

Environmental Assessment

Teddy Creek Forest Management

DOI-BLM-WY-030-EA15-59



January 2015

BLM

High Desert District - Rawlins Field Office, Wyoming



The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

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Introduction

The project area is located 6 miles West of Encampment, Wyoming, and North of State Highway 70 (Battle Creek Highway), T14N, R84W, Sections 6,7,17,18 and T14N, R85W, Sections 1,2,11,12 (see Map 1). The proposed project, consisting of 685 acres, lies entirely within Carbon County, and the Bureau of Land Management (BLM), Rawlins Field Office (RFO), boundary. The specific project area is North of Green Mountain and East of Vulcan Mountain, in the Sierra Madres.

The proposed project area includes public lands managed by the BLM, RFO. The elevation within the project area varies from 8,200 feet by Tram Gulch, to 8,800 feet. The proposed project area landscape is dominated by forest stands, intermittent and perennial streams, and some steep slopes. Dominant vegetation types within the project area consist of lodgepole pine (*Pinus contorta*), with mixed conifer subalpine fir/ Engelmann spruce (*Abies lasiocarpa*/ *Picea engelmannii*), Douglas fir (*Pseudotsuga menziesii*) and limited aspen groves (*Populus tremuloides*). Although not targeted for treatment, the overall project area also contains some ridgelines and slopes intermixed with the target areas that are dominated by mixed mountain shrubs and grasslands types.

General Information

Recent years have seen a dramatic increase in mountain pine beetle (MPB) activity and conifer tree mortality in northern Colorado and southern Wyoming. MPB infestations were declared at epidemic levels in northern Colorado and southern Wyoming in 2008. The BLM lodgepole pine forests have been affected by the MPB and are now in a state of deterioration, with a high percentage having been infested by MPB and over 75% mortality rates. The infestations and their impact on lodgepole pine forests have likely been influenced by a number of factors, including: an abundance of older, dense, large diameter trees, prolonged drought, and lack of disturbance.



Fig. 1: MPB Killed Timber

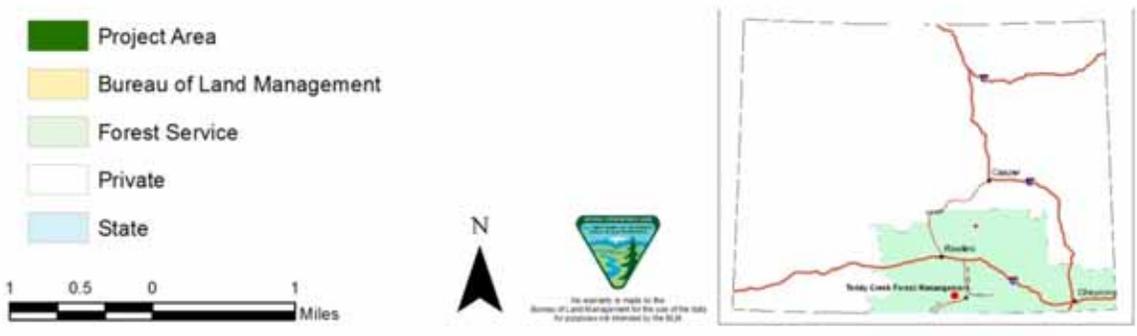
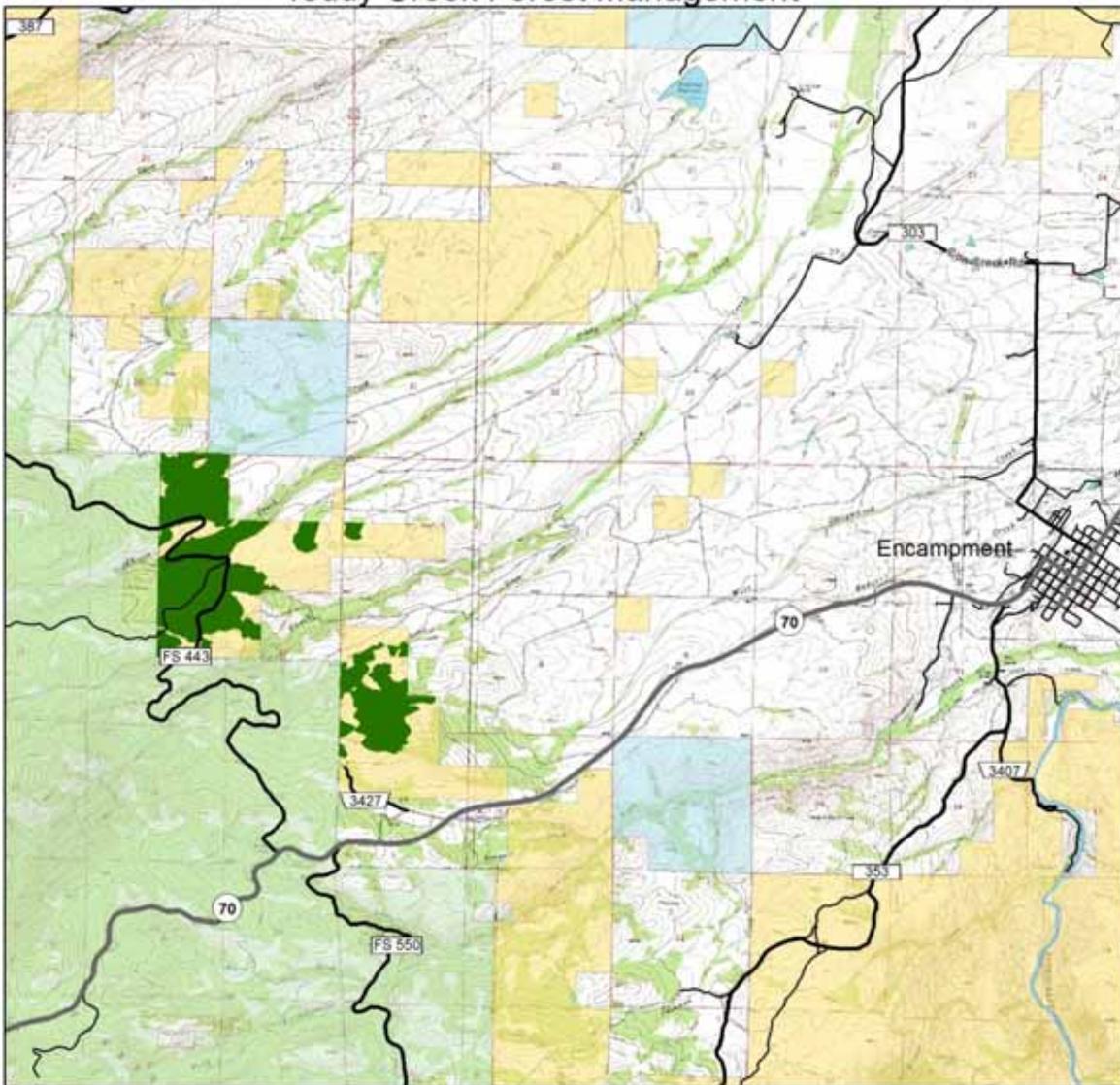


Fig. 2: Overstocked Stand

Field observations and timber stand data show that the existing stands in the project area not affected by the MPB are presently overstocked (Rocky Mountain area stocking charts for lodgepole pine indicate that at the average diameter of these stands, any density in excess of 1,000 stems per acre is considered overstocked), with declining forest health and reduced annual growth. Trees within densely stocked stands are more subject to stress and vulnerable to future attacks by insects and diseases (BLM Topsy/Pokegama Landscape Analysis pp. 195).

Map 1:

Teddy Creek Forest Management



Purpose and Need for Action

Purpose: The purpose of the proposed action is to create and maintain healthy forests (Forest health in this EA is defined as the resiliency of the forest ecosystems to sustain themselves in the process of natural disturbances such as insect outbreaks and wildfires) capable of providing a sustainable supply of timber and other forest commodities to support local and regional economies. These forests also need to provide commercially valuable wood products such as lumber, house logs, post & poles, and biomass for energy production. Another purpose for this project is to reduce the wildfire hazard associated with high fuel loading, continuous fuel arrangement, and stand density through the use of forest management practices: sanitation/salvage, timber harvests, pre-commercial thinning, mechanical treatments, and prescribed burning. The use of these management practices would prevent the continued deterioration of the forest stands by improving the existing vegetation community and increasing forest health, improving forest structure, and removing decadent and dead trees.

Need: To address declining health by introducing stand replacement disturbance. Both lodgepole pine and aspen are disturbance dependent species that are adapted to quickly colonize a site following stand replacement disturbance, such as wildland fire. Although there has been a disturbance in the form of a MPB epidemic, the disturbance has been species selective in the sense that desirable lodgepole pine trees have been killed while undesirable species such as subalpine fir were not affected. Current stand conditions are most favorable to subalpine fir establishment and very unfavorable to lodgepole pine regeneration and establishment. The previous lack of stand replacement disturbance had set the stage for a MPB epidemic (older even aged, dense, large diameter lodgepole pine) where the majority of the mature and dominant lodgepole pine trees were killed.

Tree mortality from the MPB infestation poses a significant threat to public safety along travel corridors, and in and adjacent to recreation and administrative sites. Dead and dying trees increase the potential for: persons or property being struck by falling trees; and trees falling and blocking roadways, thus preventing both emergency and non-emergency vehicle ingress and egress. Once the MPB killed trees begin to rot and wind-throw (trees uprooted or broken by wind), they contribute to the surface fuel load, fuel continuity, and subsequently increase fire hazard.

In order to reduce wildfire hazard, wind-throw, a future MPB epidemic, increase health and vigor of the forest ecosystem, improve wildlife habitat, and regenerate timber for future use, the area needs to have disturbance re-introduced in a controlled manner. There is also a need to provide a sustainable supply of timber and other forest commodities to support local and regional economies.

Decision to be made

The decision to be made is whether or not to approve the use of forest management practices including sanitation/salvage timber harvests, pre-commercial thinning, mechanical treatments, and prescribed burning in the identified stands within the Teddy Creek Forest Management Project Area.

Scoping and Issues

The Proposed Action was made available to the public on the Rawlins Field Office (RFO) NEPA Register on December 17, 2014. State of Wyoming Forestry Division was consulted and contributed to this proposed project.

Internal BLM interdisciplinary review identified resources of concern, resources that were not present, and resources not requiring additional analysis. Table 1 contains a matrix of resources and the level of consideration they were given.

Table 1. Resource Issue Checklist

Resources	Issues Present/Identified	No Issues Identified	Resource Not Present
Air Quality	√		
Areas of Critical Environmental Concern			√
Cultural	√		
Drinking/Ground Water Quality		√	
Environmental Justice		√	
Fire and Fuels Management	√		
Fisheries		√	
Floodplains			√
Forest Management		√	
Hazardous or Solid Wastes		√	
Lands and Reality		√	
Lands with Wilderness Characteristics			√
Livestock		√	
Minerals		√	
Native American Religious Concerns		√	
Paleontology			√
Prime or Unique Farmlands			√
Recreation		√	
Socioeconomics	√		
Soils	√		
Transportation and Access Management		√	
Vegetation	√		
Visual Resource Management		√	
Water Quality	√		
Watershed Management	√		
Weeds (Invasive/Non-Native Species)		√	
Wild and Scenic Rivers			√
Wild Horses			√
Wildlife	√		

Table 2. Resources considered, but not present or affected in such a manner as requiring site-specific analysis in this EA, include, but are not limited to:

Resource/Resource Use	Approved Rawlins RMP FEIS Reference
Areas of Critical Environmental Concern	3-88 to 3-89; Appendix 22
Environmental Justice	3-77
Forest Management	3-21 to 3-23
Hazardous Materials	Appendix 32
Health and Safety	
Lands and Realty	3-24 to 3-26
Lands with Wilderness Characteristics	
Minerals	3-34 to 3-44
Noise	
Off-Highway Vehicles	3-45
Paleontology	3-48 to 3-49
Range	3-27 to 3-33
Reclamation	3-44; Appendix 36
Recreation	3-51 to 3-58
Special Designations and Management Areas	3-86 to 3-98
Transportation	3-100; Appendix 21
Visual Resources	3-120 to 3-122; Appendix 25
Weeds	3-113; Appendix 31
Wild Horses	3-139 to 3-142; Appendix 12
Wilderness Study Areas	3-86 to 3-87
Wildlife and Fish (including candidate, sensitive, and threatened and endangered species)	3-158

Proposed Action and Alternatives

Proposed Action

The Rawlins Field Office of the Bureau of Land Management (BLM) is proposing to treat approximately 685 acres of forest vegetation within the Upper North Platte watershed. The proposed action currently includes removal of forest products through sanitation/salvage timber harvests, pre-commercial thinning, prescribed burning and mechanical treatments. These actions would be performed throughout the year and would adhere to the stipulations found in the mitigation section of this analysis. In order to prevent the introduction of invasive weeds into the project area, the Purchaser and its sub-contractors shall be required to clean all off-road logging and construction equipment prior to entry on to the project area.

I. Sanitation/Salvage Timber Harvest

This activity includes mechanically harvesting marketable/merchantable timber within the identified polygons (Map 2). Approximately 440 acres are targeted for sanitation/salvage treatment. In general, timber targeted for harvest would include marketable/merchantable conifer species, including but not limited to lodgepole pine, subalpine fir, and Engelmann spruce with current or prior MPB infestations. The primary species being targeted for removal would be previously MPB infested or killed lodgepole pine. Timber would be harvested via a variety of methods, to include hand (i.e. manual falling) and mechanized with the utilization of wheeled (timber skidders, log

trucks) and tracked (harvesters) equipment, or some combination of each of these methods. At a minimum, the Wyoming State Forestry Division, Forestry Best Management Practices (BMPs – <http://wyforestinfo.wyo.gov/best-management-practices>) would be followed as terms and conditions of an individual sale.

Processing: After felling, trees may be whole-tree skid to identified landing sites where they would be processed (limbs, and tops removed) or processed at stump, stacked on decks, and loaded onto trucks for transport to a sawmill. Products Other than Logs (POL), i.e., post and pole sized material, are considered optional material, and may be removed or piled along with the slash for burning.

Slash Removal: Slash or POL (optional removal) would be piled, compact and dirt free, near the landing site and burned according to a developed Burn Plan prescription following treatment. Pile burning would take place when there is enough snow or high enough surface fuel moisture conditions to inhibit unwanted fire spread. All pile burning would be implemented by the BLM. Slash burning would occur with the objective of removing at least 90% of the piled material. Slash material would be allowed to cure prior to burning so that adequate consumption would occur. Following burning, the remnants may be scattered or re-piled for additional burning.

These stands would be reevaluated in 15-25 years for pre-commercial thinning.

(See Appendix A for Stand Diagnosis and Tentative Silvicultural Prescriptions)

II. Pre-commercial Thinning (PCT)

Pre-commercial thinning operations are performed as investments in the future growth of stands which are so young and non-merchantable (less than 8" diameter) that none of the felled trees are utilized. The current high density of the stands (>1000 stems per acre) causes potential forest health problems by undesirably affecting individual tree growth. Approximately 161 acres are targeted for pre-commercial thinning. The pre-commercial thinning would involve falling and lopping trees from the stand by hand or by mechanized equipment to a specified spacing so that the remaining trees would have more room to grow to a marketable size within the identified polygons (Map 2).

The trees would be lopped and scattered to a height of less than 24 inches above the ground. Slash materials generated from these activities would be left in place and allowed to decompose naturally with no further mechanical or prescribed fire manipulation.

These stands may be reevaluated in 25-35 years for timber harvest of products other than logs, most likely post/pole materials.

(See Appendix A for Stand Diagnosis and Tentative Silvicultural Prescriptions)

IV. Prescribed Burning and/or Mechanical Treatments

Approximately 83 acres (Map 2) were determined to be poor candidates for timber production emphasis. While these stands are not suitable for timber management, other treatments have been identified related to improving overall vegetation health. These stands would be reevaluated within five years for the use of prescribed burning and/or mechanical treatment (mastication/thinning/lop and scatter treatments) to initiate disturbance and improve the stands' health, dependent on funding, stand density, and weather conditions. The proposed action would serve to re-introduce vegetative disturbance into the ecosystem in a controlled, deliberate manner. Broadcast and slash burning treatments could occur whenever prescribed environmental parameters are met. Mechanical treatments could be performed throughout the year dependent on seasonal disturbance stipulations

and or other environmental preclusions. Treatments could be completed during one application operation, or could be spread over several seasons or years until project objectives are met, dependent on weather conditions during implementation. The objectives would be to target and remove 50 to 75 percent of treatable vegetation within the identified primary target polygons.

V. Access/Roads

Access routes for proposed action should be adequate using existing and previously closed BLM, private, and U.S. Forest Service maintenance level 1, 2, or 3 roads (Map 3). Approximately 5 miles of existing temporarily closed roads may need to be reopened (vegetation removed with minimal blading and removal of water bars). Roads being reopened have been historically used for logging and would require little reconstruction.

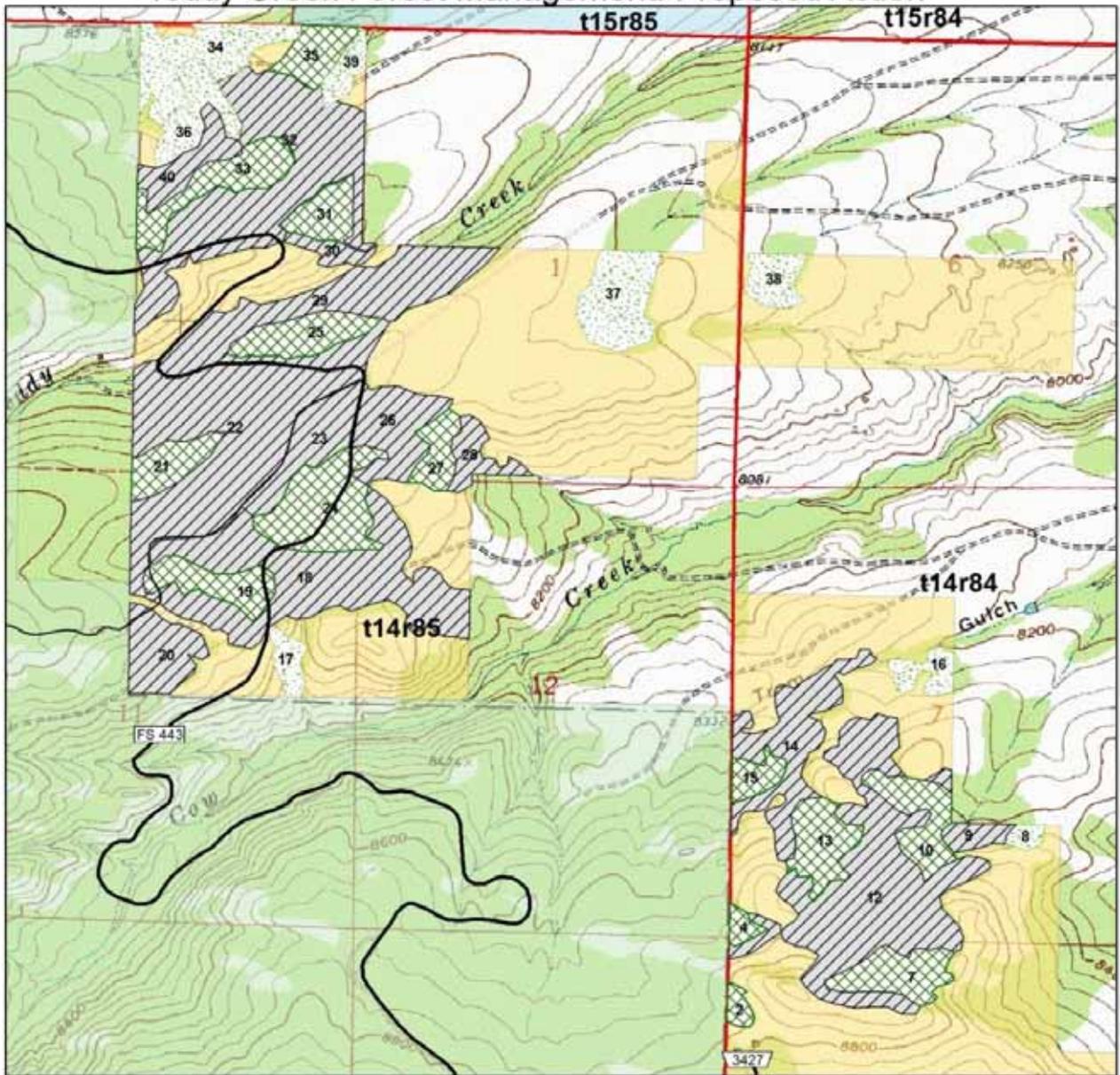
In some cases, temporary roads may need to be constructed to facilitate removal of the timber. It is estimated that a maximum of one mile of temporary road may need to be constructed on BLM lands. The location of any temporary roads would be determined by agreement with the timber purchaser/contractor and the BLM. Temporary roads are constructed only for the duration of the timber harvests and are intended to be rehabilitated after their use, generally one or two seasons of use for limited traffic. Any temporary road built as part of a timber sale shall be designed with the goal of reestablishing vegetative cover on the roadway and adjacent disturbed area within ten years after the termination of the contract. In addition to this requirement, the timber sale contract requires reclamation of these areas.

Skid Trails: Major skid trails would be spaced at approximately one hundred fifty (150) feet apart unless otherwise agreed to in writing by the Authorized Officer. Minor (feeder) trails would be placed to minimize surface disturbance. No skid trails are permitted in unstable areas, unless approved in advance in writing by the Authorized Officer. All skid trails would be at a thirty five percent (35%) or less grade unless approved in advance by the Authorized Officer.

Landings, reopened roads and temporary roads on BLM lands would be re-contoured, if necessary, and seeded from a site specific seed pick list. The reclamation and implementation would conform to BLM standards as required in the BLM Wyoming State Reclamation Policy (IM-WY-2012-032) and the Rawlins RMP (RMP Appendix 36).

Map 2:

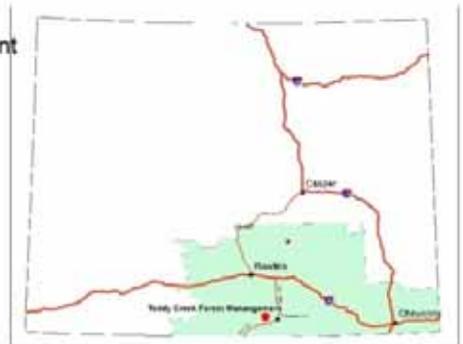
Teddy Creek Forest Management: Proposed Action



- | | |
|---|---|
|  Pre Commercial Thinning |  Bureau of Land Management |
|  Sanitation / Salvage |  Forest Service |
|  Prescribed Burning and/or Mechanical Treatments |  Private |
| |  State |

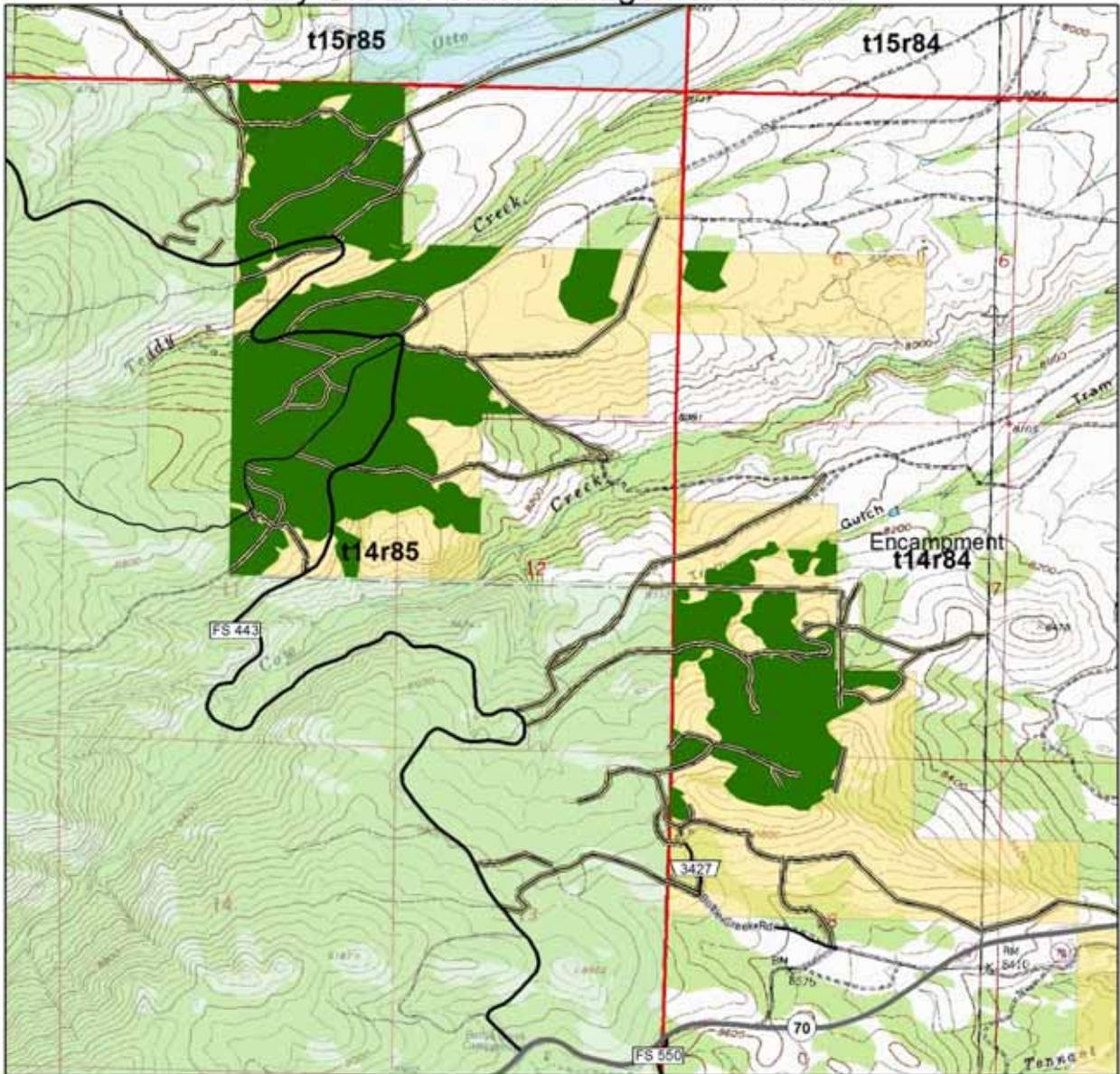


No warranty is made by the Bureau of Land Management for the use of the data for purposes not intended by the BLM.



Map 3:

Teddy Creek Forest Management: Roads



No Action Alternative

Under the No Action Alternative, no measures would be taken to improve forest health through disturbances. The expected impacts as a result of implementing the No Action Alternative are summarized in Environmental Impacts

Conformance

Conformance with the Land Use Plan

The Proposed Action is subject to the Rawlins Resource Management Plan (RMP) and the applicable Record of Decision (ROD), approved December 24, 2008. The RMP has been reviewed to determine if the Proposed Action conforms to the land use plan as required by 43 CFR 1610.5-3. The Teddy Creek Forest Management project involves treating approximately 685 acres of forest vegetation within the Upper North Platte watershed. The proposed action is forest management including sanitation/salvage, timber harvest, pre-commercial thinning (PCT), prescribed burning and mechanical treatments as defined during the analysis which may emphasize other resource areas (RMP 3-21 to 3-23).

The BLM uses the RMP as a guidance document in its environmental review. As a result of initial interdisciplinary environmental review of the Proposed Action, appropriate design features, best management practices (BMPs), and standard operating procedures (SOPs) were identified and would be applied if the Proposed Action is approved.

The Rawlins RMP can be accessed at:

<http://www.blm.gov/wy/st/en/programs/Planning/rmps/rawlins.html>

Relationship to Statutes, Regulations, or Other Plans

This EA was prepared in accordance with National Environmental Policy Act of 1969 (NEPA), as amended, and is in compliance with all applicable laws and regulations subsequently passed, including the Council on Environmental Quality (CEQ) regulations (40 CFR, Parts 1500-1508) and guidelines; U.S. Department of Interior (USDI) Regulations for Implementation of NEPA (43 CFR Part 46); USDI BLM NEPA Handbook, H-1790-1 (BLM January 2008); Guidelines for Assessing and Documenting Cumulative Impacts (BLM 1994); and the Department Manual (DM) Part 516.

The area was assessed per the Wyoming Instruction Memorandum (IM) WY-IM-2012-019 (Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Lands including Federal Mineral Estate) and WO-IM-2012-043 (Greater Sage-Grouse Interim Management Policies and Procedures). The IM directs the BLM to analyze Greater Sage-Grouse habitat at a minimum of four miles from the project location. This analysis is to occur within Greater Sage-Grouse core areas (core areas as designated by the Governor's Executive Order EO 2011-5). This project does fall within Greater Sage-Grouse core area. However the vegetation in the project areas do not support Sage-Grouse. This EA was also prepared in accordance with the following regulations and guidance policies: Endangered Species Act of 1973, as amended (ESA); Federal Land Policy and Management Act of 1976 (FLPMA); National Historic Preservation Act of 1966, as amended; Wyoming Standards and Guidelines for Healthy Rangelands; Environmental Justice (Executive Order 12898); Mineral Leasing Act of 1920; Clean Air Act, as amended; and the Clean Water Act of 1972, as amended. Section 7 consultation with the U.S. Fish and Wildlife Service (USFWS), in accordance with the ESA, was not required. The RFO RMP is currently undergoing amendment as part of the Wyoming Greater Sage-Grouse Land Use Plan Amendment (Amendment). The Draft Amendment and Environmental Impact Statement was released in December 2013.

Affected Environment

This section describes the environmental resources that may be affected as a result of the implementation of the Proposed Action and the effects of the No Action Alternative.

Air quality

Air quality is very good, with visibility often being 30-50 miles or more, relating to good vegetation cover, winds which disperse pollutants, and few local pollutants being produced. Local pollutant sources include vehicle use in the area by ranchers and recreationists. Occasional haze occurring in the area is usually a result of sources from further away, such as industrial developments or from wildfires. Several activities occur within the BLM Rawlins Field Office area that may generate Greenhouse Gas emissions. Oil and gas development, large fires, and recreation using combustion engines can potentially generate CO₂ and methane.

The impacts of climate change are expected to vary by region, and there is significant uncertainty regarding the effects of climate change on any particular region. In particular, it is unknown how climate change would affect the Teddy Creek Forest Management project area or its surrounding environment.

Socioeconomics

The proposed action lies within an area that is used by the public for a variety of uses, such as: recreation, hunting, fishing, mushroom gathering, as well as other uses. The project area has historically provided a sustainable supply of timber for processing in the surrounding communities including Encampment and Saratoga. For every million board feet of timber harvested and processed per year, approximately 10 jobs are generated, eight in the lumber and plywood industry and two in the logging industry (Charnley, S., ed. – In press). Additional benefits would be employment opportunities within the county associated with biomass utilization as well as hazardous fuel reduction. The proposed project would make available for utilization biomass material that typically is not processed for lumber or veneer. This project could result in additional employment. Pre-commercial thinning would be accomplished via service contracts to contractors in the private sector. As such, additional economic opportunities would be available over the next five years to qualified contractors.

Cultural Resources

A file search through the Cultural Records Office of the Wyoming State Preservation Office database was conducted for the project area. Through this search, the historic Southern Wyoming Tramway Company's Leschen Aerial Teamway was discovered to be originally recorded within the project boundary. The tramway was the largest capital investment into Wyoming prior to 1918 and ran from the Boston-Wyoming Smelter in Encampment, WY to the Ferris-Haggarty Mine. At the time of construction it was the world's largest aerial tramway. A class III survey was conducted and the tramway route was found to be misrouted, the tramway was resurveyed and determined to be outside the project area.

In addition, there were four other resources not eligible for the National Register of Historic Places based on the literature search determined to be within the project area: An historic timber road, two historic cabins, and one prehistoric lithic scatter. The historic road has been used in previous timber operations; most recently in 1985. One historic cabin was resurveyed, however it is outside the project area and not affected by the project. Another historic cabin was determined destroyed by BLM Archaeologists. Finally, one prehistoric lithic scatter was recorded for this project.

Soils

Soils in the project area are summarized in Table 3. The dominant soil type in this region is the Ansel-Laveta complex, which is found on slopes of 15 to 45 percent at elevations ranging from 7,400 to 8,400 feet. This soil is often found on mountainous landscapes. The dominate parent material is colluvium derived from sandstone and shale. This soil type is a deep sandy clay loam to sandy clay that is well drained and has a medium runoff class. There are small areas of Gerrard loam on slopes of 0 to 3 percent at elevations ranging from 6,800 to 7,300 feet. This soil is often found on flood plains. Its dominate parent material is alluvium derived from igneous, metamorphic and sedimentary rock. This soil type is a deep loam to clay loam that is very poorly drained and has a negligible runoff class. Fleecer sandy loams are on slopes of 0 to 25 percent at elevations ranging from 8,000 to 8,600 feet. This soil is often found in drainageways and alluvial fans. This soil type is a deep sandy loam that is well drained and has a low runoff class. Poin-Branham-Rock Outcrop complex is found on slopes of 10 to 50 percent at elevations ranging from 7,800 to 8,800 feet. This soil is often found on pediments and alluvial fans. Its dominate parent material is residuum and colluvium derived from igneous rock. This soil type is a shallow to moderately deep sandy loam to loam that is well drained and has a very low runoff class.

Mechanical operations are made difficult on most of these soil types because of the clayey component in soil layers and wetness during fall and spring. Additionally, the use of mechanical equipment can be made difficult by slopes and rocky, uneven surfaces.

Table 3: Acres and Soil Types in the Teddy Creek Forest Management Project Area

Approx. Acres	Soil Type
640	Ansel-Laveta complex, 15 to 45 Percent Slopes
10-20	Poin-Branham-Rock Outcrop complex, 10 to 50 Percent
10	Cumulic Endoaquolls-Gerrard loam, 0 to 3 Percent
10	Fleecer sandy loams, 0 to 25 Percent Slopes

Vegetation

Four forest stand types are found in the project area: mature lodgepole forest, immature lodgepole, mixed conifer and aspen (see Map 4). The majority of the forest stand types in the project area were infested with MPB and are now showing a 75 percent or greater mortality rate. The only forest stand types not affected are the immature lodgepole pine and aspen. Only the lodgepole was affected within the mixed conifer stand types. Additional information on the forest stands can be found in Appendix A along with stand stocking tables.



I. Mature lodgepole Forest - These stands contain older even-aged, dense, large diameter (10.5” Quadratic Mean Diameter¹) lodgepole pine dominated by MPB killed sawtimber with a current mortality of 75%. These stands are susceptible to wind-throw as the dead trees begin to decay and have the potential to exhibit high fire hazard, overtime, as they begin to fall and subsequently will contribute to the surface fuel load. The stands contain a minor component of subalpine fir in the understory. Where previous disturbance has occurred a smaller lodgepole size class (5-8” Diameter Breast Height²(DBH)) is present.



II. Immature lodgepole - These stands are dominated by immature lodgepole pine 20-25 years in age with minor components of subalpine fir and aspen. These areas were harvested in the early 1990’s and have naturally regenerated to a stocking level of 3,000 to 8,000 stems per acre of small diameter trees.



III. Mixed conifer - These stands are multi-storied composed of inter-mixed lodgepole pine, subalpine fir and aspen with minor populations of Engelmann spruce and Douglas fir as well as decadent aspen and subalpine fir. These stands were affected by the MPB epidemic; the current mortality within these stands is approximately 84%. There are still active insects and disease within these stands.

¹ Quadratic Mean Diameter: a measure of [Central tendency](#) which is considered more appropriate than [Arithmetic mean](#) for characterizing the group of trees which have been measured.

² Diameter Breast Height: The diameter outside bark of a standing tree measured at 4-1/2 feet above the ground.



IV. Aspen woodlands- There is a singular stand of decadent aspen in the project area. This stand is composed of older stunted aspen trees that are mostly even-aged with little regeneration in the understory.

The project is located within the Southern Rocky Mountain Conifer Forest type which includes Wyoming, South Dakota, Colorado, Utah, Arizona, and New Mexico. The uppermost (alpine) zone is characterized by alpine tundra and the absence of trees. Directly below it is the subalpine zone, dominated in most places by Engelmann spruce and subalpine fir. Below this area lies the montane zone, characterized by ponderosa pine and Douglas-fir, which frequently alternate dominance--ponderosa pine dominates on lower, drier, more exposed slopes, and Douglas-fir is predominant in higher, moister, more sheltered areas. After fire in the subalpine zone and in the upper part of the montane zone, the original forest trees are usually replaced by aspen or lodgepole pine (Forestry Handbook, 24).

The vegetation resource in the project and surrounding area comprises fuel for fire events, and dependent on type and location, can be considered to be hazardous to other surrounding resources. The fuels found on the project location can be considered to be most hazardous to values at risk immediately surrounding the project area, which include residential, recreational, and ranch related structures, and forest products. Other surrounding values include solid minerals resources (i.e. gravel pits), transportation corridors, communications facilities, and wildlife habitat.

Historic fire regimes within the project and surrounding area vary, depending upon the vegetation type. A fire regime is a generalized description of the role fire (disturbance) plays in an ecosystem. Systems for describing fire regimes may be based on the characteristics of the disturbance, the dominant or potential vegetation of the ecosystem in which ecological effects are being summarized, and/or fire severity, based on the effects of the fire on dominant vegetation (Agee 1993). In its simplest form, a fire regime can be described by frequency, and intensity or severity. Many methods are available for quantifying and describing fire regimes. The method used here is the simple Fire Regime Condition Class (FRCC). For a more detailed description of the FRCC method of quantifying fuels please refer to the Fire Regime Condition Class Definition.

Mature lodgepole pine stands are in fire regime class IV. This class involves infrequent but intense stand-replacing fires, occurring on average every 35-100+ years. Although lodgepole pine fits into this fire regime, fire occurrence is more commonly at the 100 year plus time interval. Lodgepole pines are adapted to this high-intensity, stand-replacing fire regime. The analysis area generally has not experienced large scale disturbance in the form of fire in at least 100 years. Consequently, mature stands of lodgepole pine in the project area are most commonly removed from the historic (or “natural”) disturbance and regeneration stages by 1 to 2 cycles, and can be considered to be in FRCC 2. It should be noted that a disturbance event in the form of insect infestation (and the resulting stand deterioration) has occurred in these lodgepole stands, but this has not yet changed the overall composition of the

predominant vegetation to the point that the succession process has been set back to an earlier seral stage of development.

Immature lodgepole pine stands are found throughout the project area where disturbance was experienced relatively recently (within the last 30-50 years), resulting in FRCC 1. The stands have been disturbed by forest management in the form of clear cutting, resulting in a natural regression (or progression, depending on the vantage) to an earlier seral stage of vegetation development, and a return to a more historic disturbance cycle.

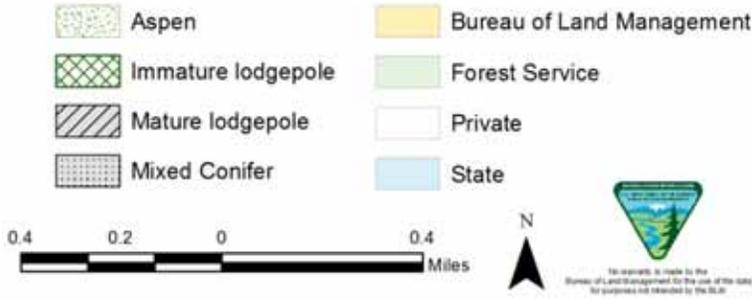
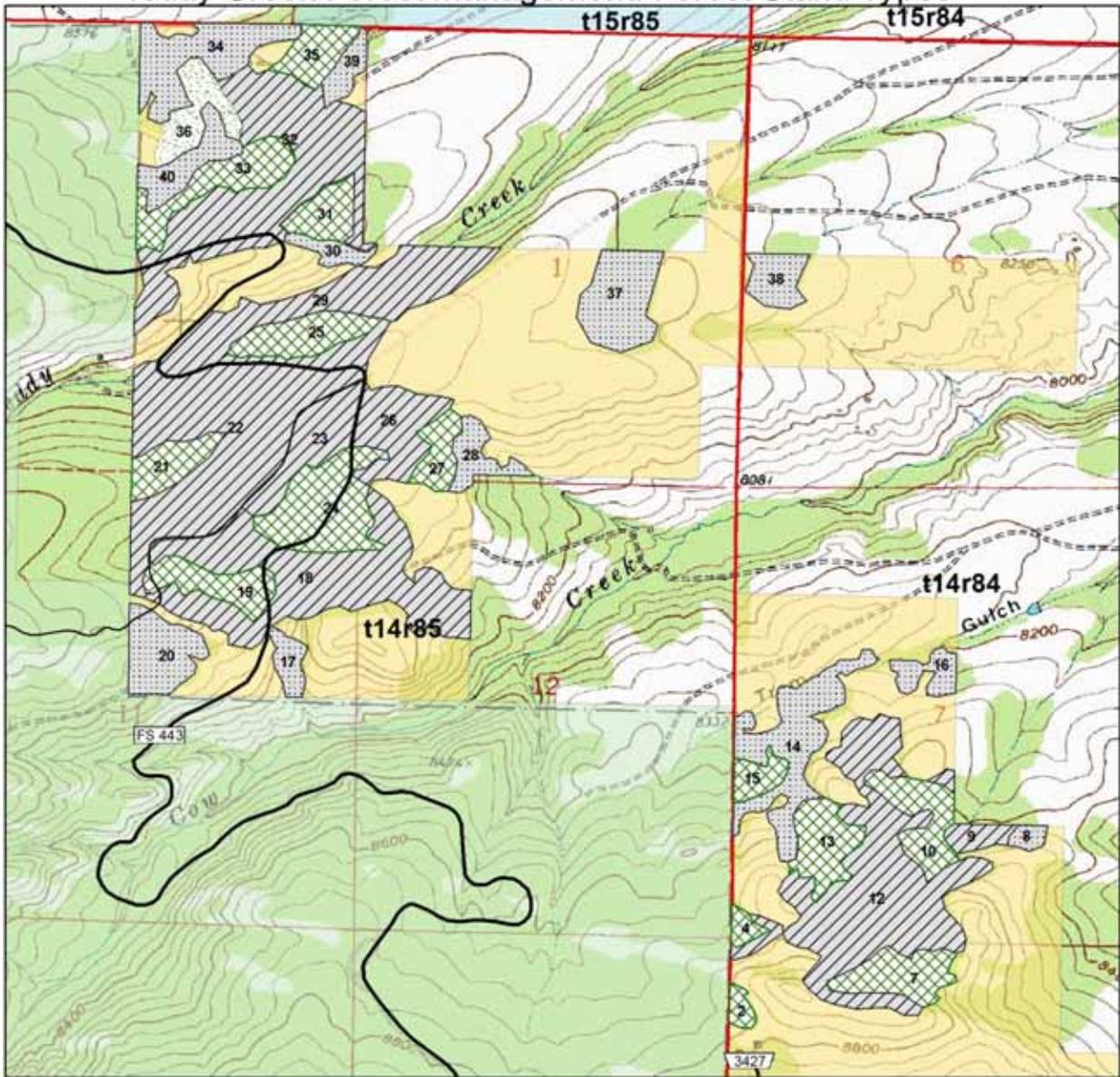
Mixed conifer vegetation types are also considered to be in fire regime class IV. In reality, these stands are comprised of aged lodgepole and aspen stands, that, through the lack of disturbance events, have become encroached upon and in some cases dominated by more shade tolerant species. Again, the lack of pronounced disturbance during the last 100+ years results in these stands having evolved into FRCC 2.

Aspen woodlands are intermingled with and surrounded by mixed mountain shrubs, lodgepole pine stands, and mixed conifer stands. These are associated mostly with fire regime III and IV, with fire occurring anywhere between 35 and 100 year + intervals, resulting in mixed to high (stand replacement) severity. It is estimated that between one and two fire return intervals have passed since disturbance in this type, placing them in FRCC 2.

Although not targeted for treatment, many ridges and slopes between and intermingled with the target polygons consist of mixed sagebrush/mountain shrub (mountain big sagebrush, Antelope bitterbrush, snowberry, serviceberry) vegetation types. Mountain big sagebrush and bitterbrush communities in the Rocky Mountain region are usually associated with fire regime group II (0-35 year frequency and high (stand replacement) severity (greater than 75% of the dominant overstory vegetation replaced.) Pre-settlement fire return intervals in mountain big sagebrush communities are estimated from 15 to 40 years. Very frequent fire suppresses mountain big sagebrush establishment, while long fire return intervals promote tree invasion into mountain big sagebrush communities. Because of the amount of conifer encroachment that is present within the mixed mountain shrub communities, it is estimated that fire frequencies have departed from natural frequencies by one or more return intervals. It is estimated that the mixed mountain shrub communities within and surrounding the project can be classified as fire regime II, FRCC 2.

Map: 4

Teddy Creek Forest Management: Forest Stand Types



Water Resources

The proposed project is located within the North Platte River watershed, more specifically Hydrologic Unit Codes (HUCs) 101800020602, 101800020508 and 101800020507. Two perennial drainages exist within the project area: Teddy Creek and Otto Creek. Teddy Creek has an approximate 2 mile reach that is in an area planned for sanitation and salvage treatment. Otto Creek has 0.6 miles of stream in an area slated for other management treatment. Otto Creek was assessed for proper functioning condition in 2003; it was given a functioning at risk rating with a non-apparent trend. To date, Teddy Creek has not been assessed for proper functioning condition. In addition to Teddy Creek and Otto Creek, there are 8 miles of ephemeral and intermittent drainages in the project area. The area receives 27 to 35 inches (National Cartography & Geospatial Center) of precipitation per year that falls primarily as snow. Further information on water resources in the area is available in the Rawlins RMP EIS (BLM, 2008), Section 3.17.

Wildlife

The Teddy Creek project area is associated with a forest type that is very productive, but due to the recent MPB infestation and resultant forest degradation, the biological productivity has been reduced; primarily through reduced carrying capacity. In general a mixed seral stage forest contains the most animal species diversity and is usually the most productive as it accommodates a wider range of species, and can provide multiple requirements in one setting (ie. food and shelter). Because the lodgepole stands are predominantly old, even-age stands with 75% being standing dead, their usefulness for both food and shelter is greatly reduced. The immature lodgepole stands are currently providing shelter and food for several species, but without some management, the over-crowded stands would not become healthy mature stands needed to maintain diversity of habitat.

Species found in this habitat include but are not limited to: black bear, bighorn sheep, bobcat, coyote, elk, mule deer, moose, mountain lion, pronghorn, badger, weasels, skunk, jack rabbits, mountain cottontail, pika, shrews, beaver, squirrels, chipmunks, yellow-bellied marmot, ground squirrels, pocket gophers, mice, jumping mice, voles, woodrat, porcupine, bats, tiger salamander, boreal chorus frog, northern leopard frog, wood frog, mountain short horned lizard, wandering garter snake, blue grouse, owls, red-tail hawk, sharp shinned hawk, northern goshawk, mourning dove, hummingbirds, sapsuckers, woodpeckers, flickers, and numerous passerines. After a field evaluation, it was confirmed that there is no suitable Greater Sage-Grouse nesting or brood rearing habitat located within the proposed project area, however it is likely that as grouse move up in elevation during the summer months that there could be occurrences of grouse in or around the project area.

The project area contains both crucial and enhancement habitat priority areas as designated by the Wyoming Game and Fish department. Crucial Habitat Priority Areas are based on significant biological or ecological values. These are areas that need to be protected or managed to maintain viable healthy populations of terrestrial and aquatic wildlife for the present and future. Enhancement Habitat Priority Areas represent those with a realistic potential to address wildlife habitat issues and to improve, enhance, or restore wildlife habitats. These areas offer potential for improving habitat and focusing Department habitat efforts. "Beetle killed conifer" is a listed example given for enhancement areas (Wyoming Game and Fish Department, January 2009).

BLM Sensitive and Species of Greatest Conservation Need

There are numerous special status and/or sensitive species that have the potential to occur within the project area. Most notable are the forest and conifer obligate species that depend upon these ecosystems for the majority of their life history requirements. These species would include the Townsend's Big-eared bat, long-eared myotis, fringed myotis, northern goshawk, boreal toad, and

northern leopard frog. Other species of management concern that have the potential to occur in the area would include various other non-game birds, raptors, mammals, amphibians, and reptiles that prefer conifer and aspen forests. Projects that are designed to improve the age class distribution and structural diversity of vegetation in the planning area would generally benefit these species.

Currently there are no Threatened or Endangered animal, plant or amphibian species identified that inhabit the proposed project area.

Environmental Impacts

This section is the scientific and analytical basis for the comparison of the Proposed Action and the No Action alternatives.

Proposed Action

Air quality

The implementation of the Proposed Action would add minor amounts of CO₂ and other exhaust pollutants from logging equipment and motor vehicles used to access the area by the BLM and contract crews completing the work. There would also be additional dust due to vehicles accessing the area. These pollutants would be temporary due to the short duration of the proposed project. Local winds would disperse any pollutants relatively quickly, depending upon the wind speeds at the time the pollutants are produced.

Forests are a major carbon sink and US forests sequester an annual average of 179 million tons of carbon (Forests and Carbon, 2008). The project area is currently not performing at a high standard due to the tree mortality rate. Harvesting the timber would promote regeneration and a younger healthier forest to contribute to carbon sequestration. Burning is one such activity that results in a release of carbon dioxide into the atmosphere, thus contributing to global climate change. However, it is the intention of the proposed action to increase vegetative cover and decrease bare ground across treatment units, thus, increasing the amount of carbon sequestration by vegetation in the project area. Treated areas should also show an increase in soil nutrient values helping to promote vegetative growth, biomass decomposition, and overall carbon cycling within the system.

Socioeconomics

The proposed action would remove approximately 7 million board feet of timber through multiple sales and result in approximately 20-30 related jobs. The local area is in need of additional timber in order to sustain the mills at their current rate. The proposed action would result in a considerable percentage of what would be processed annually. Processing facilities are dependent upon a stable, sustainable, and reliable supply of timber. Without a sustainable flow of timber, mills have a harder time operating, leading to closures and layoffs. Although private timberlands supply timber, some of the present forest industrial infrastructure is dependent upon a sustainable supply of timber from federal lands.

Cultural Resources

A Class III cultural resource inventory was performed for the project area to locate historic properties that may be impacted by the project in conformance with the National Historic Preservation Act. Previous inventories in the project covered approximately 96 percent of the project area. As timber projects have been completed in the area for greater than 50 years, the project itself is in line with the historic use of the area. No historic properties that would be adversely impacted were identified.

during the inventory. The State Historic Preservation Office was consulted for this project and concurred on this determination. Standard cultural resource design features that address buried discoveries apply and would minimize the potential for the loss or destruction of unanticipated historic properties should they be encountered during forest management activities.

Soils

The soil disturbance issues of greatest concern are compaction and erosion. Timber harvesting and road building have been identified as having the potential for increasing compaction and erosion. Repeated use of ground-based logging equipment (tractors and skidders) has, in some places, displaced or compacted soils and contributed to the reduction of soil organic matter. Due to the overall gentle slopes and stable soil conditions of the project area, there is a low probability that erosion would be increased enough to reduce soil productivity, with the exception of roads and landings.

Soil disturbance would occur when re-opening old roads and performing timber harvest. The disturbance and resulting erosion are reduced by re-opening previously used roads instead of creating new roads, as the disturbance area is less. Re-opening of closed roads and skid trails could remove most vegetation established on these routes since they were closed. Increased overland flows and concentration of overland flows could increase localized erosion and sedimentation. Implementation of BMPs would reduce the risk of adverse impacts to an acceptable level. In addition, the long term benefits to the vegetation community from dead tree removal and reduction in fuel loads outweigh these short term negative impacts.

Compaction and erosion during harvest would occur primarily on the landings and the main skid trails into the landings. Most harvesting operations are completed using mechanized ground-based equipment. This involves grapple skidders and a mechanical harvester that has a sawhead at the end of a 20 foot hydraulic arm. The mechanical harvester generally leaves the skid trails to cut and bunch trees designated for cutting. A mechanical harvester causes less soil compaction since it exerts fewer pounds per square inch of force/pressure because of their design than other ground-based harvesting machinery (BLM, 2007, PVJ Timber Sale). In addition, because the mechanical harvester has a 20 foot radial arm, it is able reach into stands and extracts trees without having to drive to every tree.

At minimum Wyoming State Forestry Division, Forestry BMPs would be implemented in this project. Any reclamation needed after the completion of the project would be required as a condition of the contracts. The reclamation and implementation would conform to BLM standards as required in the BLM Wyoming State Reclamation Policy (IM-WY-2012-032) and the Rawlins RMP (RMP Appendix 36).

Vegetation

The proposed action would improve forest health in the treated areas creating and maintaining a healthy forest capable of providing a sustainable supply of timber and other forest commodities in support of the local industry. The treated forestland would result in decreased risk from insects, disease, wildland fire hazard, and competition from undesirable species.

The results of the sanitation/salvage operations are the removal of dead, dying and susceptible sawlog timber from the lodgepole and mixed conifer stands. During the removal process, the surface becomes scarified creating conditions conducive for natural regeneration as well as opening up the canopy stimulating aspen regeneration. Increasing the age class distribution across the landscape reduces the risk for a landscape scale MPB epidemic and reduces fuel continuity. Slash left from

sanitation/salvage operations would increase fire danger and fuel loadings in concentrated areas throughout the treated stands (restricted to the slash locations, usually at the deck sites.) Following removal of the slash material, the overall amounts of flammable materials in the stands would be dramatically decreased, but would increase as the resulting vegetation evolves and matures over time.

Pre-commercial thinning of the regenerated stands would decrease stocking to a level where competition is minimized and the remaining trees would have room to grow, eventually growing into merchantable timber for a future harvest. This would reduce wildfire hazard and improve forest health in the long term reducing the potential of damage from pests and moisture stress. In the short term, fuel loading on the forest floor would increase and flammability would increase accordingly for a period as the scattered material cures and needles die and redden on the limbs. As time passes, the red needles drop from the limbs and the material decomposes, flammability and fire risk would decrease. Overall, removal of a portion of the regenerating conifer species would open up the individual stands and reduce the potential for fast moving fire carried in the crowns of the vegetation.

Timber harvests, prescribed burning and mechanical treatments would ensure stand densities are maintained at manageable levels and increase age class distribution across the landscape. Wildfire risk and fuel conditions following timber harvest operations would mimic those described for sanitation/salvage operations.

On a landscape level, the proposed actions would affect fuels by basically introducing disturbance into the vegetation present over the project sites. These vegetation types have historically and “naturally” evolved and existed with disturbance (primarily fire), and generally respond to it in a positive manner, unless the disturbance regime is drastically altered. In general, the proposed actions would remove portions of the fuel, and make the project area and overall landscape less flammable and susceptible to carrying fire for some time following treatment. The threat to values at risk associated with the project area would be removed or lessened immediately following implementation of the proposed action. As time passes and vegetation recolonizes, fuels would gradually increase and the hazard to associated values would increase.

The absence of disturbance activities in fire regime IV (the lodgepole pine and mixed conifer stands) has allowed an increase in surface fuel loading in the form of seedling/sapling trees, shrub vegetation, fine and woody litter, and an overall increase in stand density. It can also be argued that the lack of natural or managerial disturbance has allowed these vegetation stands to be more susceptible to insect infestation and the resulting death of large portions of the stands. These vegetation types typically experience stand-replacing disturbance events through natural processes, so the proposed actions would mimic natural disturbance. The actions would reduce the overall fuel loading, and reduce or remove the threat to associated values from wildfire events. Following treatment of the target units, fire behavior and spread rates would be significantly reduced, in some cases removed entirely for an extended period of time. Because the condition class of this vegetation does not appear to be altered to the extent that disturbance would completely remove it from a natural succession cycle, it is expected that reintroducing disturbance into this vegetation type would return it to its more natural range of variability. The composition and structure of vegetation and fuels would be more similar to the historic fire regime following the proposed action.

Fire regime III comprises the aspen stands in the project area, which in most cases includes a conifer component. After extended absence of fire, as the stands age, conifers have encroached into the stands. In portions of the project area, aspens have begun to be replaced by conifers. Overall, fire (or the lack thereof) has been the most important disturbance factor influencing change in structural stages and composition, and minimizing competition by conifer species. Pure aspen stands are

susceptible to mortality of above-ground stems from low intensity surface fires. However, aspen stands do not ignite easily, and specific fuel, weather and site conditions are necessary before a fire can ignite and spread. Generally, fires in young aspen stands are low intensity surface fires, unless high fuel loadings are present. Although portions of aspen stands on this project may be younger, the majority are older, in many cases decadent and dying out. These older stands are more susceptible to higher intensity fires, due to increased fuel loadings and the presence of conifer invasion. Where fire carries through the understory in decadent aspen stands, it is expected that it would remove the entire stand in the burned area. Where aspen stands do burn, the treatment would return them to their natural range of variability, to a FRCC 1. It is also expected that burned stands would not be available as fuel to carry fire for several decades following treatment. Aspen is well adapted to fire and re-colonizes a site readily after the above-ground portion of the tree is killed.

Water Resources

Potential impacts from the proposed action includes increased surface water runoff volumes and velocities, increased erosion, increased sedimentation and a decrease in downstream water quality. Changes in flow regimes could occur due to compaction and erosion from logging equipment. Soil compaction can reduce soil water storage and capacity, decrease infiltration and increase overland flow volumes. Soil displacement from roads and logging equipment can increase erosion and sediment loads to downstream water bodies. Implementation of practices outlined in the Wyoming Forestry Best Management Practices: Water Quality Protection Guidelines would decrease the risk of impacts to water resources to acceptable levels.

Impacts from the removal of timber could also increase surface water runoff, erosion and sedimentation. There would be less transpiration from trees and a greater amount of snow accumulation in the openings compared to the existing condition. This would have a greater effect on localized flow patterns than on large, watershed scale flow patterns. Targeting of dead timber, well-drained soils and a relatively low drainage density alleviate concerns of negative impacts from removal of timber.

Re-opening of closed roads and skid trails could remove most vegetation established on these routes since they were closed. Vegetation would be affected by machinery passing over the routes and surrounding vegetation could be affected by soil displacement from the roads and trails. This could cause a reduced amount of water capture and infiltration in the short-term as well as a concentration of overland flows. Increased overland flows and concentration of overland flows could increase localized erosion and sedimentation. Implementation of BMPs would reduce the risk of adverse impacts to an acceptable level. In addition, the long term benefits to the vegetation community from dead tree removal and reduction in fuel loads outweigh these short term negative impacts.

Wildlife

Disturbance to wildlife during the execution of the proposed project would result in wildlife being temporarily displaced from the area, but animals are expected to return once project implementation is completed. Human presence, noise and related traffic would be an associated disruption as well. Providing more edge, improving overall forest stand health, opening up dense forest stands and reducing the amount of accumulated hazardous fire fuels, would improve wildlife habitat both structurally and with regard to the quality of available forage. Wildlife use of the treated areas would potentially increase, therefore, it is essential that big game species, such as elk, be managed closely in treatment areas. Depending on site-specific conditions, it may be necessary to fence treated aspen stands for three to five years or until new suckers grow beyond the reach of browsing animals.

Presently, big game species are not benefiting from the amount of thermal protection associated with conifer stands due to the high percentage of standing dead trees. In the near future, big game would be further restricted from optimal use of these conifer and aspen stands due to the high amount of wind-throw, ladder fuels and downed woody debris. The suites of proposed treatments are designed to improve wildlife habitat.

Management actions to improve wildlife habitat are most successful when designed for landscape scale effect. The suite of proposed treatments has been specifically designed to achieve optimal landscape scale by pairing proposed treatments with treatments already planned to occur on private lands.

During mechanical treatments and burning activities and shortly thereafter, wildlife would potentially avoid the treatment areas. However, after treatments are completed, wildlife should move back into these areas. There would potentially be some mortality of small mammals, amphibians, and bird eggs during the treatments, but these losses should be minimal. There would be short-term loss of habitat for tree dependent songbirds. Pre-commercial thinning may reduce the quantity and quality of fawning and avian nesting cover in the short term, however the treatments that occur in the older stands would provide more cover that is spaced out allowing it to be used by even more species.

Treatment activities would potentially impact raptor and song bird nesting activities near the treatment areas. If nests are active and birds are incubating prior to the start of these treatment activities, human activity (such as equipment noise), fire or dense smoke could potentially cause the birds to abandon their nests. These same activities could cause birds to choose alternative nest sites if these treatment activities occur during nest selection. Past experiences have shown that birds are minimally impacted by forest treatments as long as human activities around or near the nest site remain minimal. Creating openings in dense stands to allow the growth of grasses, forbs, shrubs, and saplings may improve raptor hunting opportunities.

A temporary loss of browse would occur as a result of pre-commercial thinning, but production would resume during the next spring growth period. Thinning would improve the quality of browse, and availability of herbaceous forage improving the overall forage potential. Consequently, large animals such as mule deer, moose, and elk would be attracted to the treatment areas; thus, use of these areas by these animals is expected to increase.

The greatest impact would likely occur during the treatment phase and for a period of 1-2 years following treatment.

Additionally, indirect impacts to aquatic habitats could result from increased sedimentation during post-treatment runoff periods. Sedimentation accumulations within nearby drainages are anticipated be minor due to the patchiness of treatments as well as the buffer between treatment areas and drainages. Over the long-term, amphibian populations should increase as riparian conditions improve.

No Action Alternative

The lack of forest management would allow vegetation to continue to mature and die across the landscape, allowing heavy fuels to accumulate, greatly increasing the chance of a wildfire, until wildfire removed the accumulated biomass from the sites. The accumulated large amounts of woody biomass would result in a delay in re-establishing or the exclusion of regeneration from lack of an exposed bare mineral seed bed. There would be excessive fuel bed accumulation. This alternative

would inhibit the production of a sustainable supply of timber and other forest commodities to support local and regional economies. The lack of forest management would also contribute to the continued deterioration of forest health.

Air Quality

There would be no direct long or short term impacts to air quality from the No Action alternative. Indirect impacts to air quality would be realized from the increased potential for large, landscape scale wildfire events in the area which would have the potential to produce larger amounts of smoke for longer durations, and reduce air quality in the immediate area during their occurrence.

Global Warming & Carbon Sequestration

Current global warming and carbon sequestration trends would continue as a result of the no action alternative. Limiting the contribution of these forest stands to the US annual average of tons sequestered due to high mortality rates.

Socioeconomics

The No Action alternative would affect local businesses primarily dependent upon forest products. Based upon the assumption above that for every 1 million feet of timber harvested per year, 10 jobs are generated, approximately 20-30 jobs either locally or within the community that processes the timber could be impacted. The No Action alternative would result in some detectable socioeconomic change in regards to recreational uses. Access and excessive downed material would reduce hunting, fishing, and other recreational uses for safety reasons.

Cultural Resources

Under the no action alternative there would be no impacts to cultural resources.

Soils

Under the no action alternative there would be no soil disturbance. The risk of stand replacing wildfire and resultant increased erosion would continue to increase as dead fuels (biomass) continue to accumulate.

Vegetation

The No Action alternative would result in no immediate Forest Management in the project area. Conditions would remain conducive to insect infestation and disease infection. As a result, tree mortality would be expected to increase and along with it, an increase in wildland fire hazard. Immature, dense stands of lodgepole pine would continue to stagnate and not grow into a merchantable sawlog size. Dense stands would continue to be stressed due to competition for nutrients and water increasing further susceptibility to insect and disease.

Although no immediate changes would occur to the vegetation resource, long term changes would continue. Restriction of disturbance would result in continued development and, in many cases, regression of the existing vegetation communities. Vegetation types and patterns would continue to shift at roughly the same rate as has been occurring during the preceding 50 to 100 years. Dense stands of decadent conifer, and aspen with 50% mortality or greater within stands, would continue to age, moving into over-mature, wind-thrown stands, with suppressed juvenile plants and regeneration. Long term benefits from vegetation age-class structure and composition stratification would not occur. In fact, as vegetation continues to age without disturbance, significant detriments to vegetation can be expected. The vegetation and habitat would continue to become more susceptible to wildfires which could potentially remove large percentages of vegetation in the area due to the

continuity of fuels and limited fire-breaks. Shade tolerant conifer would experience increases in density, and losses of desirable species (lodgepole pine, aspen.)

Current conditions in the hazardous fuels profile would evolve and become more pronounced than present. Wildland-urban intermix issues and threats would not. Fuel loading would remain high and increase over time, and the potential threat of an uncontrolled landscape scale wildfire would continue to increase. The fuel profile would be altered and the fire regimes of the vegetation would continue to move towards states that are farther from historical and significantly altered from desired condition classes. Fuels for wildfire events would continue to be a hazard to surrounding values, and would become more hazardous as they continue to build. There would be no modification to the fuel profile and no large-scale fuel-breaks to the landscape would occur.

In the next 10 to 15 years, vegetation condition classes would remain altered from historical or natural conditions. Moderate changes to fire size, intensity and severity, and landscape patterns can be expected. Management options would be somewhat limited because of the departure from historic conditions, possibly requiring moderate levels of restoration treatments prior to managing the landscape as would be possible in the historic fire regime. Smoke production from a wildfire event and erosion potential following would be greater.

In the next 15 to 50 years, exclusion of disturbance has, and would continue to, move vegetation throughout the project area towards and into FRCC 3, where fire regimes have been significantly altered from the historical range. Multiple disturbance return intervals (more than three) would have passed in all of the vegetation types within the project area if the current trend continues. Dramatic changes would occur to either size, intensity, duration, severity, and/or landscape patterns of fires, possibly combinations thereof. This is especially true where insect infestations have killed large portions of the mature overstory canopy cover. As the canopy falls to the ground over time, the fuel profile could change to the point that fire events result in dramatically different effects than would be experienced normally. Management actions would be more severely constrained, and high levels of restoration treatments may be required before fire could be utilized to restore the natural fire regime. At the extreme, the natural fire regime could be shifted to one or more different fire regimes, not normally found in the vegetation type and/or region.

Water Resources

Under the no action alternative there would be no short term negative impacts. There would however be a greater potential for long term changes in the hydrology regime of the area. Timber stands impacted by MPB have altered interception and transpiration rates. Research suggests that watersheds infested with MPB have a higher annual water yield as well as exhibit an advanced annual hydrograph peak. Peak flows are not impacted but low, base flows are increased (Potts, 2007). Further research is needed to fully understand the impacts of MPB infestation on surface and groundwater resources.

Wildlife

With a no action alternative there would be no immediate effect on wildlife. However without treatment on stands with 75- 84 % mortality there would be a short term effect, and a long term effect on all of the treatment areas.

The short term effect would result from the stands with a lot of standing dead trees. The standing dead trees would soon become wind-thrown, making the few live trees susceptible to the wind and also ending up as wind-thrown. The large tracts of down trees would greatly reduce the amount of thermal cover available for wildlife; additionally the species that utilize the trees for habitat or food

would also be impacted. Finally the rate of regrowth of grasses, forbs, shrubs, and saplings would be greatly reduced with all the biomass covering the ground and reducing sunlight.

The long term effect would result in the large timber stands being taken out of the progressive cycle of different seral stages, as there would be very little recruitment in the wind-thrown tracts. Additionally the large tracts would also become highly prone to fire with the built up fuel on the fire floor. Uncontrolled forest fires have the potential to kill birds, amphibians, and small mammals that cannot escape the flames. Uncontrolled fire can also kill all the microorganisms in the soil resulting in areas that are unable to support vegetation, which then compounds the negative effects, through increased erosion, increased sedimentation, reduced cover and forage. The long term effects of the overcrowded pole-sized tracts would be slow recruitment to the next seral stage, resulting in a stand of stressed mature trees, making them more susceptible to disease and infestation, providing a vector for a large scale die off in the tracts surrounding the stressed trees. Both stressed tracts of trees and the potential for large scale die offs produce situations that negatively impact the wildlife that require healthy conifer ecosystems to survive.

In short, the no action alternative may not impact wildlife immediately but would have the greatest impact on wildlife in both the short and long term. Essentially wildlife would always benefit from management actions that are geared towards maintaining healthy ecosystems. In this situation producing stands with multiple seral stages with healthy recruitment and healthy trees would provide the optimal habitat, cover, and forage, as well as protect the soil that is necessary to keep the healthy stands.

Cumulative Impacts

This section describes incremental impacts on effected resources as a result of the Proposed and No Action Alternatives in combination with other past, present, and reasonably foreseeable actions in the project.

Air Quality

Wyoming's gross GHG emissions are expected to continue to grow to 69 MMtCO₂e by 2020, 56% above 1990 levels. As of 2008, the Inventory indicates that there over 33,000 active gas and oil wells in the State, 45 operational gas processing plants, 5 oil refineries, and over 9,000 miles of gas pipelines, there are significant uncertainties associated with estimates of Wyoming's GHG emissions from this sector. This is compounded by the fact that there are no regulatory requirements to track CO₂ or CH₄ emissions. Therefore, estimates based on emissions measurements in Wyoming are not possible at this time. (Wyoming GHG Inventory and Reference Case Projection CCS, Spring 2007).

Cultural

Long term cumulative effects on cultural resources from this project are expected to be minimal. Approximately 630 acres of the proposed project have been previously disturbed by previous timber projects. This project conforms to historical use of the area and would not affect any historic properties adversely.

Soils

Long term cumulative effects on soils, even from multiple types of activities, are not expected to greatly affect soil productivity and future potential of the area for timber production. BMPs on minimizing soil compaction and disturbance would reduce cumulative effects to soil resources. Treatments would continue to be implemented during the summer months (June-October) when soils are dry and least susceptible to compaction.

Weeds

Motorized recreational use and wildlife/livestock use are the other uses in the area which have the potential to introduce or spread invasive weeds. The use of BMPs to minimize the potential for weed introduction would reduce the risk of this potential to an acceptable level.

Vegetation

There have been no timber sales within the Rawlins Field office in the past 11 years. It has been 18 years since more than 10 acres have been harvested. This has left the BLM forestlands highly susceptible to insect disease and wildfire. The project area has seen timber harvest activities performed in the early 1990's. These activities have created the healthy stands of immature lodgepole pine in need of PCT. The effect of the Proposed Action, combined with future actions on BLM lands, would result in increased forest health of the forest stands on BLM lands. Generally, functional composition of the stands would continue after treatments contributing to healthy landscapes.

The proposed action would add to the cumulative effects of disturbance events in the area by manipulating the fuel profile in the immediate area, and removing fuels available for wildfires and threats to associated resources. The area surrounding Teddy Creek is part of the Baggs/Platte Valley Fire Management Unit (FMU), and is moderately susceptible to wildland fire events. Lightning-caused fires account for the majority of all unplanned ignitions. Fires have occurred with low to moderate frequency. Large fire potential varies, dependent on fuel loading and type (the high amount of available, heavy fuels resulting from insect infestation would increase the large fire potential), fuel moisture, weather, and distance from Dispatch Location (DL – although this location lies a good distance from the Rawlins BLM HDD Fire DL, it is quite close to the USFS Brush Creek-Hayden Fire DL which mitigates the potential). From 1999 through 2008, approximately 34 recorded fires occurred within the entire FMU, for a total of 9349.1 acres. This represents an average of 3.4 wild fires per year, an average of 274.97 acres per fire, and an average of 934.91 acres burned per year. Suppression fires typically occur between July 1 and September 10. Significant recent fire events in the area were the Blackhall, Hell Canyon, and Bear Mountain South fires, which occurred in similar vegetation types, but were also significantly influenced by the timing of their occurrence during extreme drought years.

For the most part, ignitions receive a timely initial attack response and are contained/controlled before large acreages are burned (more than 50 acres). The majority of ignitions are contained and controlled within a burn period or two (FRCC period) and never reach more than an acre in size. Because fuel loadings are so high following the MPB epidemic, ignitions not caught during the initial attack phase have a high probability affecting large acreages of land.

Wildlife

The surrounding Forest Service land and private lands that have been harvested in the last two years or where timber harvest would be conducted in the next two years, would add to the cumulative displacement, wildlife mortality, loss of thermal cover, and reduced forage in the short term. However the effects would still be minimal given the vast amount of acreage that would not be treated during that time period. The cumulative impact of the no action alternative has greater potential to impact wildlife. Most of the surrounding forest area has the same percentage of standing dead. These other areas impacted by the MPB are already providing a reduced thermal cover and are likely to be susceptible to wind-throw. Not taking management action on the areas available for treatment would result in even more habitat that has little to no wildlife value in the near future. Treating these areas now would provide some areas of recovering stands, when the other untreated

areas hit the point of little wildlife value, providing some tracts that wildlife can utilize, while the other areas can no longer support wildlife.

Mitigation, BMPs, Reclamation

Site-specific design features have been incorporated into the proposed action, including timing and other stipulations provided by the wildlife and cultural specialists. Therefore, no additional mitigation is needed. Residual impacts, other than those previously mentioned in this EA, would not occur. At a minimum, Wyoming State Forestry Division, Forestry BMPs would be implemented in this project. Any reclamation needed after the completion of the project would be required as a condition of the contracts. The reclamation and implementation would conform to BLM standards as required in the BLM Wyoming State Reclamation Policy (IM-WY-2012-032) and the Rawlins RMP (RMP Appendix 36).

All active fire restrictions would be followed on BLM lands.

Wildlife stipulations for Elk Crucial Winter Range are in effect from November 30th - April 30th. No activities would occur during this time period unless an exception has been filed and approved.

Other Personal/Agencies Consulted:

The following individuals/agencies have been contacted regarding this proposal:

Individual	Discipline	Organization
Susan Foley	Planning and Environmental Coordinator	BLM
Brad Tribby	Fishery Biologist	BLM
Charlie Morton	Wildlife Biologist	BLM
Lucas Carrington	Archaeologist	BLM
Mike Murry	Range Management Specialist	BLM
Chris Otto	Fuels Specialist	BLM
David Hullum	Outdoor Recreation Planner	BLM
Kelly Owens	Hydrologist	BLM
Susan Foley	Soil Scientist	BLM
Andy Skordas	District Engineer	BLM
John Sjogren	Natural Resource Specialist	BLM
Annette Treat	Supervisory Realty Specialist	BLM
Raymond Ogle	Natural Resource Specialist-Reclamation	BLM
Ben Smith	Wild Horse & Burro Specialist	BLM
Mick Hood	Forester	State of Wyoming Forestry Division

Preparer: Maureen Hartshorn, BLM, RFO Forester

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Appendix A: Stand Diagnosis

Teddy Creek Forest Management Project
Forestry & Silviculture Report

Prepared By: Mick Hood
Project Forester – Wyoming State Forestry
January 26, 2015

This report will focus primarily on sites where a timber management component is present, whether it be merchantable sized sawlogs, POL (products other than logs), or previously regenerated stands in need of thinning. The following items will be discussed for each forest stand type listed: (1) existing condition, (2) tree species ecology, (3) stand tables (where data is available), (4) future stand structure and composition with no treatment, and (5) target stand.

The Teddy Creek Forest Management Project is a total of 685 acres in size. Acres for each unit are listed in Table 1 below.

Individual stand types were delineated within the project area based on several factors including cover type, aspect, previous treatments, species condition, etc.

Although much variation exists between individual stands within the project area, five forest stand types were identified in an effort to simplify this analysis. The stands associated with each forest stand type and their corresponding acres are listed in the table below:

Table 1 – Teddy Creek Forest Stand Types

Forest Stand Types	Stand #'s	Acres
Mature Lodgepole Pine	3	2.7
	9	4.8
	11	1.0
	12	75.0
	18	64.4
	22	81.3
	23	16.7
	26	19.2
	29	40.6
	32	67.6
	Subtotal:	373.3
Immature Lodgepole Pine	2	2.7
	4	2.7
	7	14.2
	10	14.6
	13	14.0
	15	5.6
	19	12.8
	21	10.3
	24	26.7
	25	13.7
27	7.9	
31	9.4	

	33	17.1
	35	9.6
	Subtotal:	161.3
Mixed Conifer	14	28.4
	20	7.7
	28	15.7
	30	4.5
	40	11.2
	Subtotal:	67.5
Aspen	36	12.6
	Subtotal:	12.6
Transitional Mixed Conifer	8	2.4
	16	6.2
	17	5.2
	34	23.0
	37	19.8
	38	8.4
	39	5.3
	Subtotal:	70.3
	Total:	685.0

This stand diagnosis will focus on the forest stand type, as a whole, which includes the collection of stands grouped in it (see Table 1 above).

See the attached unit map.

1. Existing Condition

General Overview by Forest Stand Type

Mature Lodgepole Pine

These stands are older even aged, dense, large diameter, lodgepole pine (*Pinus contorta*), dominated by MPB (Mountain Pine Beetle) (*Dendroctonus Ponderosae*) killed sawtimber with current mortality at 75%. Due to the extensive tree mortality, these stands are susceptible to wind-throw and as the dead trees begin to decay and fall to the ground, will add significantly to the surface fuel load.

The understory is composed primarily of live subalpine fir (*Abies lasiocarpa*) and aspen (*Populus tremuloides*), with over 2,000 stems per acre of those two species combined, in the 0 to 0.99 inch diameter class alone.

The stands associated with this group represent the best salvageable timber component in the Teddy Creek analysis area. Many are on very good growing sites with high

volumes/acre. In addition to sawtimber, in some stands minor amounts or islands of POL (Products Other Than Logs) can be found.

Currently, the stand(s) are holding together well with minimal wind-throw however, future wind-throw potential is high.

One additional note-worthy item is that there appears to have been a timber trespass in stand 9 approximately ten-plus years ago. Many stumps were tagged with an aluminum tag reading BLM with a tree number. There is still some merchantable beetle kill in that unit to salvage.

Immature Lodgepole Pine:

These stands are dominated by immature lodgepole pine 20-25 years in age with aspen as a co-species. Following clearcut harvest operations 20 to 30 years ago, areas that did not immediately regenerate with lodgepole pine were colonized by aspen. There is also a small population of subalpine fir scattered throughout the stand(s).

These stands were harvested in the early 1990's and have naturally regenerated to a stocking level of 3,000 to 8,000 stems per acre of small diameter trees. Rocky Mountain area stocking charts for lodgepole pine indicate any density in excess of 1,000 stems per acre is projected to have a negative effect on board feet yield at rotation.

All the stands associated with this group are candidates for pre-commercial thinning.

Mixed Conifer:

These stands are multi-storied, composed of inter-mixed lodgepole pine, subalpine fir and aspen, with minor populations of Engelmann spruce and Douglas fir (*Pseudotsuga menziesii*). Most the lodgepole pine has been killed by MPB and pine mortality is 84%. These stands contain decadent aspen and subalpine fir. Volume per acre of both sawlogs and POL combined is 8 MBF/acre.

In the understory, regeneration leans heavily towards aspen and subalpine fir with over 1,700 stems per acre estimated in the 0 to 0.99 inch diameter class by both those species combined.

Stands associated with this group are more marginal in terms of a timber management perspective. It is not that these stands don't have the capability of supporting a merchantable volume of sawlogs, but the current species make-up and stand structure is not optimizing the sites potential. There are some pockets of merchantable lodgepole pine in areas but there is also a population of subalpine fir in the overstory and on the perimeter of these stands, especially adjacent to openings.

Although not represented by the inventory plot data, in one stand, subalpine fir was co-dominant with lodgepole pine.

Aspen:

Although most sites within the project area have an aspen component, there is one stand of decadent Aspen. This stand is composed of older stunted aspen trees with a scattering of

sapling sized lodgepole pine. The trees are mostly even aged with little regeneration in the understory.

Transitional Mixed Conifer

Approximately 70.3 acres were determined not to be good candidates to manage for timber production. While these stands are not suitable for timber management, other treatments have been identified related to other resource areas such as fuels, wildlife, range, etc. These stands will be reevaluated within five years for the use of prescribed burning and/or mechanical treatment (mastication/cutting) to initiate disturbance and improve stand health.

2. Tree Species Ecology

Stand structure and composition is similar to many mid-elevation lodgepole pine, subalpine fir, and aspen stands in the Rocky Mountain region. With the exception of the immature lodgepole pine stands, which regenerated following a timber harvest disturbance, these stands most likely regenerated with lodgepole pine and aspen following a disturbance 100 to 200 years ago, undoubtedly from a stand replacing fire, as evidenced by charred material found in the stand and the similar age and size of overstory lodgepole pine trees. As both lodgepole pine and aspen are disturbance dependent species, they are adapted to quickly colonize a site following disturbance. Lodgepole pine is adapted to fire by its thin bark, allowing the tree to be easily stem-killed by low intensity surface fire, and by the presence of serotinous cones. Most of the reproduction of aspen is by root-sprouting, many trees in a grove being connected together by a common root system in what are referred to as "clones." Aspen is dependent on fire, clear cutting, or other "clearing" disturbance to keep stands open, free of conifers, and reproducing from suckers.

Over time, the shade intolerant lodgepole and aspen are gradually replaced by more shade tolerant species such as subalpine fir and Englemann spruce (*Picea engelmannii*) as they establish themselves in the understory. The lodgepole pine in these stands has fallen victim to a mountain pine beetle epidemic, setting the stage for another stand-replacing fire event sometime in the future, thereby resetting the successional clock.

With the exception of the PCT units, these stands, with no treatment or disturbance, will continue to move in the direction of gradually being replaced by the more shade tolerant species, in this case subalpine fir, and over time, will only contain remnant populations of lodgepole pine and aspen. This phenomenon is illustrated in the stand stocking tables below.

3. Stand Stocking Tables by Stand Type

Mature Lodgepole Pine

This stand type is composed of ten different stands for a total of 373.3 acres. A total of 32 fixed and 32 variable plots, randomly located, were used to sample the trees in these stands. A 1/100th acre fixed plot was used to sample seedling, sapling, and less-than 5 inch DBH material. Variable plots using a BAF (Basal Area Factor) of 40 was used to sample trees larger than 5 inches at DBH.

The inventory plot data is summarized in Graph 1 and Table 2 below.

Graph 1

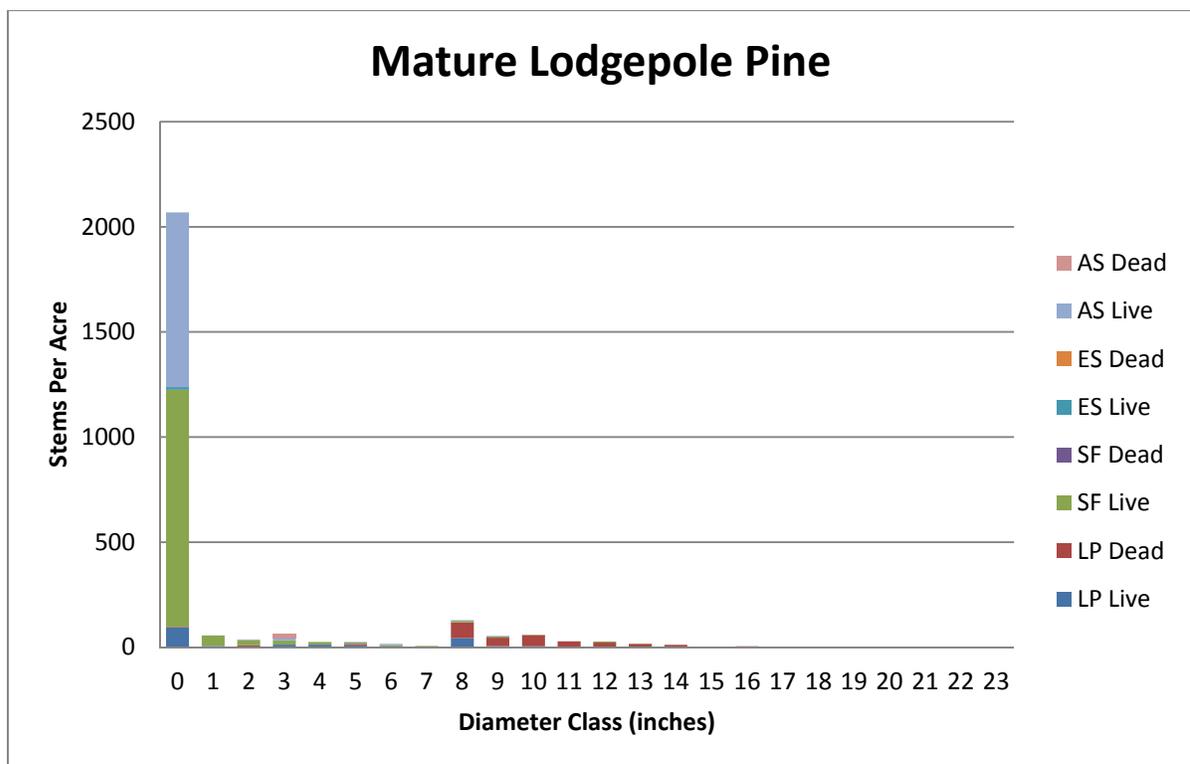


Table 2 – Mature Logepole Pine: Stocking Table (Trees per Acre)

Dia. Class	LP Live	LP Dead	SF Live	SF Dead	ES Live	ES Dead	AS Live	AS Dead	Total
0	94	3	1128	0	13	0	831	0	2069
1	6	0	50	0	0	0	0	0	56
2	3	6	25	0	0	0	3	0	38
3	13	0	19	0	3	0	9	22	66
4	13	0	13	0	0	0	0	0	25
5	9	6	6	0	0	0	3	0	25
Sub-Total < 5"	138	18	1253	0	16	0	852	22	2301
6	0	3	6	0	0	0	6	0	16
7	0	0	6	0	0	0	0	0	6
8	43	75	7	0	0	0	4	0	129
9	6	40	6	0	0	0	3	0	54
10	5	53	2	0	0	0	0	0	60
11	2	27	0	0	0	0	0	0	28
12	2	21	5	0	0	0	0	0	27
13	0	16	1	0	0	0	0	0	18
14	0	12	0	0	0	0	0	0	12
15	0	2	0	0	1	0	0	0	3
16	0	4	0	0	0	0	0	0	4
17	0	2	0	0	0	0	0	0	2
18	0	1	0	0	1	0	0	0	1
19	0	0	0	0	0	1	0	0	1
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0
Sub-Total ≥ 8"	57	252	21	0	2	1	7	0	339
Total:	195	270	1274	0	18	1	859	22	2640

Immature Lodgepole Pine

This stand type is composed of 14 different stands for a total of 161.3 acres. A total of 26, 1/100th acre fixed plot were used to sample the trees in this stand. Variable plots were not used in these stands due to the small tree diameters.

The inventory plot data is summarized in the Graph 2 and Table 3 below.

Graph 2

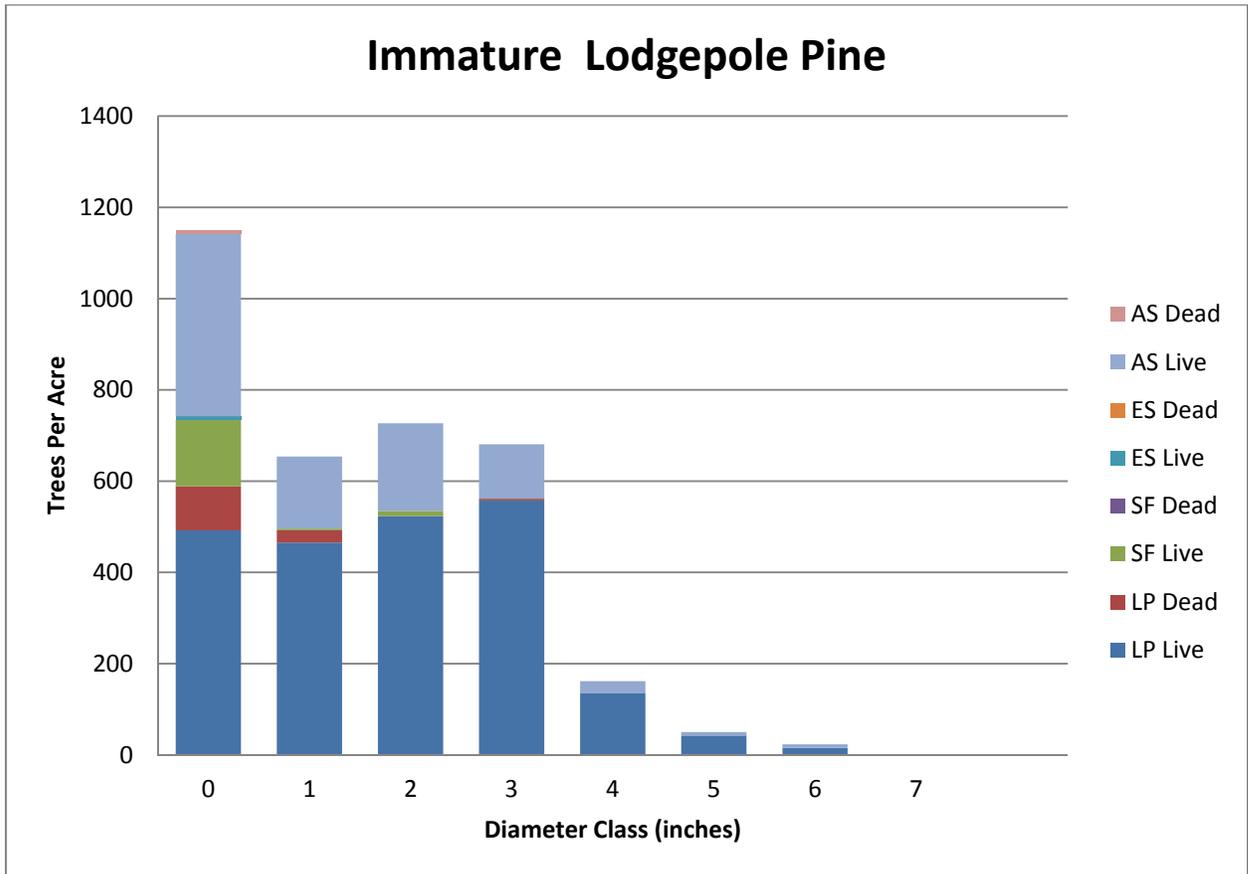


Table 3 – Immature Logepole Pine: Stocking Table (Trees per Acre)

Dia. Class	LP Live	LP Dead	SF Live	SF Dead	ES Live	ES Dead	AS Live	AS Dead	Total
0	492	96	146	0	8	0	400	8	1150
1	465	27	4	0	0	0	158	0	654
2	523	0	12	0	0	0	192	0	727
3	558	4	0	0	0	0	119	0	681
4	135	0	0	0	0	0	27	0	162
5	42	0	0	0	0	0	8	0	50
6	15	0	0	0	0	0	8	0	23
7	0	0	0	0	0	0	0	0	0
Total	2231	127	162	0	8	0	912	8	3446

Mixed Conifer

This stand type is composed of 5 different stands for a total of 67.5 acres. A total of 8 fixed and 8 variable plots, randomly located, were used to sample the trees in these stands. A 1/100th acre fixed plot was used to sample seedling, sapling, and less-than 5 inch DBH material. Variable plots using a BAF (Basal Area Factor) of 40 was used to sample trees larger than 5 inches at DBH.

The inventory plot data is summarized in the Graph 3 and Table 4 below.

Graph 3

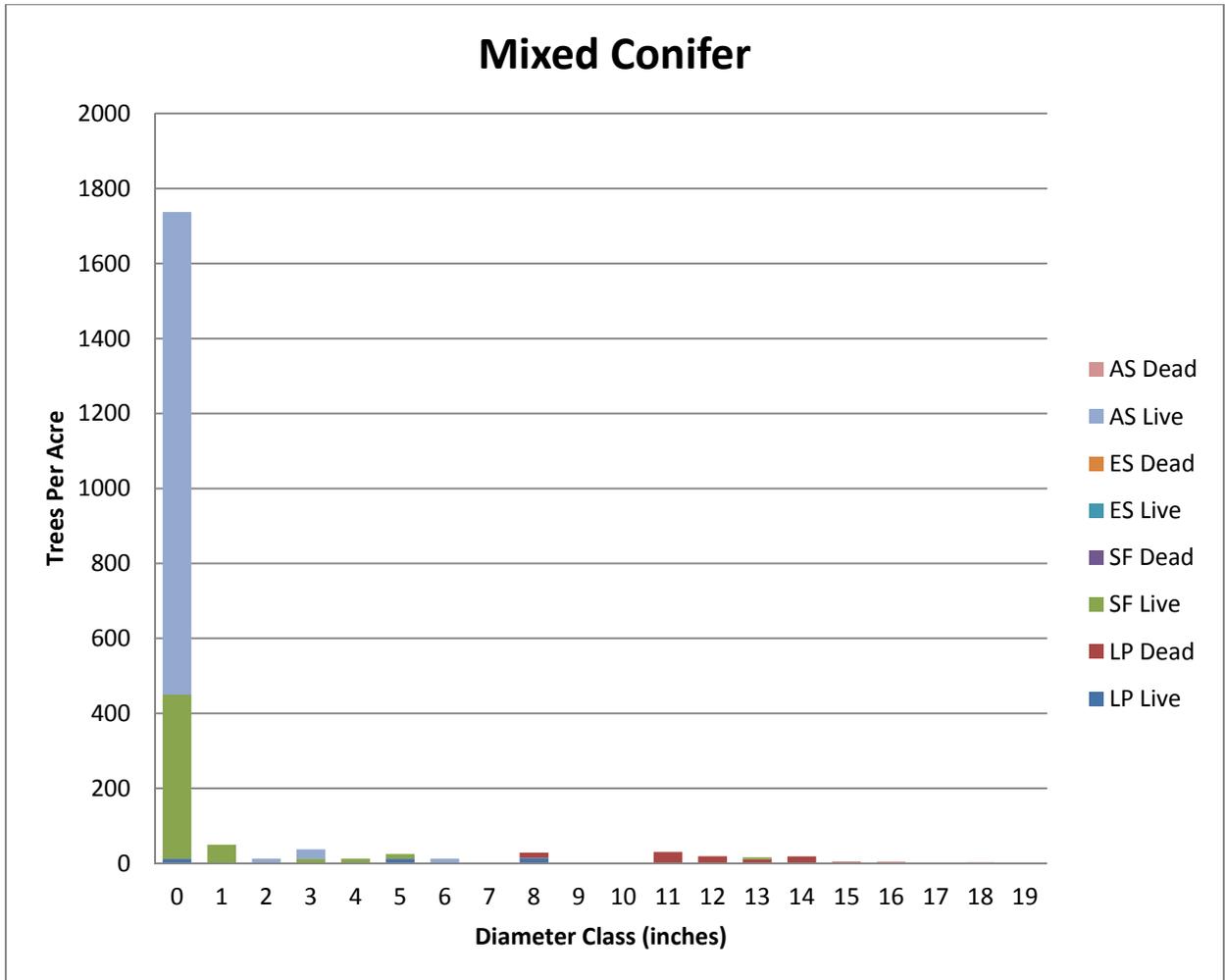


Table 4 – Mixed Conifer: Stocking Table (Trees per Acre)

Dia. Class	LP Live	LP Dead	SF Live	SF Dead	ES Live	ES Dead	AS Live	AS Dead	Total
0	13	0	438	0	0	0	1288	0	1738
1	0	0	50	0	0	0	0	0	50
2	0	0	0	0	0	0	13	0	13
3	0	0	13	0	0	0	25	0	38
4	0	0	13	0	0	0	0	0	13
5	13	0	13	0	0	0	0	0	25
Sub-Total < 5"	26	0	527	0	0	0	1339	0	1890
6	0	0	0	0	0	0	13	0	13
7	0	0	0	0	0	0	0	0	0
8	14	14	0	0	0	0	0	0	29
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	30	0	0	0	0	0	0	30
12	0	19	0	0	0	0	0	0	19
13	0	11	5	0	0	0	0	0	16
14	0	19	0	0	0	0	0	0	19
15	0	4	0	0	0	0	0	0	4
16	0	4	0	0	0	0	0	0	4
17	0	0	0	0	0	0	0	0	0
18	0	3	0	0	0	0	0	0	3
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0
Sub-Total ≥ 8"	14	104	5	0	0	0	0	0	124
Total	40	104	532	0	0	0	1339	0	2014

Aspen

Due to the lack of any merchantable material, no inventory plots were located in the aspen stand.

Transitional Mixed Conifer

These stands are not targeted for treatment for timber management and as such, no inventory plots were located in these stands.

Table 5 - Other Unit Statistics

Forest Type	Basal Area/Acre Sawlogs	Basal Area/Acre POL	Trees/Acre < 5 inches diameter
Mature Lodgepole Forest	188	8	2253
Mixed Conifer Forest	95	6	1850

4. Future Stand Structure & Composition with No Treatment

Mature Lodgepole Pine

As described in the Tree Species Ecology section above, left untreated the stand will experience forest succession typical of this vegetation type and gradually, the stand will be dominated by shade tolerant species, in this case subalpine fir. This successional change has already started to take place as illustrated in the stocking table (Table 2) above where currently, seedling sized regeneration in the stand is primarily subalpine fir and stocking is 1,128 stems per acre in the 0 to 0.9 inch diameter class. Although there is a large population of 0 to 0.9 inch diameter aspen trees (831/acre), many of these were of poor form and it is expected that many of the aspen will die and/or become suppressed as they are outcompeted by the shade tolerant subalpine fir. However, there will always be a small aspen component in this stand.

MPB killed lodgepole pine trees will continue to decay and gradually fall over adding to the surface fuel load. Surface fuel loading has the potential to reach 60 tons/acre, distributed across all time-lag size classes.

Immature Lodgepole Pine

These are highly overstocked stands of regenerated lodgepole pine (see Table 3) which followed a clearcut removal prescription approximately 20 to 25 years ago. Due to competition in the over-stocked stands, which average 3,446 stems per acre, radial growth has all but ceased. The average stem diameter is only 2 inches (across all species) which is small for a stand of this age. With a diameter this small and stocking so high, the stand(s) were off the chart on any Lodgepole Pine Stocking Charts that could be located.

Fuel loading in these stands is relatively light and where the trees are not considered part of the surface fuel load, loadings associated with Fire Behavior Prediction System Fuel Model 8 is appropriate.

Left untreated the stand(s) will continue to stagnate, radial growth as well as tree height will be affected. Although some self-thinning will occur, the size of the trees will not reach their full potential.

Mixed Conifer

As described in the Tree Species Ecology section above, left untreated the stand will experience forest succession typical of this vegetation type, and gradually the stand will be dominated by shade tolerant species, in this case subalpine fir. This successional change has already started to take place as illustrated in the stocking table (Table 4) above, where currently, seedling sized regeneration in the stand is 25 percent subalpine fir and stocking is 438 stems per acre in the 0 to 0.9 inch diameter class. Although there is a large population of 0 to 0.9 inch diameter aspen trees (1,288/acre), many of these seedlings were of poor form and it is expected that many of the aspen will die and/or become suppressed as they are outcompeted by the shade tolerant subalpine fir. However, there will always be an aspen component, at some level, in this stand.

MPB killed lodgepole pine trees will continue to decay and gradually fall over adding to the surface fuel load. Surface fuel loading has the potential to reach 20 tons/acre, distributed across all time-lag size classes.

Aspen

This stand is composed of older stunted aspen trees. These trees are mostly even aged with little regeneration in the understory. Over time the stand will most likely self-perpetuate. As openings in the stand are created as trees die, the openings will be re-colonized by aspen. It is also expected that subalpine fir will slowly gain a foothold in the stand and establish itself at some population level.

Transitional Mixed Conifer

Insect and disease pathogens are active in these stands. Without disturbance or management, where the canopy remains closed, expect regeneration from shade tolerant species such as subalpine fir and Engelmann spruce. Where pockets or groups of trees die, the openings will be repopulated by aspen or lodgepole pine.

5. Target Stand (Proposed Action)

Mature Lodgepole Pine

To help in meeting current and future timber supply needs of the local timber dependent community, the stand structure would be an even-aged fully stocked lodgepole pine stand. The lodgepole pine will be well-spaced at full stand occupancy where annual growth is optimized and stand density is targeted towards the growth of sawlog sized trees at the end of the rotation.

Initially, a sanitation/salvage prescription will be used to remove dead and susceptible trees, primarily lodgepole pine with lesser amounts of other species and including both sawlog and POL sized timber. Fifteen to 20 years following the initial entry, and establishment of natural regeneration, a weed & release pre-commercial thin will be scheduled where stocking levels are reduced to between 193 trees per acre (15' x 15' spacing) with a maximum of 435 trees per acre (10' x 10' spacing). Any competing aspen and all subalpine fir are also cut. A clearcut harvest is scheduled 80 years following the pre-commercial thin and the stand is started over again.

The short term target stand, 15 to 20 years following sanitation/salvage harvest, and following pre-commercial thinning, is listed Table 6 below.

Table 6 – Mature Lodgepole Pine: Target Stand Stocking Table

Dia. Class	LP Live	LP Dead	SF Live	ES Live	AS Live	Total
0 - 5	193 - 435	0	0	0	0	193 - 435
≥ 8	0	0	0	0	0	0
Total:	193 - 435	0	0	0	0	193 - 435

Note: Silvicultural Prescription is in a separate document.

Immature Lodgepole Pine

These stands are to be managed in support of meeting future timber supply needs of the local timber dependent community.

Referencing the lodgepole pine stocking chart, which is specific to the Rocky Mountain Region, stocking levels in excess of 1,000 trees per acre are projected to have a negative impact on stand board foot yield at rotation, given no additional intermediate density controls.

Currently the immature lodgepole pine stands have an average stocking of 3,446 stems per acre.

As such, a pre-commercial thinning entry to reduce stocking levels to between 193 and 435 stems per acre will be scheduled. Tree densities will be managed to optimize radial growth and the sites potential to produce sawlog sized trees.

Note: Silvicultural Prescription is in a separate document.

Mixed Conifer Forest

To help in meeting current and future timber supply needs of the local timber dependent community, the stand structure would be an even-aged fully stocked lodgepole pine stand. The lodgepole pine will be well-spaced at full stand occupancy where annual growth is optimized and stand density is targeted towards the growth of sawlog sized trees at the end of the rotation.

Initially, a sanitation/salvage prescription will be used to remove dead and susceptible trees, primarily lodgepole pine with lesser amounts of other species and including both sawlog and POL sized timber. Fifteen to 20 years following the initial entry, and establishment of natural regeneration, a weed & release pre-commercial thin will be scheduled where stocking levels are reduced to between 193 trees per acre (15' x 15' spacing) with a maximum of 435 trees per acre (10' x 10' spacing). Any competing aspen and all subalpine fir are also cut. A clearcut harvest is scheduled 80 years following the pre-commercial thin and the stand is started over again.

The short term target stand, 15 to 20 years following sanitation/salvage harvest, and following pre-commercial thinning, is listed Table 7 below.

Table 7 – Mixed Conifer: Target Stand Stocking Table

Dia. Class	LP Live	LP Dead	SF Live	ES Live	AS Live	Total
0 - 5	193 - 435	0	0	0	0	193 - 435
≥ 8	0	0	0	0	0	0
Total:	193 - 435	0	0	0	0	193 - 435

Note: Silvicultural Prescription is in a separate document.

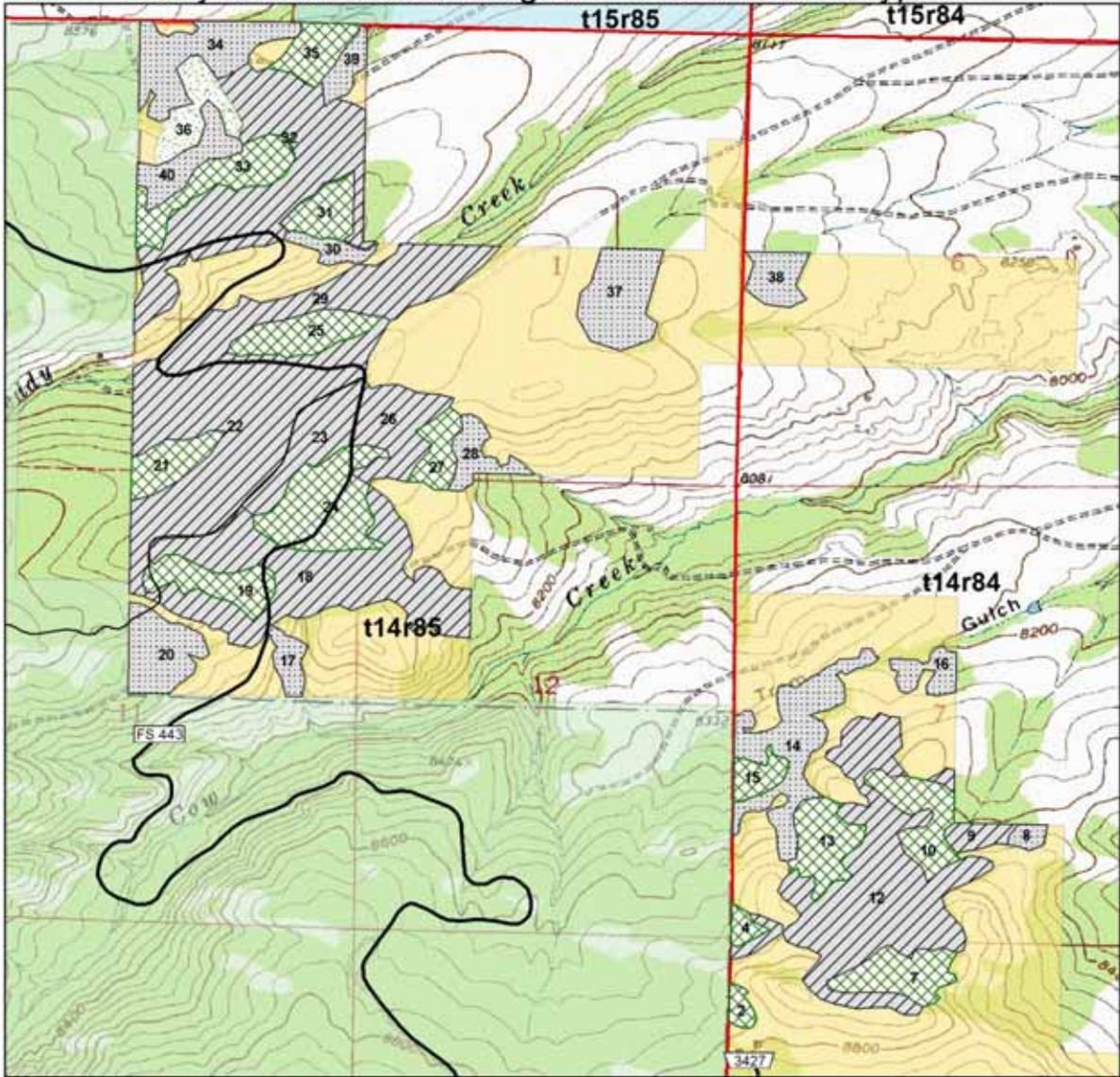
Aspen

The target stand for the Aspen Forest type will not emphasize timber management, and the exact treatment has not been chosen from those mentioned in the EA (i.e. RX burning, mechanical treatments, etc.) and as such, a site specific silvicultural prescription will be prepared following decision.

Transitional – LP, AS, SF mix

The target stand for the Mixed Conifer Forest type will not emphasize timber management, and the exact treatment has not been chosen from those mentioned in the EA (i.e. RX burning, mechanical treatments, etc.) and as such, a site specific silvicultural prescription will be prepared following decision.

Teddy Creek Forest Management: Forest Stand Types



Tentative Silviculture Prescription

Mature Lodgepole Pine

Teddy Creek Tentative Silvicultural Prescription

Prepared by: Mick Hood, Project Forester, Wyoming State Forestry Division

Stands:	Mature Lodgepole Pine 3, 9, 11, 12, 18, 22, 23, 26, 29, 32	Size:	373.3 acres
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A. Management Goals and Objectives:

Primary Goals:

- (1) Remove merchantable dead, insect infested, disease infected, conifer trees (primarily lodgepole pine) via a sanitation/salvage prescription creating conditions for the establishment of an even-aged stand.
- (2) Manage for timber production consistent with the stand(s) potential.
- (3) Support the local timber dependent community by making forest products available.

Secondary Goals:

- (1) Improve wildlife habitat (primarily through aspen recruitment/re-sprouting).
- (2) Reduce fuel loading following the recent mountain pine beetle epidemic.

B. Diagnosis

Present Stand:

These stands are older even aged, large diameter, MPB killed lodgepole pine, with current overstory mortality at 75%. Basal area of merchantable sized trees is approximately 188 ft² per acre. Volume estimates are 15 MBF per acre.

The understory is composed primarily of live subalpine fir and aspen in excess of 2,000 stems per acre, in the 0 to 0.99 inch diameter class range. In some stands minor amounts or islands of POL are found.

MPB killed lodgepole pine trees will continue to decay and gradually fall, over adding to the surface fuel load. Surface fuel loading has the potential to reach 60 tons/acre, distributed across all time-lag size classes.

For stand specific stocking tables and graphical representation of species composition and stand structure, reference the Silvicultural Prescription Appendix.

Target Stand:

Alternative A:

Management of the stand would create a future even-aged fully stocked lodgepole pine stand. The lodgepole pine will be well-spaced at full stand occupancy where annual growth is

optimized and stand density is targeted towards the growth of sawlog sized trees at the end of the rotation when CMAI is reached.

Initially, a sanitation/salvage prescription will be used to remove dead and susceptible trees, primarily lodgepole pine, with lesser amounts of other species, and including both sawlog and POL sized timber. Fifteen to 20 years following the initial entry, and establishment of natural regeneration, a weed & release pre-commercial thin will be scheduled, where stocking levels are reduced to 257 trees per acre, at a 13' x 13' spacing. Any competing aspen and all subalpine fir are also cut. A clearcut harvest is scheduled 80 years following the pre-commercial thin and the stand is started over again.

Alternative B:

Similar to Alternative A, following the sanitation/salvage harvest, a weed and release precommercial thinning would be scheduled, where any competing subalpine fir is cut and the best most well-formed lodgepole pine trees are retained and thinned to a residual stocking of 400 to 500 stems per acre (approximate 10' by 10' spacing). Under this scenario the stand would be managed with a much higher density than under Alternative A, until such time when the stand would be re-entered again with a commercial thin where POL (post and poles) and small sawlogs are removed to a residual spacing of 15' by 15', again setting the stage for yet another sawlog harvest at CMAI. A clearcut harvest is scheduled 60 years following the commercial thin and the stand is started over again

C. Treatment Alternatives

Alternative A Sanitation/Salvage followed by PCT and Clearcut		Alternative B Sanitation/Salvage followed by PCT, Commercial Thin and Clearcut	
Year 0	Sanitation/Salvage Harvest	Year 0	Sanitation/Salvage Harvest
Year 2	Burn landing piles	Year 2	Burn landing piles
Year 5	Stocking Survey	Year 3	Stocking Survey
Year 20	Pre-commercial thin to a stocking level of 257 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground.	Year 20	Pre-commercial thin to a stocking level of 435 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground.
Year 100	Clearcut	Year 60	Commercial thin to a stocking level of 193 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground. Leave the largest dominate and co-dominate trees while removing all merchantable POL and small sawlogs.
		Year 120	Clearcut

Economic Comparison using a 4% Discount Rate

Alternative A		Alternative B
750.00	Discounted Benefits	700.00
268.04	Discounted Costs	268.04
481.96	Net present value	381.96
3.8	Benefit / cost ratio	2.6

See the Silvicultural Prescription Appendix for calculations related to the above economic analysis

D. Detailed Short-Term Prescription (for Alternative A)

Action	Time	Specifications
Sanitation/Salvage	Year 0	Follow delineated stand boundaries where feasible. Limit slopes to $\leq 40\%$. Make note of and clearly delineate any SMZ's. Make note and GPS any improvements (survey monuments, fences, etc.) that will need protecting. It is expected that sufficient scarification will occur during the sanitation/salvage operation as to create an adequate seedbed for abundant natural lodgepole pine regeneration.
Pile Burning	Year 2	Burn any landing piles. After burning, assess the need for follow-up scattering of pile remnants and/or scarification needs.
Stocking Survey	Year 5	Ensure adequate natural regeneration. Minimum acceptable stocking level is 193 trees/acre. Only lodgepole pine (not aspen or any other conifer species) contribute to the stocking level in the mature lodgepole pine forest stands.
Pre-commercial Thin	Year 20	Pre-commercial thin to a 13' x 13' spacing (approximately 257 trees per acre). Favor dominant and co-dominant lodgepole pine trees. Where possible, leave only the best formed trees. Cut all subalpine fir. Where aspen pockets are present, thin the aspen to the 13' x 13' spacing, removing any aspen that are competing with lodgepole pine.
Clearcut	Year 100	Year 100 is an estimate of when the stand may reach CMAI. When CMAI is reached the stand is ready to be clearcut and a new rotation started.

Approved By: _____ Date: _____
Maureen Hartshorn, Forester (BLM)

Teddy Creek Stocking Table and Graph for Mature Lodgepole Pine

Mature Lodgepole Pine

This stand type is composed of ten different stands, included in the Teddy Creek analysis, for a total of 373.3 acres. A total of 32 fixed and 32 variable plots, randomly located, were used to sample the trees in these stands. A 1/100th acre fixed plot was used to sample seedling, sapling, and less-than 5 inch DBH material. Variable plots using a BAF (Basal Area Factor) of 40 was used to sample trees larger than 5 inches at DBH.

The inventory plot data is summarized in the Graph 1 and Table 1 below.

Graph 1

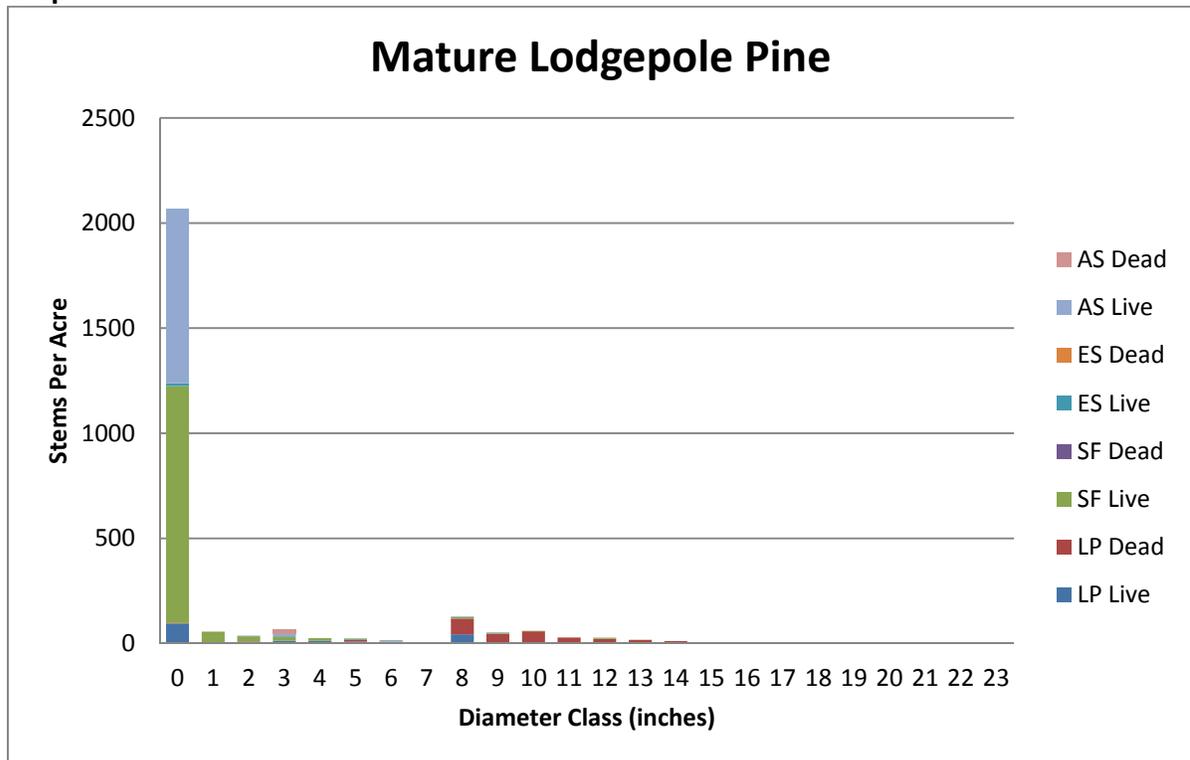


Table 1 – Mature Logepole Pine: Stocking Table (Trees per Acre)

Dia. Class	LP Live	LP Dead	SF Live	SF Dead	ES Live	ES Dead	AS Live	AS Dead	Total
0	94	3	1128	0	13	0	831	0	2069
1	6	0	50	0	0	0	0	0	56
2	3	6	25	0	0	0	3	0	38
3	13	0	19	0	3	0	9	22	66
4	13	0	13	0	0	0	0	0	25
5	9	6	6	0	0	0	3	0	25
Sub-Total < 5"	138	18	1253	0	16	0	852	22	2301
6	0	3	6	0	0	0	6	0	16
7	0	0	6	0	0	0	0	0	6
8	43	75	7	0	0	0	4	0	129
9	6	40	6	0	0	0	3	0	54
10	5	53	2	0	0	0	0	0	60
11	2	27	0	0	0	0	0	0	28
12	2	21	5	0	0	0	0	0	27
13	0	16	1	0	0	0	0	0	18
14	0	12	0	0	0	0	0	0	12
15	0	2	0	0	1	0	0	0	3
16	0	4	0	0	0	0	0	0	4
17	0	2	0	0	0	0	0	0	2
18	0	1	0	0	1	0	0	0	1
19	0	0	0	0	0	1	0	0	1
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0
Sub-Total ≥ 8"	57	252	21	0	2	1	7	0	339
Total:	195	270	1274	0	18	1	859	22	2640

Calculations for Teddy Creek Economic Analysis For Mature Lodgepole Pine

Assumptions used (for both alternatives):

Assume an inflation rate of 4%.

The analysis was completed on a per acre basis.

The existing/initial volume estimation for both alternatives is 15 MBF/acre.

The following cash flow equation was used to calculate implementation year costs & revenues (see treatment alternative table in the silvicultural prescription:

$$V_o = V_n (1+i)^n$$

Where: V_o = present value

V_n = dollar value expressed in year n

n = number of years

\$25.00/MBF (current stumpage value) x 15 MBF/acre = \$375.00/acre revenue

Burn landing piles \$8.04/acre

Stocking survey \$10.00/acre

Pre-commercial thin \$250/acre

Alternative A

Activity	Current		Implementation Year		Present Value
	Cost	Revenue	Cost	Revenue	
Sanitation/Salvage Harvest		\$375.00		\$375.00	+ \$375.00
Burn Landing Piles	\$8.04		\$8.70		- \$8.04
Stocking Survey	\$10.00		\$12.17		- \$10.00
Pre-commercial thin	\$250		\$547.78		- \$250.00
Clearcut		\$375.00		\$18,939.36	+ \$375.00
Net Present Value:					\$481.96/acre

Alternative B

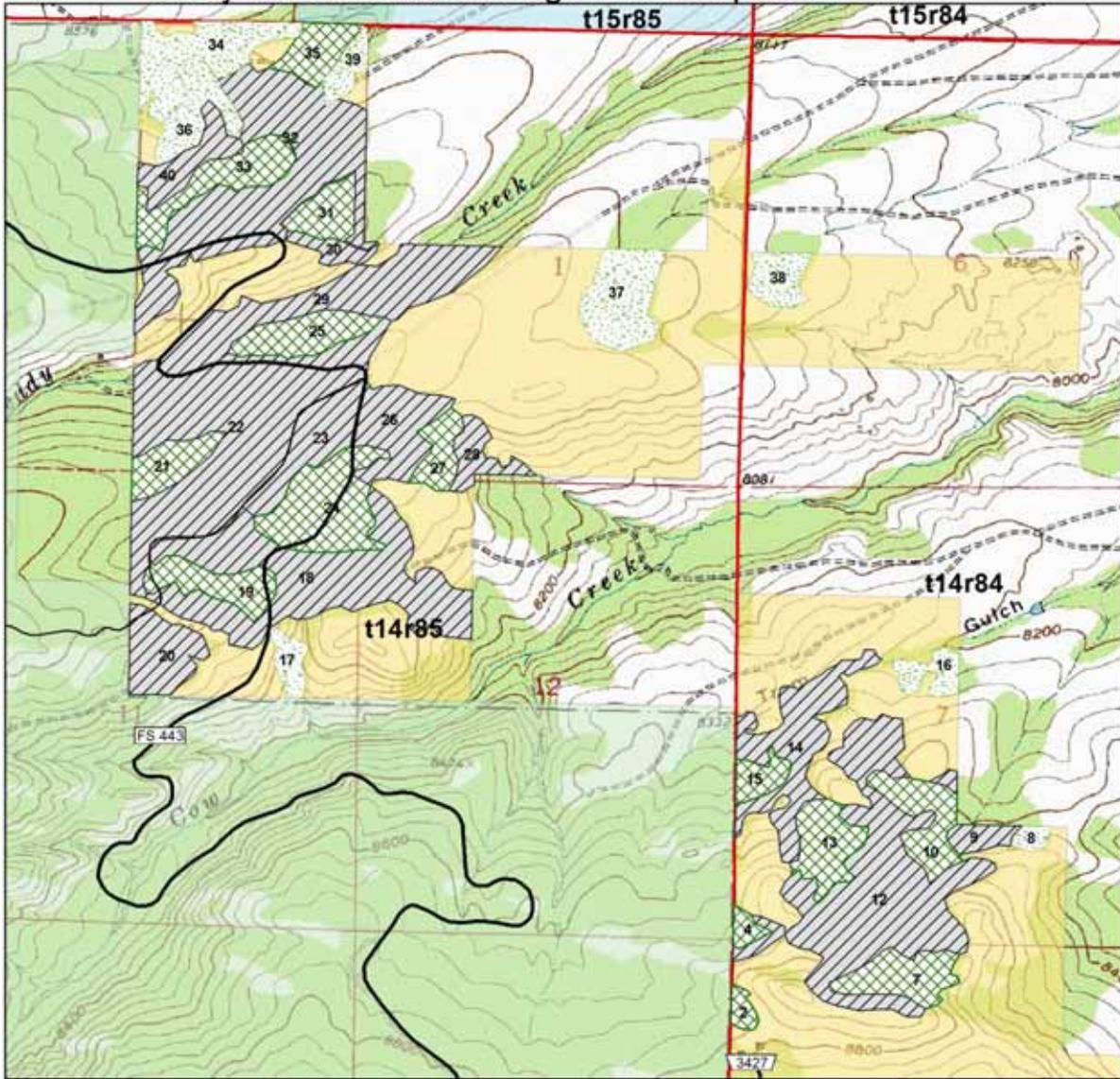
For commercial thin at year 60, a combination of POL and small diameter sawlogs will be removed, as such \$25.00/MBF for sawlogs and \$5.00/MBF for POL was averaged to determine a combined average stumpage rate of \$15.00/MBF.

The volume estimation for Alternative B was 15 MBF/acre for the first sanitation/salvage removal, 5 MBF for the commercial thin (POL and Sawtimber) at year 60, and 8 MBF/acre for the clearcut (at year 110). As the stand was being managed to a higher density leading up to the commercial thin, it was felt that volume per acre at final removal would be less.

As alternative B was managed at a higher stocking level prior to the commercial thin, the stand was grown for 10 extra years prior to the final clearcut entry.

Activity	Current		Implementation Year		Present Value
	Cost	Revenue	Cost	Revenue	
Sanitation/Salvage Harvest		\$375.00		\$375.00	+ \$375.00
Burn Landing Piles	\$8.04		\$8.70		- \$8.04
Stocking Survey	\$10.00		\$12.17		- \$10.00
Pre-commercial thin	\$250		\$547.78		- \$250.00
Commercial thin (5 mbf)		\$75		\$788.09	+\$75
Clearcut (8 MBF)		\$200		\$14,951.93	+ \$200
Net Present Value:					\$381.96/acre

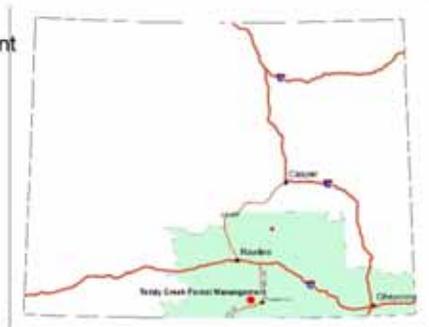
Teddy Creek Forest Management: Proposed Action



- | | |
|---|---|
|  Pre Commercial Thinning |  Bureau of Land Management |
|  Sanitation / Salvage |  Forest Service |
|  Prescribed Burning and/or Mechanical Treatments |  Private |
| |  State |



No warranty is made by the Bureau of Land Management for the use of the data for purposes not intended by the BLM.



Tentative Silviculture Prescription

Immature Lodgepole Pine

Teddy Creek Tentative Silvicultural Prescription

Prepared by: Mick Hood, Project Forester, Wyoming State Forestry Division

Stands:	Immature Lodgepole Pine 2, 4, 7, 10, 13, 15, 19, 21, 24, 25, 27	Size:	161.3 acres
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A. Management Goals:

Primary Goals:

- (1) Manage for timber production consistent with the stand(s) potential.
- (2) Support the local timber dependent community by making forest products available.

B. Diagnosis

Present Stand:

These stands are dominated by immature lodgepole pine 20-25 years in age with aspen as a co-species. Following clearcut harvest operations 20 to 30 years ago, areas that did not immediately regenerate with lodgepole pine were colonized by aspen. There is also a minor population of subalpine fir scattered throughout the stand(s).

These stands were harvested in the early 1990's and have naturally regenerated to a stocking level of 3,000 to 8,000 stems per acre of small diameter trees. Rocky Mountain area stocking charts for lodgepole pine indicate that any density in excess of 1,000 stems per acre is projected to have a negative effect on board feet yield at rotation.

All the stands associated with this group are candidates for pre-commercial thinning.

For stand specific stocking tables and graphical representation of species composition and stand structure, reference the Silvicultural Prescription Appendix.

Target Stand:

Alternative A:

These stands are to be managed for timber production consistent with the stands potential and in support of meeting future timber supply needs of the local timber dependent community.

Based on the lodgepole pine Stocking Chart, specific to the Rocky Mountain Region, current stocking levels, which average 3,446 stems per acre, will have a negative impact on stand board foot yield at rotation, with no additional density control.

As such, a pre-commercial thinning entry to reduce stocking levels is needed. Tree densities will be managed to optimize radial growth and the sites potential to produce sawlog sized trees.

A weed & release pre-commercial thin will be scheduled, as soon as possible, where stocking levels are reduced to 257 trees per acre, at a 13' x 13' spacing, which is well within and towards the upper limits of the management zone on the Rocky Mountain Region Stocking Chart . Any competing aspen and all subalpine fir are also cut. A clearcut harvest is scheduled 80 years following the pre-commercial thin, at CMAI, and the stand is started over again.

Alternative B:

Similar to Alternative A, a weed and release pre-commercial thinning would be scheduled where any competing subalpine fir is cut and the best most well-formed lodgepole pine trees are retained and thinned to a residual stocking of 400 to 500 stems per acre (approximate 10' by 10' spacing). Under this scenario the stand would be managed with a much higher density than under Alternative A, until such time when the stand would be re-entered again with a commercial thin, where POL (post and poles) and small sawlogs are removed to a residual spacing of 15' by 15', again setting the stage for yet another sawlog harvest at CMAI. A clearcut harvest is scheduled 60 years following the commercial thin and the stand is started over again

C. Treatment Alternatives

Alternative A Sanitation/Salvage followed by PCT and Clearcut		Alternative B Sanitation/Salvage followed by PCT, Commercial Thin and Clearcut	
Year 0	Pre-commercial thin to a stocking level of 257 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground.	Year 0	Pre-commercial thin to a stocking level of 435 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground.
Year 80	Clearcut	Year 40	Commercial thin to a stocking level of 193 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground. Leave the largest dominate and co-dominate trees while removing all merchantable POL and small sawlogs.
		Year 90	Clearcut

Economic Comparison using a 4% Discount Rate		
Alternative A		Alternative B
\$375.00	Discounted Benefits	\$275.00
\$250.04	Discounted Costs	\$250.00
\$125.00	Net present value	\$25.00
1.5	Benefit / cost ratio	1.10

See Silvicultural Prescription Appendix for calculations related to the above economic analysis

D. Detailed Short-Term Prescription (for Alternative A)

Action	Time	Specifications
Pre-commercial Thin	Year 0	Follow delineated stand boundaries where feasible. Pre-commercial thin to a 13' x 13' spacing (approximately 257 trees per acre). Favor dominant and co-dominate lodgepole pine trees. Where possible, leave only the best formed trees. Cut all subalpine fir. Where aspen pockets are present, thin the aspen to the 13' x 13' spacing, removing any aspen that are competing with lodgepole pine.
Clearcut	Year 80	Year 80 is an estimate of when the stand may reach CMAI. When CMAI is reached the stand is ready to be clearcut and a new rotation started.

Approved By: _____ Date: _____
 Maureen Hartshorn, Forester (BLM)

Immature Lodgepole Pine

This stand type is composed of 14 different stands for a total of 161.3 acres. A total of 26, 1/100th acre fixed plots were used to sample the trees in these stands. Variable plots were not used in these stands due to the small tree diameters.

The inventory plot data is summarized in the Graph 1 and Table 1 below.

Graph 1

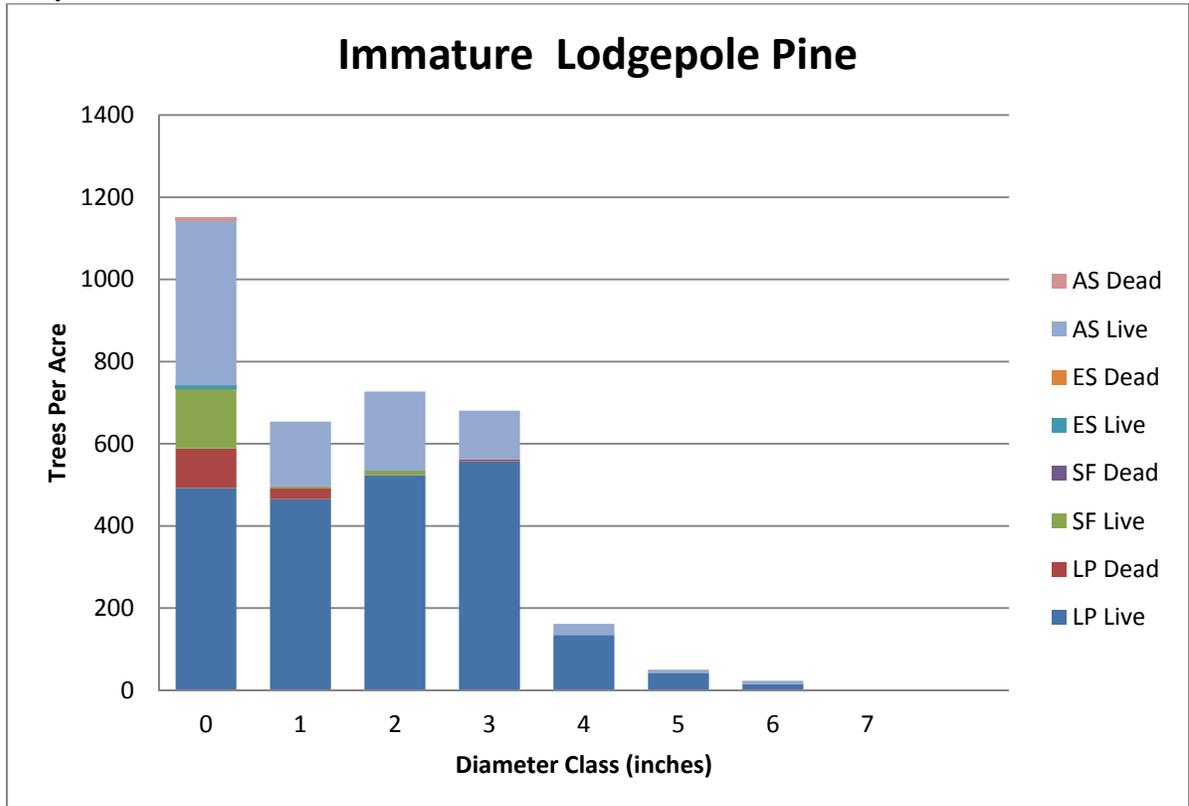


Table 1 – Immature Logepole Pine: Stocking Table (Trees per Acre)

Dia. Class	LP Live	LP Dead	SF Live	SF Dead	ES Live	ES Dead	AS Live	AS Dead	Total
0	492	96	146	0	8	0	400	8	1150
1	465	27	4	0	0	0	158	0	654
2	523	0	12	0	0	0	192	0	727
3	558	4	0	0	0	0	119	0	681
4	135	0	0	0	0	0	27	0	162
5	42	0	0	0	0	0	8	0	50
6	15	0	0	0	0	0	8	0	23
7	0	0	0	0	0	0	0	0	0
Total	2231	127	162	0	8	0	912	8	3446

Calculations for Teddy Creek Economic Analysis For Immature Lodgepole Pine

Assumptions used (for both alternatives):

Assume an inflation rate of 4%.

The analysis was completed on a per acre basis.

Volume at the end of the rotation, at CMAI, is estimated at 15 MBF per acre.

The following cash flow equation was used to calculate implementation year costs & revenues (see treatment alternative table in the silvicultural prescription:

$$V_o = V_n (1+i)^n$$

Where: V_o = present value

V_n = dollar value expressed in year n

n = number of years

\$25.00/MBF (current stumpage value) x 15 MBF/acre = \$375.00/acre revenue

Pre-commercial thin \$250/acre

Alternative A

Activity	Current		Implementation Year		Present Value
	Cost	Revenue	Cost	Revenue	
Pre-commercial thin (year 0)	\$250.00		\$250.00		- \$250.00
Clearcut (year 80)		\$375.00		\$8,643.67	+ \$375.00
Net Present Value:					\$125/acre

Alternative B

For commercial thin at year 40, a combination of POL and small diameter sawlogs will be removed, as such \$25.00/MBF for sawlogs and \$5.00/MBF for POL was averaged to determine a combined average stumpage rate of \$15.00/MBF.

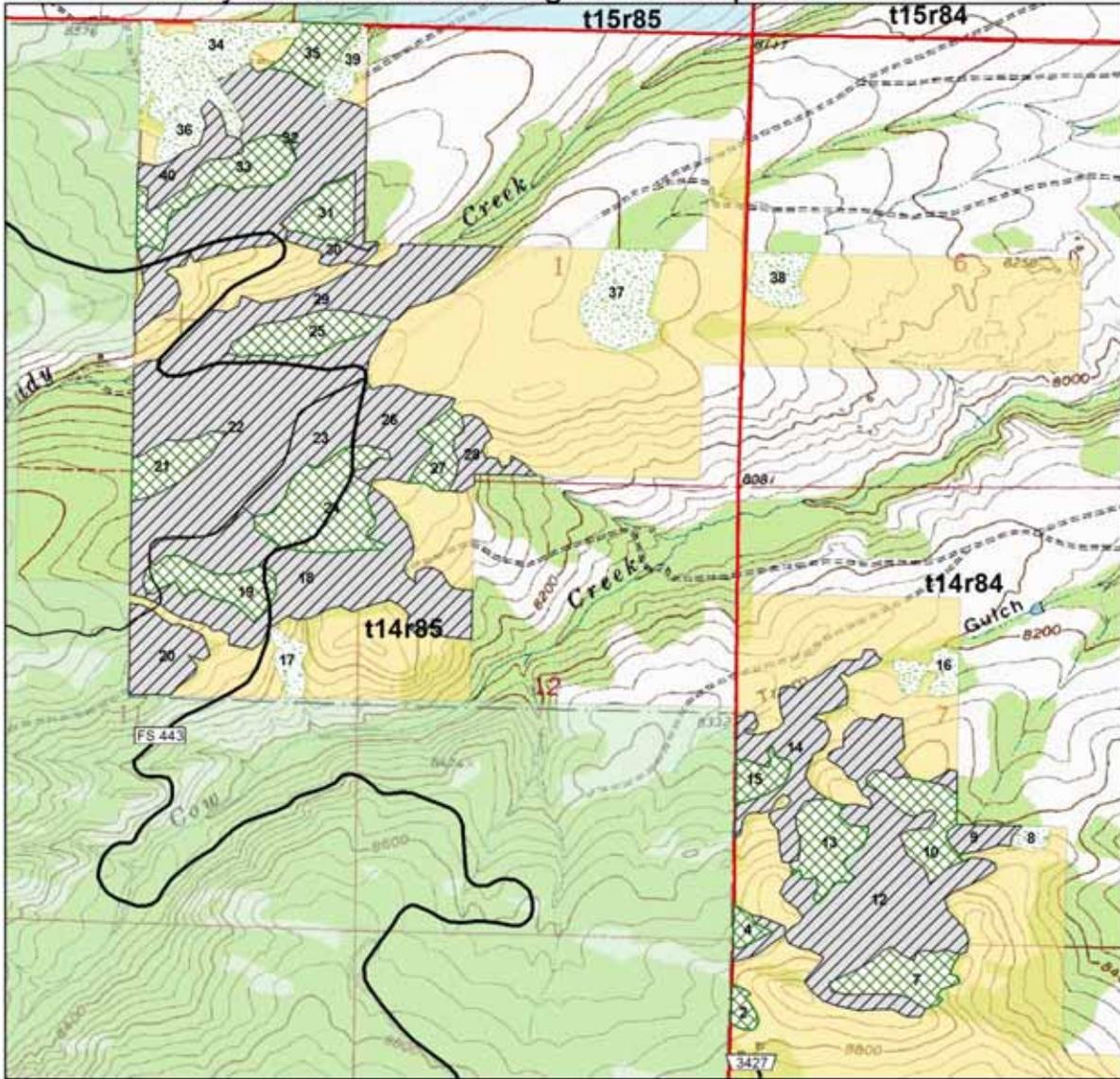
Volume at the end of the rotation, at CMAI, is estimated at 15 MBF per acre.

The volume for the commercial thin at year 40 is estimated at 5 MBF/acre (POL and sawlogs) and 8 MBF/acre for the clearcut (at year 110). As the stand was being managed to a higher density leading up to the commercial thin, it was felt that volume per acre at final removal would be less.

As alternative B was managed at a higher stocking level prior to the commercial thin, the stand was grown for 10 extra years prior to the final clearcut entry at year 110.

Activity	Current		Implementation Year		Present Value
	Cost	Revenue	Cost	Revenue	
Pre-commercial thin (year 0)	\$250.00		\$250.00		- \$250.00
Commercial thin (5 mbf) (Year 40)		\$75.00		\$360.08	+\$75
Clearcut (8 MBF) (Year 90)		\$200.00		\$6,823.87	+ \$200
Net Present Value:					\$25.00/acre

Teddy Creek Forest Management: Proposed Action



- | | |
|---|---|
|  Pre Commercial Thinning |  Bureau of Land Management |
|  Sanitation / Salvage |  Forest Service |
|  Prescribed Burning and/or Mechanical Treatments |  Private |
| |  State |



No warranty is made by the Bureau of Land Management for the use of the data for purposes not intended by the BLM.



Tentative Silviculture Prescription

Mixed Conifer

Teddy Creek Tentative Silvicultural Prescription

Prepared by: Mick Hood, Project Forester, Wyoming State Forestry Division

Stands:	Mixed Conifer - 14, 20, 28, 30, 40	Size:	67.5 acres
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A. Management Goals and Objectives:

Primary Goals:

- (1) Remove merchantable dead, insect infested, disease infected, conifer trees (primarily lodgepole pine) via a sanitation/salvage prescription, creating conditions for the establishment of an even-aged stand.
- (2) Manage for timber production consistent with the stand(s) potential.
- (3) Support the local timber dependent community by making forest products available.

Secondary Goals:

- (1) Improve wildlife habitat (primarily through aspen recruitment/re-sprouting).
- (2) Reduce fuel loading following the recent MPB (mountain pine beetle) epidemic.

B. Diagnosis

Present Stand:

These are multi-storied stands composed of inter-mixed lodgepole pine, subalpine fir and aspen, with minor populations of Engelmann spruce and Douglas fir. Most of the lodgepole pine has been killed by MPB, and pine mortality is 84%. These stands contain decadent aspen and subalpine fir. Volume per acre of both sawlogs and POL combined is 8 MBF/acre.

The understory is composed primarily of live subalpine fir and aspen with approximately 1,890 stems per acre, in the 0 to 0.99 inch diameter class range. In some stands minor amounts or islands of POL are found.

MPB killed lodgepole pine trees will continue to decay and gradually fall over, adding to the surface fuel load. Surface fuel loading has the potential to reach 20 tons/acre, distributed across all time-lag size classes.

For stand specific stocking tables and graphical representation of species composition and stand structure, reference the Silvicultural Prescription Appendix.

Target Stand:

Alternative A:

Management of the stand would create a future even-aged fully stocked lodgepole pine stand. The lodgepole pine will be well-spaced at full stand occupancy where annual growth is

optimized and stand density is targeted towards the growth of sawlog sized trees at the end of the rotation when CMAI is reached.

Initially, a sanitation/salvage prescription will be used to remove dead and susceptible trees, primarily lodgepole, pine with lesser amounts of other species, and including both sawlog and POL sized timber. Fifteen to 20 years following the initial entry and establishment of natural regeneration, a weed & release pre-commercial thin will be scheduled, where stocking levels are reduced to 257 trees per acre, at a 13' x 13' spacing. Any competing aspen and all subalpine fir are also cut. A clearcut harvest is scheduled 80 years following the pre-commercial thin and the stand is started over again.

Alternative B:

Similar to Alternative A, following the sanitation/salvage harvest, a weed and release pre-commercial thinning would be scheduled, where any competing subalpine fir is cut and the best most well-formed lodgepole pine trees are retained and thinned to a residual stocking of 400 to 500 stems per acre (approximate 10' by 10' spacing). Under this scenario the stand would be managed with a much higher density than under Alternative A, until such time when the stand would be re-entered again with a commercial thin where POL (post and poles) and small sawlogs are removed to a residual spacing of 15' by 15', again setting the stage for yet another sawlog harvest at CMAI. A clearcut harvest is scheduled 60 years following the commercial thin and the stand is started over again

C. Treatment Alternatives

Alternative A Sanitation/Salvage followed by PCT and Clearcut		Alternative B Sanitation/Salvage followed by PCT, Commercial Thin and Clearcut	
Year 0	Sanitation/Salvage Harvest	Year 0	Sanitation/Salvage Harvest
Year 2	Burn landing piles	Year 2	Burn landing piles
Year 5	Stocking Survey	Year 3	Stocking Survey
Year 20	Pre-commercial thin to a stocking level of 257 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground.	Year 20	Pre-commercial thin to a stocking level of 435 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground.
Year 100	Clearcut	Year 60	Commercial thin to a stocking level of 193 trees/acre. Lop & scatter slash to a height of less than 24 inches above the ground. Leave the largest dominate and co-dominate trees while removing all merchantable POL and small sawlogs.
		Year 120	Clearcut

Economic Comparison using a 4% Discount Rate

Alternative A		Alternative B
400.00	Discounted Benefits	380.00
268.04	Discounted Costs	268.04
131.96	Net present value	111.96
1.49	Benefit / cost ratio	1.42

See appendix of this Silvicultural Prescription Appendix for calculations related to the above economic analysis

D. Detailed Short-Term Prescription (for Alternative A)

Action	Time	Specifications
Sanitation/Salvage	Year 0	Follow delineated stand boundaries where feasible. Limit slopes to $\leq 40\%$. Make note of and clearly delineate any SMZ's. Make note and GPS any improvements (survey monuments, fences, etc.) that will need protecting. It is expected that sufficient scarification will occur during the sanitation/salvage operation as to create an adequate seedbed for abundant natural regeneration.
Pile Burning	Year 2	Burn any landing piles. After burning, assess the need for follow-up scattering of pile remnants and/or scarification needs.
Stocking Survey	Year 5	Ensure adequate natural regeneration. Minimum acceptable stocking level is 193 trees/acre. Lodgepole pine and aspen can both contribute to the stocking level in the mixed conifer stands.
Pre-commercial Thin	Year 20	Pre-commercial thin to a 13' x 13' spacing (approximately 257 trees per acre). Favor dominant and co-dominant lodgepole pine trees. Where possible, leave only the best formed trees. Cut all subalpine fir. Where aspen pockets are present, thin the aspen to the 13' x 13' spacing, removing any aspen that are competing with lodgepole pine.
Clearcut	Year 100	Year 100 is an estimate of when the stand may reach CMAI. When CMAI is reached the stand is ready to be clearcut and a new rotation started.

Approved By: _____ Date: _____
Maureen Hartshorn, Forester (BLM)

Teddy Creek Stocking Table and Graph for Mixed Conifer

Mixed Conifer

This stand type is composed of five different stands, included in the Teddy Creek analysis, for a total of 67.5 acres. A total of 8 fixed and 8 variable plots, randomly located, were used to sample the trees in these stands. A 1/100th acre fixed plot was used to sample seedling, sapling, and less-than 5 inch DBH material. Variable plots using a BAF (Basal Area Factor) of 40 was used to sample trees larger than 5 inches at DBH.

The inventory plot data is summarized in the Graph 1 and Table 1 below.

Graph 1

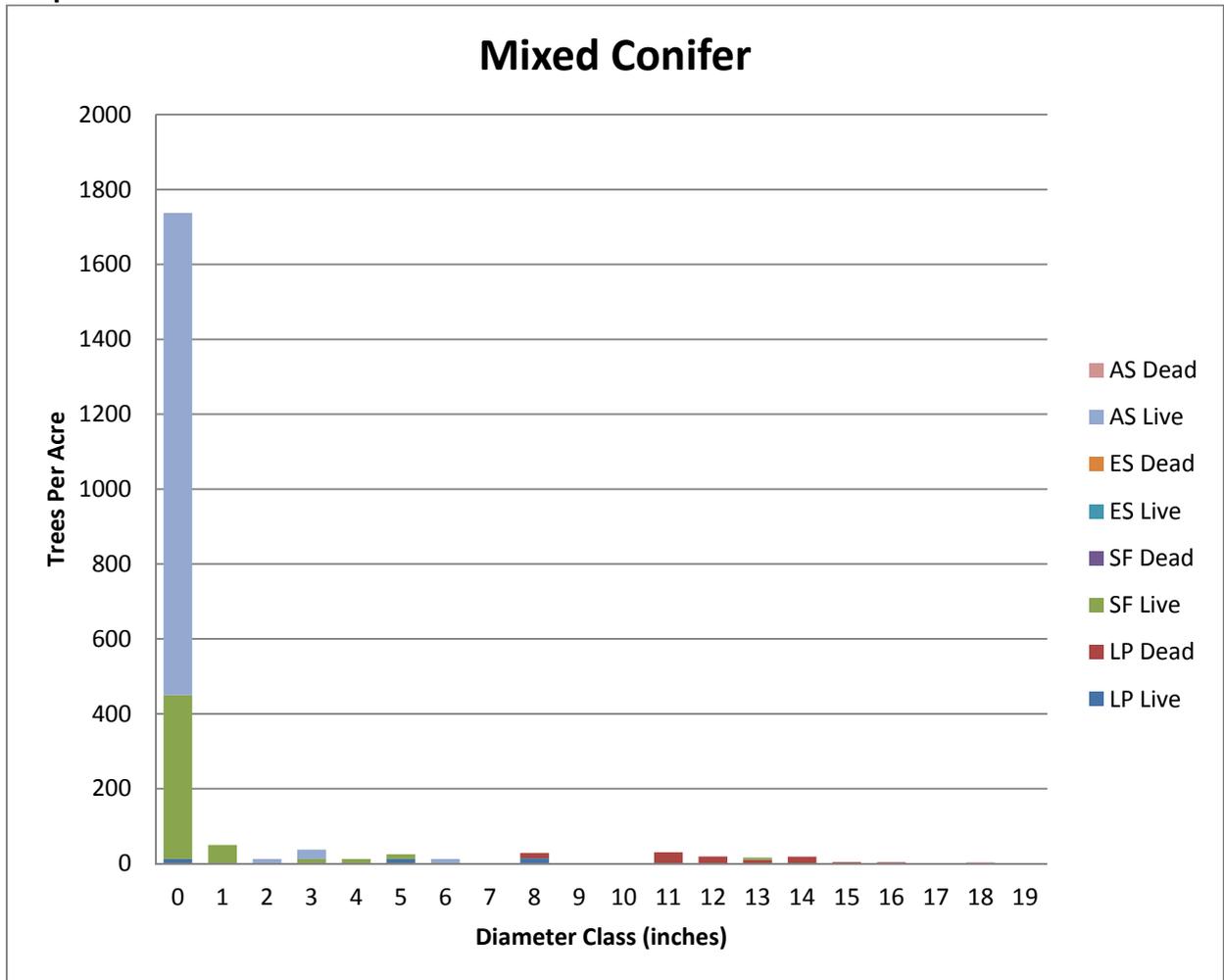


Table 1 – Mixed Conifer: Stocking Table (Trees per Acre)

Dia. Class	LP Live	LP Dead	SF Live	SF Dead	ES Live	ES Dead	AS Live	AS Dead	Total
0	13	0	438	0	0	0	1288	0	1738
1	0	0	50	0	0	0	0	0	50
2	0	0	0	0	0	0	13	0	13
3	0	0	13	0	0	0	25	0	38
4	0	0	13	0	0	0	0	0	13
5	13	0	13	0	0	0	0	0	25
Sub-Total < 5"	26	0	527	0	0	0	1339	0	1890
6	0	0	0	0	0	0	13	0	13
7	0	0	0	0	0	0	0	0	0
8	14	14	0	0	0	0	0	0	29
9	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0
11	0	30	0	0	0	0	0	0	30
12	0	19	0	0	0	0	0	0	19
13	0	11	5	0	0	0	0	0	16
14	0	19	0	0	0	0	0	0	19
15	0	4	0	0	0	0	0	0	4
16	0	4	0	0	0	0	0	0	4
17	0	0	0	0	0	0	0	0	0
18	0	3	0	0	0	0	0	0	3
19	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0
Sub-Total ≥ 8"	14	104	5	0	0	0	0	0	124
Total	40	104	532	0	0	0	1339	0	2014

Calculations for Teddy Creek Economic Analysis For Mixed Conifer

Assumptions used (for both alternatives):

Assume an inflation rate of 4%.

The analysis was completed on a per acre basis.

The existing/initial volume estimation for both alternatives is 8 MBF/acre.

The following cash flow equation was used to calculate implementation year costs & revenues (see treatment alternative table in the silvicultural prescription:

$$V_o = V_n (1+i)^n$$

Where: V_o = present value

V_n = dollar value expressed in year n

n = number of years

\$25.00/MBF (current stumpage value) x 8 MBF/acre = \$200.00/acre revenue

Burn landing piles \$8.04/acre

Stocking survey \$10.00/acre

Pre-commercial thin \$250/acre

Alternative A

Activity	Current		Implementation Year		Present Value
	Cost	Revenue	Cost	Revenue	
Sanitation/Salvage Harvest		\$200.00		\$1,010.99	+ \$200.00
Burn Landing Piles	\$8.04		\$8.70		- \$8.04
Stocking Survey	\$10.00		\$12.17		- \$10.00
Pre-commercial thin	\$250		\$547.78		- \$250.00
Clearcut		\$200.00		\$1,010.99	+ \$200.00
Net Present Value:					\$131.96/acre

Alternative B

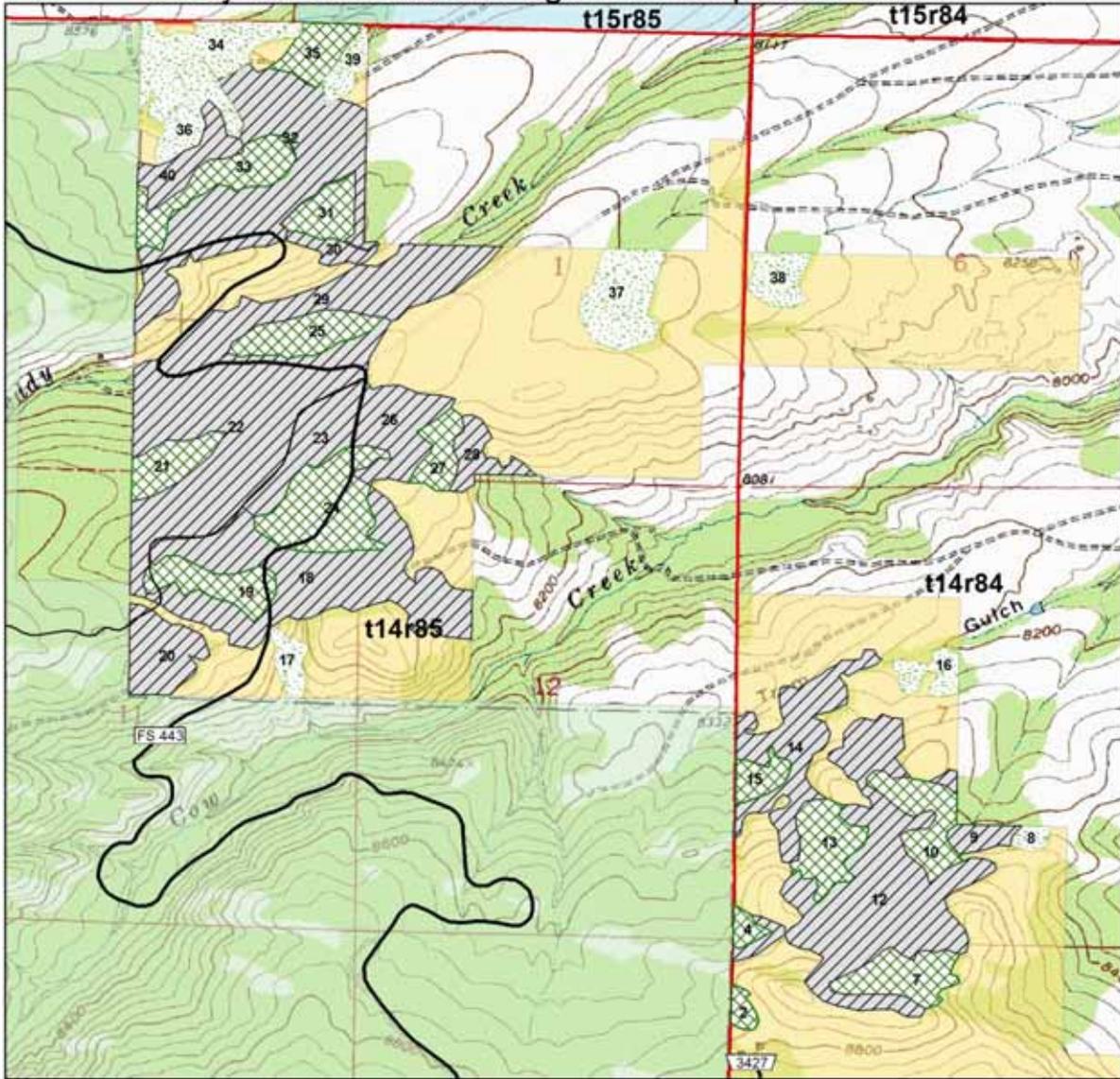
For commercial thin at year 60, a combination of POL and small diameter sawlogs will be removed, as such \$25.00/MBF for sawlogs and \$5.00/MBF for POL was averaged to determine a combined average stumpage rate of \$15.00/MBF.

The volume estimation for Alternative B was 8 MBF/acre for the first sanitation/salvage removal, 2 MBF for the commercial thin (POL and sawtimber) at year 60, and 6 MBF/acre for the clearcut (at year 110). As the stand was being managed to a higher density leading up to the commercial thin, it was felt that volume per acre at final removal would be less.

As alternative B was managed at a higher stocking level prior to the commercial thin, the stand was grown for 10 extra years prior to the final clearcut entry.

Activity	Current		Implementation Year		Present Value
	Cost	Revenue	Cost	Revenue	
Sanitation/Salvage Harvest		\$200.00		\$200.00	+ \$200.00
Burn Landing Piles	\$8.04		\$8.70		- \$8.04
Stocking Survey	\$10.00		\$12.17		- \$10.00
Pre-commercial thin	\$250		\$547.78		- \$250.00
Commercial thin (2 mbf)		\$30		\$325.59	+\$30
Clearcut (6 MBF)		\$150		\$11,213.95	+ \$150
Net Present Value:					\$111.96/acre

Teddy Creek Forest Management: Proposed Action



- | | | | |
|---|---|---|---------------------------|
|  | Pre Commercial Thinning |  | Bureau of Land Management |
|  | Sanitation / Salvage |  | Forest Service |
|  | Prescribed Burning and/or Mechanical Treatments |  | Private |
| | |  | State |



No warranty is made by the Bureau of Land Management for the use of the data for purposes not intended by the BLM.

