



# 2024 WEED AWARENESS

The Weed Control Authority is responsible for implementation of the Nebraska Noxious Weed Control Act throughout Lancaster County. The Authority has also provided the inspection and administration of the City of Lincoln's Weed Abatement Program since entering into an interlocal agreement with the city in 1996.

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## UNL Team Using Drones to Detect & Spray Phragmites

Drones have been gaining traction in recent years for use in agriculture and natural resources. In many applications, powerful cameras are attached to drones and then take pictures of agricultural fields or other areas of interest. The operators can then use these images to visualize the health of a field, identify areas that need attention or detect unwanted weeds. These camera drones, which are small and light (usually fitting within a 1-foot cube and 5 pounds or less), are popular for field scouting and for other picture-taking applications.

A newer use of drones has emerged with the introduction of sprayer drones. These drones are typically much larger than their camera-drone counterparts, weigh anywhere from 50–250 pounds and can hold between 2–15 gallons of liquid. They can be used to spray agricultural fields, where they have found a particular popularity in fungicide application. They also are being used to effectively spray noxious weeds such as phragmites. These sprayer drones can be flown manually by a pilot, or autonomously fly a pre-planned flight route under the supervision of a pilot ready to take control if anything goes wrong.

### Research Team

The University of Nebraska–Lincoln Agricultural Intelligence Research (AIR) Lab, led by Dr. Yeyin Shi, is using the technology from both camera and sprayer drones for the identification and treatment of *Phragmites australis*. Dr. Shi and her graduate student Kevin Steele work in the department of Biological Systems Engineering to use drones in innovative ways to perform novel research and benefit the environment. Working in collaboration with Brent Meyer from the Lancaster



Preliminary UNL drone prototype

County Weed Authority and Mike Reed from the Douglas County Weed Authority, the UNL team aims to use drones to identify patches of phragmites and spray these noxious weeds.

The control of phragmites has been a priority for local weed control authorities for years, but has not received the necessary attention and innovation from industry. With instances of phragmites drastically increasing in recent years, the UNL team hopes their project will help curb the spread of this invasive species through a combination of cutting-edge technology and clever engineering.

### How it Works

The UNL team is building their own customized drone, equipped with sensors, fast computers and a precision spraying system, to be able to both take pictures of an area and spray in the same flight. By including both the sensing and spraying system on the same drone, they hope to streamline the identification and treatment of phragmites.

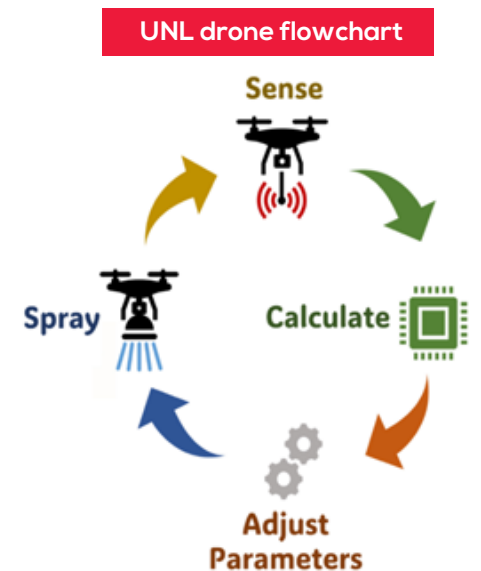
The project involves building a powerful artificial intelligence (AI) model to detect phragmites from pictures taken by a drone. The AI model runs on the mini-computer attached to the drone and will be able to determine if a picture contains a phragmites patch in less than 1 second. The process of building the AI model includes collecting pictures of known phragmites patches to help to train the model to predict if phragmites is present.

The AI technology used by the UNL team will be able to detect phragmites with a high degree of accuracy with relatively small amounts of data.

In addition to the AI phragmites detection, the UNL team is working to better understand how sprayer drones impact the environment. A pressing concern in this area is verifying that the spray from the drone is deposited on the target area. While these concerns have been studied for decades in ground-based and airplane-based spraying, drone-based spraying is new, and many questions linger regarding the best spraying practices. The UNL team includes engineers and weed scientists who perform lab experiments, do field testing and run computer simulations to improve the understanding of how sprayer drones interact with the environment.

### Outlook

Upon the project's completion, the UNL team hopes to produce the hardware and software for a prototype drone system



that can detect and spray phragmites. The drone would “sense” by taking a picture of an area, then “calculate” with the AI model if there is a phragmites patch in the area. If there is a phragmites patch in the area, it would “adjust parameters” (change the flight path, speed, height, etc.) and then “spray” the phragmites. The drone would be able to continuously take pictures, determine if there is a phragmites patch, fly to the phragmites and spray it. The team hopes the developed functions can eventually be integrated into commercial drone systems to automate phragmites control as well as help track progress and management efficacy.

This project is still underway and a lot of work remains to be done. The UNL team is currently building the AI model and working with Nebraska Weed Control Authorities to collect data. Additionally, the UNL team looks forward to collaborative partnerships with industry. They hope to produce a prototype drone in the next several years to combat invasive species across Nebraska.

## TAKE **2** | Two minutes to **read about two** invasive plants which are working to establish themselves in Lancaster County



### Callery Pear (*Pyrus calleryana* Decne.)

Callery pear (which includes the cultivars Bradford, Aristocrat, Autumn Blaze, Chanticleer and Redspire) is an invasive tree species in Lancaster County. This species is native to China and Vietnam and was originally imported in the early 1900's to serve as clean rootstock for common pear (*Pyrus communis*) — which is highly susceptible to fire blight. Callery pear has commonly been used as an ornamental, but it is now on the Nebraska Invasive Plants Watch List and its spread is being monitored.

#### Description

Callery pear is a medium-sized ornamental deciduous tree in the rose family. The uniform rounded to oval upright form, early spring flowers, glossy green foliage and respectable fall color made it desirable as an ornamental species, leading to the development of multiple cultivars.

#### Habitat

Callery pear is tolerant of a wide range of growing conditions, including tough, disturbed urban sites, pollution, dry to heavy clay soils, and sun to part shade. This ability to thrive in many locations enhances its ability to spread.

#### Means of Spread and Distribution

Cultivars are self-incompatible; thus, production of seeds does not result in seedlings unless different cultivars are within approximately one block of



one another — the distance pollinating insects are able to fly. With the release of more cultivars of differing genotypes, and the continued use of Callery pear as rootstock for fruiting pears, viable seeds are produced. Despite the fact there is very little nutritional value, the fruits are relished by birds and small mammals, and rapidly distributed by them over large areas, allowing it to invade open spaces such as pastures, grassland and open woodlands. Callery pears can also spread vegetatively, with suckers or runners forming large thickets.

#### Impact

In unmanaged areas, it can rapidly spread to form dense thickets, shading out of native species, causing a rapid change in plant and wildlife communities. This tree is a significant threat to native grasslands and grassland wildlife, but also invades forested areas.

Callery pear is one of the few trees in the U.S. that costs more to maintain than it gives back in benefits (i.e. storm water management, carbon sequestration, property value, air quality).

#### Control

Zero tolerance for Callery pear is recommended. As it is a vigorous resprouter, it is even more difficult to control than the native eastern redcedar. Unless it is completely uprooted, herbicides will be needed. Mowing is not an effective control method due to resprouting. Newly established trees can be sprayed with a foliar herbicide such as triclopyr.



### Tree-of-Heaven (*Ailanthus altissima*)

Tree-of-heaven is widespread in Nebraska and is on the Nebraska Invasive Plants Watch List as a species of concern. Also known as Chinese sumac, stinking sumac, stinktree and tree of hell, this tree is native to China. It was brought to Philadelphia in 1784 by an amateur gardener. By 1840, it was commonly available from nurseries.

#### Description

This rapidly growing tree (3–5 feet in a single growing season) can reach a height of 80 feet, with up to a 6-foot diameter trunk. Leaves are pinnately compound, meaning they have a central stem in which the leaflets are attached on each side. The leaf can range in length from 1–4 feet with 10–41 leaflets with smooth leaf margins, making it one of the largest leaves of all trees. When crushed, the leaves and other plant parts have a rancid smell like cat urine or burnt peanut butter.

#### Habitat

Tree-of-heaven is extremely tolerant of poor soil and will even grow through cracks in pavement. This tree is not shade tolerant. It will quickly colonize forest edges, fields and roadsides.

#### Means of Spread and Distribution

Tree-of-heaven spreads by hundreds of thousands of seed per tree and through



Photos: Leslie J. Mehrhoff, Bugwood.org

vegetative sprouting. A cut or injured tree may send up dozens of root suckers and resprouts, creating large clonal colonies.

#### Ecological Threat

This tree produces chemicals in its roots that prevent the establishment of other plant species nearby. Its fast growth limits habitat for other species. Its root system may be extensive and has been known to cause damage to sewer lines and building foundations.

Tree-of-heaven is also one of the preferred hosts of a newer invasive exotic pest, the spotted lanternfly (*Lycorma delicatula*). This is important because spotted lanternfly devastates agriculture crops such as grapes (wine), hops (beer) and many fruit trees such as apples, apricots and cherries.

#### Control

As with many invasive plant and insect species, elimination is difficult, expensive and time consuming due to its abundant seed, high germination rate and frequent root sprouts. Herbicide treatments are the most effective. Always read and follow the label directions when making any treatment. While young seedlings could be pulled or dug up, the chance of getting all root fragments is difficult and can lead to re-sprouts.

#### Look-Alikes

The native trees most likely to be confused with tree-of-heaven are the sumacs, black walnut and hickory. However, the flowers, smooth leaf edges, seeds and smell should give it away.

# Lancaster County Weed Control 2023 Review

The Lancaster County Noxious Weed Control Authority serves the citizens of Lancaster County to protect effectively against designated noxious weeds which constitute a present threat to the continued economic and environmental value of lands in Lancaster County.

Our office implements the mandates of the State of Nebraska Noxious Weed Control Act by setting forth management objectives and plans, methods or practices which utilize a variety of techniques for the integrated management of noxious weeds. In establishing a coordinated program for the integrated management of noxious weeds, it is the County's intent to encourage and require all appropriate and available management methods, while promoting those methods which are the most environmentally benign, practical and economically feasible.

## Noxious Weed Program

The Weed Control Authority utilizes a three-phase program to assist landowners in reducing the number of noxious-weed-infested acres in the county.

Phase 1: Prevent the development of new noxious and invasive weed infestations.

Phase 2: Provide education and public outreach on noxious and invasive weed control.

Phase 3: Provide ongoing management of State of Nebraska and Lancaster County designated noxious weeds, as well as the City of Lincoln Weed Abatement program.

Nebraska's Noxious Weed Control Act states: It is the duty of each person who owns or controls land to effectively

control noxious weeds on such land.

## Noxious Weeds in County Roadsides

Landowners are encouraged to control noxious weeds along property they own. If not controlled by the adjacent owner, Lancaster County Weed Control will control the perennial noxious weeds such as phragmites, sericea lespedeza and leafy spurge in the county roadsides.

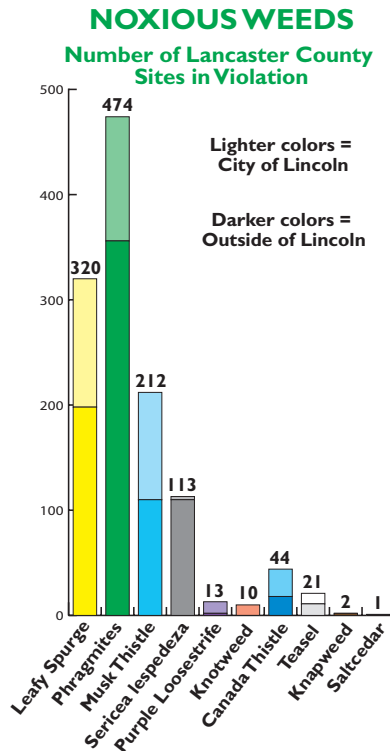
Lancaster County works closely with landowners with specialty crops and offers free-of-charge "NO SPRAY ZONE" signs when an agreement is signed. The agreement requires the landowner to control all the noxious weeds in their adjacent right of way.

## City of Lincoln Weed Abatement Program

Lancaster County Weed Control Authority is responsible to carry out the administration of the City of Lincoln's Weed Abatement program since entering an interlocal agreement with the city in 1996.

The City of Lincoln's Weed Abatement Ordinance requires landowners within city limits to maintain the height of weeds and worthless vegetation below six inches. This includes all areas to the center of the street and/or alley that adjoins their property. Our inspector's complete inspections based on pre-selected properties due to their history, request from the public and by observing severe yards while conducting other inspections.

When a property is found to be in violation, the owner of record is notified with a legal notice. If the property remains uncontrolled at



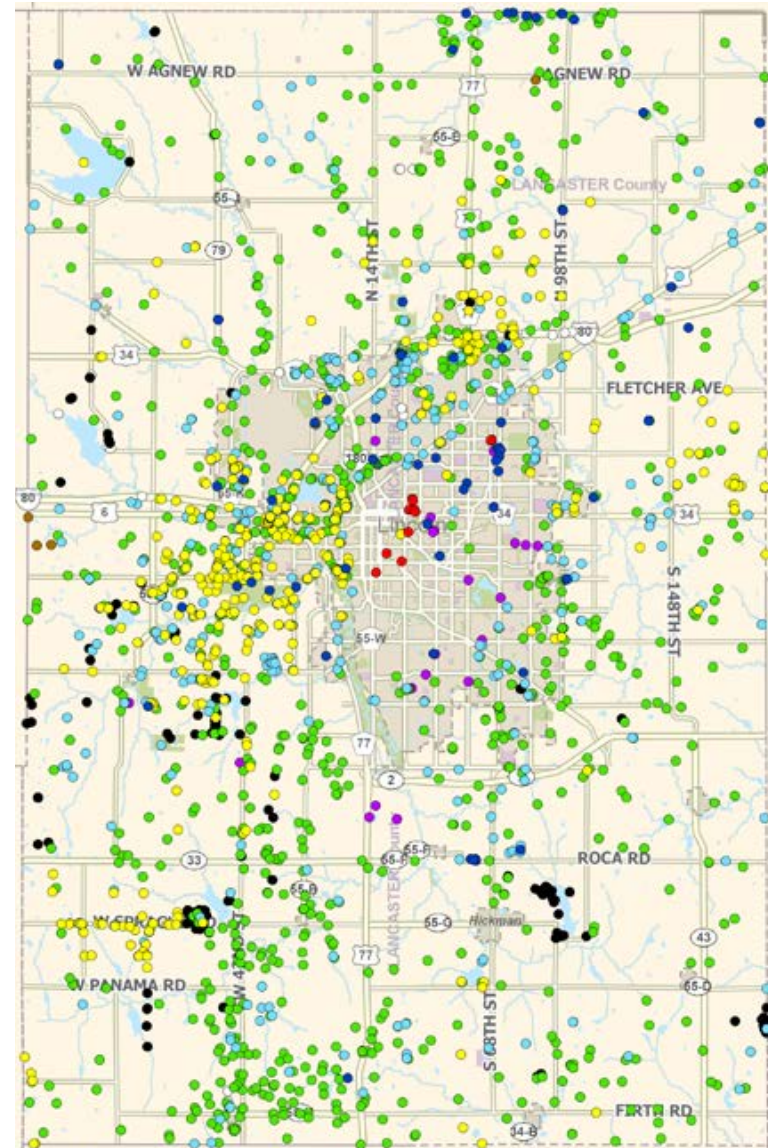
the expiration of the legal notice, the Weed Control Authority will hire a contractor to cut the property. Landowners are responsible to pay the cost of control plus an administrative fee. If the cost of control remains unpaid, a lien is placed against the property until paid.

## City of Lincoln Landfills

The Weed Control Authority is responsible for managing noxious weeds at the 48th Street and the Bluff Road landfills. To track the spread of noxious weeds and the effectiveness of the control, the landfills are annually inspected, and GPS mapped prior to treatment.

## Lancaster County Abandoned Cemeteries

Mowing and maintenance on seven abandoned cemeteries throughout the county falls under the supervision of the Weed



Control Authority. Cemeteries included are Asplund, the County Poor Farm, Dietz, Evangelical, Highland Precinct, Jordan and Uphoff.

Special recognition goes to the following volunteers:

- Lincoln Tree Service for tree trimming and removal.
- Dave Miller for mowing Jordan.

- Terry Briley for mowing Evangelical.
- Clark Liesveld and Boy Scouts of America Troop 64 for mowing Dietz.
- Troy Henning for mowing Highland Precinct & Uphoff
- Larry England for mowing the Poor Farm.
- David Almerly for mowing Asplund.

The County Commissioners serve as the Lancaster County Weed Control Authority. Currently Brent Meyer serves as the superintendent and supervises a seasonal staff of six weed inspectors with the assistance of Chief Inspector Pat Dugan and Account Clerk Danni McGown.

# Nebraska's Noxious Weeds

It is the duty of each person who owns or controls land to effectively control noxious weeds on such land. Noxious weed is a legal term used to denote a destructive or harmful weed for the purpose of regulation.

The Director of Agriculture establishes which plants are noxious. These non-native plants compete aggressively with desirable plants and vegetation.

Failure to control noxious weeds in this state is a serious problem which is detrimental to the production of crops and livestock, and to the welfare of residents of this state. Noxious weeds may also devalue land and reduce tax revenue.



STOP INVASIVE SPECIES  
IN YOUR TRACKS.

PlayCleanGo.org

**Musk Thistle**

Pink to purple flowers

Mature seedhead

Height 1.6–9.8 ft

**Canada Thistle**

Pink to purple flowers

Height 1–3.9 ft

**Plumeless Thistle**

Purple flowers

Height 1–4.9 ft

**Phragmites**

Young seedhead

Mature seedhead

Height 3.2–20 ft

**Leafy Spurge**

Large yellow leaves (bracts)

Stems/leaves have milky sap

Height .3–2.6 ft

**Sericea Lespedeza**

White or cream to yellowish-white flowers

Height 1.5–6.5 ft

**Japanese & Giant Knotweed**

Creamy-white to greenish-white flowers

Height 3–10 ft

Height 8–13 ft

**Purple Loosestrife**

Purple to magenta flowers

Height 1.3–8 ft

**Saltcedar**

Pink to white flowers

Height 3.3–20 ft

**Spotted & Diffuse Knapweed**

Lavender to purple flowers

White/purplish flowers

Height 1–3.9 ft

**Lancaster County's Noxious Weeds**

White flowers

Lavender to white flowers

Height 4–8 ft

Height 3–6 ft

**Good neighbors control noxious weeds** — If you have questions or concerns about noxious weeds, please contact your local county noxious weed control authority, Nebraska Weed Control Association ([www.neweed.org](http://www.neweed.org)) or Nebraska Department of Agriculture.