

# An Assessment of Reed Canarygrass in Northern U.S. Forests

# Research Note NRS-200

This publication is part of a series that provides an overview of the presence of invasive plant species monitored on an extensive systematic network of plots measured by the Forest Inventory and Analysis (FIA) program of the U.S. Forest Service, Northern Research Station (NRS). Each research note in this series features one of the invasive plants monitored on forested plots by FIA in the 24 states of the Midwestern and Northeastern United States.

## Background and Characteristics

Reed canarygrass (*Phalaris arundinacea*) is a cool-season perennial grass that can survive in a wide range of environmental conditions. It is native to Eurasia and North America; however over the past 100 years, several cultivars have been bred for forage, bioenergy, ornamental use, and restoration (Lavergne and Molofsky 2004). Distinguishing between native and nonnative strains is very difficult. It is believed that most colonies in the Midwest are of Eurasian origin (Czarapata 2005).

Reed canarygrass has optimal growth in full sun but is able to tolerate some shade. Where it is found, this species often forms dense colonies (Fig. 1) that reduce wildlife quality and restrict the growth of other species. Despite its ability to quickly invade an area, this aggressive invader is still planted for a wide variety of uses due to its vigor, low cost, and widespread availability (Kurtz 2013).

The latitudinal range where reed canarygrass is most abundant in Europe coincides with its distribution in the American Midwest. Since reed canarygrass is a cool-season grass, it is predicted that its distribution will shift northward with climate change (Kurtz 2010, Laverge and Molofsky 2004).

## Description

**Growth:** tall (can reach >6 feet), rhizomatous grass with hairless stems and flat, tapering leaf blades which are rough in texture (both surfaces).

**Reproduction:** seed and rhizomes; plants bloom in the spring (Fig. 2).

**Habitat:** most prevalent in wet areas but tolerates a wide range of conditions; occurring in pastures, forests, fields, and along roadways.

**Growth conditions:** low drought tolerance (30 to 65 inches of annual precipitation), high anaerobic tolerance (can withstand continuous inundation for 60 to 70 days), moderate tolerance of saline and calcareous soils, intolerant of coarse soils, 14 inch minimum rooting depth, pH of 5.5 to 8.0, ≥120 frost free days, and hardy to -38 °F.

**Control:** various mechanical and chemical methods including using both in tandem (such as tilling and herbicide application); it is difficult to eradicate established colonies due to large seedbanks (Czarapata 2005, NRCS 2014).

## Range

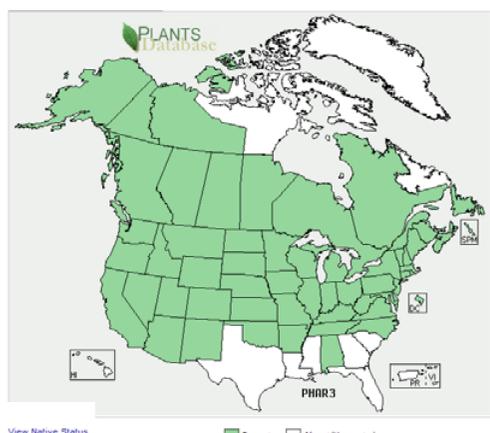
Reed canarygrass is currently found in 43 states, 10 Canadian provinces (not present in Labrador), two territories, Saint Pierre, and Miquelon (Fig. 3) (NRCS 2014).



**Figure 1.—Reed canarygrass infestation.** (Jamie Nielsen, University of Alaska Fairbanks, Cooperative Extension Service, Bugwood.org).



**Figure 2.—Reed canarygrass in flower.** (Tom Heutte, U.S. Forest Service, Bugwood.org)

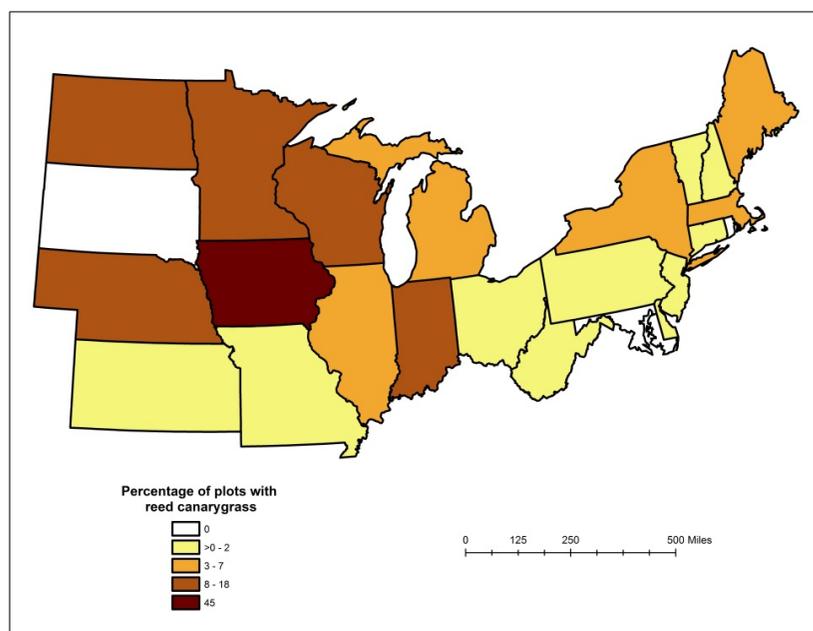


**Figure 3.—Reed canarygrass presence, U.S. and Canada.** (NRCS 2014)

## Reed Canarygrass Presence on Phase 2 Invasive Plots

FIA crews visited 7,579 forested Phase 2 (P2) Invasive plots across the NRS region between 2008 and 2012. Forty-three invasive plant species (IPS)<sup>1</sup> and one undifferentiated genus (nonnative bush honeysuckles)<sup>2</sup> were monitored. On each of these plots, which were measured in the summer, various attributes were collected including the occurrence and coverage of IPS as well as the standard forest variables measured on P2 plots (e.g., tree diameter, height). Overall, 49.5 percent of forested plots had one or more of the monitored invasives present.

Reed canarygrass was the third most commonly observed invasive plant species, after multiflora rose and garlic mustard. This invasive graminoid was found on 611 plots (8 percent) and occurred in 21 of the 24 states (Fig. 4). It was not found on plots in Maryland, South Dakota, and Rhode Island. However, according to the Plants Database (NRCS 2014), reed canarygrass occurs in all 24 NRS states. Iowa had the highest percentage of plots with reed canarygrass (45 percent). Additional information about the species monitored and county level occurrence maps for the NRS region from 2005 through 2010 can be found in Kurtz (2013).



**Reed canarygrass.** (Jamie Nielsen, University of Alaska Fairbanks, Cooperative Extension Service, Bugwood.org)

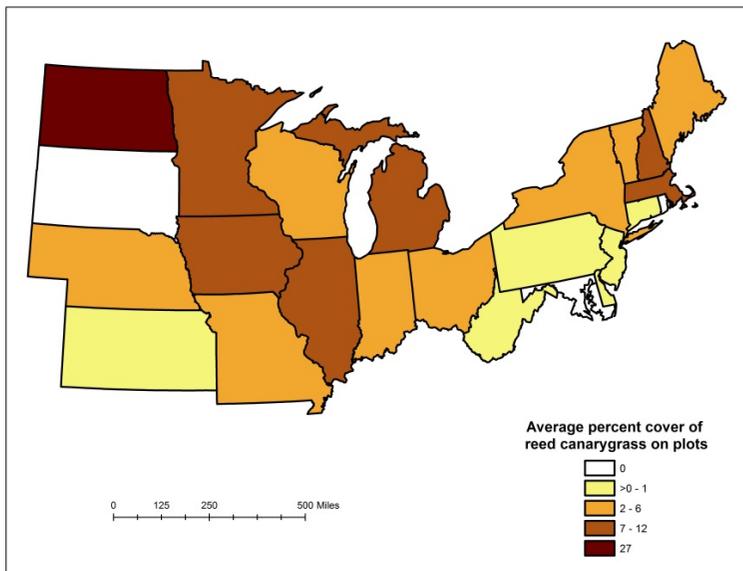
**Figure 4.—Inventory reporting area showing percent of Phase 2 Invasive plots with reed canarygrass, 2008-2012.**

<sup>1</sup>Amur honeysuckle (*Lonicera maackii*), autumn olive (*Elaeagnus umbellata*), black locust (*Robinia pseudoacacia*), Bohemian knotweed (*Polygonum xbohemicum*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), Chinaberry (*Melia azedarach*), common barberry (*Berberis vulgaris*), common buckthorn (*Rhamnus cathartica*), common reed (*Phragmites australis*), creeping jenny (*Lysimachia nummularia*), dames rocket (*Hesperis matronalis*), English ivy (*Hedera helix*), European cranberrybush (*Viburnum opulus*), European privet (*Ligustrum vulgare*), European swallow-wort (*Cynanchum rossicum*), garlic mustard (*Alliaria petiolata*), giant knotweed (*Polygonum sachalinense*), glossy buckthorn (*Frangula alnus*), Japanese barberry (*Berberis thunbergii*), Japanese honeysuckle (*Lonicera japonica*), Japanese knotweed (*Polygonum cuspidatum*), Japanese meadowsweet (*Spiraea japonica*), leafy spurge (*Euphorbia esula*), Louise's swallow-wort (*Cynanchum louiseae*), Morrow's honeysuckle (*Lonicera morrowii*), multiflora rose (*Rosa multiflora*), Nepalese browntop (*Microstegium vimineum*), nonnative bush honeysuckle (*Lonicera* spp.), Norway maple (*Acer platanoides*), Oriental bittersweet (*Celastrus orbiculatus*), princess tree (*Paulownia tomentosa*), punktree (*Melaleuca quinquenervia*), purple loosestrife (*Lythrum salicaria*), reed canarygrass (*Phalaris arundinacea*), Russian olive (*Elaeagnus angustifolia*), saltcedar (*Tamarix ramosissima*), showy fly honeysuckle (*Lonicera xbella*), Siberian elm (*Ulmus pumila*), silktree (*Albizia julibrissin*), spotted knapweed (*Centaurea stoebe* L. ssp. *micranthos*), tallow tree (*Triadica sebifera*), Tatarian honeysuckle (*Lonicera tatarica*), tree of heaven (*Ailanthus altissima*)

<sup>2</sup>The 43 IPS and one undifferentiated genus (nonnative bush honeysuckles) are hereafter referred to as "invasive species", "invasive plants", "invasives", or "IPS".

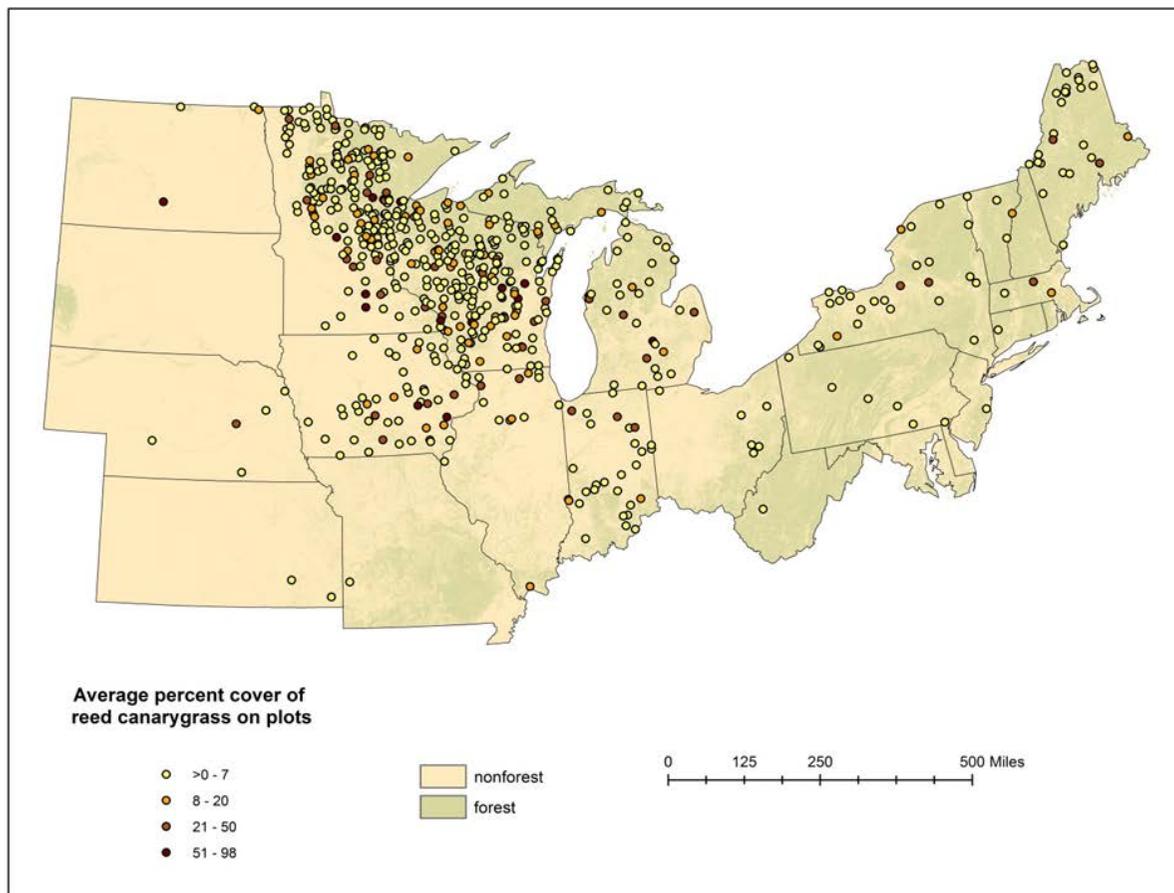
# Reed Canarygrass Cover on Phase 2 Invasive Plots

The percentage cover of reed canarygrass is shown in Figures 5 and 6, Figure 5 illustrates cover at the state level; Figure 6 focuses on the plot level. It is important to use caution when looking at overall state averages (Fig. 5) as states with a small number of occurrences are driven by a low number of plots. For states with few observances (e.g., Massachusetts and New Hampshire), Figure 6 is more informative since individual plot values can be assessed. These maps, along with Figure 4, reveal important information related to the presence and abundance of reed canarygrass in the NRS region. As can be seen in these maps, the occurrence of reed canarygrass is greatest in the north central part of this region. Over time these maps will allow us to assess changes in abundance and spread.



**Figure 5.—Average percent cover<sup>3</sup> of reed canarygrass on Phase 2 Invasive plots, 2008-2012.**

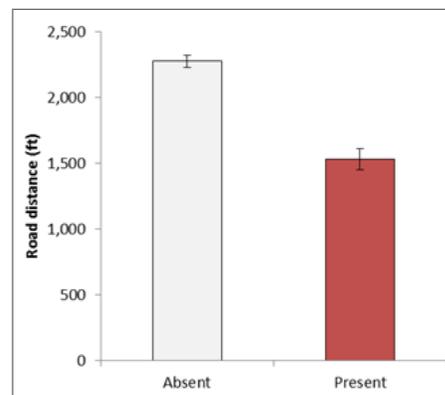
<sup>3</sup>Average percentage coverage is based on subplot data and is calculated for the portion of the plot which is forested. Each FIA plot consists of four circular  $\frac{1}{24}$ -acre subplots located at the corners and center of an equilateral triangle that is 208 feet on a side.



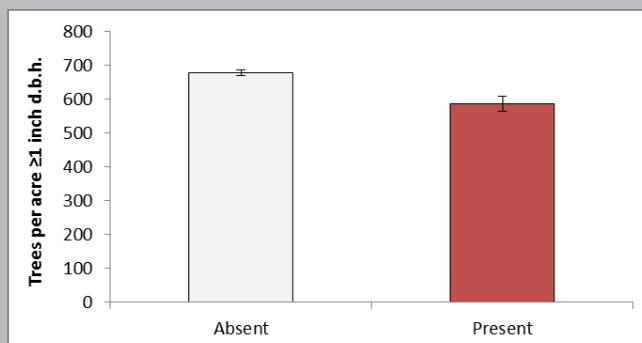
**Figure 6.—Average percent cover of reed canarygrass on plots where it occurred, 2008-2012.**

# Characteristics of Plots with Reed Canarygrass

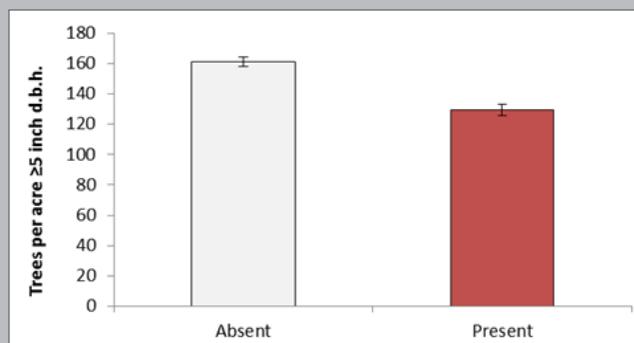
Reed canarygrass, a plant often used for site restoration, was more common on plots near roads. There was a significant difference ( $p < 0.01$ ) in the distance to the nearest road for plots with and without reed canarygrass (Fig. 7). Roads are a conduit for seed dispersal and alter light and nutrient availability, as well as drainage. Vehicles traveling on roads carry propagules of many exotics, which become dispersed along them. Roads have been found to be important vectors for IPS (Kurtz and Hansen 2013, Lundgren et al. 2004, Predick and Turner 2008). Due to the effects of roads and fragmentation, it is important to keep forest land intact.



**Figure 7.**—Average distance to the nearest road for plots with or without reed canarygrass, 2008-2012.

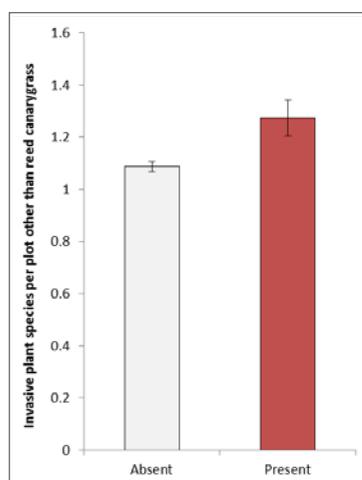


**Figure 8.**—Trees per acre ≥ 1 inch d.b.h. with or without reed canarygrass.



**Figure 9.**—Trees per acre ≥ 5 inches d.b.h. with or without reed canarygrass.

Tree cover also differs for plots with and without reed canarygrass. The current data (2008-2012) suggest that there are fewer trees per acre on plots with reed canarygrass (Fig. 8 and 9;  $p < 0.01$ ). Since the study has been ongoing for only a short period of time (2007 implementation across all of the NRS region), it is difficult to assess whether the invasive plants are influencing tree regeneration and growth or if the invasive plants are establishing where there is low tree cover and less competition. Continued investigation into this matter is important because these plants can outcompete native species and without adequate understory regeneration to replace the aging overstory, the future of the forest remains in question. These preliminary investigations are important as they suggest there is a difference between plots with and without reed canarygrass present and future studies will help determine the effects these species are causing.



**Figure 10.**—Number of invasive plant species other than reed canarygrass on plots with or without reed canarygrass.

Analyzing plots with and without reed canarygrass shows there is no significant difference in the number of IPS on plots with or without reed canarygrass (Fig. 10). This differs from what was found with other invasive plants in this region (e.g., garlic mustard) (Kurtz and Hansen 2014). This may be because the preferred site characteristics of this species differ from other species and because this species is often used for restoration (e.g., along logging roads).

Monitoring IPS is important to determine status, distribution, population size, and influential plot characteristics, as well as to detect new populations. The trends discussed in this research note are valuable and need to be reported in the future to help elucidate important factors related to the presence of the monitored invasives as well as to find out the impacts these species are causing on biota and ecosystems. This research offers nonbiased data to land managers and other concerned individuals to help understand the implications of these species and to assist in making well-informed management decisions.

\*Note: the error bars in figure 7 through 10 show a 68% confidence interval for the observed mean.



## Citation for this Publication

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## FIA Program Information

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## Additional Invasive Plant Information

Alien Plant Invaders of Natural Areas (PCA, National Park Service): <http://www.nps.gov/plants/alien/factmain.htm>

Invasive and Exotic Plants: <http://www.invasive.org/species/weeds.cfm>

Invasive Plant Atlas of New England: <http://www.eddmaps.org/ipanel/>

Invasive Plant Atlas of the United States: <http://www.invasiveplantatlas.org/index.html>

Midwest Invasive Plant Network: <http://mipn.org/>

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