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# Invasive Plant Monitoring for the Heartland Inventory and Monitoring Network: 2006-2022 - Data Release Report

#### Abigail Hobbs (0009-0004-9679-3961) 1, Craig Young (0000-0002-1687-8825) 2, and Jennifer Haack-Gaynor (0000-0003-4497-5128) 2

1 NPS Inventory and Monitoring Division, 1201 Oakridge Dr., Suite 150, Fort Collins, Colorado

2 Heartland Network, Wilson’s Creek National Battlefield, 6424 West Farm Road 182, Republic, MO 65738

# Abstract

The Heartland Network (HTLN) consists of fifteen parks within the east central U.S. ranging north to south from Minnesota to Arkansas and from east to west from Ohio to Kansas. A monitoring program was established in 2006 to collect invasive plant occurrence and cover class data in thirteen network parks. Invasive plants were chosen for monitoring because they fragment native ecosystems, displace native plants and animals, and alter ecosystem function. The purpose of the monitoring program is to determine trends in species occupancy in order to inform management needs in HTLN parks. From these data the species trends for all parks were generated. In 2024, the data were then processed for dissemination by the Inventory and Monitoring Division (IMD), complying with Executive Order 13642, Making Open and Machine Readable the New Default for Government Information. A processed tabular dataset has been created using the data provided from the parks. The dataset contains 18 columns, 35363 observations, and 123 unique species.

# Acknowledgements

Thank you to Alexa Ron, Issac Quevedo, Judd Patterson, Robert Baker, and Joe DeVivo from the IMD team in Fort Collins for their help and guidance in processing the machine readable data set and the construction of this report. Also thank you to Jennifer Haack-Gaynor and Gareth Rowell from the Heartland Network for providing additional guidance that helped in the construction of the data package, filling in gaps in the data that otherwise would have been left empty.

# Data Records

## Data Inputs

Invasive plant monitoring was conducted by Craig Young and Jennifer Haack-Gaynor in thirteen HTLN parks from 2006 to 2022. The data package described by this DRR was compiled from three separate datasets. Of these, one was a monitoring dataset, one was a sampling coordinates dataset, and one was a look-up table for cover class codes. Original data from the study are available from the NPS DataStore at <https://irma.nps.gov/DataStore/Reference/Profile/2303267> (Young and Haack-Gaynor 2024).

## Summary of Datasets Created (required)

This DRR describes the *Invasive Plant Monitoring for the Heartland Inventory and Monitoring Network: 2006-2022 - Data Package* which contains a metadata file and one data file. These data were compiled and processed for dissemination by the National Park Service Inventory and Monitoring Division (IMD) and are available at <https://doi.org/10.57830/2303109> (see Table 1).

**Table 1. Invasive Plant Monitoring for the Heartland Inventory and Monitoring Network: 2006-2022 - Data Package: List of data files.**

| **File Name** | **Size** | **Description** |
| --- | --- | --- |
| HTLN\_InvasivePlants\_Monitoring.csv | 8.6 MB | HTLN Invasive Plants Monitoring data. |

See Appendix for additional notes and examples.

# Data Quality Evaluation

The data within the data records listed above have been reviewed by staff in the NPS Inventory and Monitoring Division to ensure accuracy, completeness, and consistency with documented data quality standards, as well as for usability and reproducibility. No data quality flags were added, and the *Invasive Plant Monitoring for the Heartland Inventory and Monitoring Network: 2006-2022 - Data Package* is suitable for its intended use as of the date of processing (2024-05-16).

# Usage Notes

Users of the data package described in this report will find that column/attribute names were retained verbatim from the raw data with three exceptions: 1) In columns where the variables included units, **In[Units]** was appended to the end of the column name, 2) Some abbreviated column names have been spelled out for added clarity, and 3) the columns dwcType, BasisofRecord, ScientificName, and TaxonRank were added on behalf of the Inventory and Monitoring Division during data processing and follow Simple Darwin Core guidelines (Quevedo and Sherman 2023; Darwin Core Maintenance Group 2021; Darwin Core Task Group 2014). The EventTime column refers to the local time of day when the sample was collected within the Central Time Zone.

## Acquiring the Data Package

This data package is available for download from the NPS DataStore at <https://doi.org/10.57830/2303109> and can be directly imported into R data frames using the NPSutils package <https://doi.org/10.57830/2300651>

# Methods

## Data Collection and Sample Processing Methods

The HTLN parks selected for the monitoring program include Arkansas Post National Memorial, Cuyahoga Valley National Park, Effigy Mounds National Monument, George Washington Carver National Monument, Herbert Hoover National Historic Site, Hopewell Culture National Historical Park, Homestead National Historical Park, Hot Springs National Park, Lincoln Boyhood National Memorial, Pea Ridge National Military Park, Pipestone National Monument, Tallgrass Prairie National Preserve, and Wilson’s Creek National Battlefield. These thirteen parks contain a diverse array of habitats. Invasive plant monitoring was conducted from 2006 to 2022. In parks with less than 350 acres, sampling units were created by dividing existing park management units into polygons that were generally 1 to 3 acres (0.4 to 1.2 ha) in size with 2 acres as the target size. Between 50 to 79 polygon search units were employed per park. In parks with greater than 350 acres, systematically located line search units were established in a GIS using a random start. Line search units ranged from 200 to 400 meters in length dependent on park size and accessibility. Between 101 to 822 line search units were employed per park. Both natural and restored areas were selected for sampling, except where special equipment or permission would have been required for site access. Additionally, developed areas were excluded from sampling. Within sample plots, invasive plants were identified to the species level. For a detailed description of all park sample sites and sampling methodologies, please see Kull et al. (2022). In small parks, methods included making three equidistant passes through each polygon search unit in an east-west direction recording invasive plant cover classes that occur within approximately 1.5 to 6 meters on either side. In large parks, methods included making one pass along each line search unit in an east-west direction recording invasive plant cover classes that occur within approximately 1.5 to 6 meters on either side. Additionally, geographic coordinates were recorded at each sample site.

## Data Processing

* Code values for CoverClassInMetersSquared were directly integrated into the column variables to clarify the meaning of each value (Kull et al. 2022)
* Within the CoverClassInMetersSquared column of the raw data file, the code used to represent ‘1,000–4,999.9’ was incorrectly listed as ‘7’, ‘8’, and ‘9’, when it should have only been ‘7’. This was corrected with the approval of HTLN’s Haack-Gaynor JL.
* A missing decimal was added to the LongitudeInDecimalDegrees for Hopewell Culture National Historical Park.
* Capitalization was standardized and columns were formatted for consistency.
* Additional Darwin Core fields were appended to fit the Simple Darwin Core Guidelines (Darwin Core Task Group 2014) and to add context to the source data.

## Code Availability

The scripts used to create this report and associated datasets are available on the NPS DataStore repository at <https://doi.org/10.57830/2303268> (Hobbs 2024).

# References

Darwin Core Maintenance Group. 2021. Darwin core quick reference guide. Biodiversity information standards (TDWG). Available at <https://dwc.tdwg.org/terms>.

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Quevedo, I., and A. Sherman. 2023. IMD inventory data cleanup standard operating procedure. National Park Service, Fort Collins, Colorado; <https://doi.org/10.36967/2298851>.

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