

Rocky Mountain Research Station

Science You Can Use *(in 5 minutes)*

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A Go-To Guide for Your Mastication Questions

When, Why, How to Masticate?

Mastication, a method once used almost exclusively by utility companies to reduce vegetation beneath power lines, is now also regarded as a useful treatment for preparing a site for planting, releasing sapling-sized trees, or reducing surface fuels in fire-prone forest ecosystems. However, not all mastication treatments are the same. Land managers must consider a number of factors when designing a mastication project:

- Can the mastication equipment move/navigate on the site?
- What type of equipment should be used?
- What is the preferred size of the masticated biomass—chunks or mulch?

For land managers wanting guidance on selecting a mastication treatment, *To Masticate or Not: Useful Tips for Treating Forest, Woodland, and Shrubland Vegetation*, a general technical report (GTR) published by the Rocky Mountain Research Station (RMRS) offers answers.

Mastication from Equipment to Fuel Loads

“The idea for this GTR was to provide all the possible information that would be useful for a land manager to read, evaluate, and make a decision as to whether or not mastication is a good method for their project,” said Terrie Jain, a research forester with the U.S. Forest Service RMRS and the GTR’s lead author. The GTR discusses equipment selection (what type of carrier machine, cutting head, or cutting-head attachment can be used) why operator experience should be considered when designing a treatment, and the economic costs of mastication.

The GTR also includes three decision trees to further assist land managers in their project deliberations: (1) The influence of slope when selecting treatment options, (2) Treatment options for slopes <40%, and (3) Equipment configurations. “We decided to include the decision trees because they are really handy for

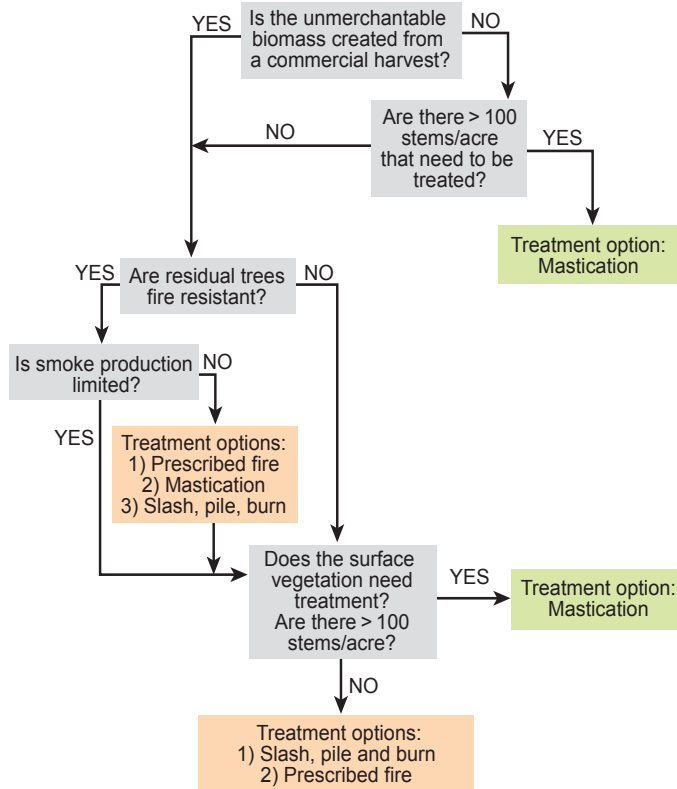
KEY FINDINGS

- *To Masticate or Not: Useful Tips for Treating Forest, Woodland, and Shrubland Vegetation* is a recent GTR that provides a synthesis of the science on ecological impacts of mastication and what land managers need to know about designing mastication projects.
- The GTR includes three decision trees that are designed to help land managers determine whether a mastication treatment is possible, and if so, the appropriate equipment to fulfill the management objectives.
- Mastication can increase the abundance of fine fuels, and if ignited these fuels can smolder for long periods; therefore, mastication may not always be an appropriate forest treatment.
- Soil nutrition is not adversely affected by mastication, and erosion and compaction are minimized when the machines are driven over masticated residue.
- An experienced operator can make the difference in reducing project costs and achieving the mastication treatment objectives.



In fire-prone forest ecosystems, mastication is an effective treatment for surface fuels. It can, however, increase the abundance of fine fuels, which potentially increases the fuel hazard. Photograph by Dana Mitchel, USFS.

Treatment options for slopes < 40%



To assist land managers in their project deliberations when deciding if a mastication project is appropriate for the given landscape or how it would be designed, the GTR includes three decision trees.

helping the land managers to critically think about what they're doing and why they're doing it," she said. "It also provides experienced people with a document to train new land managers coming into the field."

Other Mastication Considerations

Land managers may field questions from the public regarding how mastication may affect the landscape or influence future fire risk, and will find the Ecosystem Response section of the GTR useful. This section includes summaries drawn from the latest research on how mastication affects vegetation, wildlife and insect habitat, and fire-fuel characteristics. "One of the key points is not only do we talk about ecological consequences but also evaluate the effect upon fine fuels since mastication is used to treat fuels," Jain said. A review of current literature found that mastication can increase the abundance of fine fuels, which can potentially increase the fuel hazard. This increased fuel hazard is an important outcome that land managers must consider. In these situations, land managers may choose not to masticate all the biomass by leaving logs untreated or instructing the

FURTHER READING

Jain, T.B.; Sikkink, P.G.; Keefe, R.; Byrne, J.C. 2018. To masticate or not: Useful tips for treating forest, woodland, and shrubland vegetation. Gen. Tech. Rep. RMRS-GTR-381. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 55 p. www.fs.fed.us/rmrs/publications/masticate-or-not-useful-tips-treating-forest-woodland-and-shrubland-vegetation

Sikkink, G.P.; Jain, T.B.; Reardon, J.; Heinsch, F. Ann.; Keane, R.E.; Butler, B.; Baggett, L.S. 2017. Effect of particle aging on chemical characteristics, smoldering, and fire behavior in mixed-conifer masticated fuel. Forest Ecology and Management. 405: 150-165. www.fs.fed.us/rmrs/publications/effect-particle-aging-chemical-characteristics-smoldering-and-fire-behavior-mixed

Heinsch, F. Ann.; Sikkink, P.G.; Smith, H.Y.; and Retzlaff, M.L. 2018. Characterizing fire behavior from laboratory burns of multi-aged, mixed-conifer masticated fuels in the western United States. RMRS-RP-107. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 23 p. www.fs.fed.us/rmrs/publications/characterizing-fire-behavior-laboratory-burns-multi-aged-mixed-conifer-masticated-fuels

operator to create larger pieces of biomass to reduce the abundance of fine fuels.

While writing the publication, Jain received a number of mastication related questions from land managers, and these questions were integrated into a report to make it even more manager friendly. Although land managers are the primary audience for this technical report, Jain said private landowners or consulting foresters who are considering mastication treatments will find the document useful. "Mastication is a viable way to treat understory vegetation if other options are not available," she explained. "It's an important tool that should be in your toolbox."

Theresa Jain is a Research Forester with the U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station in Moscow, Idaho. Her research focus is integrating silviculture research and management applications. Jain can be contacted at <https://www.fs.fed.us/rmrs/people/tjain>

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