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Radium Valley Habitat Improvements

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1. INTRODUCTION

1.1. Identifying Information

Project Title: Radium Valley Habitat Improvement Project

Location Description: Parts of Northern Eagle and Southern Grand Counties, Colorado in lands administered by the Bureau of Land Management Kremmling Field Office (Figure 1).

Applicant: BLM

NEPA Document Number: DOI-BLM-LLCONO2000-2015-004

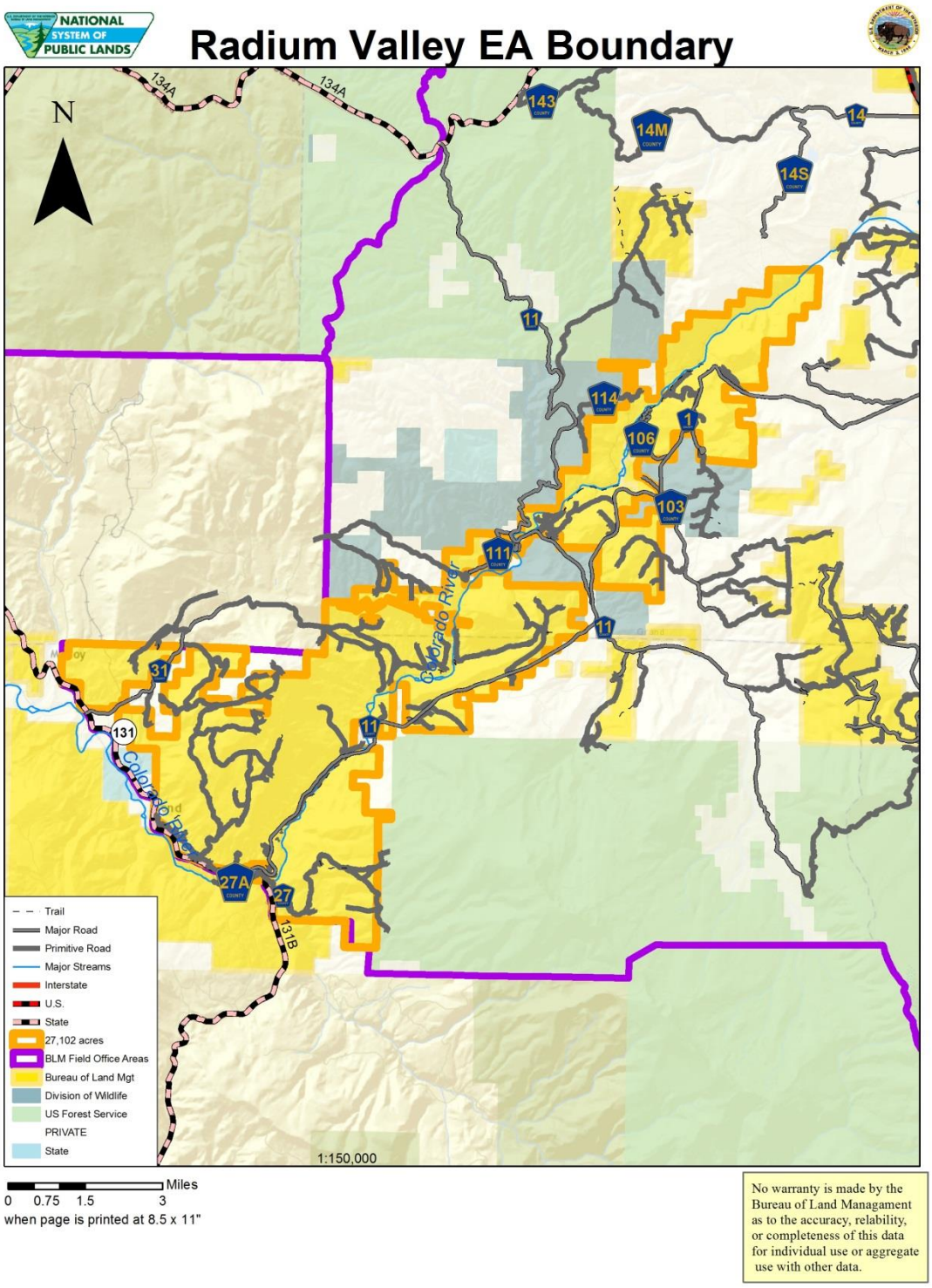
1.2. Background

The area of the proposed action encompasses approximately 27,000 acres of Bureau of Land Management (BLM) administered lands from Gore Canyon on the north end bisected by the Colorado River south to where the Piney River confluence occurs with the Colorado River in an area known as State Bridge on the Southern end (Fig. 1). Elevation ranges from 6,300-8,500 feet with dominant vegetation communities of pinyon-juniper woodland and sagebrush. This area represents important habitat for a variety of wildlife including wintering habitat for several big game species including mule deer, elk and bighorn sheep. Greater Sage-grouse are also known to occupy the proposed project area and it may represent relic habitat that could be a useful expansion of their range. Pinyon-juniper woodlands have established and encroached in recent centuries reducing the value of the habitat for the species that presently occupy the proposed project area.

Nearly 100 individual treatments in this area have occurred since 1986 with the emphasis of improving big game winter habitat. There is a total of 6,236 acres included in the proposed treatment area. These projects included a wide range of vegetation manipulation methods with varying levels of success which required converging recognition and planning by state and federal professionals to improve these important habitats that have remained unchecked by natural processes for many years. All of the numerous planning efforts had a common and prevailing theme of providing a healthy sagebrush community that is vital to the winter survival and maintenance of big game in the area, as well as benefitting numerous other species year round.

The goal of the proposed action would be to continue this theme on a landscape level approach. This comprehensive effort would draw upon the successes and failures of previous treatments in the area, combined with the most recent and relevant scientific information to prescribe a comprehensive set of tools to maintain and perpetuate a healthy landscape for wildlife.

Figure 1. T:/CO/GIS/giswork/krfo/projects/fuels_treatment/Radium Sage Grouse Improvement



1.3. Purpose and Need for Action

The purpose for this programmatic Environmental Assessment (EA), prepared pursuant to the National Environmental Policy Act (NEPA): The primary focus is to expand Greater Sage-grouse habitat and continuity, increase bighorn sheep range, and maintain and improve big game winter range. The need for the project is to improve sagebrush and mountain shrub vegetation communities and habitat continuity for numerous upland wildlife species that occupy the project area.

The proposed project would also streamline the process by which the BLM, Kremmling Field Office (KFO), analyzes individual habitat treatment projects needed to improve wildlife habitat in the Radium Valley region.

Decision to be Made:

Based on the analysis contained in this EA, the BLM will decide whether to approve or deny the proposed Radium Valley Habitat Improvement project, and if so, under what terms and conditions. Under the National Environmental Policy Act (NEPA), the BLM must determine if there are any significant environmental impacts associated with the Proposed Action warranting further analysis in an Environmental Impact Statement (EIS). The Field Manager is the responsible officer who will decide one of the following:

- To approve the Radium Valley Habitat Improvement Project with design features as submitted;
- To analyze the effects of the Proposed Action in an EIS; or
- To deny the Radium Valley Habitat Improvement Project

Once an individual project planning process has been completed, the KFO would prepare a DNA to document conformance of the proposed treatment with this EA and the current land use plan, as amended(BLM 2015). If the proposal uses a method that could potentially cause an impact that has not been adequately disclosed and analyzed in this EA, an individual project-specific EA would be required.

1.4. Conformance with the Land Use Plan

The Proposed Action is consistent with the *Vegetation Treatments on BLM Lands in the 17 Western States Programmatic Environmental Report* (PER) (BLM 2007), which evaluates the general effects of non-herbicide treatments (i.e., biological, physical, cultural, and prescribed fire) on public lands. The proposed action and No Action alternative are subject to and have been reviewed for conformance (43 CFR 1610.5) with the following land use plan:

Land Use Plan: Kremmling Record of Decision and Resource Management Plan (ROD/RMP)

Date Approved: July 8th 2015

Decision Language: "*Fish and Wildlife*" (2.1.5.) which states, "Maintain healthy, productive plant and animal communities of native and desirable species at viable population levels commensurate with the species' and habitats' potential. Ensure that plant and animals at the community and population level are productive, resilient, diverse, vigorous, and able to reproduce and sustain natural fluctuations and ecological processes."…"*Vegetation"* (2.1.4) "Manage mountain shrub communities in order to composition and structure, and to increase serviceberry, bitterbrush, and mountain mahogany…Reduce encroachment of pinyon, juniper, and other woody species in sagebrush steppe."

REMARKS: 6,500 acres of the proposal is identified in the Resource Management Plan as the Radium Basin Core Wildlife Area. "Perform habitat treatments in order to reduce the canopy cover in uniform-aged brush and mature pinyon, juniper, and other forest stands". The proposal is compatible with these objectives.

Under the Proposed Action, approval of individual habitat treatment projects would require preparation of a Documentation of Land Use Plan Conformance and Documentation of NEPA Adequacy (DNA), tiered to this programmatic EA, to identify specific project locations, methods, and timing. Additional on-the-ground surveys and clearances for special status wildlife and plants, raptors and other migratory birds, and cultural resources would be required for each treatment project prior to implementation. The relatively small range of ecological settings, habitat conditions, and treatment methods associated with the proposed action lends itself well to the tiered DNA approach.

Land Use Plan: Northwest Colorado Greater Sage-grouse Approved Land Use Plan Amendment

Date Approved: September, 2015

Decision Language: "*Special Status Species*" (2.2.1) "Maintain and enhance populations and distribution of Greater Sage-grouse (GRSG) by protecting and improving sagebrush habitats and ecosystems that sustain GRSG populations." "*Vegetation*" (2.2.2) "Use habitat restoration as a tool to create and/or maintain landscapes that benefit GRSG… prioritize treatments in areas that are thought to limit GRSG distribution and/or abundance."…Remove conifers encroaching into sagebrush habitats, in a manner that considers tribal values."

REMARKS: This area has shown limited GRSG activity since 2005 from GPS collar data. Restoring sagebrush steppe communities in this area is thought to create a logical landscape linkage between the North Eagle/South Routt and Middle Park GRSG populations for increased genetic dispersal and resilience. The GRSG amendment supports the proposed action.

2. PROPOSED ACTION AND ALTERNATIVES

2.1. Proposed Action

2.1.1. Project Components and General Schedule

The proposed action consists of several methods of vegetation removal primarily targeting but not limited to pinyon and juniper trees in the southwest corner of the Field Office. The intent of the proposed action is not to remove all the pinyon and juniper trees, but to have a comprehensive range of management actions and a decision-making framework that BLM resource managers can use to aid in selecting actions or combination of actions to improve wildlife habitat based on a specific phase that the pinyon-juniper woodland is currently in. These phases are defined (by Barrett 2007) in three principle categories as follows:

Phase I. This early stage of pinyon- juniper encroachment involves an actively-expanding, open canopy of young trees (usually 40 years old or younger), exhibiting no die-off of lower limbs. The trees are a subordinate component of the plant community. Active recruitment is taking place (tree seedlings in the shrub layer). Grasses, forbs, and shrubs are able to express their full productive potential, apparently uninhibited by competition from pinyon-juniper. In this stage, little or no observable change in plant community composition or in soil cover and overland flow can be attributed to juniper. Sometimes, however, excessive shrub canopy closure or heavy, long-term grazing use causes perennial grasses and forbs to be sparse or absent.

Phase II. This mid-successional stage of pinyon-juniper encroachment also entails an actively expanding canopy of trees now co-dominant in the plant community. In this phase, the maturing pinyon-juniper may produce berries and nuts at moderate to high levels depending on several site factors including slope, soil depth, soil texture, and available water capacity of the soil profile, shrubs may die off as the network of shallow juniper roots begins to extend its occupation of the upper soil profile. On moisture-limited sites (those with shallow soils) or on steep slopes with high rates of overland flow (low infiltration rates), shrubs may exhibit stress or die-off as a result of competition. Moderately deep and deep soil sites may retain their shrub, grass, and forb components and exhibit few biotic or abiotic effects. Target trees in this phase range from saplings to trees >200 years old.

Phase III. At this stage, occupation of the site by pinyon and juniper is complete, and its effects dominate the site. Full grow-out of the surface root network concludes; the tree's leader growth has slowed; berry and nut production has declined and tree recruitment is limited. Biotic and abiotic conditions on the site are visibly degraded. Shrub die-off will likely exceed 75 percent. Understory plant production declines, as do species richness and diversity. In the tree interspaces, the loss of understory plant cover exposes bare soil, particularly on drier, harsher sites and those with an effective rooting depth of less than 20 inches. Soil organic matter declines, and raindrop impact promotes physical crusting of the soil surface, reducing infiltration rates and, on sloping sites, overland flow and soil erosion increase. Grasses may persist as well as very limited forb growth. On slopes with southern and western exposures (harsh sites) throughout the range of juniper, the loss of understory vegetation is often most pronounced.

Each proposed treatment area is listed below with previous treatment history:

Gore / Inspiration:

Gore Proposed: 1,083 acres of mastication with potential jackpot burning (low intensity burning of mulch and slash).

History: In 1990 a 34% pelletized nitrate was aerially applied at 300 lbs. /acre with a goal of obtaining approximately 100lbs./acre Nitrogen over 254 proposed acres. This was conducted to increase productivity and palatability of winter/spring forage for big game species. The results of these treatments are typically short lived as vegetation uptakes the nitrogen. Successive treatments are often necessary for these treatments to have long term measurable results. No documentation on this specific treatment is available, but there are no ocular differences between this treatment area and the surrounding landscape.

Inspiration Proposed: 1,031 broadcast burn (ideally heli-torch) with hand thinning lop and scatter for fuel prep on the tow slope of steeper terrain when conditions are favorable.

History: In 1986 a 36 acre portion of the project area was chained and fertilized. Today chaining and fertilization tactics are ill advised for their negative or benign outcomes. In 2003, 1,971 acres were proposed for prescribed burning to be implemented in 2007. It is estimated that approximately 1/3 of this burn was completed with favorable results as far as consumption, vegetative response, and Pinyon Juniper (PJ) control to present.

The proposed action would continue on the BLM portion of the original proposal with broadcast /burning and ground ignition. There is a plan to burn 357 acres of adjacent state property in 2017 to improve bighorn sheep dispersal.

Hartman Divide/Radium Benches (West Sheep Creek):

Hartman Divide Proposed: 1,395 acres of mastication and jackpot burning with a 519 acres broadcast burn component on Hartman Hill. The Sheephorn side (East of trough road) has an additional 468 proposed broadcast burn and hand thinning component.

History: Sheephorn side: In 1990-1991 a 445 acre brush beat occurred with a Lawson Aerator removing sagebrush heights to less than 6 inches above ground level. This may have been a poor prescription for the area because certain areas are currently experiencing more bare ground in the inter-spaces than desirable (visually) with phase I PJ encroachment. This also may have been a combined impact with cattle grazing post treatment.

Hartman Hill side (West): 645 acres was proposed for 2004 Lawson Aerator work with 30 acres of hand thinning on the toe slope of Hartman Hill. Ping pong burning was also attempted with minimal results. Various cheatgrass treatments have occurred on the benches and disturbed areas above the warm springs. Treatment unit is now primarily Phase I and II PJ with a good Douglas-fir component on Hartman Hill proper.

Radium (West Sheep Creek)Proposed 2017/18: No prior vegetation treatments outside of historic road construction are recorded on these benches. Phase I mastication would be the primary method on these benches.

Dry Gulch / Copper Spur:

Dry Gulch Proposed: 1,269 acres of mastication and jackpot burning. 1,803 additional acres of broadcast burning and hand thinning.

History: 205 acres were treated most likely by Dixie Harrow to improve habitat and forage for elk in 1990. 123 acres were lopped and scattered in 2010 and 11 for burn preparation that never took place. Various cheatgrass treatments have taken place since 2013. 188 acres of PJ mastication occurred in 2015 with an additional 352 acres of hand thinning in 2015 and planned to occur in 2016. No prior treatments were recorded for the area proposed for burning.

Copper Spur Proposed for: 2,488 acres of mastication and hand thinning of PJ woodlands, primarily phase I and II PJ encroachment.

History: In 1989, 40 acres of lop and scatter took place. In 1993, 285 acres of Rollerchop was conducted within the proposed project area to increase grass and forb productivity as well as provide high quality winter grounds for big game. Various herbicide treatments have occurred mostly along the river corridor.

Piney/Rancho Del Rio:

Piney Proposed for: 1,069 acres proposed for mastication, hand thinning, and jackpot burning. This would occur primarily in phase I PJ encroachment before the FS boundary where there is a healthy sagebrush community. Additional broadcast burn proposals for Elk Creek (1,772 acres) and High Trail (915 acres) may be performed when conditions are favorable. A secondary objective of the mastication and burns are to visually open up the landscape to Greater sage-grouse, encourage movement from across the river and to protect these habitats.

History: Homestead area has received 10-15 acres of herbicide cheatgrass treatment on 2015.

Rancho Del Rio Proposed: Approximately 958 acres of mastication / hand thinning to maintain and build on previous treatment on bench area west of the river.

History: Approximately 70 acres of lop and scatter hand thinning occurred in 2005 to remove Phase I and Phase II encroachment for wildlife/fuels benefit. Area is currently phase I PJ encroachment.

Yarmony/State Bridge/ McCoy (Horn):

Yarmony : 2,589 acres of mastication and jackpot burning. The proposed treatment would secure a very large area of intact sagebrush adjacent to grouse leks currently occupying the adjacent CRVFO. Weed treatments would take place prior to the proposed action and continue as long as necessary to control infestations.

History: A prescribed fire was performed in 2008/09 within the proposed area for 880 acres. Approximately a 600 acre affective area was actually burned. The area was primarily south facing with warmer soil temperatures that had not previously been sprayed for weeds. Cheatgrass infestations were identified post burn and have been treated annually since 2013.

State Bridge/McCoy: 2,623 acres of mastication and jackpot burning. This area would also represent a large visual opening and transition area for Greater sage-grouse and other wildlife to Yarmony and Congor Mesa habitats. The McCoy unit has excellent sagebrush understory. The use of jackpot fire would be very isolated given the amount of cheatgrass potential of the area.

History: No recorded vegetation treatments exist in this area.

Habitat Types to be Treated

Sagebrush Steppe

Sagebrush steppe—comprised of sagebrush mixed with secondary shrub species with an understory of grasses and forbs (broadleaf herbaceous plants)—is a key component of big game winter range. Healthy sagebrush stands consist of mixed age classes of shrubs with annual leaf and seed production as well as evidence of regeneration. Healthy sagebrush communities contain a diverse understory of native perennial herbaceous species. Impediments to long-term maintenance of healthy sagebrush communities include encroachment and competition by trees expanding from nearby pinyon-juniper stands and invasion by noxious weeds and other undesirable non-native plants.

Pinyon-Juniper Woodland

Mature pinyon-juniper woodlands provide not only forage, but high-quality thermal and escape cover for big game. As pinyon-juniper woodlands expand and age, they can reduce production of understory vegetation by depriving those species of direct sunlight and competing with them for nutrients and moisture. A primary source of annual moisture for winter range vegetation in the region is winter snowfall. As pinyon and juniper trees mature, their crowns begin to cover an increasingly high percentage of the soil surface, often approaching 100% canopy cover in late seral stages. Shrub cover is shown to decrease by 50% when tree cover exceeded 20%. Treatments reducing canopy to $\leq$ 20% cover adequately maintained these vegetation communities. Additionally perineal herbaceous cover has been shown to decrease of 50% when

tree cover exceeded 40% tree cover. Treatment areas showed an increase in perineal herbaceous cover by greater than 9% compared to untreated plots (Bybee et al. 2016).

Mixed Mountain Shrubland

Mixed mountain shrublands provide transitional habitat between high-elevation summer range and low-elevation winter range for wild grazers. During mild winters, deer, elk, and bighorn use mixed shrublands as well lower elevation sagebrush communities for shelter and forage. Common shrubs in the mountain shrub complex in the project area include serviceberry, bitterbrush, snowberry, and mountain mahogany interspersed with sagebrush. As stands mature, the component species lose some value to wildlife. Pinyon-juniper reduction is expected to free up resources needed to diversify the age class of these currently heavily browsed communities in the project area.

Habitat Treatment Methods

Mechanical Treatment

Mechanical treatment involves the use of machinery such as wheeled tractors/loaders, tracked dozers, tracked excavator, skid steer, or specially designed vehicles with attached implements designed to cut, chop, or mulch (collectively phrased as masticate) existing vegetation. The selection of a mechanical method in a specific application is based on the characteristics of the vegetation, seedbed preparation and re-vegetation needs, topography and terrain, soil characteristics, climatic conditions, presence of sensitive resources, and an analysis of the cost compared to the expected productivity. Mechanical methods that may be used by the BLM include hydro-axing, Fecon® head style masticating, tree sheering/clipping and cutting. As new technologies or techniques are developed, these could be used if their impacts are similar to or less than those associated with other methods discussed below.

Rangeland seed drills, which consist of a series of furrow openers, seed metering devices, seed hoppers, and seed covering devices, are either towed by or mounted on a rubber tracked tire tractor. The seed drill opens a furrow in the seedbed, deposits a measured amount of seed into the furrow, and closes the furrow to cover the seed. Seeding treatments may also be implemented using an aerial application, all-terrain vehicles (ATVs and UTVs), hand application, or a combination of these methods. Through seeding in the specific target area the BLM will return the landscape to, or maintain, its desired ecological condition.
Treatments using heavy equipment would be limited to slopes no greater than 35 degrees and would primarily be used in Phase 2 and 3 pinyon-juniper woodlands.

Mechanical objectives:

- 30-70 percent reduction of pinyon-juniper trees
- Apply in combination with seeding in phase 3 treatments;
- Help protect existing shrub communities and/or reset seral conditions to diversify the landscape for wildlife benefit;

- Provide fine woody debris for runoff detention and soil retention on flat terrain or gentle slopes.
- Help create fuel break control lines for future prescribed fire treatments;

Mechanical Treatment Design Features:

1. Treatment areas would be inventoried for noxious/invasive weeds prior to treatment. Any infestations identified would be suppressed/eradicated by the BLM prior to treatment. Treatment areas would then be monitored for noxious/invasive weed infestations for a minimum of three years post treatment.

2. A BLM approved "weed free" seed mix would be used in any of the above seeding operations. Seed mixes would be produced by an appropriate resource advisor to provide the best seed mix for each individual project area. A seed mix would be identified to maintain natural vegetative communities within the project areas.

3. Treatment areas will be inventoried for biological crusts. Where present, mechanical treatments that would disturb the crust would be foregone. Drill seeding would also not occur where biologic crusts were present.

4. All heavy equipment would be cleaned (e.g. power washed) to prevent the introduction of weed seed prior to working on project area.

5. Treatment polygons would be designed by general ecological site- and would not include soils and slopes that would not respond to treatment. This will help protect the treatment areas from increased soil loss, sediment loading to the Colorado River, and invasive species.

6. If monitoring reveals ground cover less than pretreatment areas or accelerated erosion, then seeding and additional erosion control/best management practices will be implemented by the second growing season after treatment.

7. All water sources would be buffered from treatment by a minimum of 100 feet from the edge of any wetland vegetation.

8. The Colorado River corridor and the Colorado River Potential Conservation Area (PCA) will be buffered by 1320 feet from the edge of the riparian vegetation. Yarmony Creek PCA and any other PCA will be buffered by 325 feet.

9. Equipment and associated support vehicles would not operate during wet soil conditions that result in soil rutting of 2 inches or deeper.

Manual Treatment

Manual treatment involves the use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous and woody species. Treatments include cutting undesired plants above the ground level; pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth; cutting at the ground level or removing competing plants around desired species; or placing mulch around desired vegetation to limit competitive growth.

Power tools such as chainsaws and power brush saws are particularly useful for thick stems and small trees. Power tools can be used to remove and then lop and scatter the plant matter to aid in the decomposition process, drying out material to contribute fuel for future prescribed burns (red needle "jack-potting"), provide permitted public fire wood collection, to add mulch to the area, and to help buffer possible visual disturbances. Hand tools used in manual treatments may include a handsaw, axe, shovel, rake, machete, grubbing hoe, mattock (combination of cutting edge and grubbing hoe), Pulaski (combination of axe and grubbing hoe), brush hook, and hand clippers.

Manual techniques can be used in many situations and usually with minimal environmental impacts. Although they are more challenging to implement over a large area, manual techniques can be highly selective. Consequently, manual methods are particularly beneficial in sensitive habitats such as steep slopes, areas containing sensitive plants, areas inaccessible to vehicles, and areas where use of prescribed fire or mechanical treatments may not be appropriate.

Manual treatments could be used in all phases of pinyon-juniper removal although more practical in phase 1 and 2. A phase 3 utility of manual treatment may be done to buffer sensitive resources from other treatment methods or help reach alternative treatment objectives such as creating ladder fuels or control lines.

General treatment objectives by phase include:

Phase I

- 70-100 percent reduction of pinyon-juniper trees approximately 10 inches or less in diameter;
- No stump heights greater than 8 inches;
- Slash would be reduced to 24 inches or less;

- Control pinyon-juniper woodland encroachment.

Phase II

- 30-90 percent reduction of pinyon and juniper;
- Lop and scatter slash heights to Phase 1 specifications;
- Create “red needle” ladder fuels for future prescribed fire treatments;
- Help create control lines for future prescribed fire treatments;
- Reduce sage and mountain shrub community competition.

Phase III

- 10-40 percent reduction of pinyon and juniper;
- Used minimally in combination with or buffer other treatments;
- Create downed woody material on steep slopes or erosive soils;
- Help create control lines for future prescribed fire treatments;
- Reduce competition for resources to promote grass and forb production

Manual Treatment Design Features:

1. Treatment areas would be inventoried for noxious/invasive weeds prior to treatment. Any infestations identified would be suppressed/eradicated by the BLM prior to treatment.

2. Treatment areas would then be monitored for noxious/invasive weed infestations for a minimum of three years post treatment.

3. Treatments would be aligned with general ecological sites and specific resource objectives. Monitoring of treatments, against measurable objectives would be required. No treatment of unstable slopes or riparian areas. (note: Rocky mountain juniper is a component of one of the riparian communities found within the project area, and is rare in the state, found in only one other location).

4. Hand felling will have slash lopped and scattered, with slash perpendicular to the slope. If rilling and water movement is observed on treated hillslopes, additional erosion control will be required to stabilize the slope.
5.

Prescribed Burning

Prescribe fire treatments would include: pile burning, jackpot burning (burning areas of high fuel concentrations that are confined to a small area), and broadcast burning.

Pile and jackpot burning would be utilized mostly in areas of phase I and II and could be used in Phase III to remove fuel build up along control lines. The reasoning for this is to limit fire to the sagebrush, while treating the pinyon juniper. This would be done when the desirable fuels are at low fuel moistures and the non-desirable fuels are at a high fuel moisture and-or have natural barriers, and/or snow that would keep the fire from spreading from the pinyon and juniper.

Objectives for Pile and Jackpot Burning:

- 90 percent reduction of 1 hour, 10 hour, and 100 hour fuels of dead pinyon and juniper to help reduce interception of resources to understory vegetation

Typical devices to be used for implementation are but not limited to: drip torches, fusees, hand ignition devices and terra torches.

Broadcast burning would be utilized mostly in Phase II and III. Burning would be done when pinyon and juniper fuel moistures are low and sagebrush live fuel moistures are high, and/or natural barriers, control lines, and/or snow would limit the spread of fire into sagebrush. There is a likelihood that fire would burn into the sagebrush, but it would be minimal and fire spread would diminish once it left the pinyon juniper fuels.

Objectives for areas where fire is the primary tool:

- 30-90 percent reduction of pinyon and juniper;
- Increase areas that support growth of grass and forbs;

Typical devices to be used for implementation are but not limited to: drip torches, fusees, hand ignition devices, terra torches, helitorch, and plastic sphere dispenser (psd) operations.

Natural barriers, snow, and high live fuel moistures would be utilized for control lines on broadcast burns, but it is anticipated that in some areas control lines would need to be constructed. Control lines would be constructed by hand in most areas, but machinery may be used to create mow lines or improve existing roads, trails, and tracks.

<u>Prescribed Burning Design Features:</u>

1. Treatment areas would be inventoried for Downey Brome (cheat grass) prior to treatment. Any cheat grass infestations identified would be suppressed/eradicated by the BLM prior to treatment. Intense monitoring/treatment of cheat grass would continue for at least 5 years post treatment due to cheat grass ability to respond aggressively to fire and its seed viability.

2. For prescribed burns, inventory the project area and evaluate potential weed spread with regard to the fire prescription. Areas with moderate to high weed cover should be managed for at least 1 year prior to the prescribed burn to reduce the number of weed seeds in the soil. Continue weed management after the burn.

3. Minimize burning herbicide-treated vegetation for at least 6 months to allow herbicide to continue to work.

4. Ensure that a weed specialist is included on a Fire Incident Management Team when wildfire or prescribed operations occur in or near a weed-infested area.

5. Integrate prescribed fire and other weed management techniques to achieve best results. This may involve post-burn herbicide treatment or other practices that require careful timing.

6. Thoroughly clean the undercarriage and tires of vehicles and heavy equipment before entering a pre and post burned area (i.e. fire engines, UTV/ATV, or heavy machinery).

7. Control lines and burned areas will be monitored for erosion concerns. Seeding and erosion control practices will be in place prior to summer thunderstorms if burns result in exposed soils and removed understories. Additional erosion control may be necessary if adequate understories are not established by the 2nd growing season, and evidence of sheet, rill, or other accelerated erosion is observed. Future burns that are tributary to the same drainage would be postponed until prior burns have soil stabilizing vegetation.

8. Burn polygons will be determined by general ecological site, and only sagebrush steppe or mixed mountain shrubland sites will be burned unless specific objectives are developed for other ecological sites, with a new purpose and need.

9. Burn units will be outside of the 1320 foot buffer for the Colorado River, especially to protect the state imperiled riparian communities, including the Rocky Mountian Juniper- Red osier dogwood woodland. Burn units will be aligned to also provide buffers from all perennial drainages of at least 325 feet- Elk Creek, Sheephorn Creek, High Trail Gulch, and Piney River. Site specific buffers will be implemented to reflect runoff pathways, slopes, and soils.

2.1.2. General Design Features

1. All treatment areas would need to be surveyed prior to any treatments for the presence of Harrington's Penstemon (*Penstemon harringtonii*) and would be buffered by 100 ft. from known and discovered individuals or populations.

2. Manual and mechanical treatments would need to take place between July 15th and Dec. 1st to minimize the take of migratory birds and disruption of big game winter range.

❖ Exceptions to this timeframe may be granted for manual treatments of less than 100 contiguous acres per individual project area.

3. Vegetation retention strips of ≥ 300 meters would remain untreated for the continued utility of Canada Lynx (*Lynx canadensis*) movement across the State Bridge Landscape Linkage.

4. No treatments would be permitted within 0.5 miles from an active bald eagle (*Haliaeetus leucocephalus*) nest site. This NSO is lifted once nest is unoccupied or July 15th, whichever comes first.

5. No treatments would be permitted within a 0.25 miles from and active Peregrine Falcon or other identified raptor nest site.

6. No prescribed fire activity would be permitted from May 1st to June 30th in the Inspiration Point area or areas where slopes are ≥ 45 degrees for bighorn sheep lambing unless the area is cleared by the KFO wildlife biologist and Colorado Parks and Wildlife prior to ignitions.

7. In the event that areas of significant wildlife or other resource values are identified in phase III encroachment, a minimum of 40 acre contiguous parcels of these stands would be retained to protect those values.

8. All prescribed burns in the area would have signs posted on county roads and the public would be excluded from the area for public safety.

9. Contacts would be made to agencies, right-of-way (ROW) holders, authorized permittees and land owners that may be impacted as per the burn plan.

10. A news release would be issued to surrounding news outlets informing the public of when and where burn operations would occur and when temporary closures for public access may occur.

11. Smoke permits would be obtained from the Colorado Air Pollution Control Division. A burn plan would be prepared and approved prior to broadcast and pile burning operations.

12. Pile burning and jackpot operations would only be conducted when there is a minimum of three inches of snow on the level at the project work site and/or live fuel moistures in the sage are above 140 percent.

13. All aspects of the developed burn plan would be followed with approval and sign-off for each burn window of opportunity. All personnel would wear proper Personal Protective Equipment (PPE) when in the project area during burning.

14. Piles would be no larger than 30' tall 30' wide and 20' in length and no smaller than 6' x6' x 6' if raked or hand piled. Machine Piles that are built with a blade would be no smaller than 10' x10' x 7' and no larger than 20' x 20' x 12'. In both piling situations, burned pile locations would be treated to prevent noxious weed establishment.

15. Protection and Preservation of Public Land Survey System Monuments for Vegetation Treatment Projects, Instruction Memorandum No. CO-2015 - expires 09/30/2018. Prior to commencing any ground or vegetation disturbing activities, evidence of the PLSS would be marked for protection. Cadastral Survey staff shall be consulted to assist with providing data, searching for and evaluating evidence and locating and protecting monuments of the PLSS from destruction. Refer to the IM for details.

16. All known water sources, wetland and riparian areas, and the Colorado River corridor will be buffered from treatment. A minimum 100 foot buffer will be placed on all water sources, with the Colorado River corridor being buffered by 1320 feet from the edge of riparian vegetation. There will be no machinery or vehicles within wetland vegetation.

17. Monitoring methods and locations will be determined prior to each treatment. A review of collected data will be done and adaptive management will be applied as needed prior to each field season.

18. Treatments will be laid out by general ecological site, with measurable objectives for the vegetative community to be treated.

19. A road assessment should be done to determine if water bars, grading, and/or seeding is needed to insure proper drainage and no accelerated erosion due to road creation, widening, or rutting due to machinery and vehicle traffic.

20. Pinyon-juniper woodlands and Douglas-fir stands in all treatment areas shall be inventoried prior to implementation, collecting data reflecting stand structure, composition, insect and disease, etc. Mechanical, manual, and prescribe burn treatments shall not occur in old-growth stands, protecting the structural complexity and ecological functionality provided by these stands. Descriptions of

old-growth structural characteristics are referenced in Mehl (1992), Miller et al. (1999), Jacobs et al. (2008), Eisenhart (2004).

21. Thinning in young pinon-juniper woodlands shall be implemented based on diameter size class spacing guidelines developed as some percentage of maximum SDI (415 SDI for mixed pinon-juniper stands, 360 SDI for single species stands (Page, 2006; Jeffrey Underhill, USFS Region II Silviculturist, personal communication). Page notes that at 15 percent of maximum SDI, trees do not generally compete with each other and a substantial amount of resources is available for understory species. Therefore a minimum of 15 percent of maximum SDI would remain. Diameter size classes should reflect that which currently exists in the stand. Species diversity should be maintained in phase II and III encroachment.

22. Mechanical treatment should not take place in stands infected with black stain root disease as treatment can spread the disease.

23. The presence of Ips beetles in the general area may require adjustments in the implementation of thinning and the treatment of slash.

24. Following stand inventory, Douglas-fir stands should be evaluated on a site-specific basis, as to whether treatment is appropriate or not, based on stand and site conditions.

2.1.3. BLM Required Conditions of Approval to Mitigate Impacts to Cultural and Paleontological Resources

1. The applicant is responsible for informing all persons who are associated with the project that they would be subject to prosecution for knowingly disturbing archaeological sites or for collecting artifacts.

2. If any archaeological materials are discovered as a result of operations under this authorization, activity in the vicinity of the discovery would cease, and the BLM KFO Archaeologist would be notified immediately. Work may not resume at that location until approved by the AO. The applicant would make every effort to protect the site from further impacts including looting, erosion, or other human or natural damage until BLM determines a treatment approach, and the treatment is completed. Unless previously determined in treatment plans or agreements, BLM would evaluate the cultural resources and, in consultation with the State Historic Preservation Office (SHPO), select the appropriate mitigation option within 48 hours of the discovery. The applicant, under guidance of the BLM, would implement the mitigation in a timely manner. The process would be fully documented in reports, site forms, maps, drawings, and photographs. The BLM would forward documentation to the SHPO for review and concurrence.

3. Pursuant to 43 CFR 10.4(g), the applicant must notify the AO, by telephone and written confirmation, immediately upon the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Further, pursuant to 43 CFR 10.4(c) and (d), the operator must stop activities in the vicinity of the discovery and protect it for 30 days or until notified to proceed by the AO.

Paleo for construction projects:

4. The applicant is responsible for informing all persons who are associated with the project operations that they will be subject to prosecution for disturbing or collecting vertebrate or other scientifically-important fossils, collecting large amounts of petrified wood (over 25lbs./day, up to 250lbs./year), or collecting fossils for commercial purposes on public lands.

5. If any paleontological resources are discovered as a result of operations under this authorization, the applicant or any of his agents must stop work immediately at that site, immediately contact the BLM Paleontology Coordinator, and make every effort to protect the site from further impacts, including looting, erosion, or other human or natural damage. Work may not resume at that location until approved by the AO. The BLM or designated paleontologist will evaluate the discovery and take action to protect or remove the resource within 10 working days. Within 10 days, the operator will be allowed to continue construction through the site, or will be given the choice of either (a) following the Paleontology Coordinator's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (b) following the Paleontology Coordinator's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area.

Paleo for non-construction projects (e.g., habitat improvements):

6. The applicant is responsible for informing all persons who are associated with project operations that they will be subject to prosecution for disturbing or collecting vertebrate vertebrate or other scientifically-important fossils, collecting large amounts of petrified wood (over 25lbs./day, up to 250lbs./year), or collecting fossils for commercial purposes on public lands. If any paleontological resources are discovered as a result of operations under this authorization, the applicant must immediately contact the appropriate BLM representative.

2.2. No Action Alternative

Under the No Action Alternative, the KFO would continue its current approach to wildlife habitat improvements in this area. Under this approach, management direction for wildlife improvement projects would be developed individually through separate environmental assessments or other appropriate analyses. The primary difference is that under the No Action Alternative, proposed projects would require substantially longer to design, approve, and

implement, due to a piecemeal instead of comprehensive planning approach. Ultimately, however, the types and locations of treatments would be expected to be similar under both alternatives.

2.3. Alternatives Considered but Eliminated from Detailed Analysis

An alternative that did not use fire was considered but eliminated from further analysis. The rationale for this exclusion was due to the potential scale fire treatments bring to the landscape emphasis of this programmatic document. Phase II and III pinyon-juniper woodland treatments, while not impossible, would become spatially and temporally ineffective on a large scale basis for wildlife benefit. Additionally, when compared to other treatment types, numerous references illustrated that fire had the longest lasting effect to the desired outcome of removing pinyon-juniper trees and quickly resetting seral conditions (Miller 2013) needed for landscape connectivity and diversity for multiple species especially bighorn sheep (Woodward and Van Nest 1990). Eliminating fire would not as effectively meet the purpose and need for the proposed action because landscape improvements by other listed conventional methods would be both impractical and cost prohibitive.

3. PUBLIC INVOLVEMENT

3.1. Scoping

NEPA regulations (40 CFR 1500-1508) require that the BLM use a scoping process to identify potential significant issues in preparation for impact analysis. The principal goals of scoping are to identify issues, concerns, and potential impacts that require detailed analysis. Scoping is both an internal and external process.

Internal scoping was initiated when the project was presented to the Kremmling Field Office (KFO) interdisciplinary team on 08/14/2014. External scoping was conducted by posting this project on the KFO on-line National Environmental Policy Act (NEPA) register on 12/09/2014. Include other scoping that was conducted (meetings, mailings, press releases). Include notification of interested parties.

3.2. Public Comment

Delete this section if we didn't go out for public comment.

The EA and the unsigned Finding of No Significant Impact (FONSI) were available for a 30-day public review and comment period beginning Month, Day, Year and ending Month, Day, Year. A public meeting was also held on Month, Day, Year at the Kremmling Field Office to discuss the project. The BLM received [number] letters as a result of this comment period. The BLM's responses to these comments are included as Appendix B.

4. ISSUES

The CEQ Regulations state that NEPA documents "must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail" (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an environmental assessment (EA). Issues will be analyzed if: 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impacts. The following sections list the resources considered and the determination as to whether they require additional analysis.

4.1. Issues Analyzed

The following issues were identified during internal scoping as potential issues of concern for the Proposed Action. These issues will be addressed in this EA.

- **Air Quality/Climate Change**: The Clean Air Act and FLPMA require the BLM to ensure their actions comply with federal, state, tribal, and local air quality standards and regulations. There is also scientific consensus that deforestation and changes in land use are contributing to the changing chemical composition of the atmosphere.

- **Soil Resources**: Vegetation management can have both positive and negative impacts to soil resources. Nutrient cycling and even ground cover can be improved with vegetative treatments, while soil loss and erosion concerns can also increase.

- **Surface and Ground Water Quality**: The Proposed Action is located along the Colorado River segments that are being managed under the Wild and Scenic Stakeholders' Plan to protect several outstanding resource values, including water quality. Vegetation treatments can result in increased peak flows in tributary channels, carrying increased sediment and debris flows. With the design features, there should be no impacts to ground water quality.

- **Aquatic Wildlife:** Vegetation treatments can result in increased peak flows in tributary channels, carrying increased sediment and debris flows. With the design features, there should be minimal impacts to aquatic wildlife.

- **Vegetation**: See analaysis

- **Invasive, Non-Native Species**: Initial scoping determined a concern for the spread or introduction of Downey Brome (Cheatgrass) within the project area. See Invasive, Non-Native Species section below for additional analysis.

- **Migratory Birds:** Vegetation treatments at this scale will have beneficial and negative impacts on a variety of Migratory Birds in this area. Timing limitations and other design criteria would minimize take of these species and make population impacts immeasurable.

- **Terrestrial Wildlife**: The proposed action would have both positive and negative affects to these species. The negative impacts would be short lived and occur during project implementation. Overall the project is considered beneficial for the long term health of terrestrial wildlife.

- **Special Status Animal Species**: There would be no impact to Canada lynx (*Lynx canadensis*) by the proposed action. Specific design criteria would also minimize impacts to the extent where federally protected or otherwise designated special status species would warrant a higher level of protection.

- **Special Status Plant Species**: Specific design criteria would minimize impacts to Harrington's penstemon (*Penstemon harringtonii*) to the extent that would not elevate needed protection of this species.

- **Cultural Resources**: See analysis

- **Paleontological Resources**: There are no known fossils within the proposed project area.

- **Visual Resources**: The proposed action is within an area with a Visual Resource Management (VRM) designation of Class II**.** The objective of the Class II designation is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. See Visual Resources section for additional analysis.
- **Livestock Grazing:** See analysis

- **Forestry, and Forest and Woodland Vegetation**: The mechanical, manual and prescribed burning of forest and woodland vegetation can result in both adverse or beneficial effects on stand composition and structure, and ecological function.

- **Recreation:** The proposed action is within the Upper Colorado River Special Recreation Management Area (UCRSRMA). The Kremmling 2016 RMP provides guidance for the UCRSRMA that includes Recreation Setting Characteristics (RSC) for Naturalness which identifies managing for a "Natural landscape that has few modifications in harmony with surroundings and not visually obvious." See Recreation section for additional analysis.

- **Access and Transportation**: The proposed action is within an Travel Management Area identified as Limited, where motorized and mechanized travel is limited to designated routes with no cross country travel permitted. Proposed actions are along roads, primitive roads and trails that may affect public transportation and access. See Access and Transportation section for additional analysis.

- **Realty Authorizations:** There are right-of-ways present within the project area. The holders will be notified prior to any burn activity.

- **Fire Management**: See analysis

- **Hazardous or Solid Wastes**: See analysis

- **Wild and Scenic Rivers**: The project covers two sections of the Upper Colorado River, that were found suitable for inclusion into the National Wild and Scenic River System. One of Outstanding Remarkable Values for the Pumphouse to State Bridge section is its scenic quality.

- **Scenic Byways**: The proposed action is along and within the viewshed of the nationally designated Colorado River Headwaters National Scenic Byway (CRHNSB) The CRHNSB Corridor Management Plan and Business Plan identifies the area as having Scenic Qualities and is identified for protection. See Scenic Byways section for additional analysis.

4.2. Issues Considered but not Analyzed

- **Native American Religious Concerns**: No Native American religious concerns are known in the area, and none have been noted by Northern Ute tribal authorities. Should recommended inventories or future consultations with Tribal authorities reveal the existence of such sensitive properties, appropriate mitigation and/or protection measures may be undertaken.

- **Social and Economic Conditions**: There would not be any substantial changes to local social or economic conditions.

- **Environmental Justice**: According to the most recent Census Bureau statistics (2010) and guidelines provided in WO-IM-2002-164, there are no minority or low income populations within the KFO.

- **Prime and Unique Farmlands**: There are no prime and unique farmlands within the project area. Farmlands of state or local importance would not be impacted by the Proposed Action or the No Action Alternative.

- **Wilderness**: There are no designated Wilderness areas or Wilderness Study Areas located near the Proposed Action. There are no lands found to possess wilderness charachteristics within or adjacent to the project area.

- **Areas of Critical Environmental Concern:** There are no ACECs in the project area

- **Floodplains, Hydrology, and Water Rights**: The Proposed Action is located outside of the Colorado River floodplain, which is buffered from treatment. It will not increase

flood hazard or impact the functionality of the floodplain. Hydrology concerns are addressed under surface water quality and soil sections of this environmental assessment. There will be no impacts to Water Rights from the Proposed Action or the No Action Alternative.

- **Wetlands and Riparian Zones**: Inventory will occur prior to treatment. All known wetlands and riparian zones will be buffered by 100 feet from the outside edge of the vegetation. The Colorado River riparian zone will be buffered by 1320 feet, and the Yarmony Creek PCA will be buffered by 325 feet. No direct impacts will occur under the Proposed Action. The buffers are expected to also protect the areas from indirect impacts such as debris flows, sediment deposition, and increased invasive species. The hydrology specialist's report details each project area.

- **Geology and Minerals**: The proposed action will not impact any unique geologic features or mineral resources.

5. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

5.1. General Setting & Access to the Project Area

The area of the proposed action encompasses approximately 13,000 acres of Bureau of Land Management (BLM) administered lands from Gore Canyon on the north end bisected by the Grand County Road 1 converting to Eagle County Road 11 south to where the Piney River confluence occurs with the Colorado River in an area known as State Bridge on the Southern end (Fig. 1). Elevation ranges from 6,300-8,500 feet with dominant vegetation communities of pinyon-juniper woodland and sagebrush.

5.2. Air Quality

5.2.1. Affected Environment

The U.S. Environmental Protection Agency (EPA), as directed by the Clean Air Act (CAA), has established national ambient air quality standards (NAAQS) for criteria pollutants. Criteria pollutants are air contaminants that are commonly emitted from the majority of emissions sources and include carbon monoxide (CO), lead (Pb), sulfur dioxide (SO2), particulate matter smaller than 10 and 2.5 microns (PM10 and PM2.5, respectively), ozone (O3), and nitrogen dioxide (NO2). Please note that ozone is generally not directly emitted from sources, but is chemically formed in the atmosphere via interactions of oxides of nitrogen (NOX) and volatile

organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NOX and VOCs are ozone precursors). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment. The EPA regularly reviews the NAAQS (every five years) to ensure that the latest science on health effects, risk assessment, and observable data such as hospital admissions are evaluated, and can revise any NAAQS if the data supports a revision. The current NAAQS levels are shown in Table 5-1 below. Ambient air quality standards must not be exceeded in areas where the general public has access.

The CAA established two types of NAAQS:

Primary standards: Primary standards set limits to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).

Secondary standards: Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

In addition to the criteria pollutants, regulations also exist to control the release of hazardous air pollutants (HAPs). HAPs are chemicals that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. EPA currently lists 188 identified compounds as hazardous air pollutants, some of which can be emitted from oil and gas development operations, such as benzene, toluene, and formaldehyde. Ambient air quality standards for HAPs do not exist; rather these emissions are regulated by the source type, or specific industrial sector responsible for the emissions.

The EPA has delegated regulation of air quality to the State of Colorado (for approved State Implementation Plan (SIP) elements). The Colorado Department of Public Health and Environment (CDPHE), Air Pollution Control Division (APCD) administers Colorado's air quality control programs, and is responsible for enforcing the state's air pollution laws.

The CAA and the Federal Land Policy and Management Act of 1976 (FLPMA) require the BLM to ensure actions taken by the agency comply or provide for compliance with federal, state, tribal, and local air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" [Section 102 (a)(8)].

Table 5-1. Ambient Air Quality Standards

Pollutant [final rule citation]		Standard Type	Averaging Period	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		Primary	8-hour	9 ppm[a]	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		Primary and secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010]		Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
[61 FR 52852, Oct 8, 1996]		Primary and secondary	Annual	53 ppb	Annual mean
Ozone [80 FR 65292, Oct 26, 2015]		Primary and secondary	8-hour	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter [73 FR 3086, Jan 15, 2013]	$PM_{2.5}$	Primary	Annual	12 µg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 µg/m^3	Annual mean, averaged over 3 years
		Primary and secondary	24-hour	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and secondary	24-hour	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010]		Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
[38 FR 25678, Sept 14, 1973]		Secondary	3-hour	0.5 ppm[b]	Not to be exceeded more than once per year

[a] mg/m^3 = milligrams per cubic meter, µg/m^3 = micrograms per cubic meter, ppb = parts per billion, ppm = parts per million.

[b] Colorado Ambient Air Quality Standard for 3-hour SO_2 is 0.267 ppm.

Source: National – 40 CFR 50, Colorado – 5 CCR 1001-14

Existing Regional Air Quality

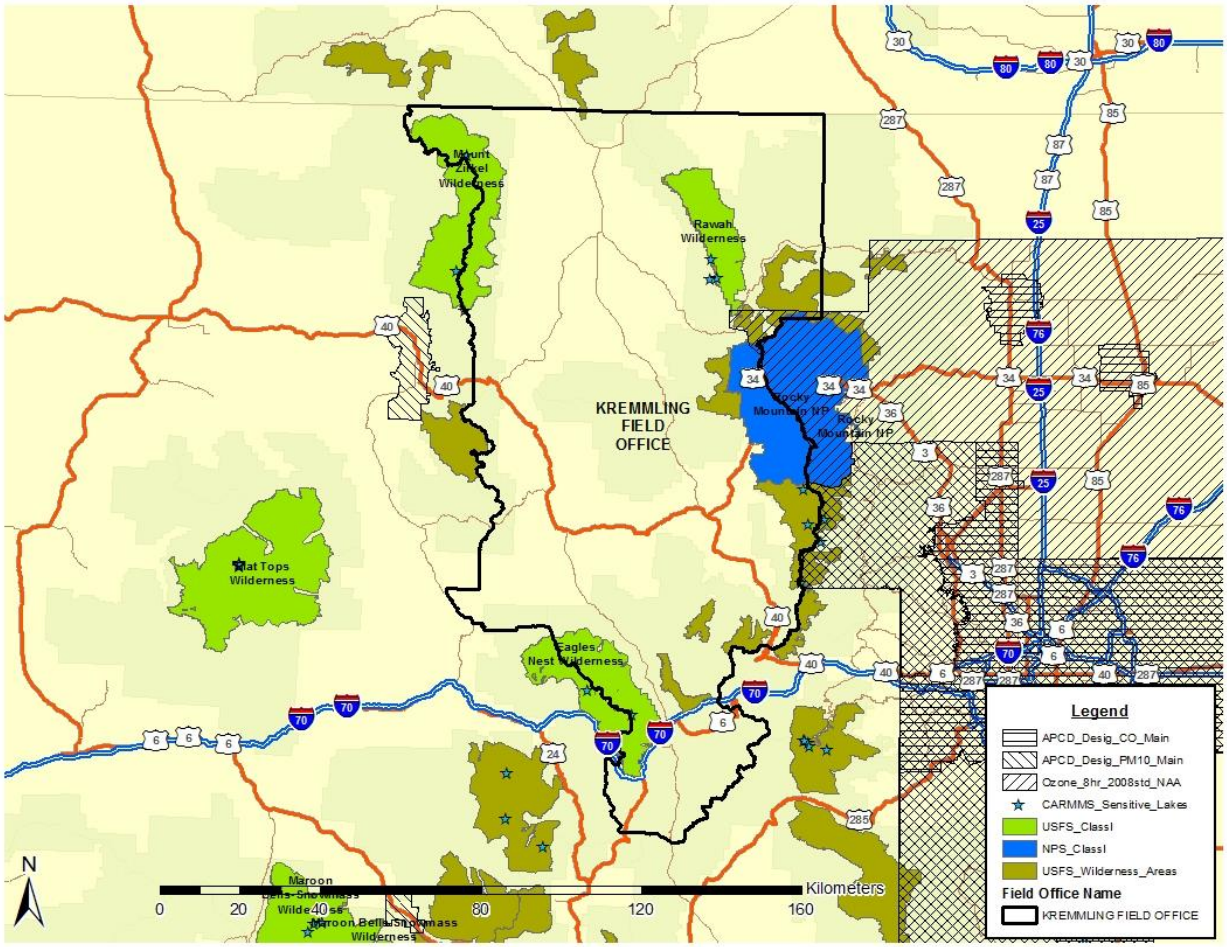
Air quality for any area is generally influenced by the amount of pollutants that are released within the vicinity and up wind of that area, and can be highly dependent upon the contaminants chemical and physical properties. Additionally, an area's topography or terrain (such as mountains and valleys) and weather (such as wind, temperature, air turbulence, air pressure, rainfall, and cloud cover) will have a direct bearing on how pollutants accumulate or disperse. Ambient air quality in the affected environment (i.e. compliance with the NAAQS) is demonstrated by monitoring for ground level atmospheric air pollutant concentrations. The APCD monitors ambient air quality at a number of locations throughout the state. The data is summarized by monitoring regions and CDPHE prepares an annual report (Annual Air Quality Reports) to inform the public about air quality trends within these regions. Similarly, several Federal Land Managers (FLMs) like the BLM, FS, and NPS, also monitor air quality for NAAQS and Air Quality Related Values (AQRVs) to meet organic act requirements. Table 5-2 below presents three years of monitoring data for criteria pollutants for KFO counties (or adjacent / representative county monitors where no monitoring exists in the KFO). The maximum monitoring value is presented where multiple monitors exist within a single county that monitor for the same pollutant. The "rank" of the concentrations are consistent with the standards form (see the "Form" column in Table 5-1 above), and the concentrations for each pollutant are for single year of monitored data. To compute the ozone design value (3 year average of the 4th highest 8-hour max) and other pollutant multiple year average concentrations, sum three consecutive years of data (if available) and divide by three.

Table 5-2. Ambient Air Quality Monitoring Data

County	Pollutant	Units	Averaging Time	2011	2012	2013	2014
Boulder	O_3	ppm	8-hour	0.076	0.076	0.079	0.070
Clear Creek	O_3	ppm	8-hour	0.080	0.084	0.085	0.075
Larimer	O_3	ppm	8-hour	0.077	0.079	0.074	0.069
Larimer	CO	ppm	1-hour	2.5	2.5	2.5	2.6
Larimer	CO	ppm	8-hour	1.3	1.7	1.4	1.4
Rio Blanco	NO_2	ppb	1-hour	5	5	4	4
Boulder	$PM_{2.5}$	$\mu g/m^3$	24-hour	13	17	17	16
Boulder	$PM_{2.5}$	$\mu g/m^3$	Annual	5.8	6.2	6	6.1
Larimer	$PM_{2.5}$	$\mu g/m^3$	24-hour	15	26	18	20
Larimer	$PM_{2.5}$	$\mu g/m^3$	Annual	5.7	7.3	6.8	6.5
Routt	PM_{10}	$\mu g/m^3$	24-hour	79	93	77	81

As shown in the Table above, the 4th highest 8-hour max ozone values for multiple years for nearby monitors are above the former and current 8-hour ozone Standard. The following plot shows that a small portion of the Denver / Front Range ozone Non-Attainment Area (NAA) extends into the far eastern side of the KFO. No other NAAs currently exist within the KFO. The proposed project will not be located within the ozone NAA.

Figure 5-1. Field Office and Designated Air Boundaries



AQRVs are metrics for atmospheric phenomenon like visibility and deposition impacts that may adversely affect specific scenic, cultural, biological, physical, ecological, or recreational resources. Visibility changes can occur when excessive pollutant contaminates (mostly fine particles) scatter light such that the background scenery becomes hazy. Deposition can cause excess nutrient loading in native soils and acidification of the landscape, which can lead to declining buffering capacity changes in sensitive stream and lake water chemistries (commonly referred to as acid neutralization change (ANC)). Air pollutants are deposited by wet deposition (precipitation) and dry deposition (gravitational settling). The chemical components of wet deposition include sulfate (SO_4), nitrate (NO_3), and ammonium (NH_4); the chemical components of dry deposition include sulfate, sulfur dioxide (SO_2), nitrogen oxides (NO_X), nitrate, ammonium, and nitric acid (HNO_3). A NPS memo suggests that the critical nitrogen load value for high elevation surface water in all natural areas of Colorado is 2.3 kg/ha-yr. The NPS *Technical Guidance on Assessing Impacts on Air Quality in NEPA and Planning Documents* suggests that critical sulfur load values above 3 kg/ha-yr may result in moderate impacts. AQRVs are important to FLMs because they have a mandate to ensure their Class I and sensitive

Class II areas meet scientific (landscape nutrient loading) and congressionally mandated goals (i.e. regional haze). Class I areas are generally pristine landscapes such as national parks, national forests, and wilderness areas that are specifically provided the highest levels of air quality protection under the CAA. Sensitive Class II areas are usually afforded additional protection under state specific rule making for one or more pollutants. This status elevates them above ordinary Class II areas which account for every other area of the country that is not explicitly designated as Class I or Sensitive Class II.
As shown in Figure 5-1 above, the following Class I / sensitive Class II areas are within or intersect the KFO planning area: Mount Zirkel Wilderness (Class I area - USFS), Eagles Nest Wilderness (Class I area – USFS), Rawah Wilderness (Class I area – USFS) and Rocky Mountain National Park (Class I area – NPS).

The figures below provide current trend data for visibility for Mount Zirkel Wilderness and Rocky Mountain National Park, and deposition data for Rocky Mountain National Park. In general, trends with a negative slope indicate better atmospheric conditions for each potentially affected area.

Figure 5-2a AQRV Visibility Data for Mount Zirkel Wilderness

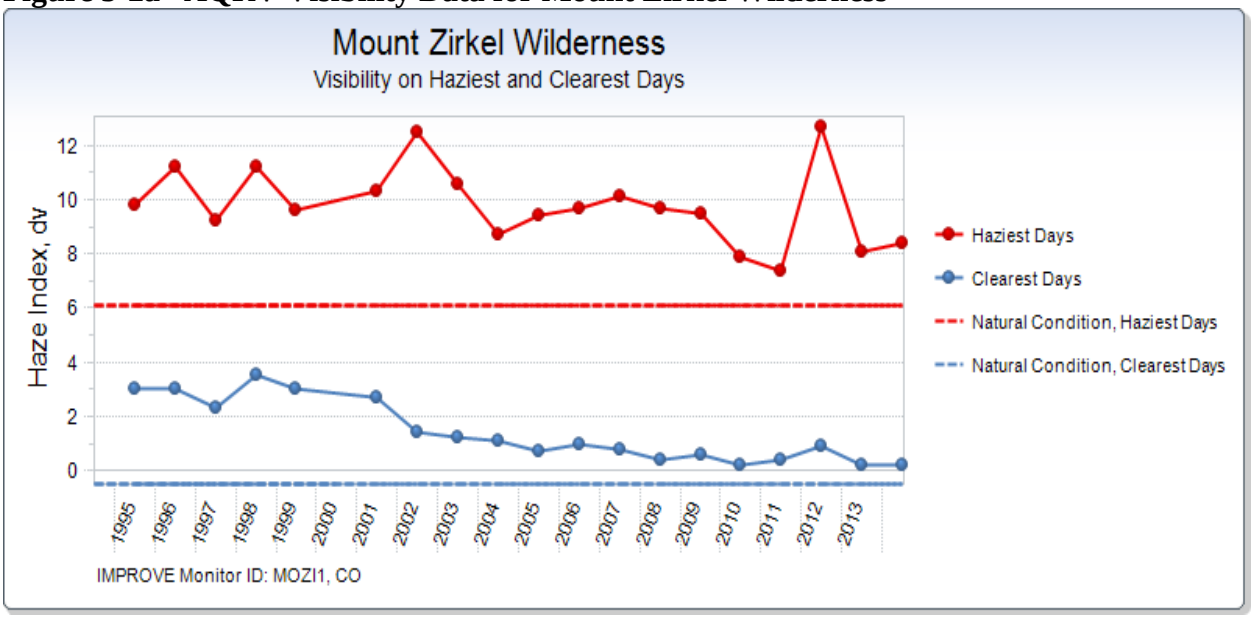


Figure 5-2b AQRV Visibility Data for Rocky Mountain National Park

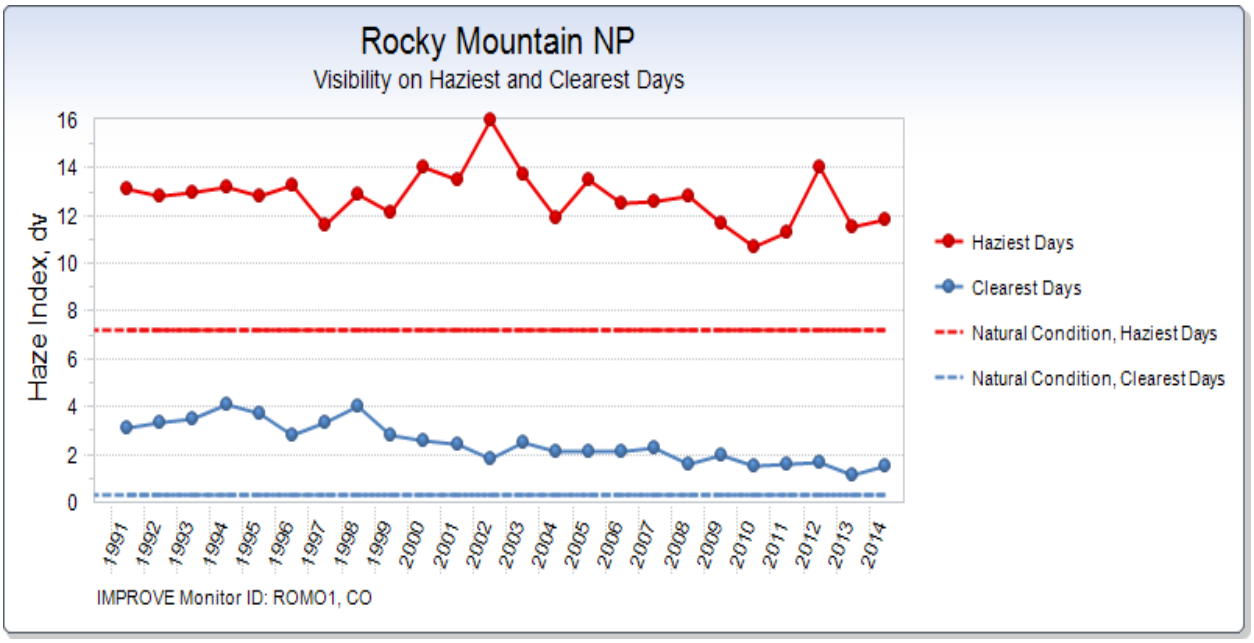
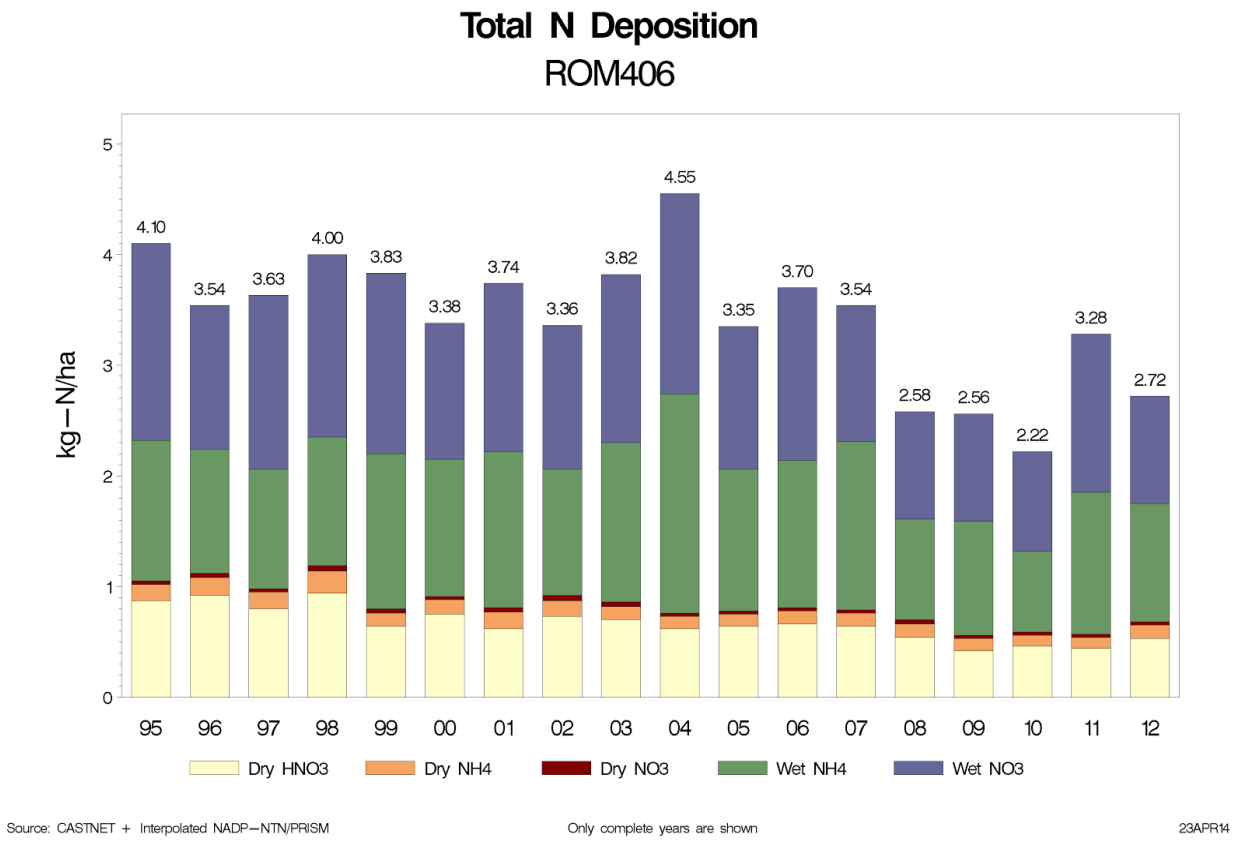
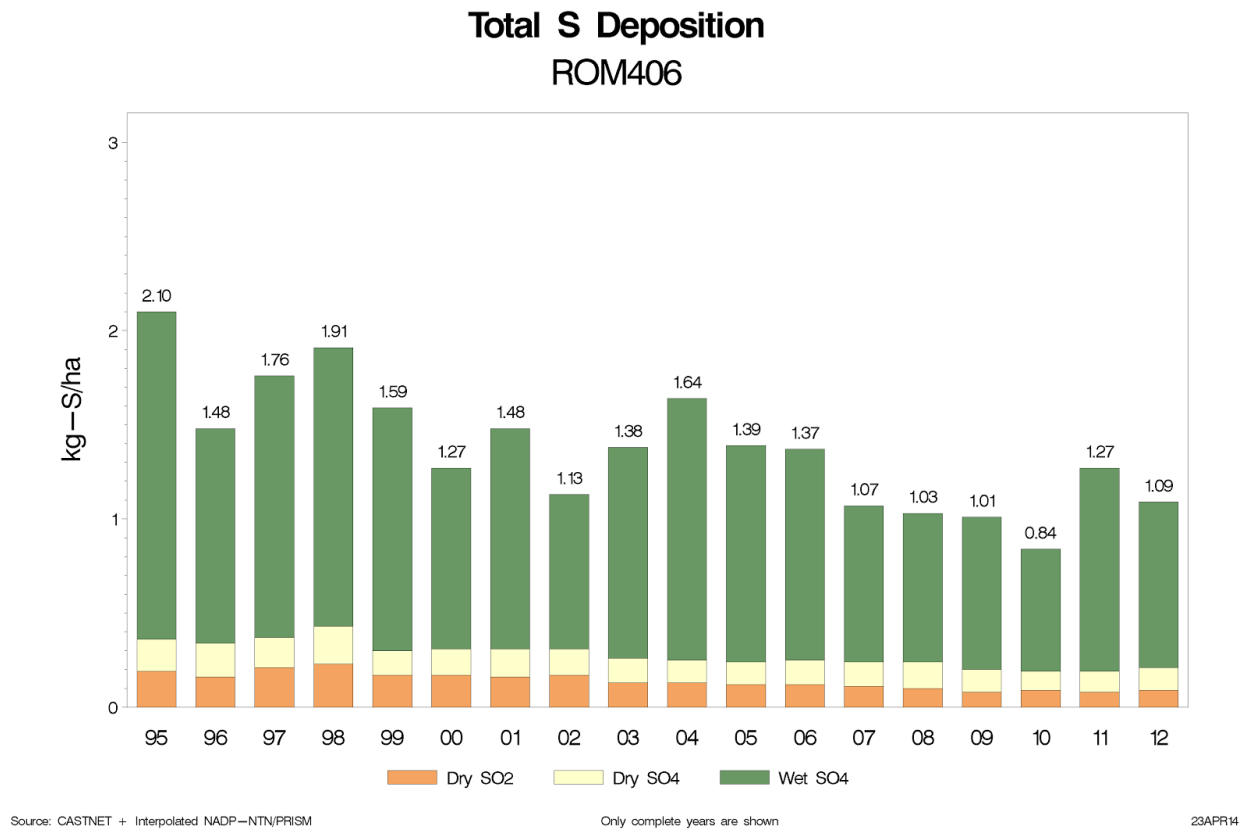


Figure 5-3 AQRV Deposition Data for Rocky Mountain National Park


Total N Deposition
ROM406
kg−N/ha
0
1
2
3
4
5
4.10
3.54
3.63
4.00
3.83
3.38
3.74
3.36
3.82
4.55
3.35
3.70
3.54
2.58
2.56
2.22
3.28
2.72
95
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10
11
12
Dry HNO3
Dry NH4
Dry NO3
Wet NH4
Wet NO3
Source: CASTNET + Interpolated NADP−NTN/PRISM
Only complete years are shown
23APR14



Greenhouse Gases and Climate Change

There is broad scientific consensus that humans are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, deforestation, and other changes in land use are resulting in the accumulation of trace greenhouse gases (GHGs) such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and several industrial gases in the Earth's atmosphere. An increase in GHG emissions is said to result in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, which is collectively referred to as climate change. The Intergovernmental Panel on Climate Change (IPCC) has predicted that the average global temperature rise between 1990 and 2100 could be as great as 5.8°C (10.4°F), which could have massive deleterious impacts on the natural and human environments. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and the burning of fossil carbon fuel sources have caused GHG concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2014 (as of April). The rate of change has also been increasing as more industrialization and

population growth is occurring around the globe. This fact is demonstrated by data from the Mauna Loa CO_2 monitor in Hawaii that documents atmospheric concentrations of CO_2 going back to 1960, at which point the average annual CO_2 concentration was recorded at approximately 317 ppm. The record shows that approximately 70% of the increases in atmospheric CO_2 concentration since pre-industrial times occurred within the last 54 years.

National Emissions Inventory Data (2011)

As previously stated, air quality is generally a function of air pollutants emissions loading within any particular region. With respect to KFO counties (Grand, Jackson, Larimer and Summit in north-central Colorado), the following emissions inventory summaries are provided to describe the affected environment in terms of current cumulative emissions intensities.

Table 5-3 2011 County NEI D

Grand	PM10	PM2.5	VOC	CO	NOX	SO2	CO2	CH4	N2O	NH3	HAPs
Agriculture										199.88	
Biogenics			20,926.80	1,966.67	86.69						1,212.83
Bulk Gasoline Terminals			11.82								0.13
Commercial Cooking	13.38	12.37	1.71	4.98							0.66
Dust	1,737.76	258.31									
Fires	5,699.79	4,827.99	13,350.34	56,788.98	679.93	397	616,167.95	2,753.21		928.23	1,212.24
Fuel Comb	41.59	41.22	45.09	272.81	79.42	34.22				4.85	7.9
Gas Stations			52.2								1.04
Industrial Processes	178.29	93.07	59.6	35.74	30.48	6.02					6.52
Miscellaneous			13.24		0.03	0.01					0.98
Mobile	84.56	74.34	967.98	6,313.54	1,531.06	11.24	208,294.08	22.33	7.93	13.01	244.3
Solvent			93.45								55.22
Waste Disposal	6.92	3.94	6.65							0.05	1.54
Sum Totals:	**7,762.29**	**5,311.24**	**35,528.89**	**65,382.72**	**2,407.62**	**448.49**	**824,462.03**	**2,775.55**	**7.93**	**1,146.03**	**2,743.35**
Jackson	**PM10**	**PM2.5**	**VOC**	**CO**	**NOX**	**SO2**	**CO2**	**CH4**	**N2O**	**NH3**	**HAPs**
Agriculture										277.69	
Biogenics			15,326.40	1,744.28	128.67						1,078.05
Bulk Gasoline Terminals			2.56								0.03
Commercial Cooking	0.34	0.33	0.04	0.14							0.02
Dust	421.02	66.9									
Fires	1,802.92	1,512.88	3,954.88	17,359.61	224.36	121.91	184,908.77	808.02		272	387.98
Fuel Comb	3.95	3.82	5	38.8	3.35	1				0.67	0.78
Gas Stations			1.54								0.09
Industrial Processes	95.63	42.95	655.62	61.72	54.23	2.33					8.5
Miscellaneous			2.89								0.21
Mobile	22.98	21.22	589.12	1,660.60	135.99	0.54	29,287.43	1.13	0.41	0.88	167.5
Solvent			17.51								5.83
Waste Disposal	0.01	0.01	0.03	0.01						0.01	
Sum Totals:	**2,346.86**	**1,648.12**	**20,555.59**	**20,865.15**	**546.61**	**125.78**	**214,196.20**	**809.15**	**0.41**	**551.24**	**1,648.98**
Larimer	**PM10**	**PM2.5**	**VOC**	**CO**	**NOX**	**SO2**	**CO2**	**CH4**	**N2O**	**NH3**	**HAPs**
Agriculture	1,370.53	274.1								1,399.84	
Biogenics			31,586.30	4,072.58	451.7						2,765.23
Bulk Gasoline Terminals			4.96								0.19
Commercial Cooking	125.95	116.73	16.71	47.86							6.57
Dust	4,360.73	598.36									
Fires	5,794.35	4,883.65	13,491.62	57,637.21	679.4	401.93	609,797.56	2,774.55		936.57	1,223.42
Fuel Comb	853.44	841.89	870.43	5,390.74	2,758.10	951.85				132.3	145.18
Gas Stations			724.9								12.89
Industrial Processes	300.08	87.53	911.65	107.04	99.27	5.7				0.13	4.55
Miscellaneous			218.45								16.1
Mobile	420.55	332.6	4,207.61	43,989.80	6,352.89	34.03	1,738,138.12	126.91	62.54	101.26	1,059.46
Solvent	6.34	5.29	2,266.50							12.39	1,354.81
Waste Disposal	70.23	67.89	172.39	102.01	44.21	12.46					9.35
Sum Totals:	**13,302.20**	**7,208.05**	**54,471.51**	**111,347.25**	**10,385.58**	**1,405.97**	**2,347,935.68**	**2,901.46**	**62.54**	**2,582.47**	**6,597.77**
Summit	**PM10**	**PM2.5**	**VOC**	**CO**	**NOX**	**SO2**	**CO2**	**CH4**	**N2O**	**NH3**	**HAPs**
Agriculture										25.56	
Biogenics			7,904.81	1,120.02	19.02						546.27
Bulk Gasoline Terminals			0.07								
Commercial Cooking	29.93	27.74	3.89	11.22							1.53
Dust	705.11	98.43									
Fires	453.45	384.28	1,068.01	4,537.60	52.78	31.31	48,539.46	220.15		74.3	95.37
Fuel Comb	66.28	65.53	80.28	477.83	120.45	3.33				9.23	12.61
Gas Stations			153.91								2.15
Industrial Processes	39.36	11.84	4.36	49.47	4.84	5.14					0.03
Miscellaneous			17.99		0.07	0.01					1.34
Mobile	73.33	62.4	746.85	7,530.18	1,204.23	5.07	290,363.76	34.71	9.84	17.54	193.21
Solvent			169.55								104.34
Waste Disposal	13.15	13.06	16.1	2.1	0.31	0.26					2.11
Sum Totals:	**1,380.61**	**663.3**	**10,165.83**	**13,728.42**	**1,401.70**	**45.12**	**338,903.22**	**254.86**	**9.84**	**126.62**	**958.95**

5.2.2. Environmental Consequences – Proposed Action

In general, the proposed action will have a temporary negative impact to air quality which will occur during the sporadic vegetation treatment and broadcast burning events. Utilization of unpaved access roads, surface disturbances and broadcast burning activities will all impact air quality through the generation of particulate matter. These activities will also produce short term emissions of criteria, hazardous, and greenhouse gas pollutants from broadcast burning smoke, vehicle and equipment exhausts. Once vegetation treatment and broadcast burning activities are complete for a particular sub-area within the entire project area, the daily activities at an area treated will be reduced to maintenance and vegetation management which may be as frequent daily visits. Emissions will result from vehicle exhausts and fugitive dust from unpaved roads from the maintenance / management personnel visits.

Ozone is not directly emitted like other criteria pollutants. Rather, ozone formation is complex, and generally results from the photochemical reaction of significant quantities of VOCs and NO_X emissions from various sources within a region, and has the potential to be transported across long ranges. Increased regional ozone formation has been shown to be associated with large episodic wildfire events, where smoke is transported large distances to increase ozone formation at various down-wind distances. In addition to ozone formation, smoke from fires consists of various particulate matter components that can elevate $PM_{2.5}$ and PM_{10} in human populated areas, and impair visibility at parks, wildernesses and other areas.

As described above, the bulk of the activities for the proposed action will have temporary negative impacts to criteria pollutants and HAPs related air quality during the vegetation treatment and broadcast burning phases. Emissions for short-term broadcast burning and unpaved surface disturbing events will not be generated with enough frequency to cause significant impacts to human air quality and related values (visibility, etc.) if certain good management practices are followed. These mitigation measures include:

- Reduce vehicle speed on unpaved surfaces (minimizes dust emissions);
- Minimize surface disturbing activities when windy episodes are forecasted and dry weather conditions exist (minimizes dust emissions);
- Apply water or other dust control measures to unpaved road surfaces that will experience multiple daily traffic trips during dry weather conditions; especially at areas on unpaved roadways near residences, places of business or similar (minimizes dust emissions);
- Minimize broadcast burning during windy events and / or for long periods when steady winds are forecasted that would transport smoke in the direction of human populated areas (residences, places of business or similar) or to parks, wildernesses or other similar areas (minimizes PM emissions transported to human occupied locations and visibility impacts to parks / wildernesses; also could minimize potential ozone formation in the ozone NAA).

The mitigation measures as described above would minimize impacts for the short-term vegetation treatment and broadcast burning phases of the proposed project. In addition to

assessing potential criteria pollutant impacts, net changes in carbon storage and related GHG emissions are also evaluated for this assessment. Using the BLM Medford, Oregon District GHG Emissions Model (Calculator), decreases in carbon storage (carbon loss for vegetation removal or burning) and associated CO2 equivalent emissions were calculated based on detailed information for the proposed project provided by Field Office specialists. The following Table 5-4 provides net changes in carbon storage and CO2 equivalent emissions for the proposed project. The following summarizes the assumptions and information that were used to develop the values for the table:

- The vegetation treatment (12,384 acres total) and broadcast burning (7,044 acres total) phases for the entire project area would last approximately 5 years.
- Approximately 20% of the areas treated or burned would be re-seeded and the other 80% would be left to re-vegetate naturally.
- Operations of ATVs, chainsaws, off-highway trucks and water trucks were included in calculations for off-road equipment.
- Operations of pick-up and heavy duty trucks were accounted for in calculations for on-road equipment.
- The net carbon change and CO2-e emissions calculations are for a short-term 10-year period that accounts for:
    - all areas that were planned to be treated / burned were treated / burned;
    - 20% of re-seeded areas completely grown-in within 10-year time period;
    - An additional 30% of the areas left to re-vegetate naturally would be completely grown-in within 10-year time period.

Table 5-4 Net Changes in Carbon and CO2 Equivalent Emissions

FOREST / VEGETATION MANAGEMENT	DECREASE IN CARBON STORAGE		CO_2 EQUIVALENT EMISSIONS		
PROJECT TYPE	Net Carbon Loss (MT)	Net Carbon Lost Per Acre (MT/Acre)	Carbon Dioxide Equivalent (MT CO2-e)	Carbon Dioxide Equivalent Per Acre (MT CO2-e/acre)	Relative Contribution (Percent)
FORESTRY COMPONENTS					
Slash Disposal - Onsite	7,072.1	0.6	25,954.6	2.1	59.2%
Broadcast Burning	31,573.3	4.5	115,874.1	16.5	264.4%
Reforestation/Revegetation	-26,743.0	-1.0	-98,146.8	-3.6	-224.0%
EQUIPMENT COMPONENTS					
Onroad and Offroad Equipment	38.9	0.0	142.9	0.0	0.3%
TOTAL FOREST MANAGEMENT	**11,941.4**	**0.4**	**43,824.8**	**1.6**	**100.0%**

As shown in the table above, there is a net loss in carbon storage (i.e. positive net CO2-e emissions) for the proposed project over the 10-year time period. Although, the net change in carbon storage (CO2-e emissions) for the project area over a much longer time period than 10-years would more than likely result in near zero net carbon loss and emissions, it is too speculative at this time to determine the types of vegetation that will eventually re-vegetate the

areas, how long that will take and if any other projects will be conducted year beyond the proposed action for the project area. For these reasons, the estimates above are reasonable for a 10-year period for the proposed action.

The following charts show net carbon loss and CO2-e emissions for the values in the table above. As shown in the charts, broadcast burning is by far the largest source of CO2-e emissions (cause of carbon loss) for the proposed project and these values are greatly offset by the re-vegetation carbon sequestration (CO2 emissions uptake) component that is reasonable to assume that would occur over the 10-year analysis period. As shown in the charts and table, the contribution from the equipment operations is almost negligible when compared to values for other activities.

Figure 5-4a CO2-e Emissions

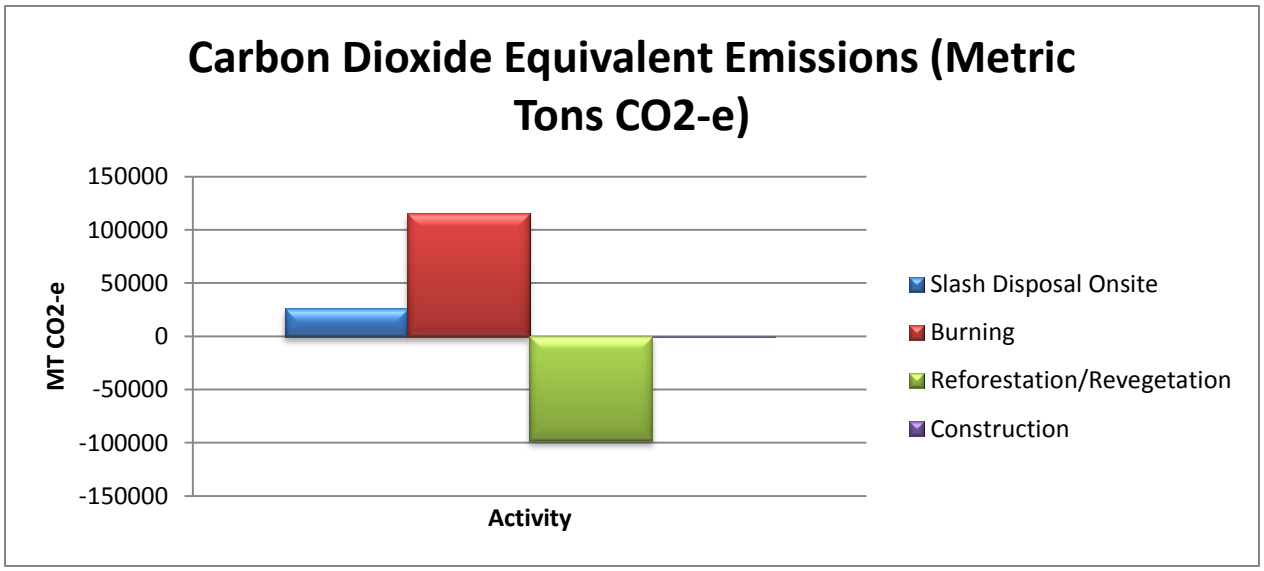
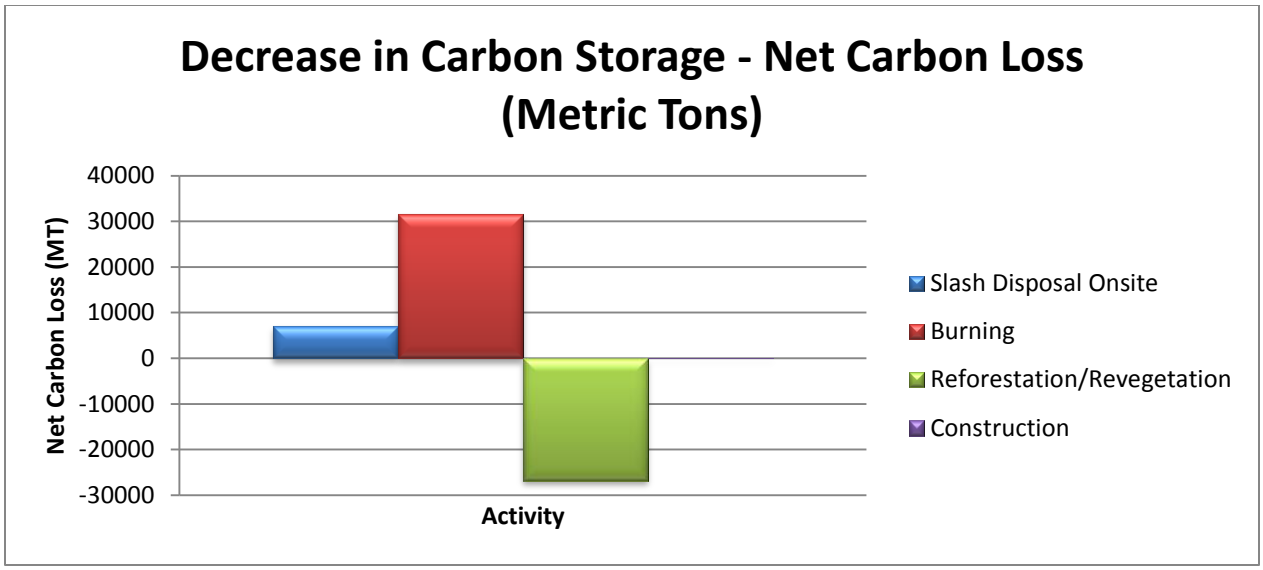


Figure 5-4b Net Changes in Carbon Storage



As described above for the net carbon storage capacity change calculations, it was assumed that a total of 50% of the treated areas would re-vegetate (20% re-seeded and 30% naturally) by the end of the 10-year calculation period. The design features as described for the Proposed Action show various methods and processes that will be implemented to promote and maintain healthy re-vegetation for the project area. Although the table and charts above show a net carbon loss and CO2-e emissions, it is reasonable to assume that by implementing the Proposed Action design features that all project areas would eventually re-vegetate healthy resulting in a near zero net carbon loss and CO2-e emissions for the project area when summed over many years.

5.2.3. Environmental Consequences – No Action Alternative

As described in the general description of the No Action Alternative for this Environmental Assessment, the types and locations of treatments would be similar to the Proposed Action Alternative, and projects would be developed individually through separate environmental assessments or other appropriate analyses in a piecemeal approach instead of a comprehensive planning approach. For this reason, it is reasonable to conclude that the potential air quality / Climate related impacts for the No Action Alternative would be similar as for the Proposed Action Alternative.

5.2.4. Mitigation Measures

As described earlier, the bulk of the activities for the proposed action will have temporary negative impacts to criteria pollutant and HAPs related air quality during the vegetation treatment and broadcast burning phases of the project. Emissions for short-term lived broadcast

burning and unpaved surface disturbing events will not be generated with enough frequency to cause significant impact to human air quality and related values if several good management practices are followed. These mitigation measures include:

- Reduce vehicle speed on unpaved surfaces (minimizes dust emissions);
- Minimize surface disturbing activities when windy episodes are forecasted and dry weather conditions exist (minimizes dust emissions);
- Apply water or other dust control measures to unpaved road surfaces that will experience multiple daily traffic trips during dry weather conditions; especially at areas on unpaved roadways near residences, places of business or similar (minimizes dust emissions);
- Minimize broadcast burning during windy events and / or for long periods when steady winds are forecasted that would transport smoke in the direction of human populated areas (residences, places of business or similar) or to parks, wildernesses or other similar areas (minimizes PM emissions transported to human occupied locations and visibility impacts to parks / wildernesses; also could minimize potential ozone formation in the ozone NAA).

For the net carbon storage change and CO2-e emissions calculations for this EA, it was assumed that 20% of the areas treated or burned would be manually re-seeded and the other 80% would be left to re-vegetate naturally over the 10-year analysis period. In addition to the mitigation measures above that are aimed at minimizing criteria pollutant and HAPs related impacts, it is encouraged that project areas are properly and adequately re-vegetated as soon as feasible to prevent prolonging re-establishment of carbon storage capacity for the project area.

5.3. Soil Resources

5.3.1. Affected Environment

The Natural Resource Conservation Service's (NRCS's) soil surveys for Grand and Eagle Counties were used for the environmental assessment, along with information from the NRCS's web soil survey. There are several soil mapping units within the project area, with a summary of the mapped ecological sites and soil concerns for each treatment area in the water quality report (appendix). The NRCS's soil surveys are not intended for site specific actions. In reviewing proposed treatments, however, they do help indicate the general soils, and where treatments may be the most practical. Additional applicability is gained by using aerial photography and field checks to improve soil mapping unit boundaries. Ecologic Site Descriptions are still being developed for the Grand County portion. The web soil survey has placed the Eagle County soils within ecological sites. Both surveys' production data were used for general community composition and production.

One of the soil mapping units within the project area include a complex that includes Torriorthents-Camborthids-Rock outcrops. This mapping unit includes soils that formed in an arid environment and generally have limited soil horizon development. They are highly susceptible to erosion, with rapid runoff and low to moderate plant available moisture. Rock

outcrops generally make up between 15-20% of the mapping unit, and increase the amount of runoff produced from the unit. This mapping unit was not within a range site, and does not have an ecological site description. This soil mapping unit will be avoided where possible, as treating these units will not meet the project's objectives and could result in increased soil loss.

Most of the project area has not been assessed for Land Health Standard for Upland Soils. Field assessments have been done in earlier pinyon-juniper treatments near Pumphouse and in the Yarmony burn unit. Earlier mechanical and manual vegetation treatments had not impacted soil health and the units were considered to be meeting the standard for upland soils. The treatments generally avoided steep slopes, were located in invaded sagebrush sites, and had limited ground disturbance.

The Yarmony Burn did result in areas with poor vegetative cover, which puts soils at risk for increased erosion.

5.3.2. Environmental Consequences – Proposed Action

The proposed mechanical treatment units already avoid steep slopes that are 35% or greater, and the design features and objectives limit treatments to sagebrush and mixed shrub sites. These features help reduce removing canopy cover and root stability from areas that will not respond with adequate grass and forb cover to stabilize soils and prevent accelerated erosion. Mechanical equipment generally has rubber tires to help reduce soil compaction and disturbances, and would not operate during wet soil conditions. To date, there has not been a field survey of the treatment units to verify general soil mapping units and to look for biological crusts. When part of an ecological site, biological crusts can be essential to ensure nutrient and water cycling in the soil and soil stability. These crusts can be an irreversible loss, especially in an arid environment.

Mastication increases the vegetative ground cover within the treated units. This material generally is not incorporated into the soil, but acts as a mulch layer. This mulch layer can reduce soil detachment and the soil's erosion potential. There are competing views on the amount of grass and forb production after treatment, but generally there appears to be an increase for at least the short term, and with aggressive weed control, will provide adequate soil protection and nutrient cycling. Studies to date indicate that the masticated materials result in increased soil bacteria populations, and a decrease in the fungi, slowing the decomposition of the organic material. The mulch will help moderate soil temperatures and moisture regimes, but trapped moisture in the mulch is evaporated and not used by plant roots. The mulch can create a dense fuel bed on the soil surface, which if burned, may increase the fire severity, increasing negative impacts to the soil.

Hand treatments generally have the least amount of soil and understory disturbance. Individuals removing invasive pinyon or juniper can avoid unstable soils and leave some litter arranged perpendicular to the slope, helping slow runoff and reduce soil loss. An actual impact of directional felling has not been thoroughly studied, and poor placement can actually accelerate soil erosion and loss.

Prescribed burning is planned generally in heavily wooded areas and on steeper slopes. By not burning pinyon-juniper ecological sites, there is a reduced risk of exposing underlying soils to erosion. Pinyon-juniper canopies protect the soils from direct raindrop impact and wooded areas produce the least amount of runoff, when compared to vegetated or bare interspaces between canopy openings. Tree roots can include both framework (horizontal) roots and tap roots (deep single root), allowing them to occupy very harsh sites where only limited vegetative cover can exist and to stabilize the site. If woodlands are opened up, not only can there be an increase in soil loss, but if cheatgrass or other invasives increase on the site, fire frequency can also increase, eventually eliminating native grass and forb populations and leaving soils very vulnerable to erosion.

In invaded sagebrush/shrub sites, prescribed fire would be used to remove the trees and leave (as much as possible) the sagebrush and understory vegetation unburnt. Broadcast burning often results in a mosaic of fire severity, and would be expected to create areas with various amounts of soil exposure, due to the removal of tree canopies and the consumption of litter or duff layers. Fire can alter the soil's water cycling, with reduced infiltration, increased rill erosion, and debris/ash movement. The consumption of vegetation also can alter the nutrients, resulting in leaching and volatilization. Soil impacts depend on the fuel loading, moisture content, fuel distribution, soil texture, soil moisture content, and the rate of combustion. Fire models aim to burn when the duff layers have sufficient moisture and depth to reduce exposure of the soil. Site visits after the fire would identify areas where erosion control and seeding are needed to help stabilize the site prior to the summer thunderstorms. Continued monitoring of the revegetation would help insure that soil health is protected.

5.3.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative, individual site treatments could still be proposed to improve vegetative conditions. The actual impacts would be similar to the impacts under the proposed action, depending on the type of treatment and its extent.

5.3.4. Mitigation Measures

None

5.4. Surface and Ground Water Quality

5.4.1. Affected Environment

The project area is located within the warmer and drier portion of the Kremmling Field Office's boundaries. Perennial waters include numerous seeps and springs, a few livestock wells, and

several streams, including the Colorado River. This segment of the Colorado River is classified for agriculture, coldwater class 1 aquatic life, existing primary contact recreation, and water supply. The tributaries also have the same classification, except they are not classified for primary contact recreation.

According to Colorado's "Integrated Water Quality Monitoring and Assessment Report, 2016", (aka 305(b) Report), the recreational, water supply, and agricultural uses are fully supported by the existing water quality in this segment of the Colorado River. The document states that the segment is not supporting aquatic life due to temperatures, and under the EPA's IR category rates it a "5", meaning it is impaired and a Total Maximum Daily Load (TMDL) is required. This is for segment 3(d) of the Colorado River from Gore Canyon to Derby Creek. There is also a segment 7 listed, described as just above the confluence with the Blue to the confluence with the Roaring Fork River, non-USFS lands. This appears to also cover the project area's portion of the river. The BLM has a temperature sensor at Pumphouse and at Radium. The temperatures are recorded every fifteen minutes, and there have not been maximum weekly average temperatures (MWAT) exceeding state standards for coldwater fisheries since 2009 when monitoring began. The river segment from Gore Canyon (confluence with Canyon Creek) to the confluence with Rock Creek (McCoy area) was just designated (2016) "Gold Medal Waters" by the Colorado Parks and Wildlife. Gold Medal Waters must produce a minimum of 60-pounds of trout/acre, and 12 trout of 14 inches or longer/per acre. There appears to be a discrepancy between the two state agencies.

Tributaries in the project area have not had much water quality sampling done. The BLM has collected a few samples and discharges on Cottonwood Creek and Sheephorn Creek. Both streams have erosive uplands and the county roads are within their floodplains. Although Sheephorn Creek contributes a visible sediment plum e to the Colorado River, upper segments have been found to support Colorado Cutthroat Trout. At this time, it is assumed that overall, water quality is acceptable. A single water quality sample has also been collected from all other streams and water sources. There are no identified concerns and the State considers these tributaries as fully supporting their use classifications.

Seeps, springs, and wells within the area are the groundwater sources in the area and are considered to be meeting agricultural uses. The Proposed Action buffers these groundwater sources from any treatment, so there will be no direct impacts. It is unlikely that there would be indirect impacts to the groundwater quality, so no further analysis is needed.

5.4.2. Environmental Consequences – Proposed Action

Vegetative treatments can increase the amount of runoff, reduce travel times, and increase the sediment loads, which can negatively impact water quality. Actual results can vary greatly from site to site and with the specific treatment results. If vegetative recovery occurs, then erosion rates typically drop to pre-treatment levels within 1 to 2 years. The design feature to assess treated areas immediately after treatment and after 2 growing seasons helps identify and improve areas that are still experiencing increased runoff and erosion. The design feature contributes to

the project area's hydrologic response and water quality returning to pre-treatment levels fairly soon (less than 5 years).

The design features help reduce negative impacts by only treating ecologic sites that are expected to respond with an increased shrub, grass, and forb community. Machinery will have rubber tires to help reduce soil compaction, and both site acess and treatment work will not occur during wet soil conditions. Ruts alter water runoff patterns, often shortening the pathways, and can increase soil detachment and transport. Buffering perennial streams will help increase the travel distances to live water, and if runoff leaves the treatment unit, some sediment deposition could occur prior to or on the stream's floodplain rather than reaching the streams.

The vegetative material left after mastication helps protect the soil surface, adding to any natural duff or litter layer. The material reduces soil detachment and can reduce or slow overland flow in areas where the canopy has been removed. The design features do not use mastication on slopes greater than 35%, which also helps prevent accelerated runoff and sediment loads. Removing the pinyon-juniper canopy decreases the interception and transpiration losses. In areas with less than 20 inches of annual precipitation, however, this will be offset by increased evaporation. Any water quality impacts from the proposed treatment would not be measurable once revegetation occurs. There would not be an increase in runoff, unless there is a change in other factors, such as increased soil compaction.

Prescribed burning effects depend on the actual site (slope, soil, vegetation condition) and fire severity and intensity. Low severity burns leave the duff layer basically intact, and there are generally few changes in runoff and erosion. Where fires consume the litter/duff layers, soils are exposed to raindrop impact and overland flow. This can result in increased sediment and nutrient loads. Actual impacts to water quality depend on the connectivity of the treatment areas and runoff pathways. Naturally, there are frequent vegetated canopy interspaces where runoff is detained and deposition occurs. If these vegetated "patches" are consumed, runoff can travel offsite, potentially reaching perennial waters and impacting water quality.

Vegetative treatments can also result in user created roads and/or increased use on existing roads. These roads tend to be the largest source of increased nonpoint source pollution associated with vegetative treatments. Widened, rutted roads can increase the drainage network density, altering runoff pathways and shortening travel times to water. Including road maintenance at the end of a treatment helps reduce this water quality concern.

5.4.3. Environmental Consequences – No Action Alternative

The No Action Alternative could involve the same proposed treatments and therefore, the same potential impacts.

5.4.4. Mitigation Measures

None

5.5. Aquatic Wildlife

5.5.1. ***Affected Environment:*** The proposed treatment areas are adjacent to the Colorado River, which supports an abundant amount of aquatic wildlife, including coldwater fish, invertebrates, ducks, geese, beavers, river otters, and muskrats.

5.5.2. Environmental Consequences – Proposed Action

The proposed fire activities could increase runoff and sedimentation in the drainages, and subsequently the Colorado River (see also Water Quality and Soils sections). An increase in sedimentation could negatively impact habitat quality for aquatic wildlife by reducing water quality. For example, increased sedimentation can alter pH and decrease dissolved oxygen which directly impacts fish, aquatic insects and aquatic plants. Sediment depositions also cement the gravel beds used for spawning, reducing the oxygenation of the spawning beds. These species are part of the food chain on which other aquatic wildlife (amphibians, waterfowl, beavers, otters, muskrats) depend to survive. Hand thinning, seeding and mechanical treatments would have slight to minimal impacts on aquatic wildlife as remaining project mulch and debris would enhance upland habitats ability to retain soil and moisture and not contribute to altering aquatic environments. Minimum treatment buffers (325ft) to the Colorado River would adequately protect impacts to aquatic wildlife.

5.5.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative, impacts to aquatic wildlife would be similar to the proposed action. If a wildfire occurred in the project area, however, there would be a much higher potential for large sediment loads to be deposited in the streams, impacting water quality and aquatic habitat. Heavy sediment loads could fill pools and spawning gravels. A wildfire could burn a large percentage of the project area, leaving few buffer strips of unburned vegetation to slow runoff and trap sediments.

5.5.4. Mitigation Measures: None

5.6. Vegetation

5.6.1. Affected Environment

The affected environment encompasses multiple ecological sites and precipitation zones. An Ecological Site Description (ESD) Report was used in extrapolating plant composition within the dominant ESD's in the project area (NRCS, web soil survey, 2016).

The Loamy Slopes, 3 to 25 percent slopes, is characteristic of Mountain mahogany (*Cercocarpus spp.*), Antelope bitterbrush (*Purshia tridentata*), Prairie junegrass (*Koeleria macrantha*), Western wheatgrass (*Pascopyrum smithii*), Bluebunch wheatgrass (*Pseudoroegneria spicata*), Saskatoon serviceberry (*Amelanchier alnifolia*), Indian ricegrass (*Achnatherum hymenoides*), Bottle brush squirreltail (*Elymus elymoides*), Black sagebrush (*Artemisia nova*), Big sagebrush (*Artemisia tridentata*), Sandburg bluegrass (*Poa secunda*) and Mountain big sagebrush (*Artemisia tridentata ssp. vaseyana*).

The Stony Loam, 12 to 25 percent slopes, is characteristic of Bluebunch wheatgrass (*Pseudoroegneria spicata*), Saskatoon serviceberry (*Amelanchier alnifolia*), Muttongrass (*Poa fendleriana*), Arizona fescue (*Festuca arizonica*), Needle-and-Thread (*Hesperostipa comata*), Prairie junegrass (*Koeleria macrantha*) and Big Sagebrush (*Artemisia tridentata*).

The Brushy Loam, 6 to 25 percent slopes, is characteristic of Gambel oak (*Quercus gambelii*), Elk sedge (*Carex garberi*), mountain snowberry (*Symphoricarpos oreophilus*), Saskatoon serviceberry (*Amelanchier alnifolia*), Letterman's needlegrass (*Achnatherum lettermanii*) and Mountain brome (*Bromus marginatus*).

A Rocky Loam, 15 to 60 percent slopes, is composed of Pine needlegrass (*Achnatherum pinetorum*), Bluegrass (*Poa spp.*), Bluebunch wheatgrass (*Pseudoroegneria spicata*), Big sagebrush (*Artemisia tridentata*), Bottlebrush squirreltail (*Elymus elymoides*) and Prairie junegrass (*Koeleria macrantha*).

The Mountain Loam, 6 to 45 percent slopes and 13-18" precipitation zone, is composed of Wheatgrass (*Pascopyrum spp.*), big sagebrush (*Artemisia tridentata*), Idaho fescue (*Festuca idahoensis*), Snowberry (*Symphoricarpos spp.*), Muttongrass (*Poa fendleriana*) and Prairie junegrass (*Koeleria macrantha*).

The Mountain Pinyon, 12 to 45 percent slopes, vegetation is composed of two-needle-pinyon (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), elk sedge (*Carex garberi*), forb species, Gambel oak (*Quercus gambelii*), grass species, mutton grass (*Poa fendleriana*), other shrub species, Saskatoon serviceberry (*Amelanchier alnifolia*) and western wheatgrass (*Pascopyrum smithii*).

5.6.2. Environmental Consequences – Proposed Action

Treatments within the project area could open the understory and allow forbs and grasses to establish where they were previously out-competed by junipers, shifting the plant community

towards a more desired state. Consequentially, mastication and prescribed fire treatments could allow invasive species such as Downy brome (*Bromus tectorum*) and houndstounge (*Cynoglossum officinale*) an open niche to establish and shift the plant community towards a less desired state.

5.6.3. Environmental Consequences – No Action Alternative

This alternative would keep the current management strategy, treatments would not be applied and the current plant community would continue to trend towards a juniper dominated state.

5.6.4. Mitigation Measures

Treatments techniques should be adjusted in areas with known invasive species infestations. Mastication should be given preference over prescribed fire in Downy brome infested areas and equipment should be inspected for seed to prevent spreading to un-infested areas.

Deferment or complete growing season rest could be required for two growing seasons or until monitoring data suggests that livestock grazing would not be detrimental to plant establishment or recruitment.

5.7. Invasive, Non-Native Species

5.7.1. Affected Environment

Sagebrush steppe, pinyon-juniper woodland, and mixed mountain shrub habitats in the Radium Valley project area include infestations of ten species listed by the State of Colorado as List B noxious weeds, four species listed as List C noxious weeds, and numerous other invasive non-native grasses and forbs.These species include List B noxious weeds in these habitats include Scotch thistle (Onopordum acanthium), bull thistle(Cirsium vulgare), Canada thistle (Cirsium arvense), musk thistle (Carduus nutans), plumeless thistle(Carduus acanthoides), houndstongue (Cynoglossum officinale), spotted knapweed (Centaurea stoebe ssp. micranthos), yellow toadflax (Linaria vulgaris), hoary cress (Cardaria draba), black henbane (Hyoscyamus niger).List C noxious weeds in these habitats include cheatgrass (Bormus tectorum), field bindweed,(Convolvulus arvensis), common burdock (Arctium minus), and common mullein (Verbascum thapsus).

In general the above noxious weeds infestation size are small (less than one acre) within the project area; however in fall burn areas such as Yarmony RX large infestations have occurred (greater than 30 acres).Cheat grass and the above thistle species have been difficult to control in these areas and there has been a loss of natural/desired vegetative communities. However in a spring prescribed burn, Inspiration Point for example, vegetative communities responded well and very little noxious weeds have been introduced or spread. In past mechanical treatments noxious weed spread/introduction has been very limited and good vegetative/desired conditions have not been affected and in many ways have been improved.

5.7.2. Environmental Consequences – Proposed Action

Under the Proposed Action, vegetation treatments would include removing juniper and pinyon trees, by mechanical treatments, prescribed fire, and hand treatments. These actions would expose the ground surface to increased sunlight and create patches of disturbed ground. Any type of soil or vegetative disturbance could provide avenue for the introduction or spread of noxious/invasive weeds. This can particularly be the case if noxious weed seeds are present or introduced during treatment operations and would create an ideal habitat for the introduction and spread of noxious weeds. Due to the presence of cheatgrass within the target habitat types, this species is of particular concern. The cheatgrass risk tends to be lower on treatment sites where initial (juniper, pinyon pine) canopy cover is lower and the densities of native bunchgrasses are higher.

Conversely, on sites with denser (Juniper, Pinyon pine) canopy cover and lower densities of native bunchgrasses, the risk of cheatgrass expansion following vegetation removal treatments is greater. This can particularly be the case of any type of prescribed fire activity due to cheatgrass' ability to significantly proliferate due to the presence of fire. To reduce the risk of noxious weed introduction and to spread and maintain natural/desirable vegetative communities see the above design features of the proposed action. With the proper implementation of the proposed design features, the natural/desired vegetative communities should improve, especially in the case of the herbaceous/woody understory with the removal of Pinyon pine/Juniper canopy. This in turn should decrease herbaceous, woody vegetative interspaces, and decrease overall chances of soil disturbance. With a healthier intact vegetative community, the likelihood of noxious or invasive species to spread or to be introduced should be reduced.

5.7.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative, impacts of habitat treatments on invasive non-native plants would be the same as the Proposed Action. Current management, consisting of designing and analyzing treatments on an individual project basis, would continue to be applied as mitigation for direct and indirect impacts on wildlife habitats. Individual weed treatments/ inventory not associated with other habitat treatments would continue to occur. Chemical control of weeds, while not specifically included in this EA, would accompany some habitat treatments, for the benefit of livestock and wildlife. Weed treatments using herbicides and other integrated Pest management were addressed in the KFO programmatic weed treatment EA (CO-120-2008-31-EA).

5.7.4. Mitigation Measures: See design features as per type of treatment above.

5.8. Migratory Birds

5.8.1. Affected Environment

BLM guidance for migratory birds emphasizes management of habitat for species of conservation concern by avoiding or minimizing negative impacts and restoring and enhancing habitat quality. The proposed treatment areas provide both foraging and nesting habitat for a variety of migratory bird species. Several species on the U.S. Fish & Wildlife Service (USFWS) Birds of Conservation Concern (BCC) list occupy these habitats.

Native plant communities in targeted areas would be comprised of sagebrush and mountain shrub with varying stages of pinyon-juniper tree encroachment to woodland establishment. Sagebrush species occurring on the BCC list that may utilize sagebrush in the proposed treatment areas include sage sparrow, sage thrasher, loggerhead shrike and Brewer's sparrow (also a BLM sensitive species). Two pinyon-juniper obligate species listed on the BCC list, the pinyon jay and juniper titmouse may also use this habitat type and can be found in old-growth pinyon-juniper woodlands that may be affected by the proposed treatments. Other perching birds in pinyon-juniper include Neotropical migrants such as the plumbeous vireo, mountain bluebird, black throated gray warbler, Virginia's warbler, and lark sparrow. Scattered pinyon-juniper trees may provide nesting and perching sites for a variety of raptor species.

5.8.2. Environmental Consequences – Proposed Action

Since project activities would not be permitted during the nesting period (May 15 – July 15), there would be little chance of take from proposed treatments. Individual birds would likely be displaced from the area during project implementation due to noise, smoke, and an increase in human presence. This disturbance would be minimal and short in duration.

The removal of encroaching pinyon-juniper trees would result in long-term benefits to sagebrush dependent bird species. Tree removal would ensure the maintenance of contiguous blocks of sagebrush habitat. The removal of pinyon-juniper trees could have some negative impacts to pinyon-juniper obligate species. However, targeted phase III areas are generally small and scattered and are within otherwise predominant sagebrush habitats. Old growth pinyon-juniper woodlands that likely exist adjacent to treatment areas would provide suitable habitat for these species.

Raptor species should not be affected as an abundance of upland foraging habitat exists in the general area. Some suitable perch trees would be eliminated, but this should have minor impacts to raptors in the area as an abundance of pinyon-juniper is found through-out the surrounding landscape. Incidental removal of sagebrush may have some impacts to migratory birds; however, this treatment would be very limited and not targeted by the proposed action.

5.8.3. Environmental Consequences – No Action Alternative

The no action alternative would analyze all habitat treatments individually. Analyzing potential impacts of individual habitat treatment projects to migratory birds would be similar as described above.

5.8.4. Mitigation Measures

Surveys prior to treatment may identify trees that contain nests, cavities, or demonstrate other qualities that make them valuable to birds and other wildlife. These trees would be signed, mapped or otherwise identified as trees to be retained within unit boundaries. Areas surveyed that render greater amounts of large and otherwise dead or dying pinyon-juniper would be identified to be retained in contiguous, uneven 40 acre patches to benefit migratory bird and big game refugia.

5.9. Terrestrial Wildlife

5.9.1. Affected Environment

The Proposed Action spans a wide array of vegetation types and elevation ranges (6,300 – 8,500 ft.). In general, the project area is largely comprised of mountain big, basin, and to a lesser extent Wyoming sagebrush communities, mountain shrub communities (serviceberry *Amelanchier alnifolia*), snowberry (*Symphoricarpos oreophilus*), mountain mahogany (*Cercocarpus spp.*), bitterbrush (*Purshia tridentata*, pinyon-juniper woodlands, small isolated pockets of aspen groves, and cottonwood galleries along drainage bottoms. This project area encompasses most of Game Management Unit (GMU) 361, a portion of GMU 36, and a very small portion of GMU 15. This area primarily offers big game winter habitat for a variety of ungulates such as mule deer, elk, and Rocky Mountain bighorn sheep. It is believed that the project area supports 8-10 times the amount of elk use as opposed to the other GMUs in Data Analysis Unit E-12 (Kirk Oldham pers. comm.). Mule deer numbers are at or near herd objectives with a year round population and increased use of winter range. S-77 bighorn sheep unit opened up one ram harvest tag in 2016 during rifle season.

Other terrestrial species range from small mammals, coyotes, bobcat, mountain lion, bear, wild turkey, dusky grouse, and a wide variety of raptor species including peregrine falcons in Gore and little Gore canyons.

5.9.2. Environmental Consequences – Proposed Action

Impacts to wildlife would vary depending on the size and location of the treatment area, habitat type involved and the type and timing of the treatment. Mechanical treatments would result in the removal or alteration of predominately woody vegetation as forage or cover resource for terrestrial wildlife species. Generally these shrubland communities can take anywhere from five years to several decades to return to a state functionally capable of

providing cover or forage for local wildlife. Mechanical treatments would likely result in the crushing of herbaceous vegetation, but would not be expected to result in a substantial loss of ground cover. Although not specifically targeted (see Proposed Action), mature components of pinyon-juniper woodlands provide nesting habitat for many woodland raptors. Proposed treatments would be reviewed and analyzed to minimize or avoid involvement of mature woodland types which have the potential to support raptor nesting functions.

Noise from the equipment would likely result in the displacement of wildlife in and around the treatment area. This would likely be localized and short term and in most cases, local wildlife would be expected to return to the surrounding area once the treatment is complete. Avoiding treatments during critical timeframes (big game calving and winter periods, raptor breeding) would minimize impacts to local wildlife.

In general, these treatments can have short term impacts on terrestrial wildlife by removing or degrading habitat, displacing wildlife, causing avoidance of otherwise functional habitats in close proximity to the treatment area and causing changes in movement patterns. There would also be potential for injury or mortality, particularly to slow-moving species. Conversely, fuels treatments may provide short term benefits to those species that depend on younger seral stages and in the long term may lead to an increase in herbaceous plant productivity and diversity, resulting in additional or better quality forage and cover resources for both big game and nongame species. For those species that rely on woody species (big sagebrush and mountain shrub communities) benefits may not be realized for several years to several decades.

The invasion of undesirable plant species would be of concern for both fire and mechanical treatments. Noxious and invasive plant species are generally of lower value to wildlife nutritionally and functionally (as a form of cover). Design features outlined in the Proposed Action would be expected to reduce the spread of noxious weeds and other annual species.

5.9.3. Environmental Consequences – No Action Alternative

Most species would not benefit from the decreased forage consequence of the no action alternative. The 60% forage to 40% cover objectives of the Kremmling RMP would diminish over time as phase I and II pinyon-juniper woodlands would reach later seral conditions and outcompete the understory communities and lower species diversity over time.

5.9.4. Mitigation Measures

None.

5.10. Special Status Animal Species

5.10.1. Affected Environment

Canada Lynx (*Lynx canadensis*): Habitat for Canada lynx, a federally threatened species, is not identified within the project area; however, the project falls within the State Bridge Linkage area. Linkage areas are habitat areas that provide landscape connectivity between blocks of habitat. Linkage areas occur both within and between geographic areas, where blocks of lynx habitat are separated by intervening areas of non-habitat such as basins, valleys, agricultural lands, or where lynx habitat naturally narrows between blocks.

Bald Eagle (*Haliaeetus leucocephalus*): Delisted from the Endangered Species Act on June 28th 2007, this raptor species still reserves protection from "take " defined under the Bald and Golden Eagle Protection Act of 1940 and remains a BLM sensitive species. Various breeding territories, associated nest sites, roosts, and winter habitat exist throughout the proposed action area which is bisected by the Colorado River. Some bonded pairs of breeding adults are known to reside in the river corridor most of the year.

Greater Sage-Grouse (*Centrocercus urophasianus*): Historic habitat for Greater sage-grouse, a BLM-designated Sensitive Species, exists throughout the entire project area. Various radio collard grouse GPS data points have been identified within the project area in recent years (2005 to present, Liza Rossi, CPW conservation biologist pers. comm.). While no sage grouse leks or production habitat is found in the proposed treatment areas, these areas may be composed of important relic habitat that could benefit this species.

Rocky Mountain Bighorn Sheep (*Ovis canadensis*): This species was added to the Colorado BLM list of sensitive species in 2015 mainly due to disease transmission from domestic sheep. This species was re-introduced to the area in 2009 and supplemented in 2013. S-77 bighorn sheep unit opened up one ram harvest tag in 2016 during rifle season.

5.10.2. Environmental Consequences – Proposed Action

Canada Lynx (*Lynx canadensis*): The proposed project temporarily alters the vegetation structure within the State Bridge Linkage area, but maintains connectivity within the lynx linkage area. In addition, the proposed project would not contribute to a reduction of habitat for prey species. Rather, an increase in ground vegetation is likely to occur, resulting in more cover and food for small mammals and birds that lynx prey upon.

Selection of the proposed action would result in a No Affect determination for impacts to Canada lynx for the following reasons:

- According to Colorado Parks and Wildlife tracking records, no radio-monitored Canada lynx currently inhabit the LAUs joined by the State Bridge Linkage Area, nor are they occupying the Linkage Area.

- The proposed project comprises a scattered area within the identified State Bridge Linkage Area and the dominant vegetation is mature pinion and juniper, which is not considered lynx habitat.
- Existing habitat features associated with the project area, which could provide barriers to lynx travel through this part of the State Bridge Linkage Area, include a well-traveled county road, a railroad-right-of way, and a major river.

- The proposed project would maintain connectivity within the linkage area.

Bald Eagle (*Haliaeetus leucocephalus*): Pinyon-juniper tree species are not identified as an important component to Bald Eagle life stages. No cutting, mastication or fire would be planned as a result of the proposed action within 0.5 miles of an identified nest site or 0.25 miles form an identified roost site. Additionally, favorable perching trees or snags that are positioned for or provide habitat value would be retained on an individual basis. Pinyon-juniper clearing or thinning is expected to benefit wintering habitat for these birds as it would indirectly provide increased production of their prey species.

Greater Sage-Grouse (*Centrocercus urophasianus*): Prescribed fire and other treatments would benefit historic sage-grouse habitat by increasing grass and forb productivity in the project area and increasing the size of sagebrush patches by removing encroaching pinyon and juniper trees. This increase in habitat could improve migration and augment existing habitat of sage-grouse between the Middle Park and Eagle/South Routt populations. A mosaic pattern would ensure a diverse age class of vegetative species, promote the health of the sagebrush ecosystem, and benefit the sustainability of Greater sage-grouse.

Rocky Mountain Bighorn Sheep (*Ovis canadensis*): Much of the proposed action is designed for the specific benefit of this species. Proposed actions are expected to improve forage, visibility, distribution and access to water and escape terrain throughout the project area. Direct and direct impacts would be identical to those identified in the above terrestrail wildlife analysis. Identified design features, #2 above, of timing limitations should be adequate to protect lambing grounds for this species.

5.10.3. Environmental Consequences – No Action Alternative

Canada Lynx (*Lynx canadensis*): The No Action Alternative would not change the structure of the vegetation in the project area and would make the area more susceptible to catastrophic wildfire. With this alternative, ground vegetation would continue to decrease in the pinyon-juniper habitat resulting in less desirable conditions for lynx prey species.

Bald Eagle (*Haliaeetus leucocephalus*): No impacts to Bald eagle are expected to occur as a result of the No Action Alternative.

Greater Sage-Grouse (*Centrocercus urophasianus*): The No Action Alternative would not change the structure of the vegetation in the project area and would make the area more susceptible to catastrophic wildfire. With this alternative, ground vegetation would continue to decrease in the pinyon-juniper habitat resulting in less desirable conditions Greater sage-grouse

Rocky Mountain Bighorn Sheep (*Ovis canadensis*): The 60% forage to 40% cover objectives of the Kremmling RMP would diminish over time as phase I and II pinyon-juniper woodlands would reach later seral conditions and outcompete the understory communities and lower species diversity over time. This would effectively diminish sage steppe communities that the S-77 herd depends on for much of the winter and spring. Visibility would decrease over time and discourage the dispersal of this species.

5.10.4. Mitigation Measures

: See Design Criteria #2, TL and #3, regarding ≥ 300 foot vegetation retention strips.

5.11. Special Status Plant Species

5.11.1. Affected Environment

Harrington's Penstomen (*Penstomen harringtonii*): Harrington's penstomen is a BLM sensitive perennial forb found in open sagebrush sites with encroaching pinyon-juniper, and on the edges of pinyon-juniper woodlands. Soils are typically rocky loams and rocky clay loams derived from basalt parent materials common to the upper Colorado River watershed. It grows at elevations between 6,200 and 9,200 feet. This habitat is present on sagebrush benches through-out the proposed treatment areas.

5.11.2. Environmental Consequences – Proposed Action

Harrington's Penstomen (*Penstomen harringtonii*): Harrington's penstomen occurs within the habitat types proposed for treatment. Potential direct impacts to this species could result from crushing under machinery used in treatment implementation, or from burial under woody mulch. Trampling from hand thinning or debris created from hand cutting may intercept resources needed for life stage development and recruitment. Plant mortality or reduced seed production could occur from prescribed or resource fire actions. Additional negative impacts to plants from proposed actions could result from the introduction or increase of noxious weeds during implementation. Potential positive indirect effects could also result by removing encroaching pinyon-juniper trees from sagebrush habitat and

treatment of noxious weeds. To prevent negative impacts, botany surveys would be conducted to project units prior to implementation.

5.11.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative, impacts of habitat treatments on Harrington's penstomen would be the same as the proposed action. Current management, consisting of designing and analyzing treatments on an individual basis, would continue to be applied as mitigation for direct and indirect impacts on wildlife habitat as a result of proposed treatments.

5.11.4. Mitigation Measures

Removal of trees would not occur within 300 meters of any occurrence of Harrington's penstomen. Treatments occurring adjacent to plant colonies would be scheduled in late fall and when the plants are determined to be dormant. Equipment would need to be washed and inspected by BLM staff prior to implementation in areas adjacent to plant colonies or in areas where travel is necessary for treatments. Site-specific seeding or herbicide restrictions may be prescribed in order to aid in habitat restoration.

5.12. Cultural Resources

5.12.1. Affected Environment -

The affected environment lies along the Colorado River which was used prehistorically by native people and historically by settlers and miners. Cultural resource inventories at the Class III level have been conducted to identify and evaluate historic properties to the National Register throughout much of the area. Areas that have not had a cultural inventory will be surveyed at the Class III level for unknown historic properties to be evaluated for the National Register of Historic Places (NRHP). Because the action is considered maintenance of previous fuels treatments to maintain healthy wildlife habitat and is phased over the next few years, consultation with the State Historic Preservation Officer (SHPO) will be for the individual actions to determine project affect. Newly inventoried areas will have their actions limited to hand or mechanical treatments to avoid a potential adverse effect.

5.12.2. Environmental Consequences – Proposed Action

The proposed action for the Hartman Divide/Radium Benches project was previously inventoried for fuels reduction in BLM report CR-04-20 and CR-04-10. The inventories were at the Class III level and Class II level for slopes greater than 30% for an inventory of 1,017 acres in BLM reportCR-04-20. One historic property 5GA3277 a prehistoric lithic scatter was located and evaluated as not eligible to the NRHP, therefore avoidance is not necessary. Another 695 acres were inventoried at the Class III level in BLM report CR-04-10 which located a total of 38 cultural resource sites and isolated finds (IFs) and evaluated as significant seven of those

prehistoric sites 5GA3093, 5GA3108, 5GA3111, 5GA3116, 5GA3119, 5GA3120, and 5GA3123. Broadcast burning across prehistoric sites would have an adverse effect to exposed hearths and bone that could be present and that lend to the sites eligibility. Heavy fuel loads would have the potential to affect buried cultural material depending on soil moisture and depth below surface of the artifacts or features (i.e. hearth). Hand thinning and carrying woody material off site would have a potential to provide direct site protection by the removal of fuel loading from sites within pinyon and juniper stands and continue earlier fuels treatment at the sites. Mechanical treatments such as mastication would have the potential of adversely affect an historic property because of the potential to alter the ground surface by digging into the soil and causing potential future direct and indirect effects from water runoff eroding and exposing cultural material. A Class III inventory BLM report #CR-16-08 located one historic grave yard 5GA4454 that is not considered to be significant and relocated prehistoric campsites 5GA659 and 5GA737 that are significant. Removal of fuel loading from the sites would have a direct effect of lessening potential wildfire impacts that would result in exposure to direct erosion resulting in the loss of cultural material form hearths and exposure of artifacts to collection.

5.12.3. Environmental Consequences – No Action Alternative

The no action alternative would have an indirect affect to prehistoric sites by allowing the increased accumulation of fuel loads on historic properties and would have catastrophic effects from a wildfire, causing direct disturbance or loss of cultural artifacts, features and scientific data from a catastrophic wildfire. The increased fuel loads would have direct and indirect affect to artifacts on the surface and those artifacts below ground surface depending on depth below surface, temperature, time of exposure to heat, soil moisture, and type of artifact or feature. There would be impacts to cultural resources from rehabilitation, the use of chemicals like retardants, introduction of weeds and pollens affecting paleobotanical data on archaeological sites.

5.12.4. Mitigation Measures

All eligible sites 5GA659, 5GA737, 5GA3108, 5GA3111, 5GA3116, 5GA3119, 5GA3120, 5GA3123, and 5GA4454 will have all heavy fuels removed from within the site boundary under the supervision of the Field Office Archaeologist using hand thinning and removal. The removal of fuel loading from within site boundaries would be continued maintenance from previous fuels treatments for habitat improvements in 2005. No mechanical or prescribed burning would take place on significant historic properties.

5.13. Paleontological Resources

5.13.1. Affected Environment

The BLM has implemented a Potential Fossil Yield Classification (PFYC) system for classifying paleontological resources on public lands. Under the PFYC system, geologic units are classified from Class 1 to Class 5 based on the relative abundance of vertebrate fossils or uncommon invertebrate or plant fossils and their sensitivity to adverse impacts. A higher classification

number indicates a higher fossil yield potential and greater sensitivity to adverse impacts. The project area contains portions of geological formations known to produce high scientifically valuable fossils, resulting in PFYC 3 classification. The formations affected, their PFYC values, and their known fossil types within the KFO proposed lease areas, are as follows (BLM Colorado State Office PFYC chart):

Troublesome – PFYC 4-5 – Mammals, including rodents such as squirrels, rabbits, horned gophers, and horses, camels, artiodactyls, and coprolite with fossil rodents skull, cats, insects, and fossil hackberry seeds; Condition 1.

Biotitic Gneiss, Schist, and Migmatite (Age 1700 – 18—m.y.) - PFYC 1 – None known. Condition 3.

The PFYC 3 has geologic units containing a high occurrence of significant fossils but is overlain by a PFYC 1. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Site 5GA1778 a Paleontological find of a Allosaur bone was collected from the north side of the Colorado River from an unrelated formation to the project area.

5.13.2. Environmental Consequences – Proposed Action

Vertebrate or other scientifically significant fossils would be inadvertently damaged from direct and indirect wildfire. Surface-disturbing activities could expose, dislodge, or damage paleontological resources and features that were not visible before surface disturbance.

5.13.3. Environmental Consequences – No Action Alternative

Fossil resources would likely be affected by an intense wildfire. New information on the paleontological resources that might be obtained in the area would not be forthcoming.

5.13.4. Mitigation Measures

Standard assessment/inventory and avoidance procedures conducted in conjunction with or prior to surface-disturbing actions would protect most paleontological resources from future indirect or direct impacts.

5.14. Visual Resources

5.14.1. Affected Environment

Visual resources are the visible physical features of a landscape that convey scenic value. The Proposed Action is within an area designated as Visual Resource Class II. The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape. The approved VRM objective classes provide the visual management standards for the design and development of future

projects and for rehabilitation of existing projects. The contrast rating process (Manual Section 8431) is used as a visual design tool in project design and as a project assessment tool during environmental review. Contrast ratings are required for proposed projects in highly sensitive areas or high impact projects, but may also be used for other projects where it would appear to be the most effective design or assessment tool. Projects must comply within contrast limits identified for designated VRM objective classes or mitigate for potential effects so that contrast ratings are not exceeded for a given class.

The proposed project area consists of gentle to steep slopes, numerous drainages and draws and is along the main Colorado River drainage. Vegetation within the Proposed Action area consists of pinyon/juniper stands which have greater density in some areas with scattered pinyon/juniper trees encroaching on sagebrush steppe areas. Some drainages and banks of perennial waterways include fur and cottonwood trees. Rock outcropping cliff faces and intermittent exposed soils are also visible within the area. Other areas proposed to be treated include mixed mountain shrublands. Vegetation within the area provides the dominant visual elements to the landscape in regards to the project areas color and texture. Dark to redish rock outcroppings and cliffs, buff to tan exposed soils, lighter green colored sagebrush areas and the darker green colored pinyon/juniper stands provide color contrasts to the area.

The Key Observation Points (KOPs) from where the Proposed Action may be visible to the casual observer include the Trough Road which is also a nationally designated Scenic Byway and the Colorado River which is highly utilized for river recreation opportunities and includes three developed recreation sites. A viewshed analysis finds the majority of the project area is within view of the KOPs which fall within the Upper Colorado River Special Recreation management Area (UCRSRMA) and the Colorado River Headwaters National Scenic Byway (CRHNSB).

5.14.2. Environmental Consequences – Proposed Action

The Proposed Action would remove vegetation by various methods including both manual and mechanical means and use of fire to improve wildlife habitat. Goals and objectives of vegetation reduction and goals are dependent on three identified phases for the pinyon-juniper woodlands and the identified general treatment objectives for each phase. Due to there not being an inventory of which area is in what phase Environmental Consequences are identified broadly for the project area and will require site specific analysis with specific Contrast Rating Worksheets developed for each project.

In areas identified within Phase I treatment objectives identify a 70-100% reduction of pinyon-juniper trees. This would potentially provide a short term change to the landscape and be noticeable to the casual observer. Jackpot Burning would occur within Phase I treatments with an objective to reduce 90% of of 1 hour, 10 hour, and 100 hour fuels of dead pinyon and juniper. This would potentially increase the change to the landscape when combined with manual and mechanical treatments. Conversely, depending on treatments on lands managed by Colorado Parks and Wildlife some consistency may occur, but would not for any lands not treated.

In areas identified within Phase II treatment objectives identify a 40-90% reduction in pinyon-juniper trees. The Description of Phase II growth identifies “Target trees in this phase range from

saplings to trees >200 years old." While broadcast burning can mimic naturally occurring reduction of fuel loads, the combination of both mechanical and fire treatments would create changes to the characteristic landscape. Conversely, as with Phase I treatment areas, depending on treatments on lands managed by Colorado Parks and Wildlife some consistency may occur, but would not for any lands not treated.

In areas identified within Phase III treatment objectives identify a 10-40% reduction of pinyon-juniper trees. The description of Phase II identifies that occupation of pinyon-juniper on-site is complete. Considering that this Phase is likely the denser Pinyon Juniper locations a reduction40% would have less impacts than objectives for Phase I and II but may have adverse impacts dependent on how effective objective goals are met. A 10% reduction would have a minimal or weak impact to the landscape and likely be unnoticeable to the casual observer. However, a 40% reduction would likely be noticeable to the casual observer and have a moderate impact to the charachteristic landscape. Additionally, Broadcast Burning would occur in Phase III areas as with Phase II areas with an objective to reduce pinyon-juniper by 30%-90%. This would assist in project implementation and meeting objectives for areas where mechanical treatment could not occur due to topographical constraints and protective measures for other resources. While broadcast burning can mimic naturally occurring reduction of fuel loads, the combination of both mechanical and fire treatments would create large changes to the characteristic landscape. In combination with a mechanical objective to reduce pinyon-juniper by 10-40%, broadcast burning to additionally reduce pinyon-juniper in Phase III areas, even with the lowest objective percentages met would have a moderate to high impact on VRM resources.

Over the long term, habitat treatments would likely improve visual resources and with the inclusion of design and mitigation measures no new contrast or long term impacts would be introduced.

5.14.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative site specific vegetation treatments would occur and have similar impacts described under the proposed action.

5.14.4. Mitigation Measures

- Mitigation measures are identified to ensure that VRM Objective Classes are met or where impacts to visual resources can be mitigated to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- To avoid or minimize impacts to visual resources, project proposals would require a detailed project description to effectively evaluate impacts of a proposed project including method of

vegetation treatment, size and magnitude. The VRM class objective for the proposed project area should be identified. The VRM class objective would reflect the management decisions made in the KFO Resource Management Plan (BLM 2015). The project proposal should be evaluated to determine if the VRM objective would be met and if additional mitigation measures are required to reduce visual impacts.

- In all treatment areas an approximate 50 foot buffer around the project perimeter will not be treated as to match existing vegetation openings and the surrounding landscape, to blend with existing vegetation.

- Openings and edges of treated areas should have a natural appearance with uneven edges rather than straight lines. The shape should be an irregular pattern like the existing natural openings and should avoid straight-line edges. The edges of the stands should be varied and random to soften and blend with the native vegetative mosaic. Favor existing healthy dominant trees to shape the edges of areas where materials are to be removed. Blend with natural landscape features such as natural openings and rock outcrops when possible. This will create free form vegetative shapes that mimic natural patterns. Make clearing edges irregular and freeform, feathering and undulating edges where possible.

5.15. Scenic Byways

5.15.1. Affected Environment

The Proposed Action is along The Colorado River Headwaters National Scenic and Historic Byway (CRHNSHB) which is located along the Colorado River between its Headwaters in Rocky Mountain National Park and State Bridge. The CRHNSHB was designated as a National Scenic Byway in 2005. Under the National Scenic Byway Program, the U.S. Department of Transportation recognizes certain roads as National Scenic Byways or All-American Roads based on archeological, cultural, historic, natural, recreational and scenic intrinsic qualities. To be designated as a National Scenic Byway, a road must possess at least one of the six intrinsic qualities. The significance of the features contributing to the distinctive characteristics of the corridor's intrinsic qualities must be recognized throughout the multi-state region (CRHNSHB Corridor Management Plan and Business Plan 2008.)

The CRHNSHB Corridor Management Plan and Business Plan identifies a Vision Statement and guidelines for the identified intrinsic qualities. The Vision statement for the CRHNSHB is "The vision of the Colorado River Headwaters Byway is to preserve the rural heritage and natural, scenic and historic resources of the byway corridor and:

1.) Help visitors find and enjoy outdoor recreational opportunities offerd through byway attractions
2.) Provide economic opportunities and benefits to the local communities
3.) Emphasize the regional and national significance of the Colorado River.

Key objectives of this vision – in order of importance – include:

1.) Preserving, protecting and interpreting the resources which tell the story of the people who settled the area and whose descendents now live along the byway.
2.) Protecting and enjoying the wide range of wildlife in these rural envirlonments.
3.) Protecting local community culture and values.
4.) Informing visitors of the regional and national significance of the Colorado River.
5.) Managing use of the area's resources in order to protect resources for future generations and advise them of acceptable opportunities for local residents.
6.) Providing economic diversification opportunities for local residents.
7.) Informing visitors of important local economic activities that contribute tot the community and national community.

The byway is separated into segments which identify intrinsic qualities and outlined within the Byway Intrinsic Resources Grid. The grid and subsequent information can be used to identify the intrinsic qualities along the byway and can assist in planning future projects and activities for the byway segments. Within each segment resources are identified and their specific intrinsic quality and identifies if the resource should be Enhanced and/or Protected, and defined by the following definitions:

E = Enhanced (developed and maintained in a sustainable matter and/or promoted by Byway materials)

P = Protect (preserve as is and protect from future impact and/or down-market or no marketing in Byway materials.

The Proposed Action is within the Trough Road to State Bridge Segment See Table Below.

ENHANCE/ PROTECT	RESOURCE	INFO STOP	INTERP SITE	INTRINSIC QUALITIES: SCENIC	HISTORIC	CULTURAL	RECREATION	ARCHAEOLOGY	NATURAL
TROUGH ROAD TO STATE BRIDGE *(continued)*:									
P	Trough Road			S					
P	Access/confluence of Blue and Colorado Rivers			S			R		N
E/P	E. C. Yust Ranch (private property)				H				
P	Inspiration Point		INT	S	H				N
P	Gore Canyon			S			R		N
E/P	Watchable wildlife		INT	S			R		N
P	Radium State Wildlife Area			S			R		N
P	Pumphouse Campgrounc		INT	S			R		
E	*Rancho del Rio						R		
E/P	BLM Access to Colorado River at Radium			S			R		N
E/P	Historic Railroad Town of Radium				H				
P	Yarmony Pit House Prehistoric Site							A	
E/P	Hi-Line Trail Overlook			S			R		N
E	*State Bridge Lodge						R		

ADDITIONAL COMMENTS:
In general, down market high use areas along Trough Road (BLM lands). Mention, but don't specifically market.
Those seeking solitude should seek elsewhere.

Resources are further broken down identifying the intrinsic qualities that the byway is primarily managed for and why it has been designated, in this case Scenic and Historic. All intrinsic qualities for the Trough Road to State Bridge Segment are Scenic, Historic, Recreation, Archeological or Natural defined by the following definitions:

S = Scenic Qualities - These are visual resources, composed of multiple elements, such as fields, buildings, rock forms, landforms, water, vegetation, distant mountains, skylines and sky that

constitute a view from the road. Scenic qualities include the ordinary as well as the spectacular. The composition of features in a view should evoke a sensation - try to look beyond the obvious.

H = Historic Qualities - These are legacies from the past. Historic sites or landscapes may be structures or sites that include buildings, bridges or burial sites. Historic sites may be less tangible and include entire farming or ranching communities, transportation or other infrastructure systems, or development patterns (historic downtown districts, for example). Many modifications to the natural environment may have historic qualities.

R = Recreational Qualities - These are traditionally associated with nature-based recreations - hiking, skiing, boating, hunting, guiding, fishing, camping, etc. Recreationalists may use bicycles, all-terrain and other off-road vehicles, hot air balloons and hang gliders, too. Consider the amenities users might appreciate - paths, benches, signs, picnic and rest spots, etc. These uses and qualities may be something to advertise and promote, or to discourage and protect.

A = Archaeological Qualities - These include past cultures and communities, as well as artifacts and ruins. Ancient rock art, dinosaur bones and cliff dwellings may come to mind.

N = Natural Qualities - These provide opportunities to experience landscapes that are not artificial. Think of watershed systems, alpine tundra, wetlands, erosion-formed rock features, prairie or desert systems.

The Proposed Project area falls in areas identified as Scenic and Natural with additional qualities if Recreational and a Historical component at Inspiration Point as well. Primary objectives are to manage for the scenery including the composition of features and the natural landscape that are not artificial.

5.15.2. Environmental Consequences – Proposed Action

Treatments under the Proposed Action would change the areas current composition of vegetation. Treatments would occur along the byway and within the viewshed of the byway and may be visibly noticeable (see Visual Resource section) to the casual observer. If proposed treatment objectives were to be achieved at their higher thresholds there would be greater impacts to the intrinsic qualities identified for the byway that made it unique for national designation. Conversely, if lower objective thresholds were met there would be less adverse impacts to the scenic byway and its intrinsic values. Regardless of the objective threshold achieved, there would be a change to the landscape the byway outlines as an intrinsic quality.

5.15.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative, proposed treatments would have the same impacts to the byway.

5.15.4. Mitigation Measures

- Include all mitigation measures identified under the Visual Resource, Wild and Scenic Rivers and Access and Transportation sections to reduce impacts to the Scenic and Natural Intrinsic Qualities identified for the byway.
- Work with local CHRNSHB committee and partnering organizations for onsite interpretation opportunities and information for any treatments within the area.
- Work with the Colorado Scenic Byways program for web-based and on-site interpretation opportunities and information for any treatments within the area.

5.16. Wild and Scenic Rivers

5.16.1. Affected Environment

Colorado River segments 4 and 5 (Confluence to State Bridge) represent one of the last major river corridors in Colorado that is relatively undeveloped. They were found suitable in 2011, for inclusion into the National Wild and Scenic River System as recreational segments. In these segments, residents and visitors can experience how Colorado appeared and see how rural ranching and farming functioned, before major population increases began in the state from 1970s onward. In addition visitors can experience a broad range of values, including challenging whitewater rafting, scenic float trips, historical structures and routes, and plants and animals that are infrequently seen elsewhere in the state.

The floatboating and fishing values in the area have been identified as important economic factors for the community. The river segments and their Outstanding Remarkable Values are within one day’s drive of major metropolitan areas in the Front Range and within one hour’s drive of three major resort communities, making them highly accessible.

Section 4 (Gore Canyon) segment contains outstanding remarkable recreational (fishing, floatboating, and scenic driving), geological, wildlife (bald eagle and river otter), and historic (Historic Moffat Road, early hydroelectric projects, and a WWII German prisoner of war camp) values.

Section 5 (Pumphouse to State Bridge segment contains outstanding remarkable recreational (fishing, floatboating, and scenic driving), scenic, geological, wildlife (bald eagle and river otter), and historic (Historic Moffat Road, early hydroelectric projects, early copper mining, Brass Balls Mine/Cable Rapid Cabin, and State Bridge) values.

5.16.2. Environmental Consequences – Proposed Action

The proposed action could haveLLCO impacts on the resource, depending on the amount of vegetation removed and the type of visual techniques used. BLM Manual 6400 – Wild and Scenic Rivers states, "Scenic and Recreational - A range of vegetation management and timber harvest practices are allowed, provided that these practices are designed to protect, restore, or enhance the river environment, including the long-term scenic character." If the project isn't designed to enhance the long term scenic character of the .25 mile corridor, then it wouldn't be allowed. The manual also states, "Prescribed fire may be used to restore or maintain habitat for threatened, endangered, or sensitive species; restore or maintain ecological conditions; and/or meet desired conditions of the RMP."

5.16.3. Environmental Consequences – No Action Alternative

The no alternative action would have little to any impacts to the resource.

5.16.4. Mitigation Measures

Design vegetative opening to repeat natural opening in the landscape. Edges that are scalloped and irregular are more natural looking. Straight line edges will be avoided.

Minimize the impact on existing vegetation by:

- Partial clearing of the limits of construction rather than clearing the entire area – leaving islands of vegetation results in a more natural look.
- Use irregular clearing shapes
- Feather/thinning the edges of the cleared areas. Feathering edges reduces strong line of contrast. To create a more natural look along an edge, a good mix of tree/shrub species and sizes will be retained.
- Dispose of all slash.

5.17. Livestock Grazing

5.17.1. Affected Environment

Overview

Lands used for livestock grazing have high cultural and economic significance to the community. Livestock grazing occurs on BLM-administered lands throughout the project area, with permits distributed over eight allotments and listed in Table 5.17. The KFO conducts Rangeland Health Assessments in allotments and determines if the allotments meet the Colorado Rangeland Health Standards. Most allotments within the project area are meeting Rangeland Health Standards while some allotments do not have an assessment on file.

Table 5.17.

Allotment	Livestock Number & Kind		Season of Use	% Public Land	AUM's
07535	189	C	6/01 to 10/31	18	171
07537	172 150	C C	5/10 to 5/28 5/20 to 6/20	100 100	107 158
07547	8	C	5/16 to 10/08	15	6
07558	430 84 5	C C H	3/01 to 2/28 5/16 to 7/30 3/01 to 2/28	9 11 20	464 23 12
07562	10	C	6/01 to 9/30	100	40
07574	83	C	5/29 to 8/01	100	177
07583	25	C	5/20 to 8/23	100	79
07585	130	C	5/23 to 7/22	50	64

"C" designates cattle use while "H" designates horse use.

Laws, Ordinances, Regulations and Standards

A federal rulemaking to address the health, productivity and sustainability of BLM-administered public rangelands established fundamentals of rangeland health and standards and guidelines for grazing administration (60 FR 9969 [Feb. 22, 1995], as amended at 71 FR

39508 [July, 12, 2006]; codified in 43 CFR 4180). Rangeland Health Standards describe a protocol to educate the public and agency personnel on using observable indicators to interpret and assess rangeland health (Technical Reference 1734-6, pg. 3). A brief description of each allotments Rangeland Health designation will be provided later in this section.

Livestock/Grazing Management

Cattle and horses are authorized to graze in allotments within the project area. Of these allotments, eight are authorized for cattle and one is authorized for horse and cattle grazing. Collectively, these allotments make up 1,301 permitted Animal Unit Months (AUM's) and 15,224 acres.

The BLM categorizes the level of management required to properly administer each grazing allotment from low to high as custodial, maintain or improve. Within the project area, four allotments are categorized as custodial, two as maintain and two as improve. A brief description of each allotment is provided below.

Allotment 07535

The season of use for the allotment is from June 1 to October 31. This allotment is approximately 1,543 Federal acres, is intermingled with private lands and is classified as a custodial allotment. Rangeland health has not been conducted in this allotment.

Allotment 07537

The season of use for this allotment is from May 10 to June 20. There are two cattle grazing permits in this allotment and a deferred rotational grazing system has been established for this allotment. This allotment is approximately 5,896 Federal acres and was determined to meet RLH during a field tour in 2011. A prescribed burn, totaling approximately 800 acres, was conducted in the allotment in 2008 and 2009.

Allotment 07547

The season of use in this allotment is from May 16 to October 08. This allotment is approximately 40 acres and is categorized as a custodial allotment. Rangeland health has not been conducted in this allotment.

Allotment 07558

The season of use for this allotment is from March 1 to February 28 and is the only authorized, year long, horse and cattle, grazing permit in the project area. A deferred rotational grazing system has been established in the allotment. This allotment is approximately 2,476 Federal acres, is intermingled with private land and, therefore, is categorized as a custodial allotment. Rangeland health has not been conducted in this allotment.

Allotment 07562

The season of use for this allotment is from June 01 to September 30. This allotment is approximately 798 Federal acres and is categorized as a maintain allotment. A RLH tour was conducted in 1999 and the allotment was determined to meet standards.

Allotment 07574

The season of use for this allotment is from May 29 to August 01. This allotment is approximately 2,500 Federal acres and is categorized as an improve allotment. A RLH tour was held with the ID team in 2001 and it was determined that the allotment met rangeland health standards.

Allotment 07583

The season of use for this allotment is from May 20 to August 23. This allotment is approximately 571 Federal acres and is categorized as a custodial allotment. A RLH tour was conducted in 1999 and the allotment was meeting standards.

Allotment 07585

The season of use for this allotment is from May 23 to July 22. A deferred rotational grazing system has been established for this allotment. This allotment is approximately 1,400 Federal acres and is categorized as a maintain allotment. No record of RLH standards exists.

5.17.2. Environmental Consequences – Proposed Action

The proposed action would remove woody vegetation and allow grass and forb communities to repopulate the previous understory which could create better foraging conditions for livestock and promote compliance with RLH standards. Fire treated areas may require growing season rest from grazing to allow new plants to establish. After plant establishment, livestock may target treated areas due to an increase in available forage.

5.17.3. Environmental Consequences – No Action Alternative

This alternative would continue the current trend of grazing management throughout the affected allotments. Changes in rotation schedules or complete rest would not be needed because the treatments would not occur.

5.17.4. Mitigation Measures

For treatment areas that do not require grazing rest, treatments should be scheduled before or after the grazing season to avoid conflicts with livestock.

5.18. Forestry, and Forest and Woodland Vegetation

5.18.1. Affected Environment

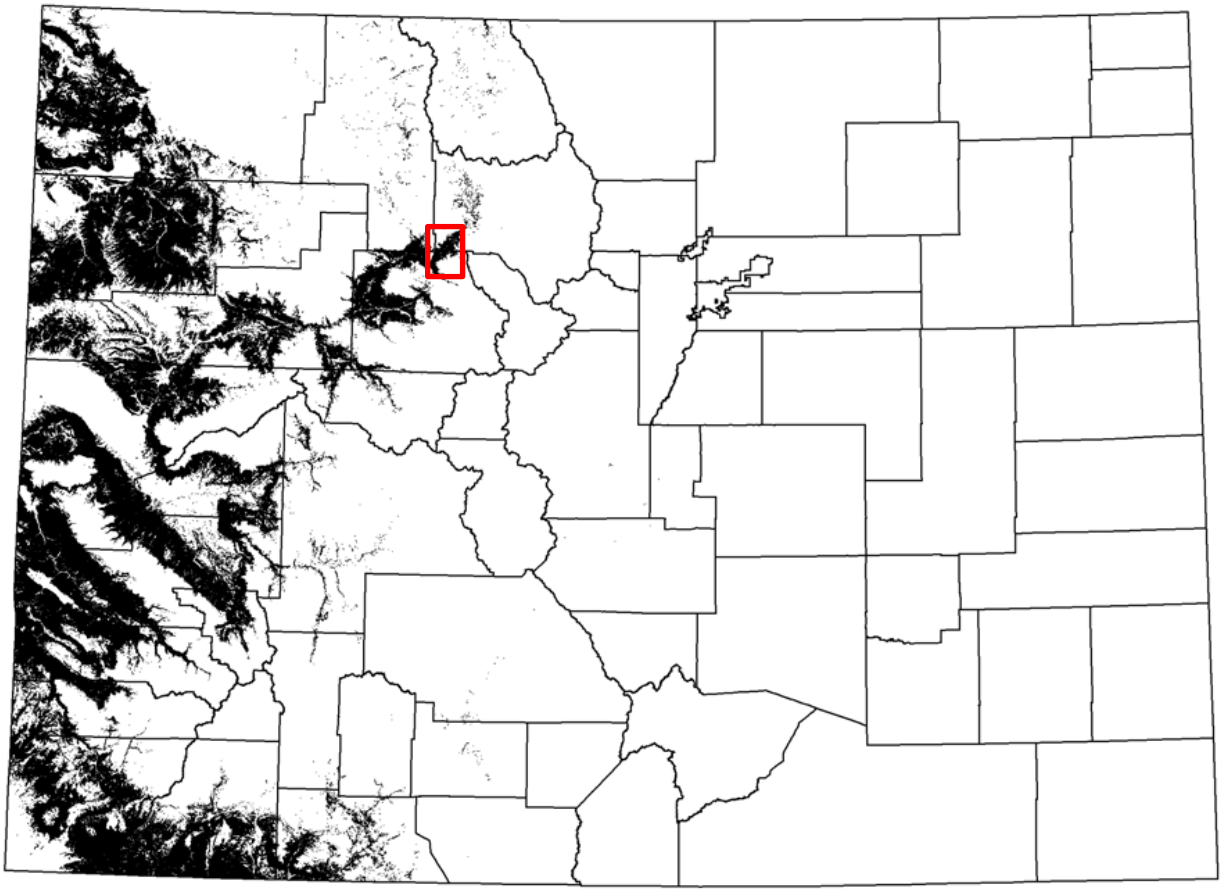


Figure 5.17 Exaggerated extent of pinyon juniper with KFO portion in red (CNHP 2005).

Pinyon-juniper and juniper woodlands comprise some of the most widespread and diverse vegetation types in the western United States where they are distributed across approximately 100 million acres. Reflecting the diversity within these types, an international database of species and communities named NatureServe lists 148 plant associations that are dominated by various combinations of pinyon and juniper species (Romme et al. 2009). These various vegetation types are typically lumped together as the Pinyon-juniper vegetation type.

The vast majority of Colorado's 5.3 million acres of Pinyon-juniper woodlands are located between the elevations of 4900 to 8000 feet on the dry mountains and foothills of the Western Slope. Pinyon-juniper woodlands are also found, to a limited extent, in south-central Colorado and the Eastern Plains (The map above displays only the pinyon-juniper woodlands located on the Western Slope). Varying combinations of pinyon pine

(Pinus edulis) and three juniper species comprise Colorado's pinyon-juniper woodlands. One-seed juniper (Juniperus monosperma), Rocky Mountain juniper (Juniperus scopulorum), and pinyon pine make-up the woodlands in southcentral and southeastern Colorado. Most of the juniper found in pinyon-juniper woodlands on the Western Slope is Utah juniper (Juniperus osteosperma), although Rocky Mountain juniper may be found mixed with Utah juniper, or may even replace it, at higher elevations (CNHP 2015).

Pinyon-juniper stands can be even-aged to uneven-aged, with canopy closures typically between 25 and 60 percent. Pinyon pine and the various juniper species are slow growing and long-lived, although pinyon pine tree are more susceptible than juniper species to drought, insects and disease. Pinyon pine trees are susceptible to black stain root disease (*Leptographium wageneri*) and to pinyon ips bark beetle (*Ips confusus*) infestations (CNHP 2015). Utah juniper trees can live for more than 1,000 years while pinyon pine trees can exceed 600 years of age (Rick Miller et al. 1999). Pinyon and juniper species are extremely sensitive to fire and heat damage and are easily killed by even moderate fire intensity. Pinyon-juniper stands can be found on all aspects and slopes, and on almost all landforms. The understories of pinyon-juniper woodlands may be shrubby, grassy, sparsely vegetated, or rocky (CNHP 2015).

Pinon-juniper stands can exhibit a high degree of variability in both composition and structure. In general, stands found at higher elevations tend to be comprised of a higher percentage of pinyon pine while juniper tends to be more prevalent in stands found at lower elevations. Romme et al. (2008, 2009), identifies three different pinyon-juniper types characterized by differences in canopy structure, understory characteristics, and historical disturbance regimes – persistent pinyon-juniper woodlands, pinyon-juniper savannas, and wooded shrublands.

Pinyon-juniper savannas are relatively rare in the Southern Rocky Mountains and on the Colorado Plateau (Romme et al. 2008), and have not been found in the Radium Valley Analysis Area. The vast majority of the pinyon-juniper vegetation type found in the analysis area is persistent pinyon-juniper woodland. Persistent pinyon-juniper woodlands are found throughout the western United States but are especially prevalent on the Colorado Plateau and the Western Slope of Colorado. Areas occupied by persistent woodlands are on sites that have soils, climatic conditions, and disturbance regimes that intrinsically favor pinyon and/or juniper trees. Persistent woodlands are places that, barring disturbance, have been occupied by pinyon and/or juniper trees for hundreds of years and where trees are the dominant vegetation on the site (Romme et al. 2008). Also found throughout the west, but most common in the Great Basin, wooded shrublands are described as having a dominant shrub stratum with a component of pinyon and/or juniper trees. Tree densities can change over time due to fluctuations in climate or the occurrence of disturbance events but shrubs are always the principle component of these plant communities (Romme et al. 2008).

During the last 130-150 years, some areas of the western United States have witnessed a substantial increase (identified as infill by Jacobs et al. 2008) in tree density and canopy closure in many previously existing pinyon and juniper woodlands. This increase, however, is not universal as other areas have remained unchanged or have actually seen a decline. Likewise, expansion of pinyon and juniper trees into grasslands and shrublands has been extensive in some areas, but has been uncommon or non-existent in others (Romme et al. 2009). Various causal agents have been suggested for the two different processes of infill and expansion, including: (1) natural, ongoing, Holocene range expansion, (2) natural demographic response (ie; pulsed establishment) to fluctuating weather patterns, (3) stages in normal stand development, (4) recovery from harvest (historic or pre-historic), (5) recovery from past, severe disturbance (drought, fire, insect, or disease) induced mortality events, (6) response to grazing practices including altered competitive interactions, soil properties, hydrologic patterns, and fire regimes, (7) or accelerated growth as a result of elevated temperatures and CO2 levels associated with recent anthropogenic climate changes (Jacobs et al. 2008).

Data collected from research conducted on persistent pinyon-juniper woodlands on the Colorado Plateau, the Uncompahgre Plateau and Mesa Verde National Park, substantiates that infill and expansion has and is occurring on portions of these areas, however, the change at the broad, landscape scale is minimal (Romme et al. 2009). Consistent with findings regarding infill in previously existing pinyon and juniper woodlands, Eisenhart's research on the Uncompahgre Plateau shows that tree density did increase after 1881 but that there was an even more dramatic increase in the 1700's following several periods of severe drought, including the mega-drought of the 1500s (Eisenhart 2004). The mega-drought is believed to have resulted in widespread, mass mortality, especially of pinyon pine trees. Eisenhart draws upon evidence and conclusions from other studies to suggest that a climate shift at the end of the Little Ice Age promoted the growth of existing trees and the establishment of new trees during much of the last 200 years. Tree-ring chronologies indicate that the last 200 years have been unusually wet as compared to the record going back over 2000 years. Her data also determined that the rate of tree establishment remained fairly constant following the initial increase in the 1700s until just after 1880. She notes that this pattern is very different from that found in Grand Basin woodlands where more than 90 percent of the sampled trees are less than 150 years old.

A number of studies indicate that historic fires in persistent woodlands in western Colorado and the Colorado Plateau were predominantly low-frequency, high-severity fires of variable extent (Eisenhart 2004; Romme et al. 2003; Floyd et al. 2004; Romme et al. 2009). Most fires were very small, restricted in size by the sparse and discontinuous array of fine fuels, topographic breaks, etc., and had little or no effect on woodland composition and structure. Large, stand-replacing fires did occur, driven by drought and wind, but they were relatively rare, with fire rotations measured in the hundreds of years (Romme et al. 2003). Historic fire rotations on the Colorado Plateau averaged 400 or

more years. There is no evidence to support more frequent fire rotations on the Colorado Plateau. Examples of the length of historic fire rotations include: 400-600 years on the Uncompahgre Plateau (Romme et al. 2009) and 400+ years in Mesa Verde National Park (Floyd et al. 2004).

Some western Colorado and Colorado Plateau woodlands, that are many hundreds of years old, exhibit no evidence of past stand-replacing fire (Romme et al. 2003; Eisenhart 2004; Floyd et al. 2004; Romme et al. 2009). Some areas of persistent woodland in Mesa Verde National Park have not burned since the Anasazi abandoned their cliff dwellings (Floyd et al. 2004; Romme et al. 2003). It can require many decades, or up to a century or more, for pinon and juniper to re-occupy a site following a stand-replacing fire or other high-mortality, disturbance event (Romme et al. 2003; Eisenhart 2004). Long fire rotations mean that processes and mechanisms other than fire are the driving force behind changes in the structure of many persistent woodlands. In western Colorado and the Colorado Plateau, researchers suggest that those changes are the result of climatic variation modified by topographic position, competition and episodic tree establishment and mortality events (Eisenhart 2004; Romme et al. 2009). A recent example of a major disturbance event affecting stand structure occurred in the early 2000s when drought, high temperatures, and bark beetle outbreaks were responsible for the death of millions of pinyon pine trees in the Four Corners region.

Disturbance events such as this are likely to occur more frequently in the future, as the result of a warming climate. In December 2015, the Colorado Natural Heritage Program (CNHP) completed a climate change vulnerability assessment for priority species and ecosystems for the Colorado Office of the Bureau of Land Management (BLM). Pinyon-juniper woodlands were ranked as highly vulnerable to climate change within the next 35 years, primarily due to the interaction of drought, fire and insect-caused mortality. A high vulnerability ranking means that climate change is likely to have a noticeable impact to the ecosystem. Increased temperatures will likely result in increased droughts which can increase the occurrence and severity of insect outbreaks and wildfire. Pinyon-juniper woodlands may become increasingly dominated by juniper as pinyon pine trees are less tolerant of drought and more susceptible to insect outbreaks (CNHP 2015).

As the above paragraphs indicate, persistent woodlands can be many hundreds of years old. Many researchers distinguish older stands from younger stands by whether they originated prior to, or after, Euro-American settlement. In other words, those that existed prior to about 1850-1880 (depending on location), as compared to those that established after that date). In “Old-Growth Descriptions for the Major Forest Cover Types in the Rocky Mountain Region” Mehl (1992) listed tree attributes used to describe pinyon-juniper old growth. In addition to structural characteristics such as the presence of dead, broken, or deformed tops and/or bole or root rot; standing and down dead trees; variation in tree diameter; etc.; his list included a minimum age for the upper canopy of 200 years. Old-growth woodlands exhibit a greater complexity in stand structure, topography and ecological function than that exhibited in younger stands, and play a unique role in

contributing to biological diversity across the landscape (Miller et al. 1999). In her study on the Uncompahgre Plateau, Eisenhart (2004) found that old-growth stands were common across the study area, consistent with finding in Mesa Verde National Park. Old-growth stands were found at all elevations and topographic positions (Eisenhart 2004). They were not restricted to steep, rocky or shallow soils, although they were less common on finer-grained soils greater than one meter deep. In many older, persistent woodlands, evidence indicates that stand densities were greater in the past than they currently are, suggesting that density-dependent thinning had occurred sometime in the past. In fact, stands with the highest tree density were between 100 to 250 years old (Eisenhart 2004).

Approximately 27,000 acres of public land administered by the Bureau of Land Management, Kremmling Field Office, is located within the Radium Valley Analysis Area. An assessment of the analysis area using ArcGIS, and a spatial display of the forest and woodland stands contained in the Forest Vegetation Information System database (FORVIS), reveals that an estimated 10,404 acres have been identified as either forest or woodland sites. Ninety-eight percent of these stands are identified as either pinyon-juniper, or Douglas-fir, sites. FORVIS is the BLM's national system for forest inventory information. Unfortunately, there is no site specific information in FORVIS for any of the pinyon-juniper or Douglas-fir sites other than identifying first, and in some cases second, canopy layer species.

The 2015 Approved Resource Management Plan (ARMP) for the Kremmling Field Office displays the acres of various vegetation communities on public lands managed by the office. The plan estimates that pinyon-juniper communities occupy 6,995 acres, and that Douglas-fir occupies 4,530 acres, of these public lands. These acres were derived in 1993 from the field office's stand information database used at that time, as part of an exercise to determine a sustainable timber harvest level. All of the identified pinyon-juniper acres and about 70 percent of the Douglas-fir acres are located within the Sheephorn Resource Management Unit (RMU), which encompasses the Radium Valley Analysis Area.

Examining the stands in ArcGIS identified in FORVIS as pinyon-juniper sites, and calculating those acres electronically, reveals that the total acreage is actually 7,374 acres, of which 7,227 acres are located within the analysis area and 147 acres are located just outside of it. Based on the descriptions of pinyon-juniper types by Romme and others, the vast majority, if not all, of these pinyon-juniper stands would be classified as persistent pinyon-juniper woodlands. It is assumed that the discrepancy in acres for pinyon-juniper in the ARMP and the acres calculated in ArcGIS is the result of differences in how those acres were calculated. Douglas-fir stands totaled 2,983 acres within the analysis area using the same process. The balance of the 27,000 acres of public lands within the analysis area is identified as non-forested sites. Some of these sites are truly open sites. Others, however, appear to be persistent pinyon-juniper woodlands that have not been identified as such in FORVIS.

The following Table displays the number of acres identified as pinyon-juniper woodland, Douglas-fir, Lodgepole pine, Aspen, or non-forest by the type of treatment prescribed in the Proposed Action:

Table 5.17

	Acres of Prescribed Treatment				
	No Treatment	Broadcast Burn/Manual Hand Thin	Mastication/ Jackpot Burn	Mastication & Broadcast Burn	Totals
Non-Forest	5,376	2,249	7,741	1,230	16596
Pinyon-Juniper Woodland	418	1,543	5072	194	7227
Douglas-Fir	884	1,181	910	8	2,983
Lodgepole Pine	52	81	0	0	133
Aspen	61	0	0	0	61
Totals	6,791	5,054	13,723	1,432	27,000

The above table shows that the prescribed treatments, as initially proposed, would treat 20,209 acres, or about 75 percent, of the analysis area. In addition, about 92 percent of the ArcGIS calculated acres for all identified pinyon-juniper woodlands in the Kremmling Field Office, and about 46 percent of the Douglas-fir stands would be treated under the initial proposal. As noted above, some of the area proposed for treatment within the non-forested component appears to be occupied by persistent pinyon-juniper woodlands or Douglas-fir stands that have not been broken-out in the FORVIS database. In addition, some of the Douglas-fir stands in the FORVIS database contain a secondary canopy layer of juniper. Douglas-fir stands in the area have experienced some insect caused mortality over the last several years.

5.18.2. Environmental Consequences – Proposed Action

Conducting inventories in all pinyon-juniper woodlands and Douglas-fir stands would facilitate the subsequent identification of old-growth stands. Mechanical, manual, and prescribed burn treatments would not occur in old-growth stands. Not treating old-growth stands would

protect the structural complexity, and the ecological resiliency and integrity of these stands. Potential injury to pinyon pine and/or juniper trees and soil disturbance would be avoided since treatment would not occur. Jacobs et al. (2008) developed a regional scale predictive model for the Four Corners states to distinguish between old pinon-juniper stands (> 150 years of age) and younger stands of more recent origin. Spatial modeling identified woodlands in Grand and Eagle Counties of Colorado as having a predicted probability of 65-100 percent for being made-up of old pinyon-juniper stands. Field visits and anecdotal evidence indicates that persistent pinyon-juniper stands in the analysis area contain old trees. It is, therefore, likely that there would be a reduction in the treatment acres as initially proposed. However, the amount of the reduction is currently unknown.

Younger pinyon-juniper stands are most likely in some stage of recovery from a past disturbance event and are in the process of re-establishing on persistent woodland sites, rather that invading previously non-treed sites. The thinning or prescribed burning of these stands would likely have minor to moderate impacts, either adverse or potentially beneficial.

Mechanical and manual thinning would generate pinyon and juniper, slash. Pinyon pine thinning slash can attract bark beetles if they are in the general area, however, adjusting slash treatments, or changing the timing of treatment and, therefore, the timing of slash creation, should help to limit infestations. Treatment can result in injury to the pinyon and juniper trees that are to remain. Injured pinyon trees release pheromones that can attract pinyon ips bark beetles, potentially resulting in a bark beetle infestation. Depending on the severity of the infestation, pinon pine mortality could result in stands comprised almost exclusively of juniper in the upper canopy.

Decreasing stand densities may reduce competition for soil moisture during droughts. On the other hand, decreasing stand density could decrease soil shading, increase soil temperatures, and subsequently decrease soil moisture available for both trees and understory. Opening up these stands by mechanical, manual, or prescribed burn treatments, increases their vulnerability to weed infestations. Mechanical treatment would inevitably result in soil disturbance which, in turn, could increase that risk. Design criteria include pre-treatment inventories and post-treatment monitoring for the presence of noxious/invasive weeds. Treatment of current weed infestations would take place prior to pinyon-juniper thinning or burning. New infestations following pinyon-juniper thinning or burning would also be treated. Intensive inventories and monitoring of pre- and post-treatment areas, and treatment of identified weeds, would help to reduce the likelihood of infestations.

The mechanical or manual thinning, or the prescribed burning, of stands would inevitably affect stand structure. Younger stands are less structurally and ecologically complex than older stands. However, changes in structure now could limit the complexity of the residual stand as it ages, reducing the biological diversity that it can contribute to the landscape. Thinning could shift species composition or age-class distribution resulting in an increased vulnerability to certain disturbance events. Using a percentage of maximum Stand Density Index (SDI) to develop diameter size class spacing guidelines for tree retention would avoid some of the issues

that can result from implementing other prescriptions that have been used to reduce stand densities. Retaining a mixed species stand of several size classes (an imperfect proxy for age classes as trees on poor growing sites may be surprisingly small for their age) would maintain a certain level of uneven-aged development and, subsequently, stand resiliency. Implementing prescribed burns in younger pinyon-juniper stands to reduce stand densities would likely result in a patchy distribution of trees across the treatment area. Some areas would have few, if any, remaining live trees or understory and other areas would be relatively untouched. There would be little ability to control residual stand species composition or age-class distribution.

Removing pinyon pine and juniper by prescribed fire from wooded shrublands, comprised of mountain mahogany, serviceberry, etc., can be an especially effective treatment. Not only do these species resprout vigorously following treatment, but their response to treatment also makes them less vulnerable to weed invasion. Similar to pinyon pine and juniper, sagebrush recovery is very slow following fire, creating conditions that would increase the vulnerability of the site to weed infestations. Therefore, tree removal from sagebrush-steppe sites is probably best accomplished by treatment other than prescribed fire. Removing recently established pinon and juniper trees from wooded shrublands would mimic a contraction of the tree component within a shrub-dominated matrix, in response to unfavorable climatic fluctuation. Removing pinyon and/or juniper trees from wooded shrublands would have only minor effects to pinyon-juniper ecosystems as a whole.

5.18.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative, the types and locations of treatments would be similar to the Proposed Action. Therefore, the impacts of implementing the No Action Alternative would similar to those identified for the Proposed Action.

5.18.4. Mitigation Measures

None

5.19. Recreation

5.19.1. Affected Environment

The proposed action encompasses the majority of the Upper Colorado Special Recreation Management Area (6,868), Recreation Management Zone (RMZ) one is excluded from this analysis as it is outside of the project boundary. The major uses of the area include floatboating, kayaking, fishing, camping, hiking, wildlife viewing and extreme jeeping. The SRMA received approximately 87,000 visitors in FY 2015, mostly in the river corridor.

The floatboating and fishing in the area have been identified as important economic factors for the community. The SRMA is within one day's drive of major metropolitan areas in the Front

Range and within one hour's drive of three major resort communities, making them highly accessible.

RMZ's two and three, which include the river corridor from Confluence to State Bridge, are managed for naturalness under the Recreation Setting Characteristics. The entire SRMA is also managed under VRM class II objectives.

5.19.2. Environmental Consequences – Proposed Action

During project implementation there is the potential for temporary impacts to recreation users. The Proposed Action would temporarily interfere with recreational use during proposed treatment activities. The temporary presence of equipment/personnel in localized areas and alteration of views may affect visitor enjoyment. There could be a short-term reduction in scenic integrity and visitor use during and immediately following thinning and prescribed fire. Displacement of dispersed recreation users would occur due to restrictions in areas where thinning and burning were occurring. Smoke accumulation would be temporary because pile burning and prescribed fires would only be ignited under favorable conditions for smoke dispersion. Fires would not be ignited during the summer months to minimize impacts to recreation activities. Because activities would only occur in a small area each year relative to the total project area size, effects would not be substantial. Hunting success may decrease in localized areas in the short-term, depending upon the response of wildlife to the presence of equipment and personnel in the area as well as the habitat changes. Visual resources and subsequent use of the area for scenic viewing and by other recreationalists would be temporarily or permanently impacted, depending on the level of manipulation, until vegetation adequately re-establishes. In the long-term, wildlife viewing experiences would improve because of the improvement in wildlife habitat

5.19.3. Environmental Consequences – No Action Alternative

The No Action alternative would have little impact on recreation in the area, unless a catastrophic wildfire occurs which could limit recreational opportunities in the short-term. The absence of thinning and prescribed fire under the No Action alternative would avoid the potential for temporary direct impacts to visitor use and experience.

5.19.4. Mitigation Measures

None

5.20. Access and Transportation

5.20.1. Affected Environment

The Proposed Action is within a Travel Management Area that is identified as Limited, where motorized and mechanized travel is limited to designated routes and there is no cross country travel. Outside of the Argentine Trail east of the Radium Warm Springs and the Gore Canyon Trail there are no restrictions for horseback travel. There are no restrictions for foot travel

throughout the project area. Several primitive roads within the area have been designated to permit full size vehicle traffic for public access related to area recreation opportunities including but not limited to camping, hunting, hiking, scenery and wildlife viewing. In some instances specific routes designations limit the general public to specific modes of travel such as foot, horseback and/or bicycle travel designated Administrative Routes. Designated Administrative Routes allow specific entities, such as Agency employees, grazing permittees or Right-of-Way holders to utilize the route by motorized travel specifically for the management of lands, permits or other authorizations. Current designated route were established over time with alignments limited to certain areas due to the area topography and vegetation.

5.20.2. Environmental Consequences – Proposed Action

Treatments under the Proposed Action to reduce vegetation cover would reduce natural boundaries that have primarily limited motorized and mechanized travel to existing linear routes and their immediate adjacent areas. This would provide greater openings along routes that then can be accessed where it could not be before. As vehicles have the ability to access new areas there is the potential for an increase in newly disturbed areas including the establishment of unauthorized trails, In areas where proposed mechanical treatments or authorized vehicles would travel to implement the proposed action there is potential for new disturbed areas that could appear as established routes open for travel. Additionally, the opening of the canopy will make routes identified for decommissioning more readily visible to the public and potentially attract unauthorized use. Conversely, reducing vegetative cover would provide greater opportunities for dispersed camping along designated routes while making easier cross country access for foot and horse travel.

5.20.3. Environmental Consequences – No Action Alternative

Under the No Action Alternative the proposed programmatic action covering multiple areas and types of implementation would not occur. Wildlife enhancement projects could still occur over time but a smaller scale and more specific to a site with the potential for more specific analysis. Impacts would be similar or the same to Access and Transportation as the Proposed Action

5.20.4. Mitigation Measures

- Along all designated routes and existing dispersed camps open for full size vehicles or mechanical use (bicycles) vegetative cover including Pinyon Junipers and other woody species will remain intact for 150 feet to prevent new unauthorized travel and disturbances. Beyond the initial 150 feet for an additional 150 feet treatments will be implemented incrementally that gradually reduces vegetative cover so that it blends in naturally to the casual observer reducing the potential for new disturbances and the establishment of new unauthorized routes.

- In the event vehicles and equipment used to implement the proposed action create new disturbances that are noticeable to the casual observer those disturbances will be covered with materials cut during project implementation. If no natural materials from project

implementation are available to cover disturbed areas the point of access will be fenced to prevent unauthorized travel and signed as a Restoration Area. Once the disturbance has naturally reclaimed and no obvious access point is identifiable the fencing and signage will be removed.

- Any cut and/or fill done to allow equipment and/or vehicular access to project areas will be reclaimed by ensuring that areas or temporary routes are re-sloped and vegetated with an approved seed mix.
- All designated roads and trails that are used by equipment and/or vehicles will be maintained to a minimum standard that they are when project implementation occurs. Upgrading of routes is permitted for project implementation that benefits public access, safety and adjacent resources.
- In the event a route that is designated for decommissioning is utilized for project implementation that route shall be decommissioned after use by scarifying and seeding and/or covered with native materials from project implementation.
- In the event a route that is designated for specific modes of travel with an established tread width greater than needed (ie. a two-track primitive road but designated for foot, horseback and/or bicycle travel) it may be reduced to a single track trail, defined as a route maintained to a maximum of 24 inches. After use, the unneeded tread shall be decommissioned after use by scarifying and seeding and/or covered with native materials from project implementation.
- During project implementation public notice will be provided a minimum of two weeks prior to work in any specific area by news releases and signage on site.

5.21. Fire Management

5.21.1. Affected Environment

The proposed action is located in Grand County and Eagle County, Colorado. The Cottonwood Creek-Sheephorn Creek, Gore Canyon, Sheep Creek-Colorado River, Lower Piney River, and Yarmony Creek-Colorado River 6th order watersheds were looked at for the affected environment. These were chosen because the majority of the proposed treatments fall within these five watersheds, and wildfire tends to follow watersheds. There have been 81 recorded wildfires encompassing 1,974 acres for an average of two fires of about 24 acres since 1980 within these watersheds.

Fuel models are used to help aid in determining fire behavior among different types of vegetation. The current primary fuel models, using the 40 Scott and Burgan Fire Behavior Fuel Model (FBFM40), within the five watersheds are; GR1, GR2, GS1, GS2, SH1, SH7, TU1, TU5, and TL3, this data was taken from LANDFIRE data (also known as Landscape Fire and Resource Management Planning Tools) (http://www.landfire.gov).

GR1 and GR2 would best represent Phase I in the pinyon/ juniper. GS1, GS2, and SH1 would best represent the sagebrush openings. SH7 would best present Phase II and III when environmental conditions allow for active fire behavior (low fuel moistures, high winds, high temperature, and low relative humidity). TU1 and TL3 would best represent Phase II and Phase III when environmental conditions only allowed for passive fire behavior (high fuel moistures, low to no winds, low temperature, and high relative humidity).TU1, TU5, and TL3 would also represent conifer tree stands, and mix conifer/juniper stands.

Indicators of wildland fire ecology and management are summarized through fire regime and fire regime condition class classifications. Fire regime is a concept used to characterize the personality of a fire in a given vegetation type, such as how often an area burns, the type of pattern created, and the ecological effects. The majority of the five watersheds is Fire Regime III, which means historically the watersheds burned a frequency of every 35-200+ years and generally mixed severity.

Fire regime condition class (FRCC) indicates the degree of departure from the historic fire regime (HFR) (Hann and Bunnell 2001(Table 3-28). The Historical Mean Fire Return Interval for the proposed action is 101-125 years. While the fire regime of a particular area is not likely to change except in the very long term, the FRCC can be changed through fire management and other vegetation management actions. A comprehensive FRCC data layer that is consistent across the whole KFO planning areas does not exist. LANDFIRE Vegetation Condition Class (VCC) data is available for the proposed treatment area. VCC is a close approximation for FRCC as it reflects the changes in vegetation structure and composition resulting from changes in fire regime. VCC does not include the fire regime departure which is a component of FRCC. The VCC layer quantifies the amount that current vegetation has departed from simulated historical vegetation reference conditions.

Three condition classes describe low departure (VCC 1), moderate departure (VCC 2), and high departure (VCC 3). Vegetation condition class is a close approximation for FRCC, VCC is calculated based on changes to species composition, structure state, and canopy closure suing methods described in the Interagency Fire Regime Condition Class Guidebook (Barrett et al. 2010). VCC is based on departure of current vegetation conditions from reference vegetation conditions only.

The use of VCC data provides a tool for the measurement of departure from normal conditions on a broad scale, and allows land managers to measure the number of acres within

each condition class for planning efforts to focus on moving the landscape to an improved vegetation condition class. This is the dataset that will be used for further analysis in this document and there is further discussion regarding this data later in this document. Table 1 shows the current VCC within the five 6th order watersheds.

Table 1

	Acres	Percent of Total
Vegetation Condition Class I	40,917	38
Vegetation Condition Class II	55,147	52
Vegetation Condition Class III	10,021	09
Other; Water, Rocks, Barren Etc.	1,306	1

5.21.2. Environmental Consequences – Proposed Action

Table 2 below shows the best case scenario in VCC if a certain percentage of the proposed action is completed within the proposed action area within the Radium Valley Habitat Improvement Programmatic EA boundary.

Table 2

All treatment areas within the Proposed action.	100% of treatment results in VCC 1	80% of treatment results in VCC 1	60% of treatment results in VCC 1	40% of treatment results in VCC 1	20% of treatment results in VCC 1	0% of treatment results in VCC 1
Vegetation Condition Class I	26,848	24,638	22,429	20,219	18,010	15,800
Vegetation Condition Class II	0	1,958	3,915	5,873	7,830	9,788
Vegetation Condition Class III	0	252	504	756	1,008	1,260

Table 2 shows that within the proposed action if 0-100 percent of the project is treated, the goal of a VCC 1 being a higher percentage than the combined VCC 2 and VCC 3 is currently within in the proposed action boundary. The data shows that if no treatment is done the goal of more VCC 1 then VCC 2 and 3 combined is currently attained, but with the Mean Fire Return Interval being 101-125 and looking at historical aerial photos of the area it shows that the FRCC 1 in the proposed area is close to becoming FRCC 2 (using VCC compared to the Mean Fire Return to get the FRCC). By treating not only the VCC 2 and 3, but also the VCC 1 areas (that weren't include in recent past treatments), this should restart the Mean Fire Return Interval making the FRCC 1(that weren't include in recent past treatments) at the lower end instead of the higher end.

The proposed action doesn't reduce fuel loading in sage and lodgepole pine and Douglas fir fuel types, thus these two fuel types would not be treated and would continue to move towards the next Fire Regime Condition Class. Fire intensity would likely increase in sage and lodgepole pine and Douglas fir fuel types, due to increase fuel loading, thus reducing the effectiveness of strategies and tactics in wildland fire suppression and management on BLM lands. Because of this it is most likely that only about 20 to 40% of the area within the five 6th order watersheds would likely be treated.

By treating Phase II and Phase III this would most likely change the fuel model from a SH7 to a GR1 and or maintain a TU1 and TL3 no matter the environmental conditions, this would be accomplished by reduced canopy cover and increased crown spacing. Changing the fuel model from SH7 to GR1 and or maintaining a TU1 and TL3, would lower fire intensity, which would allow for more options and effectiveness of strategies and tactics in wildland fire suppression and wildland fire management on BLM lands, which in turn would most likely reduce the costs of wildland fire suppression and wildland fire management for the BLM. By this changing of fuel models the fire intensity would be lower but the fire frequency would most likely increase due to the increase in fine fuels.

5.21.3. Environmental Consequences – No Action Alternative

Direct and Indirect Effects: Under the No Action Alternative, the VCC in BLM administered lands would stay the same and over time continue the transition into the next VCC class. The VCC on State, local and USFS lands could decrease due to treatments done by each agency, and could meet the goal to have a higher percent of VCC 1 then VCC 2 and VCC 3 combined. Within the No Action Alternative, Wildfires would likely be higher in severity and intensity, due to tighter crown spacing and canopy cover. Established wildfires tend to be bigger and longer in duration then prescribed fires and for this reason could increase the danger to the public, by smoke impacts and possible direct flame contact.

5.21.4. Mitigation Measures

None.

5.22. Hazardous or Solid Wastes

5.22.1. Affected Environment

The affected environment for hazardous materials includes air, water, soil, and biological resources that may potentially be affected by an accidental release of hazardous materials during transportation to and from the project area, storage, and use in preparation and project operations. Sensitive areas for releases include areas adjacent to waterbodies and areas where humans or wildlife could be directly impacted.

BLM Instruction Memoranda numbers WO-93-344 and CO-97-023 require that all NEPA documents list and describe any hazardous and/or extremely hazardous materials that would be produced, used, stored, transported, or disposed as a result of a proposed project. The most pertinent of the Federal laws dealing with hazardous materials contamination are as follows:

- The Oil Pollution Act (Public Law 101-380, August 18, 1990) prohibits discharge of pollutants into Waters of the U.S., which by definition would include any tributary, including any dry wash that eventually connects with the Colorado River.

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (Public Law 96-510 of 1980) provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment. It also provides national, regional, and local contingency plans. Applicable emergency operations plans in place include the National Contingency Plan (40 CFR 300, required by section 105 of CERCLA), the Region VIII Regional Contingency Plan, the Colorado River Sub-Area Contingency Plan, and BLM's Hazardous Materials Contingency Plan.

- The Resource Conservation and Recovery Act (RCRA) (Public Law 94-580, October 21, 1976) regulates the use of hazardous substances and disposal of hazardous wastes. Note: While oil and gas lessees are exempt from RCRA, ROW holders are not. RCRA strictly regulates the management and disposal of hazardous wastes.

5.22.2. Environmental Consequences – Proposed Action

Possible pollutants that could be released during the implementation phase of this project would include diesel fuel, hydraulic fluid, lubricants, herbicides and incendiaries. These materials would be used during vegetation treatments and for refueling and maintaining equipment and vehicles. Potentially harmful substances used in the operation phases would be kept onsite in limited quantities and trucked to and from the site as required. No hazardous substance, as defined by 40 CFR 355 would be used, produced, stored, transported, or disposed of in amounts above threshold quantities. Waste generated would not be exempt from hazardous waste regulations.

Chemicals subject to reporting under Title III of the Superfund Amendments and Reauthorization Act in quantities of 10,000 pounds or more would not be used, produced, stored, transported, or disposed of during any phase of the project. None of the chemicals used during the project meets the criteria for an acutely hazardous material/substance, or meet the quantities criteria per BLM Instruction Memorandum No. 93-344. Environmental Consequences – No Action Alternative

No additional consideration for hazardous materials or solid waste would need to be given for No Action Alternative.

5.22.3. Mitigation Measures

Emergency response to hazardous materials or petroleum products on BLM lands are handled through BLM's Contingency Plan. BLM would have access to regional resources if justified by the incident.

No extremely hazardous substance, as defined in 40 CFR 355, in amounts above threshold planning quantities would be produced, used, stored, transported, or disposed of during construction or operation of the facilities.

All chemicals purchased for use for this project will be fully utilized, thus generating no excess chemicals for long term storage (over 180 days), or disposal.

Solid waste, including human waste and trash, may be generated during construction activities. These would be appropriately stored onsite and periodically removed to a landfill or water treatment facility.

5.23. Colorado Standards for Public Land Health

In January 1997, the Colorado BLM approved the Standards for Public Land Health. These standards cover upland soils, riparian systems, plant and animal communities, special status species, and water quality. Standards describe conditions needed to sustain public land health and relate to all uses of the public lands. If there is the potential to impact these resources, the BLM will note whether or not the project area currently meets the standards and whether or not implementation of the Proposed Action would impair the standards.

5.23.1. Standard 1 – Upland Soils

Upland soils exhibit infiltration and permeability rates that are appropriate to soil type, climate, land form and geologic processes. Much of the project area has not been assessed for land health standards. The areas that have been assessed (see Range Management Section of this EA) are generally felt to be meeting Standard 1. The Yarmony Burn raised some soil concerns, but is continuing to improve.

The Proposed Action could result in increased soil loss from wind and water erosion, compaction, and changes in soil nutrient and water cycling. The design features restrict treatment activities to where soils will support the objectives and long term soil health will be protected by successful revegetation and erosion control. Adaptive management will be used to further refine treatment areas to meet long term land health. The No Action Alternative is no different than the Proposed Action.

5.23.2. Standard 2 – Riparian Systems

Riparian systems associated with both running and standing water function properly and have the ability to recover from major disturbance such as fire, severe grazing or 100-year floods. Most of the riparian and wetland areas within the Project Area are considered to be meeting the Land Health Standard. There are 2 Potential Conservation Areas- along the Colorado River and Yarmony Creek- due to the high biodiversity and rare riparian communities present. The Yarmony Burn did not protect the wetland buffer around the High Sage Spring wetland and burned out the vegetation, making it more vulnerable to overgrazing, weeds, and erosion. Continued management efforts are helping the area improve.

Riparian and wetland areas are buffered from any direct impacts from the Proposed Action. The design features and buffers should also help limit any indirect impacts from the treatments, and adaptive management will be used to help address any potential problems, such as increased invasive species within the riparian and wetland communities. Implementation of the design features is essential to see the areas continue to meet Standard 2.

There is no difference between the No Action Alternative and the Proposed Action.

5.23.3. Standard 3 – Plant and Animal Communities

Healthy, productive plant and animal communities of native and other desirable species are maintained at viable population levels commensurate with the species and habitat's potential.

5.23.4. Standard 4 – Special Status Species

Special status, threatened and endangered species (Federal and state), and other plants and animals officially designated by the BLM, and their habitats are maintained or enhanced by sustaining healthy, native plant and animal communities.

5.23.5. Standard 5 – Water Quality

The water quality of all water bodies, including ground water where applicable, located on or influenced by BLM lands will achieve or exceed the Water Quality Standards established by the State of Colorado. Water quality within the project area is generally considered to be fully supporting the designated uses (see Water Quality discussion). The area is being managed to protect the Outstanding Resource Value (ORV) of water quality.

The Proposed Action could impact water quality within the Colorado River and tributaries. Design features to buffer drainages and perennial waters, to limit equipment to gentler slopes, and to only treat ecological sites that will respond to treatments will help reduce water quality impacts and maintain the existing water quality. Monitoring to identify areas needing additional erosion control and adaptive management will help areas continue to meet Standard 5.

There is no difference between the No Action Alternative and the Proposed Action.

6. CUMULATIVE IMPACTS ANALYSIS

6.1. Cumulative Impacts by Resource

6.1.1. Air Quality

The Affected Environment Section states that the overall cumulative air quality for the region is improving. These trends account for the normal cycle of vegetation treatment and surface disturbances / improvement around the region. Emissions for short-term broadcast burning and unpaved surface disturbing events for the Proposed Action will not be generated with enough frequency to cause short-term (much less long-term) significant contributions to human air quality and related values (visibility, etc.) if certain good management practices are followed. The carbon loss would eventually be offset by re-vegetation for the project area in the long-term.

The overall long-term changes in cumulative particulate matter related impacts (regional change in dust and smoke emissions) when evaluating over multiple years is net zero meaning that projects of these types are not necessarily occurring more frequently year to year but occur in different locations around the region. The overall long-term changes in carbon storage when evaluating over many years are almost net zero due to project area eventually building back carbon storage capacity as much as before vegetation removal for the proposed action.

Based on this information, it is not anticipated that the Proposed Action would significantly contribute to cumulative air quality issues (following good management practices)...for that matter, it does not appear that cumulative air quality around the region will experience negative changes (degrade) for emissions sources associated with the proposed action and other foreseeable future actions.

6.1.2. Soil Resources

The potential cumulative effects are dependent on the project's treatments, design features, other uses on public lands, and the land management occurring on adjacent state and private lands.

At present time, the majority of the public uses in the area are recreational. Besides the intense use along the river corridor, recreational use also occurs during the big game hunting season and some OHV use. Impacts to soil resources generally occur in camping areas and roads, adding to accelerated erosion, vegetation removal, and soil compaction. By treating sagebrush and mixed shrub communities' pinyon-juniper component, there may be an increase in the grass-forb community. Mastication will create a mulch layer on the soil, helping reduce soil erosion from the treated areas. These treatments are expected to help maintain the sagebrush or shrub community, but over time, these treatments will need to be repeated. Depending on the frequency of follow-up treatment, there could be an increase in soil compaction and road density. Including road and trail reclamation in the project's design feature will help offset this impact to soils.

Prescribed fire poses the largest potential cumulative impact to soils. Although only low severity fires are planned, surface fuels designed to help carry the fire in pinyon-juniper can increase the amount of duff/litter consumption, and the temperatures soils are exposed to. The resulting mosaic of a fire can also contain areas of higher fire intensity, which may also expose soils to increased wind and water erosion. Field review after a fire, implementing erosion control practices in areas of exposed soil, and using adaptive management to adjust future treatments will help manage soil resources for longterm sustainability.

The No Action Alternative would separate each proposed treatment into an individual action requiring a NEPA document. Assuming all of the proposed treatments would eventually occur, then the cumulative impacts would be the same. If the individual proposals were spread out over a longer time period, or some treatments were modified or eliminated, then the expected cumulative impacts would most likely be less.

6.1.3. Surface and Ground Water Quality

The cumulative effects of the proposed project and other land use actions are dependent on the sequence of events, the specific locations, and the amount of disturbance. Most of the treatments are not tributary to the same first or second order drainage (for example Dry Gulch, High Trail Gulch, etc), but several mechanical units are adjacent to the Colorado River. The proposed mastication on BLM is located on gentle slopes and leaves a mulch ground cover which will help raindrop impact and could help slow runoff. The less steep slope should help keep runoff from just travelling under the mulch layer. The proposed buffer of 1320 feet from the outer extent of the Colorado River's riparian vegetation will help allow for re-deposition of any sediment loads prior to reaching the river. Most of the state and a large percentage of the private lands are

located more upland than the public lands. Treatments and land actions on their lands would generally be buffered by the public lands located along the river corridor.

The Proposed Prescribed Burns are generally not located along the same small drainages, although about 500 acres of the Hartman and Sheephorn burn units are tributary to Sheephorn Creek. 500 acres do not make up a large percentage of Sheephorn Creek's watershed, but they are both located near the lower end of the creek, fairly close to the confluence with the Colorado River. The design feature requires that these two units would not be burned during the same year, and the first to be burned would be stable and revegetated prior to the second one being burnt. The High Trail and Elk Creek burn units have similar concerns, with 1,953 acres being tributary to Piney River. These two burn units would also be staggered in treatment to help reduce the potential impact to water quality.

Monitoring as implementation progresses will help adjust the proposed buffers and treatment units to better reflect best management practices to protect water quality.

The No Action Alternative would separate each proposed treatment into an individual action requiring a NEPA document. Assuming all of the proposed treatments would eventually occur, then the cumulative impacts would be the same. If the individual proposals were spread out over a longer time period, or some treatments were modified or eliminated, then the expected cumulative impacts would most likely be less.

6.1.4. Floodplains, Hydrology, and Water Rights

The Proposed Action would not directly impact floodplains, hydrology, or water rights, nor would there be measurable indirect impacts. The Proposed Project and the No Action Alternative would not add to any ongoing or future impacts to these issues.

6.1.5. Wetlands and Riparian Zones

The Proposed Action would not directly impact wetlands and riparian zones, and design features are designed to minimize any indirect impacts. The Proposed Project and the No Action Alternative would not add to any ongoing or future impacts to these issues.

6.1.6. Aquatic Wildlife

Actions analyzed in combination with current and foreseeable land uses are not expected to have measurable cumulative impacts to this resource.

6.1.7. Vegetation

Currently, pinyon juniper encroachment has shifted plant community composition within the project area. Livestock grazing is occurring within the project area and will continue for the foreseeable future. The Proposed Action would remove encroaching juniper and allow desirable forbs and grasses to repopulate treated areas and possibly shift plant composition to

a more desirable state. Treatments would not occur under the No Action Alternative and the current trend of juniper encroachment would continue.

The cumulative effects of the Proposed Action would remove encroaching juniper, create an opening for vegetation to establish and possibly provide more desirable forage/cover for wildlife and/or livestock. The Proposed Action could also provide an opening for invasive species (Downy brome for example) to establish, reducing desirable forage/cover and increasing the fire potential within the project area. Overall, the Proposed Action is anticipated to shift the plant community to a Sagebrush/bunchgrass system, providing cover for wildlife, forage for livestock and ~~possibly increasing water infiltration for plants~~ which would be a positive result for the area.

6.1.8. Invasive, Non-Native Species

Currently, pinyon juniper encroachment has shifted plant community composition limiting the amount of desirable native herbaceous and shrub plant communities. The Proposed Action would remove encroaching juniper and allow desirable forbs and grasses to repopulate treated areas. This may limit the amount or prevent the spread of noxious or invasive species if proposed design features are implemented for noxious weed management. Under the no action alternative treatments would still occur but would likely be addressed in individual environmental analysis at a later time.

The cumulative effects of the Proposed Action would remove encroaching juniper, create an opening and or expansion for more desirable vegetation to establish and possibly provide more desirable forage/cover for wildlife and/or livestock. The Proposed Action may also provide an opening for noxious or invasive plants to be established, in which Downey brome (cheatgrass) is a more significant concern due to the proximity of established populations within the project area. However if design features of the proposed action are implemented it's anticipated that more desirable vegetative communities will become established which will increase forage for wildlife and provide a more proactive prevention against noxious/invasive species.

6.1.9. Migratory Birds

Actions analyzed in combination with current and foreseeable land uses are not expected to have measurable cumulative impacts to this resource.

6.1.10. Terrestrial Wildlife

The Proposed Action combined with increased land uses is expected to increase hunting pressure on big game species in the area as this decreasing hiding cover. Bighorn populations for S-77 commence in 2016. GMU 361 and 15 currently enjoy mule deer and elk herds at

population objective. If these herds drop below population objectives during the life of this document, adaptive management strategies may need to be developed to address this issue.

The No Action alternative combined with other land use actions leaves this habitat susceptible to shrinking winter habitat for the greater amount of species utilizing this landscape combined with higher levels of recreational use. Big game populations, particularly mule deer are expected to decline as a result.

6.1.11. Special Status Animal Species

The proposed action in combination with current and foreseeable land uses are not expected to have measurable cumulative impacts to this resource.

The no action alternative would allow for more vegetation continuity within the State Bridge Landscape Linkage for Canada lynx which may be important as land uses increase. However this does not manage the area for catastrophic wildfire which may eliminate this linkage area.

6.1.12. Special Status Plant Species

Actions analyzed in combination with current and foreseeable land uses are not expected to have measurable cumulative impacts to this resource.

6.1.13. Areas of Critical Environmental Concern

The Proposed action would not affect any designated ACECs.

6.1.14. Cultural Resources

It is not expected to have foreseeable cumulative indirect or direct impacts to cultural resource sites from the proposed action other that natural process while providing protection from a catastrophic or intense wildfire. While the no action alternative would result in the loss of scientific information from a potential wildfire event.

6.1.15. Paleontological Resources

Most paleontological resources are found on rocky outcrops or areas where vegetation is slight to non-existent. There is little potential of an effect to paleontological resources from the proposed action or no action alternative.

6.1.16. Visual Resources

Cumulative effects from the Proposed Action are dependent on the success rate within treatment objectives. Under the Proposed Action there would be a large scale change to the landscape that may be noticeable to the casual observer and be short term in nature. The area is designated and managed for a VRM Class II which identifies that the change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the

predominant natural features of the characteristic landscape. With proper implementation of mitigation measures as identified the cumulative impacts of current, proposed and foreseeable future actions would minimize cumulative impacts.

6.1.17. Wild and Scenic Rivers

Impacts to this resource from the Proposed Action would be temporary and localized and would not be expected to contribute a noticeable amount to cumulative impacts.

6.1.18. Livestock Grazing

Due to the intermingled ownership and importance of the area for summer range, any actions that impact public lands would affect adjacent private and state lands and livestock grazing in general. The Proposed Action may cause adjustments to a permittee's grazing use. Deferment or rest may be required to allow burned areas to recuperate and allow perennial grasses and forbs to establish. Temporary use in reserve allotments described in the Record of Decision (ROD) of the Kremmling Field Office Resource Management Plan (RMP) may be granted at the Authorized Officers' discretion (RMP, 2015).

Changes in rangeland condition by applying treatments and various grazing management techniques could improve the overall health of the range and provide long term benefits to the rangeland and evaluating grazing use in the affected allotments by; monitoring percent cover, species composition and canopy gap to determine if adjustments are needed.

6.1.19. Wild Horses

The proposed action would not affect wild horses since they do not inhabit the project area.

6.1.20. Forestry, and Forest and Woodland Vegetation

Past, current, and reasonably foreseeable future actions, as well as the proposed treatments and associated design criteria, all have a role in potential cumulative effects of the Proposed Action alternative. The types and locations of treatments under the No Treatment alternative would be expected to be similar to the Proposed Action and, therefore, the cumulative effects would be expected to be similar as well.

As stated at the beginning of this document, there have been about 100 individual vegetation treatment projects in the area since 1986 and approximately 6,236 acres have been treated. The Proposed Action would re-treat at least some of these areas. Vegetation treatments on state land have taken place in the past, are presently taking place and are proposed for the near future. The area is heavily used by recreationalists, primarily in the fall during the big game hunting season, during the summer along the river corridor, and also receives some ATV use. Recreational use is likely to increase in the future due to expected increases in population. Treatment implementation and recreation use can result in the creation of travelways. The

discussion of previous treatments also mentions that weed treatments, including treatment for cheatgrass infestations, have taken place in the past and continue to the present.

As discussed in the consequences section, changes in the stand structure of younger pinyon-juniper woodlands through implementation of the Proposed Action may limit the structural and ecological complexity of the residual stands as they age. These manipulated stands may never develop into quality replacement old-growth woodlands. Depending on the extent of treatment within the analysis area and on adjacent private and state lands, biological diversity across the landscape could be adversely affected.

Treatment of cheatgrass (*Bromus tectorum*) infestations have occurred in the past in several areas of the analysis areas and continue to present. As discussed in the consequences section, opening up pinyon-juniper stands by any method increases their vulnerability to weed infestations. Soil disturbance resulting from the use of mechanical equipment during treatment implementation or recreational vehicle use can create an even more favorable seedbed for weed establishment. The development of travelways during the implementation of treatments or by recreational users can facilitate the dispersal of weed seeds into previously inaccessible areas. Finally, ATVs and other recreational vehicles, as well as mechanical equipment can be vectors for weed seeds. The scope of the potential, pinyon-juniper, treatments would increase the logistical complexity of identifying and treating all current and future infestations of weeds in general, and cheatgrass in particular. A widespread cheatgrass infestation in these woodlands would be especially problematic as it would create a highly flammable, continuous fuel-bed. Such an event could allow fire to occur in a stand much more frequently than it did historically, ultimately resulting in site degradation. If fire became much more frequent than it was historically on a large scale, it would likely result in an irreversible and irretrievable loss of resources.

6.1.21. Recreation

Other actions occurring in the project area also have the potential to affect recreation resources. Impacts to this resource from the Proposed Action would be temporary and localized and would not be expected to contribute a noticeable amount to cumulative impacts.

6.1.22. Access and Transportation

Cumulative effects from the Proposed Action are dependent on the success rate within treatment objectives. At higher thresholds there would be greater openings in vegetation along designated routes and the potential for new unauthorized route creation or disturbance. There are also potential that areas utilized for treatment access could become established new routes if not effectively rehabilitated or restricted from public use. If new routes were to be created or areas utilized for treatment access are utilized after treatments occur there is potential for cumulative incremental increases in unauthorized cross country travel which could continue to propagate as new spurs continue to be created in outlying years. With proper implementation of mitigation

measures as identified the cumulative impacts of current, proposed and foreseeable future actions would minimize cumulative impacts over time.

6.1.23. Fire Management

Cumulative effects for the purposed action are as follows; The table below shows the results if a certain percent of treatments are completed by the BLM, USFS, Colorado Parks and Wildlife, and Private Landowners within the five 6th order watersheds.

All treatment areas within the Proposed action effect on the five 6th order watersheds	100% of treatment results in VCC 1	80% of treatment results in VCC 1	60% of treatment results in VCC 1	40% of treatment results in VCC 1	20% of treatment results in VCC 1	0% of treatment results in VCC 1
Vegetation Condition Class I	106,085	93,052	80,018	66,984	53,950	40,917
Vegetation Condition Class II	0	11,029	22,059	33,088	44,118	55,147
Vegetation Condition Class III	0	2,004	4,008	6,013	8,017	10,021

The table above shows that the proposed action will be able to meet the goal of attaining a higher percentage of FRCC 1 then FRCC 2 and FRCC 3 combined within the five 6th order watersheds, if 20-100% of the area is treated. The sage brush fuels models could be treated on private and lodgepole pine and Douglas fir stands could by treated on the USFS, Colorado Parks and Wildlife, and Private Landowners within the five 6th order watersheds.

Cumulative effects for the no action are as follows; The table below shows the results if all present and planned projects are completed by the USFS, Colorado Parks and Wildlife, and Private landowners within the five 6th order watersheds.

All planned projects by all agencies except BLM	100% of all treatments are completed	80% of all treatments are completed	60% of all treatments are completed	40% of all treatments are completed	20% of all treatments are completed	0% of all treatments are completed
Vegetation Condition Class I	79,237	68,414	57,589	46,765	35,940	25,117
Vegetation Condition Class II	0	9,071	18,144	27,215	36,288	45,359

Vegetation Condition Class III	0	1,752	3,504	5,257	7,009	8,761

The table above how that if 40-100% of the five 6th order watersheds are treated by all agencies and private landowners other than the BLM, the goal of a higher percent of VCC 1 then VCC 2 and VCC 3 combined would be attained. It would provide more options for strategies and tactics by lowering fire intensity in treated areas, create escape routes, safety zones, add control lines that could aid in suppression in the event of a wildland fire, and help to get closer to the goal of a higher VCC1 then VCC2 and VCC 3 combined on the USFS, Colorado Parks and Wildlife, and Private landowners lands. BLM lands would continue to increase in the amount of VCC2 and VCC3 and lower the VCC1. Fires on the BLM lands would most likely be higher in severity and intensity which would also increase the cost to suppress and the cost of rehabilitation.

7. SUPPORTING INFORMATION

7.1. Interdisciplinary Review

Table 1. List of Preparers

Name	Title	Area of Responsibility	Date Signed
Paula Belcher	Hydrologist	Surface and Ground Water Quality; Floodplains, Hydrology, and Water Rights; Prime and Unique Farmland, Soil Resources, Wetlands and Riparian Zones	5/20/2016
Forrest Cook	Air Quality Specialist	Air Quality and Climate Change	5/23/2016
Darren Long	Wildlife Biologist/ Project Lead	Special Status Animal Species, Migratory Birds, and Aquatic and Terrestrial Wildlife, Areas of Critical Environmental Concern	4/27/2016
RC Lopez	Rangeland Management Specialist	Vegetation, , Livestock Grazing,	5/3/2016
Ken Belcher	Forester	Forest Management and Woodland Products,	6/2/2016
Zach Hughes	Natural Resource Specialist	Noxious, non-native species, vegetation	04/11/2016
Bill B.Wyatt	Archaeologist	Cultural Resources, Paleontological Resources, Native American Religious Concerns	5/24/2016
John Monkouski	Outdoor Recreation Planner	Visual Resources, Access and Transportation, Scenic Byways	6/29/2016
Kenneth Dittlinger	Outdoor Recreation Planner	Lands with Wilderness Characteristics, Wilderness, Recreation	6/29/2016
Jessica Lopez Pearce	Geologist	Geology and Minerals	5/23/2016
Annie Sperandio	Realty Specialist	Realty Authorizations	6-14-2016

Name	Title	Area of Responsibility	Date Signed
Kevin Thompson	Fire Management Specialist	Fire Management	1/19/2016
Monte Senor	Planning & Environmental Coordinator	NEPA Compliance	

7.2. Tribes, Individuals, Organizations, or Agencies Consulted

Tribal consultation was initiated with the Northern Ute Tribe, Ute Mountain Tribe, Southern Ute Tribe in a face to face meeting on April 7, 2016. A letter and follow up phone call was made to the Northern Arapaho and Eastern Shoshone Tribes. No concerns were identified for known traditional cultural properties (TCPs) or sites of spiritual concern sites were given.

The State Historic Preservation Officer (SHPO) representative Mark Tobias was contacted on April 25, 2016, for the project implementation and desire to evaluate the project affect to cultural resources on a project by project basis over the time period for the implementation of wildlife habitat improvement along the Colorado River. It was determined that as long a fuels treatments were done by hand across cultural resource sites there would be a no adverse effect from project implementation. The fuels aspect of the habitat improvements project was a continued maintenance of earlier inventory for habitat and fuels reduction along the Colorado River.

Informal consultation was conducted regarding affects to Canada lynx (*Lynx canadensis*) and the associated State Bridge Landscape Linkage Area on November 9th 2015. It was determined that the proposed action would not directly impact lynx nor deter their ability to navigate the area between home ranges.

Colorado Parks and Wildlife from the Hot Sulphur District were consulted prior and throughout the planning process to collaborate habitat improvements. Unanimous support has been received from this planning effort from this entity.

7.3. References

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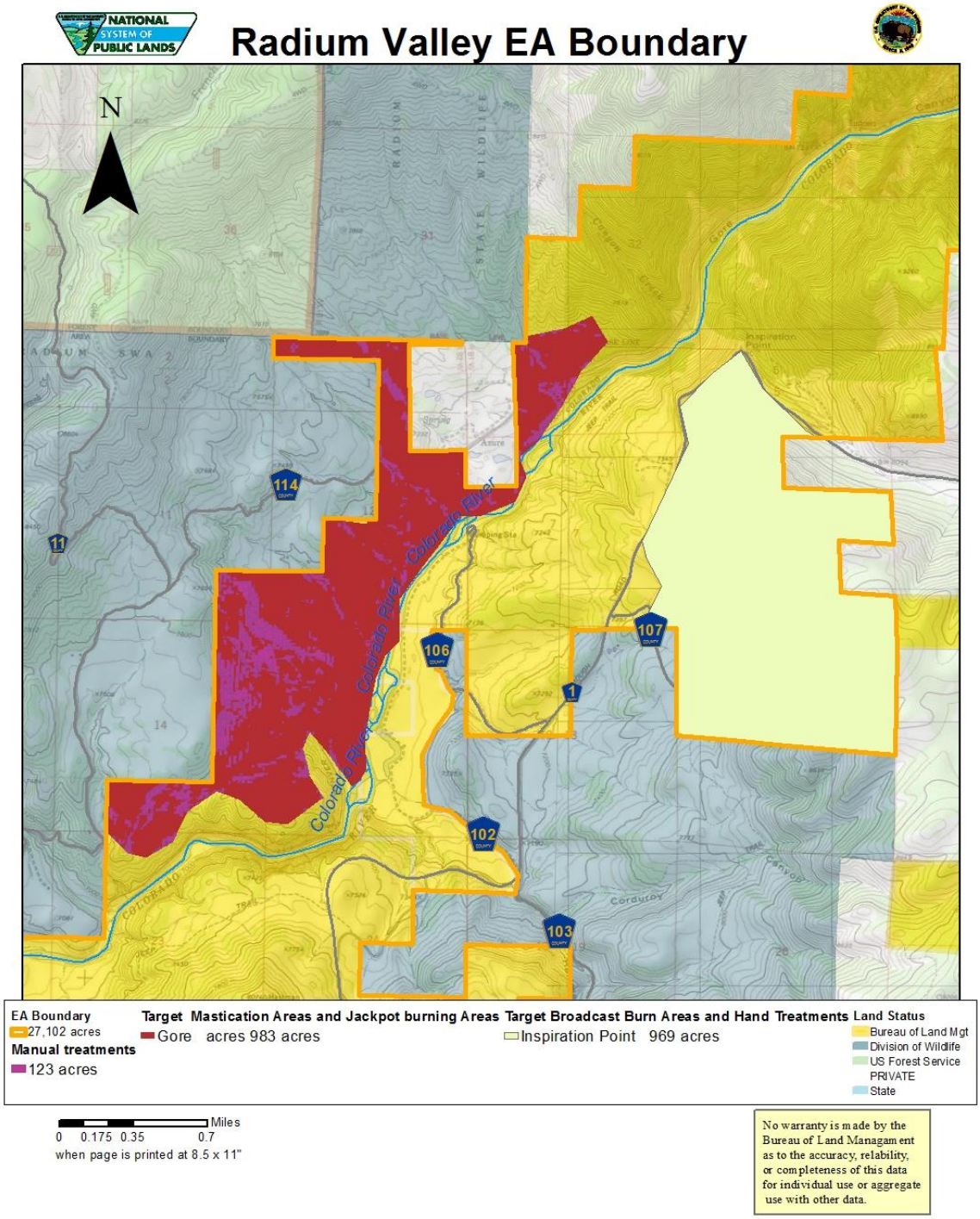
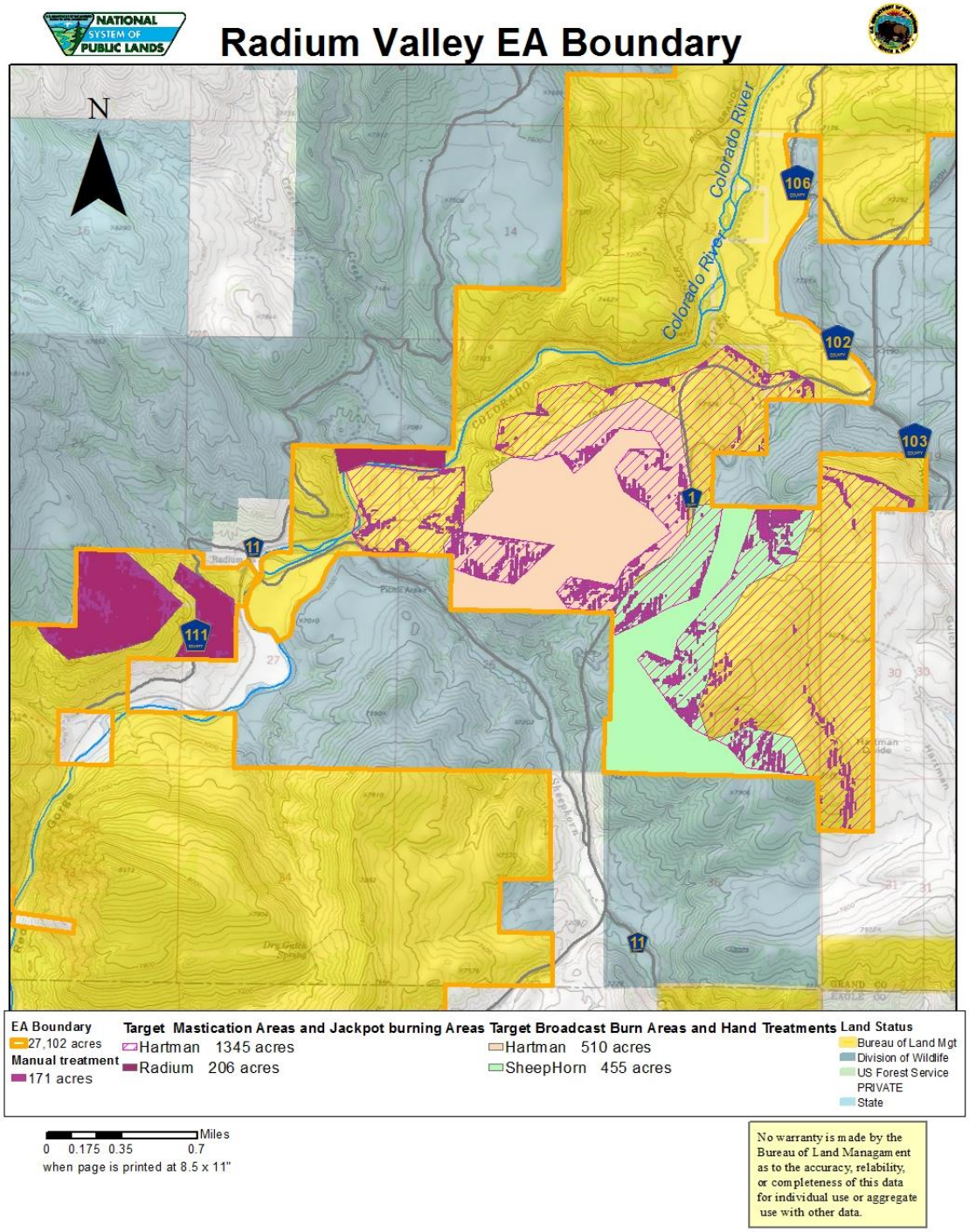
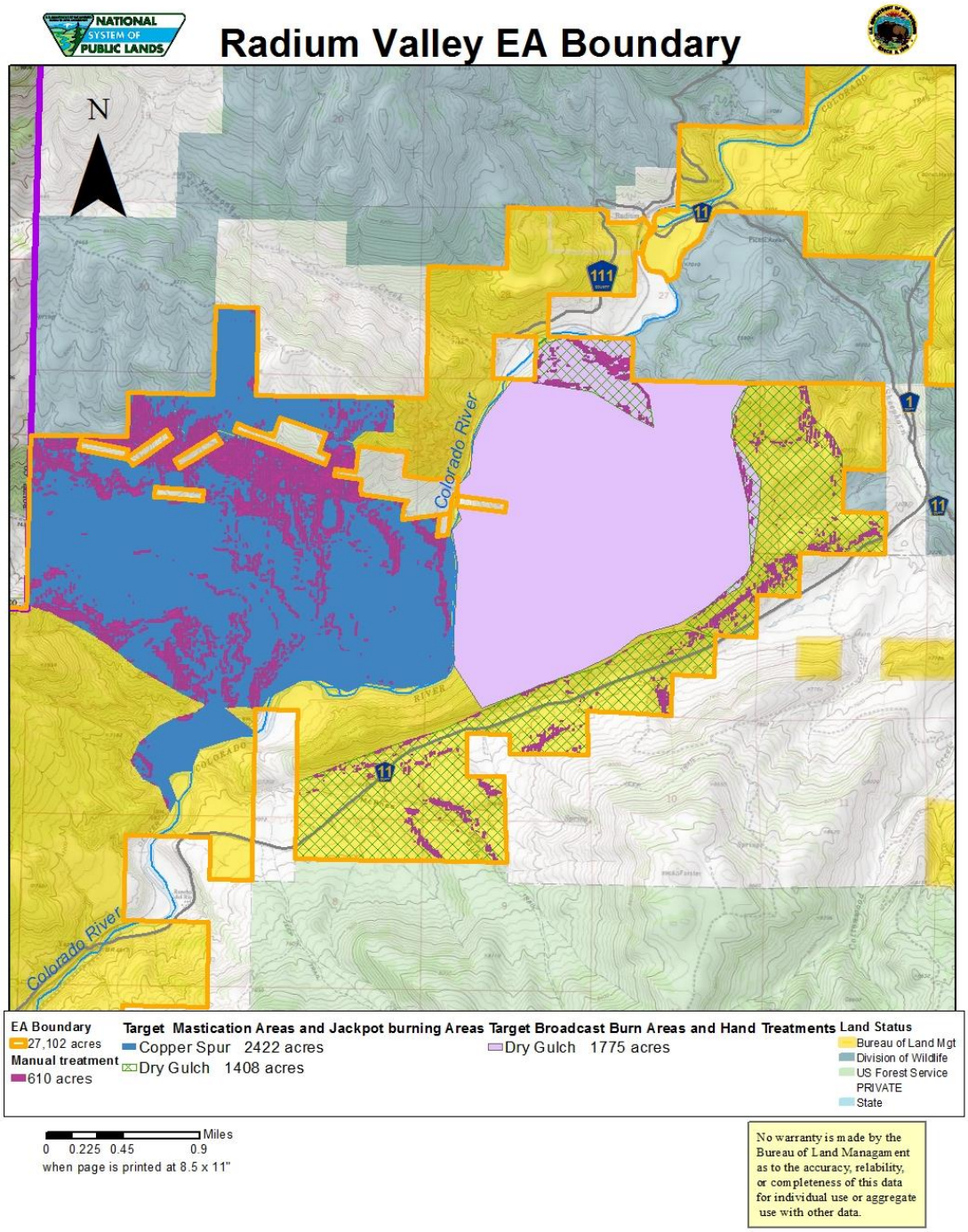
Gore and Inspiration Point



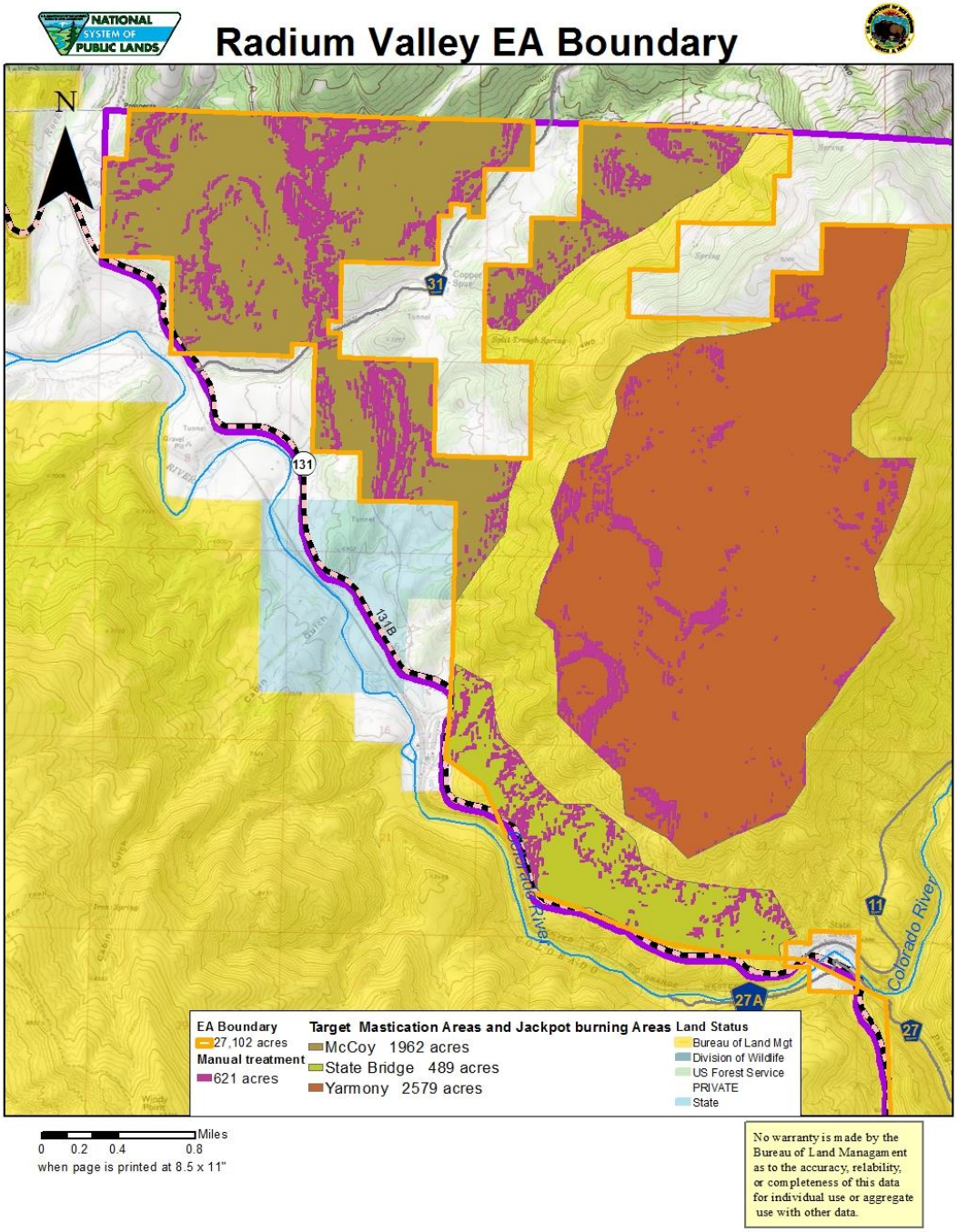
Hartman and Radium



Dry Gulch and Copper Spur

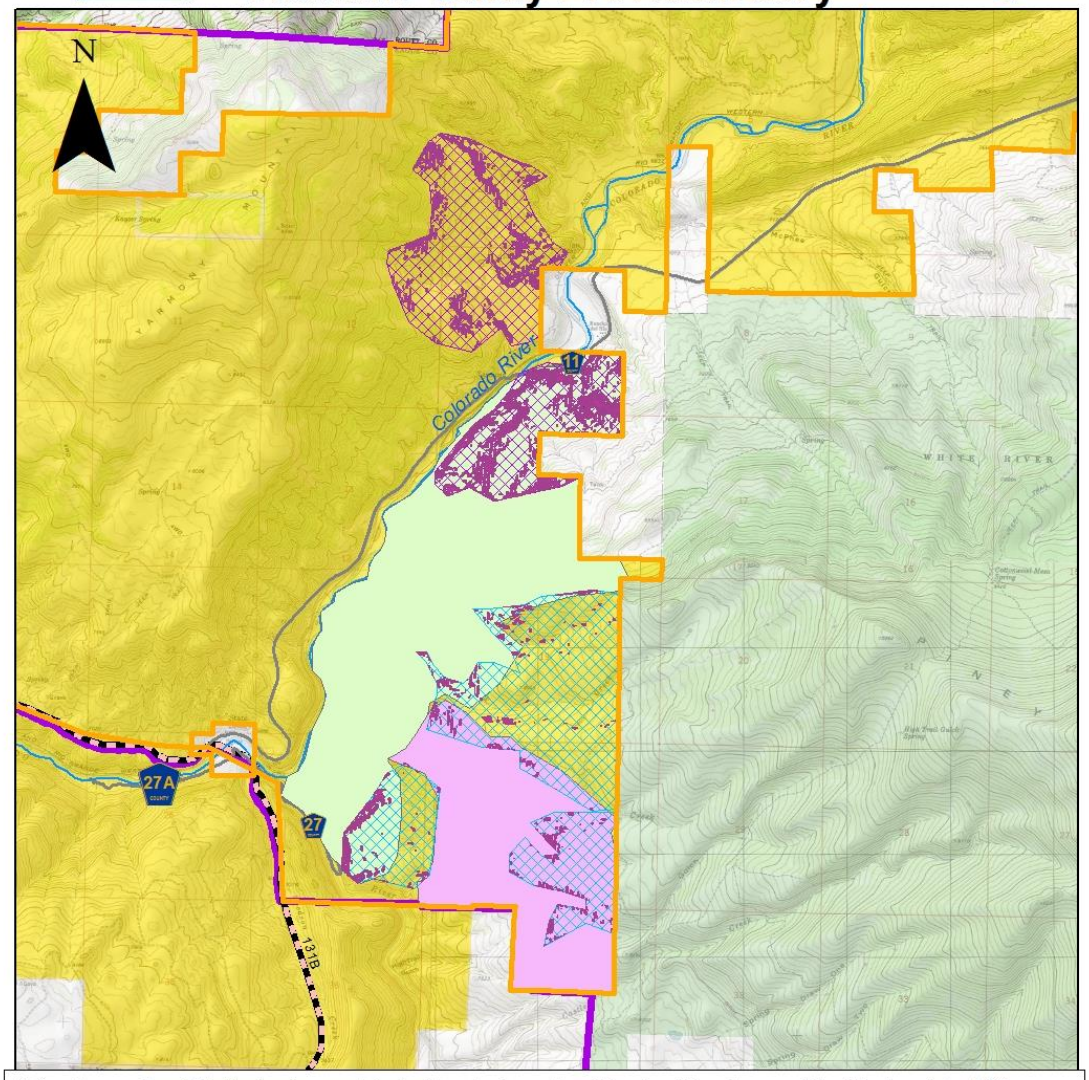


McCoy, Yarmony and State Bridge



Piney and Rancho Del Rio

Radium Valley EA Boundary



EA Boundary
27,102 acres
Manual treatment
259 acres

Target Mastication Areas and Jackpot burning Areas
Piney 1050 acres
Rancho Del Rio 938 acres

Target Broadcast Burn Areas and Hand Treatments
Elk Creek 1752 acres
High Trail 896 acres

Land Status
Bureau of Land Mgt
Division of Wildlife
US Forest Service
PRIVATE
State

Miles
0 0.275 0.55 1.1
when page is printed at 8.5 x 11"

No warranty is made by the Bureau of Land Managament as to the accuracy, relability, or completeness of this data for individual use or aggregate use with other data.

8. Soil, Water, Air Specialist Report

Written by: Paula Belcher

Radium Valley Habitat Improvements
Programmatic Environmental Assessment **DOI-BLM-LLCON02000-2015-004**

NEPA Compliance Record Rationale

The proposed programmatic environmental assessment to treat acres of public lands in Grand and Eagle Counties within a 27,000 acre project area requires an assessment of compliance with state and federal regulations to protect water quality and the Colorado Land Health Standards #1, 2, and 5. The Project is comprised of several treatment areas which are located in the Upper Colorado River Basin. A review of the potential impacts of the proposed action and no action alternative was done for each treatment area, using ArcMap, the NRCS Soil Surveys for Grand and Eagle Counties, National Wetland Inventory, and field data.

Individual treatment units were determined in March, 2016. Due to the short turn around, the following design features were applied to each treatment site for this analysis. Prior to the actual treatment, field review may require additional areas to be buffered, or the size of the buffers adjusted. Even more importantly, compliance checks will be required, as NEPA design features are worthless unless applied on the ground.

<u>Wetland Sites:</u>

- All known wetland sites were buffered by 100 feet to help prevent disturbances within wetland vegetation zones. The buffers are from the edge of the wetland vegetation outward.

  Although these sites would generally not be treated, these areas are mapped to help ensure compliance- there will be no equipment or vehicles within the wetland zones, nor will these areas be burned or manually treated. These buffers will help reduce the possible spread of invasive species within the wetlands and will help avoid soil compaction and the degradation of water quality.

- Water sources are also included on the map and will be buffered by 100 feet minimum

  The water sources layer may be developed water sources such as wells and springs, where infrastructure should be protected. It also includes seeps or undeveloped springs. Where these sources are mapped within a drainage (or at the top of a drainage), they may support a riparian zone within the drainage, and equipment will not cross these drainages.

- The Yarmony Creek PCA will have a minimum 325 foot buffer applied. The Colorado River & Colorado River PCA will have a minimum 1320 foot buffer applied.

  Included in the attached maps are identified Potential Conservation Areas (PCA) that were mapped by the Colorado Natural Heritage Program. These PCAs can include unique or rare plant communities, or highly diverse communities that are in good

condition, and are recommended for protection. A portion of the Colorado River is within a PCA, and is for a "Rocky Mountain Juniper/Red-osier dogwood Woodland Community". The community has a S2 rating- it is imperiled in the state because of rarity. It has been found along the Colorado River in Eagle County, and in one other county in the state. The width of this PCA polygon is approximately 1,320 feet. The Kremmling RMP adopted a No Surface Occupancy stipulation for oil and gas disturbances along the Colorado River corridor of 2,640 feet (a half mile buffer) to protect water quality, fisheries, riparian communities, visual resources and other resource values. The NSO width is not required for less disruptive activities, or where the disturbance is proposed to help improve those resources. For the proposed treatments, the PCA buffer of 1,320 feet will be applied to help protect these resource values as a minimum. Prior to the project implementation, this buffer can be reviewed per treatment unit. Depending on the specific proposed treatment, location of the unit, the riparian community, soils and slopes involved, etc., the buffer may need to be increased or could be reduced. The buffer would never be smaller than 325 feet for any surface disturbance outside of the PCA.

The Heritage Program's summary of the Colorado River PCA: "Several different riparian communities exist along this stretch which are not represented anywhere else within Colorado. There are no pristine sections along the entire Colorado River, and the section from Radium to Red Dirt Creek is no exception. What this section has to offer is one of the most intact portions of riparian habitat left along the 250 mile Colorado state stretch of river."

Ecological Sites: The NRCS Soil Surveys are not intended for site specific actions. In reviewing proposed treatments, however, they do help indicate where treatments are the most practical and the general areas to treat. Additional applicability is gained by using aerial photography to improve ecological sites, as soil and vegetation changes are visible in large-scale photographs. Note: Grand County Soil Survey does not have ecological site descriptions (ESD) to date. Range Sites were used for discussion. Eagle County soil mapping units were grouped into "ecological sites" on the Web Soil Survey, but appear to be Range Sites. Both surveys' production data were used for plant community discussion.

- **Only** soil mapping units that support **sagebrush steppes**, **mixed mountain brush**, or **coniferous forest (non pj) vegetation** are displayed on each Unit's map, and a table of the associated ecological/range sites and percentage of the unit are included. There could be instances where treatments might be considered on other sites, but with the current project's purpose and need, and stated objectives, these areas should not be treated.
- If the decision is still made to treat recommended "no treat" areas, then specific design features to stabilize and revegetate these areas would be required.
- It is also recommended that the units be monitored and similar treatments considered only after a treated area is successfully revegetated and stable for at least two growing seasons.

Within the proposed treatment units are large areas that are not within ecological sties that will meet the project's objectives. They are not sagebrush, mixed shrub, or grass

sites that are invaded by pinyon-juniper woodlands. There are Torriorthent-Camborthid-Rock Outcrop complexes, for example, where soils can be shallow and undeveloped. These sites are highly erosive, and removing the pinyon-juniper (or any other) vegetation increases the potential soil loss, and will not result in increased wildlife forage. Research has shown opening the canopy not only increases soil erosion, but makes the site much more susceptible to cheat grass invasion. This also increases the frequency of fire and creates a totally new ecological site- a pinyon juniper woodland with frequent fire.

It has been expressed that many of these areas will naturally "fall out" during the field treatments- having insufficient fuel to carry fire, or that equipment operators will not treat these areas. Where these areas are continuous and large enough to exclude, however, they should be left out from the start. There are proposed hand treatments, for example, on steep slopes that do not have the soils to support the desired vegetative objectives. In these areas, it doesn't make sense to treat them. Instead it would be better to avoid these areas from the start.

In this report, all of the proposed treatment units are mapped with their soil survey's ecological sites.

The table below summarizes the project, treatment units, and percent of the unit that does not appear to support the proposed treatment/project objectives.

Summary of Treatment Units:

Treatment Unit	Proposed Treatment	**% Unsuitable due to Ecological Sites**
Copper Spur	Mastication & Hand Thinning	37% No Treat
Dry Gulch	Mastication/Jackpot Burn Broadcast Burn	11% No Treat 54% No Treat
Elk Creek	Broadcast Burn	38% No Treat
Gore	Mastication/Jackpot Burn	34% No Treat
Hartman	Mastication/Jackpot Burn Broadcast Burn	14% No Treat 14% No Treat
High Trail	Broadcast Burn	41% No Treat
Inspiration	Broadcast Burn	55% No Treat* *Aerial photos indicate more could be treated
McCoy	Mastication/Jackpot Burning	84% No Treat
Piney	Mastication/Jackpot Burn/Hand Thinning	8% No Treat

Radium	Mastication/Jackpot Burn	34% No Treat
Rancho del Rio	Mastication	59% No Treat
Sheephorn	Broadcast Burn	14% No Treat
State Bridge	Mastication/Jackpot Burn	35% No Treat
Yarmony	Mastication/Jackpot Burn	16% No Treat

Proposed Treatment Areas:

Gore / Inspiration:

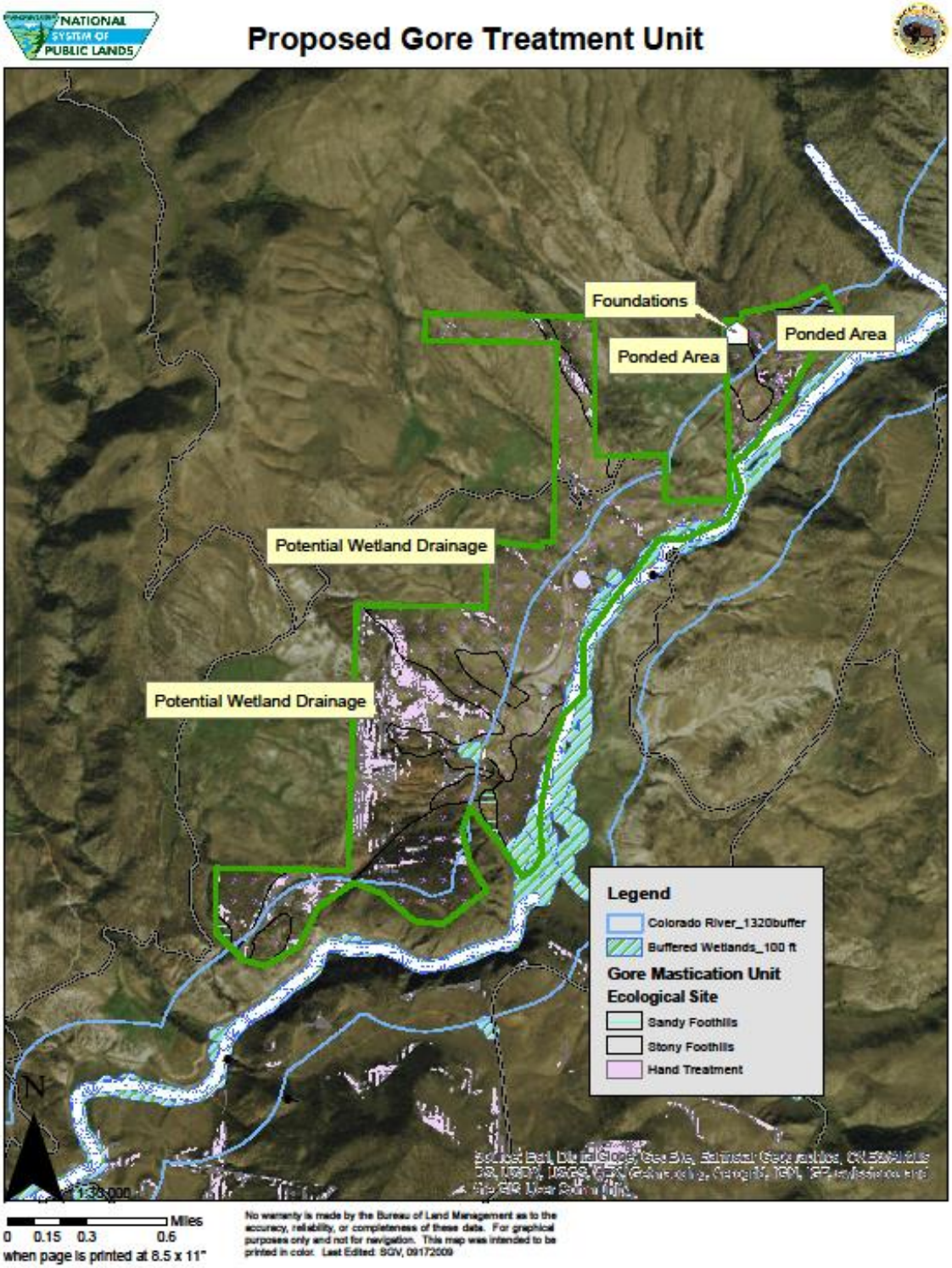
Gore Proposed 2020: 1,083 acres of mastication with potential jackpot burning (low intensity)
Mastication/Jackpot Burn 1,083 acres

Ecological Site	Percent of Entire Unit	Plant Composition for Range Site	Production, Normal Year	Acres within the Colorado River Buffer, 1320 ft.
Wetlands	5%			Approximately 381 acres (35%) of total unit (1083 acres). 46% of the Stony Foothills are in the buffer.
Stony Foothills	60%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Torriorthents-Rock Outcrops	34%			
Sandy Foothill	1%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	

The Gore Mastication Unit is predominantly mapped as a sagebrush site that would be expected to meet the objectives. Current condition is not known, but poorer soils are mapped within the unit and would not be treated by any method, unless specific objectives are developed for these areas from site data. Soils generally have only low to moderate hazards from water erosion, with only 50 some acres within the sagebrush community (outside of the river's buffer) that are on highly erosive soils. Steeper slopes are also primarily outside of the sagebrush community. Most of the proposed hand cutting does not appear to be beneficial, occurring on steeper slopes and rock outcrop complexes.

The unit has no known developed springs and most of the drainages appear to be ephemeral, although they have not been inventoried. There are two drainages that appear to support wetland vegetation, and another that has a mapped wetland near the mouth. The railroad tracks appear to

act as a detention dam at the toe of several of the drainages, and would intercept sediment loads and detain runoff from reaching the Colorado River. North of the private property that is surrounded by the unit is what appears to be an historic hay meadow. Abandoned irrigation ditches are visible in aerial photographs, and the main ditch crosses the top of the field and ditch seepage appears to improve the vegetative cover. Two foundations and a trash pile appear to be located within the proposed treatment unit.


Proposed Gore Treatment Unit
NATIONAL SYSTEM OF PUBLIC LANDS
Foundations
Ponded Area
Ponded Area
Potential Wetland Drainage
Potential Wetland Drainage
Legend
Colorado River_1320buffer
Buffered Wetlands_100 ft
Gore Mastication Unit
Ecological Site
Sandy Foothills
Stony Foothills
Hand Treatment
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Inspiration Unit

Inspiration Proposed: 1,031 broadcast burn (ideally heli-torch) with hand thinning lop and scatter for fuel prep on the tow slope of steeper terrain when conditions are favorable.

There is a plan to burn 357 acres of adjacent state property in 2017 to improve bighorn sheep dispersal.

Broadcast Burn

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	
Rocky Outcrop-Cryoboralfs, Cryoborolls, Torriorthents	55%			
Woodlands	15%			
Stony Loam	17%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	
Stony Foothills	11%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Sandy Foothills	2%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	

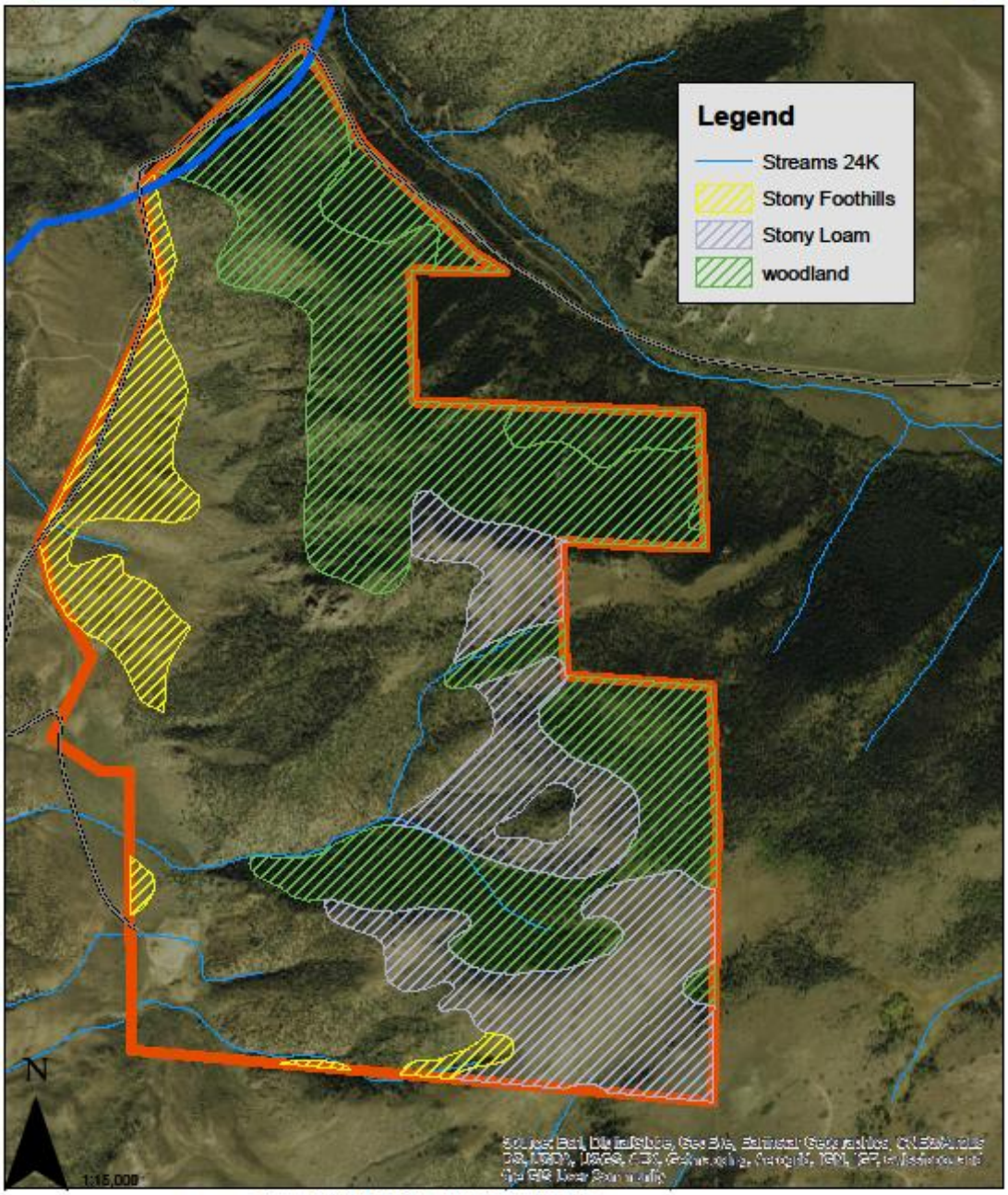
Most of the proposed burn unit is mapped on slopes greater than 30%, except the adjacent state property which is less steep. There are few mapped soils with water erosion concerns, except on the state lands, where approximately 14% are highly susceptible to water erosion. To date, the earlier burn has not resulted in accelerated erosion. The burn generally left many of the tree stems and/or trees, consuming only the needles or the crowns, and killing the trees. It appears that at least a portion of the root systems is still intact. The burn primarily burned in the lower slopes which are mapped as sagebrush steppe communities, and there was a good understory prior to the burn. Looking at both historic and current aerial photographs, these communities appear to extend further up the slope than the soil survey indicates. In the steeper slopes, there are only fingers that were burnt and not extensive areas. These fingers, however, did not result in increased runoff pathways.

The original EA identified concerns with slope instability and/or increased sediment transport potentially impacting Grand County Road 1 (Trough Road) and the private landowner expressed concerns about the burn impacting their property, especially their water source. Burning the northeast side of the project could have the higher potential to result in debris flows or rock

slides reaching the county road, and has the shortest runoff route to the Colorado River. Depending on the acreage burned and the fire's severity, erosion control measures could help insure that the burn area did not impact County Road 1. The distance from the treatment unit to the private residence should protect their water source from impacts.

It is assumed that previously burned areas would not be reburned, but that the prescribed fire would target areas that had not burned before. By not reburning areas, they would act as a buffer to the county road, being less steep than proposed burn areas and well vegetated. The old burn areas could help runoff deposit sediment loads (if any) prior to reaching the county road.

Proposed Inspiration Point Treatment Area



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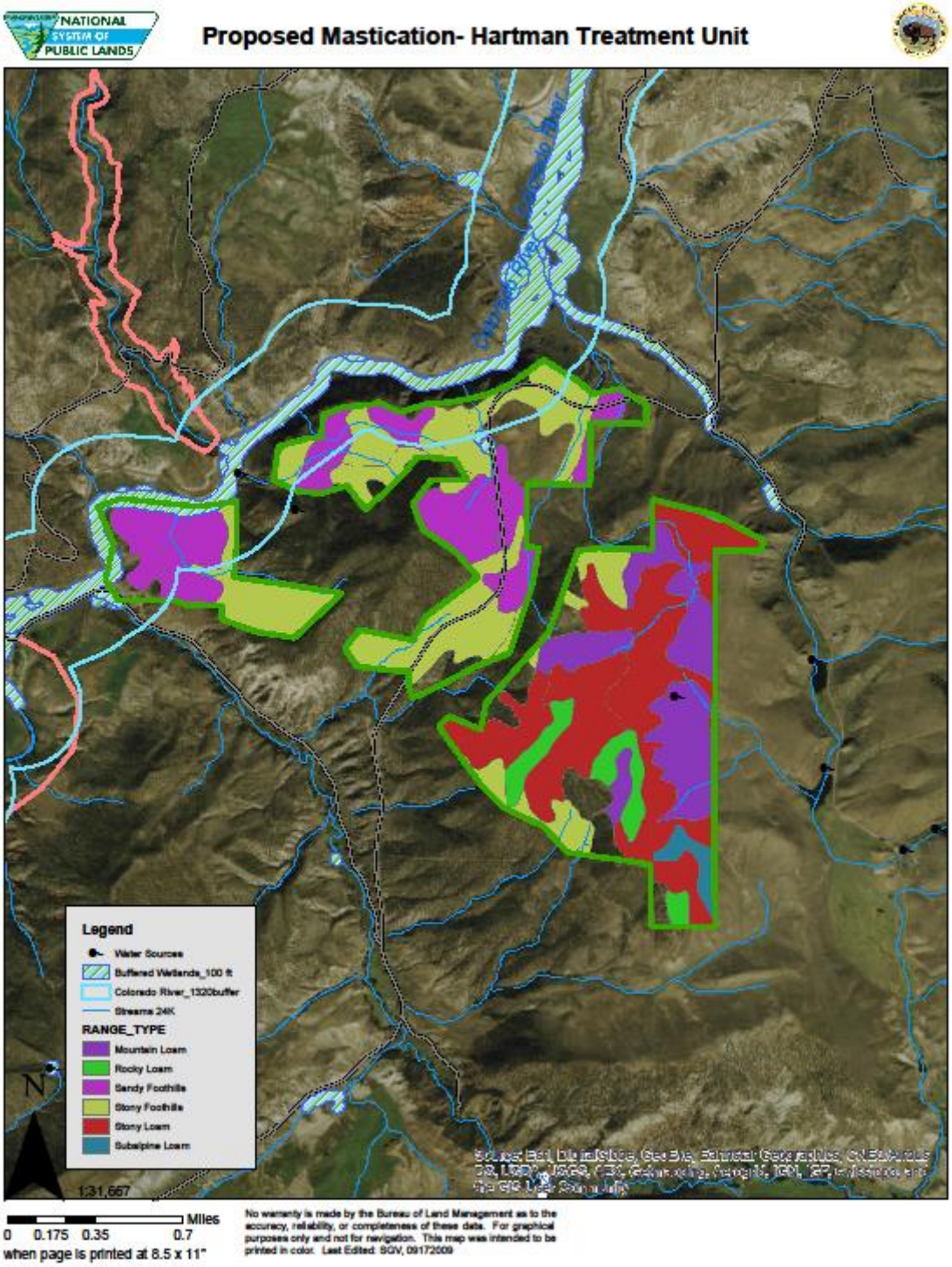
Hartman Divide/Radium Benches (West Sheep Creek):

Hartman Divide Proposed 2016/17: 1,395 acres of mastication and jackpot burning with a 519 acres broadcast burn component on Hartman Hill. The Sheephorn side (East of Trough Road) has an additional 468 proposed broadcast burn and hand thinning component

Mastication (from April 4th 2016 mapped units)-

Ecological Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Comments:
Stony Loam	25%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	About 215 acres are within the PCA and would not be treated. "Center" unit, east side overlooking hay meadow on Gore Canyon ranch- highly water erosive soils. "West" unit, of Stony Foothill soils, highly water erosive soils. Most would not be treated, within river buffer.
Sandy Foothill	25%	Western Wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	
Stony Foothills	17%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Torriorthent Camborthids, Rock Outcrops, Cryborolls	14%			
Mountain Loam	8%	Big sagebrush Idaho fescue muttongrass	1,200 lbs	
Rocky Loam	7%	Bluegrass 15% Pine needlegrass 10% Big sagebrush 5%	900 lbs	
Subalpine Loam	2%	Thurber's fescue 40% Nodding brome 10% Parry's danthonia 5%	2,800 lbs	



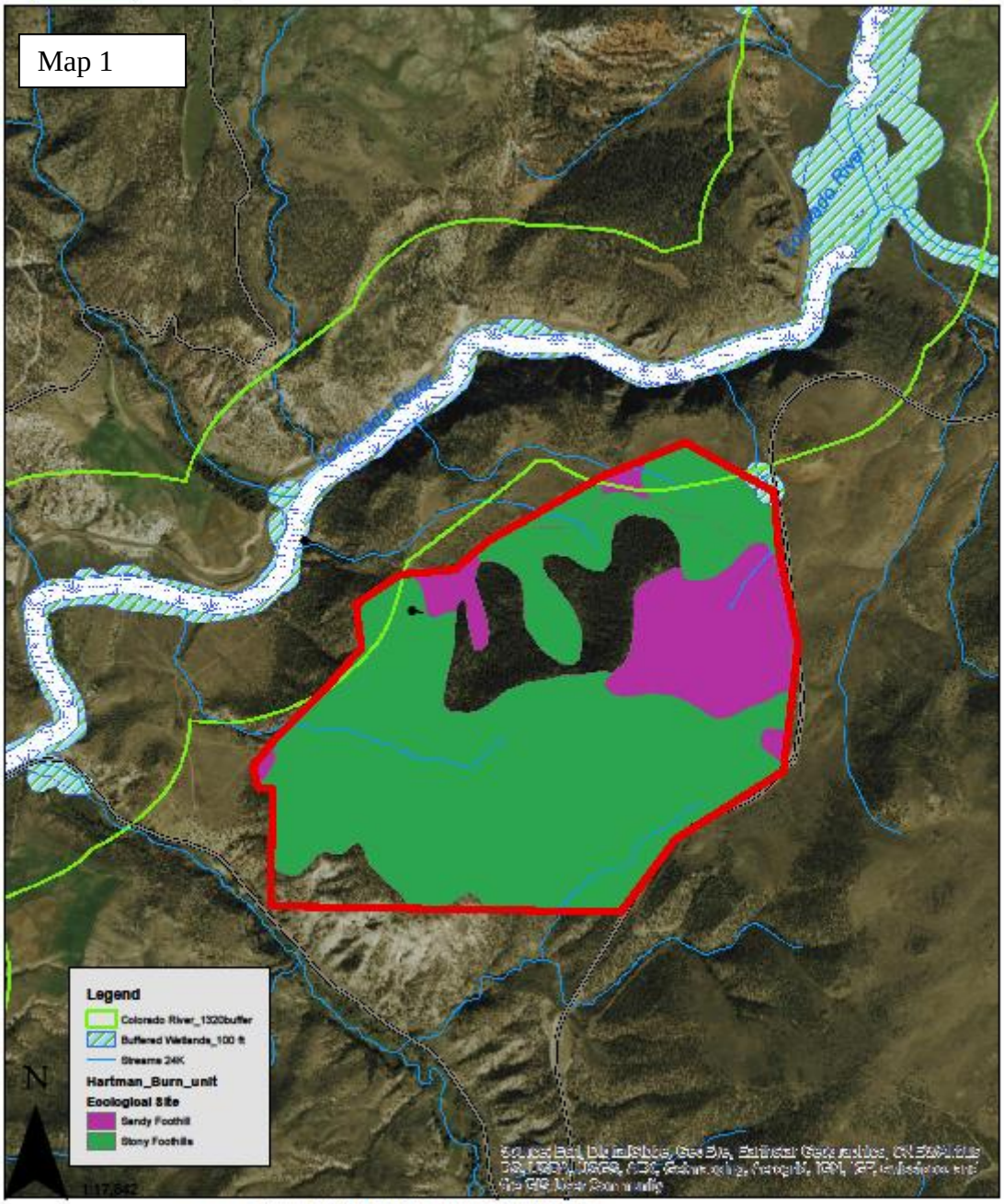
Hartman Hill Burn (519 acres)

Ecological Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Comments:
Stony Foothills	70%	Bluebunch wheatgrass, 30% Big sagebrush 15% Bottle squirreltail 10%	600 lbs	Although there are very few highly water erosive soils, they are located in the southwest portion of the burn, which is tributary to Sheephorn Creek.
Sandy Foothills	16%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	
Rock Outcrop-Haploborolls	11%			
Torriorthents-Rock Outcrop	3%			

The Hartman Burn unit has several areas with slopes that exceed 30%, primarily along drainages. If areas have a severe burn, the steep drainages could rapidly transport increased sediment during summer thunderstorms. Approximately 175 acres of the burn unit (as currently drawn) would be tributary to Sheephorn Creek. Sheephorn Creek has a visible plume of sediment where it joins the Colorado River. The stream is in a fairly confined valley with the county road directly adjacent to the creek. Sediment sources have been presumed to be the road and the "badland slopes" adjacent to the road, which carry sediment loads directly to road and/or the creek. Runoff pathways from the burn to Sheephorn Creek range from 400 to 5000 feet. The primary ecological site for the burn is mapped as having fairly low production. The southwest line of the burn unit could be moved to increase the distance from Sheephorn Creek and avoid the steep slopes. If the fire burns the understory or is fairly continuous within the portion of the burn tributary to Sheephorn, then additional erosion control may be necessary until revegetation helps stabilize the burn unit.

The rest of the burn unit is tributary to the Colorado River. The runoff pathways range from 1700 to about 2300 feet, and would deposit at Paddlers' Hot Springs. From aerial photographs, there appear to be a few old livestock ponds in drainages, which depending on their condition, could detain sediments. Post burn monitoring should identify if there are areas where erosion control will be needed. If cheatgrass or other invasives do increase on the site, the drainages will be transits to the river, furthering the spread. (Note: CNHP does have an upland PCA in the Radium area- see Map 4).

Proposed Burn- Hartman Treatment Unit



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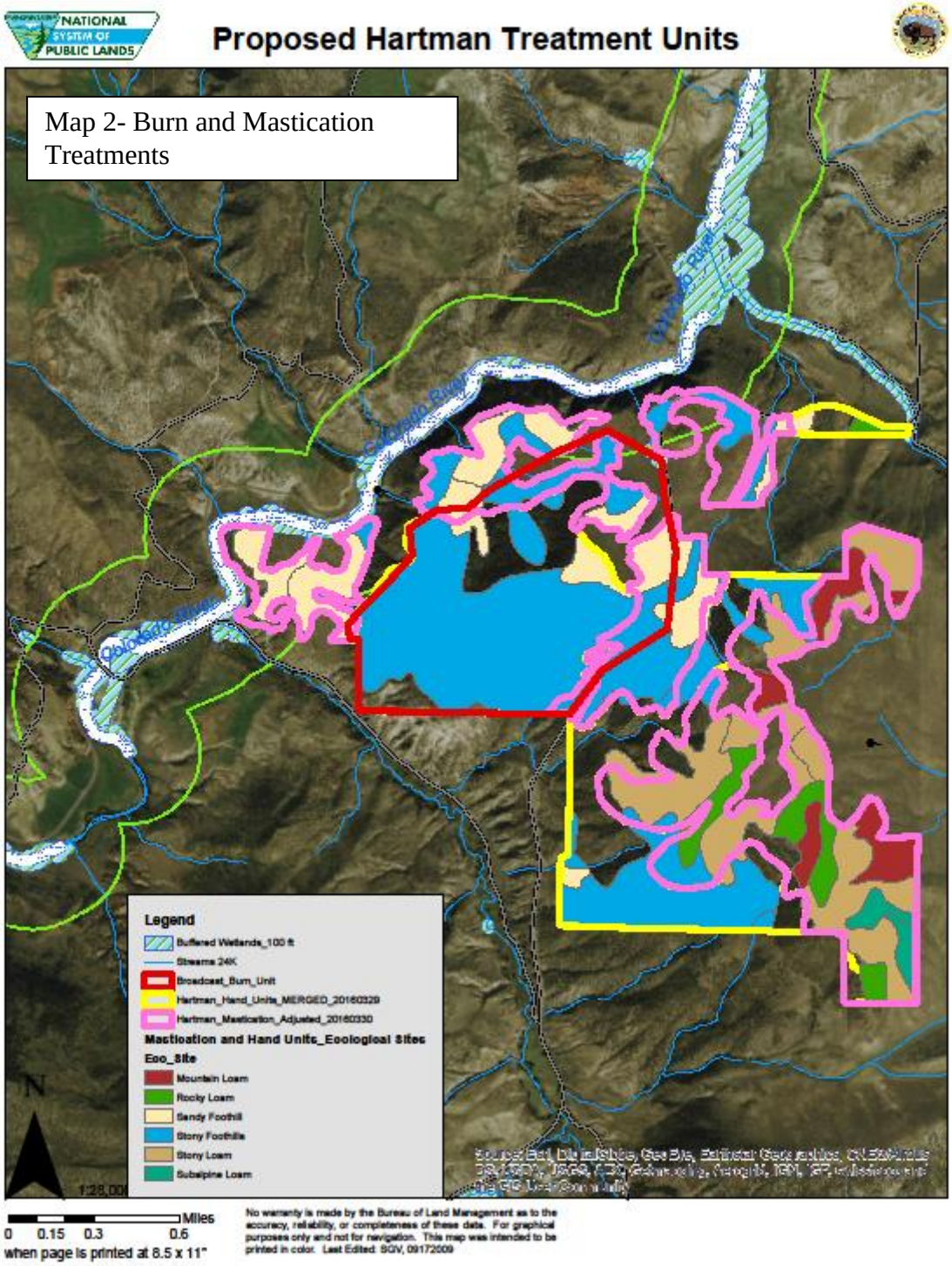
Proposed Hartman Treatment Units
Map 2- Burn and Mastication Treatments
Legend
Buffered Wetlands_100 ft
Streams 24K
Broadcast_Burn_Unit
Hartman_Hand_Units_MERGED_20160329
Hartman_Mastication_Adjusted_20160330
Mastication and Hand Units_Ecological Sites
Eco_Site
Mountain Loam
Rocky Loam
Sandy Foothill
Stony Foothills
Stony Loam
Subalpine Loam
N
Miles
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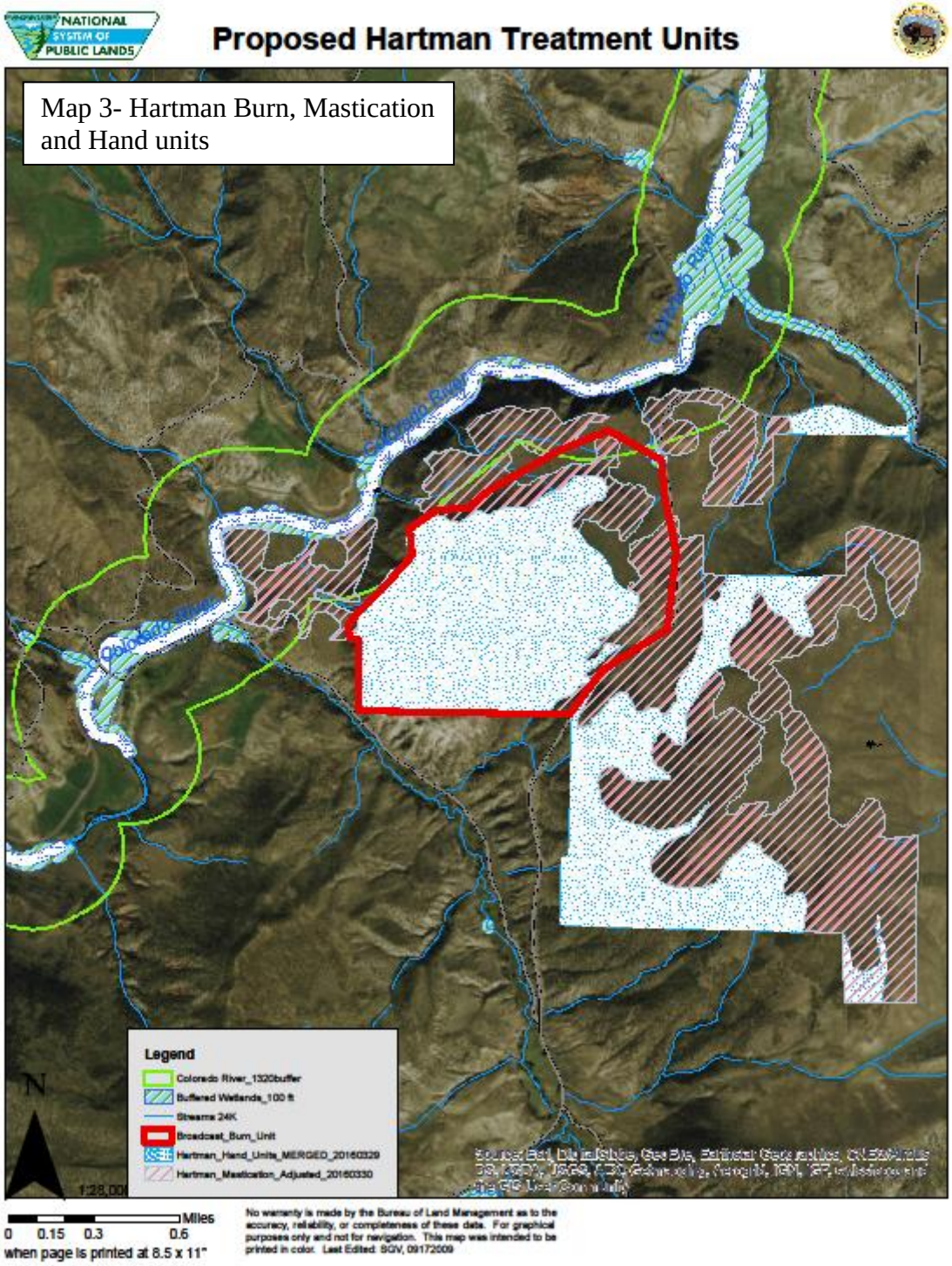
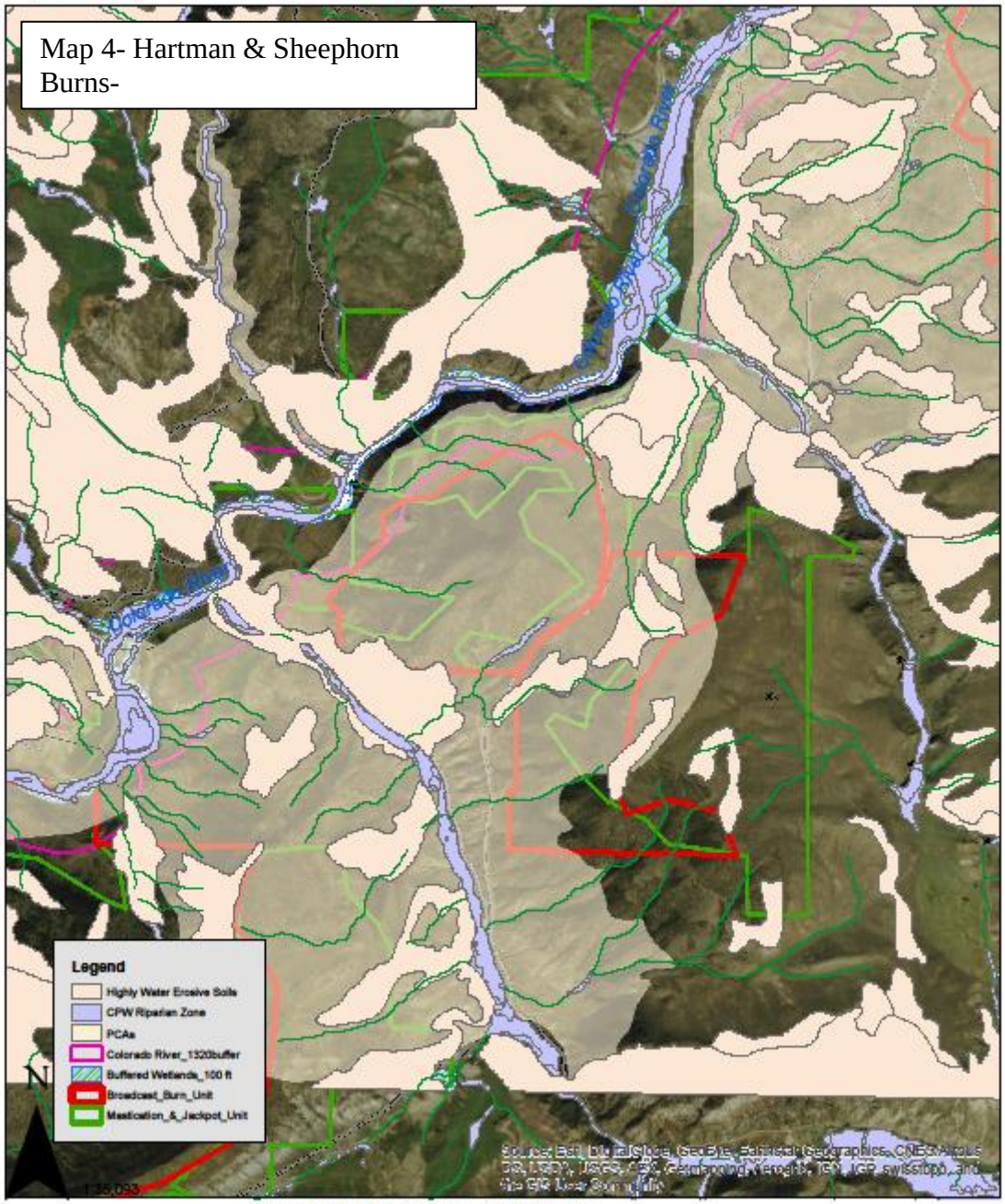


Sheephorn Burn – 468 acres

Broadcast Burn

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Stony Foothills	70%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	Few highly water erosive soils, primarily along drainages. Tributary to Colorado River and Sheephorn Creek.
Sandy Foothills	16%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	
Rock Outcrop-Haploborolls	11%			
Torriorthents-Rock Outcrop	3%			

Proposed Hartman Treatment Unit



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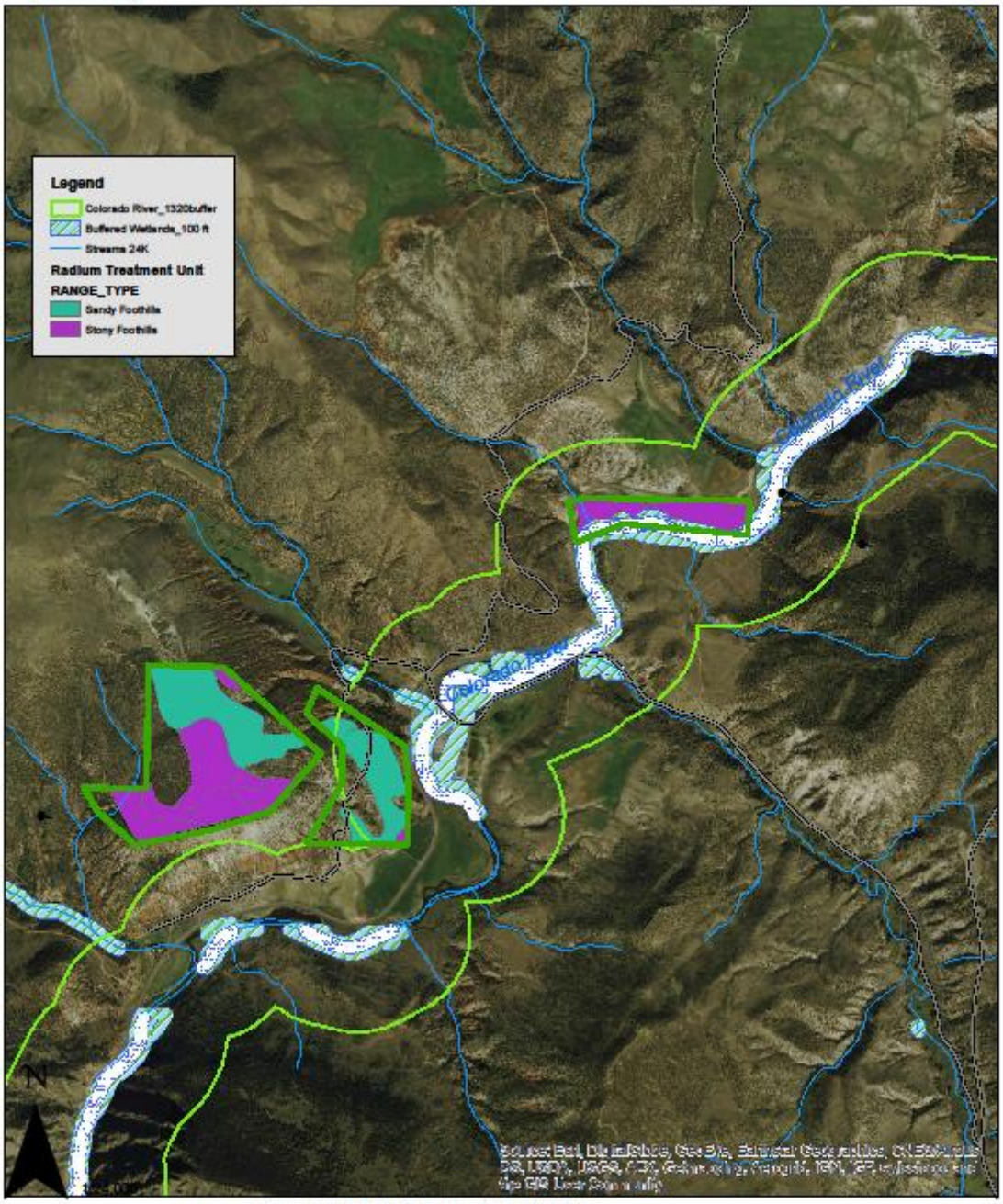
Radium (West Sheep Creek) Proposed 2017/18: Phase I mastication would be the primary method on these benches.

Mastication/Jackpot Burn

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes
Stony Foothills	37%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	Currently 51 acres outside of PCA
Sandy Foothills	30%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	Currently 38 acres outside of PCA
Torriorthents-Rock Outcrop	24%			
Rock Outcrop-Haploborolls	9%			
Water	1%			

Proposed Radium Treatment Units



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Dry Gulch / Copper Spur:

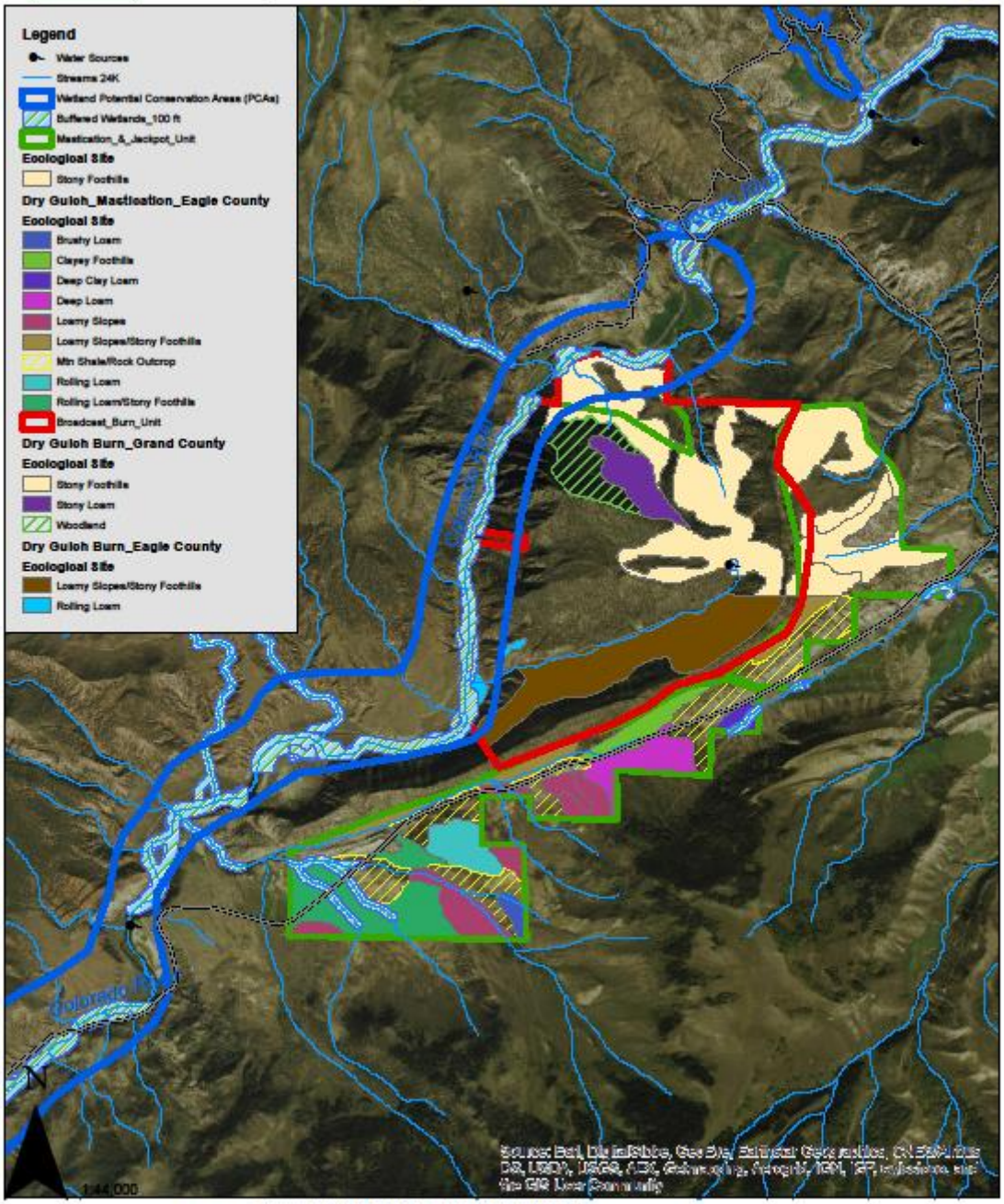
Dry Gulch Proposed 2016/2017: 1,269 acres of mastication and jackpot burning. 1,803 additional acres of broadcast burning and hand thinning.

Mastication/Jackpot Burn

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	NOTES:
Stony Foothills	35%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	98 acres within the PCA should not be treated. Wetlands requiring buffer are located on the south/east side of county road.
Rolling Loam	16%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	
Loamy slopes	13%	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	
Mtn Shale/Rock Outcrop (Rock Outcrops 45%)	11%	W.Wheatgrass 30% Muttongrass 10% Serviceberry 10% Big sagebrush 10% Mtn big sagebrush 5%	400 lbs on Mtn Shale portion	
Torriorthents-Rock Outcrop	11%			
Deep Loam	5%	Big Sagebrush 10% Needleandthread 10% W. Wheatgrass 10% Muttongrass 5% Mtn. Snowberry 5% Prairie junegrass 5% Saskatoon serviceberry 5%	1500 lbs	
Clayey Foothills	4%	W Wheatgrass 40% Wyo big sagebrush 20% Bottlebrush squirreltail 5% Indian ricegrass 5%	900 lbs	
Sandy Foothills	3%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	
Deep Clay Loam	1%	W Wheatgrass 30% Letterman's Needlegrass 10%	1,600 lbs	

		Wyo big sagebrush 10% Nodding brome 5% Serviceberry 5%		
Brushy Loam	1%	Gambel oak 25% Elk sedge 15% Snowberry, Serviceberry 20% Needlegrass 10%	2,000 lbs	
Wetlands	0.5%			

Proposed Dry Gulch Treatment Units



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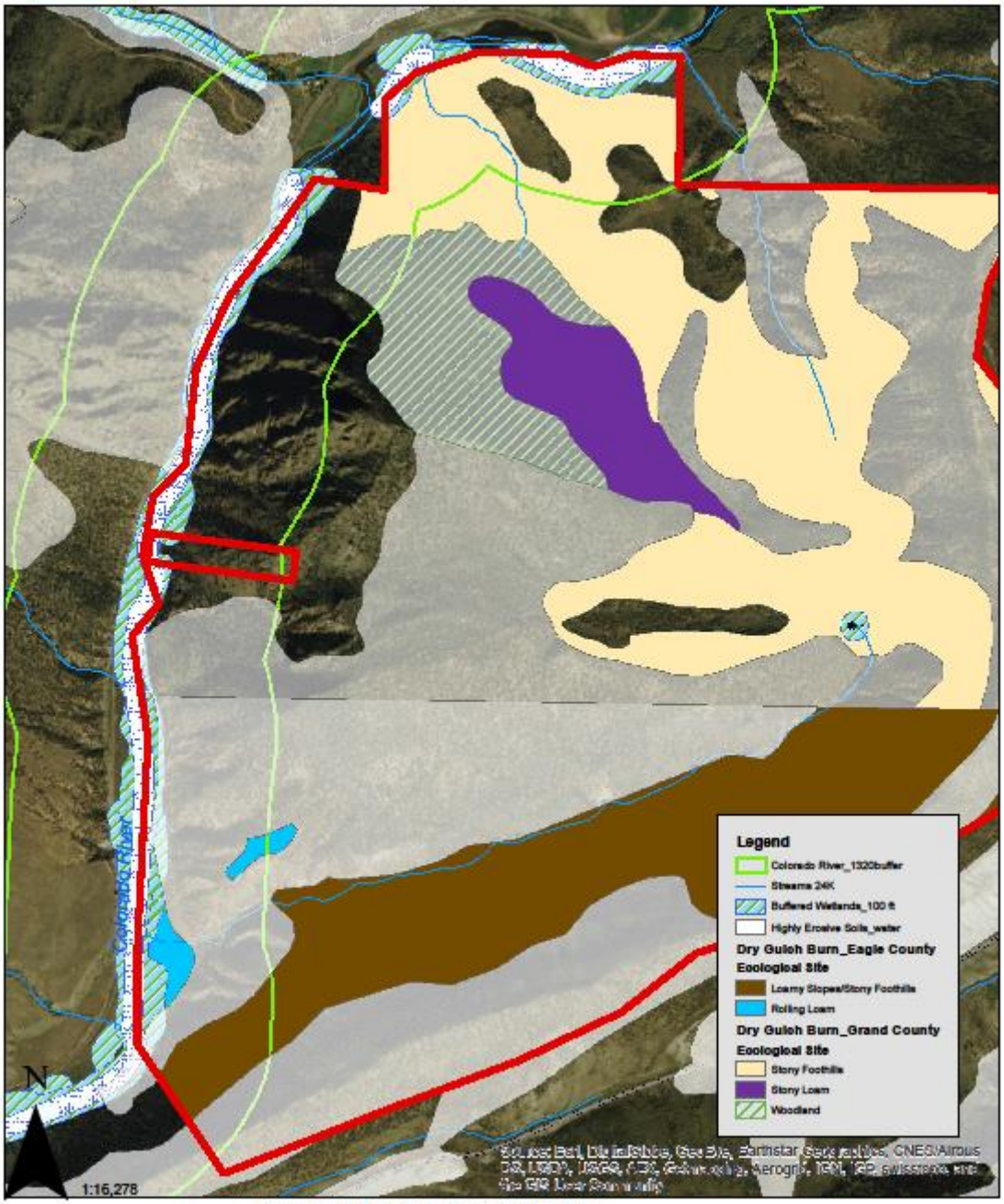
Broadcast Burn- Dry Gulch

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Torriorthents-Rock Outcrop	44%			385 acres are within the Colorado River buffer and would be removed from the burn unit. Most of that is steep sloped, non-treatable ecologic sites. Much of the unit is highly erosive. Steep slopes will transport sediment loads to the Colorado River. Post-burn review of erosion control needs required.
Stony Foothills	28%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Rock Outcrop-Haploborolls	10%			
Loamy Slopes	7 %	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	
Woodland	5%			
Stony Loam	3%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	
Sandy Foothills	2%	Western wheatgrass 40% Green needlegrass 20% Big sagebrush 15%	900 lbs	
Rolling Loam	1%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	

Proposed Dry Gulch Burn Unit



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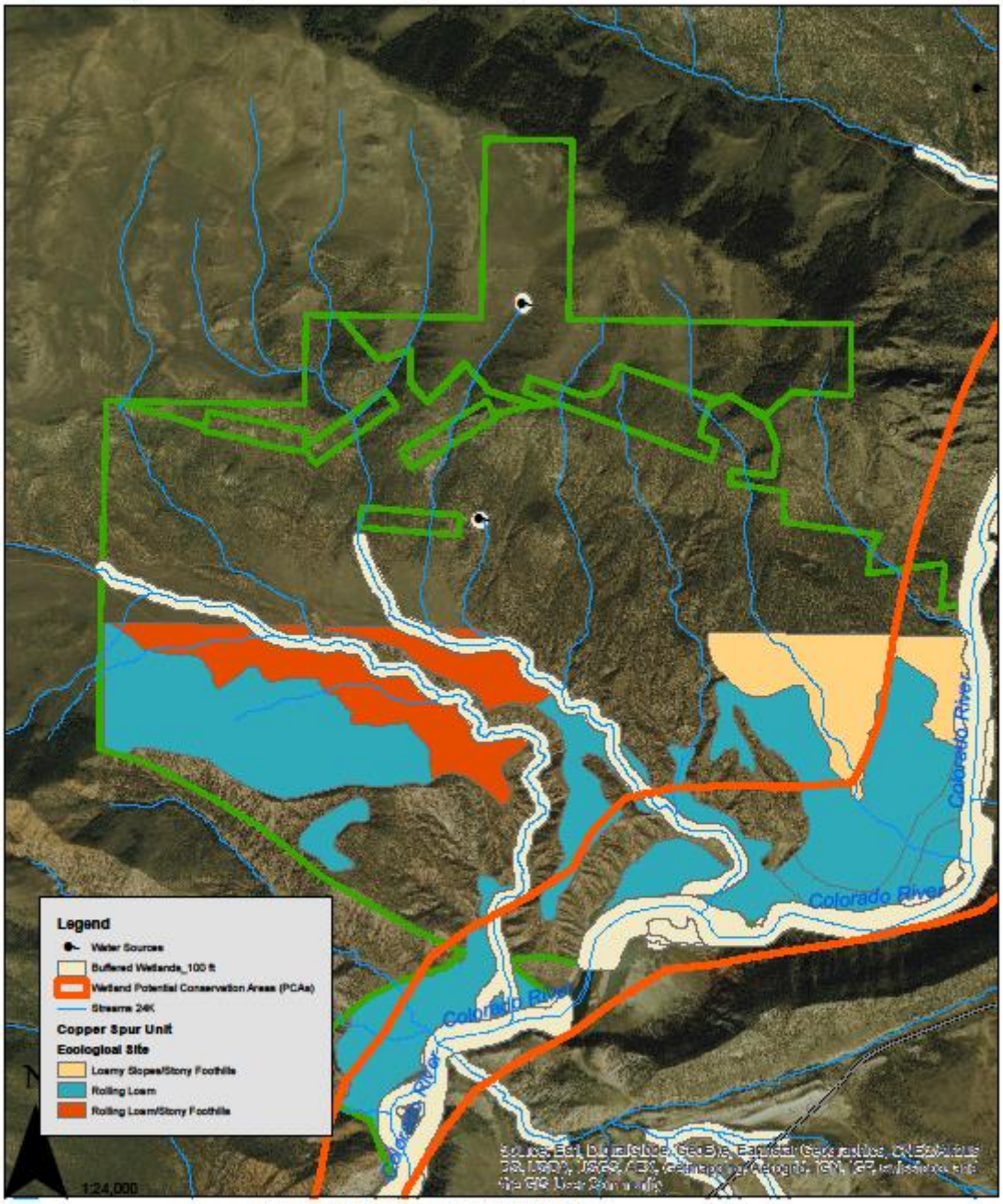
Copper Spur Proposed for 2019:

2,488 acres of mastication and hand thinning of PJ woodlands, primarily phase I and II PJ encroachment.

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Rolling Loam	53%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	Approximately 446 acres are within the PCA and would not be treated. Steep slopes on northern and southern boundaries of treatment, especially southern portion, with highly erosive soils.
Torriorthent-Camborthid-Rock Outcrop	37%			
Stony Foothills	7%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Loamy slopes	3%	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	

Proposed Copper Spur Treatment Unit



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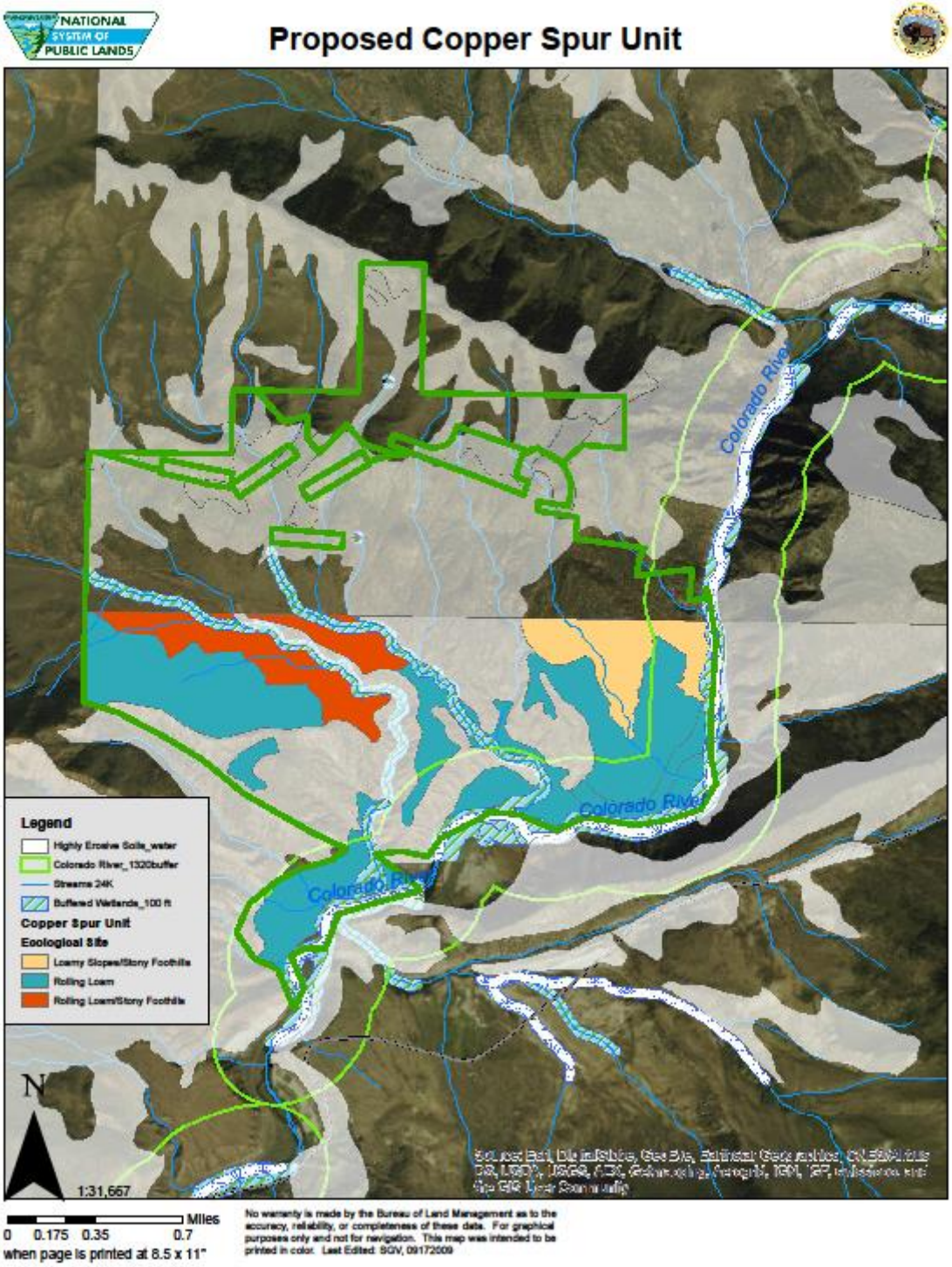


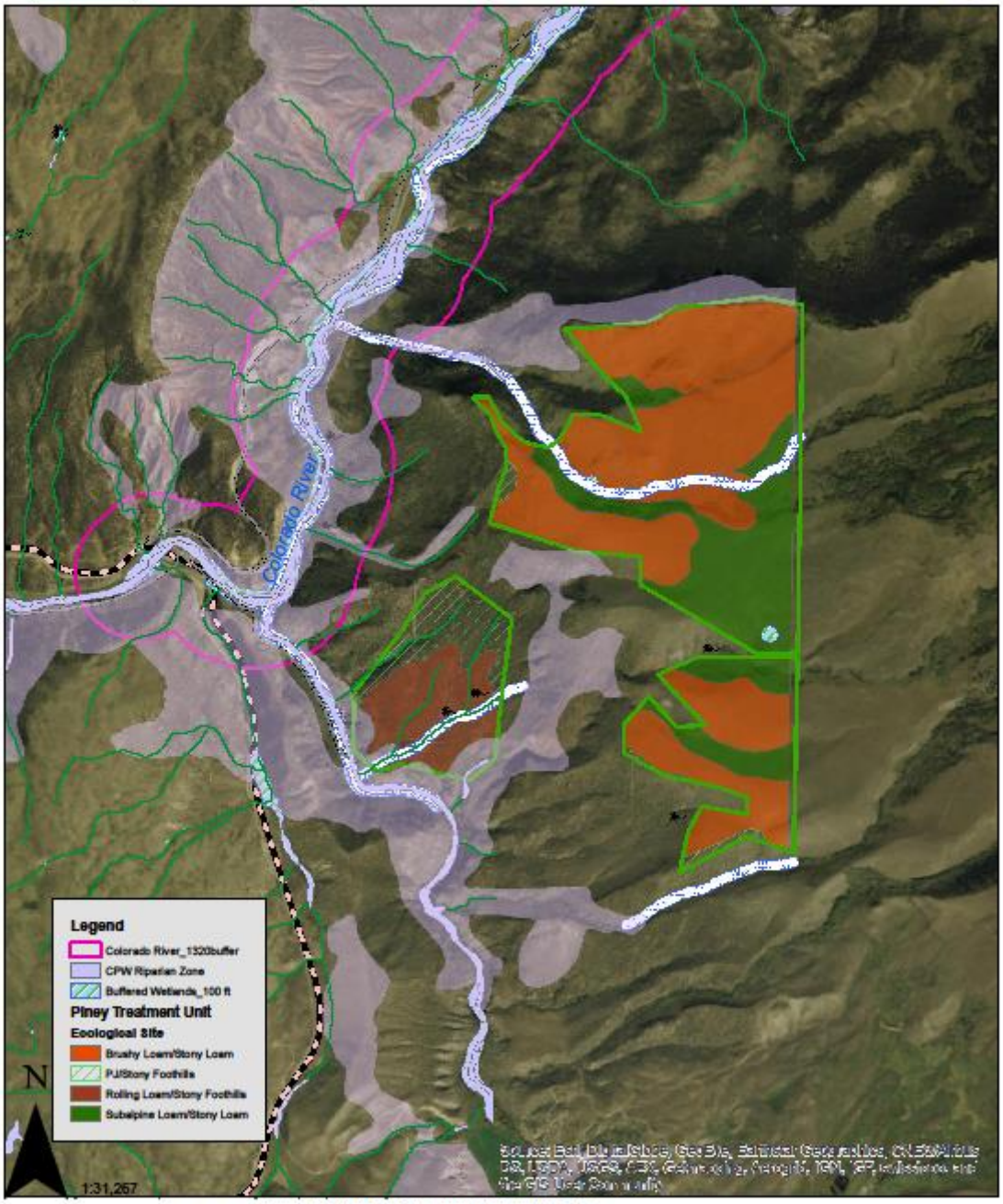
<u>Piney/Rancho Del Rio:</u>

FONSI- DOI-BLM-LLCONO2000-2015-0004-EA

Piney Proposed for 2021: 1,069 acres proposed for mastication, hand thinning, and jackpot burning. Additional broadcast burn proposals for

Ecological Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Stony loam	36%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	Units include two drainages with known wetlands and several seeps, which are included on the map. Potential for additional sources, especially along drainages. Units are not on highly erosive soils, although most of the units are 30% slope or greater.
Brushy loam	31%	Gambel oak 25% Elk sedge 15% Snowberry, Serviceberry 20% Needlegrass 10%	2,000 lbs	
Subalpine Loam	12%	Thurber's fescue 40% Nodding brome 10% Parry's danthonia 5%	2,800 lbs	
Stony Foothills	7%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Rolling Loam	7%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	
Pinyon-Juniper	4%			
Torriorthent-Camborthids-Rock Outcrop	4%			

Proposed Piney Treatment Unit



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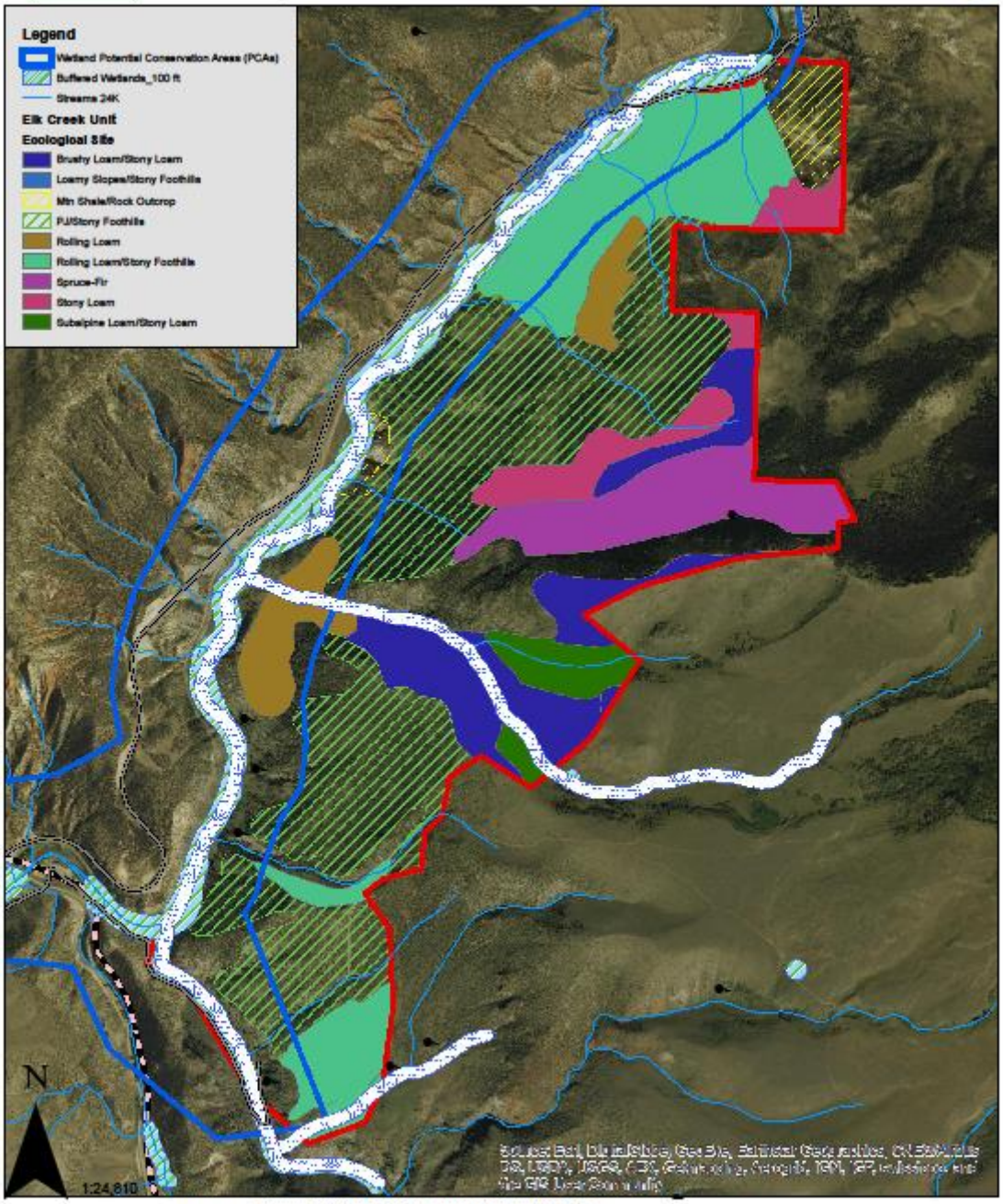
Elk Creek (1,772 acres) broadcast burn

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Stony Foothills	21%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	506 acres are within the PCA and would not be treated. Steep slopes down to the Colorado River, Elk Creek, Piney River, and High Trail Gulch. Burn unit should buffer Piney and Elk Creek (perennial drainages) by 325 feet to protect water quality and riparian communities. Post-fire review determine erosion control practices needed to protect fisheries and water quality.
Torrriorthent-Camborthid-Rock Outcrop	20%			
Pinyon-Juniper	18%			
Rolling Loam	14%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	
Stony Loam	11%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	
Spruce-fir	8%			
Brushy Loam	6%	Gambel oak 25% Elk sedge 15% Snowberry, Serviceberry 20% Needlegrass 10%	2,000 lbs	
Mtn Shale/ Rock Outcrop Rock outcrops 45%	2%	W.Wheatgrass 30% Muttongrass 10% Serviceberry 10% Big sagebrush 10% Mtn big sagebrush 5%	400 lbs/	
Subalpine loam	1%	Thurber's fescue 40% Nodding brome 10% Parry's danthonia 5%	2,800 lbs	
Loamy Slopes	trace	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	

Proposed Elk Creek Treatment Unit



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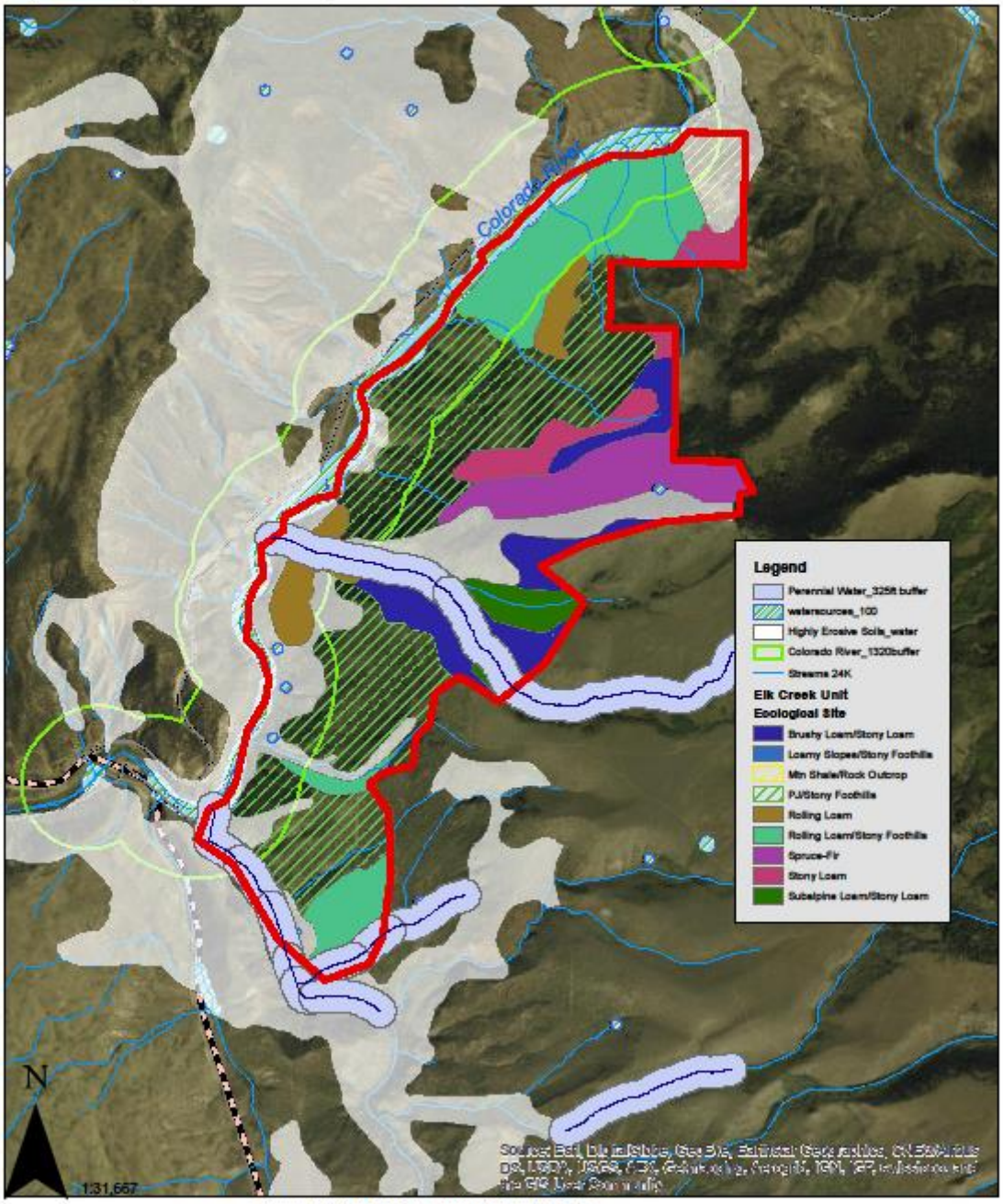
Proposed Elk Creek Burn Unit



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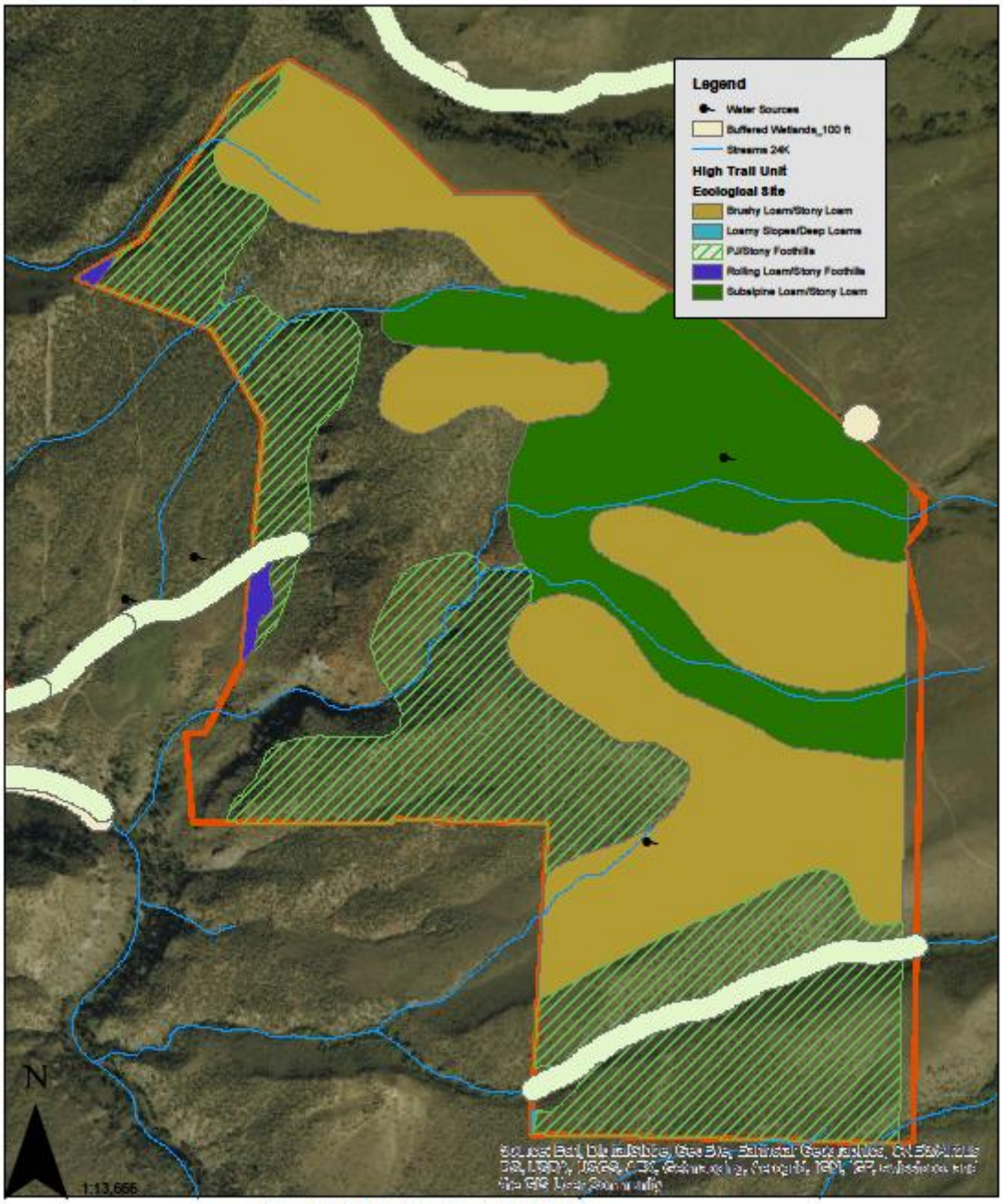
High Trail (915 acres) broadcast burn.

Range Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Stony Loam	26%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	Runoff pathway to Piney is generally a quarter mile. Limited highly erosive soils, but slopes are generally 30% or higher. Buffer perennial drainages and do post-fire review to insure there are no erosion concerns.
Torriorthent-Camborthid-Rock Outcrops	21%			
Pinyon-Juniper	20%			
Brushy Loam	20%	Gambel oak 25% Elk sedge 15% Snowberry, Serviceberry 20% Needlegrass 10%	2,000 lbs	
Stony Foothills	16%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Subalpine Loam	11%	Thurber's fescue 40% Nodding brome 10% Parry's danthonia 5%	2,800 lbs	
Rolling Loam	trace	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	
Loamy Slopes	trace	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	
Deep Loams	trace	Big Sagebrush 10% Needleandthread 10% W. Wheatgrass 10% Muttongrass 5% Mtn. Snowberry 5% Prairie junegrass 5% Saskatoon serviceberry 5%	1500 lbs	

Proposed High Trail Treatment Area



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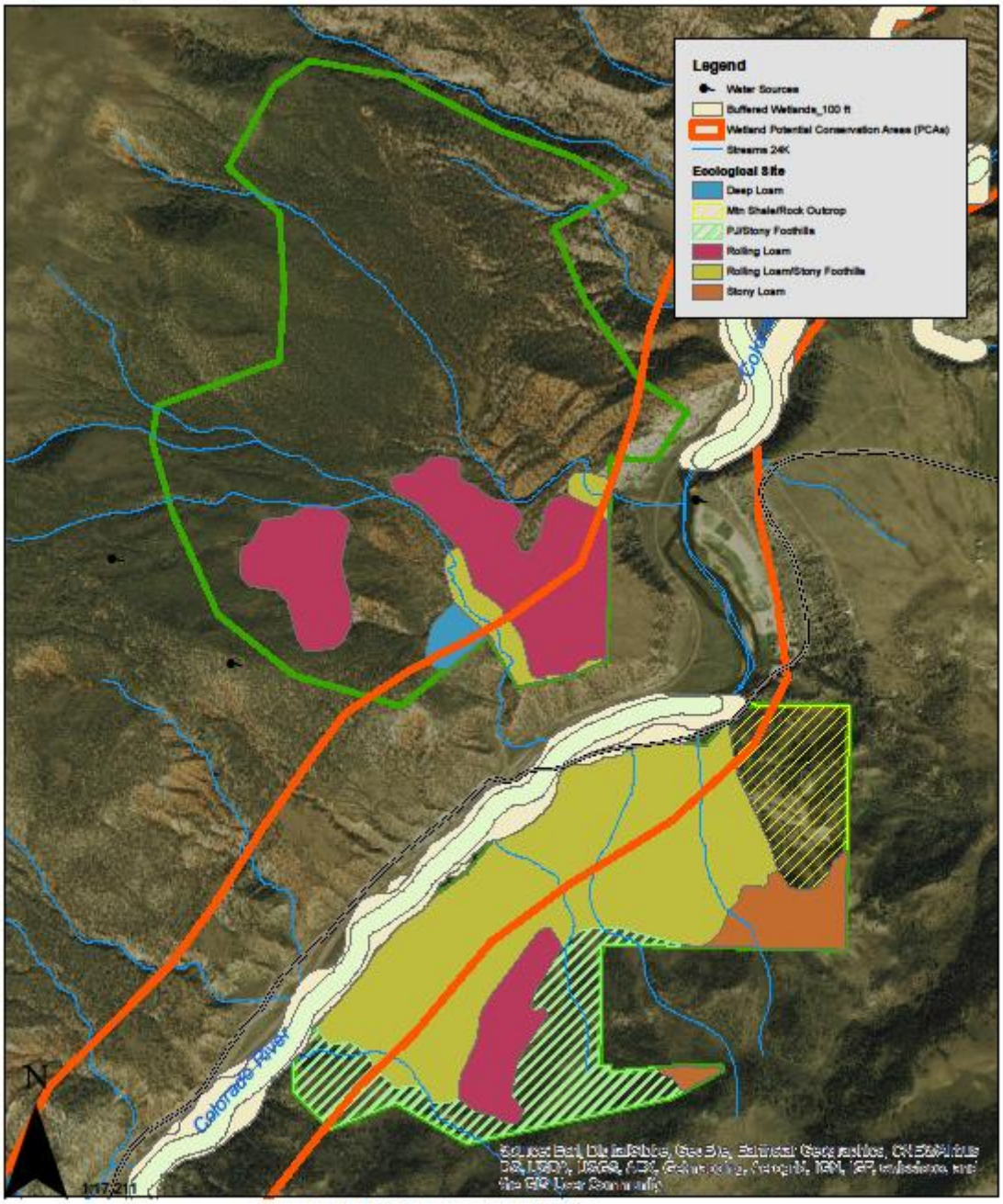
Rancho Del Rio Proposed 2021: Approximately 958 acres of mastication / hand thinning to maintain and build on previous treatment on bench area west of the river.

Ecological Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Torriorthent-Camborthid-Rock Outcrop	55%			Approximately 197 acres are within the PCA and would not be treated. West unit has limited treatable ecologic sites, and "non treatable" are all highly water erosive soils. East unit has the most acres within the PCA, and only 47 acres of highly erosive soils. The erosive soils are Mtn. Shale/Rock Outcrop, so may not be worth treating due to limited response (<600lbs/acre, depending on rock percentage).
Rolling Loam	25%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs	
Stony foothills	11%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs	
Pinyon-Juniper	4%			
Stony Loam	3%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs/acre	
Mtn Shale/ Rock Outcrop Rock outcrop 45%	2%	Mtn Shale-45% W.Wheatgrass 30% Muttongrass 10% Serviceberry 10% Big sagebrush 10% Mtn big sagebrush 5%	400 lbs/acre	
Deep loam	1%	Big Sagebrush 10% Needleandthread 10% W. Wheatgrass 10% Muttongrass 5% Mtn. Snowberry 5% Prairie junegrass 5% Saskatoon serviceberry 5%	1500 lbs/acre	

Proposed Rancho del Rio Treatment Area



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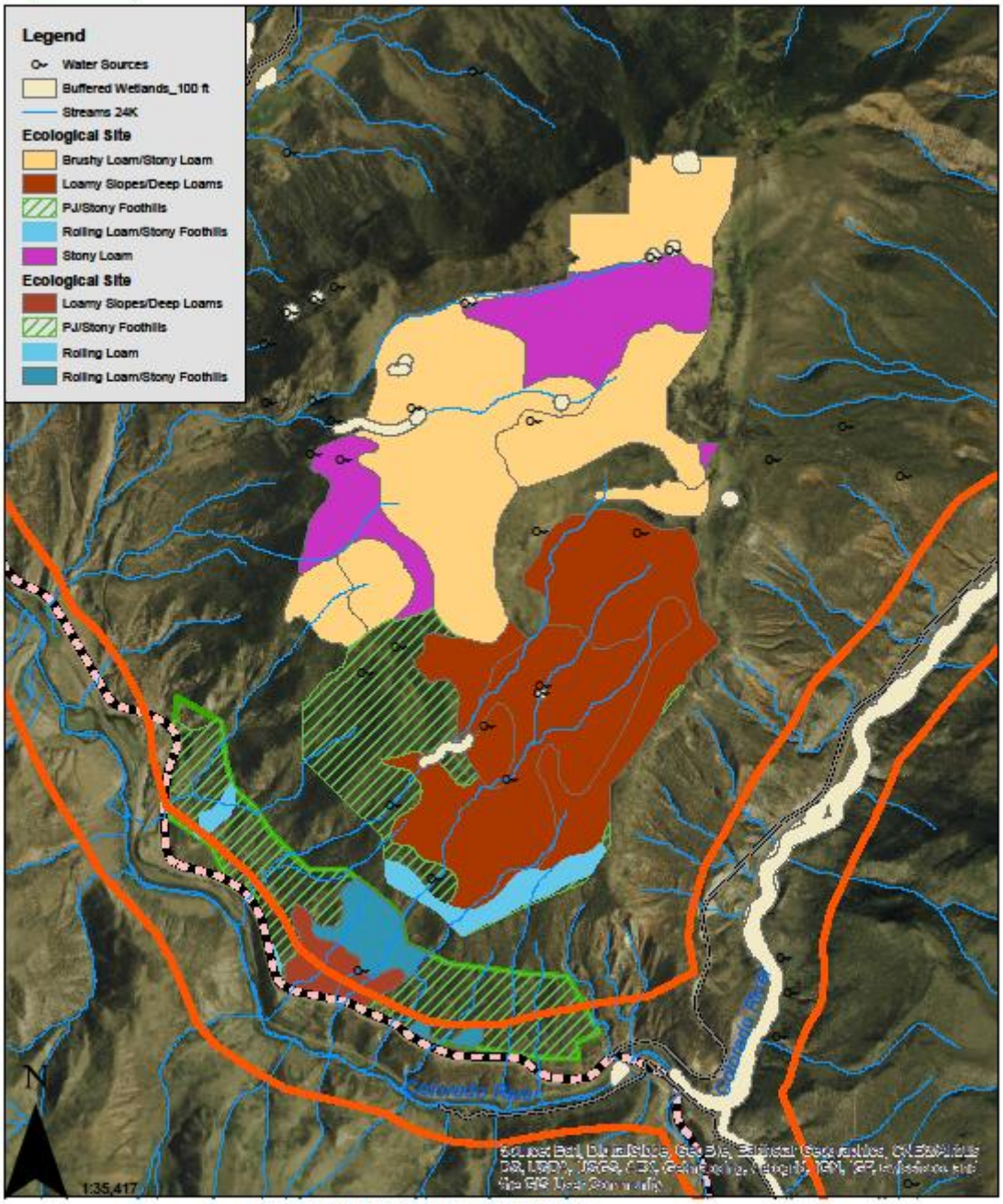
<u>Yarmony/State Bridge/ McCoy (Horn)</u>:

Yarmony Proposed in 2018: 2,589 acres of mastication and jackpot burning.

Ecological Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	Notes:
Stony Loam	30%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs/acre	There are multiple spring developments, some support wetland areas that will be avoided. Burnt areas will not be treated until ID team field review.
Brushy loam	20%	Gambel oak 25% Elk sedge 15% Snowberry, Serviceberry 20% Needlegrass 10%	2,000 lbs	
Loamy slopes	16%	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs/acre	
Deep loam	12%	Big Sagebrush 10% Needleandthread 10% W. Wheatgrass 10% Muttongrass 5% Mtn. Snowberry 5% Prairie junegrass 5% Saskatoon serviceberry 5%	1500 lbs/acre	
Torriorthent-Camborthid-Rock Outcrop	8%			
Pinyon-Juniper	8%			
Stony foothills	5%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs/acre	
Rolling Loam	1%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs/acre	

Proposed Yarmony & State Bridge Treatment Areas



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State Bridge/McCoy proposed 2018/2019: 2,623 acres of mastication and jackpot burning.

StateBridge

Ecological Site	Percent of Unit	Plant Composition for Range Site	Production, Normal Year	NOTES:
Pinyon-Juniper	33%			Approximately 98 acres within the Colorado River PCA and would not be treated.
Stony foothills	30%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs/acre	
Rolling Loam	10%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs/acre	
Loamy slopes	7%	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	
Deep loam	5%	Big Sagebrush 10% Needleandthread 10% W. Wheatgrass 10% Muttongrass 5% Mtn. Snowberry 5% Prairie junegrass 5% Saskatoon serviceberry 5%	1500 lbs	
Torriorthent-Camborthid-Rock Outcrop	2%			

McCoy

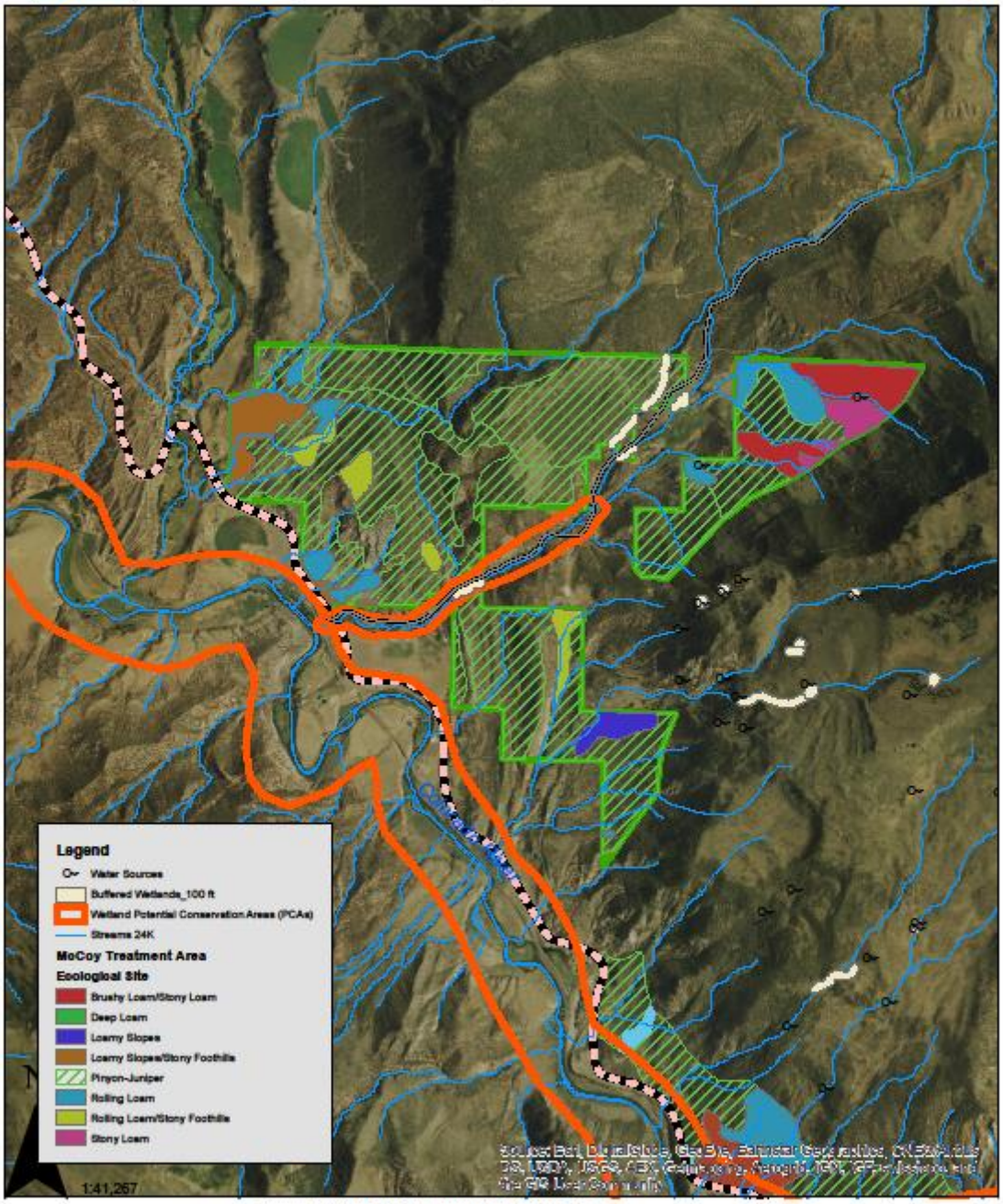
From CNHP, "Yarmony Creek is an intermittent creek that runs southwest to the Colorado River. The creek has a low gradient and is dominated by narrowleaf cottonwood (Populus angustifolia) and Rocky Mountain juniper (Juniperus scopulorum). The creek is surrounding by pinyon-juniper and sagebrush habitat. This section of the creek ranges in elevation of 6,680-7,000 feet and includes approximately 107 acres."

"The riparian occurrence is included but the boundary is not extended much farther. The upstream hydrology is important in maintaining the current condition and should be considered before any manipulations or changes take place. " SITE SIGNIFICANCE: Biodiversity Significance Rank B3: High Biodiversity Significance Biodiversity Significance Comments This site includes a globally rare (G2G3/S2) plant community in fair condition (C-ranked).

Most of the unit has highly erosive soils and have slopes that are 30% or greater. Treatment units should focus on ecologic sites that are capable of a vegetative response to meet the objectives.

Ecological Site	Percent of Unit	Plant Composition for Ecologic Site	Production, Normal Year	Notes:
Pinyon-Juniper	71%			Approximately 34 acres are within the Colorado River PCA and would not be treated. The Yarmony Creek PCA crosses through the unit and would be buffered.
Torriorthent-Camborthid-Rock Outcrop	13%			
Rolling Loam	6%	W. Wheatgrass 20% Wyo. Big sagebrush 15% Needle & thread 15% Sandberg bluegrass 10% Misc. shrubs 10%	800 lbs/acre	
Loamy slopes	3%	Misc. shrubs 10% Grass 10% Forb 10% Ricegrass 10% Mtn. Mahogany 10%	900 lbs	
Stony Loam	3%	Bluebunch wheatgrass 25% Bitterbrush 15% Big sagebrush 10%	1,200 lbs	
Stony foothills	2%	Bluebunch wheatgrass 30% Big sagebrush 15% Bottlebrush squirreltail 10%	600 lbs/acre	
Brushy loam	2%	Gambel oak 25% Elk sedge 15% Snowberry, Serviceberry 20% Needlegrass 10%	2,000 lbs	
Deep loam	0.2%	Big Sagebrush 10% Needleandthread 10% W. Wheatgrass 10% Muttongrass 5% Mtn. Snowberry 5% Prairie junegrass 5% Saskatoon serviceberry 5%	1500 lbs	

Proposed McCoy Treatment Area



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U.S. Department of the Interior
Bureau of Land Management
Kremmling Field Office,
2103 East Park Avenue
Kremmling, CO 80459

Finding of No Significant Impact (FONSI)

DOI-BLM-CO-LLCONO2000-2015-0004-EA

BACKGROUND

The proposed action consists of several methods of vegetation removal primarily targeting but not limited to pinyon and juniper trees in the southwest corner of the Field Office. The intent of the proposed action is not to remove all the pinyon and juniper trees, but to have a comprehensive range of management actions and a decision-making framework that BLM resource managers can use to aid in selecting actions or combination of actions to improve wildlife habitat based on a specific phase that the pinyon-juniper woodland is currently in.

FINDING OF NO SIGNFICANT IMPACT

Based upon a review of the EA and the supporting documents, I have determined that the Proposed Action is not a major federal action and will not have a significant effect on the quality of the human environment, individually or cumulatively with other actions in the general area. No environmental effects meet the definition of significance in context or intensity, as defined at 40 CFR 1508.27 and do not exceed those effects as described in the DOI-BLM-CO-LLCONO2000-2015-0004-EA Record of Decision and Approved Resource Management Plan (2015). Therefore, an environmental impact statement is not required. This finding is based on the context and intensity of the project as described below.

Intensity

The following discussion is organized around the 10 Significance Criteria described at 40 CFR 1508.27. The following have been considered in evaluating intensity for this Proposed Action:

1. Impacts that may be both beneficial and adverse.
There are impacts that are direct, indirect, and cumulative as a result of the proposed action. Negative impacts are expected to be short term and not disrupt the overall inherent or unique qualities of the project area.

2. The degree to which the Proposed Action affects public health or safety.
There would be no impact to public health and safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
The proposed action includes a Core Wildlife Area, Special Recreation Management Area, Scenic Byway, and is divided by the Colorado River. Avoidance and mitigation measures

outlined in this document would be adequate to protect and balance public use for these unique and natural values.

4. Degree to which the possible effects on the quality of the human environment are likely to be highly controversial.
The proposed action is not expected to have a measurable effect on the human environment and is not anticipated to have high levels of controversy.

5. Degree to which the possible effects on the quality of the human environment are highly uncertain or involve unique or unknown risk.
No highly uncertain or unknown risks to the human environment were identified during analysis of the Proposed Action.

6. Degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
The Proposed Action neither establishes a precedent for future BLM actions with significant effects nor represents a decision in principle about a future consideration.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.
This project combined with other projects would not cause cumulatively significant impacts.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed on the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
The State Historic Preservation Officer (SHPO) representative Mark Tobias was contacted on April 25, 2016, for the project implementation and desire to evaluate the project affect to cultural resources on a project by project basis over the time period for the implementation of wildlife habitat improvement along the Colorado River. It was determined that as long a fuels treatments were done by hand across cultural resource sites there would be a no adverse effect from project implementation. The fuels aspect of the habitat improvements project was a continued maintenance of earlier inventory for habitat and fuels reduction along the Colorado River.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act (ESA) of 1973.
Informal consultation was conducted regarding affects to Canada lynx (*Lynx canadensis*) and the associated State Bridge Landscape Linkage Area on November 9th 2015. It was determined that the proposed action would not directly impact lynx nor deter their ability to navigate the area between home ranges.

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.
Neither the Proposed Action nor impacts associated with it violate any laws or requirements imposed for the protection of the environment.

SIGNATURE OF AUTHORIZED OFFICIAL: _____

Field Manager

DATE SIGNED: