

Multiflora Rose removal from riparian forests along the Hudson River and its effect on native migratory bird species diversity.

Miller, M.S.

Ecology, Ecosystems, and the Environment, University of Vermont, Burlington, VT, USA

INTRODUCTION

- Nearly two hundred species of neotropical migratory birds breed in, or migrate through, the Hudson Valley each year due to its position along the Atlantic Flyway. Many species, including the endangered Wood Thrush and Cerulean Warbler, have experienced population decline over the past 40 years due to habitat degradation and disturbances to forest understories (Audubon, 2017). Those species of birds nesting in forest understories that have experienced an overall population growth, such as Gray Catbirds, have often been found nesting in Multiflora Rose (Schlossberg & King, 2010). However, there is increasing evidence that the invasive species, Multiflora Rose, reduces the richness of breeding bird species inhabiting riparian forest fragments (Massé & Vulinec, 2010). As the landscape becomes more dominated by invasive species, native birds are more likely to prefer invasive nesting sites that outcompete native shrubs (Meyer et al., 2015).

Multiflora Rose (Fig. 1) is a deciduous, thorny shrub native to Japan, often forming dense thickets which outcompete native plants for resources and space through direct or indirect competition (Banasiak & Meiners, 2009). The plant produces rose hips which develop in the late summer-fall and remain on the plant throughout the winter (LHPRISM). The hips are consumed by many species of birds, including the American Robin, despite containing fewer nutritional constituents than native shrub fruits (Smith et al., 2013). Consequentially, birds serve as seed vectors for the plant, and the consumption of fruits from invasive species may exacerbate invasion on the landscape, perpetually diminishing habitat quality for many native migratory birds in riparian forests (Labbé & King, 2020).



Fig. 1 Multiflora Rose (*Rosa Multiflora*) (LHPRISM, 2020).

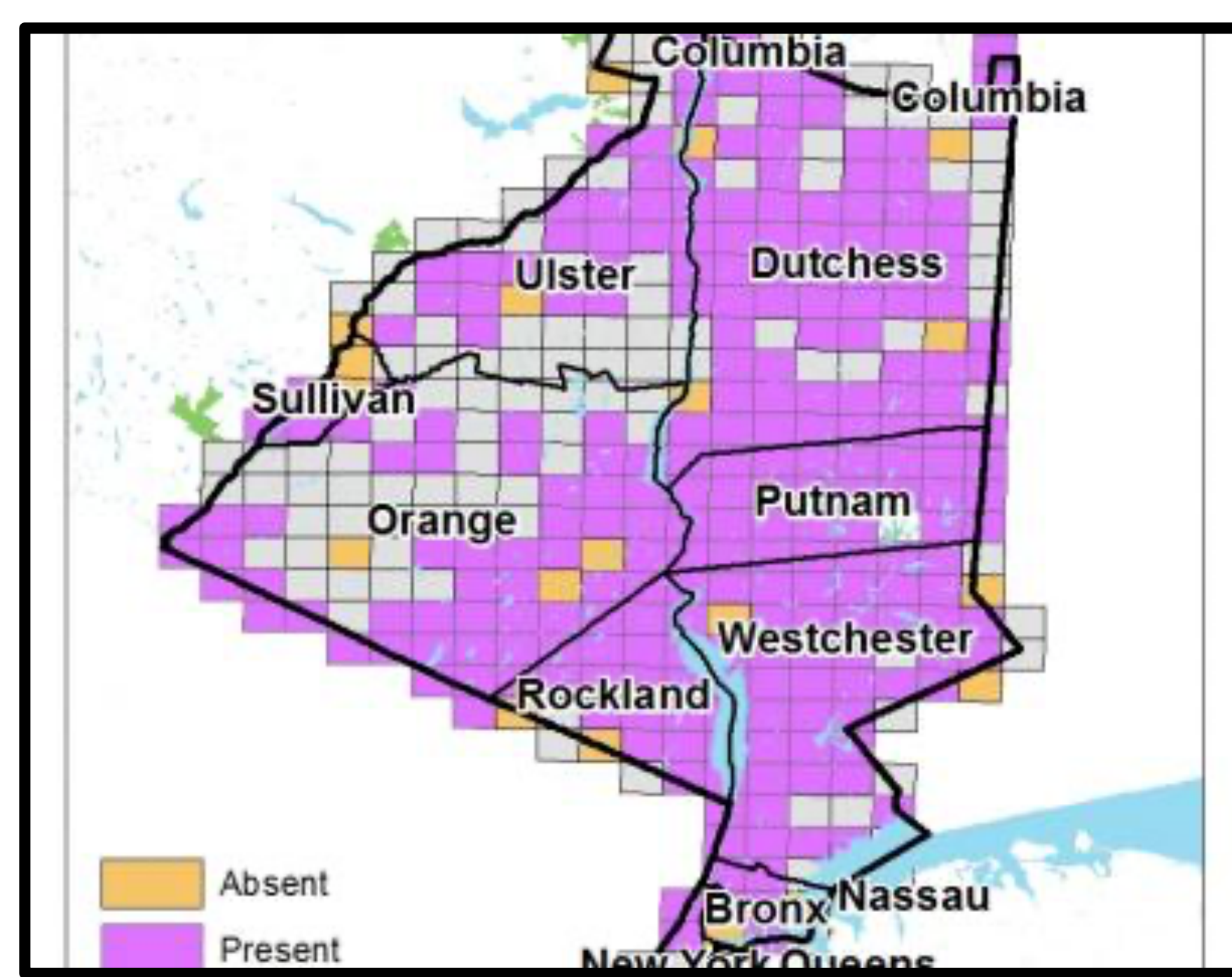


Fig. 2 Multiflora Rose presence along Hudson River, a map of potential sites (LHPRISM, 2020).

OBJECTIVES

Purpose:

- This study aims to understand how efforts to eradicate Multiflora Rose, which competes with more nutritious native fruits, will affect the diversity of migratory bird species in riparian forests which have found replacement nesting sites and supplementary nutrition from this invasive plant.

Hypothesis:

- There is a relationship between Multiflora Rose removal and songbird diversity.

Prediction:

- Biological invaders can serve critical ecological roles, particularly where they have been long-established or effectively replaced functionally similar native species. In such cases, eradicating invasions can have unintended consequences on other components of the ecosystem (Valente et al., 2019). In this case, it is predicted that as Multiflora Rose abundance is reduced, songbird diversity will reduce, while d) random patterns of removal will mitigate such effects (Fig 3.).

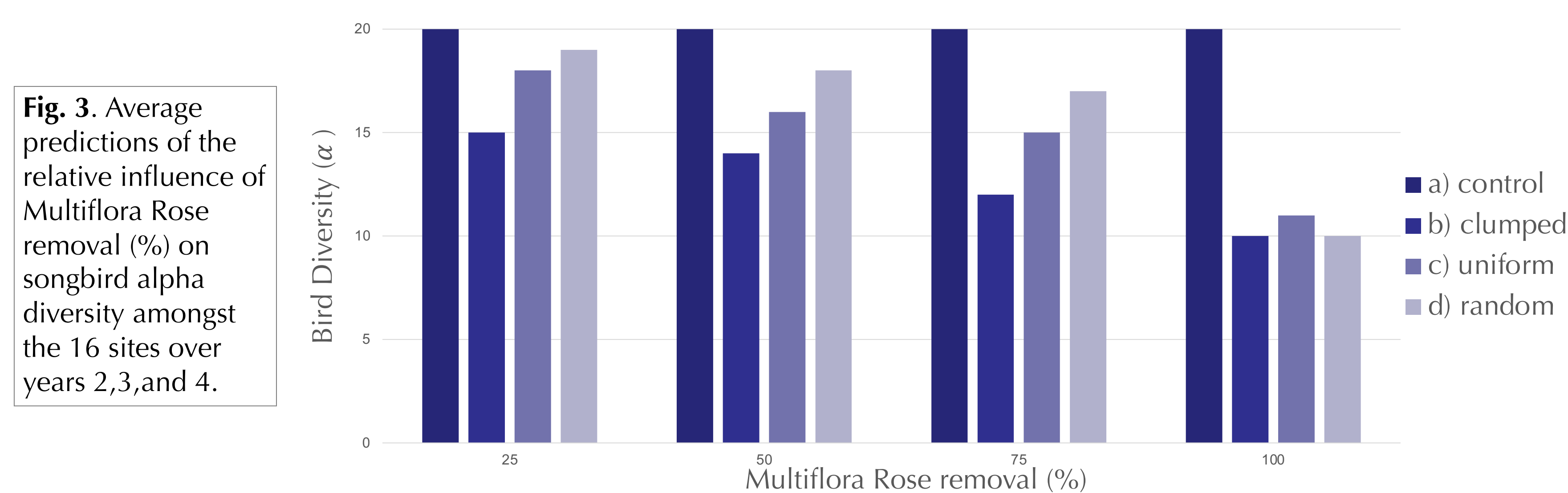


Fig. 3. Average predictions of the relative influence of Multiflora Rose removal (%) on songbird alpha diversity amongst the 16 sites over years 2,3, and 4.

METHODS

Study Sites:

- A total of 16 sites along the Hudson River will be selected. Locations will be standardized to the Hudson River's Important Bird Areas (IBA) scientific criteria, home to assemblages of bird species of concern to the state. The standardization of survey locations is intended to reduce the number of extraneous factors influencing bird diversity, and to maintain consistency throughout all sites, beyond the intentional manipulation of Multiflora Rose abundance. (Fig. 2)

Field Methods:

- Sites will be surveyed for Multiflora Rose abundance, measured by an average plant cover (sq. meters) per site (5,550 sq. m.) along transects that are 550 m in length, 10 m in width, and located 5 m off the riverbank. The first year, bird diversity will be monitored on all 16 sites. The transects will be visited twice between May and June when bird breeding and nesting activities are at their peak, and twice between September and October when Multiflora Rose is exhibiting maximum fruit yield (LHPRISM, 2020). Transects will be walked and surveyed for birds through sight and sound identification (Valente et al., 2019). Alpha α , beta β , and gamma γ diversity will be calculated.
- The second, third, and fourth year, Multiflora Rose abundance will be manipulated along a gradient. 4 sites will remain unmanipulated as a) controls (Fig. 4), 3 sites will have 25% of Multiflora Rose cover removed, 3 sites will have 50% removed, 3 sites will have 75% removed, and 3 sites will have 100% of Multiflora Rose cover removed (Valente et al., 2019). Each of the 3 sites under 25%, 50%, and 75% removal treatments will iterate Multiflora Rose removal according to different patterns of dispersal: b) clumped, c) uniform, or d) random (Fig. 4). All sites will be equally distributed along the river and randomly selected to each treatment. Bird diversity will be calculated using the same techniques as the first year.

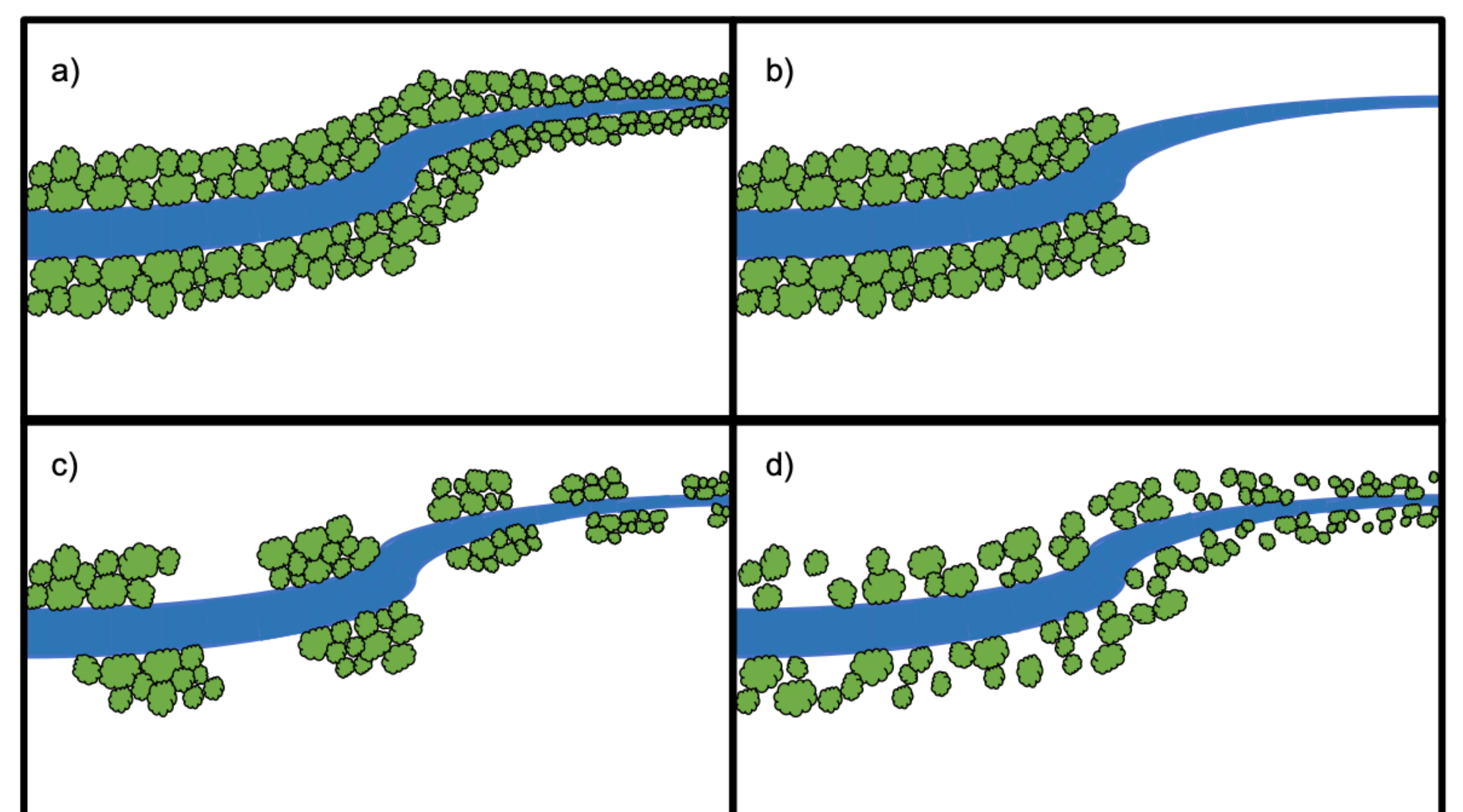


Fig. 4. Patterns of Multiflora Rose dispersal treatments (Valente et al., 2019).

Statistical Analysis:

- Statistical analysis of the resulting data will be conducted using ANOVA to attain a p value which may strengthen any correlations between Multiflora Rose removal and changes in bird diversity identified at the 16 varying sites, offering a spatial and temporal scope.

MANAGEMENT IMPLICATIONS

- Invasive flora are a growing conservation concern, often threatening mature forests and altering native flora and fauna assemblages (Serniak et al., 2017).
- Assuming the eradication Multiflora Rose exhibits a negative influence on bird species, then removing it in a pattern which best supports bird populations should be emphasized in riparian forest management along the Hudson River. This study will help inform conservation strategies towards songbird populations, potentially extending towards future studies on invasive species and ecological traps.

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