



2016-2017 Gambel Oak Understory Study Summary

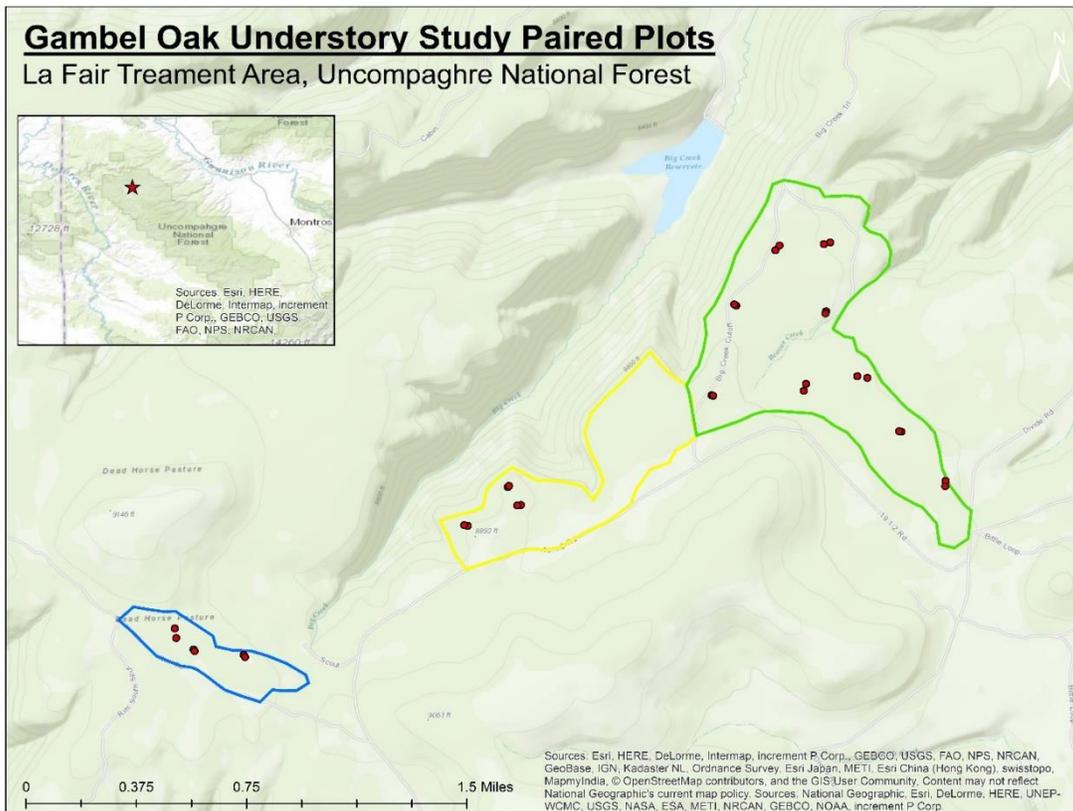
CFRI-1707

Vegetation management and fuel mitigation treatments are increasingly used to reduce fuel hazard, alter fire behavior, and restore ecosystem structure and function. Regionally, fire mitigation treatments including thinning and/or prescribed fire are often implemented in ecosystems where Gambel oak (*Quercus gambelii*) is a major component species which has contrasting management concerns as it is both important wildlife habitat and a hazardous ladder fuel. Understory vegetation response to the removal of Gambel oak is important for wildlife managers to ensure the overall improvement of browse potential of many understory grass, forb and shrub species. However, little is known about understory vegetation response to Gambel oak treatments (cutting, mowing, or prescribed burning).

Thus, treatments aimed at reducing Gambel oak may or may not actually improve wildlife browse potential. Although some information on understory vegetation response to Gambel oak treatments exists, much of this research was developed for the Southwestern U.S., and may not reflect the unique environmental conditions on the Uncompahgre Plateau nor the conditions of the northern extent of Gambel oak's range in Colorado. At the northern extent of its range in the Uncompahgre Plateau and Front Range Mountains, Gambel oak often grows as a low shrub, whereas in the southern extent of its range, the oak may grow as tall shrubs or large mature trees. Due to this variability, it is unclear whether information and research on Gambel oak from the Southwestern U.S. applies to the northern extent of its range in Colorado. Locally-relevant information on Gambel oak management is greatly needed to understand understory vegetation response to cutting and prescribed burning treatments in this species.



Photo (above) depicting a common Gambel oak patch surrounded by ponderosa pine in the La Fair treatment unit in the northern Uncompahgre Plateau, CO.



Map (above) of La Fair treatment areas 1A, 1B, 1C, and paired plots (red dots) on the Uncompaghre Plateau.

In 2016, the Colorado Forest Restoration Institute (CFRI), in partnership with the Uncompaghre Plateau Collaborative Forest Landscape Restoration Program, set out to research how Gambel oak treatments such as cutting, mowing, and prescribed fire influence Gambel oak growth and understory vegetation, particularly for the purposes of improving wildlife habitat and browse potential and to better inform the effectiveness of treatments in Gambel oak on the western slope of Colorado.

CFRI aims to answer the following research questions:

- 1) How does understory vegetation respond to treatments (mowing or prescribed burning) of Gambel oak?
- 2) What is the growth response of Gambel oak following treatments in terms of density and growth of sprouts?
- 3) What influence does Gambel oak treatment have on conifer regeneration?

CFRI implemented a paired plot study design in randomly located nearby patches of Gambel oak within the La Fair treatment area in the northern part of the Uncompaghre Plateau (see map above). For each paired patch, one patch will be randomly mowed and the other will not (i.e. remain a control plot). Patches were selected that were similar in patch size and size of Gambel oak within each patch.

CFRI collected pre-treatment data from 15 paired plots (total of 30 plots) in the La Fair treatment unit in July 2016. Paired plots were randomly located within treatment areas. Within 3m radius circular plots, regenerating and overstory stems of Gambel oak and other tree species were measured. Understory vegetation (by species cover and abundance), other ground cover variables, and abiotic conditions of

each paired plot were also measured (see plot depiction below). The La Fair treatment area experienced mowing treatments to manage Gambel oak, aspen, and small diameter ponderosa pine in late summer 2016. During 2016 mowing treatments, patches containing one of each paired plot were randomly mowed and the other remained as an unmowed control.

CFRI returned to relocate and remeasure mowed and unmowed paired plots in July 2017, and will perform analyses and present the results to the Uncompaghre Plateau Collaborative Forest Landscape Restoration group in early 2018.

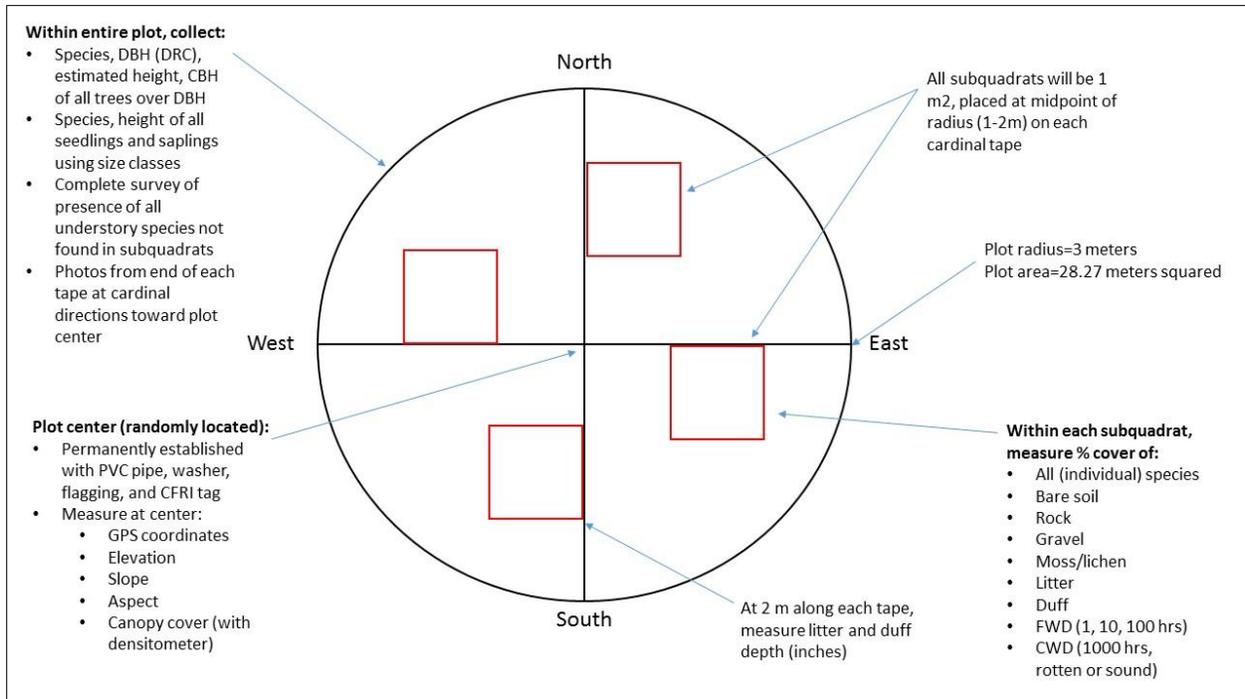


At left: Gambel oak patch in the La Fair treatment area prior to treatment (top left); patch mowed following treatment (middle left).



Below: 1 m² subplot prior to treatment (bottom left) and following treatment (bottom right).





Plot depiction (below). Transects were placed along cardinal directions 3 m from a permanently established plot center. Tree species height, DBH, CBH; tree seedlings and saplings species and size class; and understory species presence were measured for the entire plot. Within 1 m² subplots centered on each transect, understory species and forest floor cover was recorded. Plot-level topographic variables, such as elevation, slope and aspect, were measured at plot center.

The USFS Grand Mesa Ranger District has plans to follow mowing treatments within the La Fair treatment area with prescribed burning in 2017-2018. Once prescribed burning has taken place, CFRI will return to remeasure all plots at least once following burning. If funding allows, CFRI will remeasure plots to examine understory vegetation and Gambel oak resprouting response a few years after both mowing and prescribed burning for a longer-term assessment of Gambel oak and understory recovery following treatments. Short and longer-term results from this study will provide information on how two management practices in Gambel oak, including mowing and prescribed fire, effect changes in Gambel oak structure, regeneration, and interactions with understory vegetation.