that have developed with grazing, the highest level of species diversity may be found when grazing by either wild or domestic ungulates are part of the system (Hobbs and Huenneke 1992). Species diversity can be maximized if the landscape is maintained in a variety of seral states. However, in areas that have not evolved under grazing pressure from ungulates, the dominant species are those that are not tolerant of grazing. Introduction of livestock into such systems can cause major changes in species composition and in the worst case scenario a habitat type change.

Changes in Forest Density

Livestock grazing may indirectly affect rare plant species by influencing forest density. The effect of livestock grazing on forest density is complex, being influenced by forest type, grazing intensity, and other management actions such as fire suppression. A commonly held view is that livestock, particularly cattle, maintain forests in a more open condition as a result of herbivory, trampling, and rubbing against understory trees. However, livestock may also contribute to greater forest density by encouraging tree seed germination through removing competing vegetation and disturbing the soil, providing a seedbed for tree seed germination. Ponderosa pine forests are believed to have become much denser in part due to livestock grazing (Belsky and Blumenthal 1997, Cooper 1960, Rummell 1951). After logging ponderosa pine forests, livestock were historically moved on the range to take advantage of a flush of forage. Heavy grazing and soil disturbance combined with fire suppression resulted in widespread tree seed germination, leading over time to the overstocked forest stands so familiar today. Thus, livestock grazing may lead to more open or denser stands, depending on a number of factors.

Introduction and colonization of invasive plant species

Domestic livestock, as well as agriculture, logging, road construction, and other practices that disturb soils have been instrumental in establishment of nonnative invasive plant species in western habitats, including tamarisk (*Tamarix*) (Hobbs and Huenneke 1992), cheatgrass (*Bromus tectorum*) (Mack 1981), and other weedy grasses (D'Antonio and Vitousek 1992). Livestock act as a vector for seeds, disturb the soil, and reduce composition and reproductive capability of native species. Exotic weeds have been able to displace native species in part because native grasses of the Intermountain West and Great Basin are not adapted to frequent and close grazing (Mack and Thompson 1982). Consequently, populations of native species have been depleted by livestock, allowing more grazing tolerant weedy species to invade. Degradation of rangeland may result in a new stable state of succession with unpalatable woody shrubs, grasses, and forbs replacing the native vegetation (Laycock 1991).

In summary, livestock are capable of transporting and encouraging establishment and spread of invasive species (Belsky and Gelbard 2000). Once established, invasive species may permanently replace much of the native flora in a new successional stage wherein a natural return to the previously existing mix of native plants is unlikely. Invasive species invasion is a decidedly negative indirect effect to rare plant members of all habitat guilds.

Impacts to soils

Grazing by wild or domestic ungulates can indirectly impact rare plant species through soil compaction and erosion. Impacts due to changes in the soil environment are described in detail under indirect effects of hand and mechanical treatment.

Impacts to hydrology

Grazing by wild or domestic ungulates can indirectly impact rare plant species through alteration of hydrology. Impacts due to changes in hydrology are described in detail under indirect effects of hand and mechanical treatment.

Members of the WET and MOIST habitat guilds will likely be the most negatively impacted rare plant species. Livestock, particularly cattle, loiter in wet and moist areas due to the abundance of

palatable forage and access to water. In addition to grazing, churning of the soil and trampling will cause detrimental impacts to members of the guild.
Members of the OPEN habitat guild will also be impacted by implementation of biological treatment. Trampling and grazing will be negative impacts, but if herbivores keep the habitat in a more open condition (as is intended) members of the guild may also benefit due to prevention of tree and shrub encroachment in their habitat. Heavy use that results in species composition shifts would be detrimental to members of the guild.

Members of the FOREST habitat guild could be negatively impacted as a result of indirect effects resulting from implementation of biological treatment. In addition to potential impacts from trampling and herbivory, changes in overstory cover pose a negative effect.

8.2.3 Cumulative Effects

Cumulative Effects Applicable to all Plant Species

Two legal definitions exist for cumulative effects, as they relate to impacts analysis for TEPS plant species. Under NEPA, cumulative impacts are the incremental impacts of the Proposed Action when added to other past, present, and reasonably foreseeable future federal, state, and private activities (40 CFR 1508.7). Under the Endangered Species Act (ESA), "cumulative effects" only consider future non-federal activities that are reasonably certain to occur in the action area for listed species considered in the analysis (U.S. Fish and Wildlife Service and National Marine Fisheries Service 1998). Future federal activities or activities permitted by federal agencies are not included under ESA cumulative effects because such activities that may adversely affect threatened or endangered species must undergo consultation with the U.S. Fish and Wildlife Service, pursuant to Section 7 of the ESA. Since no threatened or endangered species are analyzed in this document, ESA cumulative effects are not evaluated. Cumulative impacts, as defined by NEPA, are discussed below.

Actions likely to occur in the Analysis Area

The transmission line corridors analyzed in the Environmental Impact Statement traverse numerous habitats in Utah, Colorado, and western Nebraska. A list of reasonably foreseeable future actions would be extensive. However, it is expected that the following types of activities will take place in or adjacent to the transmission line corridor in the reasonably foreseeable future:

- Vegetation management activities, particularly those associated with the ongoing beetle infestation. Such activities will lead to a more open canopy with additional light reaching the forest floor (which may be beneficial or detrimental depending on the species), soil disturbance, and compaction, development of skid roads, and noxious weed invasion. Changes in forest composition, structure, and fire frequency will also take place.
- Livestock grazing will result in biomass removal and trampling as well as changes in species composition, compaction of soils, changes in fuel loading and the fire regime, downcutting of riparian areas with subsequent drying of adjacent meadows, and noxious weed invasion. Within riparian areas and wet meadows livestock grazing will lead to churning of the soil and hummocking.

- Road construction will lead to soil disturbance and erosion, destruction of habitat, and noxious weed invasion. It will also increase the impacts from recreational activities by allowing improved access for those activities.
- Motorized and non-motorized recreational use (including off-road vehicle use, camping, horseback riding, mountain biking, hiking, hunting, and fishing) will likely lead to the development of non-system roads and trails, development of dispersed campsites, erosion, and transporting noxious weeds into previously uninfested areas.
- Urban development will destroy plant habitat, fragment populations, and increase the risk of weed invasion and fire.
- Oil and gas development will result in the destruction of habitat, construction of roads and pipelines, soil disturbance, spread of non-native plant species and noxious weeds, and reductions in water quality.

A lack of information regarding the presence, absence, and extent of threatened, endangered, and proposed/candidate species in the analysis area makes evaluation of cumulative effects more difficult and speculative. For the rare plant species analyzed in this document, historical population data are unavailable. It is unknown whether these species have always been rare or if management activities have made them less common across the landscape due to cumulative effects. It is also not known whether other projects in the area are impacting sensitive species. Should sensitive plant species be impacted by proposed activities, those losses will be in addition to other cumulative impacts occurring throughout the region. However, by performing botanical surveys and protecting or enhancing known populations of these species cumulative effects will be minimized.

9.0 Determinations of Effect and Rationale

The following determinations are based on the analysis presented above. A brief rationale is given in support of the determination. Due to similarities between the no-action and proposed action alternatives (both will consist of vegetation management by hand or mechanical means) the determination for each group of species is identical. An effect determination of "may adversely impact individuals, but not likely to result in a loss of viability in the Planning Area, nor cause a trend toward federal listing" is extremely broad. However, it must be used in cases where minor and unexpected (albeit still possible) impacts as well as intensive and broad-scale impacts that, though severe, will not lead to a trend towards listing as a threatened or endangered species. In this case, the difference between the no-action and proposed alternatives is in severity of impacts.

9.1 No Action Alternative

Under the no action alternative a determination of "**May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing**" is made for *Botrychium furcatum, Botrychium lineare, Botrychium paradoxum, Eriogonum exilifolium, Festuca hallii, Ipomopsis aggregata* ssp. *weberi, Machaeranthera coloradoensis, Penstemon harringtonii,* and *Triteleia grandiflora* (members of the OPEN habitat guild). This determination is based on the following rationale:

- although no additional activities are planned under the no-action alternative, maintenance activities will take place under the existing authorization, resulting in impacts to members of the guild.
- while additional habitat may be created (a beneficial effect) as a result of on-going maintenance activities, a beneficial impact determination cannot be made as the effect is not wholly beneficial and some negative consequences (such as direct impacts) may result during implementation.

Under the no action alternative a determination of "**May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing**" is made for *Astragalus leptaleus* and *Cypripedium parviflorum* (members of the MOIST habitat guild) as well as *Carex diandra, Carex livida, Eriophorum altaicum* ssp. *neogaeum, Eriophorum gracile, Mimulus gemmiparus, Parnassia kotzebuei, Rubus arcticus* ssp. *acaulis, Salix candida, Salix serissima, Selaginella selaginoides,* and *Utricularia minor* (members of the WET habitat guild). This determination is based on the following rationale:

- although no additional activities are planned under the no-action alternative, maintenance activities will take place under the existing authorization, resulting in impacts to members of the guild.

Under the no action alternative a determination of "**May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing**" is made for *Viola selkirkii* (a member of the FOREST habitat guild). This determination is based on the following rationale:

- although no additional activities are planned under the no-action alternative, maintenance activities will take place under the existing authorization, resulting in impacts to *Viola selkirkii*.

9.2 Proposed Action Alternative

Under the proposed action alternative a determination of "**May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing**" is made for *Botrychium furcatum, Botrychium lineare, Botrychium paradoxum, Eriogonum exilifolium, Festuca hallii, Ipomopsis aggregata* ssp. *weberi, Machaeranthera coloradoensis, Penstemon harringtonii,* and *Triteleia grandiflora* (members of the OPEN habitat guild). This determination is based on the following rationale:

- proposed maintenance activities will cause direct and indirect impacts to members of the guild.
- although integrated design criteria are intended to minimize direct impacts from proposed activities, unavoidable indirect impacts may still occur.
- while additional habitat may be created (a beneficial effect) as a result of proposed activities, a beneficial impact determination cannot be made as the effect is not wholly beneficial and some negative consequences (such as direct impacts) may result during implementation.

Under the proposed action alternative a determination of "**May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward**

federal listing" is made for *Astragalus leptaleus* and *Cypripedium parviflorum* (members of the MOIST habitat guild); as well as *Carex diandra, Carex livida, Eriophorum altaicum* ssp. *neogaeum, Eriophorum gracile, Mimulus gemmiparus, Parnassia kotzebuei, Rubus arcticus* ssp. *acaulis*, *Salix candida*, *Salix serissima*, *Selaginella selaginoides*, and *Utricularia minor* (members of the WET habitat guild). This determination is based on the following rationale:

- proposed maintenance activities will cause direct and indirect impacts to members of the guild.
- although integrated design criteria are intended to minimize direct impacts from proposed activities, unavoidable indirect impacts may still occur.

Under the proposed action alternative a determination of "**May adversely impact individuals, but not likely to result in a loss of viability on the Planning Area, nor cause a trend toward federal listing**" is made for *Viola selkirkii* (a member of the FOREST habitat guild). This determination is based on the following rationale:

- proposed maintenance activities will cause direct and indirect impacts to the species.
- indirect effects from overstory removal will make habitat less suitable for the species. However, abundant potential habitat is found within the planning unit, and it is unlikely that proposed activities pose a significant threat to the species.

10.0 Recommended Conservation Measures to Avoid, Minimize, or Mitigate Adverse Effects

Conservation measures are designed to minimize impacts to rare species and natural habitats. Conservation measures were developed in interdisciplinary team meetings with representatives from Western and the Forest Service. Conservation measures are given in Sections 2.2.2.7 and 2.2.2.8, above.

11.0 Responsibility for a Revised Biological Evaluation

This Biological Evaluation was prepared based on presently available information. If the action is modified in a manner that causes effects not considered, or if new information becomes available that reveals that the action may impact endangered, threatened, proposed, or sensitive species that in a manner or to an extent not previously considered, a new or revised Biological Evaluation will be required.

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Appendix 1: Baseline Vegetation Summary

Extensive GIS analysis was performed on Western's power transmission lines in the project area. A summary of vegetation type by power transmission line is given below.

WAPA Proposed Action: Baseline Vegetation Summary on USFS Managed Lands			
Forest: RMBNF			
Date: 07.25.2011			
** 'Treated' vegetation types indicate areas of cutting that have occurred after the NAIP aerial date of acquisition. These areas have been determined to be cleared based on acquired West Range cutting data.*			
Transmission Line	**Long-Term Compatibility**	**Veg Type**	**Acres**
ARCHER-NORTH PARK	*Compatible*	Forb	0.8
ARH-NOP / 230kV	*Compatible*	Treated	26.7
		Total	**27.5**
	Incompatible	Aspen	0.1
	Incompatible	Lodgepole Pine	3.6
	Incompatible	Spruce/Fir	8.3
		Total	**12.0**
		Grand Total	**39.5**
AULT-CRAIG	*Compatible*	Forb	43.2
AU-CRG / 345kV	*Compatible*	Grass	22.4
	Compatible	Rock Soil	0.2
	Compatible	Shrub	4.0
	Compatible	Treated	144.1
	Compatible	Tufted Hairgrass - Sedge	3.0
	Compatible	Willow	5.2
		Total	**222.2**
	Incompatible	Aspen	3.8
	Incompatible	Lodgepole Pine	20.3
	Incompatible	Spruce/Fir	28.0
		Total	**52.1**
		Grand Total	**274.3**
GORE PASS-HAYDEN	*Compatible*	Forb	56.1
GOT-HD / 138kV	*Compatible*	Grass	17.8
	Compatible	Treated	4.4
	Compatible	Tufted Hairgrass - Sedge	5.5
	Compatible	Willow	2.7
		Total	**86.6**
	Incompatible	Aspen	4.1
	Incompatible	Lodgepole Pine	10.6
	Incompatible	Spruce/Fir	0.8
		Total	**15.5**

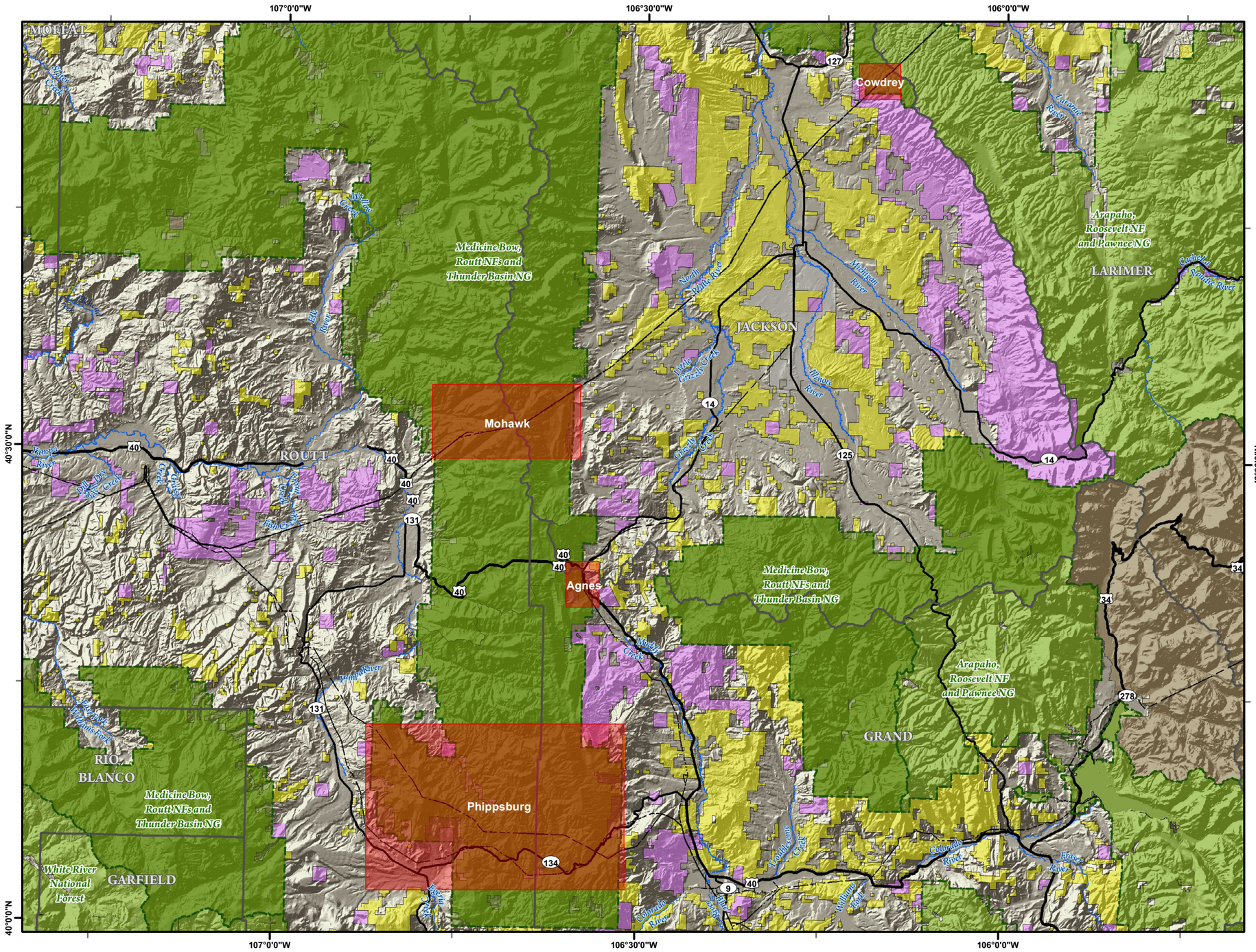
		Grand Total	**102.0**
GORE PASS-MUDDY PASS	*Compatible*	Grass	19.2
GOT-MPS / 69kV		**Total**	**19.2**
	Incompatible	Aspen	0.5
		Total	**0.5**
		Grand Total	**19.7**
HAYDEN-GORE PASS	*Compatible*	Forb	32.8
HDN-GOT / 230kV	*Compatible*	Grass	5.7
	Compatible	Treated	206.2
	Compatible	Tufted Hairgrass - Sedge	10.1
	Compatible	Willow	9.2
		Total	**263.8**
	Incompatible	Aspen	6.2
	Incompatible	Lodgepole Pine	51.9
	Incompatible	Spruce/Fir	10.6
		Total	**68.7**
		Grand Total	**332.5**
HAYDEN-NORTH PARK	*Compatible*	Forb	42.5
HDN-NOP / 230kV	*Compatible*	Grass	16.4
	Compatible	Shrub	17.4
	Compatible	Treated	61.3
	Compatible	Willow	3.8
		Total	**141.3**
	Incompatible	Aspen	7.9
	Incompatible	Lodgepole Pine	9.4
	Incompatible	Spruce/Fir	8.9
		Total	**26.2**
		Grand Total	**167.5**
Transmission Line	**Compatibility**	**Veg Type**	**Acres**
All Transmission Lines	*Compatible*	Forb	175.4
	Compatible	Grass	81.4
	Compatible	Rock Soil	0.2
	Compatible	Shrub	21.4
	Compatible	Treated	442.7
	Compatible	Tufted Hairgrass - Sedge	18.6
	Compatible	Willow	20.8
		Total	**760.6**
	Incompatible	Aspen	22.6
	Incompatible	Lodgepole Pine	95.7
	Incompatible	Spruce/Fir	56.6
		Total	**174.9**
		Grand Total	**935.5**

Appendix 2: Acres of Vegetation Types

Acres of Vegetation Types in the Rights-of-Way in Medicine Bow-Routt National Forests

Vegetation Type	Acres
Aspen	22.6
Cleared	442.7
Forb	175.4
Grass	81.4
Lodgepole pine	95.7
Rock soil	0.2
Shrub	21.4
Spruce/fir	56.6
Tufted hairgrass - sedge	18.6
Willow	20.8
TOTAL	**935.5**

Appendix 3: Maps of the Project Area



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 1

Project Area Locations

- Project Area
- Transmission Line
- Interstate
- US Highway
- State Highway
- Stream
- County
- United States Forest Service
- Routt & Medicine Bow National Forests
- National Park Service
- Bureau of Land Management
- State
- Private
- Other

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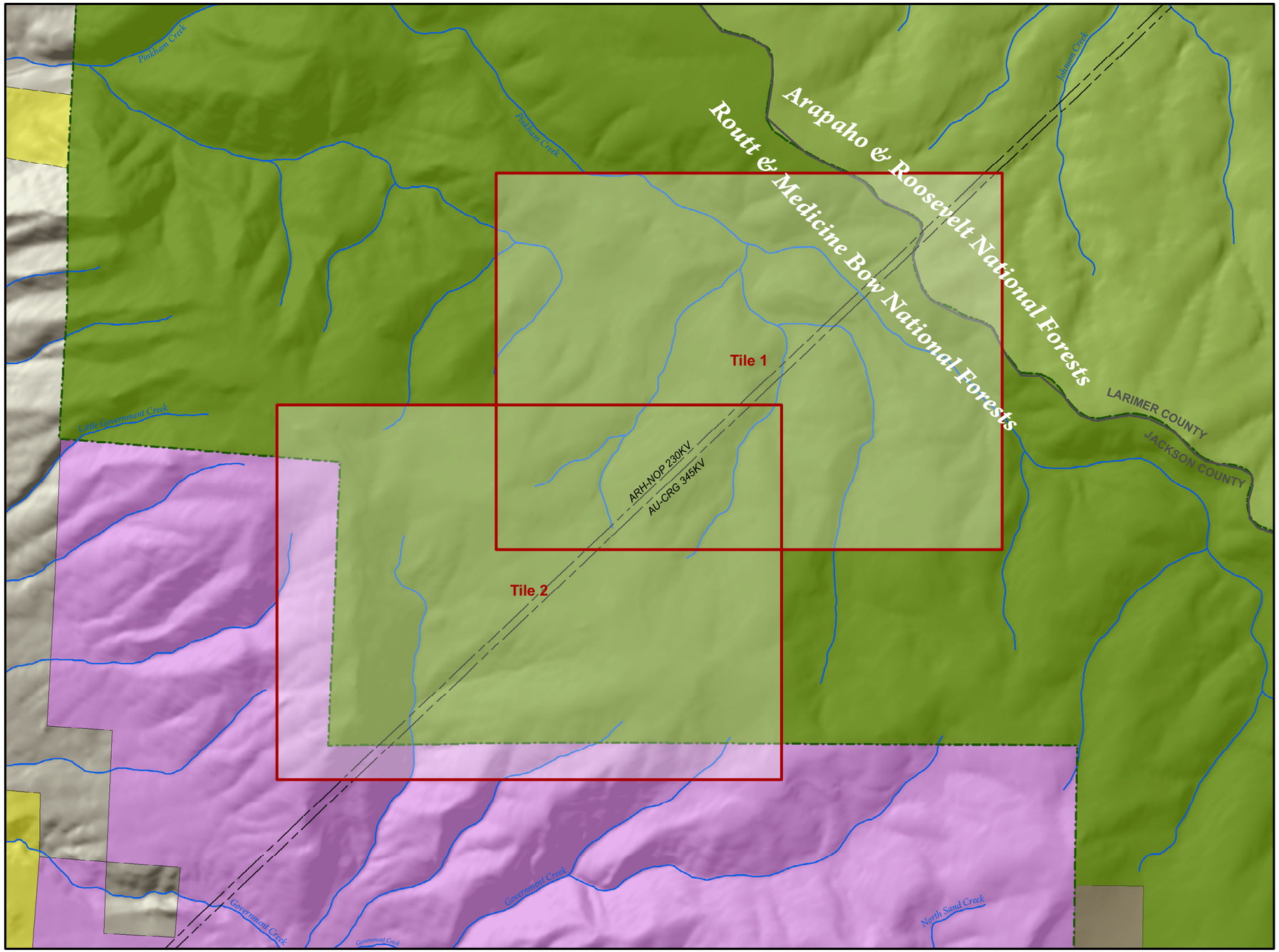
0 5 10 20 Miles

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 2

Cowdrey Tile Locations

- Project Area
- Transmission Line
- Interstate
- US Highway
- State Highway
- Stream
- County

LAND STATUS

- United States Forest Service
- Routt & Medicine Bow National Forests
- Bureau of Land Management
- State
- Private

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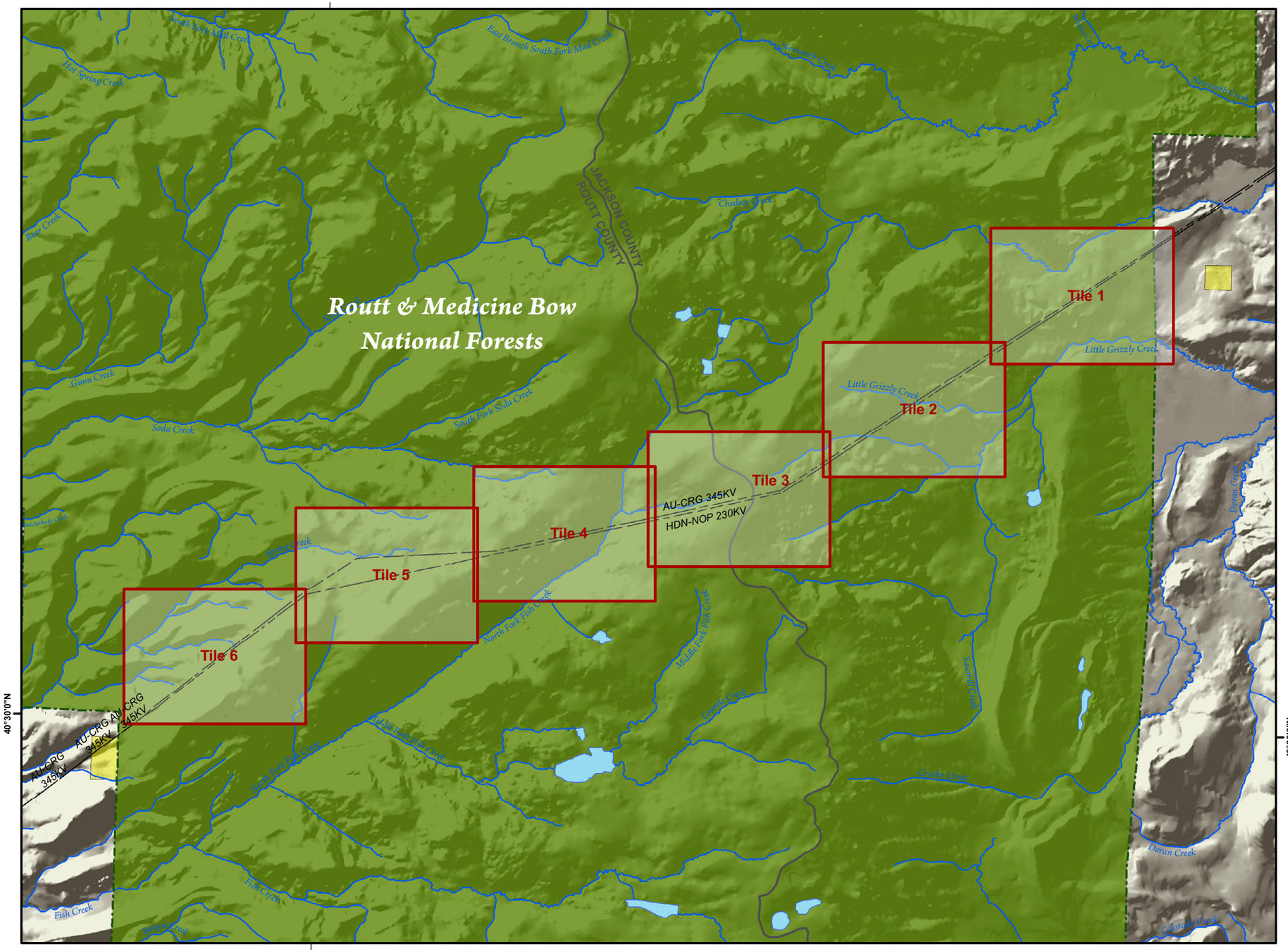
0 1,000 2,000 4,000 Feet

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 3

Mohawk Tile Locations

- Project Area
- Transmission Line
- Interstate
- US Highway
- State Highway
- Stream
- County

LAND STATUS

- Routt & Medicine Bow National Forests
- Bureau of Land Management
- Private

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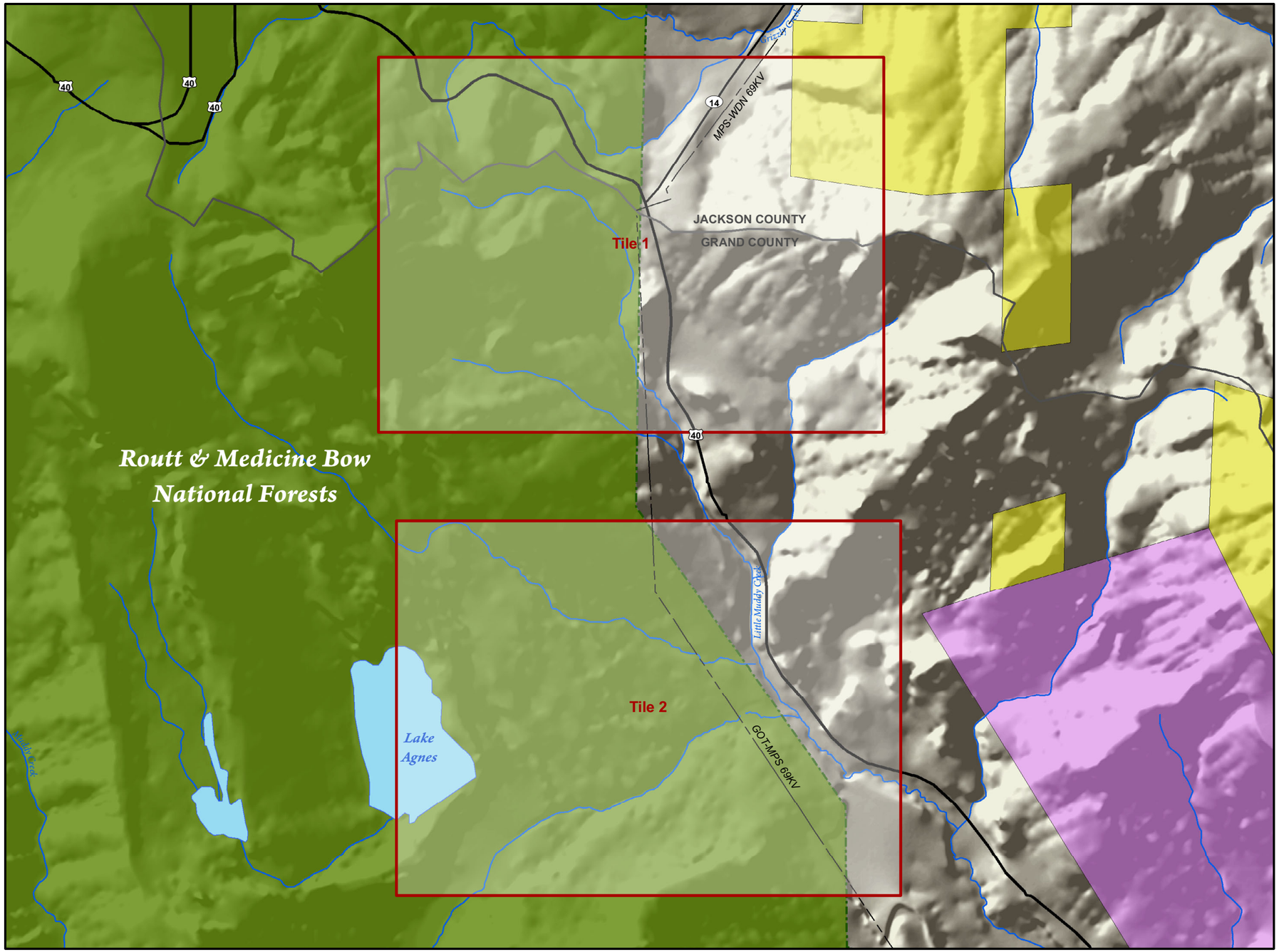
0 2,950 5,900 11,800 Feet

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 4

Agnes Tile Locations

- Project Area
- Transmission Line
- Interstate
- US Highway
- State Highway
- Stream
- County

LAND STATUS

- Routt & Medicine Bow National Forests
- Bureau of Land Management
- State
- Private

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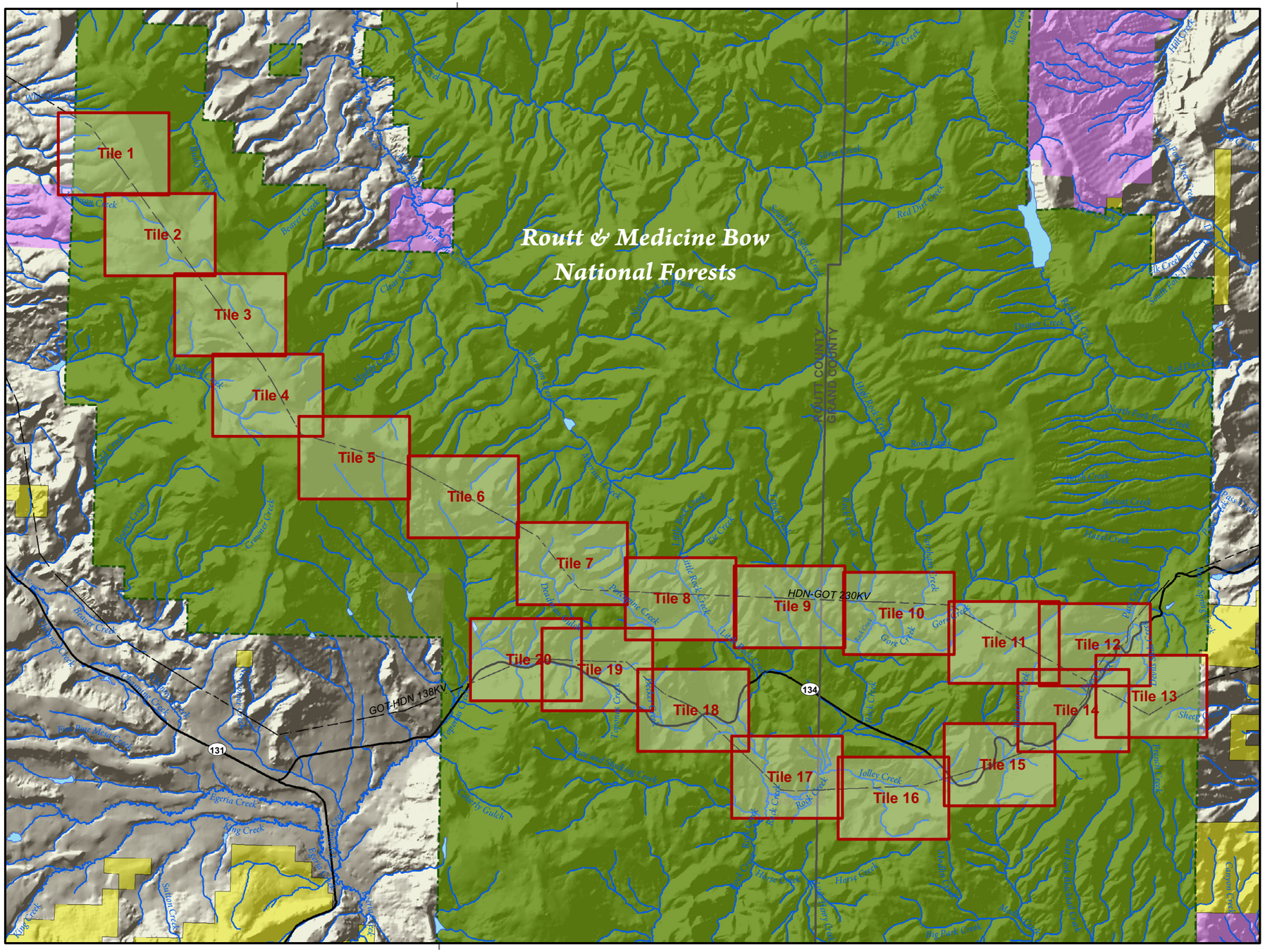
0 1,000 2,000 4,000 Feet

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 5

Phippsburg Tile Locations

- Project Area
- Transmission Line
- Interstate
- US Highway
- State Highway
- Stream
- County

LAND STATUS

- Routt & Medicine Bow National Forests
- Bureau of Land Management
- State
- Private

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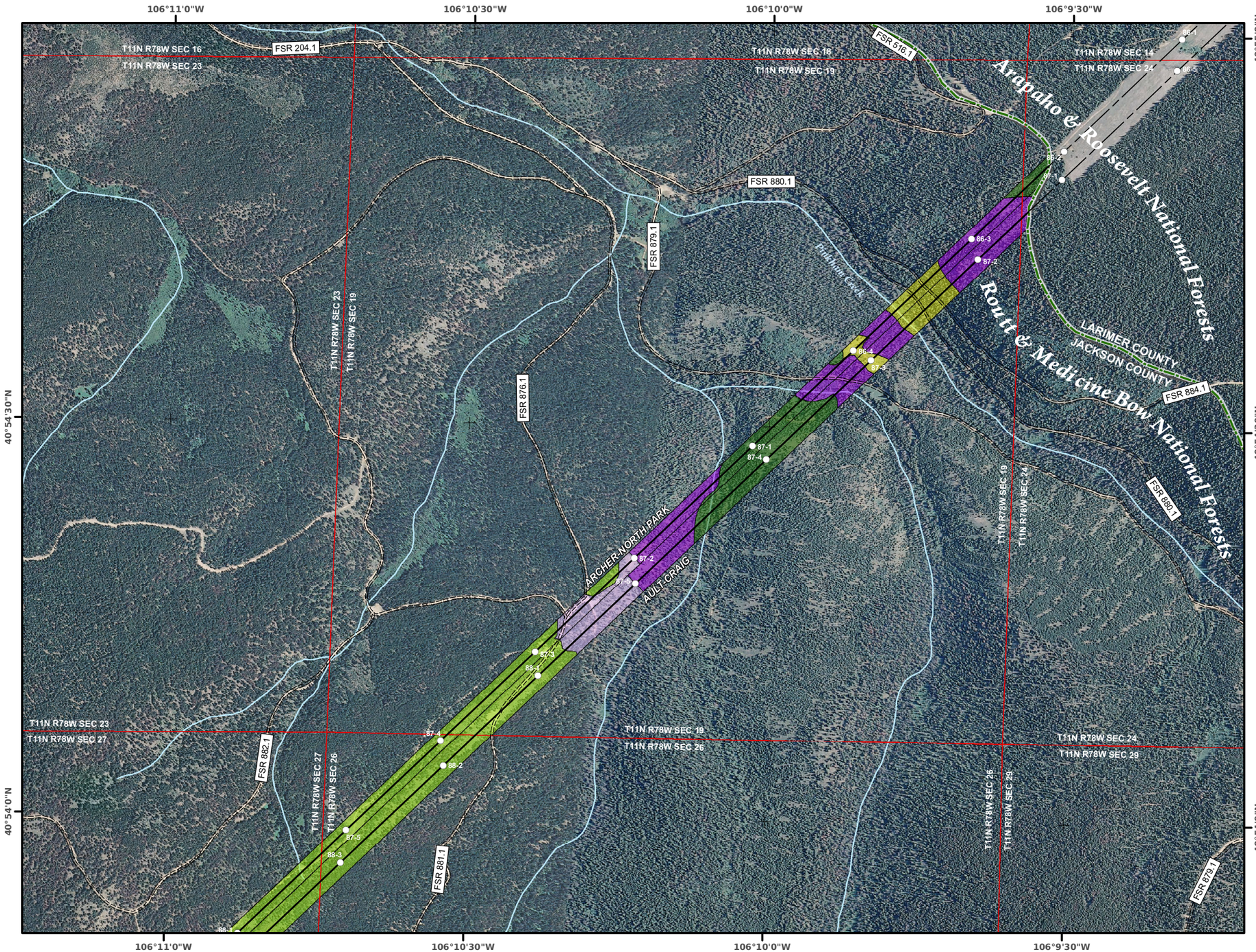
0 4,900 9,800 19,600 Feet

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 6

Parks Ranger District

Jackson County

Cowdrey 1 Project Area

Archer-North Park & Ault-Craig Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

** Non-USFS managed lands within the USFS administrative boundary represent private inholdings and other inholdings owned and managed by other governmental agencies.*

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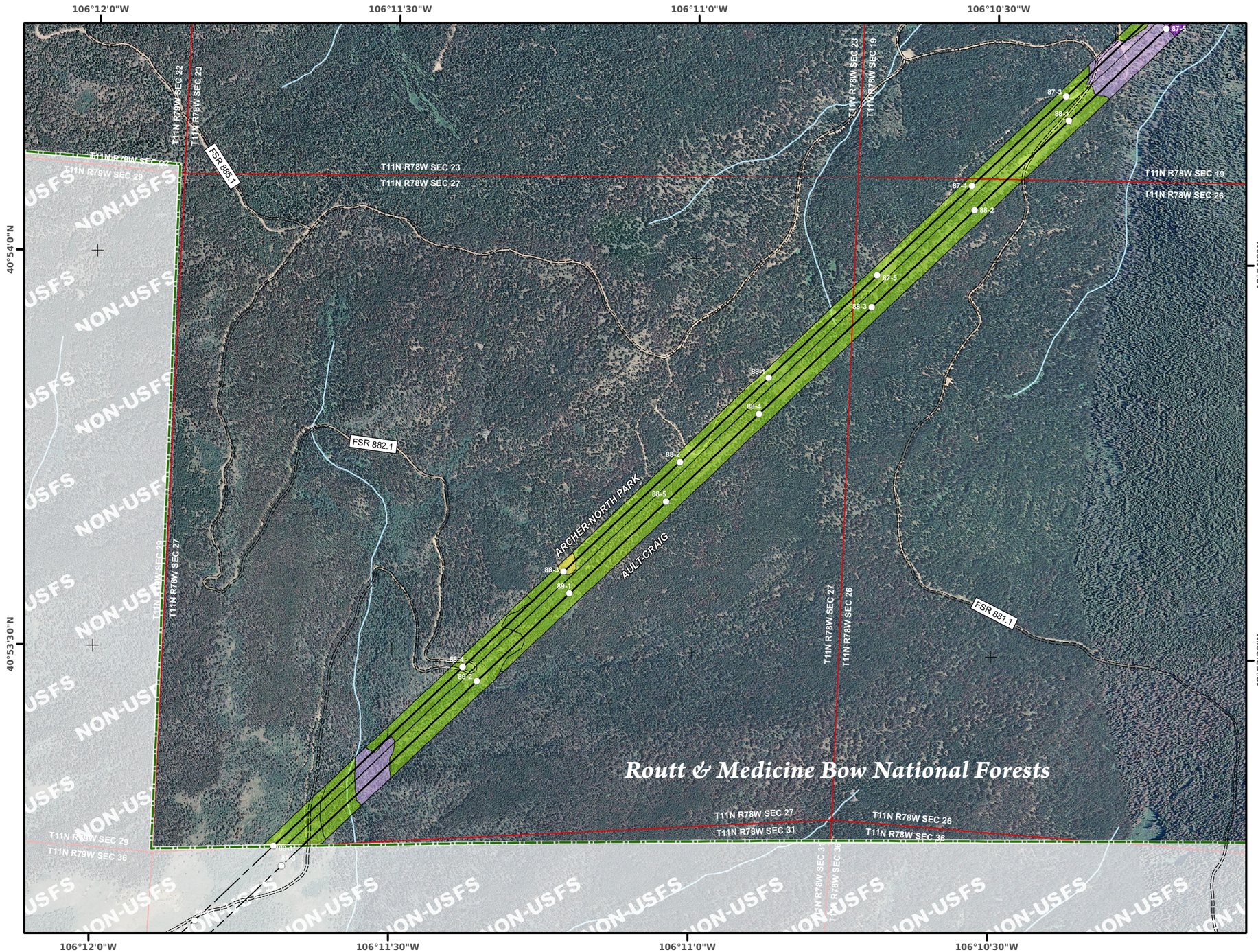
0 400 800 1,600 Feet

Scale: 1" = 800'

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 7

Parks Ranger District

Jackson County

Cowdrey 2 Project Area

Archer-North Park & Ault-Craig Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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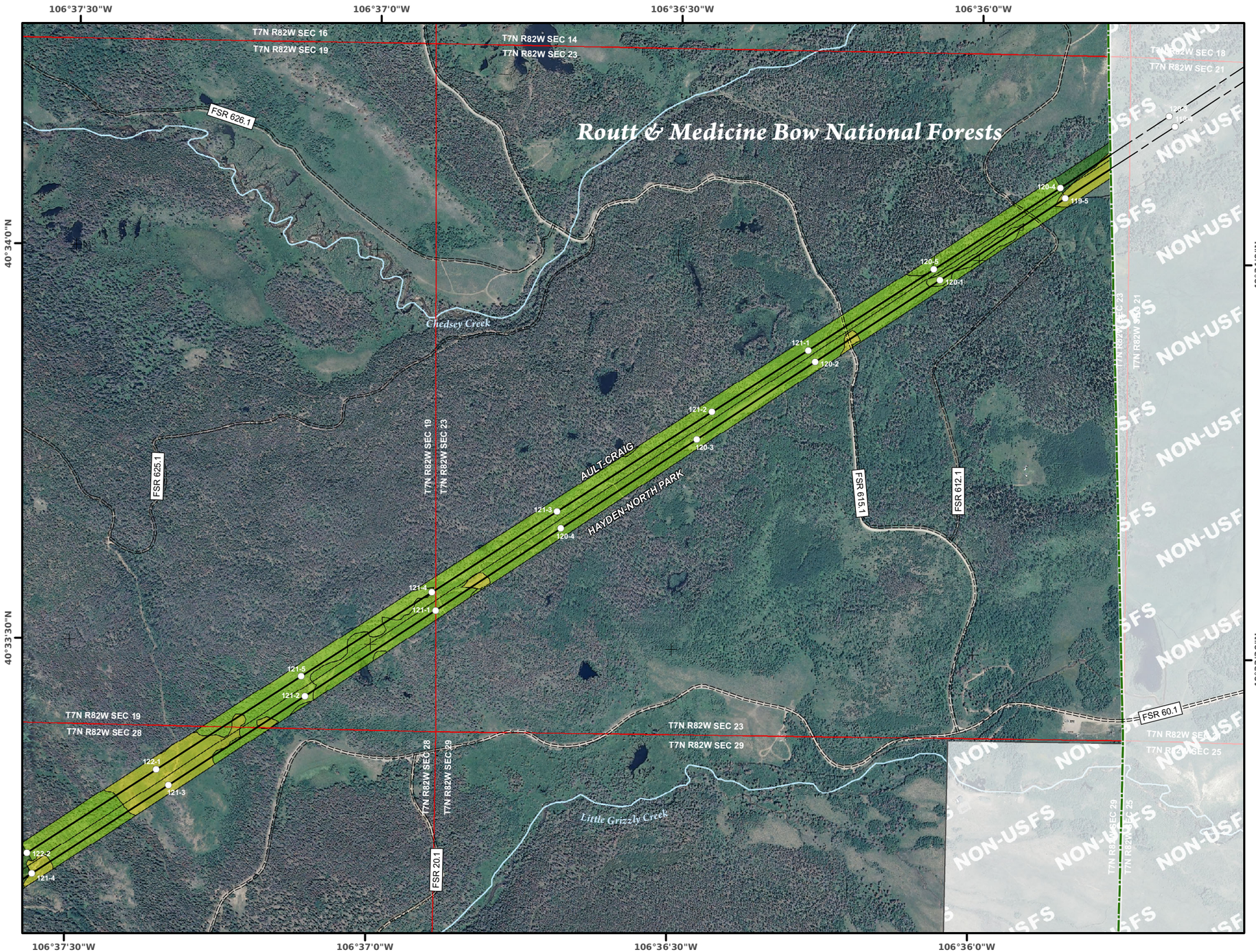
0 400 800 1,600 Feet

Scale: 1" = 800'

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 8

Parks Ranger District

Jackson County

Mohawk 1 Project Area

Ault-Craig & Hayden-North Park Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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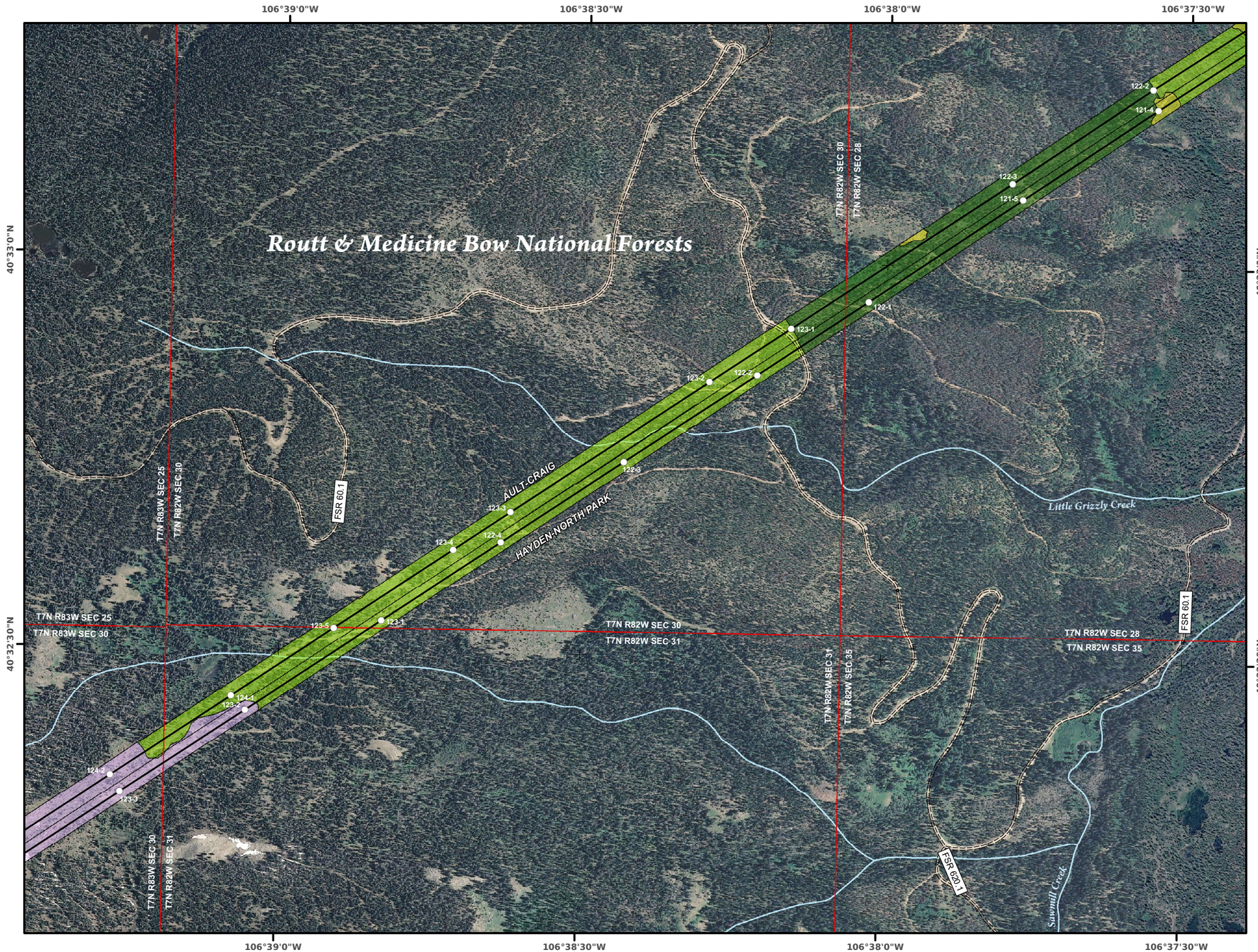
0 400 800 1,600 Feet

Scale: 1" = 800'

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 9

Parks Ranger District

Jackson County

Mohawk 2 Project Area

Ault-Craig & Hayden-North Park Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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0 400 800 1,600 Feet

Scale: 1" = 800'

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Prepared For: Western Area Power Administration
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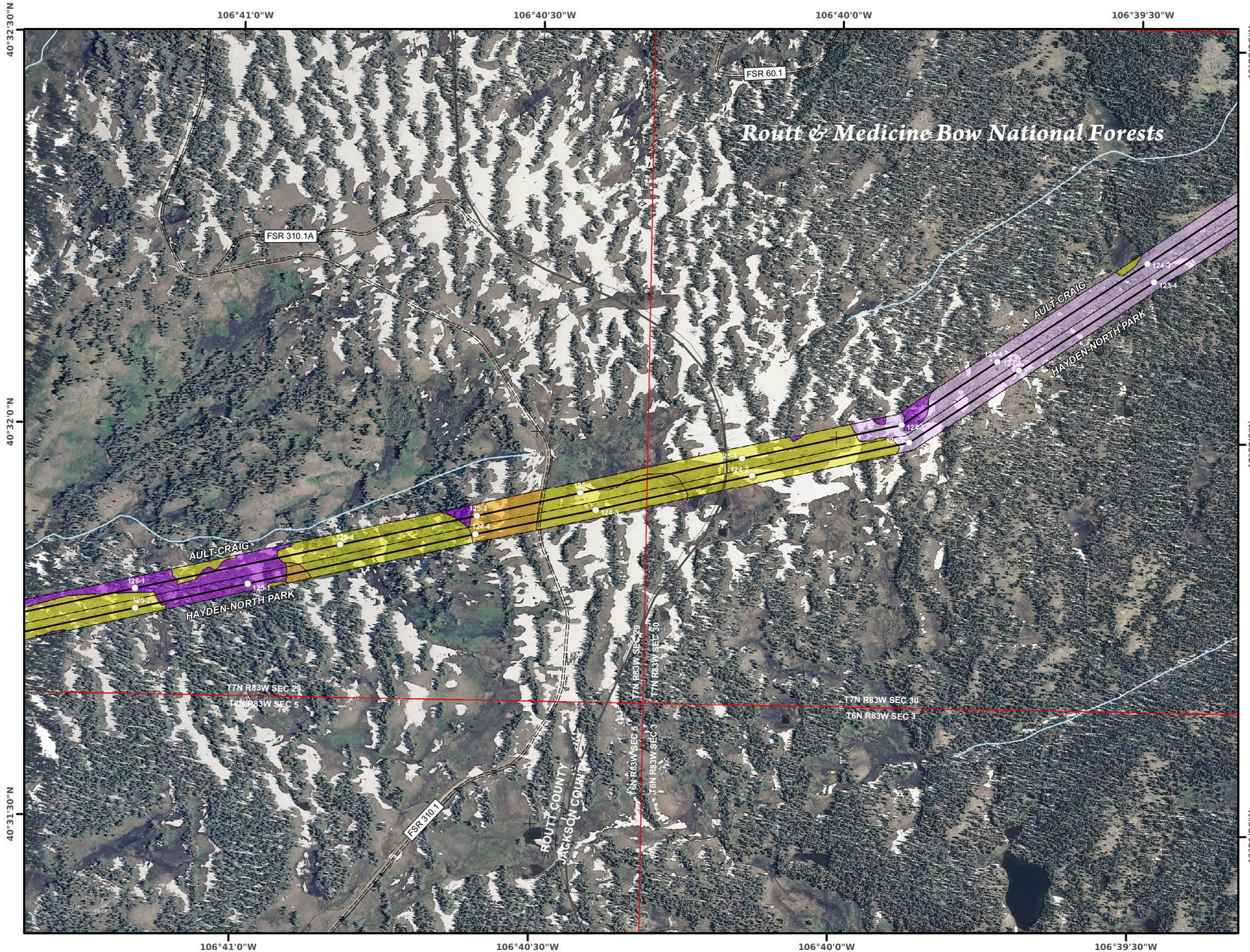

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 10

Hahns Peak/Bears Ears & Parks Ranger Districts

Routt & Jackson Counties

Mohawk 3 Project Area

Ault-Craig & Hayden-North Park Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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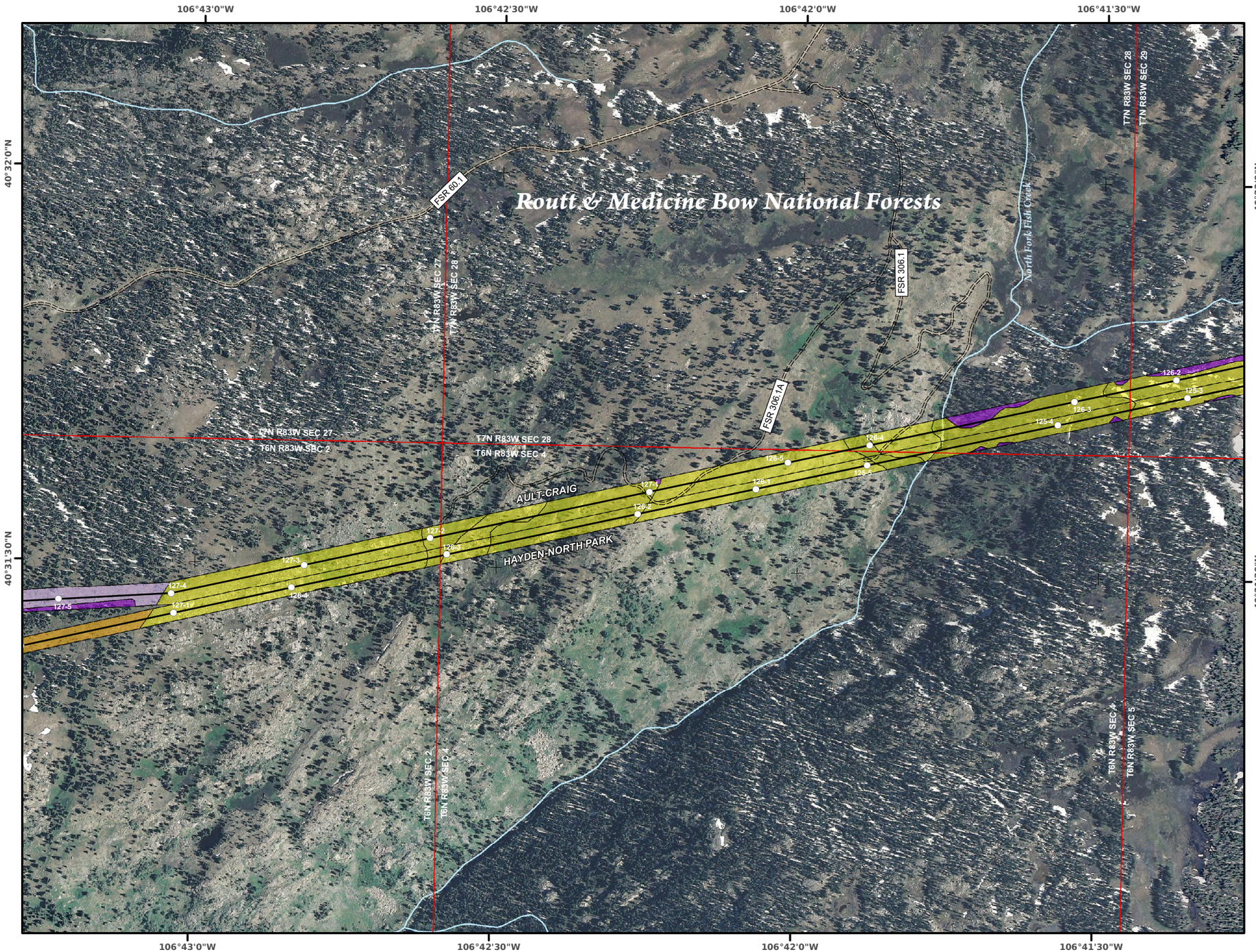

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 11

Hahns Peak/Bears Ears Ranger District

Routt County

Mohawk 4 Project Area

Ault-Craig & Hayden-North Park Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
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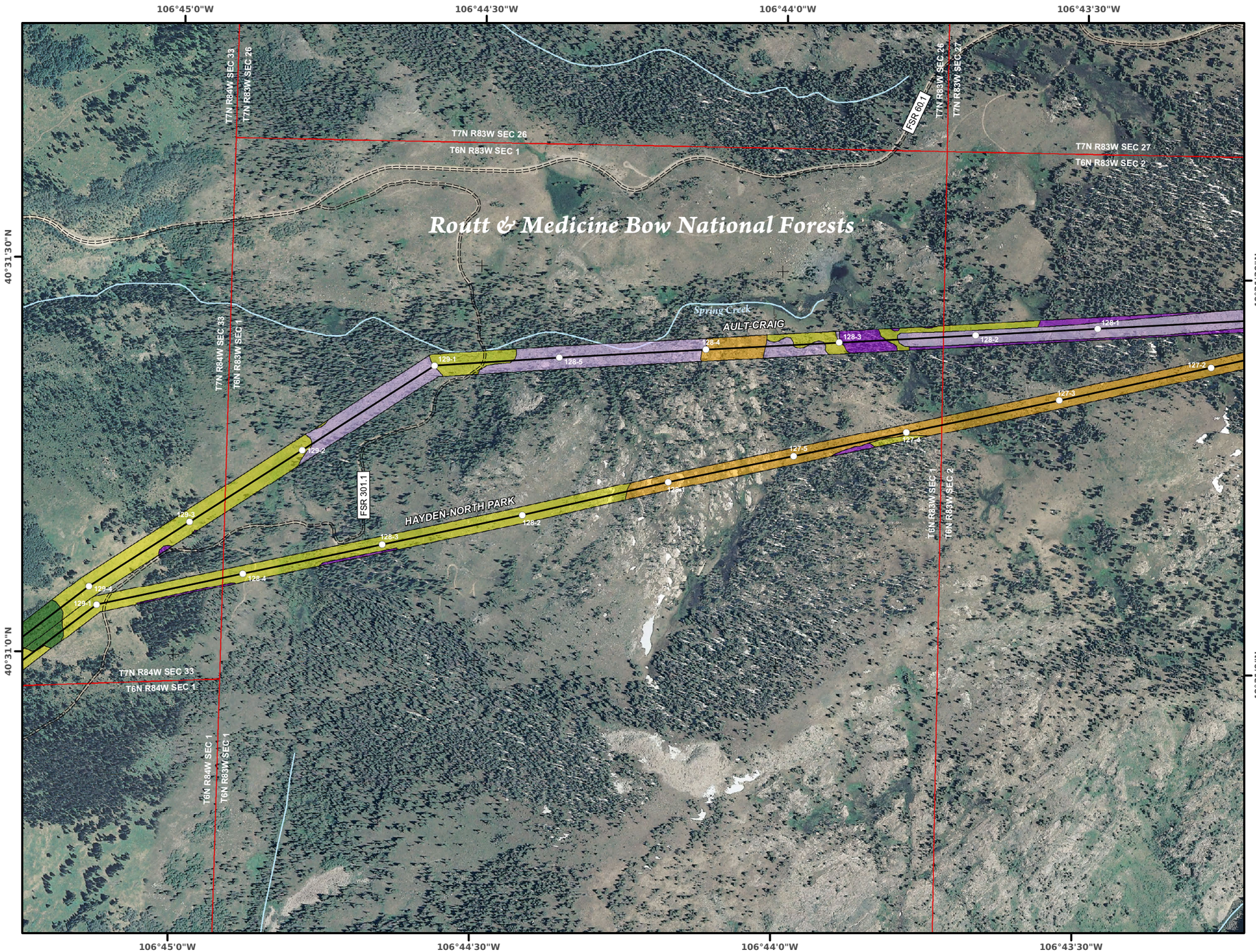

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 12

Hahns Peak/Bears Ears Ranger District

Routt County

Mohawk 5 Project Area

Ault-Craig & Hayden-North Park Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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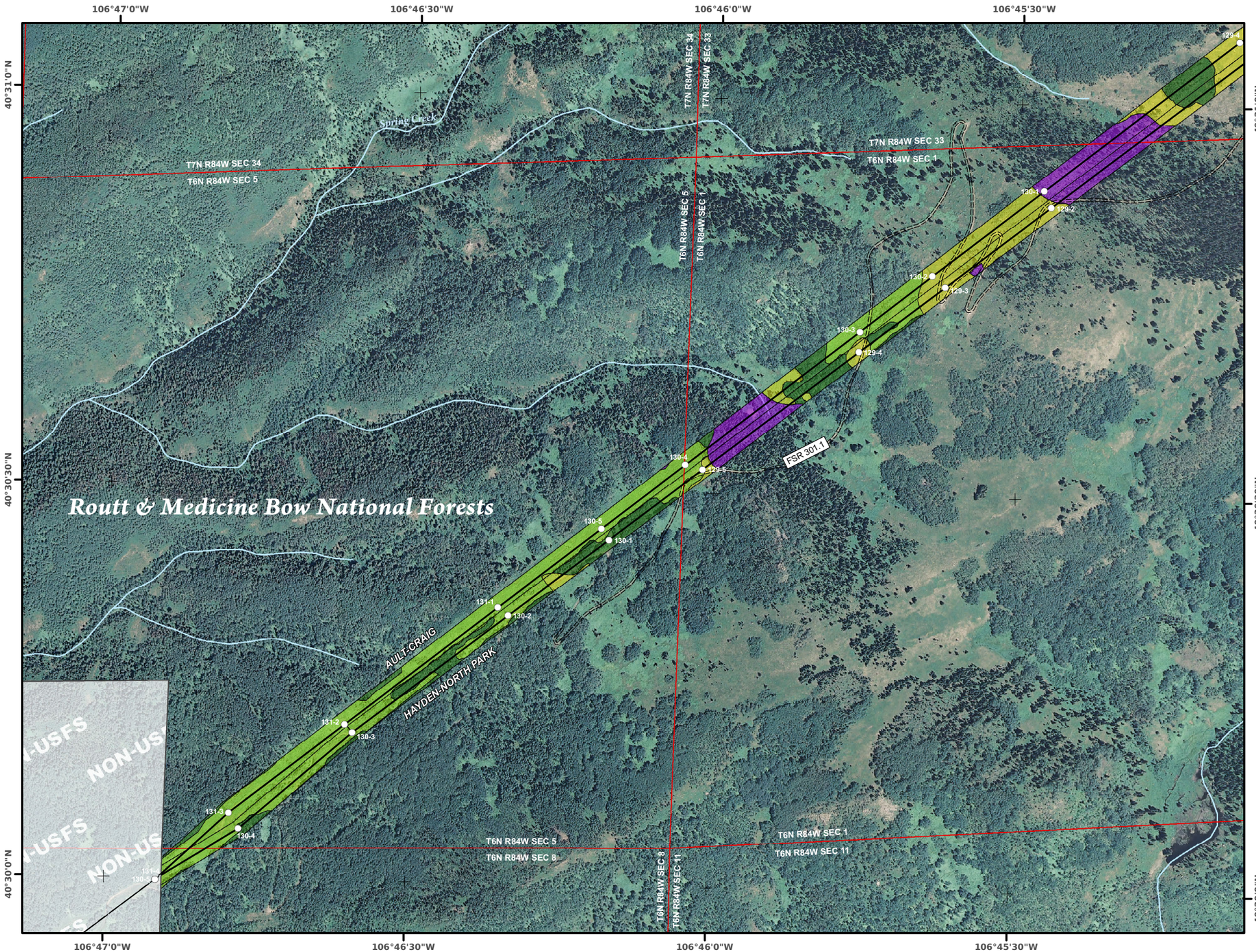

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 13

Hahns Peak/Bears Ears Ranger District

Routt County

Mohawk 6 Project Area

Ault-Craig & Hayden-North Park Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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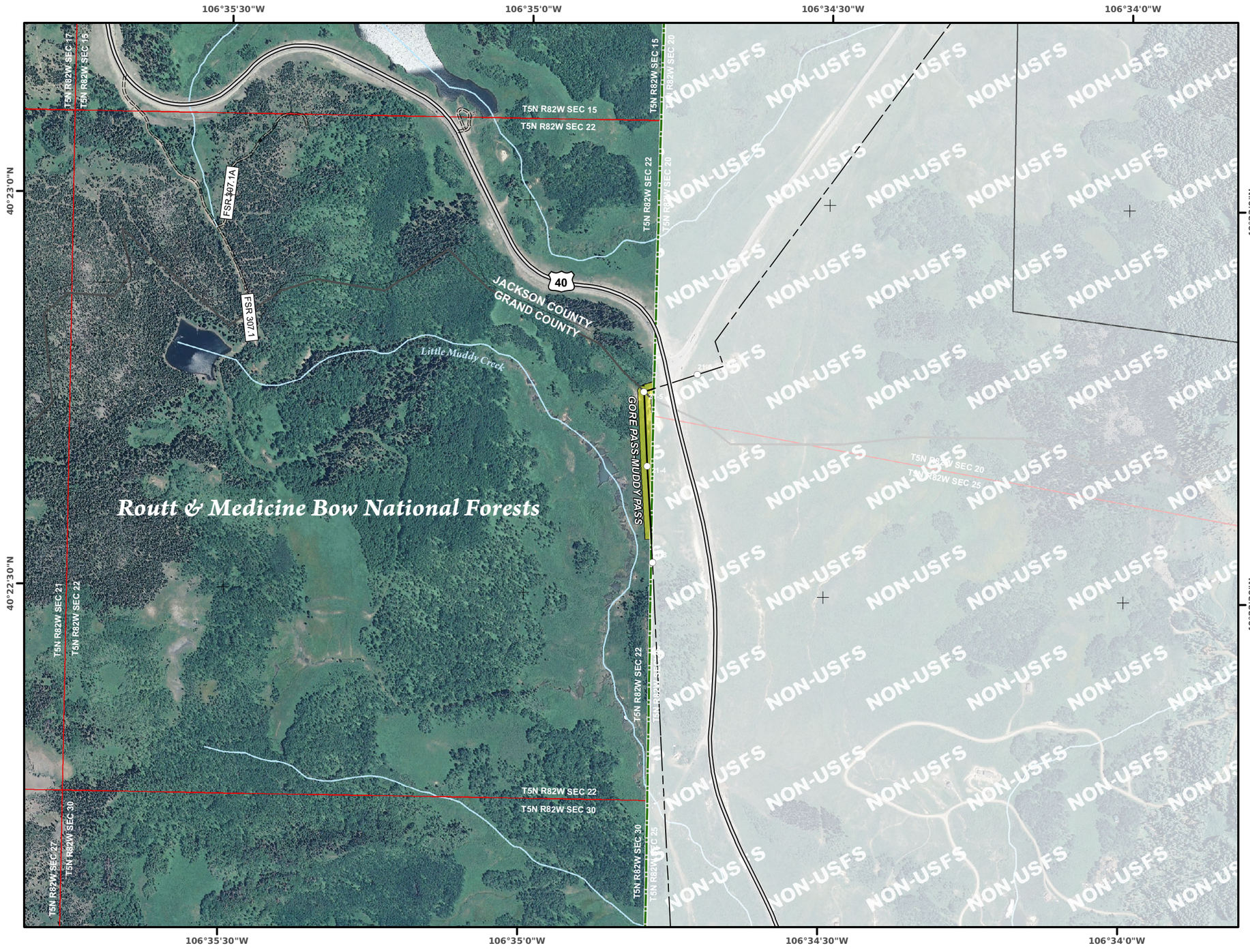

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

Western Area Power Administration

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 14

Yampa Ranger District

Grand County

Agnes 1 Project Area

Gore Pass-Muddy Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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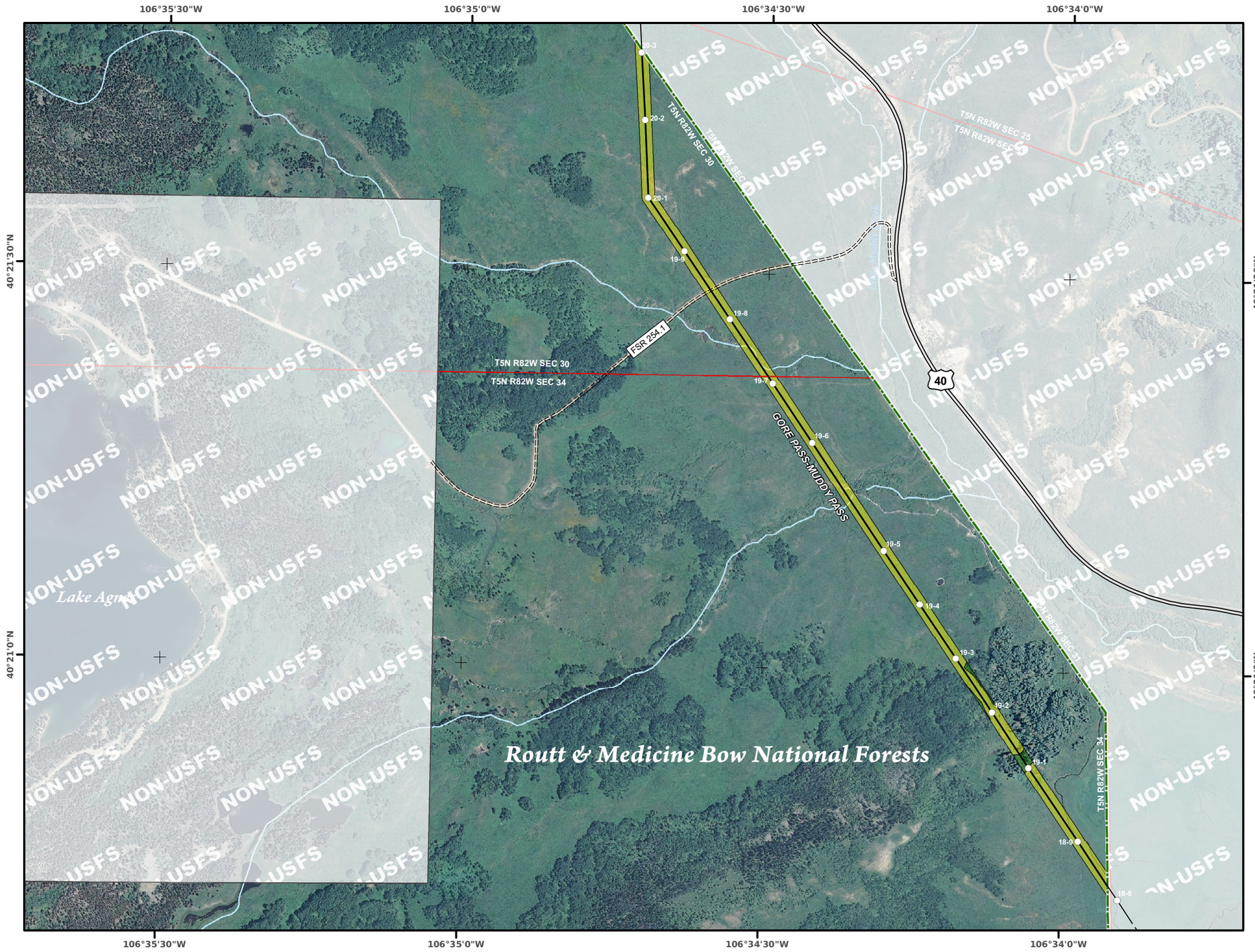

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 15

Yampa Ranger District

Grand County

Agnes 2 Project Area

Gore Pass-Muddy Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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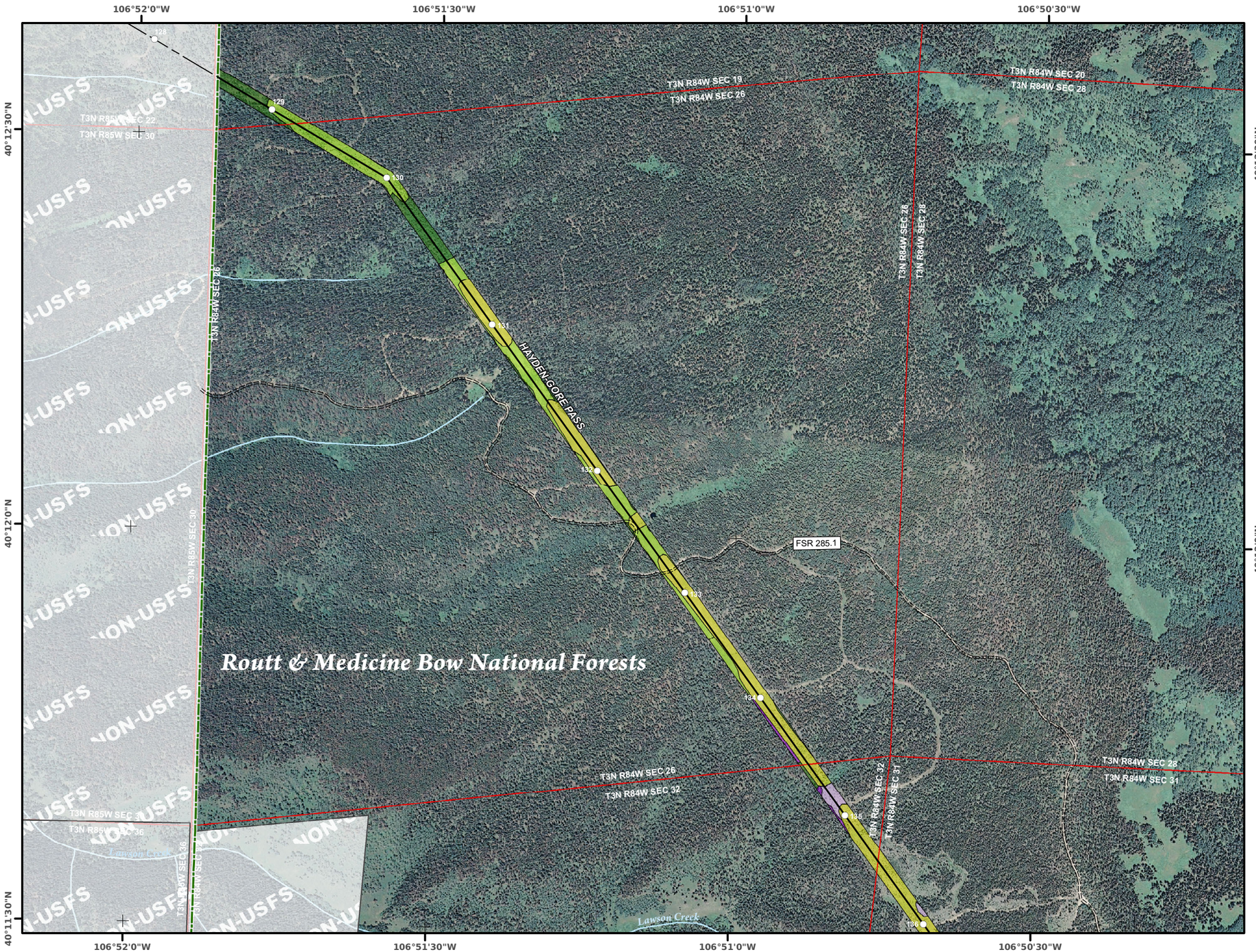

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 16

Yampa Ranger District

Routt County

Phippsburg 1 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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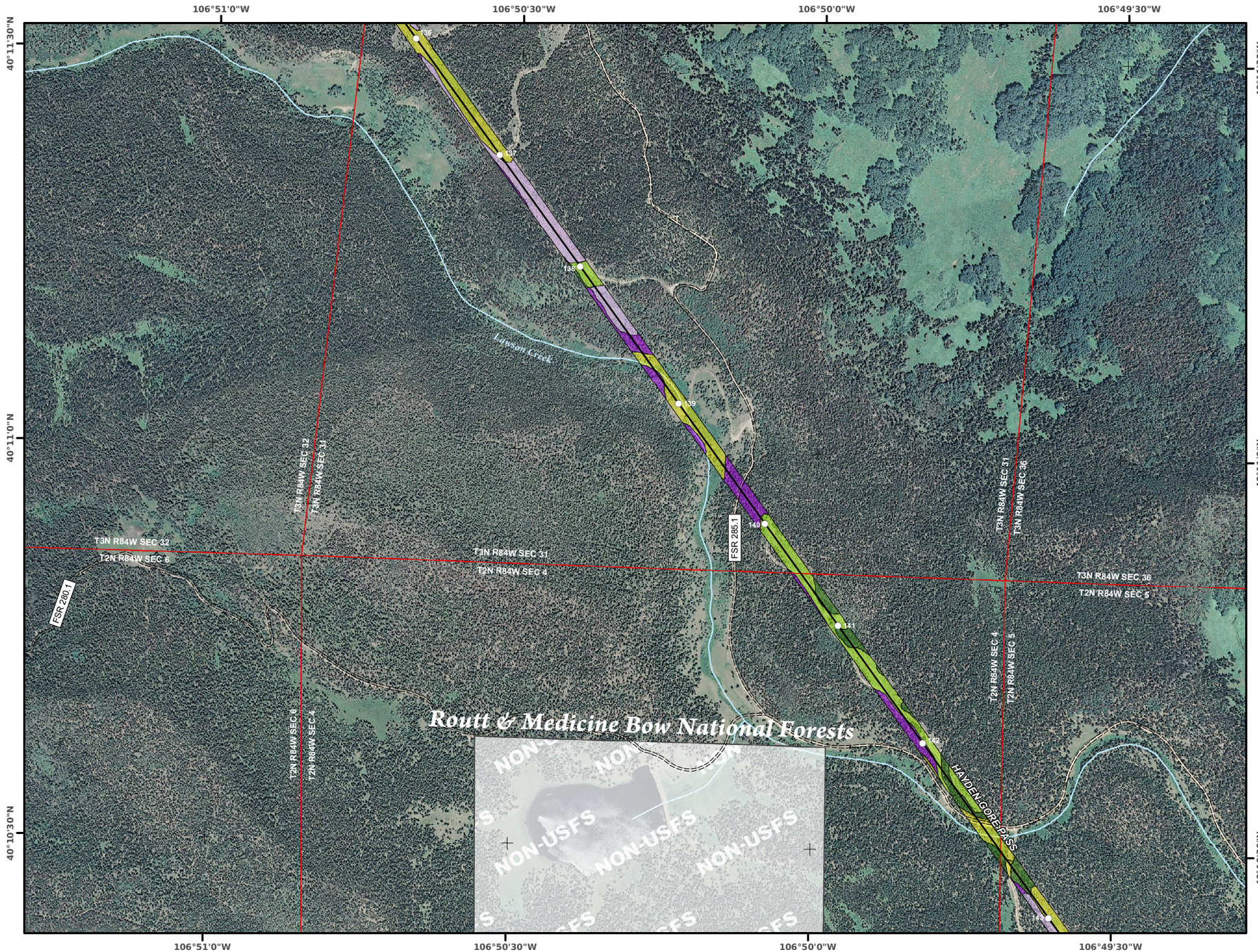

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 17

Yampa Ranger District

Routt County

Phippsburg 2 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

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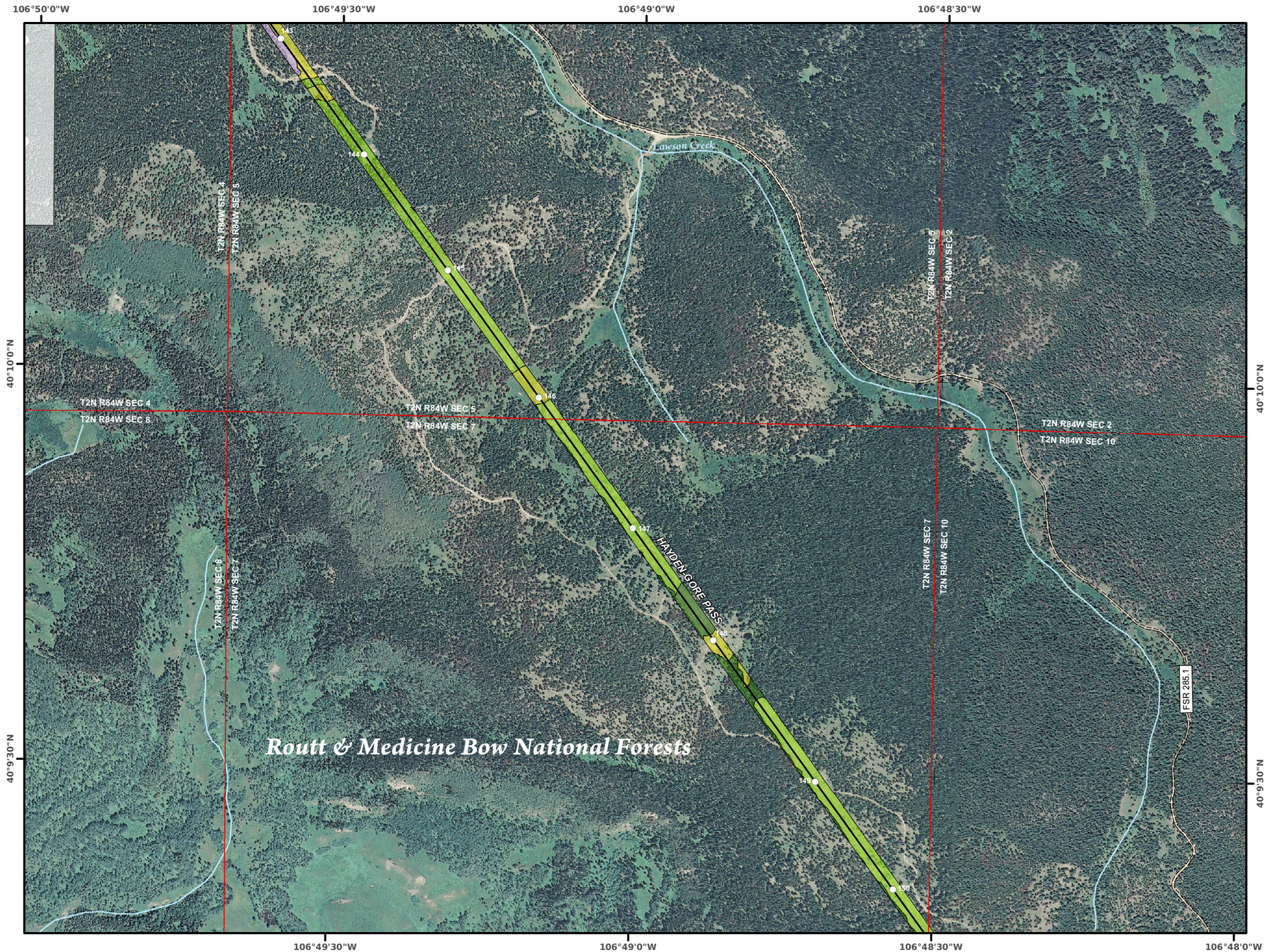

Western Area Power Administration

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 18

Yampa Ranger District

Routt County

Phippsburg 3 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
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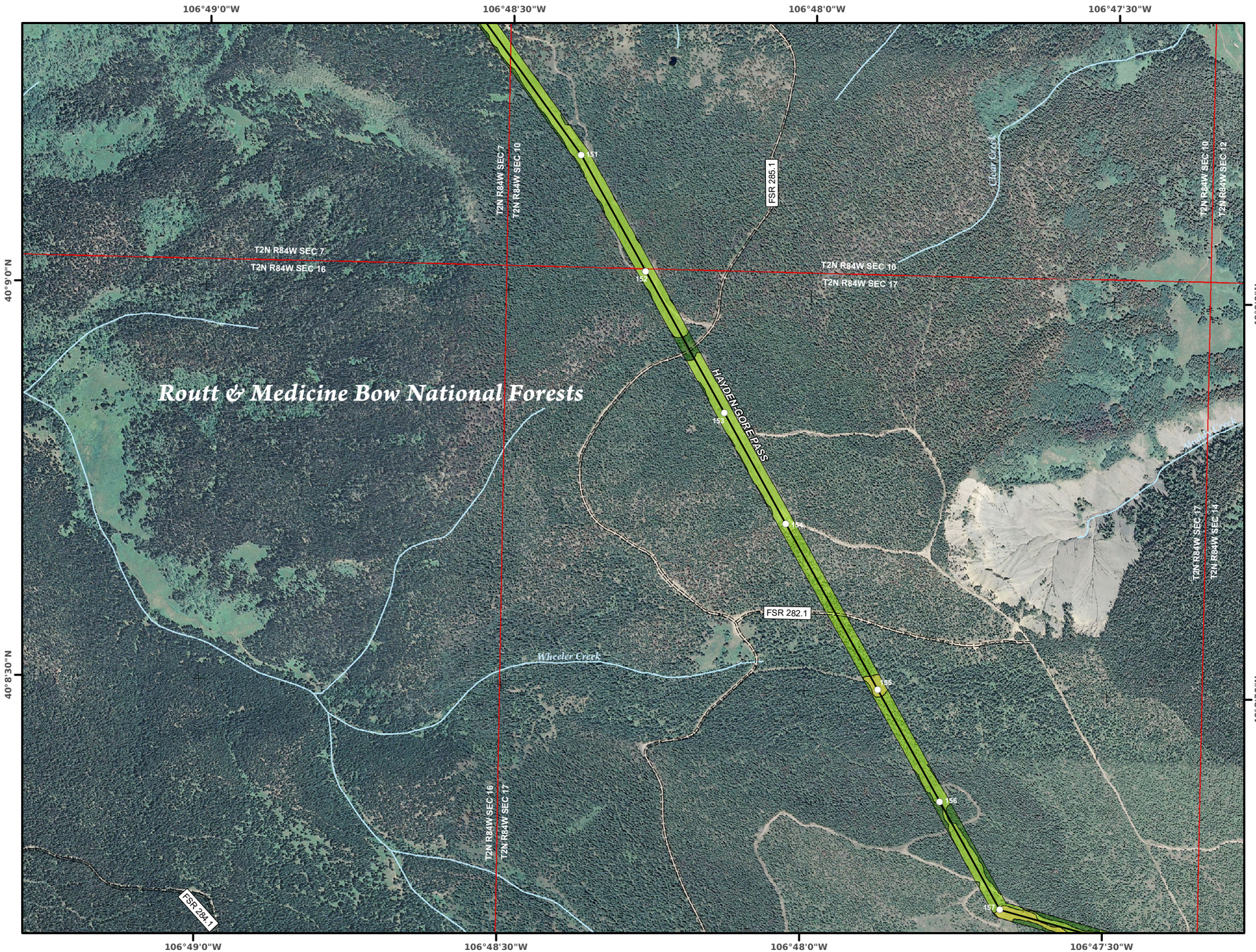

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 19

Yampa Ranger District

Routt County

Phippsburg 4 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

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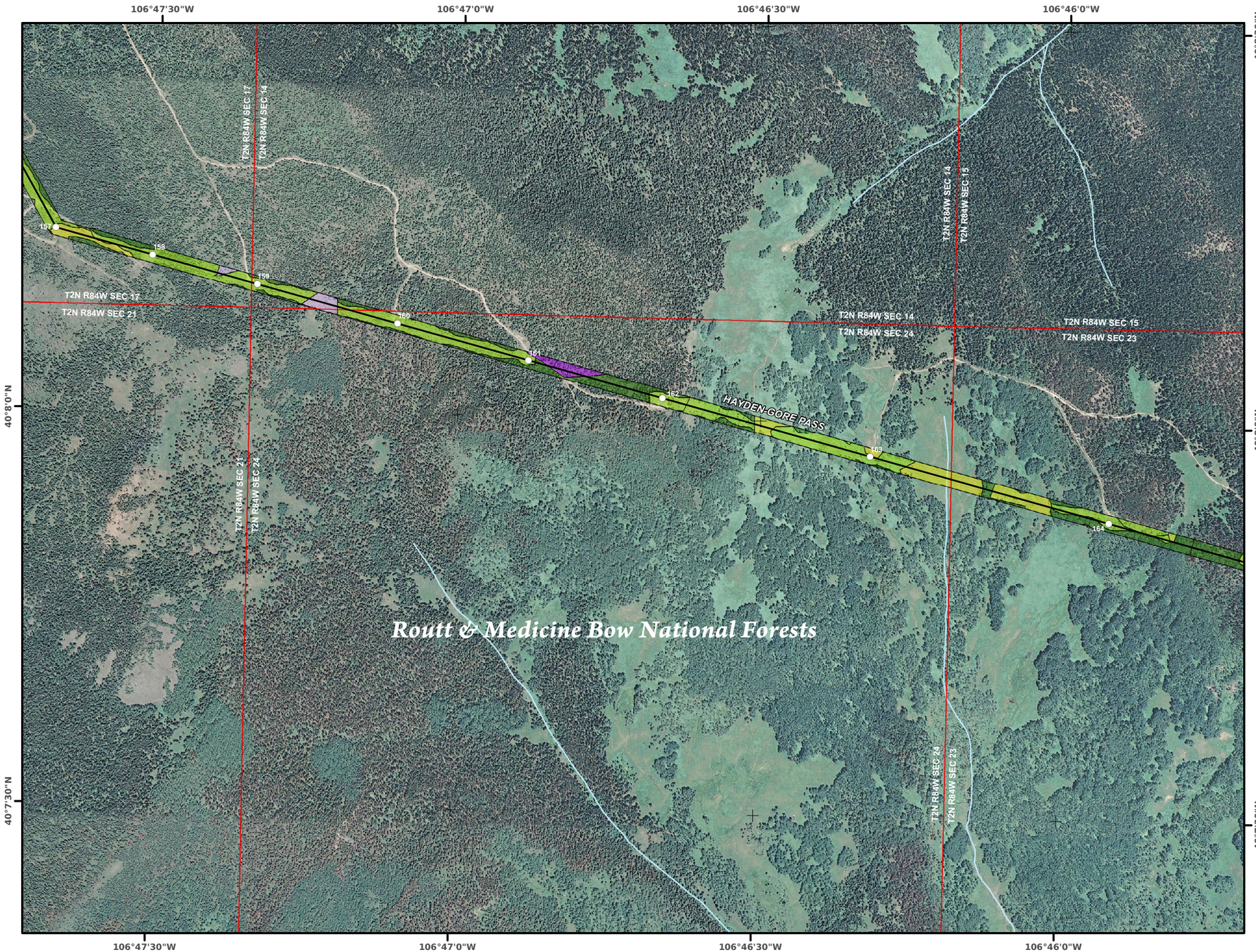

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 20

Yampa Ranger District

Routt County

Phippsburg 5 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

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0 400 800 1,600 Feet

Scale: 1" = 800'

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011

106°45'30"W 106°45'0"W 106°44'30"W 106°44'0"W

40°8'0"N

40°7'30"N

40°7'0"N

T2N R84W SEC 23
T2N R83W SEC 19
T2N R84W SEC 30
T2N R83W SEC 26
T2N R83W SEC 22
T2N R83W SEC 25

163 166 167 168 169 170 171 172 173 174

HAYDEN-GORE PASS

Deadman Gulch

NON-USFS

Routt & Medicine Bow National Forests

106°45'30"W 106°45'0"W 106°44'30"W 106°44'0"W

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 21

Yampa Ranger District

Routt County

Phippsburg 6 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

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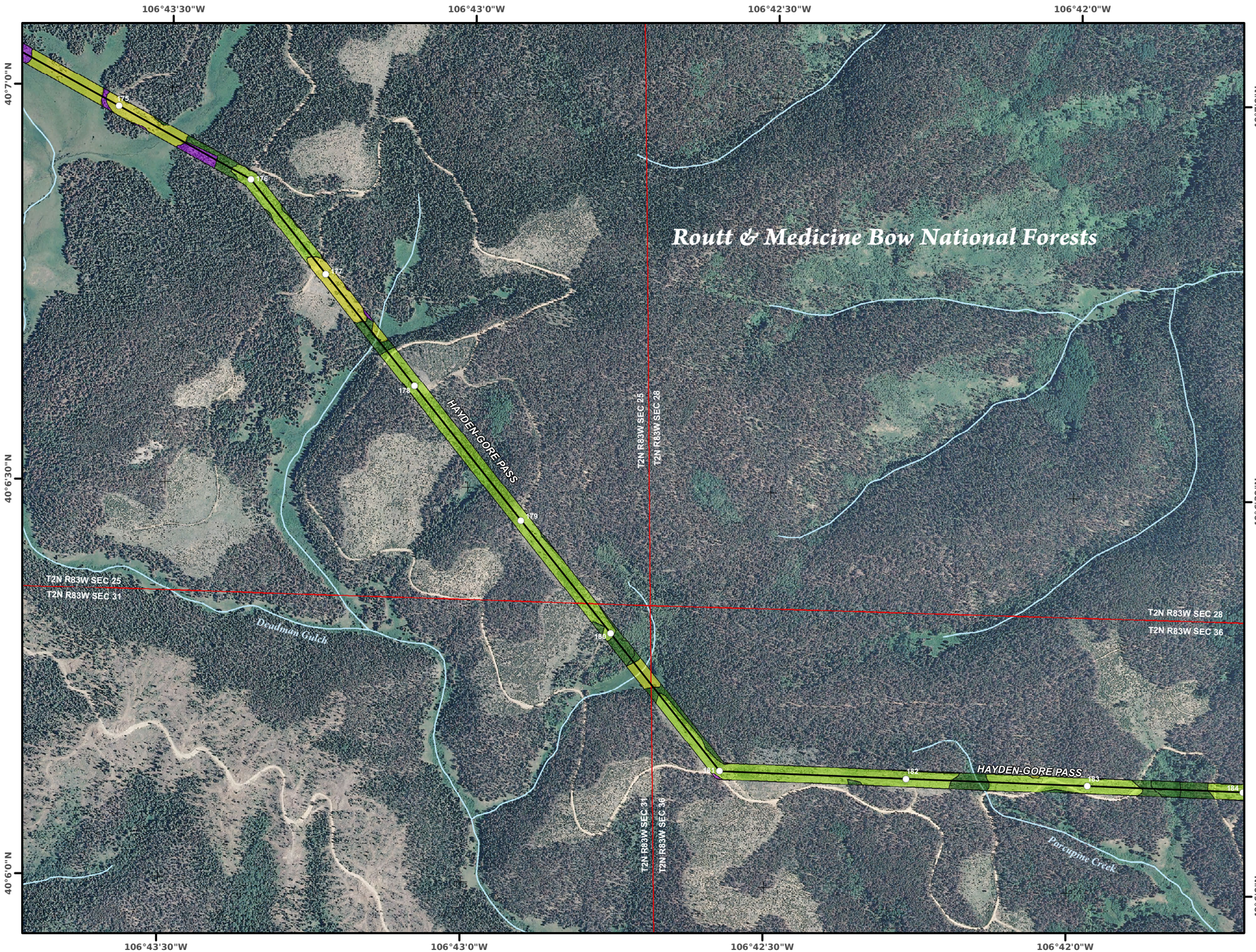

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 22

Yampa Ranger District

Routt County

Phippsburg 7 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

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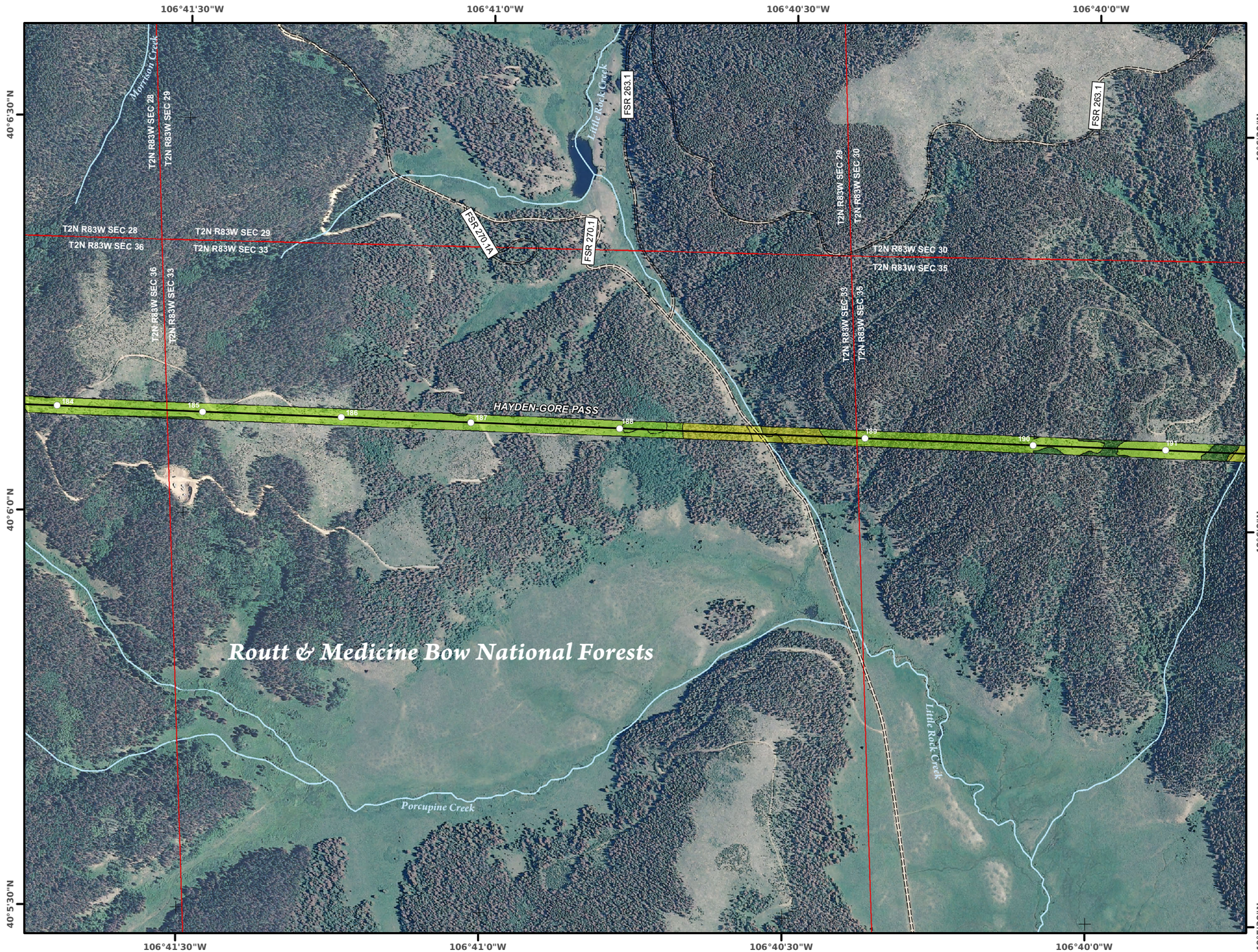

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 23

Yampa Ranger District

Routt County

Phippsburg 8 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

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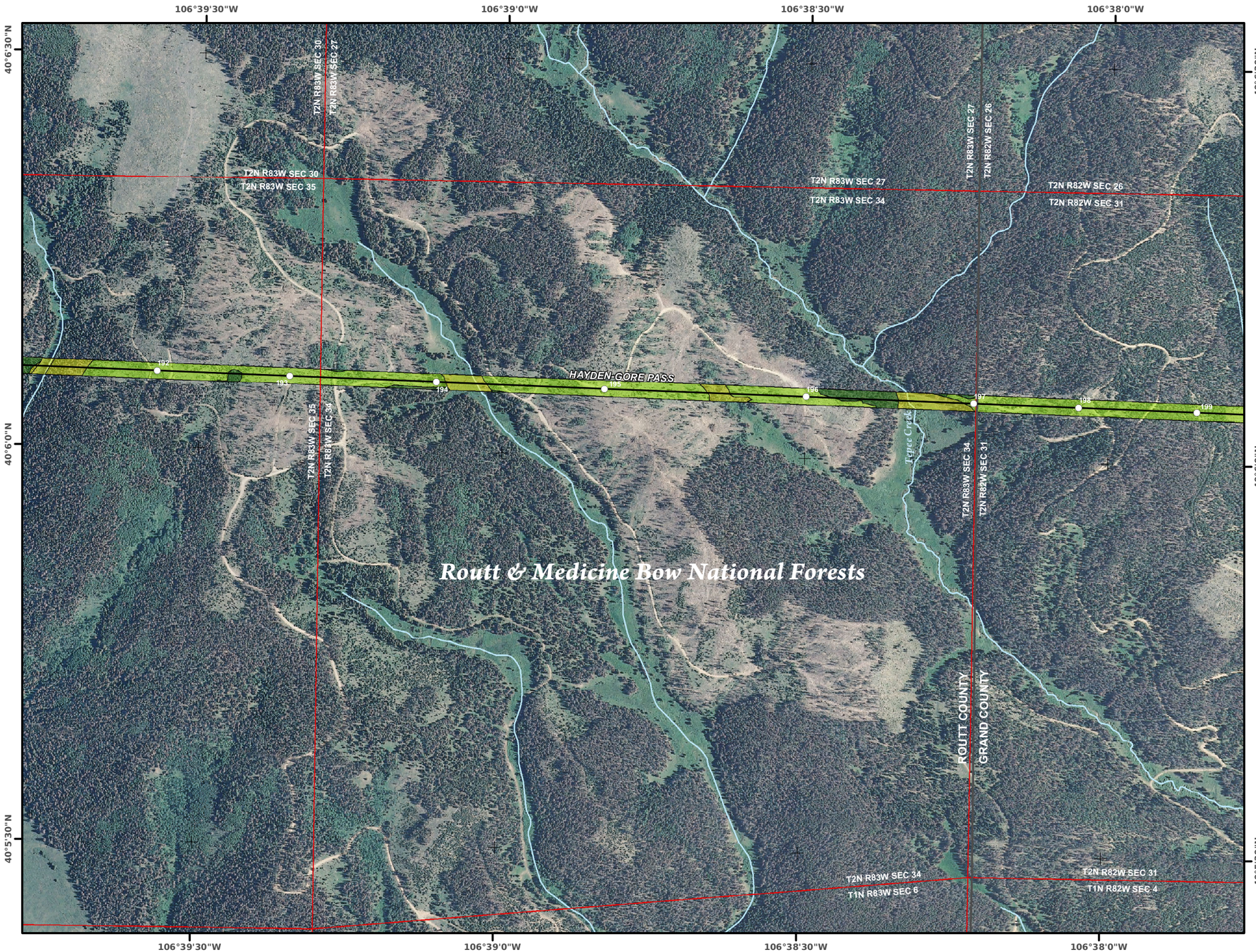
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 24

Yampa Ranger District

Routt & Grand Counties

Phippsburg 9 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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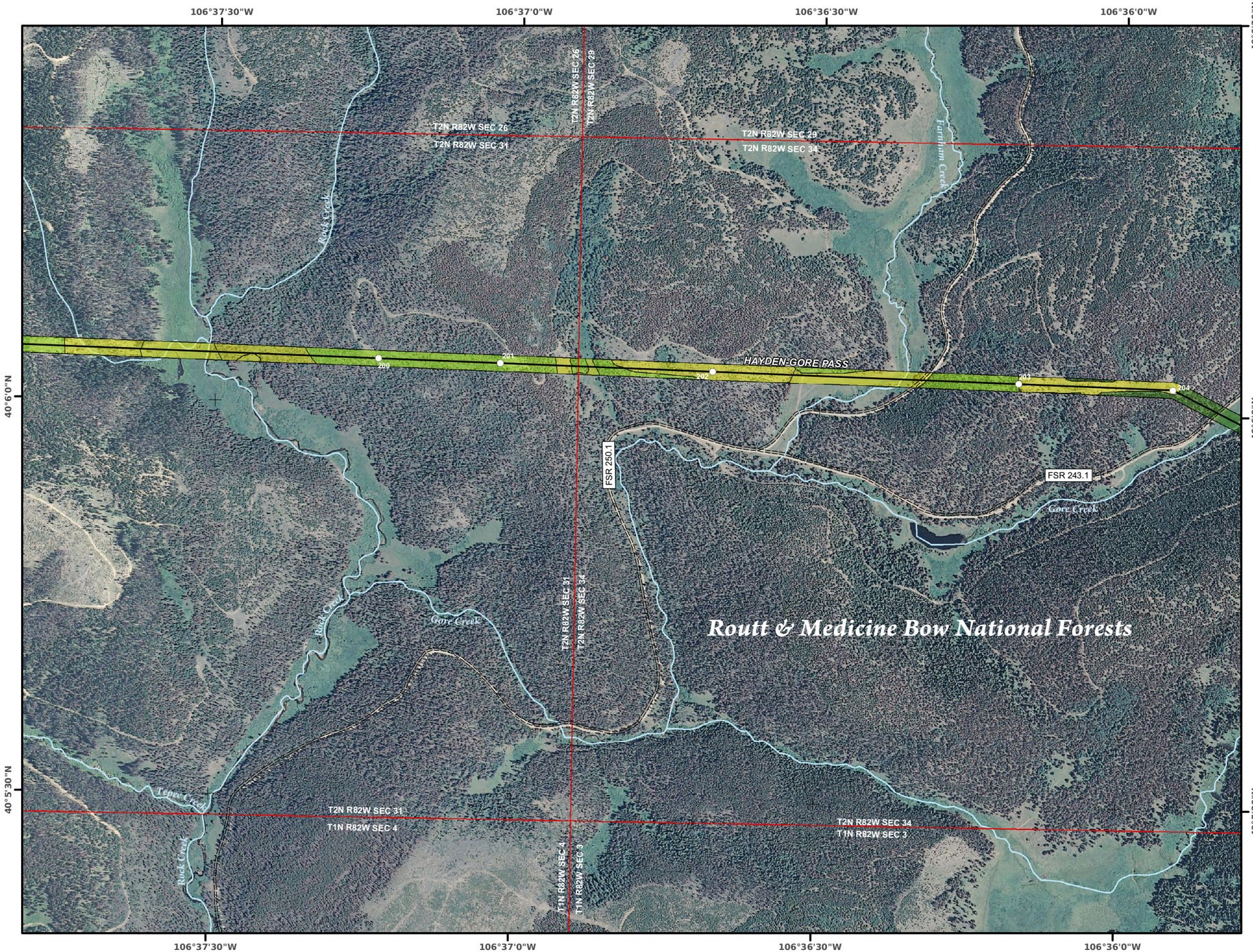
0 400 800 1,600 Feet

Scale: 1" = 800'

Prepared By: PENDO solutions
Prepared For: Western Area Power Administration
Date: July 2011



Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 25

Yampa Ranger District

Grand County

Phippsburg 10 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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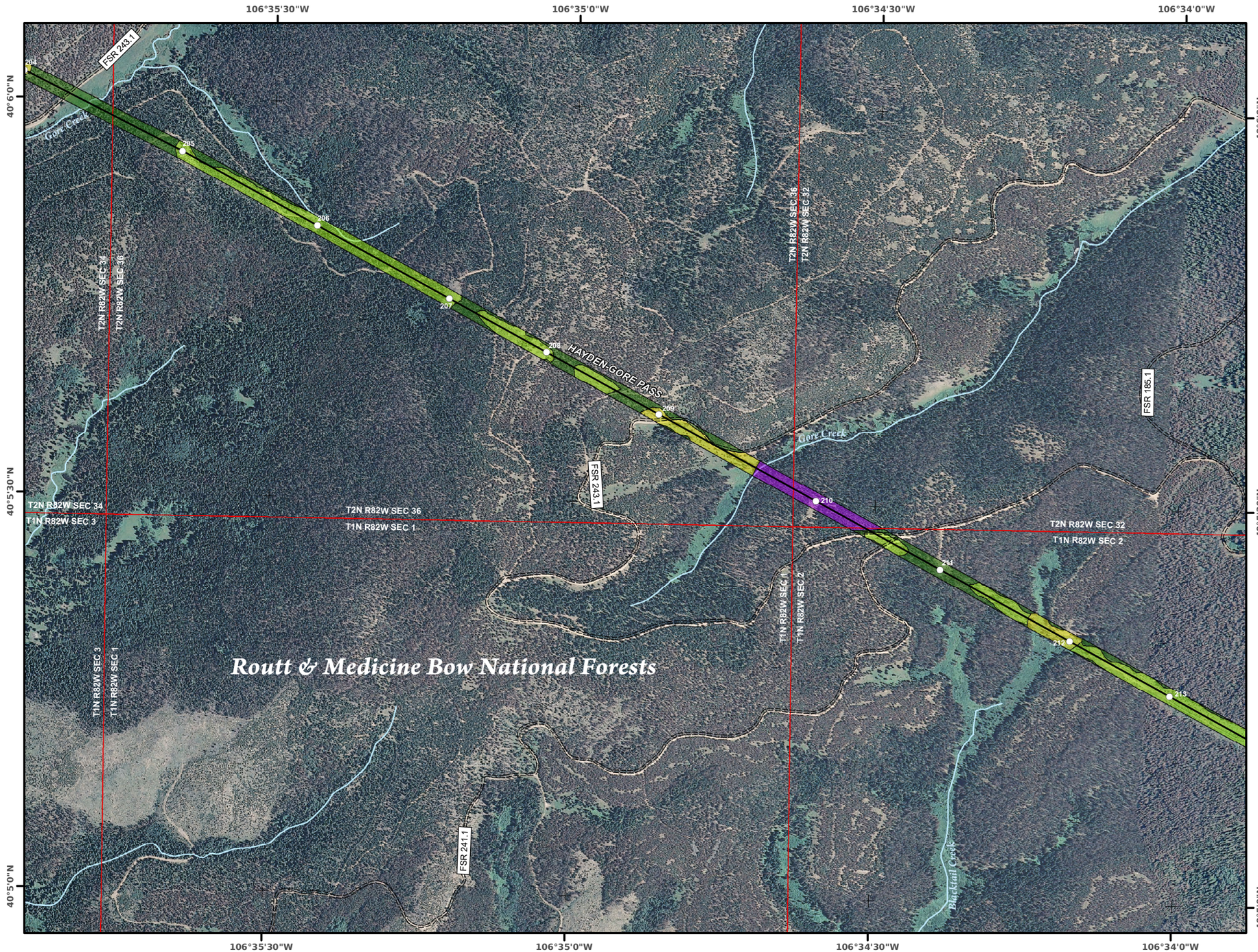

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 26

Yampa Ranger District

Grand County

Phippsburg 11 Project Area

Hayden-Gore Pass Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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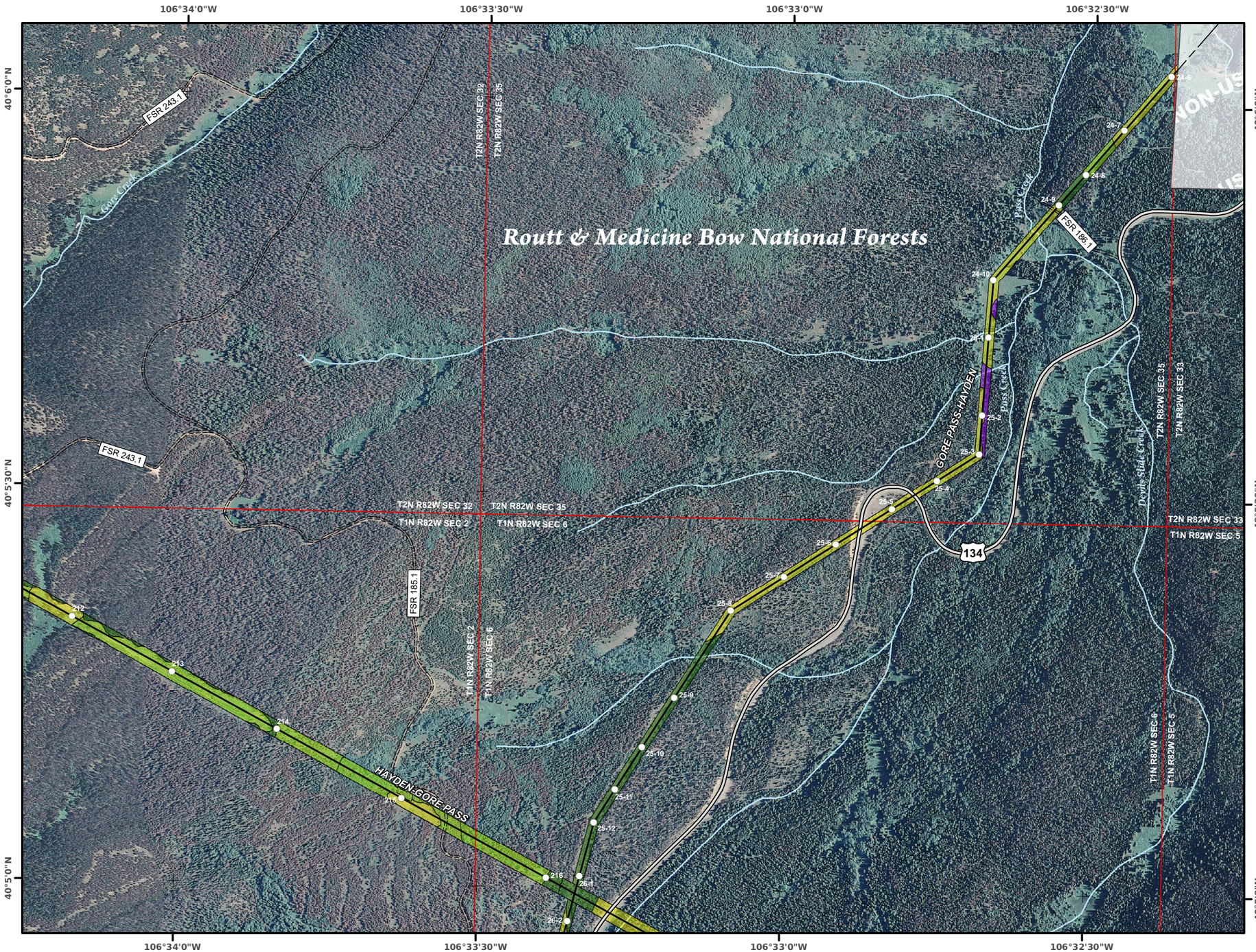

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 27

Yampa Ranger District

Grand County

Phippsburg 12 Project Area

Hayden-Gore Pass & Gore Pass-Hayden Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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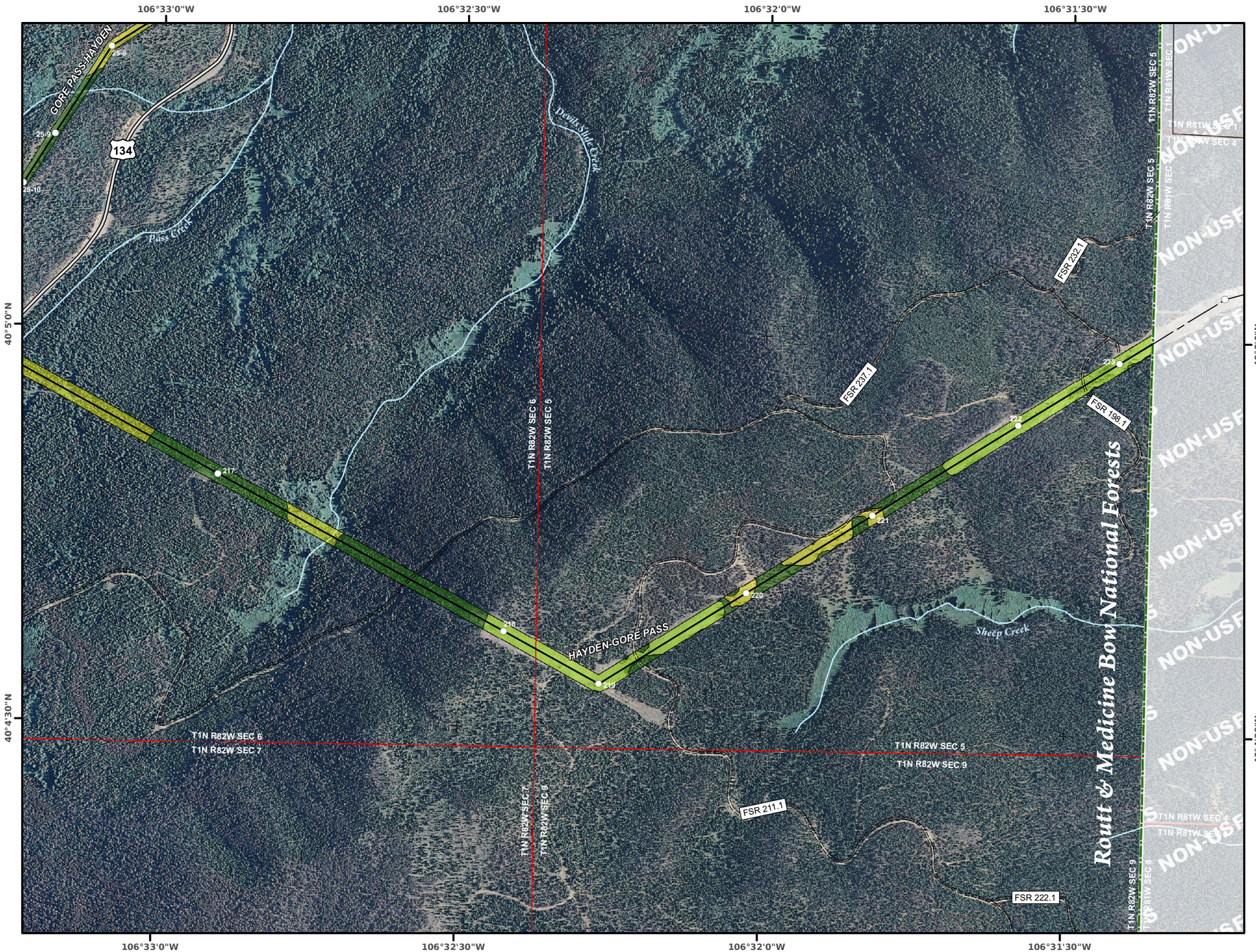

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 28

Yampa Ranger District

Grand County

Phippsburg 13 Project Area

Hayden-Gore Pass & Gore Pass-Hayden Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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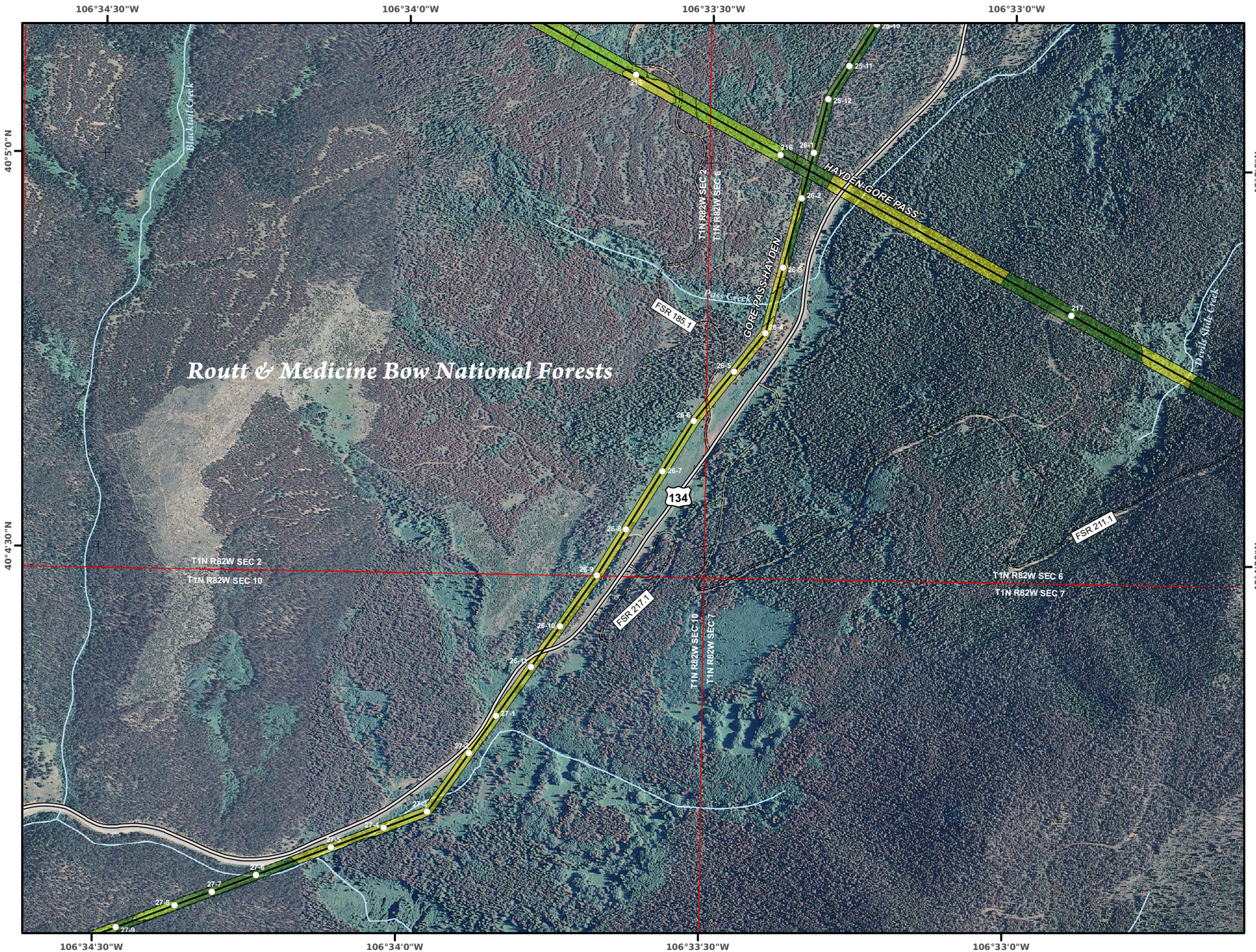

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 29

Yampa Ranger District

Grand County

Phippsburg 14 Project Area

Hayden-Gore Pass & Gore Pass-Hayden Transmission Lines

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 30

Yampa Ranger District

Grand County

Phippsburg 15 Project Area

Gore Pass-Hayden Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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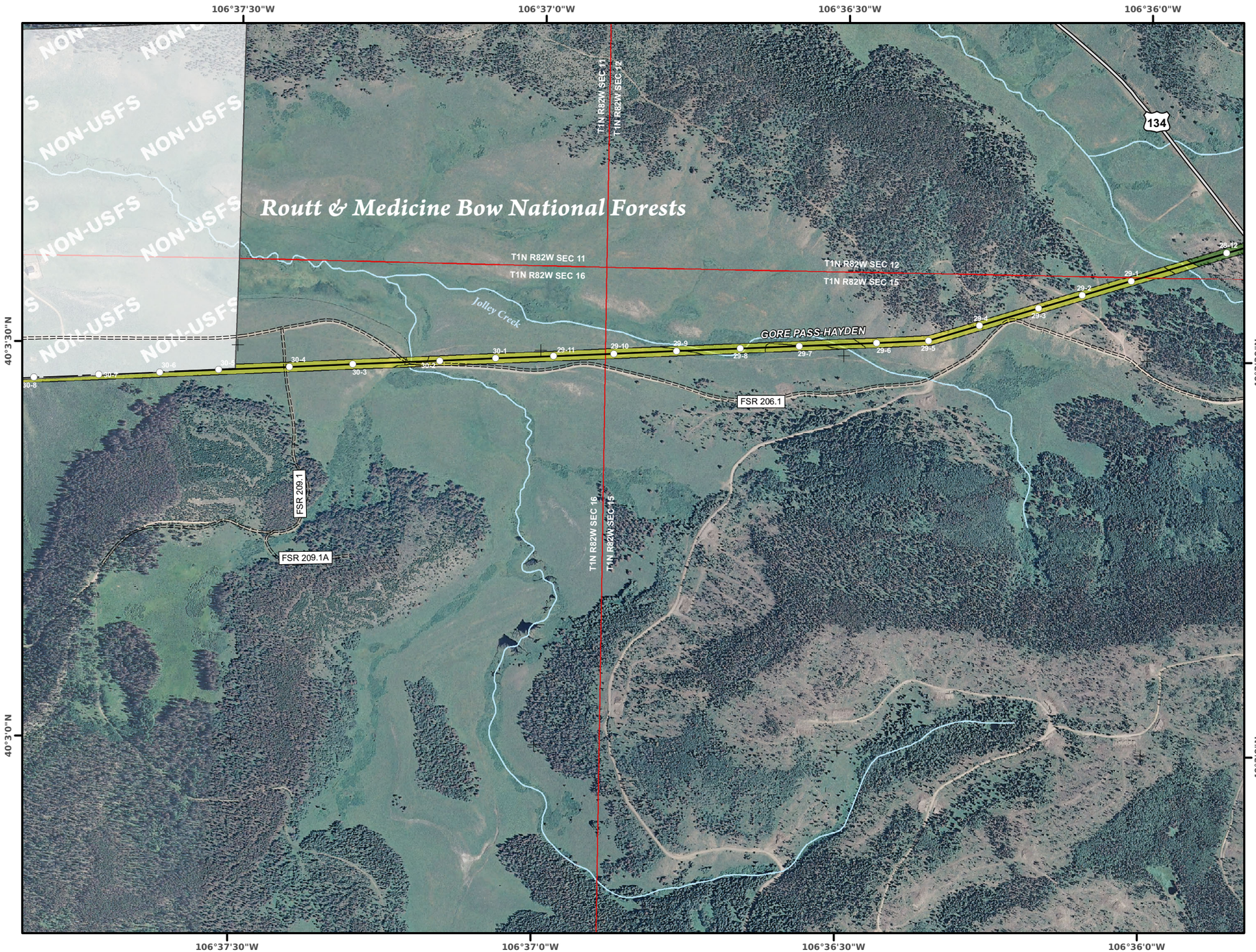

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 31

Yampa Ranger District

Grand County

Phippsburg 16 Project Area

Gore Pass-Hayden Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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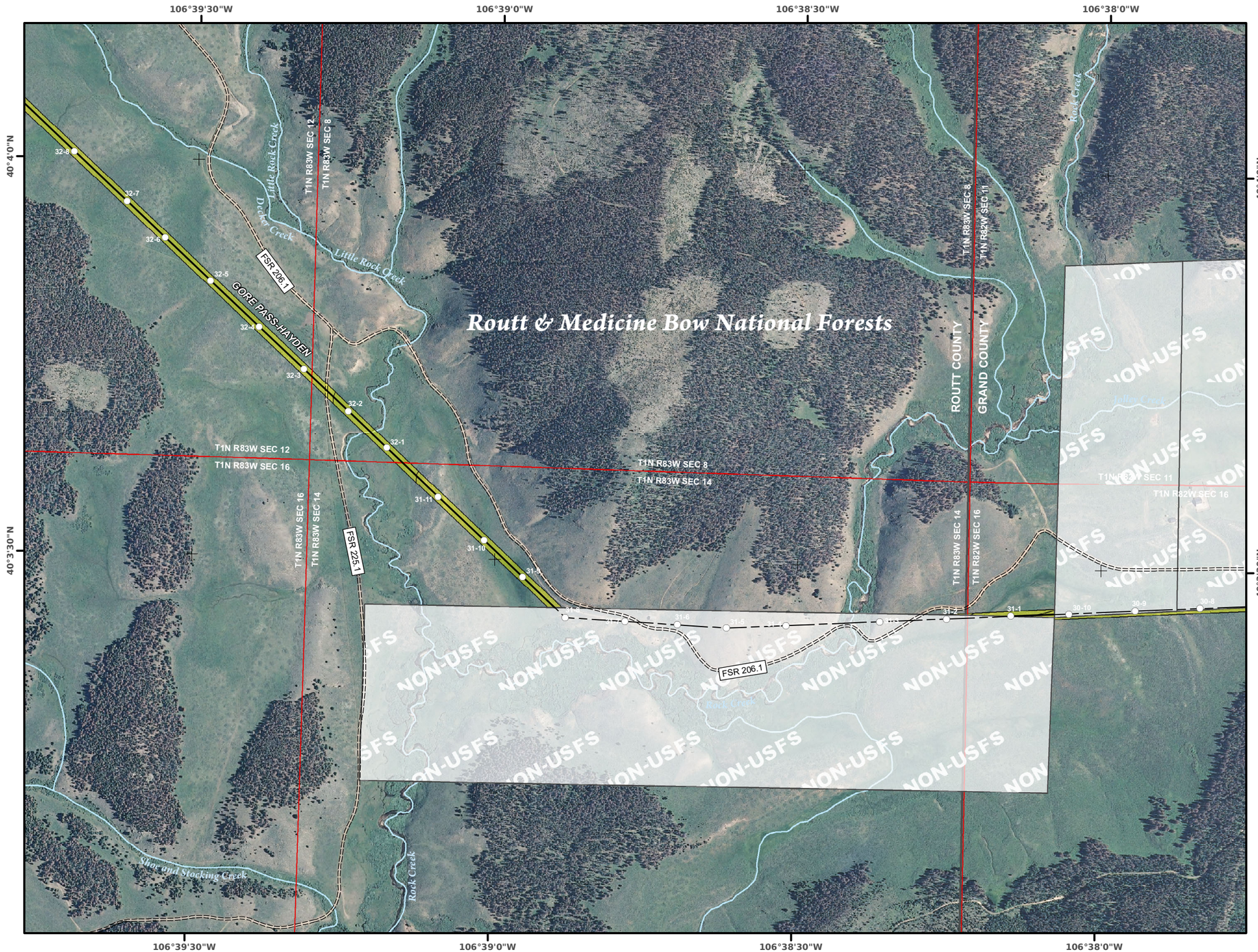

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

Western Area Power Administration

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 32

Yampa Ranger District

Routt & Grand Counties

Phippsburg 17 Project Area

Gore Pass-Hayden Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
5. *Currently compatible / long-term incompatible. Slow-growing mature vegetative community.*
6. *Low-growth vegetation communities with high fuel loads.*

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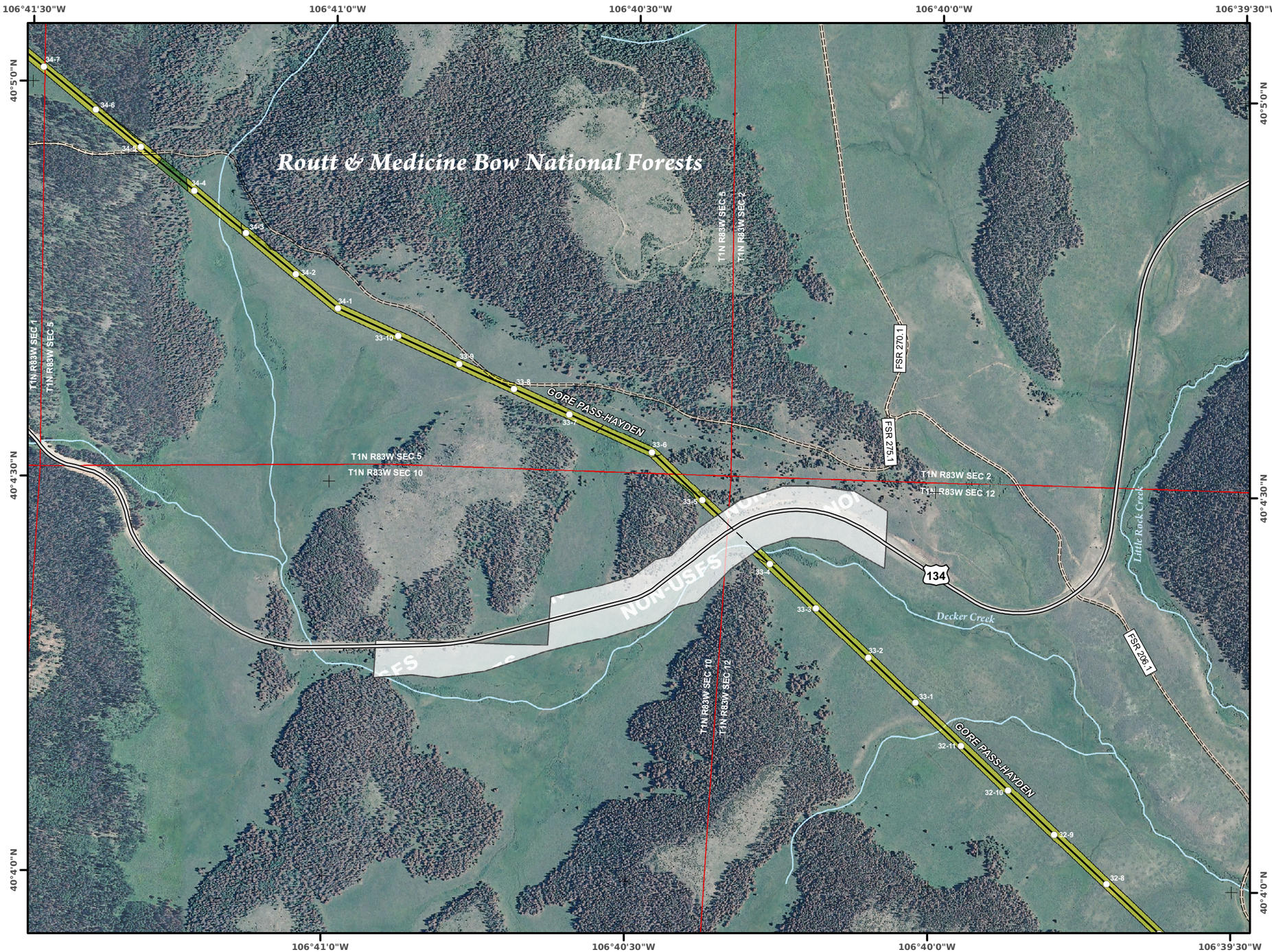

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 33

Yampa Ranger District

Routt County

Phippsburg 18 Project Area

Gore Pass-Hayden Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
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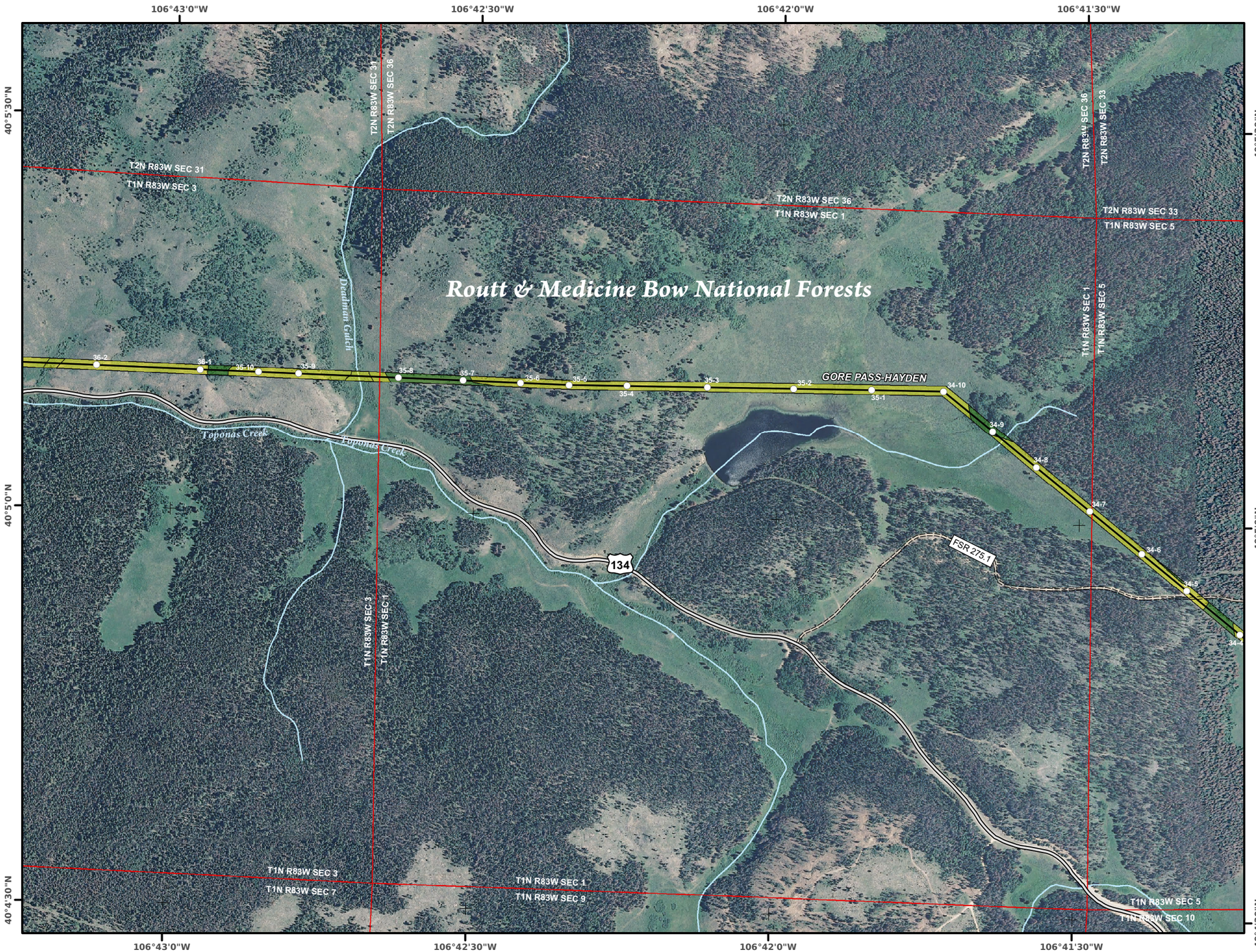

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 34

Yampa Ranger District

Routt County

Phippsburg 19 Project Area

Gore Pass-Hayden Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
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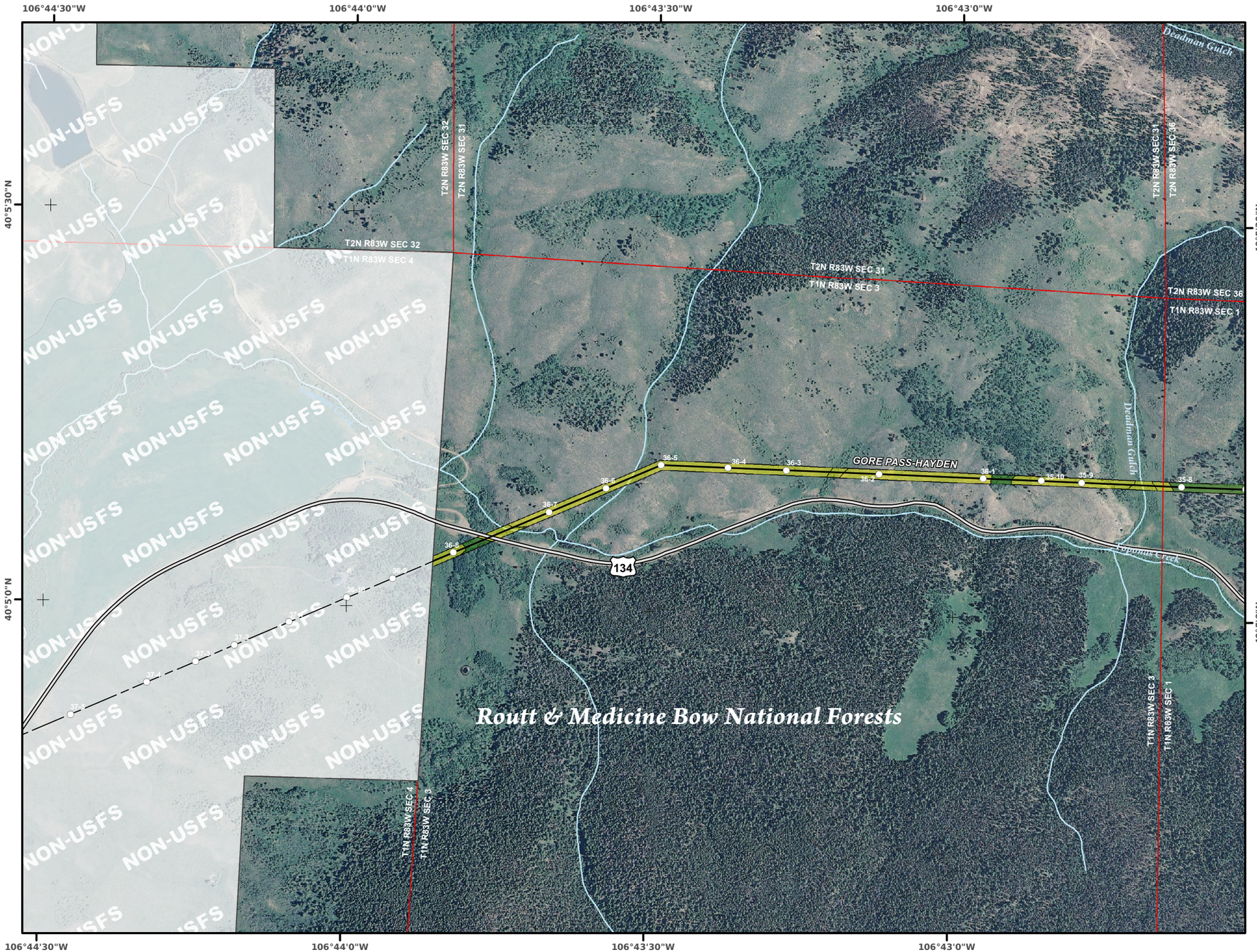

Forest Service Reauthorization of Western's Transmission Lines in Colorado, Utah & Nebraska

PROPOSED ACTION

Routt & Medicine Bow National Forests

FIGURE 35

Yampa Ranger District

Routt County

Phippsburg 20 Project Area

Gore Pass-Hayden Transmission Line

- Structure
- Transmission Line on USFS Managed Lands
- Transmission Line on Non-USFS Managed Lands
- Forest Service Road
- *USFS Administrative Boundary
- Stream

ROW Conditions

1. *Spanned vegetation & low-growth compatible vegetative communities.*
2. *Currently incompatible / long-term incompatible. Fast-growing mature vegetative community.*
3. *Currently compatible / long-term incompatible. Fast-growing mature vegetative community.*
4. *Currently incompatible / long-term incompatible. Slow-growing mature vegetative community.*
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