



2020 Colorado Forest Action Plan Appendix 7- Average Costs by Forest Cover Type and Colorado State Forest Service Area, Including Case Studies

General notes/background:

Cost by forest cover type are divided by four distinct CSFS areas. Costs do not reflect implementation, which averages 35% for overhead/administration but can be as high as 51%.

Factors Affecting Cost/Acre:

- Scope of Work-requirements and specifications needed for the job
- Acres-size of project
- Location of project-how far does the contractor have to travel, mobilize equipment
- Handwork-lap and scatter, specialty and involved handwork
- Harvesting and Hauling vs. Just mastication
- Timber sale vs. fuels reduction/forest health project
- Product utilization requirements: hauling timber, mulching, chipping
- Slope/terrain
- Complexity of project
- Equipment and crew required
- Helicopter use
- Work around homes (involving lots of handwork/ thinning and mastication). High maintenance projects, multiple landowners. All costs increase in wildland-urban interface (WUI).

Treatment Cost by Forest Cover Type/ Area (i.e. SW, NW, SE, NE)

Introduced Riparian – SW – assume mechanical vs. hand – 1200 – 2500 (1600 avg. cost per acre)

SE – 500-1500 (1000 average (Russian olive/tamarisk))

None for NE, NW

Lodgepole Pine – NE – 700 – 4000 (1700 avg.) no commercial value

SW- 600 – 4000 (2200 avg) commercial value of wood may set off some cost

NW – 0 – 2400 – (100 – 2900 revenue) \$1 to \$5/ton (1200 avg)

SE – N/A



Mixed Conifer - NW – 1000 - 3000 (1500 avg)

NE – 1400 – 3000 (2000 avg)

SW – 2000-3500 (2800 avg) –fire mitigation (WUI), slash is deep, high elevation

SE –800-5000 (\$2050 average)

Oak Shrubland - NE- 800 basic mastication – 2875 hand work (2200 avg)

This includes pondo-oak mix

NW – 200 – 700 (400 avg)

SW – 400 – 1100 (800 avg)

SE – 250 – 2000 (800 avg)

Pinyon-juniper - SW – 400 – 1000 (700 avg) all mastication – often fuel breaks around subdivision – can go as high as 2500/acre in WUI/d-space

NE – N/A

NW – 400 – 600 (500 avg)

SE – 500 – 2300 (1600 avg)

Ponderosa Pine – NW – 0 – 2000 (1000 avg)

NE – 1200 – 3500 (2300 avg)

SW – 800 – 2000 (1200 avg)

SE – 800 – 3000 (1825 avg)

Riparian – SW – 600 – 1600 (800 avg)

NE - 2500 – 4700 (3600 avg)

NW – primarily does restoration work

SE – N/A



Spruce Fir – NE - N/A

SW – 1400 – 3500 (2500 avg) can be 4000-5000 acre in WUI – landowners incur much of these costs

NW – 0 – 2500 (1500 avg)

SE – 1200 – 2400 (1775 avg)

Hardwood (Aspen primary)

NE – 1200 – 1300 (1250 avg)

NW – 1000 – 1500 (1200 avg)

SW – 800 – 2500 (1800 avg)

SE – N/A

Conifer Hardwood – NW – 1000 – 1500 (1250 avg)

NE – 1200 – 1300 (1250 avg)

SW – 1500 – 2500 (2000 avg)

SE – N/A

Conifer (assuming same as mixed conifer)

NW – 1000 - 3000 (1500 avg)

NE – 1400 – 3000 (2000 avg)

SW – 2000-3500 (2800 avg) –fire mitigation (WUI), slash is deep, high elevation

SE –800-5000 (2050 average)



Harvesting Project Case Studies, by CSFS Area

Northeast Area (NE)

Ben Delatour Scout Ranch (Data provided by Bob Sturtevant & Gretchen Reuning, NRCS)

Project Location, Operational Period & General Work Description

- Project located at Ben Delatour Scout Ranch located northwest of Fort Collins in Larimer County
- The operational period was November 2016 through April 2017
- Treatment area consisted of 55 acres
- Forest type was predominantly ponderosa pine with some Douglas-fir and rocky mountain juniper

Desired Future Forest Conditions

- Conduct thinning to promote overall stand health, reduce ladder fuels and address mistletoe and bark beetle activity.

General prescription

- Cut all trees dead/alive as designated
- All logging slash and preexisting down woody debris was piled for burning

Product utilization

- There were 50+ loads
- A few loads of green firewood were sold in Severance



- The rest of the loads either went as firewood or sawlogs to Forks Lumber or United Wood Products in Longmont.

Project cost

- Contractor cost was \$2,300 per acre (\$126,500 total)
- Pile burning costs were \$10,000 to TNC

Heavens Project (Data provided by Nate Beckman)

Project Location, Operational Period & General Work Description

- Project area was located in Jefferson County 9 miles southeast of Conifer
- The operational period began immediately after contact was awarded and was scheduled to end August 31, 2019
- Project area was 556 acres of land (combined acreage of 5 landowners)
- Treatment area was 359 acres, comprised of 5 different forest types, accessed by unimproved dirt and 4-wheel drive roads
- Project area was broken into 12 separate adjoining units
- Desired future forest conditions (outcomes)
 - Increased forest structure heterogeneity on a landscape scale
 - Improved wildland suppression opportunities along roads
 - Meadow restoration and expansion
 - Aspen stand maintenance
 - Reduced forest fuel loads and improved aesthetics
- General prescription
 - Full (whole) tree harvest of designated trees > 6" DBH



- Mastication of 95% of seedling and saplings (<6" DBH)
- Promote ponderosa pine and aspen
- Target removal of Douglas-fir and lodgepole pine
- Achieved variable density and heterogenic forest structure as desired for each treatment unit

Product Utilization

- All woody biomass (merchantable and non-merchantable (slash) was removed from the project area, except for 85 to 130 cords of firewood left at designated landings
- Documentation of removal had to be provided to the contract administrator
- No recommendations for utilization were provided for either logs or POL
- All slash from timber >6" DBH had to be removed
- Regeneration (<6" DBH) could be removed, chipped and broadcast, or masticated

Project Cost

- Contactor cost was \$3,370 per acre (\$1,217,530 total)
- Project start date was late winter/spring 2018
- Project end date was summer 2019

Southeast Area (SE)

Black Forest Project (Data Provided by Kurt Mackes)

Introduction

The Black Forest Fire occurred in June of 2013 and was highly destructive burning over 14,000 acres and destroying nearly 500 homes and 200 outbuildings in the Wildland Urban Interface (WUI). The value of



the insured property losses was over \$420 million and the cost of suppression was an additional \$9.3 million, which does not include losses such as damage to roads, power lines, and costs associated with rehabilitation. Extremely expensive fires like the Black Forest Fire are not uncommon in the west and this simple fact creates the need to identify and improve methods that can help pay for treatments. Additionally, there is always a need to determine exactly what sort of rehabilitation and other activities should take place in a burned area after a large fire such as this.

Statement of Need

This project was implemented to assist landowners with post-fire timber removal on and around their properties.

- Burned timber removal is expensive (\$2,000 to \$3,000 per acre)
- Many landowners can't afford to pay for timber removal
- Necessity to develop a strategy to assist landowners with the removal of trees killed by fire (for present and future fires)
- Fire creates a large stock of burned logs that are only available and utilizable in the short-term
- Merchantable small logs have accumulated in decks throughout the Black Forest burn area

Scope of Work

- Focus on small private landowners on properties up to 100 acres
- Provide assistance with burnt log removal
- Relocate a portable sawmill to the Black Forest area
- Transport logs to the portable mill
- Process logs into a viable product

Methodology

- Worked with the local non-profit organization Black Forest Together (BFT)
- Identified and contacted landowners in the area by email, mail or phone
- Assisted with the purchase and set up of a portable mill
- Contracted log truck and skidder
- Procured a \$54,000 grant from Colorado State Forest Service (CSFS) to set up mill and treat 300 acres of merchantable timber (primarily burnt, some green)
- Awarded a \$12,000 grant from DNR to move mill to the Black Forest



- Relocate portable sawmill to the Black Forest
- Conducted a demonstration to show that the sawmill is fully operational
- Arranged for log pickup from over 300 acres
- Skid steer was purchased and used to move logs to the roadside when necessary
- Log truck was purchased and used to transport logs to the mill
- Marketing study was performed to identify and contact potential wood processing facilities in the area that would take the timber

Overview of Project Timeline

- July 2014 – Workshop to propose concept
- June 2015 – Funding secured and contractor selection
- July 1, 2015 – Project formally kicks-off
- September 2015 – Sawmill site located, log truck purchase and first logs arrive at mill site
- January 2016 – Skid-steer purchase
- June 2016 – Sawmill fully operational
- June 2016 – Project extended
- May 2017 – Mill relocated to Ludwig property
- December 31, 2017 – Project completed

Presentations and Workshops

- Presentation on Enhancing Wood Utilization in the Black Forest at a workshop held in the Black Forest (approximately 40 in attendance) - (7/26/14)
- Presentation at SAF Annual Meeting (approximately 100 in attendance) - CO/WY Section held in Glenwood Springs on Black Forest Project, presented by Kurt Mackes (5/8/15)
- Attended and gave brief presentation on utilizing fire-killed trees at Black Forest equipment demonstration (approximately 15 in attendance) sponsored by Colorado Forestry Association (6/13/2015)
- Presentation at the CSFS planning meeting (approximately 30 in attendance) held in Pueblo on Black Forest Project (10/28/15)



- Black Forest workshop and equipment demonstration (approximately 25 in attendance) sponsored by Black Forest Together and COWOOD (11/14/15), received favorable press coverage in an article published in the Black Forest News
- Presentation on Black Forest Project at SAF Annual Meeting – CO/WY Section (approximately 100 in attendance), presented in Gunnison by Kurt Mackes during May 2016
- Attended and gave presentations (Mackes) at the Partners Workshop hosted by COWOOD (approximately 50 in attendance). Also assisted/helped host field trip to Black Forest sawmill (6/21/16 & 6/22/16)
- Presentation (Mackes) on Black Forest Project at SAF National Convention held in Madison, Wisconsin (approximately 40 to 50 in attendance) , November 2016

Project Outcomes

- 17 landowners participated in the project
- Logs were also provided from the utility line clearing operation conducted by Mountain View Electric Association
- Self-loading log truck to haul burnt logs was purchased and used
- Bobcat with grapple attachment to skid logs to roadside was purchased and used
- Scragg mill, resaw and generator were purchased and was fully operational May 2016
- Wood marketing study was completed for the Black Forest
- Merchantable burnt timber was salvaged from over 340 acres of forestland impacted by the Black Forest fire at an estimated cost of \$200 per acre

Chatfield Storage Reallocation Project (Summary provided by Meg Halford)

Project Location, Operational Period & General Work Description

- Project area is located in Douglas and Jefferson Counties at the Chatfield State Park Reservoir.
- Main partners/contractors: Chatfield Reallocation Management Corp (CRMC); Army Corp of Engineers (ACE); Colorado Parks and Wildlife (CPW); Denver Water (DW) and twelve other city and county water municipalities; Dam Safety Board; Environmental Resources Org (ERO) and Colorado State Forest Service (CSFS)



- As part of the Chatfield Reservoir expansion to hold more water (expanded to hold water up to 12 ft. higher around the entire reservoir), CSFS was hired to oversee and manage the vegetation removal phases of the expansion. This involved the following:
 - Delineating and layout of all vegetated areas within the fluctuation elevation zones (27 stands, 396 acres).
 - Identifying and setting up a ten acre Demo Project to help determine final treatment methods and processes both in wetland areas and dry areas
 - Identifying and establishing Monitoring Plot areas for long-term monitoring
 - Gridding all stands and assessing trees and identifying and marking all trees for removal (Cottonwood and Sandbar willow)
 - Gridding and estimating all downed woody debris levels for removal
 - Scope of Work development in coordination with all Army Corp, CPW, ERO and CSFS specifications and standards specific to working in wetland and cottonwood vegetation.
 - Show-me and Contractor selection recommendations to CRMC
 - CSFS on Adaptive Management Plan committee and Technical Advisory committee.
 - CSFS Project Administration
- Project planning for the vegetation removal portion of the project began in the spring of 2016.
 - Two phases were implemented to determine how the vegetation removal would get down and approximate costs to complete the work:

Phase I (Spring 2018-6 weeks): a Demo Project of 10 acres was delineated in the Plum Creek fluctuation zone area of the park.

- The demo project went through a bid process with interested contractors through a Request for Proposal (RFP) process. The process required proposed equipment to be used, helicopter operations, hand crews and a utilization plan that included hauling the material out of the Park.
- The demo project was used to finalize the Scope of Work, final vegetation removal processes and costs.

Phase II (Fall 2018-Spring 2019-9 months): Vegetation Removal in all Fluctuation Zone (FZ) Stands using the treatment methods and processes developed from the demo project.

- Helicopter Logging in all FZ areas that were identified as “wet acre” stands that could not be treated via mechanical equipment (approximately 110 acres).



- Hand and mechanical tree removal and mastication in “dry acre” stands (approximately 176 acres)

Phase III (2018-2024): CSFS contracted to implement post monitoring assessments and inventories to assess residual tree health over time as a result of inundation/drought. Involves post-treatment and post-fluctuation monitoring for residual tree and willow health as well as grid inventories throughout all stands (27 stands 396 acres) to monitor and identify any at-risk trees and new ground woody debris for removal.

- Operational period for Phase 2 began after nesting bird season and safety meetings were completed in August 2019. The project was expected to go through two different seasons of operations and be completed in winter or spring of 2020. However, project was completed in nine months from its start date with unexpected cease operations orders from the Army Corp of Engineers, working around other construction schedules, weather and ground conditions.

General Prescription

- All standing Cottonwood, Willow and other deciduous trees from 2” diameter and greater that were identified as dead, declining or assessed as a hazard of potentially falling over within a year were identified for full tree harvest and utilized as mulch.
- All downed woody debris 2” and greater was removed and utilized as mulch.
- All residual downed woody debris that was 4” diameter and less that could not be bagged or hauled was masticated within each “dry stand”.

Product Utilization

- One-hundred percent of the standing and ground woody debris that was removed from the stands was mulched on-site and hauled to A-1 Organic wood utilization and recycling plants in Englewood and Monaco sites.
- Mulch was re-treated at the plant for US wide distribution of a mulch product. All by products that could not be used at the wood utilization sites were hauled to A-1 Organics compost plant in Keensburg and used for compost and soil products.
- Approximately 265 truck/chip vans were used to haul the mulch/chips out of Chatfield State Park
- This equated to approximately 49,395 cubic yards = ~1,333,665 ft³ of mulch = ~66,683 tons of mulch.



Project Costs:

Contractor costs were broken down as follows:

- Dry Acres w/Machines: \$4,680 per “dry” acre

Included: Equipment mobilization, Equipment & Operator time to complete grappling, tree shearing and mastication, Hand-cutting and piling marked trees, Herbicide Application (Russian olive), and Reseeding. Included all supervision and safety management. Included all fuel, tools, and supplies necessary to execute the dry “dry” acres on the project.

- Helicopter Acres: \$23,300 per “helicopter” acre (\$13,500 to fly the biomass to landing area; \$9,800 for ground crews to cut, stack, bag and all ground assistance for choking material to helicopter)

Included: Helicopter mobilization, Helicopter flight time, and all ground operations, including hand cutting dead & down, hand-piling, cutting marked trees, helicopter ground support, Herbicide Application (Russian Olive), and Reseeding. Includes all supervision and safety management. Included all fuel, tools, and supplies necessary to execute the “helicopter” acres on the project.

- Grinding/Mulching: \$1,390 per acre (all acres)

Included: Mobilization of grinding-related machinery to project, mobilization between decks within the project, equipment & operator time to grind chip and load trucks, fuel, tools and supplies to grind all decked wood fiber. Equipment includes whole-tree chipper, front-end high-reach loader, and excavator with thumb.

- Hauling: \$150 per hour

Included: Driver & chip truck time to transport all wood fiber to a Wood Fiber Recycling. The facility took all wood fiber from the project at no tipping fee.

- Average cost estimate per acre for acre assumptions (dry vs helicopter acres) and operational assumptions: \$15,884 per-acre*
- Total Costs
 - Demo Project: \$191,535



- Fluctuation Zone Vegetation Removal: \$4,357,337
- Total end cost: \$4,548,872

Spring Creek Fire Case Study

In summer 2018, the Spring Creek Fire burned 108,045 acres and 141 homes along highway 160 between La Veta and Fort Garland. Fire suppression costs were \$32 million, of which 25.5 million was billed to the State of Colorado (DFPC 2018). As shown by cost studies conducted on the Hayman Fire (Lynch 2005) and the Black Forest Fire (Cyphers 2018) this cost estimate is incomplete and does not consider costs incurred after the fire is extinguished. This case study will focus on one aspect of fire cleanup, dead tree removal. It is based on site visits to the Spring Creek Fire Area in November 2018 and July 2019. On its west side, the fire burned through portions of Trinchera Ranch and several subdivisions including Forbes Park. Dead tree removal efforts on the Trinchera Ranch and Forbes Park subdivision will be compared.

The cost of dead tree removal is dependent on the size of the trees and their suitability for use in products. Cost estimates for salvaging burned sawtimber are currently about \$1000 or more per acre, with all or part of this cost offset by the value of logs. Sawmills in close proximity to the Spring Creek burn area were still accepting burned logs in July 2019, typically paying \$800 to \$1,500 (average around \$1,000) per truckload (approximately 25 tons) depending on log species, diameter and quality. For dense overstocked stands of small trees, dead tree removal can easily exceed \$2,000 per acre and quotes in the \$3,000 to \$5,000 per acre range are likely over time as the trees stand dead and eventually blowdown.

About 3000 acres burned on the Trinchera Ranch. They had 3 mechanized logging sides working in the burn area on the ranch in July 2019, removing around 10 to 15 truckloads of logs per day. Logs were being transported to their mill, Blanca Forestry Products. If they treat all 3000 acres, which was their plan, cost will probably be around \$3 to \$5 million, but much of the cost (if not all) will be offset by revenue from wood products.

By contrast, 6,000 to 7,000 acres of Forbes Park Subdivision burned. The Landowner Association sent out an RFP for dead tree removal on the development, but it was basically up to the 3000 individual landowners to decide if they wanted to pay for the work on their property. The LOA informed landowners that treatment costs were around \$1,000 to \$3,000 per acre. Several harvesting contractors visited the property and declined the opportunity to work there. Two small contractors were working there in July 2019, with combined treatment capacity of 100 to 200 acres a year. Nonetheless, to treat all acres burned on the subdivision would likely cost somewhere between \$6 and \$21 million. This estimate does not consider other impact costs associated with the fire.

There are many potential challenges to removing dead trees and consequences of not removing them, especially in subdivisions such as Forbes Park. Fragmented land ownership in the burn area complicates



the logistics of removing dead trees, with many landowners opting out because of high removal costs. Homeowners living in unburned areas may object to noise and traffic generated by removal efforts. The resource is time sensitive, particularly for large logs, because of checking and biological attack. Within 2 to 3 years after the fire, most sawmills will no longer accept burned timber from the area. Also, after 3 years blowdown and associated hazards will become more prevalent increasing removal costs. There is also a lack of markets for smaller timber, which also drives up costs.

Private landowners were generally grateful for the fire-fighting effort, but when the firefighters went home, those impacted by the fire were surprised by the lack of public assistance, particularly with fire cleanup (removal of dead trees) and forest rehabilitation. Many landowners contacted felt they were more or less on their own. Lacking expertise, they were looking for guidance, in addition to resources. With respect to private land, should landscape scale treatment decisions be based primarily on the ability and willingness of a landowners to pay for the work? An evaluation strategy that identifies high priority watersheds for treatment and assists with getting the resources in place to get the job done needs to be developed. The CSFS has the expertise to fill this role, but lacks the capacity both in terms of personnel and funding. There must be a commitment at all levels of federal, state and local government to support landowners in recovering from large fire events such as the Spring Creek Fire. Partnering with the Forest Products Industry will be necessary to minimize dead tree removal costs. If nature is allowed to take its course, recovery will be slow, decades, perhaps centuries in some areas, and outcomes likely less desirable.

Northwest Area (NW)

Closure 2 Timber Sale Project (Summary provided by Russ Gross)

Project Location, Operational Period & General Work Description

- The timber sale was located in one large treatment area on the Colorado State Forest, east of Walden.
- This sale was a rebid of the Closure sale where the previous purchaser went bankrupt.
- The contract was signed on November 2013, work began December 2013 and was completed in December 2017. During the winter of 2013/2014 the original purchaser had a subcontractor operate the sale.
- The treatment area, including harvested and non-harvested acres, was 505 acres. There were 12 small clearcut units totaling 193 acres, with an additional 12 acres of overstory removal for a total of 205 acres harvested.



- The sale was comprised of predominately-dead lodgepole pine, but included areas of green lodgepole and small patches of Engelmann spruce and subalpine fir.
- The sale was accessed by a graveled county road. The purchaser was required to install several temporary roads that were subsequently removed and restored to natural condition.
- Desired future forest conditions (outcomes)
 - Regenerate large stands of dead lodgepole pine, a result of the recent Mountain Pine Beetle epidemic.
 - Remove hazards along forest roads and trails used by the public.
 - Increase aspen regeneration to benefit of wildlife and increase species and age diversity across the landscape.
 - Reduced forest fuel loads before large-scale blowdown of dead timber occurs.
- General prescription
 - Remove all lodgepole pine, Engelmann spruce, and subalpine fir greater than 30 feet tall in clearcut units
 - Remove all lodgepole pine, Engelmann spruce, and subalpine fir greater than six inch DBH in overstory removal areas
 - Retain all aspen

Product Utilization

- All slash was lop and scattered to increase soil moisture, retain nutrients onsite, mitigate erosion potential, and provide for cone distribution and microsite protection for seedling growth.
- Sawlog utilization:

Johnny Moore Mountain Timber Sale Project (Summary provided by Russ Gross)

Project Location, Operational Period & General Work Description



- The timber sale was located in two units on the Johnny Moore Mountain State Trust Land just west of the Colorado State Forest, east of Walden.
- The contract was signed on November 2016, work began March 2019 and was completed in July 2019, with no work being conducted from the middle of April until the end of June, due to muddy season and elk calving restrictions.
- Treatment area was 124 acres, comprised of predominately-dead lodgepole pine, but included areas of lodgepole poles, in areas the purchaser had to work around abundant aspen to remove the lodgepole.
- The sale was accessed by through private property, and a 1.3-mile access road that was constructed and stabilized by the purchaser.
- When finished the road had water bars installed and was seeded to prevent erosion, the road was left as an emergency access route into a heavily hunted area.
- Desired future forest conditions (outcomes)
 - Regenerate large stands of dead lodgepole pine, a result of the recent Mountain Pine Beetle epidemic.
 - Increase aspen abundance for the benefit of wildlife.
 - Reduced forest fuel loads before large-scale blowdown of dead timber occurs, in areas, some blowdown had started to occur which made this sale more challenging.
- General prescription
 - Removal of dead conifers.
 - Removal of all green lodgepole pine greater than 30 feet tall.
 - Retain all aspen
 - Retain all Douglas-fir

Product Utilization

- All slash was lop and scattered to increase soil moisture, resulting in increased growth for regenerating trees.
- Sawlog utilization:
 - Green logs greater than eight feet in length and five inches in diameter at the small end.



- Dead logs greater than eight feet in length and seven inches in diameter at the small end.
- POL (Products other than logs) was required to be removed, all lodgepole logs greater than eight feet in length and greater than four inches in diameter at the small end, although the purchaser did remove poles with a smaller top end diameter.

Project Cost and Operational Period

- Sawlogs were sold at \$5 per ton
- POL was sold at \$25 per load to incentivize the removal of POL
- \$12,648.15 worth of wood products were been removed, coming out to an average of \$102.00 per acre of revenue.
- There was very little green sawlogs on this sale, predominately green poles.

Southwest Area (SW)

Big Willow Salvage Harvest Project (Summary provided by Jodi Rist & Kyle Kleve)

Project Location

- Sale area is located approximately 11 miles NNW of Lake City in Gunnison County

Operational Period

- The harvest began in August, 2019 and is set to expire 5 years from signing date-

General Work Description

- Project area for Big Willow Salvage is 2,155 acres on USFS land
 - 3 cutting units, comprised of 28 “sub-units”
- The entire sale is located in Englemann spruce- subalpine fir forest type
- Access via Highway 50 from the north to improved Alpine Plateau gravel road

Desired future forest conditions

- Increased fire resilient forest on a landscape scale by reducing the fuel load



Harvest Prescription

- Whole tree harvest of all live and usable-dead Englemann Spruce greater than or equal to 9" DBH and all live subalpine fir greater than or equal to 8" DBH

Product Utilization

- Utilized all merchantable cut spruce and fir logs over 8' length and down to 7" top on englemann spruce and 6" top on subalpine fir
- Slash piled within landings to be burned by USFS, some slash scattered back across the harvest units

Project Income

- Sale purchased by Montrose Forest Products
- Total bid price awarded at \$571,466.07

Brahma GNA Project Cost Summary for Forest Action Plan (Summary provided by Tim Reader)

Project Location and general info

Brahma Project location: Mancos Ranger District San Juan National Forest, roughly 10 miles north of Mancos and east of Hackley Reservoir, Montezuma County Colorado

- 100.8 acres total
- Ponderosa pine forest type with Gambel oak understory with encroaching pinyon and juniper
- Gentle slopes with no riparian features
- Divided into 4 management units

Cost and Operational period

- Show me tour was conducted 9/10/2019, three contractors participated, two bid on project
- Contractor was awarded the bid at a cost of \$1781.25 per acre over the entire 100.8 acres for a total of \$179,550.02 for the project
- Executive Service Agreement was signed on 10/9/2019 between CSU and Vegetation Management West
- Work began 10/24/2019 and the crew finished the cut skid and decking of Management Unit 1 on 11/26/2019, prior to the Dec 1 seasonal road closure.
- Work Resumed 5/7/2020 after snow melted and roads opened / dried out for the season



- Currently in operation
- December 1, 2020 Deadline for project completion

Work Description

- **Desired conditions:** Thinned forest stands that are wildfire and insect/disease resilient
- The silvicultural objective for the project area is to move many of these stands towards an uneven-aged structure and composition. This would be accomplished by creating a clumpy distribution of large diameter cone/seed bearing trees with scattered openings available for regeneration. In addition to a shift to more vertical diversity in the stand structure, thinning around the larger trees would allow more nutrients and sunlight to promote increased vigor, health and size. Another objective is to make these stands more fire resilient and reintroduce fire into the ecosystem. These goals can be met through a restoration type prescription. This prescription would create small openings in the stand for natural regeneration, harvest the majority of small suppressed pine, which often act as ladder fuels and promote the larger diameter, fire resistant trees.

Silvicultural Prescriptions

Thinning

- All trees marked with orange slash are reserve trees and not to be cut.
- Fell all trees NOT marked with an orange slash mark (Leave Tree Mark - LTM) down to 5.0" DBH.
- Thin all ponderosa pine trees that are at least 12' tall and 4.9" DBH and less to a 10'x10' spacing.
- Fell all dead trees 16" DBH and less.
- Fell all pinyon pine and juniper trees 4.5' tall or greater.
- Cut all Gambel oak 6" Diameter at Root Collar (DRC) and less that is within 5' of the dripline of all residual ponderosa pine 8" DBH and greater; and cut all oak back to the bole of the tree. Essentially create an area of cut oak in a circle pattern around the tree out to 5' beyond the drip line and back to the bole.

Post Felling Processing

- All felled trees 5.0" dbh and bigger should have the top severed from the stem at 5" upper diameter.
- Cut to length requirement: from butt end of the bole measure up 38' and cut bole, if the remainder tapered end has more than 38' of length cut again at 38' and if there is a remaining piece it should be piled as slash. In event that the 2nd piece of the first cut is less than 7' it should be piled as slash; if it is 7' or more it should be skid and decked according to contract specifications.



Slash Processing

- 80% of all Contractor Created Slash Should be Piled
- All oak, pinyon pine and juniper cut trees should be treated as slash and entire tree/shrub piled
- Piles shall be constructed to facilitate full consumption when they are burned. Piles shall be compact with most small diameter slash on the bottom and larger diameter on top
- Air pockets (empty space-void of slash) within piles should be kept to a minimum. Proper cutting of slash prior to piling facilitates minimal air spaces
- Piles shall not be less than 10 feet in diameter and not greater than 40 feet in diameter. Larger-sized and fewer numbers of piles are desired, and will require some long-distance dragging of material
- Piles need to be at minimum 20' away from residual tree driplines

Skid/Deck

- Skid all 5" dbh and larger logs that are at least 7' in length to designated decking areas indicated on the contract area map and deck.
- DBH will be measured from the severed end of the bole up 4.5' (if log is felled).

Product Utilization

- Cut logs measuring at least 5" dbh and at least 7' in length are to be decked around the perimeter of the project site along forest service roads and trails
- The log decks are to be scaled by the USFS and sold to the lowest bidder

Chicken Creek GNA Project (Summary provided by Ryan Cox and Tim Reader)

Project Location, Operational Period & General Work Description

- Project located Montezuma County ~ 15 mi east of Dolores.
- The operational period began immediately after contracted was awarded and was completed September 2018.



- Treatment area consisted of two locations. 5 units on Haycamp Mesa consisting of 375ac and 2 units in Millwood consisting of 59ac.
- Forest type is Ponderosa pine with Gambel oak understory and occasional encroaching Piñon and Rocky Mountain juniper.

Desired Future Forest Conditions

- Conduct thinning to remove advanced regen, promote overall stand health, reduce ladder fuels and address endemic bark beetle populations.

General prescription

- Cut all trees dead/alive (larger than 5" dbh) as designated
- Thin/cut all regen (small pines) that are at least 2' tall and 5" dbh and smaller to a 8'x8' spacing
- Cut all Pinyon and Juniper
- All logging and slash and preexisting down woody debris was piled for burning

Product utilization

- All designated trees (6" diameter and larger) were cut to a 3" diameter top and left in place.
- Skidding, decking and removal was conducted under a second contract.
- Estimated volume was 3-4ccf per acre or 1300-1700ccf total.

Project cost and operational period

- Contractor Cost was \$352.66 per acre (total of \$153,054)



- Project start date was July 2018
- Project end date was August 2018

Robert Bean Wildfire Mitigation and Wildlife Habitat Improvement Project (Summary provided by Austin Shelby)

Project Location

- Project was located approximately 8.5 miles NW of the town of Ridgway in the North Log Hill area, Ouray County.

Operational Period

- 5/28/19-8/28/19

General Work Description

- Mastication in dense old growth pinyon/juniper forest with some Gambel oak component scattered throughout

Desired future forest conditions

- 40-60 ft crown spacing of residual trees (pinyon/juniper) with some 2-5 tree groups and select grouping of Gambel oak within treatment areas
- Treatments improved defensible space, created shaded fuel breaks and created wildlife habitat openings.
- Treatment was reseeded

Product Utilization

- All material was masticated. However, the project could have supported some fence post/firewood utilization prior to being masticated.

Project Income

- None

Project cost

- 76.3 acres @ \$549/acre= \$40,406.40 for total cost

Contractor Info

- Contractor used Barko 930 with Fecon mulching head.



Chicken Creek GNA Project (Summary provided by Ryan Cox and Tim Reader)

Project Location, Operational Period & General Work Description

- Project located Montezuma County ~ 15 mi east of Dolores.
- The operational period began immediately after contracted was awarded and was completed September 2018.
- Treatment area consisted of two locations. 5 units on Haycamp Mesa consisting of 375ac and 2 units in Millwood consisting of 59ac.
- Forest type is Ponderosa pine with Gambel oak understory and occasional encroaching Piñon and Rocky Mountain juniper.

Desired Future Forest Conditions

- Conduct thinning to remove advanced regen, promote overall stand health, reduce ladder fuels and address endemic bark beetle populations.

General prescription

- Cut all trees dead/alive (larger than 5" dbh) as designated
- Thin/cut all regen (small pines) that are at least 2' tall and 5" dbh and smaller to a 8'x8' spacing
- Cut all Pinyon and Juniper
- All logging and slash and preexisting down woody debris was piled for burning

Product utilization

- All designated trees (6" diameter and larger) were cut to a 3" diameter top and left in place.



- Skidding, decking and removal was conducted under a second contract.
- Estimated volume was 3-4ccf per acre or 1300-1700ccf total.

Project cost and operational period

- Contractor cost was \$352.66 per acre (total of \$153,054)
- Project start date was July 2018
- Project end date was August 2018

Millwood Project (Summary provided by Ryan Cox and Tim Reader)

Project Location, Operational Period & General Work Description

- Project located in Montezuma County ~ 7 mi west of Mancos
- Operational period is open and anytime when conditions are favorable to skidding
- Work involves skidding, sorting, processing, and decking of previously felled trees within 4 units covering an area of 247 acres. Work is located in an area that has been previously felled and logs have been cut at roughly 6" diameter top and live branches roughly limbed. Service is to skid logs, complete limbing of logs, sort logs by diameter, process logs, deck logs, and pile cull log pieces along designated areas according to specifications.

Desired Future Forest Conditions

- The desire is to limb, skid, sort, process, and deck logs into 14.0" dbh and below and 14.1" dbh and above decks. Resultant cull log pieces from processing will be piled next to decks.

General prescription



- Skid logs to designated decking areas indicated on the contract area map.
- Logs can be decked on both sides of the designated decking areas **except** along FSRD 559.
- DBH will be measured on a cut tree from end of the log 4.5' up the bole
- Logs are to be sorted into two size categories 14" dbh and below followed by 14.1" dbh and above. The two group sizes should then be processed and decked separately.
- Decks need to be compact, neat and orderly with minimal air space.
- The minimum height of a deck is 4 feet in units 2, 3, and 4. Decks in unit 1 shall not be any taller than 4 feet from ground level.
- Logs are never to be decked in a road or in a location that limits road access.
- Logs in unit 1 are to be decked along the south, east, and west boundaries.
- Logs in unit 2 are to be decked along the east boundary (FSRD 559 side)
- Logs in unit 3 are to be decked along the 2 track road that makes up the eastern boundary
- Logs in unit 4 are to be decked along the north boundary (FSRD 559K)
- Unless approved by agency representative decks are to be parallel with the closest road or unit boundary, within 100' of the closest road or unit boundary positioning of deck should favor arm assisted loading onto log transport trailers.
- Larger and fewer decks are preferred.
- Contractor's operations shall not unnecessarily damage young growth or other trees to be reserved.
- The Contractor's operations shall be conducted reasonably to minimize soil erosion. Equipment shall not be operated when ground conditions are such that excessive damage will occur. Contractor shall adjust the kinds and intensity of erosion control work done to ground and weather conditions and the need for controlling runoff. Operation may be suspended verbally at sole discretion of Project Administrator, followed by written direction at any time due to resource damage.
- Dispersed skidding practices should be used.
- When designing landing and decking locations arm assisted log trailer loading logistics should be taken into account and planned accordingly. Technical proposal (work plan)



submitted should take into account technical aspects for the service to meet specifications.

- Additional trees may need to be cut in order to accommodate processing and decking of logs depending upon contractor's plan of operation and space needs; creation of landings/decking locations should be worked into the contractor's bid to accommodate the additional work (final approval of work plan including, layout and designated tree felling; will occur at pre-work meeting upon award).

Processing of Logs

- Logs in unit 1 do not need to be processed just skid and decked.
- Logs 14.0" dbh and below shall be bucked into pieces between 15' – 15'.6" prior to decking. Effort made to maximize utilization required.
- Logs 14.1" dbh and above only require limbing for processing. They will be left as a whole log, and will not be bucked.
- All logs should be fully de-limbed of both live and dead branches, "nubs", burls, and other protruding bumps prior to decking.
- De-limbing should be flush with edge of bole to produce a relatively even and round edge.
- Any "orphan wood" created during processing or (aka) pieces of log left over after processing cuts are implemented, should be placed in piles along designated decking areas.

Product utilization

- All merchantable wood products are decked by sawlog or POL at lengths specific to specs provided by purchasers to USFS before contract work began. Decks have been sold by USFS permit to purchasers as contract has been ongoing

Project cost and operational period

- Contractor cost is \$500/ac (total of \$135,795)



- Project started in August 2018 and is ongoing. Delays have been encountered due to several factors including: Contractor has been primarily working alone without help, project experienced periods of no operation due to Government shutdown winter 2018/19 and now some delays because of covid. Project end date is September 2020.