



# Garlic Mustard (*Alliaria petiolata*) Early Detection Monitoring at Homestead National Monument of America

Natural Resource Report NPS/HTLN/NRDS—2010/259



**ON THE COVER**

Garlic mustard plant found at Homestead National Monument of America.

Photograph by: Jesse Bolli, Resource Management Specialist, Homestead National Monument of America.

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## **Executive Summary**

In the spring of 2010 a search for garlic mustard (*Alliaria petiolata*), a non-native invasive plant species, was conducted at Homestead National Monument of America. Garlic mustard occurs throughout eastern and south-central Nebraska, including Gage County where the park is located. On April 26, 2010, prior to our search, a small amount of garlic mustard was found at the monument and hand-pulled. Our comprehensive search of all woodland habitat in the park a few days later found no garlic mustard. We hope that early detection and removal efforts have eradicated garlic mustard from the park.

## Introduction

A non-native biennial, garlic mustard (*Alliaria petiolata*) invades woodlands throughout the Eastern and Midwest regions of the United States (Anderson et al. 1996). Garlic mustard is a shade-tolerant species and prefers shaded habitat, including both disturbed and undisturbed woodland (Anderson et al. 1996, Kaul 2006). Several mechanisms have contributed to the success of garlic mustard invasion in North American forests (Rodgers et al. 2008). Garlic mustard contains secondary compounds that reduce the plant's palatability to herbivores, thereby allowing garlic mustard a competitive advantage over other understory vegetation (Rodgers et al. 2008). Furthermore, garlic mustard produces allelopathic compounds in the soil, inhibiting germination of other plant species and also affecting soil biota (Prati and Bossdorf 2004, Rodgers et al. 2008, Burls and McClaugherty 2008). Garlic mustard's high seed production and rapid growth in the second growing season allow garlic mustard to successfully outcompete other vegetation (Anderson et al. 1996, Rodgers et al. 2008). The impacts of garlic mustard on a habitat can include alterations to soil microbial communities, a decrease in native flora abundance and loss of biological diversity (Anderson et al. 1996, Rodgers et al. 2008).

Since the first recorded occurrence of garlic mustard in Nebraska in 1975, the species has been found in at least 18 counties in the state, including Gage County, the location of Homestead National Monument of America (Kaul 2006). Recent increases in the occurrence of garlic mustard in eastern Nebraska demonstrate the importance of monitoring for this species at the monument (Kaul 2006).

On April 26, 2010, Jesse Bolli identified a patch of garlic mustard at Homestead National Monument of America. The location of the patch was approximately 0683813 meters east and 4461895 meters north (UTM, Zone 14, NAD83). The patch was approximately 2m x 3m in size and consisted of approximately 200 plants. Kent Pfeiffer of Nebraska Game and Parks and Karola Mlekush of the Heartland Inventory and Monitoring Network confirmed the identification. Jesse Bolli and Jake Warner then removed the plants by hand, collecting a volume of approximately 30 gallons.

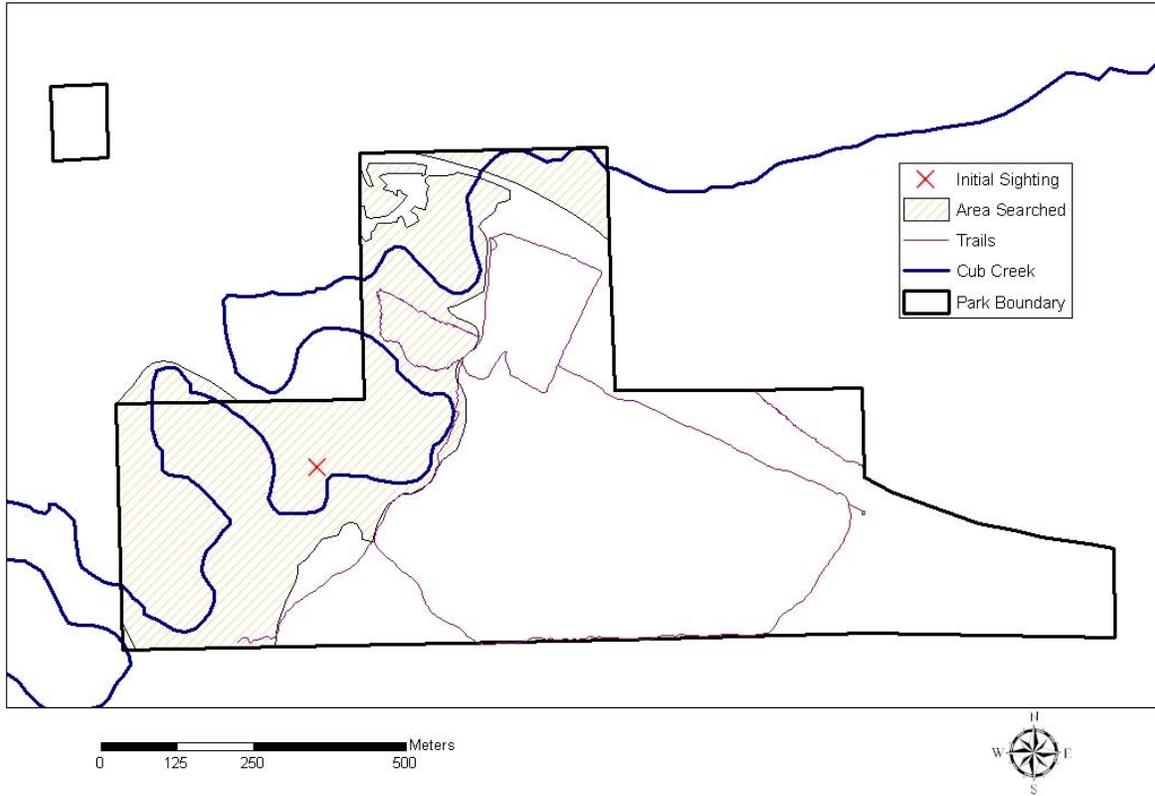
## Methods

After detection and removal of the plants, on April 28 and 29, Jesse Bolli, Chad Gross, and Craig Young searched all wooded areas within Homestead National Monument of America for garlic mustard (Figure 1). Second-year plants would have been flowering during the search. Observers walked parallel transects, approximately 8 to 10 m apart, across all woodland habitat. While individual plants may have been overlooked, we believe that our search would have detected patches comparable to the one initially found on the park. Due to a GPS error in the field, we were unable to record our exact search paths as intended.

## Results and Discussion

Our thorough search of woodland habitat at Homestead National Monument of America found no garlic mustard on the park. We hope that the early detection and removal of this invasive plant eradicated garlic mustard within the park borders. In this case, early detection was a fortuitous finding while Jesse Bolli was conducting control of invasive tree species. Because prevention and early detection are principal strategies for successful invasive exotic plant management, monument staff should continue to work with the Heartland I&M program and Exotic Plant Management Team to monitor for future garlic mustard colonization. Because invasive exotic plants quite often undergo a lag period between introduction and subsequent colonization, managers can take advantage of early detection monitoring to identify invasive exotic species and eradicate these plants before populations become well-established. While there is a need for long-term suppression programs to address very high-impact species, eradication efforts are most successful for infestations less than one hectare in size (Rejmanek and Pitcairn 2002). Costs, or impacts, to ecosystem components and processes resulting from invasion also increase dramatically over time, making ecosystem restoration improbable in the later stages of invasion. Further, in their detailed review of the nonnative species problem in the United States, the U.S. Congress, Office of Technology Assessment (1993) stated that the environmental and economic benefits of supporting prevention and early detection initiatives significantly outweigh any incurred costs, with the median benefit-to-cost ratio being 17:1 in favor of being proactive. (Paragraph uses text directly from Welch 2007)

Homestead National Monument of America  
Garlic Mustard Survey 2010



**Figure 1.** Search area for garlic mustard (*Alliaria petiolata*) at Homestead National Monument of America.

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