

# Lake States Fire Science Consortium

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## Optimizing burn regimes to maintain snags for savanna birds in Minnesota

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Loss of fire-dependent habitat, like oak savannas, is associated with a decline in bird species that depend on these important habitats. Fire-sensitive trees that are killed by prescribed burns in savannas become standing dead trees (snags) on the landscape which provide habitat for bird nesting and territorial and mating displays. However, the response of snag abundance to fire and subsequent role of snags in providing habitat for specialist birds has not been investigated. Davis and Miller (2018) investigated relationships among fire, snag abundance, and breeding bird populations in an oak savanna in Minnesota from 1995 – 2017.

This study was conducted in oak savanna at the Cedar Creek Ecosystem Science Reserve, which has been under prescribed burn restoration since 1964. Field surveys were conducted for three distinct burn units: unit 1 was burned 14 times since 1987, unit 2 was burned 8 times since 1992, and unit 3 was burned 8 times since 1997. The status of all tree stems > 2 cm DBH was monitored yearly from 1995 – 2017 within the study grid. A total of sixteen 50-m radius bird census plots were established throughout the three burn units for bird point count censuses. At each bird census plot, observers documented early morning (0600-0930) bird visits to 14 pairs of dead and nearby live trees of comparable size for hour-long periods at each of the 16 census plots. The following vegetation data was also recorded at each census plot: number of snags, ratio of snags to live trees, live tree basal area, and canopy extent of live and dead trees.

Across the entire burned area, small snag (10 – 25 cm DBH) abundance was stable from 1995 – 2001 but had



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### MANAGEMENT IMPLICATIONS

1. Large snag abundance initially increased but then declined with repeated burns, and small snag abundance consistently declined as restoration progressed.
2. Snag abundance was positively related to breeding bird populations, including species in decline like red-headed woodpeckers and lark sparrows. No negative effects were observed.
3. Live and dead trees supported different types of bird behaviors: live trees were used more frequently for foraging, whereas dead trees were used for reproductive behaviors.
4. Monitoring snag abundance and characteristics in northern oak savannas and similar habitats may help managers adapt management and prescribed burn plans to support breeding bird populations.

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## Research Brief for Resource Managers

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declined by more than 60 % by 2017. Large snag (> 25 cm DBH) abundance was stable for the first five years, then increased and peaked from 2001 – 2007 before exhibiting a steady decline until 2017. As the number of burns increased and savanna restoration progressed, bird guilds shifted from insectivorous air salliers (e.g. flycatchers) to insectivorous bark gleaners (e.g. woodpeckers). Bird species richness and density increased with increasing snag abundance. Four of the bird guilds and 13 bird species, including red-headed woodpeckers and lark sparrows, increased with snag abundance; none of the guilds declined as snag abundance increased. During field observations, more bird species were seen on dead trees than live trees. Live trees were used more frequently for foraging, while dead trees were used for reproductive behaviors.

Protecting individual snags during prescribed burns or increasing time between burns to prolong snag abundance may benefit savanna bird communities. Furthermore, snag features relating to size, tree species, and extent of decay may also influence which birds utilize a particular snag. Thus, additional information about relationships between snag features and rare or declining bird species has the potential to improve management for species of concern.

## Reference

*Davis, M.A., Miller, A., 2018. Savanna restoration using fire benefits birds utilizing dead trees, up to a point. American Midland Naturalist 179, 94–104.*