



Research Brief for Resource Managers

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Responses of animal abundance and diversity to forest thinning in North America

Verschuyt, J., S. Riffell, D. Miller, and T. Bently Wigley. 2011. Biodiversity response to intensive biomass production from forest thinning in North American forests – A meta-analysis. Forest Ecology and Management 261:221-232.

Mechanical forest thinning is widely applied in North America for commercial purposes, and to restore or otherwise modify potential fire behavior. It is also increasingly being viewed as a means for meeting alternative energy demands. In a 2011 paper in the journal *Forest Ecology and Management*, researchers examined the short-term consequences of this practice for forest animal abundance and diversity by summarizing the results of 33 studies that, together, documented over 500 animal population and community responses to forest thinning treatments throughout the continent.

Researchers organized their summary using a variety of criteria - by metric (species diversity, abundance within taxa/guilds, abundances of individual species), by animal type (bird, mammal, reptile, amphibian, invertebrate), by region (NE, SE, SW, NW), by thinning type (pre-commercial, commercial, fuels treatment), and by thinning intensity (light thin, moderate thin, heavy thin). Abundance and diversity data were collected six months to 24 years after thinning.

At the continental scale, across most thinning types and intensities, researchers concluded that thinning generally increases the abundance and diversity of most animal taxa, and that the

Management Implications

- The responses of avian and mammalian abundance and diversity to forest thinning in North America are usually relatively small, and rarely negative.
- Light and moderate thinning intensities typically associated with fuel treatments tend to increase avian and mammalian abundance and diversity, whereas heavy thinning intensities (>66% basal area removed) are more likely to result in decreases or no changes at all.
- Responses to thinning treatments will vary to some extent by forest type, and response of any single target species may not always follow the trend seen for the majority of species.

magnitude of response to forest thinning, whether positive or negative, is usually small.

The majority of studies available to the researchers pertained to birds and mammals. For birds, looking at patterns for all regions and thinning intensities combined, responses to thinning were positive for most measures of abundance and diversity, and negative for none. The same was true for mammals.

For the southwest region in particular (including California), avian and mammalian responses largely matched patterns seen at the continental

scale. Amphibian, reptile, and invertebrate responses to forest thinning in the southwest could not be assessed due to the lack of available data.

Animal responses sometimes depended on thinning type and/or thinning intensity. Most measures of avian and mammalian abundance and diversity were higher in lightly and moderately thinned stands when compared to nearby untreated stands, but abundance and diversity in heavily thinned stands was generally no different, and in some cases lower, than in untreated stands. This finding may explain why the positive effects seen for fuels treatment thins—all of which were light or moderate intensity—were consistently greater than those seen for pre-commercial and commercial thins, which tended to be of higher intensity.

Possible reasons for the observed positive effects of thinning on animal abundance and diversity may include increases in forest productivity, reduced dominance by competitively superior species, and redevelopment of the understory shrub and herbaceous layers.

Importantly, the researchers pointed out that responses to thinning treatments will vary by forest type, and the response of any single target species may not follow the trend seen by the majority of species.

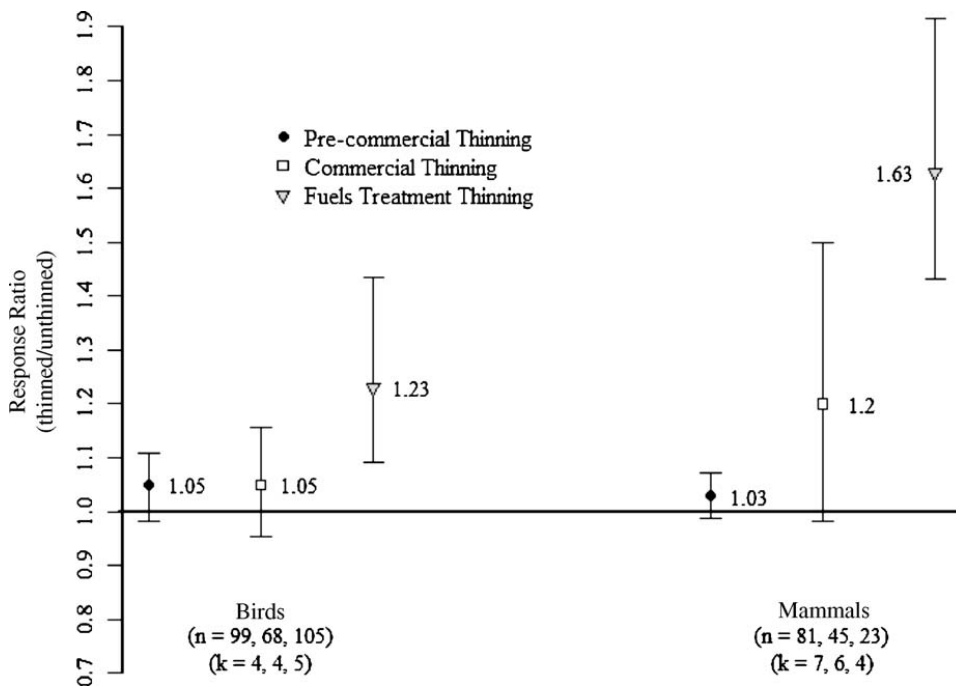
Suggestions for further reading:

Amacher, A.J., R.H. Barrett, J.J. Moghaddas, and S.L. Stephens. 2008. Preliminary effects of fire and mechanical fuel treatments on the abundance of small mammals in the mixed-conifer forest of the Sierra Nevada. *Forest Ecology and Management* 255:3193-3202.

Kalies, E.L., C.L. Chambers, W.W. Covington. 2010. Wildlife responses to thinning and burning treatments in southwestern conifer forests: a meta-analysis. *Forest Ecology and Management* 259:333-342.

Meyer, M.D., D.A. Kelt, and M.P. North. 2007. Effects of burning and thinning on lodgepole chipmunks (*Neotamias speciosus*) in the Sierra Nevada, California. *Northwestern Naturalist* 88:61-72.

Siegel, R.B., and D.F. DeSante. 2003. Bird communities in thinned versus unthinned Sierran mixed conifer stands. *Wilson Bulletin* 115:155-165.



Avian and mammalian responses to different types of forest thinning in North America. Responses shown as the ratios of abundance and diversity in thinned areas divided by that in nearby unthinned areas, with bars indicating 95% confidence intervals. For fuels treatments, confidence intervals were completely above 1.0, indicating a significant positive effect of thinning. Confidence intervals for other types of thinning included 1.0, indicating no significant thinning effect.