Norton, Michelle - FS, HAMILTON, MT

From: ROBERT KANDACE RICH <[redacted]
Sent: Thursday, May 19, 2022 9:48 AM
To: FS-comments-northern-bitterroot-stevensville
Subject: [External Email]Comments on Bitterroot Front EA
Attachments: Bitterroot Front Mechanical Options.pdf

Thank you for the opportunity to comment on the Bitterroot Front EA. I strongly support the objectives of this project. It is long overdue. There is a great need for fuel reduction and forest restoration on the Bitterroot Front. I encourage the Bitterroot Forest to utilize all methods available to achieve the goals of this project in a cost efficient manner. The more efficiently you work the more acres you can treat. I also encourage the Forest to use mechanical methods when they are the best tool for the job. This would include mechanical methods that remove commercial material as a product to reduce fuels and also lower treatment cost.

Much of the area is on steep slopes that can be challenging to operate equipment on. I have attached a PDF that summarizes the various mechanical methods that are feasible today with new technologies. It is my hope that the Forest will consider the full range of mechanical options available to achieve the goals of this project. I will be happy to discuss these options with the Forest in greater detail if so desired.

Again, thank you for the opportunity to comment on this project.

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Bitterroot Front Mechanical Options

This paper outlines a range of potential mechanical treatment options that could be implemented on the Bitterroot Front Project.

Timber harvesting and mechanical fuels reduction on steep slopes of over 40% on Forest Service lands are typically done by using some type of cable yarder or in some cases helicopters. These are both viable options for this project. However, in recent years, advances in the technique of tether logging have become more common and have application on the sites within the project area.

While utilization of forest products is not a primary objective of the project, much of the fuel that could be removed has commercial value. Removal and utilization of this material can serve to reduce fuels, reduce smoke impacts from burning and also lower treatment costs as at least some of the fuel being removed has commercial value which can partially offset cost of the fuels reduction work.

Several options are listed below that could be employed to meet project objectives. It is likely that a combination of these methods used in different stands or even within the same stand may do the best job of meeting project objectives and minimizing implementation cost. This would be determined on a stand by stand basis.

The Concept of Tethering or Winch Assist

Tethering consists of using a winch line to assist a working machine up and down steep slopes. The winch line may be driven by a separate assisting machine or a winch mounted directly on the working machine itself. The working machine provides much of its own power for operations. The winch line serves to "assist" the working machine and stabilize it on the slope. Tethering also helps to evenly distribute a machines ground pressure on its tracks or wheels. This allows the machine to achieve better traction and reduces sliding of the machine and spinning of tracks or wheels. This significantly reduces soil impacts from rutting and soil displacement.

Currently, in the United States, the only types of machines that have a winch mounted on the working machine itself are harvesters and forwarders by one manufacturer, Ponsse. All other machines that work while tethered require a second assisting machine above them on the slope to provide the winch assist. Tether logging is a fairly new and evolving technique. It is logical to expect new applications and practices to develop in the near future.

Assisting machine and working machine

Winch mounted on working machine

Potential Options for Mechanical Treatments

Option 1- Hand pile and burn
Option 2- Tethered Harvester- Forwarder
Option 3- Tethered Feller-Buncher and Skidder
Option 4- Tethered Shovel Logging
Option 5- Tethered Harvester- with piles
Option 6- Skyline yard with a conventional yarder and/or an off-road yarder and swing skid to landing
Option 7- Helicopter
Option 8- Tethered Mastication
Option 9- Combination of Methods

Option 1- Hand Pile and Burn

Trees, generally less than 10" in diameter would be cut and piled by hand. Piles would be burned when weather conditions allow. Material above 10" DBH can be difficult and expensive to handle by hand especially on steep slopes. Lighting hand piles can be challenging when snow covered. Safety concerns may also arise when burning crews have to work on steep ground when snow covered and icy.

Larger standing stems and heavy down fuels could not be treated with this method as they are too large to be manually handled. The need to improve roads would be minor as only crew vehicle access would be required. Project objectives of fuel reduction would likely not be met over much of the area as a result of not treating this larger material.

Meets Project Objectives? ***Only in small diameter stands***
Difficulty of Burning Piles: ***Difficult,*** *many small piles to burn on steep slopes*
Potential to Utilize Products*: No*

Option 2- Tethered Harvester and Forwarder (remove nearly all material)

Trees would be cut with a tethered harvester and removed from the stand with a tethered forwarder. Cutting small material (less than 4") can cause problems for a harvester as this small material often causes the bar chain to be thrown on the harvester head. In this material the harvester can actually pull the tree out of the ground rather than cut it. Treating small material with a very expensive harvester will result in high treatment costs.

Tethered harvesters and forwarders can operate on slopes of up to 80%. This enables them to bring material to the top of ridges and then untether and forward long distances up or downhill on the ridgetop to access roads. This would greatly reduce the need for additional road construction.

Cut to length harvesting is designed to process all material at the stump. Machines operate on a slash mat to protect soils. However retaining this slash in the unit could exceed desired fuel loads and could actually create a new down fuel hazard. To mitigate this situation, the merchantable portion of a tree could be processed into logs as usual, but then top of the stem with limbs still attached could be placed by the side of the trail and removed by the forwarder when logs are removed. Tops could then be piled below the road at the landing for burning. Forwarders could also pile non-merchantable material and existing down fuels along trails for burning if desired.

Trails would be approximately 50 feet apart as the boom on a harvester has approximately a 30 foot reach. Forwarders are capable of long forwarding distances which would reduce road needs.

Meets Project Objectives? ***Yes***
Difficulty of Burning Piles: ***Low Landings Only*** *- No piles created within the cutting unit unless desired. Large landing piles could be built if tops are removed from the unit.*
Potential to Utilize Products: ***Yes***

Option 3- Tethered Feller-Buncher and Skidder- remove all material whole tree

Feller-bunchers and skidders can also be tethered. Feller-bunchers generally have a shorter boom than a harvester but still can reach out from a central trail to cut and bunch stems for whole tree skidding by a tethered grapple skidder. Feller-bunchers with hot saws have no trouble cutting smaller trees. Whole tree skidding would remove nearly all material from the cutting unit and concentrate it at the roadside. Stems would then be processed at the landing with slash piled below the road.

Trails with this system would likely be 40-50 feet apart. Tethering a rubber-tired skidder is currently an uncommon practice. Tracked feller-bunchers would also have difficulty operating in areas that are rocky.

Meets Project Objectives? *Yes*
Difficulty of Burning Piles: *Low*-*Nearly all fuel would be removed from the treatment unit and piled at roadside landings.***
Potential to Utilize Products*: Yes*

Option 4- Tethered Shovel Logging

Shovel logging involves using a modified log loader to swing whole trees or logs from the stump to the landing. It is most often used in clearcuts on the west coast but it is possible to use in partial cuts. Leave trees, especially in denser leave stands make operations very difficult as the shovel needs to swing trees with its boom and leave trees make this difficult to do. This can result in decreased production and increased stand residual damage.

Distance that trees must be moved is a major cost factor as trees need to be swung many times, this raises treatment cost significantly. For relatively short distances it is a widely employed method in regeneration cuts, on private lands in Oregon and Washington. Shovel logging is not practical for long distances and is limited to 500 feet or less.

Timber could be cut by hand or a tethered feller-buncher. Bunching would reduce cost and stand damage. Shovels are tracked machines and rocky ground would make operations difficult.

Meets Project Objectives? ***Yes, with difficulty***
Difficulty of Burning Piles: ***Low-*** *All material removed whole tree, no piles within units*
Potential to Utilize Products: ***High***

Option 5- Tethered Harvester- Cut and pile all stems mechanically, burn piles

Harvester chunking up stems for piling

Piles built by a harvester

Under this option a tethered harvester would cut timber, but rather than process it into logs for utilization it would delimb and chunk up stems into short pieces approximately 8-12 feet long or whatever length is desired. The harvester would then place all this material into well-constructed piles for burning. These piles would likely be larger than hand piles as the harvester is capable of placing all material within an approximately 25 foot diameter semi-circle into one pile.

Material too large for hand piling could be placed into these piles enabling a more complete treatment than hand piling could achieve. It would likely be advantageous to make piles as large as possible so that burning would be easier than small piles. There would be no utilization under this method. All material would be burned.

Meets Project Objectives? ***Yes***
Difficulty of Burning Piles: ***Moderate-*** *Piles would be larger, fewer and easier to light than hand piles but there would still be approximately forty piles per acre due to the limited reach of the machine's boom*
Potential to Utilize Products: None

Option 6- Skyline yard with a conventional yarder and/or an off-road yarder and swing skid to landing


Skyline Yarder


Whole trees being yarded on a skyline system


Yoader


Excaline

The traditional way of logging most steep slopes in the past has been with the use of a skyline yarder. Yarders operate from a road and range greatly in size. The smaller the timber and lower the volume per acre, generally, the smaller the machine that is used. Logs or whole trees are moved to the landing area by a system of cables. Conventional yarders require at least a 14' wide road, wider in winter conditions where machine slide off is possible. Yarding uphill is preferred for many reasons which requires a road at the top of any harvest unit.

However machines such as yoaders and excaliners are capable of working off road as a skyline yarder and then having a ground based skidder move logs or whole trees to a landing. Yoaders are log loaders that have also been modified to work as a skyline yarder. Excaliners are excavators that have been converted to work as a skyline yarder. Both of these types of machines are able to work without existing roads, often from ridgelines and skyline yard steep slopes. They can also work from existing roads as a conventional skyline yarder would.

Trees could be cut by hand or mechanically with a tethered feller-buncher. Felled timber would then be skyline yarded either to a road or a ridgetop trail. If material is yarded to a trail it is then skidded to the landing with a ground based machine. All material would be yarded whole tree with slash piled at the landing or along ridgelines. Different types of yarders have different line capacity which in turn limits their maximum yarding

distance. Skyline yarding also requires topography that allows for adequate skyline deflection to be achieved. This is an important consideration in project planning.

Meets Project Objectives? *Yes*
Difficulty of Burning Piles: *Low-* *All material removed whole tree, no piles within units*
Potential to Utilize Products: *Yes*

Option 7- Helicopter

Under this option stems could be cut mechanically with a tethered feller-buncher or cut by hand. Mechanically bunching stems before they are flown would significantly lower costs. All yarding would be by helicopter. Small material can be placed into piles and flown out or hand piled for burning. Helicopters require suitable flight paths that do not overfly inhabited areas or structures. This may require roads and trails open to the public be temporarily closed. Helicopters also require suitable landing areas to land logs and service the helicopter. Helicopter is an extremely high cost system compared to other logging systems. It should only be utilized if other mechanical methods are not feasible.

Meets Project Objectives*? Yes*
Difficulty of Burning Piles*: Low, only large landing piles*
Potential to Utilize Products: *Yes*

Option 8- Tethered Mastication

Boomed feller-buncher with a masticating head

Masticating head

Boomed masticators, when tethered, could operate on steep slopes within the project area. To date, I am not aware of any contractor that has used a masticator when tethered. However, it is technically feasible. If it is feasible to tether a boomed feller-buncher there is no reason that the same machine could not be tethered when configured as a masticator.

Boomed feller-bunchers, even when not tethered, would be able to work slopes of up to 45%. Mastication could be done in small diameter conifer stands and could even be capable of thinning. Mastication when used in larger diameter stands can create a mulch layer several inches thick that will lead to excessive stand mortality following prescribed fire or wildfire. For this reason its use is not recommended in stands past the pole size.

Meets Project Objectives? *Only in small diameter stands*
Difficulty of Burning*: No Piles*
Potential to Utilize Products: *No*

Option 9- A combination of methods

A combination of several options may yield the best results, for example:

- A tethered harvester could cut and process larger merchantable stems into sawlogs and at the same time process smaller non-merchantable stems into machine piles along with slash and tops from sawlog processing. Material less than 4' DBH could be cut ahead of time and these small stems could be mechanically placed into piles when the forwarder goes through the unit to forward out sawlogs.

- An excaliner could yard an area whole tree and small material could be piled by hand or treated with a masticator after yarding.

- A tethered harvester could cut and buck up stems into piles and a helicopter could fly out a small number of higher value sawlogs that are cut.

These are just examples of the ways that treatment methods could be combined in order to achieve project objectives in the most economical manner.

Comparison of Options

	Meets project Objectives	Difficulty of Burning Piles	Potential to utilize material
Option 1- Hand pile and burn	Only in small diameter stands	Difficult	No
Option 2- Tethered Harvester-Forwarder	Yes	No Piles	Yes
Option 3- Tether Feller-Buncher and Skidder	Yes	Low- Landings only	Yes
Option 4- Tethered Shovel Logging	Yes, with difficulty	Low- Landings only	Yes
Option 5- Tethered Harvester making piles and burn	Yes	Moderate to difficult	No
Option 6- Skyline Yard with conventional yarder and/or Excaliner/Yoader and swing skid to landing	Yes	Low- Landings only	Yes
Option 7- Helicopter	Yes	Low- Landings only	Yes
Option 8- Mastication	Only in small diameter stands	No piles	No
Option 9- Combination of Methods	Yes	Varies	Yes

Contracting:
Different mechanical systems (helicopter, skyline, tethered, whole tree and tethered cut to length) may all be able to achieve the desired treatment on much of the project area. It may be beneficial to specify a desired end result for the project and allow different contractors to explain how they will achieve that in a request for proposal (RFP) process rather than specify a specific logging system for each unit. When taking this type of approach, it is important to make sure that all systems will work given the design of the treatment units and that contractors understand the limitations they need to operate under such as, where additional roads can and cannot be constructed and which roads may be upgraded. Different logging systems have different design requirements. For example:

- Helicopter will require feasible flight paths and suitable landing areas.
- Skyline will require adequate road access or ridge top location for off road yarders and subsequent ground based swing skidding. Skyline will also be limited by maximum external yarding distances.
- Tethered operations will need either road access or ridgetop access similar to skyline and will also be limited by length of tether line on assisting machines.

All systems need to be feasible to implement or contractors will be eliminated from the bidding process. This may require project planners to design the project for several different systems to ensure that all of them are feasible to implement. Given the limited number of contractors capable of this type of work and willingness to mobilize long distances, it is prudent to keep the potential contractor pool as large as possible.

If it does not create an unacceptable hazard within a unit, skidding or yarding fuels with low or no value to a designated disposal area for burning can reduce cost significantly. On steep ground this would most likely be yarding or tether logging to ridgetops for piling. If there is material with commercial value mixed in, this material could be skidded to landings for subsequent hauling as a product.

Additional source of information on tether logging:
Compilation by Region 6 of research and educational material on tethered logging on steep slopes
https://ecoshare.info/projects/central-cascade-adaptive-management-partnership/synthesis-papers-tools/tethered-logging-bibliography/tethered-logging-literature/