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Biological Assessment and Evaluation

Access Design for Highway 84 at Mill Creek Road Project (CDOT Permit #517018)



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Abbreviations and Acronyms

BAE	Biological Assessment and Evaluation
CDOT	Colorado Department of Transportation
Ecosphere	Ecosphere Environmental Services, Inc.
Highway 84	State Highway 84
IPaC	Information, Planning, and Conservation System
MBTA	Migratory Bird Treaty Act
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
PCEs	Primary constituent elements
Project	Access Design for U.S. Highway 84 at Mill Creek Road Project
ROW	right-of-way
TUAs	Temporary use areas
TWLTL	Tow-way left-turn lane
USFWS	U.S. Fish and Wildlife Service
USGS	U. S. Geological Survey

1. Introduction/Executive Summary

Ecosphere Environmental Services (Ecosphere) was contracted by Summit AE on behalf of Mountain Crossing, LLC (the Project proponent) to conduct a Biological Assessment and Evaluation (BAE) for the proposed Access Design for Highway 84 at Mill Creek Road Project (Project). The proposed Project would include restriping of travel lanes and installation of a new two-way left-turn-lane (TWLTL) on Highway 84 in support of the Mountain Crossing Development. Mountain Crossing, LLC, has proposed development of approximately 70 acres of private land in the Town of Pagosa Springs in Archuleta County, Colorado (Maps A-1 and A-2, Appendix A). The development would be known as Mountain Crossing and would include a mix of commercial and residentially zoned property that would be accessed from Mill Creek Road, off Highway 84. The proposed Project would include expansion of the existing asphalt surface and installation of gravel shoulder and road bank slopes to meet existing grade on Highway 84. In addition, the proposed Project would include paving and installation of curb and gutter, sidewalk, street lamps, and other related appurtenances of a section of Mill Creek Road.

The purpose of this BAE is to review the proposed Project in sufficient detail to determine to what extent it may affect any U.S. Fish and Wildlife Service (USFWS) federally listed endangered, threatened, and candidate species and proposed or designated critical habitat. This BAE is prepared in accordance with legal requirements set forth under Section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531 [c]). Additionally, impacts to species protected by the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act, and sensitive species listed by the State of Colorado and are considered in this report.

The determinations made in this BAE are based on pre-field research, observations from the field investigation, and professional judgment.

1.1 Consultation History

Communications between the USFWS and Ecosphere biologists regarding the proposed Project are described below:

- In June 2017, Ecosphere biologists visited the project area with Allison Jehly (USFWS) to discuss the proposed Mountain Crossing Development, evaluate survey recommendations, and review the locations of Pagosa skyrocket individuals and groups.
- Discussion between the Project consultant/engineer (Keith Mendenhall) and the USFWS occurred in February 2018, where conservation measures were developed for the proposed Project (see Section 2.2 Conservation Measures).
- Determination of the action area and extent of analysis for the Project was discussed by representatives from Colorado Department of Transportation (CDOT), USFWS, and Ecosphere in March of 2018. At the time of that conversation, the conclusion was reached that the Project did not include a federal nexus as currently designed and that the scope of analysis should be limited to the CDOT right-of-way (ROW) and areas that would be directly impacted by construction of the Project (i.e., Mill Creek Road). Based on the lack of federal nexus, consultation would include CDOT and the Project proponent, or representatives thereof.

2. Proposed Action

The planned development of the Mountain Crossing property is expected to result in an increase in vehicle traffic, thereby necessitating the widening of Highway 84 and the construction of a two-way left-turn lane (TWLTL) from the Highway onto Mill Creek Road, which would serve as direct access to the development. The proposed Project lies within the Town of Pagosa Springs jurisdiction; Mountain Crossing, LLC is the permittee for State Highway Access Permit #517018. The Project would be entirely privately funded. The proposed improvements are needed to allow for continued safe travel for existing Highway 84 traffic in addition to the expected future vehicle traffic associated with the Mountain Crossing development.

The proposed Project would include lane adjustments (re-striping) and widening of Highway 84 immediately south of the intersection with U. S. Highway 160 to accommodate turn lane improvements. The existing two-lane street configuration on Highway 84 would be modified to accommodate a TWLTL, a configuration which provides a center lane exclusively for left-turning vehicles coming from either direction. The proposed improvements along Highway 84 would take place at approximately mile point 27.657 and would include a total of approximately 1,862 linear feet (0.35 mile) of road surface. The re-striping would take place over the entire section of the Highway surface to be improved. Within the re-striping area, approximately 1,138 linear feet (0.22 mile) of the Highway 84 asphalt surface would be extended to the west at the approach to the intersection with Mill Creek Road (Appendix A, Map A-3). A total of approximately 560 cubic yards of new asphalt would be placed along the western edge of Highway 84 at a maximum width of approximately 4 feet, with continuous tapers. All new asphalt would be placed adjacent to the western edge of the existing asphalt surface, within the highway ROW.

In addition to the work on Highway 84, approximately 1,780 linear feet (0.34 mile) of improvements—including paving of the travel surface and installation of curb and gutter, sidewalk, street lamps, and other related appurtenances—would occur on Mill Creek Road, beginning at its intersection with the Highway. An estimated two acres of the Mountain Crossing parcel would be designated for temporary use areas (TUAs) during construction of the proposed Project. TUAs would be used for staging of materials and equipment and would be located outside of occupied Pagosa skyrocket habitat.

The proposed widening of Highway 84 and any associated slope stabilization would occur within the limits of the existing CDOT ROW for the highway and within the Town of Pagosa Springs platted road ROW for Mill Creek Road. No new ROW acquisition would be required for the Project. Most of the improvements would occur along Highway 84, but Mill Creek Road would also be improved, beginning at the Highway intersection. The Mountain Crossing Development would be accessed directly from Mill Creek Road. No utilities would be moved as part of the proposed Project.

The final design of the Proposed Action is currently being developed and construction is proposed to begin in summer of 2018. Once initiated, construction activities would take approximately 6 weeks to complete.

2.1 Location

The proposed Project is located just south of the intersection of U. S. Highway 160 and Highway 84 in the Town of Pagosa Springs, in Archuleta County, Colorado. The project area is included on the Jackson Mountain 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle map. The legal description of the proposed Project is:

Township 35 North, Range 1 West, Section 18
New Mexico Principal Meridian

2.2 Conservation Measures

To minimize impacts from the proposed Project, Mountain Crossing, LLC has committed to several conservation measures developed in coordination with USFWS during Project planning. Conservation measures are actions that, when implemented, will reduce or eliminate effects to specific resources. As applicant-committed measures, they are part of the proposed Project, and are considered in the effects analysis. The following list of conservation measures will be implemented to minimize impacts to Pagosa skyrocket from the proposed Project.

- To minimize direct disturbance of Pagosa skyrocket individuals, new asphalt required for lane widening will be placed along the western edge of Highway 84, where fewer Pagosa skyrocket plants have been identified during species specific surveys. New asphalt on the eastern side of Highway 84 will be limited to what is needed at the intersection with Mill Creek Road.
- All temporary use areas—including areas used for staging or storage of materials and equipment—will be located outside of areas occupied by Pagosa skyrocket.
- The developer will place an interpretive sign within the Mountain Crossing development describing conservation and life history of Pagosa skyrocket.
- A portion of the Mountain Crossing parcel has been removed from the development scenario and set aside to receive transplanted Pagosa skyrocket individuals that may be impacted by construction of the proposed Project.
- To maintain an open herbaceous vegetation layer suitable for Pagosa skyrocket, mulch or other ground cover will not be used to reclaim disturbed areas.
- To prevent the introduction or spreading of noxious weeds within the project area, all equipment will be cleaned prior to entry into the project area. The project area will not be sprayed for noxious weeds prior to, during, or after construction; removal of noxious weeds will be completed by hand pulling.
- The following CDOT guidelines for Pagosa skyrocket are pertinent to the Proposed Action and will be used for construction within the project area. The complete list of CDOT Guidelines for construction within occupied Pagosa skyrocket habitat is included as Appendix C.

    1. Disturbance of occupied or suitable habitat for the skyrocket will be avoided or minimized as much as possible. Surface disturbance will be avoided to the greatest extent possible from May 1 to September 1 to minimize damage to mature, reproductive plants. Prior to any unavoidable ground disturbance, all plants including rosettes will be marked with a pin flag by a qualified biologist. Where practical the biologist will document the population by counting adult and rosette plants,

recording GPS coordinates for the area occupied, and taking photographs. The boundary of plant habitat will be clearly marked with orange construction fence. A biologist will be present on the site when ground work commences to ensure that avoidance guidelines are followed. If project plans change, the biologist will be notified and a new survey will be conducted.

2. If soil in the ROW is to be disturbed or removed as part of CDOT activities, 6 inches or less, 3 inches if possible, of topsoil will be stockpiled in non-habitat areas and replaced after construction to preserve the seed bank.
3. Unavoidable rosettes and plants will either be transplanted or mitigated through property acquisition according to draft guidelines for threatened and endangered plant mitigation developed by the USFWS. Transplantation sites would be monitored for a period of 3 years to document success of transplantation efforts. Annual monitoring reports would be prepared, which assess the success of the transplantation efforts.
4. All equipment will be kept on the paved roadway if possible.
5. Equipment staging will occur on previously existing parking surfaces or other non-habitat as determined by a qualified biologist.
6. The number of access points to a construction site will be limited to one road into the site and one road out of the site. This road should be in an area where it will cause the least impact to the Pagosa skyrocket.
7. Whenever possible, geotextile material covered with a straw marker and several inches of fill will be placed where equipment will be driving to protect the topsoil and root structures during construction. When construction is complete, the geotextile, straw, and fill will be removed, allowing for quick re-growth.
8. Reseeding of disturbed areas will be allowed using an appropriate native seed mix as specified by a CDOT Landscape Architect in consultation with a qualified biologist.
9. No herbicide will be used in the project area.
10. No mowing will be allowed in the project area from May 1 through September 1.

2.3 Determination of the Action Area

For purposes of analysis, the project area is defined as the 0.35-mile-long section of Highway 84 and adjacent ROW where construction would take place, the associated 0.34-mile-long portion of Mill Creek Road and adjacent ROW to be improved, and designated temporary use areas estimated at approximately 2 acres to be used during construction. The project area is approximately 10 acres in size and includes approximately 5.9 acres of CDOT ROW.

The action area includes all areas where direct, indirect, or cumulative effects to listed species or their habitats could result from the proposed Project. The action area includes the project area and a 300-foot radius buffer of the project area, totaling approximately 66 acres (Appendix A, Map A-2). The rationale for delineating the action

area is based on the types of impacts that could occur from implementing the proposed Project, including emissions, dust, noise, and disruption of pollinators.

3. Environmental Baseline Conditions

Prior to conducting fieldwork, existing resource information was reviewed. Geologic information was acquired from the U.S. Geological Survey (USGS 2008). Surface soil maps and descriptions were obtained from the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey (USDA NRCS 2013). The National Hydrography Dataset (NHD) was reviewed to identify potentially jurisdictional wetlands or waterways in the action area (NHD 2013).

3.1 Field Survey Methodology

Ecosphere biologists have completed Pagosa skyrocket surveys in varying portions of the project area annually since 2013; specific survey areas for each year are shown on Map A-4 (Appendix A) and are included in the annual survey reports, which can be found in Appendix B. On June 21, 2017, Ecosphere biologists completed pedestrian surveys within the eastern portion of the Highway 84 ROW. The western portion of the Highway 84 ROW was most recently surveyed in June 2015. Additional surveys in support of the proposed Mountain Crossing Development were completed on June 13, July 5, and July 11, 2017 along Mill Creek Road and within the adjacent private parcel that is owned by Mountain Crossing and is slated for future development. The 2017 Highway 84 ROW surveys were limited to the eastern side of the Highway, beginning approximately 500 feet north of the intersection with Mill Creek Road and continuing to 300 feet south of the Mill Creek intersection, for a total survey length of approximately 800 feet and a total survey area of approximately 1.2 acres. In addition, surveys were completed adjacent to Highway 84 on a portion of the privately-owned Mountain Crossing parcel (Map A-4, Appendix A).

Pagosa skyrocket surveys for the Project were conducted by biologists walking parallel belt transects approximately 10 feet apart, with 100 percent visual coverage of the survey area. All plant observations were recorded using a 1-meter point count method. When an individual or discrete grouping of individuals was encountered, a pin flag was placed near the individual and all rosettes and flowering individuals at or within a 1-meter radius of each flag were counted. The flag location and plant counts by development stage were recorded using a sub-meter GPS. Where 1-meter plots were in close proximity and had potential to overlap, pin flags were laid on the ground in a line to define the boundary between each plot, ensuring no individuals were double-counted. Where several 1-meter plots occurred in an area, one biologist counted individuals and marked each pin flag with the count for rosettes and adults, while the second biologist captured and recorded the GPS data. Where dense clusters of plants were observed, a polygon area was delineated and all plants within the polygon were counted and recorded.

In addition to the species-specific surveys for Pagosa skyrocket, habitat suitability for other federal and state listed species was reviewed during field surveys.

3.2 Existing Land Use

Highway 84 is a two-lane paved highway running generally north to south through the action area. Its ROW width varies along its length from approximately 100 to 175 feet, with the exception of the triangular ROW area at the intersection with U. S. Highway 160, which is substantially wider to incorporate two merging lanes. Mill

Creek Road is a gravel-surface road running east to west through the action area, and generally centered within an approximately 60-foot-wide ROW. Both roads receive year-round use by passenger vehicles and heavy trucks, and include both underground and overhead utility lines. Surrounding land use is dominated by low-density residential development, light commercial development, industrial use, and livestock/agricultural uses.

3.3 Topography

The proposed Project is located on the Jackson Mountain 7.5' U.S. Geological Survey topographic quadrangle map. Topography within the project area is heavily disturbed and consists mainly of road shoulder, roadside ditch, raised driveways, and intersections. Slopes were visually estimated at 5 to 25 percent and elevations in the survey area range from approximately 7,100 to 7,200 feet above sea level. Slopes in the eastern portion of the Highway 84 ROW were visually estimated at up to 30 percent near the edge of asphalt, while slopes in the western portion of the ROW were estimated at 15-20 percent.

3.4 Hydrology

No evidence of surface hydrology in the Highway 84 ROW was observed during field surveys. The ditch along Mill Creek Road supports small areas of standing water when adjacent agricultural lands are being irrigated; several culverts cross under Mill Creek Road through the project area. Based on topography, surface runoff generally flows northwest toward the San Juan River, approximately 0.4 mile north of the project area; the San Juan River is located across U. S. Highway 160 from the project area.

According to the NHD, an unnamed tributary to Mill Creek passes through the extreme southeastern corner of action area as shown on Map A-2 in Appendix A (NHD 2013). In addition, there are three small (less than 1-acre) stock ponds that intersect the action area. The project area does not contain any mapped drainages.

3.5 Geology and Soils

Surface geology in the action area includes the Mancos Shale Formation, which inter-tongues complexly with units of overlying Mesaverde Group or Formation; the substrate includes shale-dominated formations of all ages (USGS 2008).

According to the NRCS, the project area contains four mapped soil types (USDA NRCS 2013). Table 3-1 lists these soil types and includes a brief description of the soil properties.

Table 3-1. Soil Units Mapped in the Action Area

Map Unit Name (Map Unit Symbol)	Parent Materials	Landform	Hydric Rating
Carracas Clay Loam, cool, 3 to 35 percent slopes (C0-V)	Slope alluvium derived from shale	Hills	Not Hydric
Herm Clay Loam, 3 to 12 percent slopes (C2-CD)	Slope alluvium derived from shale	Hills	Not hydric

Map Unit Name (Map Unit Symbol)	Parent Materials	Landform	Hydric Rating
Tefton Loam, 1 to 3 percent slopes (12)	Mixed alluvium	Floodplain steppes	Hydric

Source: USDA NRCS 2013.

3.6 Vegetation

Vegetation cover in the action area is dominated by a mix of pasture grasses and disturbed herbaceous vegetation; species composition is likely due in large part to the use of roadside seed mixes in the area. Dominant herbaceous species within the project area include smooth brome (*Bromus inermis*), western wheatgrass (*Pascopyrum smithii*), and alfalfa (*Medicago sativa*). Several Siberian elm (*Ulmus pumila*) trees are scattered along the Highway 84 ROW near the intersection with Mill Creek Road, generally on the east side of Highway 84.

Patches of Colorado-listed noxious weeds were observed in the project area, including field bindweed (*Convolvulus arvensis*), Canada thistle (*Cirsium arvense*), and musk thistle (*Carduus nutans*).

4. Federally Listed Species and Critical Habitats

The USFWS Information, Planning, and Conservation (IPaC) System was reviewed for federally listed species to consider during analysis of the proposed Project. Ten species with potential to occur in the project area or to be impacted by the proposed action were considered in the analysis (USFWS 2018). Nine of these species were eliminated from detailed analysis due to a lack of potential habitat in the project area or the action area (Table 4-1). One species, Pagosa skyrocket, occurs in the project area and is analyzed in detail below.

Table 4-1. Federally Listed Species Considered during Analysis of the Proposed Action

Species	Status	Habitat Description	Habitat Status/Potential to Occur in the Project Area (PA) and Action Area (AA)
MAMMALS			
New Mexico meadow jumping mouse (*Zapus hudsonius luteus*)	Endangered	Nests in dry soils, but uses moist streamside, dense and tall riparian/wetland vegetation up to an elevation of about 8,000 feet.	No suitable habitat in the PA or AA.
North American Wolverine (*Gulo gulo luscus*)	Proposed Threatened	Wide variety of alpine, boreal, and arctic habitats including boreal forests, tundra, and western mountains throughout Alaska and Canada.	No suitable habitat in the PA or AA.
BIRDS			
Southwestern willow flycatcher (*Empidonax traillii extimus*)	Endangered	Dense, shrubby riparian vegetation, usually near surface water or saturated soil.	No suitable habitat in the PA or AA.
Mexican spotted owl (*Strix occidentalis lucida*)	Threatened	Mature to old growth mixed conifer stands on steep, north-facing slopes with snag and downed wood and canopy closure. Minimum patch size for nesting or roosting is 100 acres within a 600-acre protected activity center.	No suitable habitat in the PA or AA.
Yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	Threatened	Cottonwood forest with dense understory vegetation, minimum habitat patch size 2 hectares.	No suitable habitat in the PA or AA.

Species	Status	Habitat Description	Habitat Status/Potential to Occur in the Project Area (PA) and Action Area (AA)
FISHES			
Bonytail chub (Gila elegans)	Endangered	Flowing pools and backwaters in deep water of the Upper Colorado River basin.	There are no rivers in the PA or AA. No water depletions are expected for the proposed Project.
Colorado pikeminnow (*Ptychocheilus lucius*)	Endangered	Large rivers with a strong current, deep pools, eddies, and quiet backwaters. Tributaries of the Colorado and San Juan Rivers.	There are no rivers in the PA or AA. No water depletions are expected for the proposed Project.
Humpback chub (Gila cypha)	Endangered	Deep, fast-moving rivers in the Colorado River Basin. Formerly found in the Colorado River and its larger tributaries, upstream of Boulder Canyon; now occurrence is limited to the Grand Canyon portion of the mainstream Colorado and (mainly) the lower Little Colorado River.	There are no rivers in the PA or AA. No water depletions are expected for the proposed Project.
Razorback sucker (*Xyrauchen texanus*)	Endangered	Rivers with strong, steady currents over sandy bottoms.	There are no rivers in the PA or AA. No water depletions are expected for the proposed Project.
PLANTS			
Pagosa skyrocket (*Ipomopsis polyantha*)	**Endangered**	**Found on barren shale, ponderosa pine, piñon-juniper, or scrub-oak communities on the Mancos Shale Formation. Elevation range is 6,400 – 8,100 feet.**	**PA contains a population of Pagosa skyrocket; PA and AA are within designated critical habitat for this species.**

Bold text indicates species warrants detailed analysis.

4.1 Pagosa Skyrocket

4.1.1 Status

Endangered with Designated Critical Habitat.

4.1.2 Distribution and Habitat

The range of the Pagosa skyrocket is restricted to Archuleta County, Colorado. Pagosa skyrocket habitat is described as consisting of shale barrens at elevations between 6,400 to 8,100 feet (USFWS 2012). Habitat is characterized as barren, dark gray Mancos shale outcrops or Mancos shale-derived soils in open montane-

grasslands and grassland understory at the edges of open ponderosa pine (*Pinus ponderosa*), juniper (*Juniperus* spp.), and Gambel oak (*Quercus gambelii*) forests. The species occurs on extremely dry and erosive shale soils, conditions that are harsh and difficult for most other plant species to survive.

Pagosa skyrocket is considered a ruderal species, which means it is one of the first plant species to colonize disturbed lands. The species is found in light to moderately disturbed areas such as rills (small, narrow, shallow incisions in topsoil layers caused by erosion from overland flow or surface runoff), areas that are only occasionally disturbed, or areas with previous disturbances that have been colonized but not subsequently disturbed (USFWS 2012). Plants may be found adjacent to roads or developed areas, such as roadside ditches or utility lines, where periodic grading or disturbance of the soil occurs (USFWS 2011). Seeds are not thought to disperse far, but do colonize quickly.

At the time of the Pagosa skyrocket's Endangered Species Act listing, it was estimated that 2.5 percent of occupied habitat was on Federal land managed by the U.S. Bureau of Land Management, 9.1 percent on State Highway and County Road ROWs, 1.9 percent on the Town of Pagosa Springs parkland and land owned by Archuleta County, and 86.4 percent on privately owned lands (USFWS 2011).

The two known occurrences of Pagosa skyrocket—known as the Pagosa Springs and Dyke occurrences—collectively occupy about 388.4 acres of habitat within a range that includes about 6.5 square miles. The Pagosa Springs occurrence is southeast of the Town of Pagosa Springs along both sides of Highway 84. Occupied habitat occurs within the Colorado Department of Transportation ROW along Highway 84 extending approximately 3 miles south of the intersection with U.S. Highway 160, and on private lands on both sides of the highway (USFWS 2011). The Dyke occurrence is located approximately 13 miles west of the Town of Pagosa Springs.

4.1.3 Habitat Suitability and Occurrence within the Project Area

The following sections include a summary of the field survey results for Pagosa skyrocket in the project area. A complete and detailed description of habitat suitability and Pagosa skyrocket occurrence within the project area is included in the Pagosa Skyrocket Survey Reports (Appendix B).

Survey Results – Habitat Suitability

Habitat suitability in the project area was determined based on the presence or absence of the primary constituent elements (PCEs) for Pagosa skyrocket as observed during field surveys and described in the Designation of Critical Habitat (USFWS 2012). There are five PCEs for Pagosa skyrocket: (1) Mancos shale soils, (2) elevation and climate, (3) plant community, (4) habitat for pollinators, and (5) appropriate disturbance regime. The entire project area contains Mancos shale soils and an elevation and climate suitable for Pagosa skyrocket. Habitat for pollinators exists in the project and action areas; however, pollinator habitat is limited to some degree by development on adjacent private land.

The plant community in the project area is dominated by smooth brome; however, native plant species commonly associated with Pagosa skyrocket occurrences were observed during field surveys—including western wheatgrass, Indian ricegrass (*Achnatherum hymenoides*), hairy false goldenaster (*Heterotheca villosa*), buckwheat (*Eriogonum* spp.), and Lewis flax (*Linum lewisii*). Additionally, areas of exposed shale soils with low vegetative cover were observed cover in the project area. Disturbance regimes in the project area are variable:

the eastern side of the ROW is predominately vegetated surface and—because of the steeper topography—contains fewer driveways than the western side of the ROW. The western side of the ROW has lower angle slopes and contains several driveways and increased disturbance. A detailed discussion of the PCEs for Pagosa skyrocket habitat is included in Section 4.2, Critical Habitat.

Survey Results – Occurrence in the Project Area

The presence of Pagosa skyrocket in the project area was confirmed in 2017. However, 2017 surveys were limited to the eastern side of the Highway 84 ROW. The western side of the ROW was most recently surveyed in 2015, when a total of approximately 1,835 plants were recorded in the survey area. Of these, 1,578 individual plants were included in the proposed project area. Plants were scattered within the Highway 84 ROW from near the edge of pavement to the edge of the ROW.

Occurrences of Pagosa skyrocket observed from 2013 through 2017 are included on Map A-4 (Appendix A) and detailed further in the annual Pagosa Skyrocket Survey Reports (Appendix B).

4.1.4 Direct and Indirect Effects

Direct effects of the proposed Project would include loss of approximately 0.1 acre (5,060 square feet) of suitable habitat for Pagosa skyrocket where new asphalt is laid adjacent to the western edge of Highway 84. Additional direct impacts would include surface disturbance, vegetation trampling, and soil mixing and compaction within suitable habitat for the species. These impacts would result from construction and could occur at various points within the project area; however, impacts would be focused in the TUAs and along the western edge of the Highway 84 ROW, where the bulk of the work is proposed. Construction of the Project is expected to result in an increase in airborne dust and potential disruption of pollinators, should Project activities occur during the blooming season. Based on the proximity of the proposed construction to known Pagosa skyrocket individuals, the proposed Project is expected to result in the transplanting of individual plants, as described in the Conservation Measures (Section 2.2). Transplanting is intended to reduce mortality or injury of individual Pagosa skyrocket plants; however, individual plants may not survive the transplanting efforts. Construction would also include disturbance of seed bank soils. Indirect effects may include the spread of invasive plant species or noxious weeds into areas of disturbed suitable habitat. Disturbed areas adjacent to the edge of asphalt are expected to revert to pre-construction conditions once construction is complete.

For purposes of this analysis, impacts are considered temporary when they are expected to persist for one or two growing seasons, while permanent impacts would be expected to persist for the life of the road improvements—estimated at 10 years or more. Temporary impacts would generally include vegetation and soil disturbance adjacent to the new edge-of-asphalt and in TUAs, pollinator disturbance during construction, and increased dust associated with construction. For analysis, we estimate there will be approximately 2.1 acres of temporary disturbance, including the TUAs (2 acres) and an area approximately 5 feet wide along the new edge-of-asphalt on Highway 84 (0.1 acre). Permanent impacts would include the loss of 0.1 acre of suitable habitat within the footprint of the new asphalt along the western edge of Highway 84. In addition, the section of Mill Creek Road within the project area—including the adjacent road shoulder and ditch—would be converted to a paved surface.

Based on surveys completed in 2015, there are no Pagosa skyrocket individuals located within the area along the western edge of Highway 84 where asphalt would be laid. Along Mill Creek Road, three adult (flowering) individuals were observed in 2017. Based on the biennial growth habit of the Pagosa skyrocket, these flowering individuals are not expected to persist beyond 2017; however, the area surrounding these plants would be checked for any new rosettes prior to construction. Should flowering plants or rosettes be observed prior to construction in the areas where new asphalt would be laid, they would be removed from the project area and transplanted onto the designated area of the Mountain Crossing property prior to construction. Pagosa skyrocket plants outside of the area where new asphalt would be placed are not expected to be crushed or killed during construction, therefore no transplanting of these individuals is proposed.

Long-term maintenance within the project area would include roadside mowing, weed treatment, and seasonal magnesium chloride spraying. These maintenance activities would be completed by CDOT crews along Highway 84 and impacts would be minimized by implementing the CDOT guidelines for construction within occupied Pagosa skyrocket habitat (Appendix C). Temporary impacts, such as vegetation trampling and pollinator disturbance, could occur because of the maintenance activities. More intensive maintenance such as road resurfacing may be necessary after several years. The existing roadways have been in place and regularly maintained for decades.

Direct and indirect effects would be minimized by the implementation of conservation measures (as described in Section 2.2). Adverse effects to individual plants could occur; however, based on the project design and implementation of Conservation Measures—including the transplanting of individuals—the proposed Project **may affect, and is not likely to adversely affect** the Pagosa skyrocket.

4.1.5 Cumulative Effects

Cumulative effects are those effects of future state or private activities, not involving federal activities that are reasonably certain to occur within the action area (50 Code of Federal Regulations 402.02). Future state, private, or non-federal activities that are reasonably certain to occur in the action area include:

- Additional development of residential and agricultural properties and changes in land management practices, including mowing, weed management, agriculture, and livestock grazing;
- Ongoing improvements and maintenance of transportation routes including highway, road, ditch, and driveway maintenance; and
- Utility installation and maintenance, including overhead power line improvements and maintenance and potential underground utility installation and maintenance.

Development of residential or agricultural properties in the action area may result in the removal of suitable Pagosa skyrocket habitat and may directly harm individuals or groups of plants. The majority of the action area is under private land ownership, leaving little opportunity for regulatory protection of plants. Changes in land use, such as an increase in the intensity of livestock grazing or frequency of mowing, may directly harm individual plants and push currently suitable habitat into a disturbance regime that renders it unsuitable for Pagosa skyrocket. Conversely, a reduction in grazing intensity or frequency of mowing may benefit plants by converting currently unsuitable habitat into suitable habitat. Weed management on private lands may result in herbicidal drift onto Pagosa skyrocket individuals, or may reduce floral resources for pollinators to the extent that

pollination opportunities for Pagosa skyrocket are diminished. However, if weeds or aggressively spreading plant species are able to grow unchecked, they may outcompete Pagosa skyrocket. Conversion of native vegetation into grassland may reduce the availability of suitable habitat in the action area.

Transportation routes within the action area include Highway 84, several paved driveways, commercial access points, and neighborhood roads. Maintenance of the Highway and neighborhood roads may include mowing, grading, and ditch maintenance, all of which occur at least annually. To stabilize and reduce fugitive dust and to assist in snowmelt, Mill Creek Road and Highway 84 are treated with magnesium chloride—which may result in overspray onto Pagosa skyrocket plants. Maintaining, improving, or installing private driveways or commercial access points in the action area may directly harm individual plants and convert currently suitable habitat into unsuitable habitat.

The proposed Project would add to the collective impacts from the activities described above by permanently removing approximately 0.1 acre of habitat across the project area, none of which is known to be currently occupied by individuals. In addition, 2.1 acre of temporary impacts are expected within the TUAs and adjacent to the construction areas, as well as impacts along Mill Creek Road.

4.2 Critical Habitat

The project area contains designated critical habitat for Pagosa skyrocket. No other designated or proposed critical habitat occurs within the action area.

Designated Critical Habitat – Pagosa Skyrocket

The USFWS designated critical habitat for Pagosa skyrocket in August of 2012 (USFWS 2012). A total of approximately 9,641 acres has been designated as critical habitat for the species across four geographic areas. Two critical habitat units (CHUs) are located surrounding known populations (Pagosa Springs and Dyke Units), and two CHUs occur outside the current geographic area known to be occupied by the species where Federal lands intersect with suitable habitat (Eight Mile Mesa and O'Neal Hill Units) (USFWS 2012). The project area is located on private land entirely within the Pagosa Springs CHU (Appendix A, Map A-1).

4.2.1 Direct and Indirect Effects

The project area, which is approximately 10 acres in size, occurs entirely within the designated Pagosa Springs CHU for Pagosa skyrocket, accounting for approximately 0.1 percent of the 6,456 acres in the Pagosa Springs CHU and 0.08 percent of total designated critical habitat for the species (USFWS 2012).

Construction of the proposed Project would result in approximately 0.1 acre (5,060 square feet) of permanent habitat loss within the Pagosa Springs CHU. This accounts for approximately 0.03 percent of the 388.4 acres of known occupied habitat (USFWS 2011). Construction of the proposed Project would result in an additional 2.1 acre of temporary disturbance in the CHU (approximately 0.5 percent of known occupied habitat).

There are five primary constituent elements of Critical Habitat specific to Pagosa skyrocket; each of these elements and their potential to be impacted by the proposed Project is discussed below.

Mancos Shale Soils

The proposed Project would result in soil mixing and compaction where new asphalt is laid and in the portion of ROW directly adjacent to the new asphalt. Soil compaction may also occur adjacent to work areas and in TUAs as vehicles and equipment travel within the project area. However, the proposed Project is expected to have no effect on the shale content of soils within the CHU. Disturbed topsoil will be stockpiled in non-habitat areas and replaced after construction to preserve the seed bank.

Elevation and Climate

The proposed Project is expected to have no effect on elevations or climatic conditions within the CHU.

Plant Community

The proposed Project is not expected to noticeably alter plant communities within the CHU. Portions of the project area, including the Highway 84 ROW and adjacent private land parcels, contain smooth brome (*Bromus inermis*). Smooth brome is an aggressive, rhizomatous, sod-forming perennial grass (Smoliak et al. 1981). Construction would expose disturbed soils, thereby increasing the potential for noxious weeds, exotic species, or aggressive plant species such as smooth brome to increase in the project area, potentially displacing or outcompeting Pagosa skyrocket plants. In an effort to maintain an open herbaceous vegetation layer suitable for Pagosa skyrocket, mulch or other ground cover would not be used to reclaim disturbed areas. These impacts would be minimized based on implementation of conservation measures for the proposed Project (Section 2.2), which include hand removal of noxious weeds and measures to prevent the introduction of noxious weeds within the project area and use of an appropriate native seed mix during reclamation.

Habitat for Pollinators

The proposed Project is expected to have discountable, temporary effects to pollinators and pollinator habitat within the CHU. Direct effects may include pollinator mortality or avoidance of the project area during the construction period. Individuals that may avoid the project area are expected to temporarily disperse into adjacent suitable habitat during construction. There may be a slight decrease in floral resources for pollinators as plants in the project area may be covered with asphalt, or crushed or trampled during construction. Construction may remove or crush a small amount of ground or twig nesting habitat for pollinators within the project area. Because the proposed Project would take place adjacent to an existing highway within an existing ROW, it would not contribute to fragmentation of pollinator habitat.

Appropriate Disturbance Regimes

Disturbance along Highway 84 would include installation of new asphalt adjacent to an existing road surface; along Mill Creek Road, road improvements would take place on and adjacent to the existing road surface. Appropriate disturbance regimes for Pagosa skyrocket are described as light to moderate, or intermittent or discontinuous (USFWS 2012). Construction of the proposed Project would include ground disturbance within the CHU. Once construction is completed, routine maintenance on Highway 84 would follow existing CDOT maintenance timelines and would be completed in accordance with the CDOT guidelines for work in occupied Pagosa skyrocket habitat (Appendix C). Light to moderate disturbance from maintenance would occur intermittently over the life of the road improvements. Pagosa skyrocket has persisted within the existing ROW

with the current level of routine maintenance. The proposed Project is expected to be compatible with the appropriate disturbance regime for Pagosa skyrocket. For decades, the Pagosa skyrocket has persisted within the existing ROW, which is subject to regular maintenance and other disturbances. The level of disturbance associated with construction and maintenance of the existing roadway may have contributed to maintaining the existence of a ruderal species such as Pagosa skyrocket in the area.

The proposed Project is not expected to appreciably diminish the value of the CHU for the conservation of the species and the Pagosa Springs CHU is expected to continue to function and support the biological and physical environment essential for the conservation of the species after construction. Based on these conclusions, the proposed Project **may affect, but is not likely to adversely affect** critical habitat for Pagosa Skyrocket.

4.2.2 Cumulative Effects

Future State, private, or non-Federal activities that are reasonably certain to occur in the action area are listed below. The impacts for these activities are described in Section 4.1.5, Cumulative Effects.

- Additional development of residential and agricultural properties and changes in land management practices, including mowing, weed management, agriculture, and livestock grazing;
- Ongoing improvements and maintenance of transportation routes including highway, road, ditch, and driveway maintenance; and
- Utility installation and maintenance, including overhead power line improvements and maintenance and potential underground utility installation and maintenance.

The proposed Project would add to the impacts from the activities described above by temporarily disturbing up to 2.1 acres of vegetation and soils within the Pagosa Springs CHU on private property and within an existing ROW. In addition, the Project would permanently convert approximately 0.1 acre of the CHU to asphalt surface highway and a section of Mill Creek Road and adjacent shoulder and ditch (currently gravel surface) would be converted to a paved surface. Based on this minimal size of the impacts and the current roadside habitat condition of the area to be impacted, the proposed Project would not appreciably diminish the value of the CHU for the conservation of the species.

4.3 Summary of Effects Determinations

The proposed Project would have no effect on nine of the ten federally listed species considered during the analysis (Table 4-2). Based on the absence of individuals within the footprint of proposed construction, as well as implementation of Conservation Measures as described in Section 2.2, the proposed Project may affect, and is not likely to adversely affect the Pagosa skyrocket (*Ipomopsis polyantha*). The project area is located within a portion of the designated Pagosa Springs Critical Habitat Unit for Pagosa skyrocket; however, the project is not expected to appreciably diminish the value of the CHU and the Pagosa Springs CHU is expected to continue to function and support the biological and physical environment essential for the conservation of the species after construction. Based on these conclusions, the proposed project may affect, and is not likely to adversely affect critical habitat.

Table 4-2. Summary of Effects Determinations

Species	Status	Effects Determination
New Mexico meadow jumping mouse	Endangered	No effect
North American Wolverine	Proposed Threatened	No effect
Southwestern willow flycatcher	Endangered	No effect
Mexican spotted owl	Threatened	No effect
Yellow-billed cuckoo	Threatened	No effect
Bonytail chub	Endangered	No effect
Colorado pikeminnow	Endangered	No effect
Humpback chub	Endangered	No effect
Razorback sucker	Endangered	No effect
Pagosa skyrocket	Endangered	May affect, not likely to adversely affect
Critical Habitat		
Pagosa skyrocket	Designated; Pagosa Springs Critical Habitat Unit	May affect, not likely to adversely affect

5. Migratory Bird Treaty Act

Most birds are protected by the Migratory Bird Treaty Act (MBTA). In Colorado, this includes all birds except Rock Doves (feral pigeon) (*Columba livia domestica*), Eurasian Collared Doves (*Streptopelia decaocto*), House Sparrows (*Passer domesticus*), European Starlings (*Sturnus vulgaris*), and some game birds. The USFWS administers the MBTA, which prohibits taking migratory birds protected under the MBTA. The USFWS includes 15 MBTA species that should be considered in the effects analysis for the Proposed Action (USFWS 2018); these species and their potential to occur in the action area are listed in Table 5-1.

The primary effect to MBTA species utilizing the habitats within the action area would be temporary avoidance of the area during construction activities. There is abundant habitat adjacent to the action area that temporarily displaced bird species could use during construction. A small amount of vegetation, primarily roadside grasses, would be removed for the Proposed Action. The Project is located within the existing Highway 84 ROW, so it would not contribute to habitat fragmentation. No bird nests were observed in the project area during field surveys.

Table 5-1. Migratory Bird Species Considered in the Effects Analysis

Species1	Status2	Habitat Description	Potential to Occur within the Action Area
Bald Eagle[3] (*Haliaeetus leucocephalus*)	**Non-BCC Vulnerable; State-C**	**Nests in tall trees and near bodies of water**	**Potential flyover; see Section 6 for discussion**
Black Swift (*Cypseloides niger*)	BCC (CON) Rangewide	Nests on ledges, in shallow caves, or on sheer cliffs, usually in association with waterfalls	No potential for occurrence
Brewer's Sparrow (*Spizella breweri*)[2]	**BCC, BCR**	**Primarily sagebrush, mixed shrublands with an average canopy height of about 5 feet.**	**Potential migration**
Brown-capped Rosy-finch (*Leucosticte australis*)	BCC (CON) Rangewide	Rock faces in alpine tundra	No potential for occurrence
Clark's Grebe (*Aechmophorus clarkii*)	**BCC Rangewide**	**Uses lakes and marshes with extensive areas of open water bounded by emergent vegetation**	**Potential migration**
Golden Eagle[3] (*Aquila chrysaetos*)	**BCC, BCR**	**Open habitats including grasslands, sagebrush, farmlands or tundra**	**Potential foraging; see Section 6 for discussion**
Grace's Warbler (*Dendroica graciae*)	BCC, BCR	Ponderosa pine with scrub oak understory	No potential for occurrence
Lewis's Woodpecker (*Melanerpes lewis*)	BCC (CON) Rangewide	Open ponderosa pine forests, riparian, and piñon-juniper woodlands	No potential for occurrence
Marbled Godwit (*Limosa fedoa*)	BCC (CON) Rangewide	Breeds in northern prairies of the United States and Canada; migrates to shoreline habitats of southern California and western Mexico	No potential for occurrence
Olive-sided Flycatcher (*Contopus cooperi*)	BCC (CON) Rangewide	Snags and conifers, on steep slopes, open stands, and natural openings	No potential for occurrence
Piñon Jay (*Gymnorhinus cyanocephalus*)	BCC (CON) Rangewide	Piñon-juniper woodlands	No potential for occurrence
Rufous Hummingbird (*Selasphorus rufus*)	**BCC Rangewide**	**Openings and secondary succession communities, mature forest parks and residential areas.**	**Potential migration**

Species1	Status2	Habitat Description	Potential to Occur within the Action Area
Virginia's Warbler (*Vermivora virginiae*)	**BCC Rangewide**	**Scrubby, dense shrublands**	**Potential migration**
Willet (*Tringa semipalmata*)	**BCC Rangewide**	**Grasslands associated with shallow wetlands**	**Potential breeding in action area**
Willow Flycatcher (*Empidonax traillii*)	BCC-BCR	Habitat restricted to river corridors, riparian woodlands, and willow habitat	No potential for occurrence

[1] Species in bold have the potential to occur within the project area.

[2] Status codes: State-C= Species of Special Concern in the State of Colorado
BCC= Birds of Conservation Concern
BCC Rangewide= Birds of Conservation Concern that are of concern throughout their range (USFWS 2018)
BCC-BCR= Birds that are BCC that are of concern only in particular Bird Conservation Regions
Non-BCC Vulnerable= birds that are not BCC in the project area, but appear on the list because of Eagle Act Requirements

[3] Bald Eagle and Golden Eagle are discussed below in Section 6, Bald and Golden Eagle Protection Act

Impacts to migratory birds would include an increase in dust, noise, equipment, and human presence in the project area during construction. The conversion of vegetation to asphalt surface adjacent to Highway 84 is not expected to affect the availability of migratory bird habitat, based on the proximity to existing asphalt surface and high-speed vehicle travel. If vegetation removal beyond the grasses adjacent to the existing roadway is proposed during the nesting season (April 1 – August 31), a preconstruction survey to identify active migratory bird nests within the Highway ROW and Mill Creek Road ROW would be conducted 7 to 10 days prior to initiation of construction. If active nests were located, CDOT would be contacted for guidance on how to proceed. Guidance may include implementation of buffers, timing restrictions, or other appropriate measures to minimize or avoid impacts to nesting migratory birds.

6. Bald and Golden Eagle Protection Act

The Project and action areas are considered winter range, winter forage, and winter concentration areas for bald eagle (CPW 2016). In addition, there are two mapped bald eagle roosts within one-half mile of the action area. Bald eagles typically congregate near water sources, which provide access to their main food source in the summer and winter. In winter, bald eagles utilize communal roosts in large trees. The proposed Project is located just south of the San Juan River, which may provide foraging opportunities for the species; however, the project area is separated from the River by U. S. Highway 160. The project area does not contain any large trees that would provide suitable perch locations for bald eagles. Based on the distance to water resources and the lack of perch sites in the project area, the proposed action is not expected to impact bald eagles. The project area contains suitable foraging habitat for golden eagle, especially along Highway 84 where there is increased potential for roadkill.

7. State Listed Species

A review of the Colorado Parks and Wildlife website lists 74 species that are considered threatened, endangered, or are a special concern for the State of Colorado (CPW 2018). The action area contains potential habitat for three of these species: Botta's pocket gopher, bald eagle, and northern leopard frog (Table 7-1). The potential for impacts to bald eagle is discussed above in Section 6; Botta's pocket gopher and northern leopard frog are discussed in further detail below.

Table 7-1. State-listed Species Considered in the Effects Analysis

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
Mammals			
Black-footed ferret (*Mustela nigripes*)	SE	Open grasslands with prairie dog colonies year-round.	The action area does not contain prairie dog colonies.
Black-tailed prairie dog (*Cynomys ludovicianus*)	SC	Short- and mixed-grass prairies of eastern Colorado.	No prairie habitat occurs in the action area. Distribution of species does not include western Colorado.
Botta's pocket gopher (*Thomomys bottae*)	**SC**	**Prefers sandy soils of valley bottom riparian areas, agricultural areas, roadsides, grasslands, piñon-juniper woodlands, montane forests/shrublands, and semi-desert shrublands.**	**The action area may contain suitable habitat.**
Gray wolf (*Canis lupus*)	SE	Occurs in a variety of habitats where large prey (primarily ungulates) occurs.	The action area does not contain suitable habitat; gray wolves are considered extirpated in Colorado.
Grizzly bear (*Ursus arctos*)	SE	Found in a variety of habitats where forage is abundant.	The action area does not contain suitable habitat; grizzly bears are considered extirpated in Colorado.
Kit fox (*Vulpes macrotis*)	SE	Saltbush, shadscale, and greasewood-dominated shrublands.	The action area does not contain suitable habitat.
Lynx (*Lynx canadensis*)	SE	Large tracts of high elevation (>8,000 feet) mixed coniferous forest.	The action area does not contain suitable habitat.
Northern pocket gopher (*Thomomys talpoides macrotis*)	SC	Agricultural and pasture lands, semi-desert shrublands, and grasslands at lower elevations from 5,000 feet upward, into alpine tundra.	Known distribution of the subspecies *macrotis* is limited to north-central Colorado.

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)	ST	Well-developed riparian areas with adjacent, relatively undisturbed grassland communities and a nearby water source.	The action area does not contain suitable habitat; distribution of this species in Colorado is restricted to the Front Range.
River otter (*Lontra canadensis*)	ST	Riparian habitats with an abundant food base of fish and/or crustaceans. Minimum estimated water flow requirement is 10 cubic feet per second.	The action area does not contain suitable habitat.
Swift fox (*Vulpes velox*)	SC	Short- and mid-grass prairie habitats.	No prairie habitat occurs in the action area; species' distribution does not include western Colorado.
Townsend's big-eared bat (*Corynorhinus townsendii pallescens*)	SC	Semi-desert shrublands, piñon-juniper woodlands and open montane forests below 9,500 feet. Requires caves or abandoned mines for roost sites during all seasons and stages of its life cycle; distribution is strongly correlated with the availability of these features.	The action area does not contain suitable habitat.
Wolverine (*Gulo gulo*)	SE	Large, remote tracts of boreal forest and alpine tundra.	The action area does not contain suitable habitat.
Birds			
American Peregrine Falcon (*Falco peregrinus anatum*)	SC	Rugged terrain with rocky cliffs and canyons, 30 to 1,000+ feet high; adjacent to rivers, lakes, or streams.	The action area does not include any rocky cliffs suitable for nesting.
Bald Eagle (*Haliaeetus leucocephalus*)	**SC**	**Primarily found around lakes, reservoirs, and rivers. Large branched trees used for nesting, roosting, and foraging.**	**Habitats along the San Juan River may provide foraging opportunities for the species; however, U.S. Highway 160 separates the project area from the San Juan River and associated foraging opportunities. Discussed previously in Section 6.**
Burrowing Owl (*Athene cunicularia*)	ST	Dry, open, short-grass plains; usually associated with prairie dog towns and sandy soil.	The action area does not contain prairie dog towns.

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
Columbian Sharp-Tailed Grouse (*Tympanuchus phasianellus columbianus*)	SC	Gambel oak and serviceberry shrublands often interspersed with sagebrush shrublands, aspen forests, wheat fields, and irrigated meadows and alfalfa fields.	The action area does contain suitable habitat.
Ferruginous Hawk (*Buteo regalis*)	SC	Flat or rolling terrain in grassland, shrub-steppe, and desert habitats.	The action area does not contain suitable habitat.
Greater Sage Grouse (*Centrocercus urophasianus*)	SC	Sagebrush shrublands are primary habitat; adjacent meadows, grasslands, aspen, and willow thickets also used in summer.	The action area does not contain sagebrush shrublands.
Greater Sandhill Crane (*Grus canadensis tabida*)	SC	Migrants use mudflats around reservoirs, agricultural fields, marshes, and wet meadows. Breeding range does not include Colorado.	The action area does not contain suitable habitat.
Gunnison Sage Grouse (*Centrocercus minimus*)	SC	Big sagebrush shrub-steppes with low vegetation.	No big sagebrush habitats exist in action area.
Least Tern (*Sterna antillarum*)	SE	Sandy or pebbly beaches around lakes or reservoirs or sandbars in rivers.	The action area does not contain suitable habitat.
Lesser Prairie Chicken (*Tympanuchus pallidicinctus*)	ST	Prefer sandy grasslands with an abundance of mid-grasses, sandsage, and yucca.	The action area does not contain suitable habitat.
Long-Billed Curlew (*Numenius americanus*)	SC	Short-grass prairies or fields. Nests close to standing water.	No prairie habitats occur in the action area.
Mexican Spotted Owl (*Strix occidentalis lucida*)	ST	Mature to old growth stands of mixed conifer in canyon/cliff habitat.	No suitable mixed conifer habitat occurs within the action area.
Mountain Plover (*Charadrius montanus*)	SC	Short grass prairies or flat, open (30% bare) grasslands; often associated with prairie dog towns and intensive grazing.	No suitable habitat occurs within the action area.
Piping Plover (*Charadrius melodus circumcinctus*)	ST	Sandy lakeshore beaches, river sandbars, and sandy wetland pastures.	No suitable habitat occurs within the action area.

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
Plains Sharp-Tailed Grouse (*Tympanuchus phasianellus jamesii*)	SE	Scrub oak thickets lacking conifers, agricultural, and riparian areas. Leks located in meadows, burned areas, or ridges/knolls.	The action area does not contain suitable habitat and is outside of the known range for this species.
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	SE	Dense, shrubby riparian vegetation, usually near surface water or saturated soil.	The action area does not contain suitable habitat.
Western Snowy Plover (*Charadrius alexandrinus*)	SC	Alkali flats around reservoirs; migrants use mudflats and sandy shorelines.	The action area does not contain suitable habitat.
Western Yellow-Billed Cuckoo (*Coccyzus americanus*)	SC	Cottonwood forest with dense understory vegetation. Minimum habitat patch size is approximately 4 acres.	No suitable habitat occurs within the action area.
Whooping Crane (*Grus americana*)	SE	Mudflats around reservoirs and agricultural areas. Winters on salt flats.	No suitable habitat occurs within the action area.
Amphibians			
Boreal Toad (*Bufo boreas boreas*)	SE	Springs, streams, ponds, lakes and marshes in spruce-fir or sub-alpine forests or meadows at elevations > 7,000 feet.	The action area does not include spruce-fir or subalpine forests or alpine meadows.
Couch's Spadefoot (*Scaphiopus couchii*)	SC	Burrows in the soils of short-grass prairie habitat.	No short-grass prairies exist in the action area; species' distribution does not include southwestern Colorado.
Great Plains Narrowmouth Toad (*Gastrophryne olivacea*)	SC	Areas with low grasses and forbs in the bottoms of rock-rimmed canyons and slopes with flat rocks.	Suitable habitat does not exist in the action area; species' distribution does not include southwestern Colorado.
Northern Cricket Frog (*Acris crepitans*)	SC	Edges of ponds, reservoirs, and streams, along ditches, in pastures, and sandhill country.	Distribution of this species is limited to northeastern Colorado.
Northern Leopard Frog (*Lithobates pipiens*)	**SC**	**Wet meadows, marshes, ponds, lakes, reservoirs, streams, and ditches.**	**The action area contains suitable habitat along the unnamed tributary to Mill Creek, in roadside ditches along Mill Creek Road, and**

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
			along the margins of stock ponds.
Plains Leopard Frog (*Rana blairi*)	SC	Margins of streams, ponds, reservoirs, creek pools, and irrigation ditches in plains grasslands, sandhills, stream valleys, or canyon bottoms.	Distribution of this species statewide is restricted to eastern Colorado.
Wood Frog (*Rana sylvatica*)	SC	Sub-alpine marshes, bogs, ponds, lakes, stream edges, wet meadows, willow thickets, and surrounding forests.	No sub-alpine habitats occur within the action area.
Reptiles			
Common Garter Snake (*Thamnophis sirtalis*)	SC	Occupies marshes, ponds, and stream edges.	Statewide, this species is restricted to northeastern Colorado (CPW 2018).
Common Kingsnake (*Lampropeltis getula*)	SC	Canyon bottoms with perennial water, irrigated fields, plains grasslands near streams, and short-grass prairies at elevations ranging from 4,600 to 5,200 feet.	The action area is above the elevation range for this species.
Longnose Leopard Lizard (*Gambelia wislizenii*)	SC	Flat or gently sloping shrublands with large percentage of open ground.	Populations in Colorado are restricted to the western border of the state (Schorr et al. 2011).
Massasauga (*Sistrurus catenatus*)	SC	Inhabits dry plains grasslands and sandhills below 5,500 feet.	The action area does not contain suitable habitat and is above the elevation range for the species.
Midget Faded Rattlesnake (*Crotalus viridis concolor*)	SC	Sagebrush desert with rocky outcrops; also, plains grasslands, piñon-juniper, and montane woodlands.	The action area does not contain suitable habitat.
Roundtail Horned Lizard (*Phrynosoma modestum*)	SC	Dry grassland and shrubland habitats on gravelly to rocky soils.	The action area does not contain grassland or shrubland habitats; statewide distribution of this species is restricted to southeastern Colorado.
Texas Blind Snake (*Leptotyphlops dulcis*)	SC	Found on canyon slopes and bottoms in a variety of habitats with damp, loose rocky soil.	The action area does not contain canyon habitat; statewide distribution of this

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
			species is restricted to southeastern Colorado.
Texas Horned Lizard (*Phrynosoma cornutum*)	SC	Plains grasslands and in areas with a high percentage of bare ground.	The action area does not contain suitable habitat; statewide distribution of this species is restricted to southeastern Colorado.
Triploid Checkered Whiptail (*Aspidoscelis neotesselata*)	SC	Hillsides, arroyos, canyons, canyon-grassland transition zones, roadsides, and juniper savanna; endemic to southeastern Colorado below 7,000 feet.	The action area is above elevation range for the species; statewide distribution of this species is restricted to southeastern Colorado.
Yellow Mud Turtle (*Kinosternon flavescens*)	SC	Streams, ponds, ditches, flooded fields, and surrounding grasslands and sandhills.	This species is only known to occur in eastern Colorado.
Fishes			
Arkansas Darter (*Etheostoma pallididorsum*)	ST	Clear waters of low current with sandy bottoms and abundant aquatic vegetation.	No suitable habitat occurs within the action area.
Bonytail Chub (*Gila elegans*)	SE	Flowing pools and backwaters in deep water of the Upper Colorado River basin.	No suitable habitat occurs within the action area.
Brassy Minnow (*Hybognathus hankinsoni*)	ST	Inhabits pools of sluggish clear creeks and small rivers, usually over sand or gravel.	No suitable habitat occurs within the action area.
Colorado Pikeminnow (*Ptychocheilus lucius*)	ST	Large rivers with strong currents, deep pools, eddies, and quiet backwaters.	No suitable habitat occurs within the action area.
Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*)	SC	Gravel-bottomed creeks, lakes, and small rivers, primarily of the upper Colorado River watershed.	No suitable habitat occurs within the action area.
Colorado Roundtail Chub (*Gila robusta*)	SC	Found in slow moving water of large rivers, adjacent to faster moving water.	No suitable habitat occurs within the action area.
Common Shiner (*Luxilus cornutus*)	ST	Cool, clear, shaded streams with gravelly bottoms.	No suitable habitat occurs within the action area.

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
Flathead Chub (*Platygobio gracilus*)	SC	Inhabits sandy runs of small to large turbid rivers.	No suitable habitat occurs within the action area.
Greenback Cutthroat Trout (*Oncorhynchus clarki stomias*)	ST	Cold, clear, oxygenated streams with overhanging branches, undercut banks, and eddies behind rubble.	No suitable habitat occurs within the action area.
Humpback chub (*Gila cypha*)	ST	Flowing pools and swift, turbid, rocky runs of the Upper Colorado River basin.	No suitable habitat occurs within the action area.
Iowa Darter (*Etheostoma exile*)	SC	Found in vegetated lakes and pools of headwaters, creeks, and small rivers.	No suitable habitat occurs within the action area.
Lake Chub (*Couesius plumbeus*)	SE	Occupies lake habitats, but migrates to streams to spawn.	No suitable habitat occurs within the action area.
Mountain Sucker (*Catostomus platyrhynchus*)	SC	Small rivers and streams with gravel, sand, and mud bottoms.	No suitable habitat occurs within the action area.
Northern Redbelly Dace (*Phoxinus eos*)	SE	Found in lakes, ponds, bogs, and pools of headwaters and creeks with vegetation.	No suitable habitat occurs within the action area.
Plains Minnow (*Hybognathus placitus*)	SE	Rivers with some current, turbid waters, and sandy bottoms.	No suitable habitat occurs within the action area.
Plains Orangethroat Darter (*Etheostoma spectabile*)	SC	Streams with shallow riffles or runs over sandy or gravelly substrate.	No suitable habitat occurs within the action area.
Razorback Sucker (*Xyrauchen texanus*)	SE	Rivers with strong, steady currents over sandy bottoms.	No suitable habitat occurs within the action area.
Rio Grande Chub (*Gila pandora*)	SC	Pools of small to moderate streams. Associated with undercut banks, overhanging and aquatic vegetation.	No suitable habitat occurs within the action area.
Rio Grande Cutthroat Trout (*Oncorhynchus clarki virginalis*)	SC	Found in gravel-bottomed creeks, lakes, and small rivers, primarily in the upper Rio Grande River watershed.	No suitable habitat occurs within the action area.

Species[1]	Status[2]	Habitat Description	Potential to Occur in the Action Area
Rio Grande Sucker (*Catostomus plebeius*)	SE	Small streams with clear pools and riffles.	No suitable habitat occurs within the action area.
Southern Redbelly Dace (*Phoxinus erythrogaster*)	SE	Small, slow, clear creeks with algae covering the streambed and deep silt deposits.	No suitable habitat occurs within the action area.
Stonecat (*Noturus flavus*)	SC	Found in rubble and boulder riffles of fast moving creeks and rivers.	No suitable habitat occurs within the action area.
Suckermouth Minnow (*Phenacobius mirabilis*)	SE	Riffles of warm creek, streams, and rivers with low to moderate currents.	No suitable habitat occurs within the action area.
Mollusks			
Cylindrical Papershell (*Anodontoides ferussacianus*)	SC	Muddy or sandy substrate of lakes and quiet streams.	No suitable habitat occurs within the action area.
Rocky Mountain Capshell (*Acroloxus coloradensis*)	SC	Found in cold clear glacial lakes.	No suitable habitat occurs within the action area.

[1] Species in bold have the potential to occur within the Project and/or action area.

[2] Status Codes: FE=Federally Endangered
FT= Federally Threatened
SE= State Endangered
ST= State Threatened
SC= State Special Concern (not a statutory category)

7.1.1.1 Botta's Pocket Gopher

Botta's pocket gophers prefer the sandy soils of valley bottom riparian areas. The species has also been known to use many other habitats; however, areas with soils that are high in clay or contain extremely coarse substrates are apparently avoided (Fitzgerald et al. 1994). Botta's pocket gophers have been recorded in a variety of vegetation types, including agricultural land, grasslands, roadsides, open parklands, piñon-juniper woodlands, open montane forest, montane shrublands, and semi-desert shrublands. Individuals do not hibernate and can be active any time of day or night. The action area includes roadsides and agricultural land; however, no burrows were observed during field surveys. The species has not been recorded in Archuleta County and the population is considered secure in Colorado (NatureServe 2017a). No sign of pocket gophers or

suitable burrows were observed in the Project or action area. Given the level of human activity and traffic within the Project and action areas, and the range of the species, it is unlikely that Botta's pocket gopher would inhabit the area on a regular basis. The Proposed Action is not expected to impact Botta's pocket gopher.

7.1.1.2 Northern Leopard Frog

Northern leopard frog breeding habitat generally includes the shallow edges of ponds (natural or man-made), as well as creeks, streams, or rivers with still or very slow-moving water (Smith and Keinath 2007). Summer range includes the upland areas around the breeding ponds, especially grasslands, wet meadows, and wetlands that may be important for connecting areas of breeding habitat. Over-winter sites generally include the bottom of lakes, streams, and ponds that are large enough not to freeze over completely in the winter. Northern leopard frogs do occur in Archuleta County, and the population is considered vulnerable in Colorado (NatureServe 2017b). There are suitable wetlands and shallow ponds within the action area; however, it is unlikely that northern leopard frogs would utilize the project area based on the proximity to active roadways. Disturbance in the project area is not expected to impact the species.

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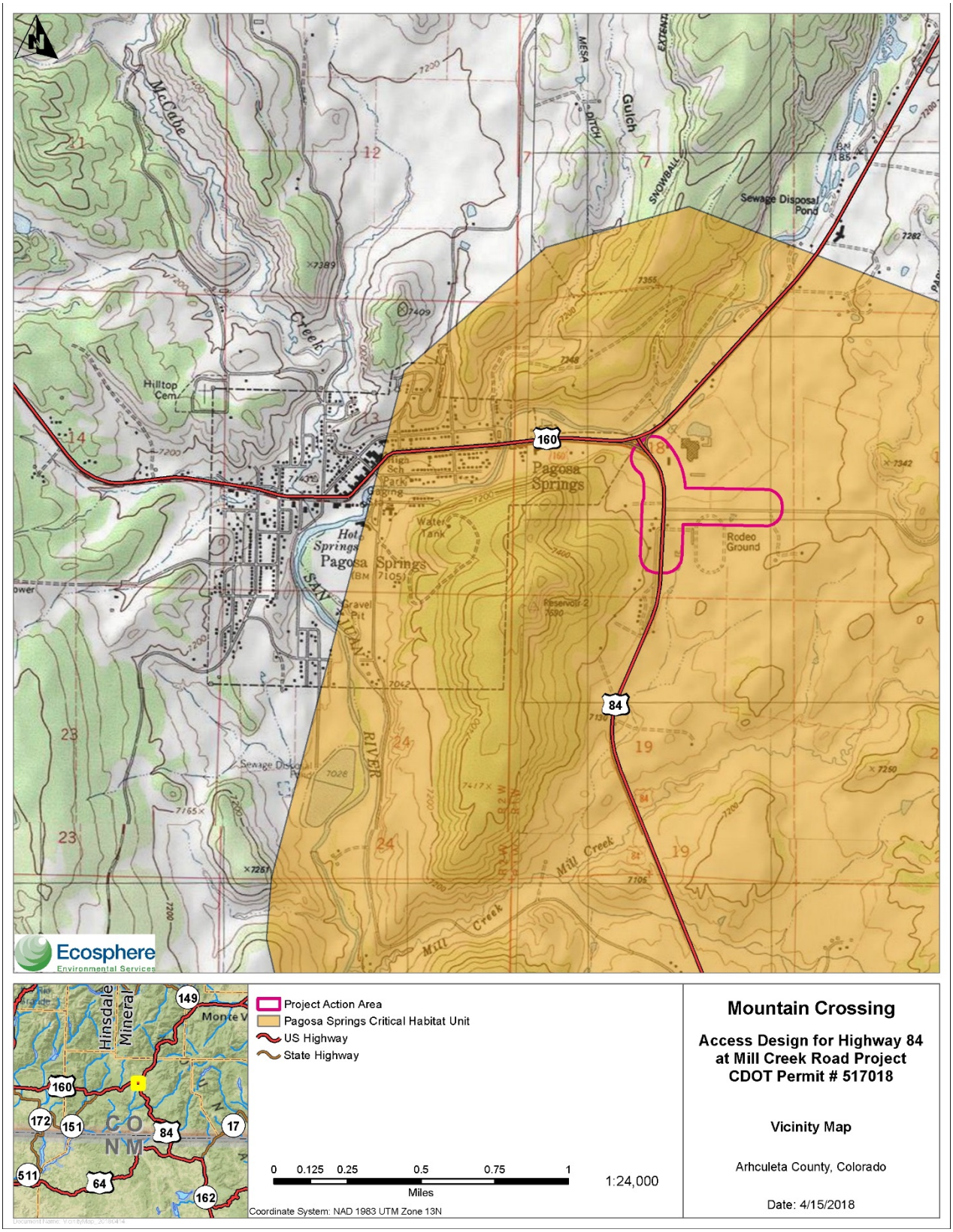
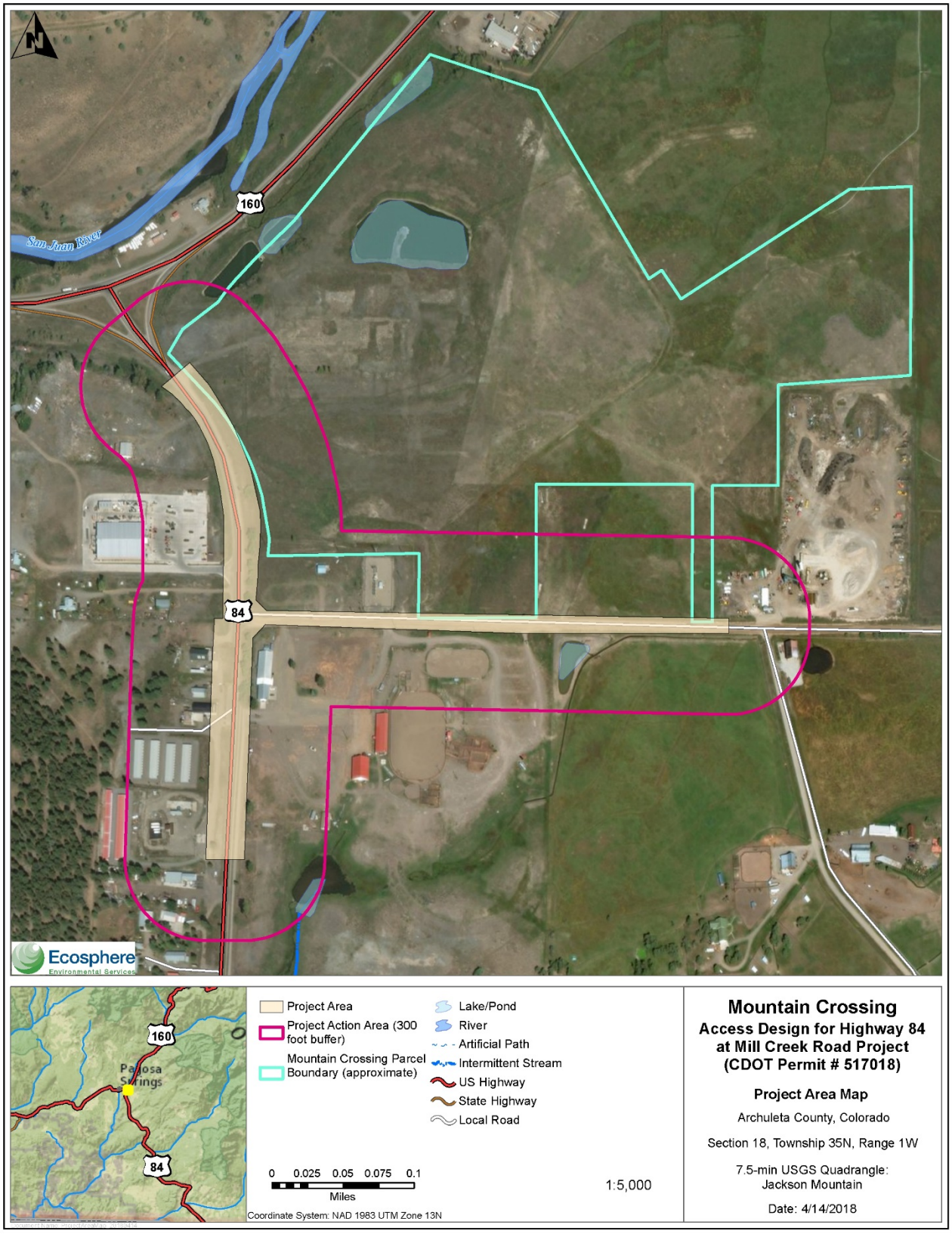
Alison Rohwer	Biologist	▪ Field Biologist ▪ Biological Assessment Preparation
Karin Freeman	Environmental Planner	▪ Field Biologist ▪ Project Support
Henry Colomb	GIS	▪ GIS Support ▪ Mapping
Cindy Lancaster	Senior Technical Editor	▪ Document Formatting ▪ Editing

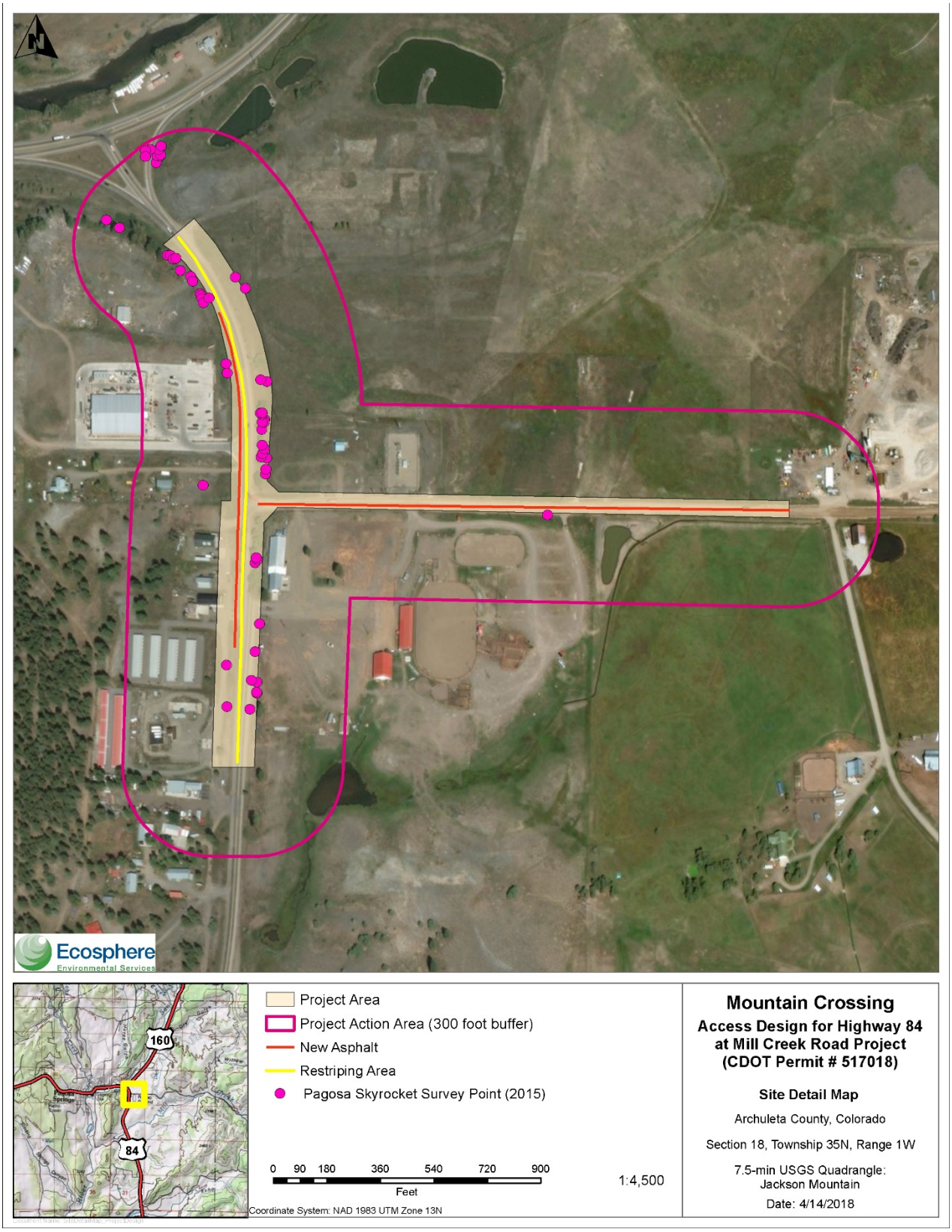
Appendix A – Project Area Maps



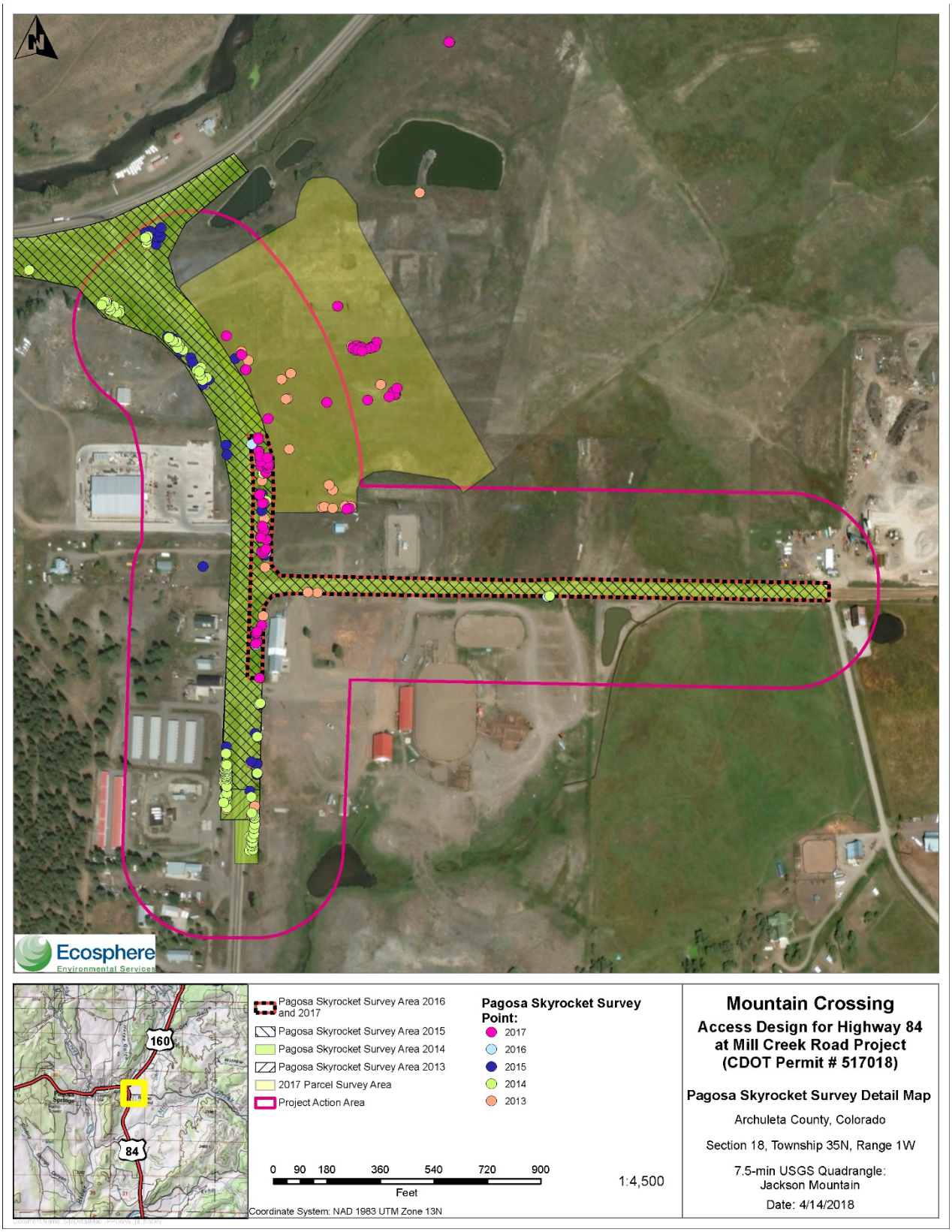
Map A-1. Project Vicinity and Critical Habitat



Map A-2. Project Area Map



Map A-3. Site Detail Map



Map A-4. Pagosa Skyrocket Survey Detail Map

Appendix B – Pagosa Skyrocket Survey Reports: 2013-2017

April 2018

Pagosa Skyrocket Survey Report

2013 – 2017 Survey Results: Highway 84 and Mill Creek Road

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Abbreviations and Acronyms

CHU	Critical Habitat Unit
Ecosphere	Ecosphere Environmental Services, Inc.
Hwy	Highway
NRCS	Natural Resources Conservation Service
ROW	right-of-way
USFWS	U.S. Fish and Wildlife Service

1. Introduction

This survey report presents the results of Pagosa skyrocket (*Ipomopsis polyantha*) surveys conducted by Ecosphere Environmental Services, Inc. (Ecosphere) annually between 2013 and 2017 within the Colorado Department of Transportation and Town of Pagosa Springs right-of-way (ROW) along U.S. Highway (Hwy) 84 and Mill Creek Road near the Mountain Crossing parcel. The Mountain Crossing parcel is located on the southeast side of the intersection of Hwy 160 and Hwy 84 in Pagosa Springs, Colorado (Figure 1, Appendix A). The legal description for the survey area is Township 35 North, Range 1 West, Section 18, New Mexico Principal Meridian.

2. Species Background and Listing Information

The Pagosa skyrocket is a rare plant of the *Polemoniaceae* (phlox) family endemic to shale outcrops in and around Pagosa Springs in Archuleta County, Colorado. On July 27, 2011, the U.S. Fish and Wildlife Service (USFWS) designated the Pagosa skyrocket as endangered throughout its entire range (USFWS 2011). The final rule that listed Pagosa skyrocket as endangered became effective on August 26, 2011 (USFWS 2011). Identified threats to the species included residential and commercial development, highway maintenance, and livestock grazing.

The range of the Pagosa skyrocket is restricted to Archuleta County, Colorado. Pagosa skyrocket is only found on shale barrens in two populations between 6,750 to 7,775 feet and in and near the town of Pagosa Springs. Habitat is characterized as barren, dark gray Mancos Shale outcrops or Mancos Shale-derived soils in open montane grasslands and within the grassland understory at the edges of open ponderosa pine (*Pinus ponderosa*), juniper (*Juniperus* spp.), and scrub oak *(Quercus gambelii)* forests. The species occurs on extremely dry and erosive shale soils, conditions that are harsh and difficult for most other plant species to survive. Pagosa skyrocket has also shown a tolerance or affinity for short-term, periodic soil disturbance. Plants may be found adjacent to roads or developed areas, such as along roadside ditches or utility lines, where periodic grading or disturbance of the soil occurs (USFWS 2011).

Pagosa skyrocket is an herbaceous biennial species, producing a basal rosette of leaves in its first year and a flowering stem in a subsequent year. Rosettes may persist for several years until conditions are right for flowering. Pagosa skyrocket is considered a ruderal species, which means that it is one of the first plant species to colonize disturbed lands. Seeds are not thought to disperse far and plants are able to colonize nearby disturbed areas quickly. The species is found in light to moderately disturbed areas such as rills (small, narrow, shallow incisions in topsoil layers caused by erosion by overland flow or surface runoffs), areas that are only occasionally disturbed, or areas with previous disturbances that have been colonized and not subsequently disturbed (USFWS 2012).

At the time of the Pagosa skyrocket's Endangered Species Act listing, it was estimated that 2.5 percent of occupied habitat is on Bureau of Land Management land, 9.1 percent on state highway and county road ROWs, 1.9 percent on Town of Pagosa Springs parkland and county-owned land, and 86.4 percent on privately owned lands (USFWS 2011).

The USFWS designated Critical Habitat for Pagosa skyrocket in August of 2012 (USFWS 2012). A total of approximately 9,641 acres is designated as Critical Habitat across four geographic areas. The Pagosa Springs and Dyke Critical Habitat Units (CHUs) are located surrounding known populations. The Eight Mile Mesa and O'Neal Hill CHUs are located on federal lands intersecting with Mancos Shale habitat, but occur outside the known range of the species (USFWS 2012). The Mountain Crossing Parcel and associated survey area is contained entirely within the Pagosa Springs CHU (Figure 1, Appendix A).

3. Methodology

Prior to conducting fieldwork, existing resource information was reviewed to identify potential habitat for Pagosa skyrocket within the ROWs. Geologic information was acquired from the U.S. Geological Survey (USGS 2008). Surface soil maps and descriptions were obtained from the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2013). Vegetation analysis was completed during field surveys.

Pedestrian surveys for Pagosa skyrocket have been completed annually from 2013 – 2017 by Ecosphere biologists as shown in Table 3-1 (below) and on Figure 7 (Appendix A). Surveys were completed each year during the blooming season, when the plants are most visible. The initial survey area included approximately 2,000 feet of the ROW on both the east and west sides of Hwy 84 and approximately 1,900 feet of the ROW on the north and south sides of Mill Creek Road.

Table 3-1. Annual Survey Effort Details

Survey Year	Survey Biologists	Survey Dates	Length of ROW surveyed (feet)	Approximate Survey Area (acres)
2013	K. Freeman, A. Rohwer, S. Friedley	June 17, 21, 26	Hwy 84: 2,150 Mill Creek Road: 1,900	12.1
2014	K. Freeman, A. Rohwer, S. Roberts, E. Thorne	July 8, 9, 11	Hwy 84:2,150 west side / 2,300 east side Mill Creek Road: 1,900	12.4
2015	K. Freeman, S. Friedley, A. Way, D. Kesonie	June 22, 24, 26	Hwy 84:2,000 Mill Creek Road: 1,900	12.1
2016	A. Rohwer, S. Friedley	June 21	Hwy 84: 800 (east side only) Mill Creek Road: 1,900	3.6
2017	A. Rohwer, K. Freeman	June 21	Hwy 84: 800 (east side only) Mill Creek Road: 1,900	3.6

In 2013, 2014, and 2015, surveys along Hwy 84 began at the intersection with Hwy 160 and continued south to approximately 750 feet past the intersection with Mill Creek Road. Due to GPS errors, the 2014 survey area extended an additional 160 feet south on the east side of Hwy 84, to approximately 900 feet south of the intersection with Mill Creek Road. For the 2015 surveys, biologists mapped the south end of the survey area at 650 feet south of the intersection of Hwy 84 and Mill Creek Road, and loaded the information onto the GPS unit prior to field work. In 2016 and 2017, the survey area along Hwy 84 was reduced to reflect changes in the project design (Figure 7, Appendix A). Surveys along Mill Creek Road have consistently commenced at the intersection with Hwy 84 and continued east to the intersection with Tierra del Oro Road. The survey area included all areas within the ROWs where suitable habitat for Pagosa skyrocket occurs. Surveys were conducted

by biologists walking parallel lines with 100 percent visual coverage across the survey area. In areas where the ROW was not clearly marked, biologists used best judgment to determine ROW boundary.

3.1 Survey Results

The following sections provide information about land use, topography, soils and geology, vegetation, and habitat and occurrence of Pagosa skyrocket in the survey area. The information below was obtained from a combination of field survey, literature review, and available Geographic Information Systems data. Survey area maps and photographs are provided in Appendix A.

3.2 Existing Land Use

The survey area includes the Hwy 84 ROW and the Mill Creek Road ROW (defined by fencelines paralleling the travel surface). Highway 84 is a two-lane paved highway running generally north to south in the survey area. Its ROW width varies along its length from approximately 100 to 175 feet, with the exception of the triangular ROW area at the intersection with US Hwy 160 and US Hwy 84, which is substantially wider to incorporate two merging lanes. Mill Creek Road is a gravel-surface County Road (CR 302) running generally east to west in the survey area, and generally centered within an approximately 60-foot wide ROW. Both roads receive year-round use by passenger vehicles and heavy trucks and include both underground and overhead utility lines. Surrounding land use is dominated by low-density residential development, commercial development, industrial use, and agriculture/livestock.

3.3 Topography

The parcel is located on the Jackson Mountain 7.5' U.S. Geological Survey topographic quadrangle map. Topography within the survey area is heavily disturbed and consists mainly of road shoulder, roadside ditch, raised driveways, and intersections. Slopes were visually estimated at 5 to 25 percent and elevations in the survey area range from approximately 7,100 to 7,200 feet above sea level.

3.4 Geology and Soils

Surface geology in the survey area includes the Mancos Shale Formation, which inter-tongues complexly with units of overlying Mesaverde Group or Formation; the substrate includes shale-dominated formations of all ages (USGS 2008).

According to the NRCS, the survey area contains four mapped soil types (USDA NRCS 2013). Table 3-2 lists these soil types and includes a brief description of the soil properties.

Table 3-2. Soil units mapped in the survey area

Map Unit Name (Map Unit Symbol)	Parent Materials	Landform	Hydric?
Abeyta-Carracas Complex, 30 to 60 percent slopes (C0-F)	Slope alluvium derived from sandstone and shale	Hills	Not Hydric
Carracas Clay Loam, cool, 3 to 35 percent slopes (C0-V)	Slope alluvium derived from shale	Hills	Not Hydric
Herm Clay Loam, 3 to 12 percent slopes (C2-CD)	Slope alluvium derived from shale	Hills	Not hydric
Tefton Loam, 1 to 3 percent slopes (12)	Mixed alluvium	Floodplain steppes	Yes

3.5 Vegetation

The majority of the survey area consists of pasture grasses and disturbed herbaceous vegetation. Herbaceous cover within the survey area is dominated by smooth brome (*Bromus inermis*), western wheatgrass (*Pascopyrum smithii*), alfalfa (*Medicago sativa*), and field bindweed (*Convolvulus arvensis*), which is a Colorado-listed noxious weed. Patches of Canada thistle (*Cirsium arvense*) and musk thistle *(Carduus nutans),* also Colorado-listed noxious weeds, occur within the survey area. Several Siberian elms (*Ulmus pumila*) occur scattered along the Hwy 84 ROW near the intersection with Mill Creek Road, generally on the east side of Hwy 84. The Mill Creek Road ROW is somewhat less vegetated than the Hwy 84 ROW, though the species composition is similar. The reduction in vegetative cover is likely due to the gravel shoulders of the road and the narrower ROW.

3.6 Pagosa Skyrocket

The entire survey area is located within the Pagosa Springs CHU. Potential habitat (Mancos shale geology and Mancos shale-derived soils) is mapped throughout the survey area; areas of suitable habitat were observed throughout the ROWs. Table 3-3 (below) shows the number of Pagosa skyrocket rosettes and adults observed during the surveys.

3.6.1 Survey Results – 2013

During the 2013 survey effort, approximately 768 Pagosa skyrocket plants were observed within the survey area, including 394 flowering plants (adults) and 374 rosettes. Plants were scattered throughout the survey area, as shown on Figure 2 (Appendix A). The majority of plants were observed within the Hwy 84 ROW (391 adults and 373 rosettes); the Mill Creek Road ROW contained only a few individuals (3 adults and 1 rosette). A relatively dense patch of plants was observed along the west side of the Hwy 84 ROW near the Mountain View Storage driveway (399 US Hwy 84). This patch accounted for a large portion of the total plants observed—165 adults (42 percent of total adults observed) and 242 rosettes (65 percent of total rosettes observed). Based on Archuleta County parcel data, a small cluster of plants (6 adults and 3 rosettes) included in the ROW count appears to occur on private property; these plants are located on a steep shale slope on the west side of Hwy 84 near the intersection with Hwy 160.

3.6.2 Survey Results – 2014

During the 2014 survey effort, approximately 1,822 Pagosa skyrocket plants were observed within the survey area, including 501 flowering plants (adults) and 1,321 rosettes. Plants were scattered throughout the survey area similarly to the 2013 plant locations, as shown on Figure 3 (Appendix A). There was an overall increase in the number of plants observed in the survey area; however, some of the increase (55 adults and 135 rosettes) can be attributed to the additional survey area that was completed in 2014 along the eastern ROW of Hwy 84.

As in 2013, the majority of plants were observed along Hwy 84 (496 adults and 1,320 rosettes). There was a reduction in the number of occurrences on Mill Creek Road (one occurrence in 2014 vs. 3 occurrences in 2013); however, the number of plants was relatively similar (5 adults and 1 rosette). The dense patch of plants on the west side of Hwy 84 near Mountain View Storage was again observed, with approximately 210 adults (42 percent of total adults observed) and 280 rosettes (21 percent of total rosettes observed). As a note, portions of the highway ROW were apparently mowed in late June or early July 2014, just before surveys were completed. The mowing may have affected the ability to detect adults and rosettes. Adult plants may have been inadvertently excluded from the count due to the removal of the plant stalk and flowers. In addition, rosettes may have been more visible than in previous surveys due to the removal of tall grasses and herbaceous overstory.

3.6.3 Survey Results – 2015

During the 2015 survey effort, approximately 1,835 Pagosa skyrocket plants were observed within the survey area, including 795 flowering plants (adults) and 1,040 rosettes. Plants were observed scattered throughout the survey area similar to previous years, as shown on Figure 4 (Appendix A). There was an overall increase in the total number of plants observed in the survey area.

Similar to previous years, the majority of plants were observed along Hwy 84 (794 adults and 1,032 rosettes). As in 2014, there was one small cluster of plants observed on Mill Creek Road (1 adult and 8 rosettes). The dense patch of plants on the west side of Hwy 84 near Mountain View Storage was again observed, and comprised the majority of plants found during the survey. There were approximately 578 adults (72 percent of total adults observed) and 702 rosettes (68 percent of total rosettes observed) in this patch.

3.6.4 Survey Results – 2016

Approximately 202 Pagosa skyrocket plants were observed within the 2016 survey area, including 79 flowering plants (adults) and 123 rosettes. Plants were observed scattered throughout the survey area similar to previous years, as shown on Figure 5 (Appendix A). In order to reflect changes in project design, the 2016 survey area was reduced from approximately 12.1 acres to approximately 3.6 acres (Figure 7, Appendix A).

Similar to previous years, the majority of plants were observed along Hwy 84 (118 adults and 74 rosettes). As in previous years, there was one small cluster of 10 plants observed on Mill Creek Road (5 adults and 5 rosettes). Because the dense patch of plants on the west side of Hwy 84 near Mountain View Storage fell outside of the 2016 Survey Area, those plants were not included in the 2016 survey effort. However, casual observation indicated that the patch was still densely populated.

3.6.5 Survey Results – 2017

Approximately 321 Pagosa skyrocket plants were observed within the 2017 survey area, including 133 flowering plants (adults) and 188 rosettes. Plants were observed scattered throughout the survey area similar to previous years, as shown on Figure 6 (Appendix A). The 2017 surveys were completed across the same area that was surveyed in 2016, covering approximately 3.6 acres (Figure 7, Appendix A).

Similar to previous surveys, the majority of plants were observed along Hwy 84 (130 adults and 188 rosettes). As in previous years, a small cluster of plants was observed on Mill Creek Road. The Mill Creek Road occurrence was limited to 3 adults; no rosettes were observed. Casual observation of the western side of the Highway 84 ROW indicated that the area is still occupied by Pagosa skyrocket; however, the western side of the Highway 84 ROW was not surveyed in 2017.

Table 3-3. Pagosa Skyrocket plants observed in the survey area from 2013 – 2017

Survey Year	Survey Area	Rosettes	Adults	Total
2013	Initial (2013) Survey Area	374	394	768
2014	Initial (2013) Survey Area	1,186	446	1,632
	Additional Survey Area	135	55	190
	Initial + Additional Survey Area (Total)	1,321	501	1,822
2015	2015 Survey Area	1,040	795	1,835
2016	2016 Survey Area* (reduced)	123	79	202
2017	2016 Survey Area	188	133	321

*Survey area was reduced from 12.1 to 3.6 acres to reflect design changes

4. Literature Cited

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USFWS. 2012. Federal Register Vol. 77, No. 156. Final Rule: Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Ipomopsis polyantha* (Pagosa Skyrocket), *Penstemon debilis* (Parachute Beardtongue), and *Phacelia submutica* (DeBeque Phacelia). August 13, 2012.

U.S. Geological Survey (USGS) Gap Analysis Program. 2008. 1:500,000 Scale Geology for the Southwestern U.S. [Computer file]. Logan, Utah, USA: RS/GIS Laboratory, College of Natural Resources, Utah State University.

Appendix A – Maps and Photographs

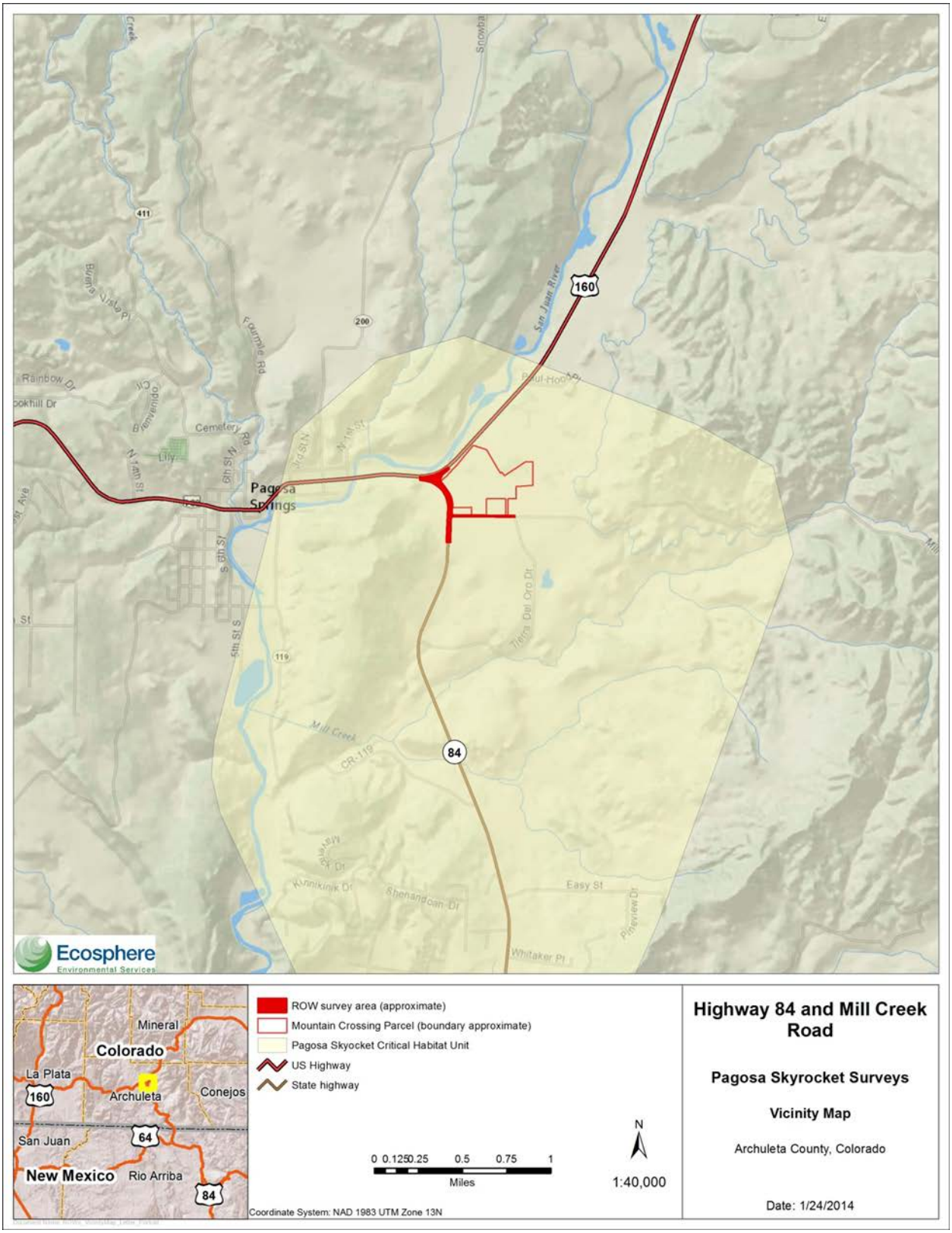

Figure 1. Survey Area with Pagosa Springs Critical Habitat Unit

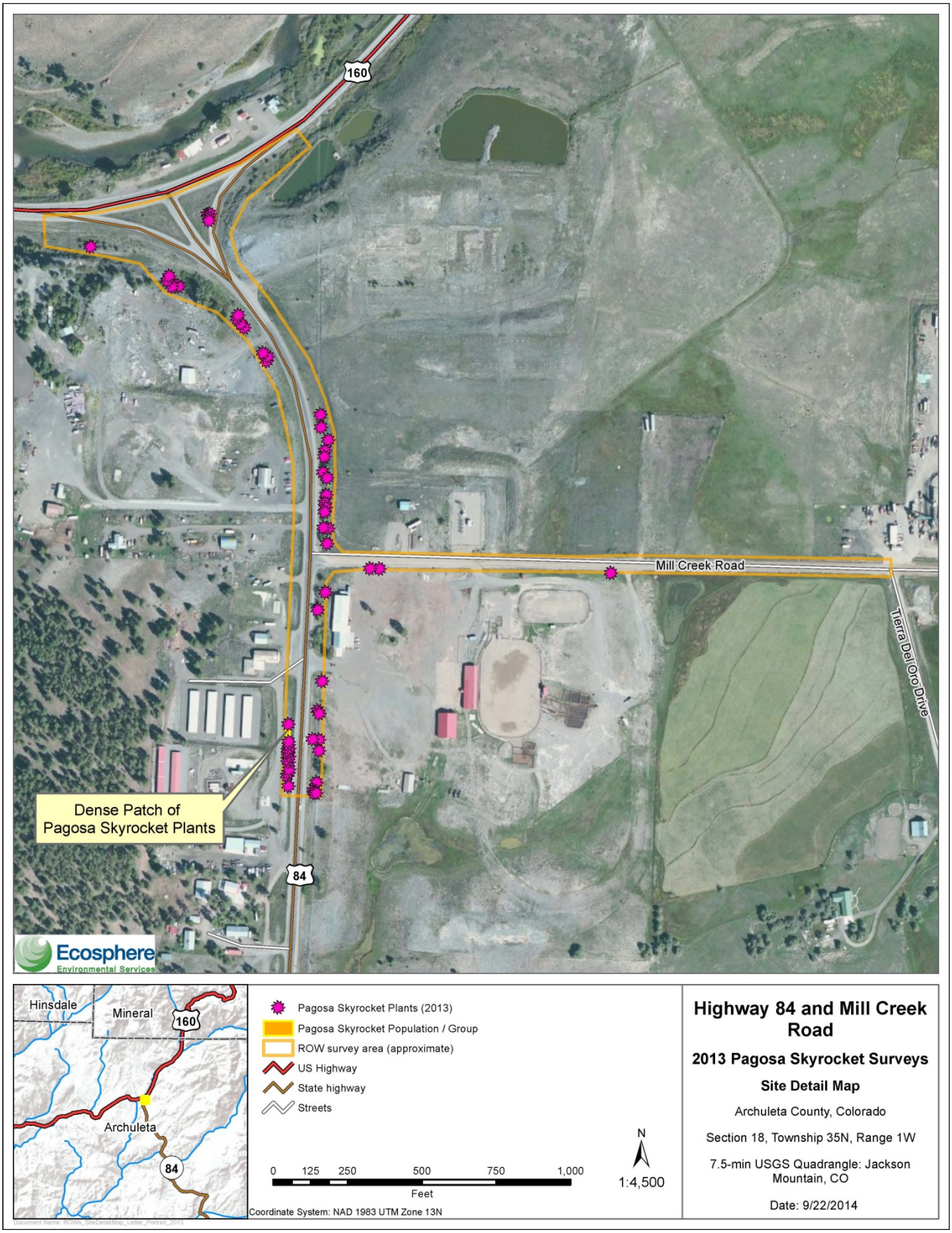

Figure 2. 2013 Survey Results – Pagosa Skyrocket Plants within the Survey Area

Figure 3. 2014 Survey Results – Pagosa Skyrocket Plants within the Survey Area

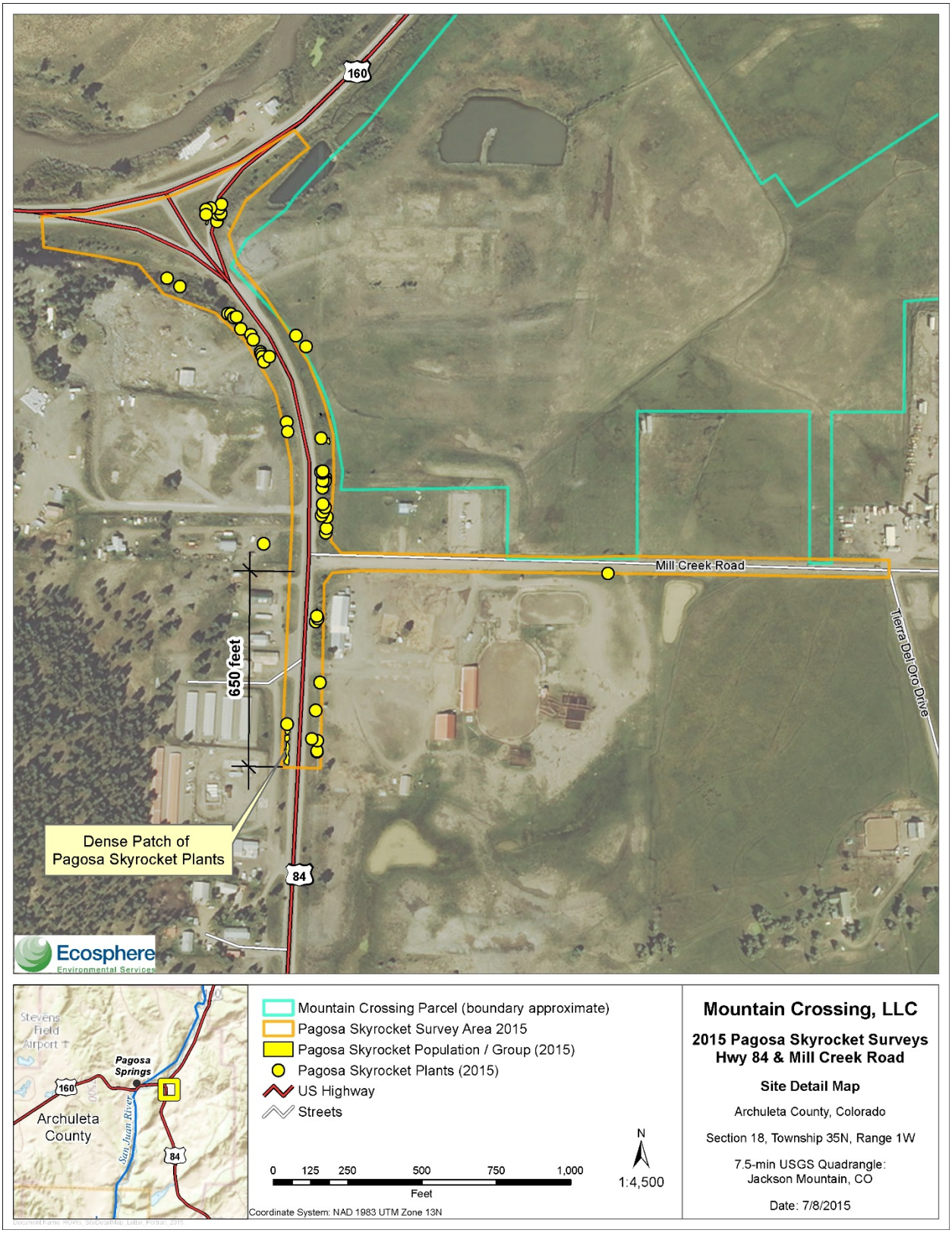

Figure 4. 2015 Survey Results – Pagosa Skyrocket Plants within the Survey Area

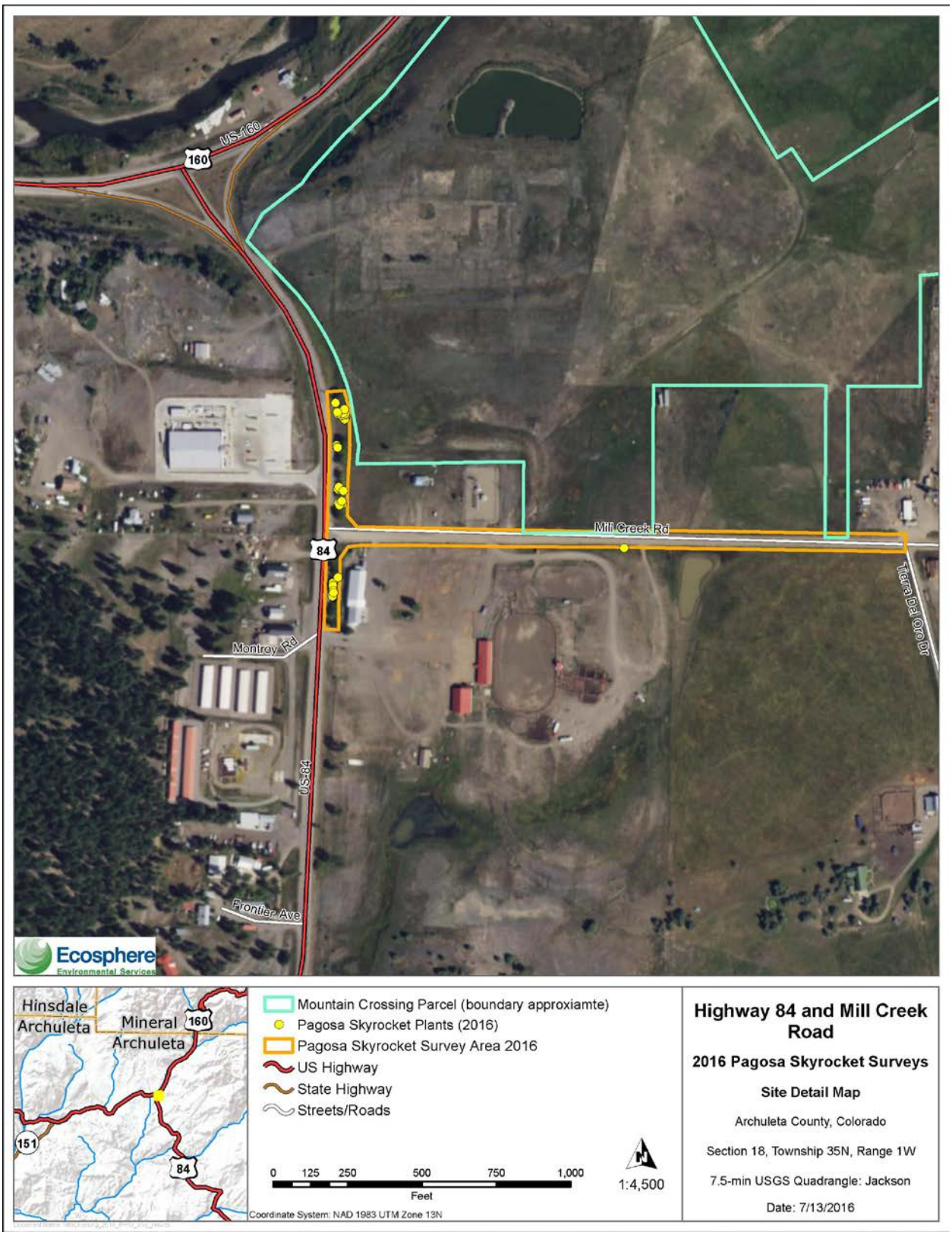

Figure 5. 2016 Survey Results – Pagosa Skyrocket Plants within the Survey Area

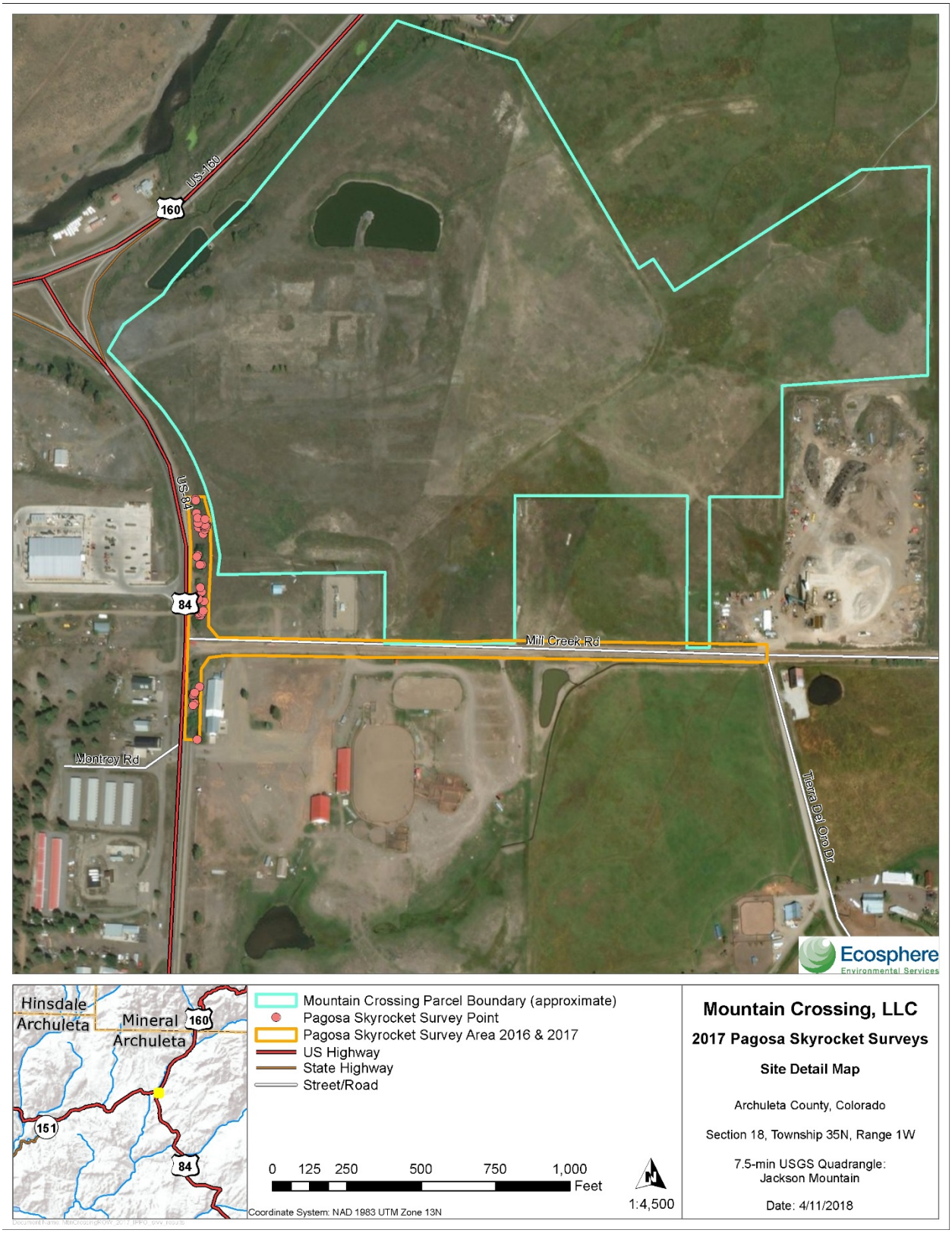

Figure 6. 2017 Survey Results – Pagosa Skyrocket Plants within the Survey Area

Figure 7. Pagosa Skyrocket Survey Area Boundaries, 2013 – 2017

Photo 1. Portion of Highway 84 survey area looking north from in front of Mountain View Mini Storage (2015)

Photo 2. Portion of Mill Creek Road survey area looking east from near the intersection with Highway 84 (2015)

Photo 3. Dense vegetation and tall grass observed during 2015 surveys; Pagosa skyrocket individuals are marked with blue flags

Photo 4. Pagosa skyrocket individuals growing in the shade of Siberian elm trees on the east side of Highway 84 during 2015 surveys

Photo 5. Dense grasses observed on the east side of Highway 84 during 2015 surveys. Pagosa skyrocket individuals are marked with blue flags

Photo 6. Exceptionally tall Pagosa skyrocket observed in 2015 competing with smooth brome in dense skyrocket patch at southwest end of Hwy 84 survey area

Appendix C – *Ipomopsis polyantha* (Pagosa skyrocket, also known as Pagosa gilia) Guidelines for CDOT Activities in Occupied Habitat

Ipomopsis polyantha (Pagosa skyrocket, also known as Pagosa gilia) Guidelines for CDOT Activities in Occupied Habitat

The Pagosa skyrocket (skyrocket) is a rare native plant found only in Archuleta County, Colorado, in and around the Town of Pagosa Springs. Adult plants flower from May through July and start producing seeds in July and August. In the fall the adult plants die. Seeds grow into low rosettes that will bloom during the following spring, or remain as seeds or rosettes until there is enough moisture. Plants grow on fine textured soils derived from outcrops of Mancos Shale. They can be found on barren shale or in ponderosa pine (*Pinus ponderosa*), piñon pine (*Pinus edulis*), juniper (*Juniperus spp.*) or Gambel oak (*Quercus gambelii*) communities at an elevation range of 6,800-7,300 feet (Spackman et. al 1997; Anderson 2004). The U.S. Fish and Wildlife Service (USFWS) added the Pagosa skyrocket to the List of Endangered and Threatened Wildlife in 50 CFR I 7.12(h) as an endangered species on July 27, 2011 (76 FR 45054). Critical habitat was designated on September 12, 2012 (77 FR 48368).

The skyrocket is one of the few special status species in Colorado that seem to show a penchant for the Colorado Department of Transportation's (CDOT) right-of-way (ROW) making it particularly vulnerable to CDOT activities. The roadside is often less disturbed than adjacent private lands where grazing, landscaping, and building destroy plants and seed banks. In order to be responsive to the need to protect these plants, and in keeping with CDOT's Environmental Stewardship Guide, CDOT is recommending the following guidelines be implemented when activities in the ROW have the potential to adversely affect the plant or its habitat.

1. CDOT environmental staff will be notified as early in the planning stage as possible but no less than 90 days before projects begin. The USFWS and the Colorado Natural Heritage Program, as well as the Bureau of Land Management and the U.S. Forest Service when applicable, will be notified as soon as possible before projects begin so that they can work with the environmental staff to develop a plan for avoidance, minimization, recovery, and restoration actions needed at specific sites, and to allow for transplanting of plants and rosettes that cannot be avoided.
2. Disturbance of occupied or suitable habitat for the skyrocket will be avoided or minimized as much as possible. Surface disturbance will be avoided to the greatest extent possible from May 1 to September 1 to minimize damage to mature, reproductive plants. Prior to any unavoidable ground disturbance, all plants including rosettes will be marked with a pin flag by a qualified biologist. Where practical the biologist will document the population by counting adult and rosette plants, recording OPS coordinates for the area occupied, and taking photographs. The boundary of plant habitat will be clearly marked with orange construction fence. A biologist will be present on the site when ground work commences to ensure that avoidance guidelines are followed. If project plans change, the biologist will be notified and a new survey will be conducted.
3. If soil in the ROW is to be disturbed or removed as part of CDOT activities, six inches or less, three inches if possible, of topsoil will be stockpiled in non-habitat areas and replaced after construction to preserve the seed bank.
4. Unavoidable rosettes and plants will either be transplanted or mitigated through property acquisition according to draft guidelines for threatened and endangered plant mitigation developed by the USFWS.

Transplantation sites would be monitored for a period of three years to document success of transplantation efforts. Annual monitoring reports would be prepared which assess the success of the transplantation efforts including the viability of transplanted individuals, evidence of successful germination and propagation of transplanted individuals, observable genetic effects to transplanted plants resulting from movements on the landscape, and the effectiveness of transplanting techniques. In addition to an evaluation of transplanting efforts, monitoring should confirm or provide measures to maintain the primary constituent elements of Pagosa skyrocket habitat within the transplantation site. Mitigation is preferable to transplanting and would be accomplished through the acquisition of land or permanent conservation easements on private or State lands. Impacts to habitat and individuals would be compensated at a 3:1 ratio minimum based on the acreage of impacted occupied habitat resulting from proposed activities. Mitigation sites would exhibit the primary constituent elements of Pagosa skyrocket habitat and would be located as near existing occupied habitat as feasible to promote cross pollination. When possible, mitigation sites should be contiguous as well as non-linear to better protect habitat and pollinators. A management plan for easements and properties should also be developed in order to better protect the species.

5. Underground borings are encouraged when possible.
6. All equipment will be kept on the paved roadway as Jong as possible.
7. Equipment staging will occur on previously existing parking surfaces or other non-habitat as determined by a qualified biologist.
8. The number of access points to a construction site will be limited to one road into the site and one road out of the site. This road should be located in an area where it will cause the least impact to the Pagosa skyrocket.
9. Whenever possible, geotextile material covered with a straw marker and several inches of fill will be placed where equipment will be driving in order to protect the topsoil and root structures during construction. When construction is complete, the geotextile, straw, and fill will be removed, allowing for quick re-growth.
10. Reseeding of disturbed areas will be allowed using, scarlet globemallow (Sphaeralcea coccinea), Crandall's penstemon (Penstemon cespitosus), native blue flax (Adenolinum lewisii), and Arizona fescue (Festuca arizonica), or other appropriate native seed mix as specified by a CDOT Landscape Architect in consultation with a qualified biologist.
11. No herbicide will be used on US Highway l60 (US 160) between mile markers 130 and 133, and between 143 and 145.5; or on Colorado State Highway 84 (SH 84) between mile markers 18.5 and 19.0, 19.5 and 20.5, 21.0 and 21.5, and between 23.5 and 28.0.
12. No mowing will be allowed from May 1 through September l on US 160 between mile markers 127 and 150 or on SH 84 between mile markers 18 and 28.

Although the intent of these guidelines is to avoid or minimize impacts to the species and its habitat, their implementation does not preclude consultation under the Endangered Species Act. An analysis of the effects posed by proposed actions to Pagosa skyrocket and/or its critical habitat will continue to be an essential

component to the conservation of the species. Any activities that may adversely affect the species will require consultation with the USFWS.

If there are questions or comments regarding these guidelines, please call (970) 385-1400 or (303) 512-4959.

Signed,

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