



Mastication Operational Guidelines



Vertical mastication head on wheeled tractor.

Guidelines for mastication treatments:

- **Resource Protection**
- **Operations**
- **Administration**



Mastication of forest biomass for wildfire hazard reduction and forest health improvement has expanded dramatically across the state; the guidelines below focus on mastication techniques.

Consider the following recommendations during any mastication treatment, regardless of the method used.

Resource Protection:

1. Inspect all equipment prior to beginning work to ensure that it is in compliance with local requirements for spark arrestors, fire extinguishers, emissions, oil leaks, etc.
2. Thoroughly wash all equipment to reduce the risk of introducing or spreading noxious weeds.
3. When welding or cutting metal during equipment maintenance, use caution to avoid igniting a wildfire. Include language in contracts that describe the necessary tools, equipment, water and water delivery systems required for wildfire suppression.
4. Collect all liquids, containers and packaging associated with equipment fueling and maintenance, and properly dispose of it off-site.
5. Collect any soil contaminated with spilled liquids or grease and properly dispose of it off-site.
6. Avoid mastication and the deposition of mastication by-products such as chips and chunks in the following areas:
 - a. Perennial streams (i.e. streams that carry water year-around).
 - b. Intermittent streams (i.e. streams that carry water during only part of the year).
 - c. Road surfaces, drainage ditches and culvert basins.
 - d. On roads and trails, periodically remove mastication by-products larger than 1-inch in diameter and/or 1-foot in length as appropriate based on the level of road or trail use.
7. Make sure mastication treatments do not disturb soils or vegetation that protects the bottom surface of valleys from soil erosion and sediment transfer. Ephemeral drainages (i.e. areas that bear water only during and immediately after rain and/or snowmelt)

can be highly erosive and typically direct water into stream channels.

8. Avoid damaging residual stands of trees during mastication treatments.

- a. Ensure that target basal area or tree spacing is adequate to allow sufficient room for equipment operation.
- b. Carefully review the operator's proposal for the type(s) of equipment to be used to ensure that it is appropriately scaled to desired basal area or tree spacing.
- c. The most common residual tree damage involves removal of bark from the bole by movement and proximity of heavy equipment. These often are referred to as "bump" or "rub" trees. Contract language should require removal and/or mastication of bump and rub trees if it does not significantly affect the desired basal area or tree spacing. Contract language also should include an excessive damage penalty (per tree basis) for significantly damaged trees. Size of damage or size of tree should be specified (e.g., trees that are 6" dbh and greater).



Before mastication, above.

9. Consider how valuable shrubs will respond to mastication.

- a. Avoid shrub species that may not respond well to mastication (e.g., bitterbrush).
- b. Consider leaving species that have other resource values such as those that are beneficial for wildlife if they are not ladder fuels.

10. Schedule mastication treatments to complement important wildlife nesting, fawning, calving and breeding seasons.

11. Consider rehabilitation of access trails, as equipment often will use the same access trail when traveling from equipment staging or service areas to the project area.

- a. Reseed access trails if necessary and install waterbars or other water-diversion treatments. If additional information on erosion control is needed, consult the publication "Colorado's Best Management Practices for Protecting Water Quality," available through the Colorado State Forest Service (<http://csfs.colostate.edu/pdfs/ForestryBMP-CO-2010.pdf>).
- b. Close access trails by brushing-in and/or installing gates or temporary fencing.



Same area after mastication.

12. Rehabilitate equipment staging and service areas as necessary. Consider ripping compacted soils, as well as requirements for reseeding and mulching.

Operations:

13. Consider proximity of treatment areas to structures. Conduct mastication treatments so that debris is projected away from buildings and other values that may be damaged by flying chunks

of biomass or rock. Different combinations of machine carriers and mastication heads affect how and where mastication debris is projected. Consider specific equipment combinations and/or contract requirements to address limits on how and where debris is projected if significant “target areas” are part of an individual project.



Horizontal mastication head on a boom.

14. Match equipment to slopes and other terrain features found within the project area. As a rule:

- a. Wheeled equipment generally is effective on terrain with less than a 35-percent slope.
- b. On relatively consistent, unbroken terrain, wheeled equipment has been used on terrain with slopes up to 45 percent.
- c. Tracked equipment generally is most effective on terrain with slopes greater than 35 percent. Maximum slopes for operation of tracked equipment are +/- 55 percent.
- d. Broken terrain, areas where numerous drainages bisect a project area, are best treated using tracked machinery equipped with a mastication head mounted on a boom or arm; an example is a Timbco equipped with a Quadco mastication head.

15. Tracked equipment disturbs vegetation and soils, and creates berms whenever they turn. This can be accentuated on steeper slopes and when conditions are wet. Be sure to specify in the contract a maximum allowable height for berms. Require that berms exceeding the specified height be smoothed prior to approval of an operational unit. Berms often can be smoothed by dragging a boom-mounted mastication head across the area during normal operations. (Some contractors effectively use ATVs equipped with a front blade to smooth berms). Avoid turns in the bottom of ephemeral areas to maintain vegetation and soil stability, and limit frequency of drainage crossing; cross at right angles if necessary.

Administration:

16. Conspicuously post signs on roads and trails in the project area warning people of flying debris. Temporarily close roads or have flaggers to control traffic when working adjacent to roads and trails open to the public.

17. Do not approach equipment until you have made eye contact with the operator(s) to ensure that they know where you are; some equipment can throw debris up to 300 feet. Some operators use small radios for communicating; often, operators will provide the project administrator with a radio to contact them when timely communication is essential.

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