



Impacts of Invasive Trees on Nesting Success of Breeding Birds in Missouri River Riparian Forests

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Introduction

- Missouri River riparian forests support a high abundance and diversity of birds^{3,5}.
- River management practices decrease geomorphic dynamism reducing colonization of pioneer species such as plains cottonwood (*Populus deltoides*) and willow (*Salix spp.*).
- Corollary invasion of upland native plant species eastern red cedar (ERC; *Juniperus virginiana*) (Fig. 1) and non-native species such as Russian olive (RO; *Elaeagnus angustifolia*) (Fig. 2)^{1,2}.
- Cues used by birds to select nesting habitat may become unreliable when invasive species are chosen as nesting sites.^{4,7,8}
- Invasive plants may increase risk of nest predation and reduce reproductive success for birds^{6,8}.

Objectives

- Assess invasive tree species influence on daily nest survival rate (DSR) of breeding birds in Missouri River riparian forests.
- Determine what nest-site (e.g. vegetation cover, nest tree species, nest height) and nest-patch scale habitat features (e.g. number and composition of stems, shrubs, and trees; distance to edge) affect DSR.
- Understand what temporal factors (e.g. time of season, nest stage, and year) influence DSR.

Study Area and Methods

- Systematic nest searches from May to early August at 6 sites with variable invasive tree elements along the 59-mile MNR (Fig. 3).
- Nest monitoring every 3-5 days to determine success or failure of nesting attempt.
- Vegetation surveys to assess vegetation structure and composition around at nest-site and nest-patch scales.
- Program MARK used for analysis of daily nest survival with vegetation characteristic covariates.



Figure 1. Eastern red cedar (*Juniperus virginiana*)



Figure 2. Russian olive (*Elaeagnus angustifolia*)

- RO most widely used nest tree (Figs 4, 5).
- ERC not common nest tree (Fig 5), no consistent DSR trends (Fig 4).
- 2016-2017: 268 nests of 24 bird species (Fig 6). DSR generally lower in RO than in native plants for individual species and for all birds combined (Fig 4).
- 2018: 220 nests of 18 bird species (Fig 6). DSR generally higher in RO than in native plants for individual species and all birds (Fig 4).

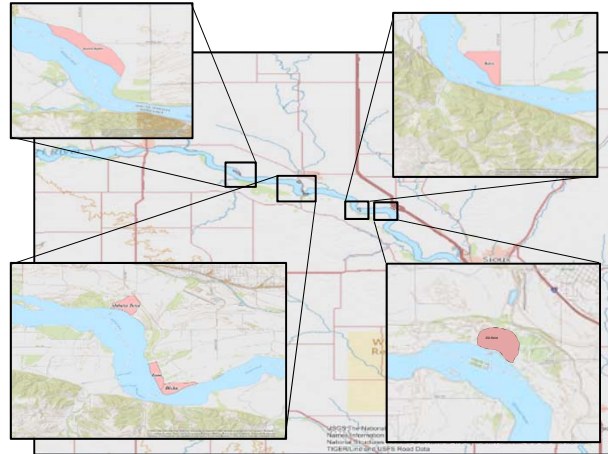


Figure 3. Survey sites along the Missouri River in southeastern South Dakota.

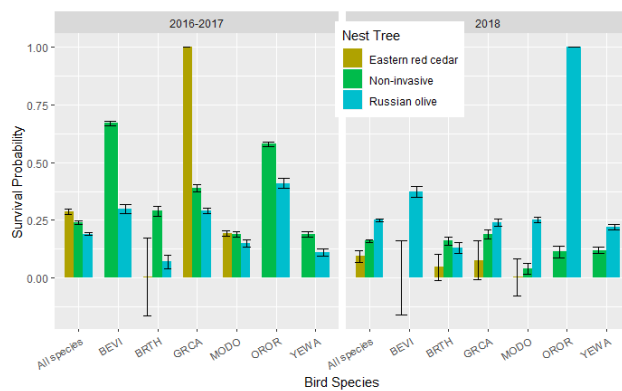


Figure 4. Variation in cumulative nest survival rate in RO, ERC, and native tree species.

- Preliminary data suggest that while many birds nested in invasive trees, there was wide variation in daily nest survival probability among bird species, years, and nesting substrate types.
- Effect of Russian olive nest-site selection on breeding success was not consistent among bird species or years.
- Eastern red cedar similarly variable, but less used as nesting substrate.

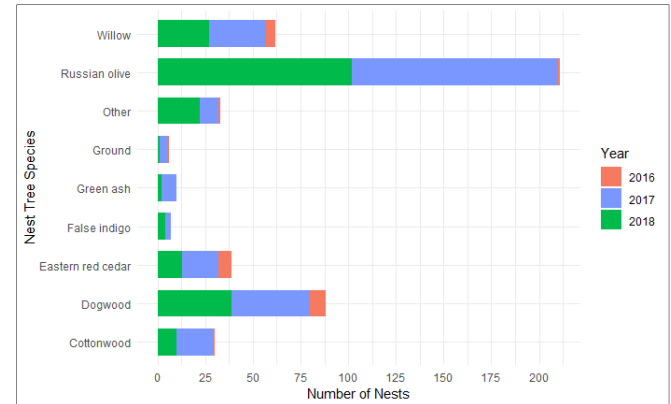


Figure 5. Numbers of nests in different tree species from 2016-2018.

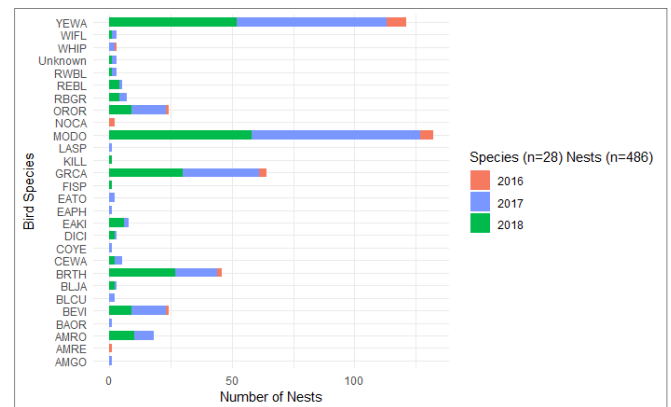


Figure 6. Numbers of bird nests found from 2016-2018.

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