A Review of Common Buckthorn

Westchester Village Hall
Westchester, IL
January 18, 2024

Preview

- Introduction
- What is an invasive species?
- Background/History
- Present Status
- Chicago Region Tree Census 2020
- Westchester & CRTI
- Control/Removal
- Planting Alternatives
- Conclusion

Introduction

The topic of our conversation today is **Common Buckthorn** (*Rhamnus cathartica).* This is an invasive woody shrub/tree species which has become one of the more vexing environmental problems in the Chicago region.

Many people may pass by this plant every day, unaware of its presence in our area…

<<< Image Credit: Dave Coulter (2023)

"The Green Cloud"

What defines an invasive species?

An "invasive species" is a species that is:

1) non-native (or alien) to the ecosystem under consideration and,

2) whose introduction causes or *is likely to cause economic or environmental harm or harm to human health*.

Image/Text Credit: USDA National Invasive Species Information Center

Background/History

Common Buckthorn (*Rhamnus cathartica)*

This dioecious shrub or small tree can live at least to 39 years. The species has small honey-scented flowers pollinated by insects, with resulting green drupes ripening to black in September and October.

Many species of both native and introduced birds are known to consume the fruits and are considered primary dispersers.

(Kurylo & Endress (2012).

<<< Image Credit: Biodiversity Heritage Library

Background/History

Habitat: Both common and glossy buckthorn can be found in a wide variety of habitats from prairies to woodlands though their impacts are greatest in wooded areas.

Hardiness: Zone 3

Mature Shape: Small tree or tall dense shrub

Height: 25 feet

Width: Trunk up to 10 inches in diameter

Site Requirements: Common buckthorn prefers well-drained soils; glossy buckthorn can be found in drier areas but does best in wet soils.

Common Buckthorn Leaves - Photo by Chris Evans, University of Illinois, Bugwood.org

Leaves: Common buckthorn leaves are 1-1.5 inches long, simple, opposite or sub-opposite (occasionally alternate), hairless, round or oval with a pointed tip, and have finely toothed margins. Common buckthorn has 3-4 pairs of veins. Glossy buckthorn leaves are 1-3 inches long, simple, usually alternate, and oblong with smooth margins. Glossy buckthorn leaves have 6-9 pairs of veins.

Flowering Dates: Common: May-June; Glossy: May to first frost

Buckthorn flowers emerge from the leaf axils and are small with white or greenish yellow petals. Common buckthorn flowers have 4 petals and glossy buckthorn flowers have 5 petals. Buckthorn fruit are pea-sized, berry-like, drupes that start out as red and turn black as they ripen in the late summer to early fall. Glossy buckthorn can have branches with fruit in varying stages of ripeness throughout the summer and fall.

Common buckthorn has gray-brown bark that becomes flaky and darker gray-black as the plant ages. Common buckthorn often resembles the bark of plum and cherry trees. Both species have prominent lenticles, yellow sapwood, and pinkish orange heartwood. Common buckthorn has thorns but glossy buckthorn does not.

Credit: Iowa Stare University Extension and Outreach

Background/History

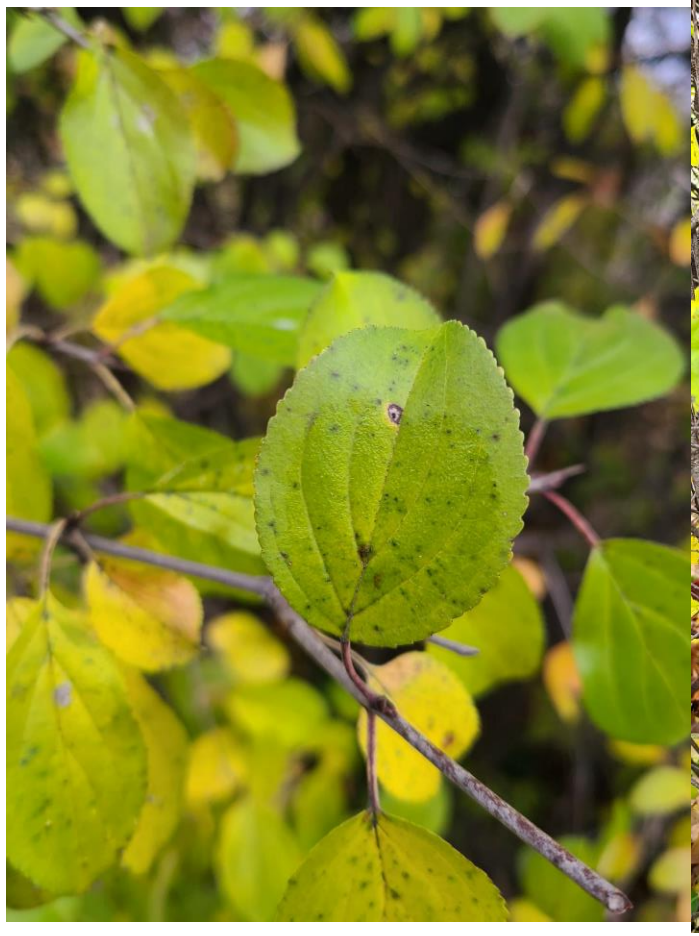


Image Credits: Dave Coulter 2023,2024

Background/History

Common Buckthorn is native to Europe and western Asia (Kurylo & Endress (2012).

Image Credit >>> Kurylo, Knight, Stewart, & Endress (2007).

Background/History

When was Common Buckthorn brought to North America?

A review of the literature shows a general consensus of Common Buckthorn arriving in North America during the 19th century but it is unclear as to exactly which part of the century it arrived….the suggestion that the entry happened during "colonial times", which would appear to be accurate.

By the early 19th century, Common Buckthorn was "common in hedges" in the Philadelphia, PA area and was so common in some parts of New England that it was considered indigenous to New York in early plant catalogues…

Kurylo and Endress (2012)

Background/History

Why was Common Buckthorn brought to North America?

Common buckthorn is often said or implied to have been imported to North America as an ornamental, hedge, and/or shelterbelt species, but its initial introduction to the continent may have been for a different purpose.

The first reported Common Buckthorn hedge was in Salem, MA, where it was established from a Common Buckthorn "tree" in a local physician's garden (ca.1834) who had "long used the fruit as a cathartic in his medical practice" .
This usage suggests the possibility that Common Buckthorn made its way to North America initially as a medicinal plant before its more common use as a hedge plant.

"Buck-Thornes" mentioned in an English herbal dating to 1633 states the taxon was often commented on by 16th-century medical writers. King's American Dispensatory calls it a powerful cathartic, While Common Buckthorn is often mentioned as a medicinal plant in old texts, there is also mention of its use for making dye/tint. Kurylo and Endress (2012)

Background/History

The date and location of the first Common Buckthorn introduction or movement into the midwestern United States from the New England/Mid-Atlantic area cannot be stated for certain.

The *Wisconsin Farmer* recommended its cultivation as a hedge plant because of its temperature hardiness and adaptability in New England and an earlier issue offered a testimonial about a very effective 10-year-old buckthorn hedge in Rockford, IL

Therefore, the species was in the Midwest by at least 1839 and the existence of established hedges was observed in the Chicago area, even growing wild along the Fox River, west of Chicago, IL, suggesting the species was in the Midwest even earlier.

Kurylo and Endress (2012)

Background/History

Prairie Farmer > 1 December 1845

ILLINOIS
DIGITAL NEWSPAPER
COLLECTIONS

"In our opinion the best thing for a hedge is the Rhamnus Catharlicus (sic) or ***buckthorn*** *; and this is so far perfect, for that purpose that it is needless to look farther . Its adaptation to hedge was stated at length in the last volume of the Prairie Farmer…"*

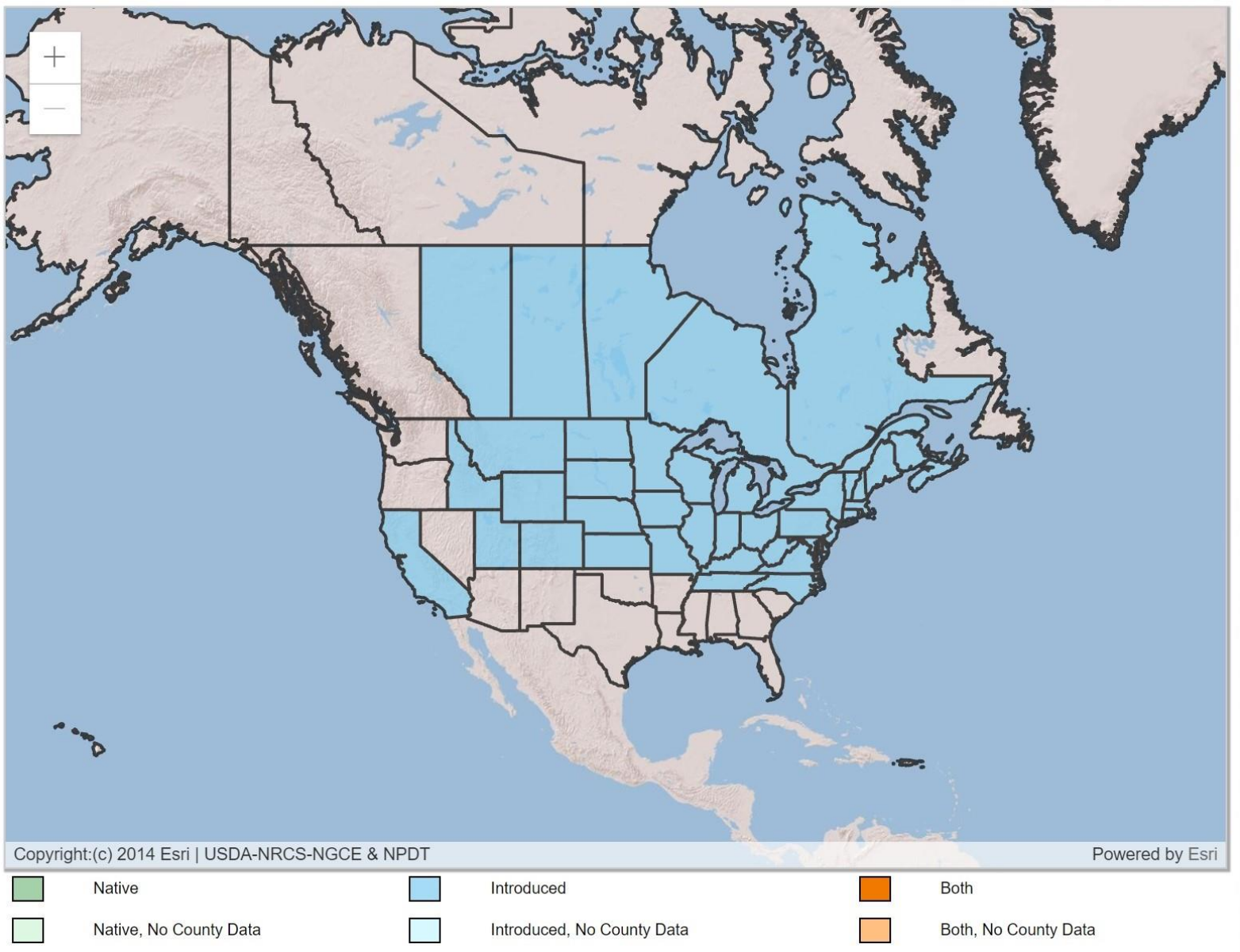
"We have it on good authority that this shrub grows wild near St . Charles, on Fox River…"

A New Leicester Sheep, belonging to Da l. Elston, Esq., of Chicago.—(Fig. 12.)

Background/History

Today, Common Buckthorn is highly invasive in certain regions of North America (Ontario, Canada, and the midwestern states of Wisconsin, Illinois, and Minnesota), and problematic from Colorado in the western United States to Nova Scotia in eastern Canada (Kurylo et al. 2007).

Image Credit >>> USDA (2014).



Present Status

Present Status

Image Credits: Dave Coulter 2023

Present Status

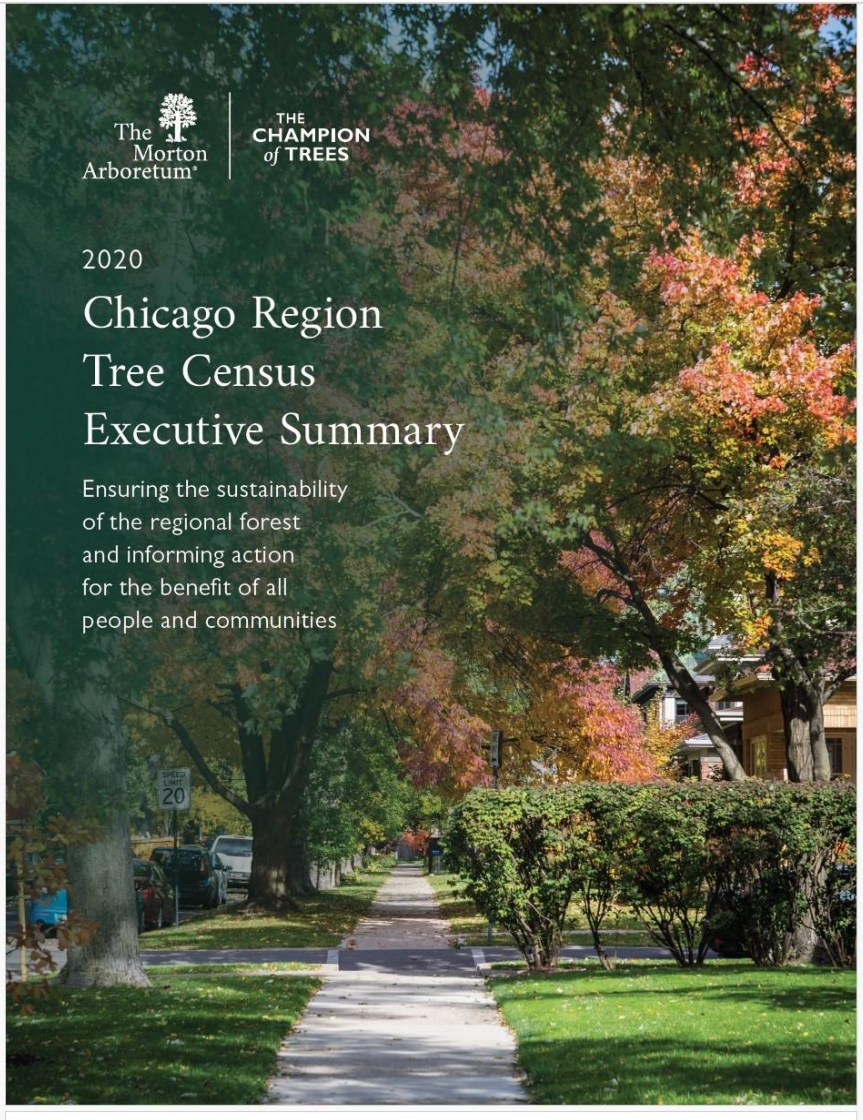
Image Credits: Dave Coulter 2023

Chicago Region Tree Census 2020

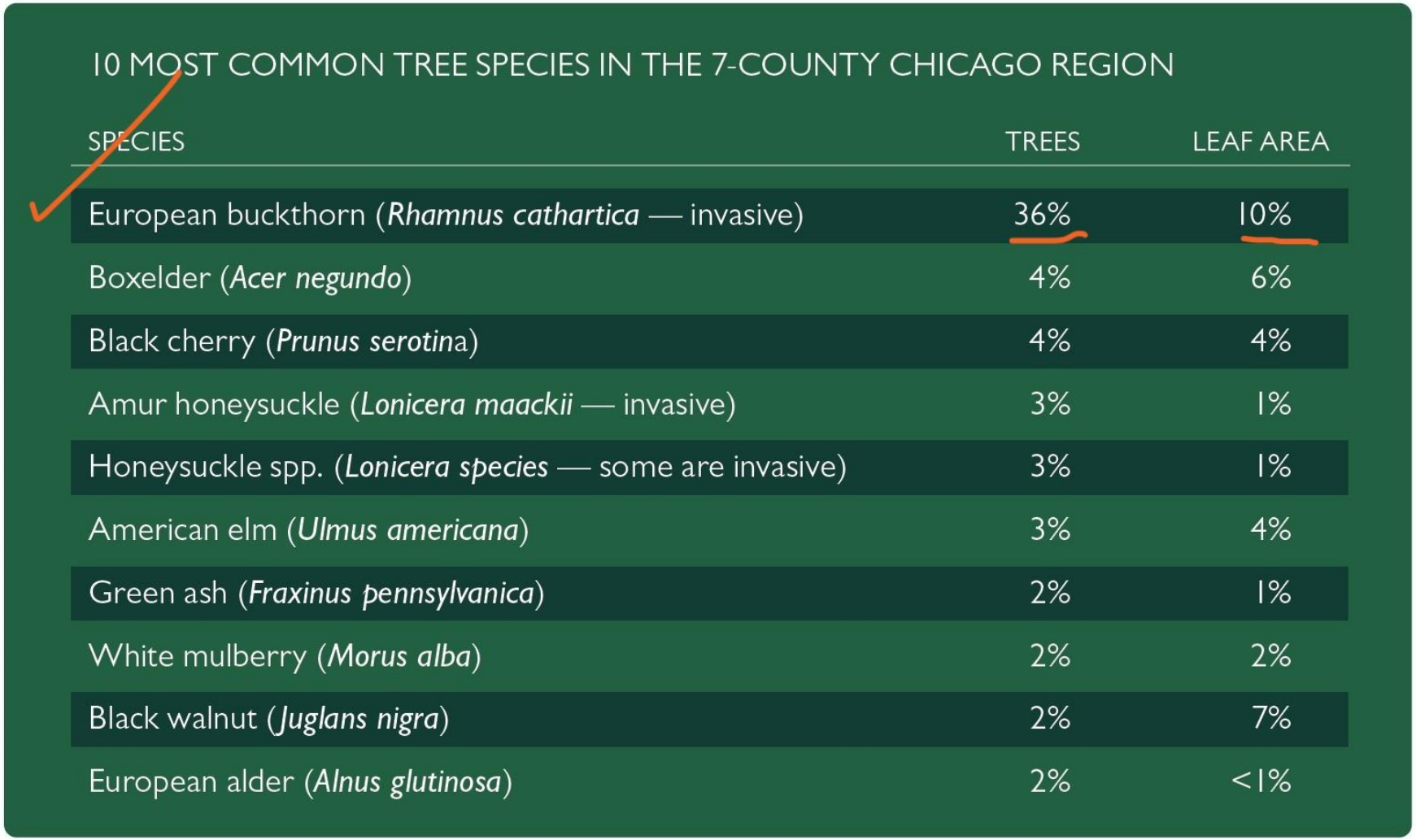
THE BUCKTHORN PROBLEM

The most common species in the region is the invasive European buckthorn, which accounts for 36% of total trees. Although its population ranges from 4% to 55% in different counties, buckthorn is a serious issue for the region. Buckthorn reduces the diversity of the forest by outcompeting native plant species, causing long-lasting damage to the soil and the larger ecosystem. Its dense thickets shade the ground from sunlight, making regeneration of oaks and other plants difficult. Buckthorn also generally does not grow large enough to provide the benefits of canopy trees. Residents should replace buckthorn on their property with species highlighted in the Healthy Hedges program, a collaborative initiative in the Chicago region to reduce the damage caused by invasive woody plants.

Credits: Chicago Region Tree Census 2020



Chicago Region Tree Census 2020



10 MOST COMMON TREE SPECIES IN THE 7-COUNTY CHICAGO REGION

SPECIES	TREES	LEAF AREA
European buckthorn (*Rhamnus cathartica* — invasive)	36%	10%
Boxelder (*Acer negundo*)	4%	6%
Black cherry (*Prunus serotina*)	4%	4%
Amur honeysuckle (*Lonicera maackii* — invasive)	3%	1%
Honeysuckle spp. (*Lonicera species* — some are invasive)	3%	1%
American elm (*Ulmus americana*)	3%	4%
Green ash (*Fraxinus pennsylvanica*)	2%	1%
White mulberry (*Morus alba*)	2%	2%
Black walnut (*Juglans nigra*)	2%	7%
European alder (*Alnus glutinosa*)	2%	<1%

spp: several species

Credits:
Chicago Region Tree Census 2020

Chicago Region Tree Census 2020

The Regional Forest in 2020 *continued*

For the seven-county region, the top species in terms of the number of individual trees (stem count) are **European buckthorn** (*Rhamnus cathartica*), **boxelder** (*Acer negundo*), **black cherry** (*Prunus serotina*), and **Amur honeysuckle** (*Lonicera maackii*). Two of the top four species (European buckthorn and Amur honeysuckle) are invasive (Figure 3). The species with the highest stem count for the city of Chicago are **white mulberry** (*Morus alba*) and **European buckthorn** (Figure 4).

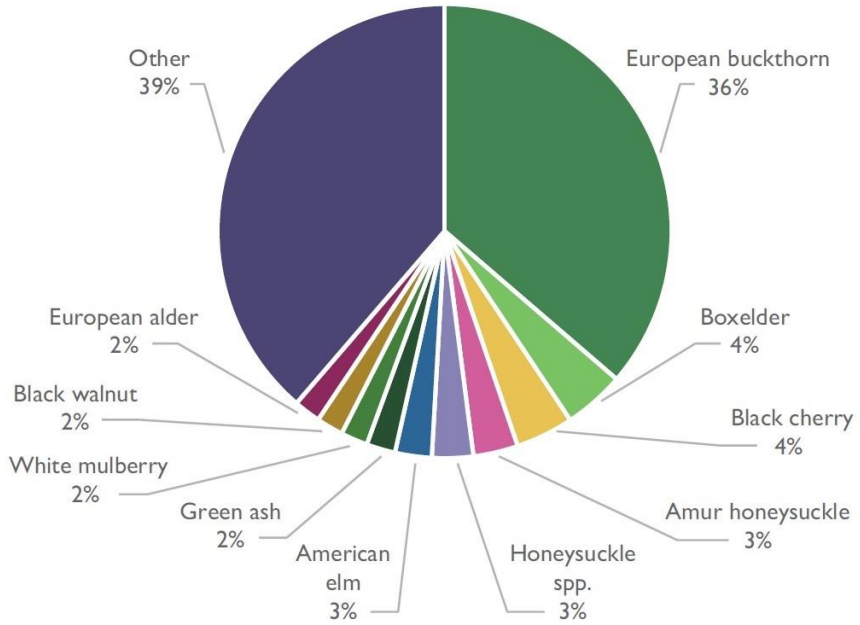
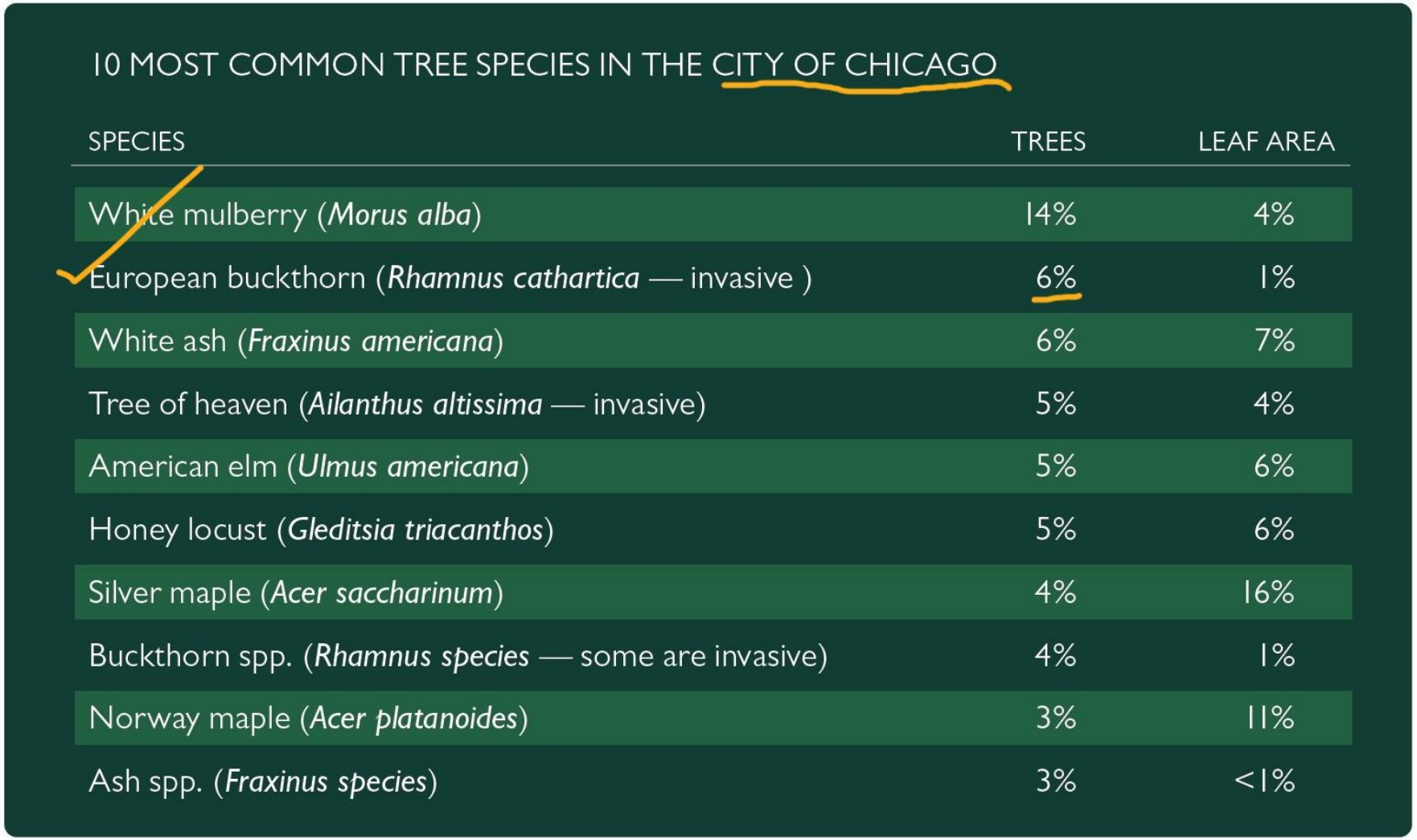


Figure 3: Top 10 species based on stem count in the seven-county Chicago region, shown with the percentage of the population.

Credits:
Chicago Region Tree Census 2020

Chicago Region Tree Census 2020



10 MOST COMMON TREE SPECIES IN THE CITY OF CHICAGO

SPECIES	TREES	LEAF AREA
White mulberry (*Morus alba*)	14%	4%
European buckthorn (*Rhamnus cathartica* — invasive)	6%	1%
White ash (*Fraxinus americana*)	6%	7%
Tree of heaven (*Ailanthus altissima* — invasive)	5%	4%
American elm (*Ulmus americana*)	5%	6%
Honey locust (*Gleditsia triacanthos*)	5%	6%
Silver maple (*Acer saccharinum*)	4%	16%
Buckthorn spp. (*Rhamnus species* — some are invasive)	4%	1%
Norway maple (*Acer platanoides*)	3%	11%
Ash spp. (*Fraxinus species*)	3%	<1%

spp: several species

Credits:
Chicago Region Tree Census 2020

Chicago Region Tree Census 2020

- Buckthorn is a serious issue for the region.
- Buckthorn reduces the diversity of the forest by outcompeting native plant species, causing long-lasting damage to the soil and the larger ecosystem.
- Its dense thickets shade the ground from sunlight, making regeneration of oaks and other plants difficult.
- Buckthorn also generally does not grow large enough to provide the benefits of canopy trees.

Credits:
Chicago Region Tree Census 2020

Chicago Region Tree Census 2020

Invasive Woody Species

Invasive plant species are often characterized by their vigor, acclimation, reproductive capacity, and lack of natural enemies. Invasives often thrive in areas of high disturbance and in harsh growing conditions. As seen in the 2010 and 2020 tree censuses, the regional forest continues to be dominated by exotic, invasive species—specifically European buckthorn (*Rhamnus Cathartica*) and Amur honeysuckle (*Lonicera maackii*) (Nowak 2013). This is likely due to the connectivity of the region, its wide variety of land use classes, lack of environmental management of transportation corridors, introduction of nonnatives in residential communities, and the harsh growing conditions in urban and suburban settings, among other reasons. In fact, the 2020 census found that these two species now make up more than 42% of the region's trees.

Invasive species can greatly impact the biodiversity of a region, as well as the forest structure and function. To have a healthy and sustainable regional forest, there needs to be a special emphasis on removing these invasive woody species and replacing them with a diverse selection of woody plants. This is critical for the future of the seven-county region of Chicago.

European buckthorn and Amur honeysuckle make up more than 42% of the region's trees.

Credits:
Chicago Region Tree Census 2020

Westchester & CRTI

Westchester

Urban Forestry Summary

CHICAGO REGION TREES INITIATIVE

Our Trees.
Our Communities.
Our Future.

Temperature and Trees

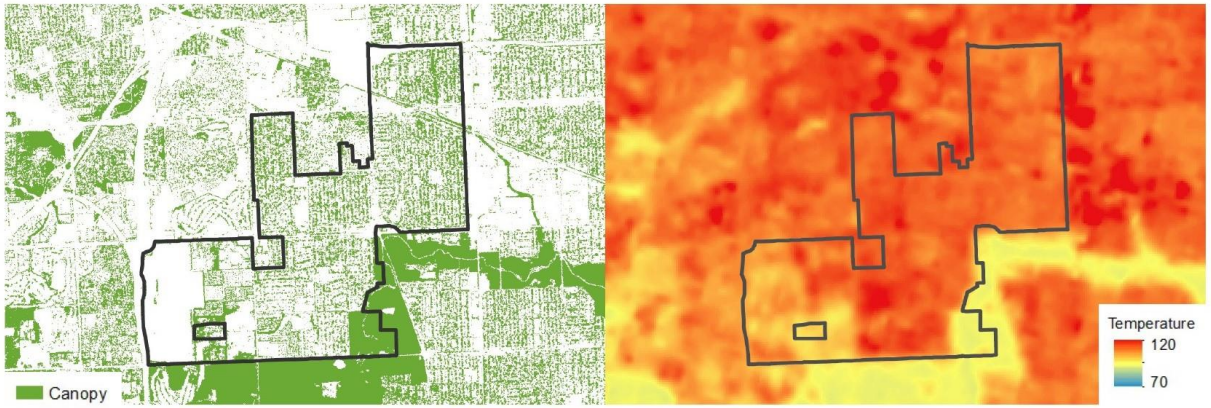


Figure 13: The image on the left shows tree canopy and on the right shows surface temperature. Surface temperature was calculated using a LandSat8 image from July 2017. Areas that have higher tree canopy tend to have lower temperatures.

Credits:
Chicago Region Tree Initiative

Westchester & CRTI

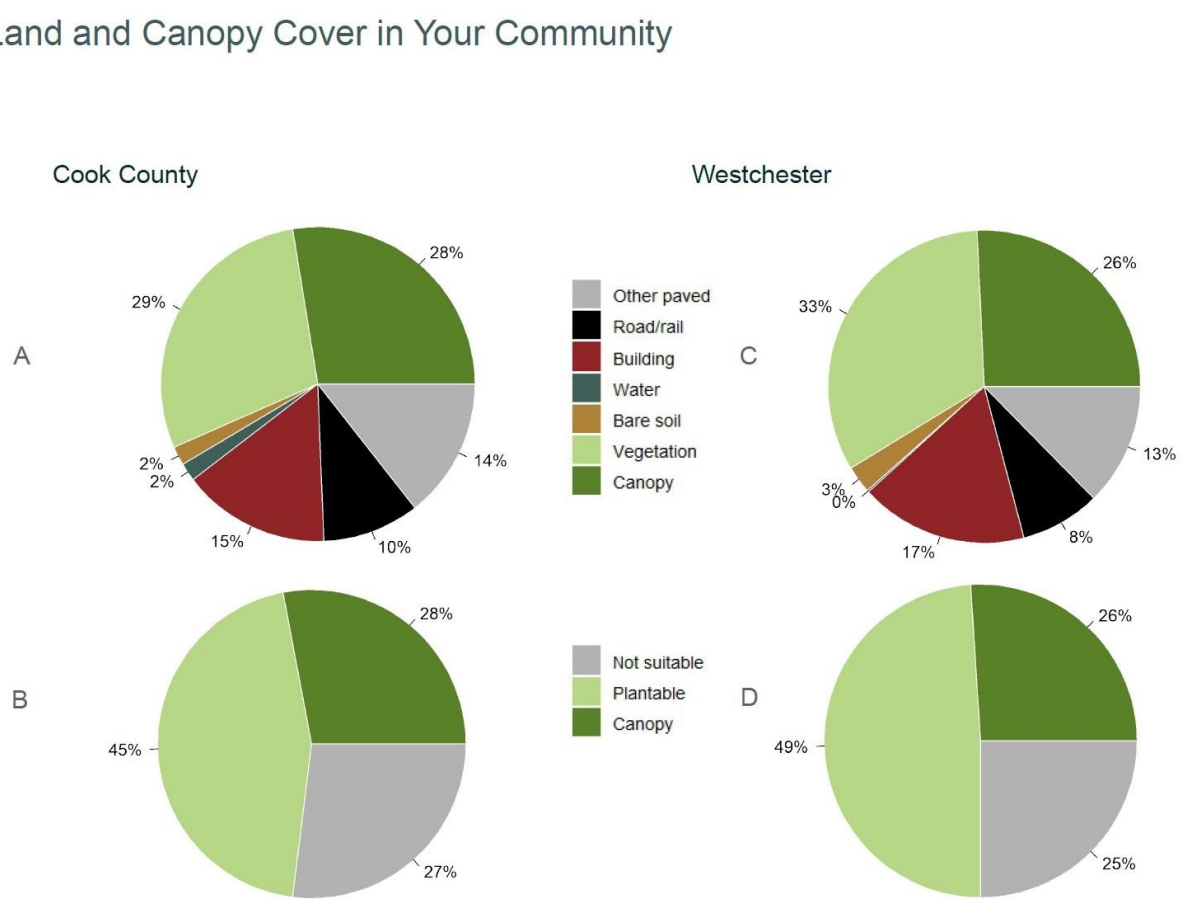


Figure 2: Land cover distribution and plantable space in Cook County (A and B) and in Westchester (C and D).

Credits:
Chicago Region Tree Initiative

Control/Removal (Physical)

Control Methods

Removing buckthorn plants early, before they produce fruits is the most effective way to prevent them from spreading. If the plants are still within their first year of growth but there are too many seedlings to remove by hand, prescribed fire in the fall or early spring can be effective. A prescribed fire may need to be performed for two to three years in a row depending if there are seeds in the soil that will sprout the year following the initial burn. Caution should be taken to make sure native plants can tolerate repeated burning. Combining fire with grazing goats can also be effective. Once buckthorn has formed dense thickets, fire is generally not an effective control method. If manual control is not practical, see our Chemical Control of Unwanted Vegetation article for specific herbicides and application methods.

Credit: Iowa Stare University Extension and Outreach

Image Credits: Dave Coulter (L); Scuppernong Springs Nature Area (R)

Control/Removal (Physical)

Credit: Friends of the Mississippi River

Critical Period Cutting:

First, the "canopy" of a buckthorn tree is cut during the growing season, leaving a tall stump of 4-5 feet behind.

Twice during that same growing season, any resprouts on the stump are removed. This stresses the plant by exhausting the plant's root reserves. Without leaves, the buckthorn isn't able to photosynthesize — its only method to replenish those stored nutrients.

Over the next growing season, any additional resprouts are removed from the high stump after initial leaf-out in the spring and before leaf-drop in the fall. This repeated stressing of the plant, combined with a lack of stored energy, will put an end to the plant without the use of herbicides.

Control/Removal (Chemical)

3. Select the preferred method of applying the chemical. The various methods of application are:
   - **Foliage sprays**: applied to stem and actively growing foliage
   - **Basal spray**: prepared by mixing chemicals in kerosene, diesel oil or bark penetrants and applied as a drench to the lower 18” of tree’s trunk or canes, thoroughly soaking the root crown around the stem
   - **Cut stump**: chemical applied to freshly cut stump surface
   - **Frill or hack-n-squirt**: chemical placed in frill made by overlapping ax-cuts around the base of the tree
   - **Hatchet injection**: chemical is injected into tree using a hypohatchet
   - **Soil application**: sprays, granules or pellets applied to soil surface or injected into the subsoil

Credit: Iowa Stare University Extension and Outreach

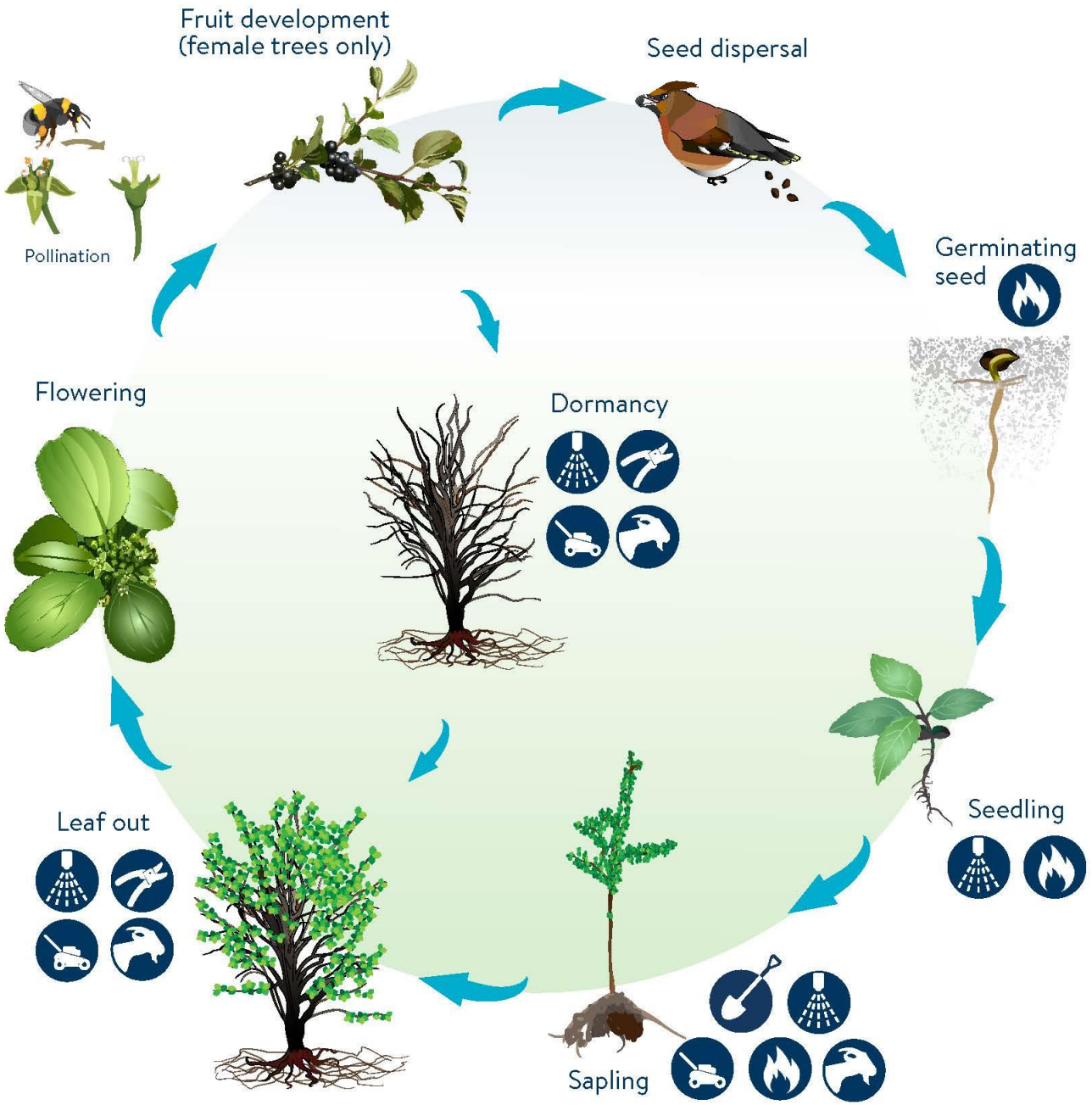
Control/Removal (Chemical)

Buckthorn	20% Garlon 4 Ultra + Bark Oil	Basal Bark (Mid-summer - late fall)
	Pathfinder II (RTU)	Cut stump (Mid-summer - late fall)
	2% Garlon 4 Ultra, spray to thoroughly wet	Foliar (when growing)

Follow label Instructions… it's the law!

Credit: Iowa Stare University Extension and Outreach

Control /Removal



Credit: University of Minnesota Extension

Control/Removal

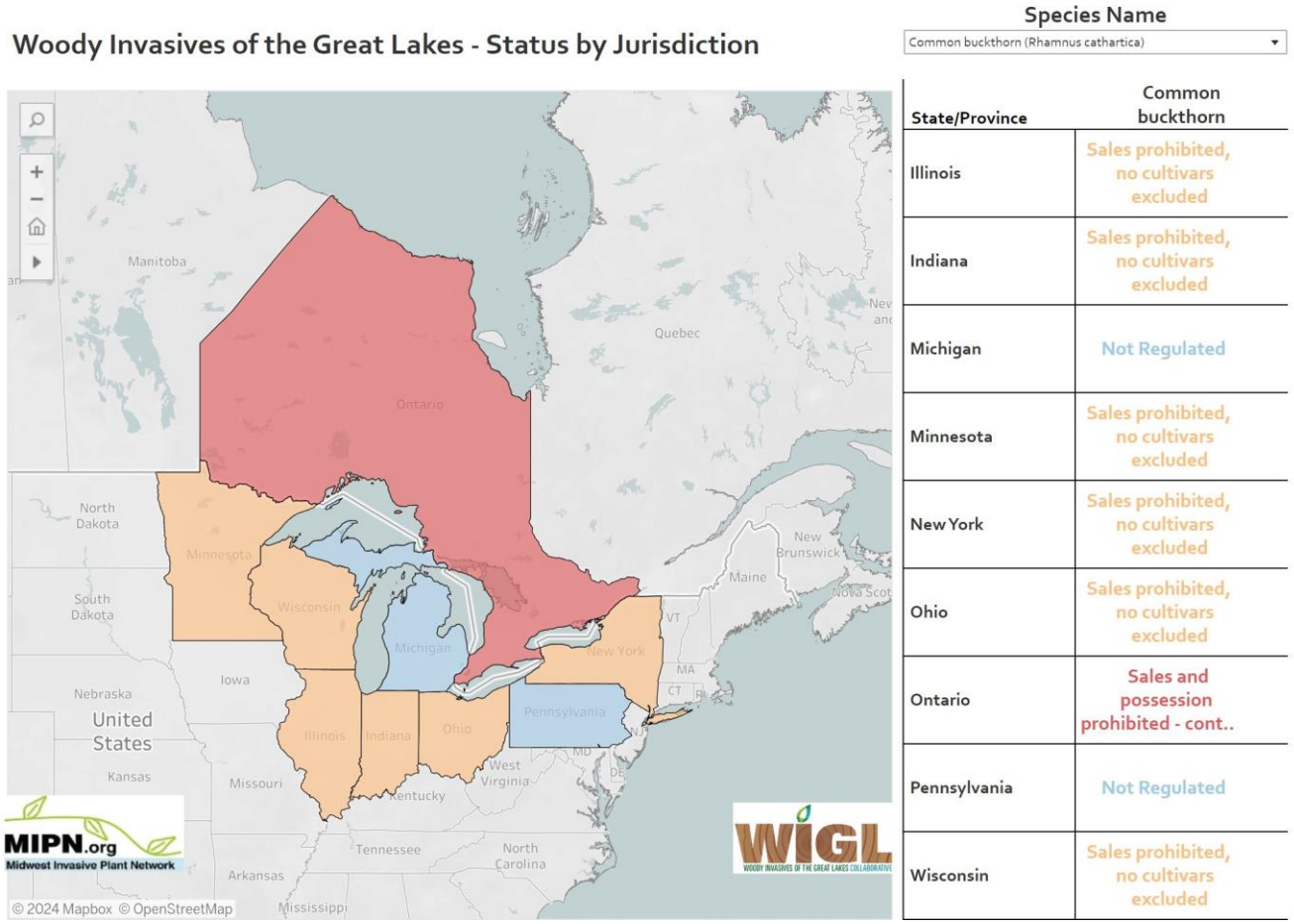
CONSERVATION
(525 ILCS 10/) Illinois Exotic Weed Act.

(525 ILCS 10/1) (from Ch. 5, par. 931)
Sec. 1. Short Title. This Act shall be known and may be cited as the Illinois Exotic Weed Act.
(Source: P.A. 85-150.)

(525 ILCS 10/2) (from Ch. 5, par. 932)
Sec. 2. Definition. Exotic weeds are plants not native to North America which, when planted either spread vegetatively or naturalize and degrade natural communities, reduce the value of fish and wildlife habitat, or threaten an Illinois endangered or threatened species.
(Source: P.A. 85-150.)

(525 ILCS 10/3) (from Ch. 5, par. 933)
Sec. 3. Designated exotic weeds. Japanese honeysuckle (Lonicera japonica), multiflora rose (Rosa multiflora), purple loosestrife (Lythrum salicaria), common buckthorn (Rhamnus cathartica), glossy buckthorn (Rhamnus frangula), saw-toothed buckthorn (Rhamnus arguta), dahurian buckthorn (Rhamnus davurica), Japanese buckthorn (Rhamnus japonica), Chinese buckthorn (Rhamnus utilis), kudzu (Pueraria lobata), exotic bush

Credit: Illinois General Assembly



State/Province	Common buckthorn
Illinois	Sales prohibited, no cultivars excluded
Indiana	Sales prohibited, no cultivars excluded
Michigan	Not Regulated
Minnesota	Sales prohibited, no cultivars excluded
New York	Sales prohibited, no cultivars excluded
Ohio	Sales prohibited, no cultivars excluded
Ontario	Sales and possession prohibited - cont..
Pennsylvania	Not Regulated
Wisconsin	Sales prohibited, no cultivars excluded

Credit: Woody Invasives of the Great Lakes Collaborative

Why Removal? Let's Review:

– Invasive impacts

Once established, common buckthorn maintains large populations through prolific seed production and high rates of germination, even under shade. It out-competes other plant species by growing very quickly and by leafing out very early in the spring and retaining its leaves late into the fall, effectively extending its growing season. Its biological advantages often allow common buckthorn to form a dense single-species stands that prevent regeneration of native species. Buckthorn also alters its habitat to favor its own growth by influencing nitrogen cycling (Heneghan et al. 2006). It may also exude chemicals that prevent the germination of some native plant species (Warren et al. 2017, Klionsky et al. 2010). Its chemical activity may also prevent native amphibian eggs from hatching, further disrupting ecosystems (Sacerdote and King 2014). Buckthorn also appears to negatively impact the bird species that use it for nesting and food (Knight 2005).

Common buckthorn negatively impacts agriculture by acting as a host for crop pests. It is a known host plant of crown-rust, a fungal disease of oat crops, and the soybean aphid. Without treatment, soybean aphids can reduce soybean crop yields by 26% (Kim et al. 2008).

Credit: Woody Invasives of the Great Lakes Collaborative

Planting Alternatives?

Credits: Chicago Region Tree Initiative

Going Forward

How to best address the problem?

We know the nature of this problem….
We know the scale of the problem….
We know the consequences of inaction….
We have the knowledge and the tools to address the problem…

Do we have the will?

Thank You!

OSAGE INC

Horticulture & Ecology Applied

Resources Cited:

- Dave Coulter (photos 2023, 2024)
- Biodiversity Heritage Library >>> https://www.biodiversitylibrary.org/page/303692#page/365/mode/1up
- Kurylo, Jessica & Knight, Kathleen & Stewart, J. & Endress, Anton. (2007). Rhamnus cathartica: Native and naturalized distribution and habitat preferences1. Journal of the Torrey Botanical Society. 134. 420-430. 10.3159/1095-5674(2007).
- Kurylo, Jessica & Endress, Anton. (2012). Rhamnus cathartica : Notes on Its Early History in North America. Northeastern Naturalist. 19. 601-640. 10.2307/41810145.
- USDA >>> https://plants.usda.gov/home/plantProfile?symbol=rhca3
- USDA National Invasive Species Information Center >>> https://www.invasivespeciesinfo.gov/what-are-invasive-species
- Illinois Digital Newspaper Collections >>> Prairie Farmer, etc.
- Chicago Region Tree Census >>> https://mortonarb.org/science/tree-census/
- Iowa Stare University Extension and Outreach - Buckthorn Invasive Species Profile >>> https://naturalresources.extension.iastate.edu/encyclopedia/buckthorn-invasive-species-profile

Resources Cited:

- Iowa Stare University Extension and Outreach - Chemical Control of Unwanted Vegetation >>> https://naturalresources.extension.iastate.edu/encyclopedia/chemical-control-unwanted-vegetation
- Friends of the Mississippi River -A new tool in our toolbox for buckthorn control: Critical period cutting >>> https://fmr.org/updates/conservation/new-tool-our-toolbox-buckthorn-control-critical-period-cutting
- Scuppernong Springs Nature Area >>> https://scuppernongspringsnaturetrail.com/2012/06/29/burning-brush-piles/
- University of Minnesota Extension >>> https://content.govdelivery.com/attachments/MNMDA/2021/02/09/file_attachments/1688267/Common%20Buckthorn%20WEB%202.21%20%28002%29.jpg
- Chicago Region Trees Initiative – Westchester Urban Forestry Summary >>> https://chicagorti.org/app/uploads/2022/09/WestchesterSummary.pdf
- Woody Invasives of the Great Lakes Collaborative – Common buckthorn >>> https://woodyinvasives.org/woody-invasive-species/common-buckthorn/#1562693791641-6f007f86-0a8cfa11-61a14714-3122ef93-98d154b7-3e7f
- Illinois General Assembly – (525 ILCS 10/) Illinois Exotic Weed Act >>> https://www.ilga.gov/legislation/ilcs/ilcs3.asp?ActID=1735&ChapterID=44
- Chicago Region Trees Initiative – Healthy Hedges >>> https://chicagorti.org/app/uploads/2022/05/Brochure-11x17-Healthy-Hedges-update-20190412.pdf