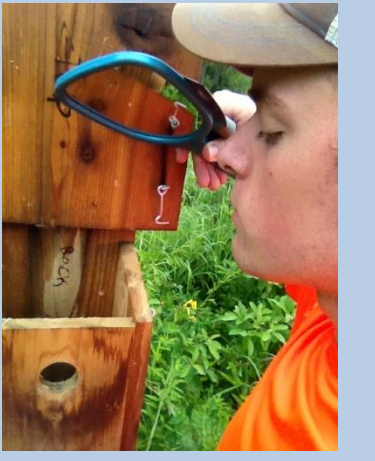


Prescribed burning effects on nesting by Eastern Bluebirds (*Sialia sialis*) in a restored Ozark border landscape

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Fire and bluebirds

- Prescribed fire is a common management practice used in restoration ecology.
- Though prescribed burning is a common practice, the effects on bluebird nesting are unknown.
- Fire could reduce bluebird nesting by limiting food sources (bottom-up control).
- Fire can also induce top-down controls on bluebird populations by exposing mesopredators (snakes) to upper-level predators, leading to increased nest success due to lower predation rates in burned areas (Wilgers, Horne, 2007).
- Dataset compiled by citizen-scientists at Shaw Nature Reserve for the previous eight years was utilized to test hypotheses.



Photo Taken by Ken Thomas



Lynn Buchanan (back, left), with the assistance of Jill (front) and Yvonne (right), monitor a nest box at Shaw Nature Reserve. Photo courtesy of Lynn Buchanan

Materials and Methods

Shaw Nature Reserve, the study site for the experiment, covers over 2,400 acres (~10km²) and has been restored to display native landscapes in part by prescribed burning events (Shaw Nature Reserve, 2017). The Bluebird Trail at SNR consists of 85 nest boxes. Box monitoring occurs weekly from April to August. Each box is opened and observations are made and then recorded on datasheets. Each box is in a designated management unit at SNR, so a Garmin GPS device was used to record the location of each box to allow for appropriate analysis. Data analysis was performed using a logistic exposure model to predict daily survival and predation rates for each nest attempt in a given year. In this scenario, the fate of a nest was modeled with days as a predictor of success. The management units were separated by whether or not they are mowed or burned for management. Then the rates for the respective management types were compared to test the effect of fire using whether or not a unit had been burned as a predictor of nest fate. To determine the effect of time since fire, only the observations for which time since fire was less than or equal to three years were used due to the majority of observations occurring in that timeframe. Similar to the previous two analyses, time since fire was used as a predictor of nest fate.

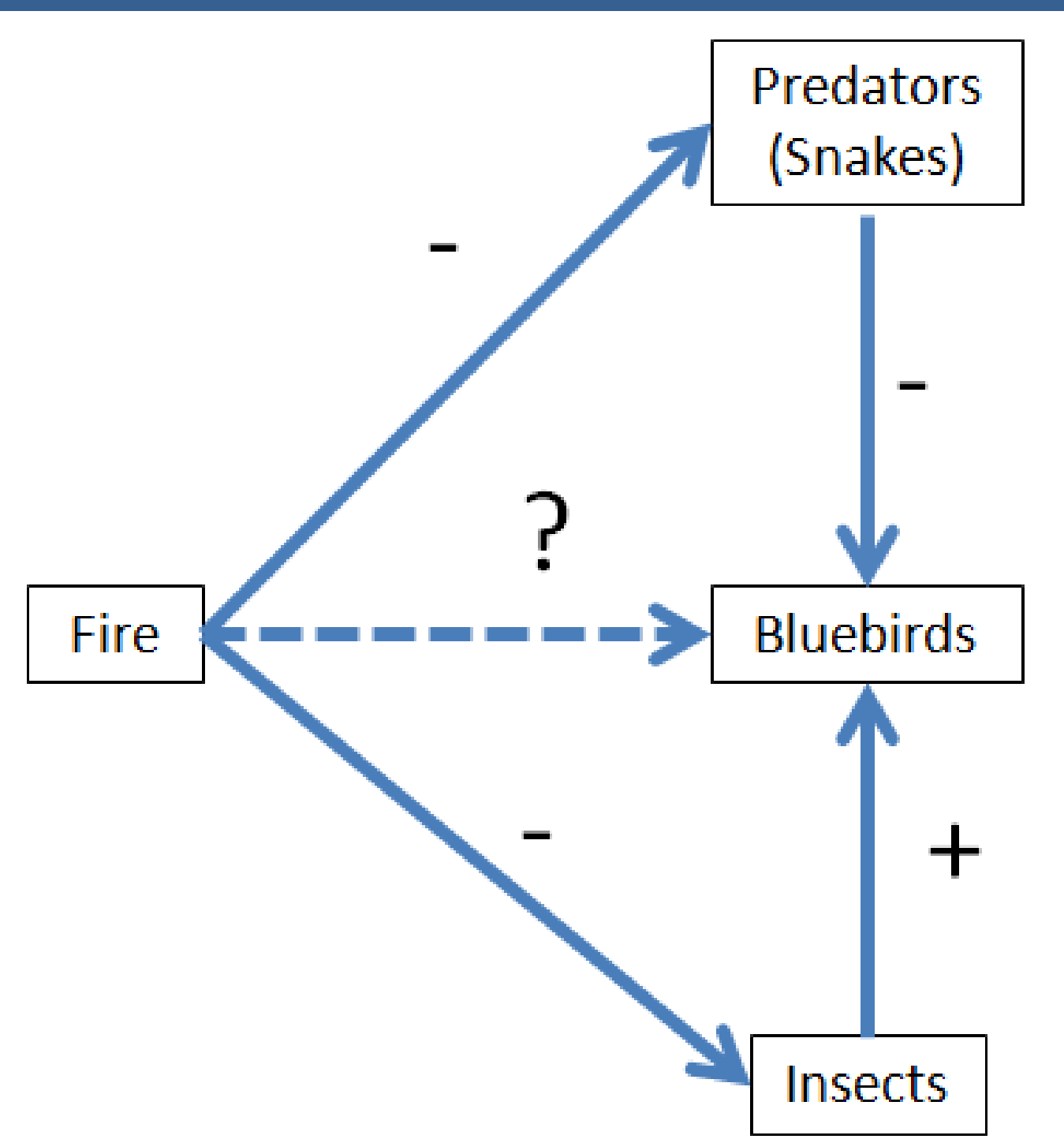
Results

- Prescribed burning and time since fire do not significantly aid or harm ($p > 0.05$) Eastern Bluebirds and other bird species utilizing the nest boxes at Shaw Nature Reserve.

Species	Average Nest Success (%) ±(SE)	Average Snake Predation Rate (%) ±(SE)	Annual Trend	Effect of Fire
Eastern Bluebird	90.8(0.5)	4.6(0.3)	No	No
House Wren	92.1(0.1)	4.0(0.3)	No	No
Tree Swallow	92.1(0.1)	4.8(0.4)	No	No

Average success and predation rates of nesting attempts in bird boxes at Shaw Nature Reserve

- Daily survival rate is 99.8+% for all species, regardless of burning or mowing for management.
- Daily predation rates are extremely low for all species under both management types.
- The average number of eggs and fledglings do not change significantly between burned and mowed units.



What we found

- Eastern Bluebird, House Wren, and Tree Swallow nests at Shaw Nature Reserve are succeeding at high rates.
- Contrary to our expectations, prescribed burning did not aid, nor harm, bluebird nest success.
- In addition to high rates of nest survival, predation rates were very low.
- Prescribed burning also did not affect the daily predation rate nor did it lead to an increase in the number of eggs or fledglings per nest.



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