MINNESOTA AQUATIC INVASIVE SPECIES
RESEARCH CENTER *in partnership with*
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# MNPhrag

# Minnesota Non-native *Phragmites* Early Detection Project

## *Guide to Identifying Native and Non-native* Phragmites australis

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**Introduction**

Distinguishing native from non-native *Phragmites australis* can be challenging. Here we provide guidance to assist you in making this distinction. The morphological characters presented here are in order of stronger characters to weaker characters. Characters most readily identifiable in the field are leaf sheath adherence to the stem and stem glossiness. These characters are best used after mid-summer and in winter. Ligule height can be a strong character, but is not as readily identifiable in the field, although note that the thickness of the band of color along the ligule can be used in the field. Stand density, stem height, leaf color, and inflorescences are variable characters that are not reliable on their own for identification. A solid ID depends on using as many as 6 different characters. Information is provided here on each of these characters to provide additional context for distinguishing native from non-native *Phragmites*.

Report populations of suspected non-native Phragmites in the EDDMapS app. Along with your report, submit several photos including photos of the whole stand and images that show details of the inflorescences, leaf sheaths, and stem color/texture.

The EDDMapS app can be downloaded for free from Bugwood and the GreatLakes Early Detection Network (GLEDN)

Thank you for your contribution to efforts in the early detection of invasive Phragmites in Minnesota.

**Photo Credits**

- Bernd Blossey - Cornell University, Ecology and Management of Invasive Plants; Ithaca, NY. Pages 1 and 8.
- Julia Bohnen – University of Minnesota; Department of Fisheries, Wildlife and Conservation Biology; St Paul, MN. Pages 1-8.
- Robert Meadows – North Delaware Wetland Rehabilitation Program; Delaware Mosquito Control Section; Newark, DE. Page 9.
- Kristin Saltonstall – Smithsonian Tropical Research Institute; Panama City, Panama. Pages 2 and 9.

# Get acquainted with terms used in this guide

## Grass vegetative structures

Leaf blade

Ligule – the area on the upper surface of the leaf where the leaf blade joins the leaf sheath; usually a membranous tissue, fringe of hairs, or a combination of both

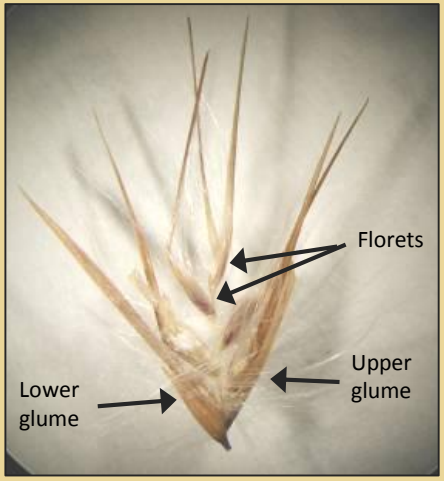
Culm – a grass stem

Leaf sheath – the basal part of a grass leaf which encircles the stem

## Grass floral structures

Inflorescence – the collection of flowers or the seedhead of a plant

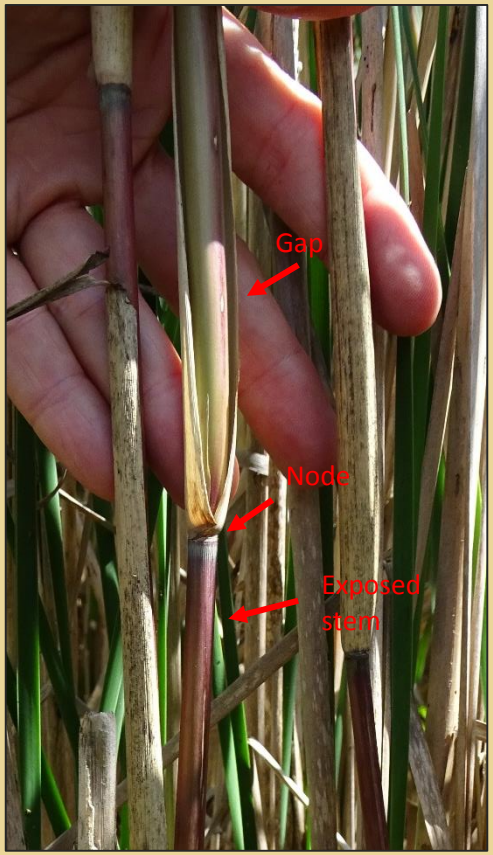
Spikelet – the basic unit of a grass flower




Inflorescence photo courtesy R. Blossey. Spikelet photo courtesy K. Saltonstall.

# Leaf Sheath Adherence to Stem

## Leaf Sheaths on Current Year's Stems




**Native**
Sheaths loosely attached and gap away from the stem; some may be open down to their attachment at the node.

**Non-native**
Sheaths closely attached to the stem with no gaps.

These photos taken in August

ID Tips:
In early to mid summer, the leaf sheaths on the upper stems of **native *Phragmites*** are also tightly adhering. Lower sheaths may be somewhat loose, but may not gap yet. Note that the sheaths of **native *Phragmites***, particularly on the lower stems, do not consistently overlap each other and the stem is exposed in the gap between the two adjacent sheaths. In early summer, the stems will already be red where they are not covered by the sheath and they will be smooth and shiny.

The sheaths of **non-native *Phragmites*** more consistently overlap each other, so the stem appears to be more consistently green. Sometimes on the lower stem, the sheaths do not overlap, and where the stem is exposed, it may have a reddish blush This seems to be more typical of young stems and stems growing in standing water. Where the stem is exposed, it will be dull and rough, as described on page 5.

# Stem Texture and Color

**Native**
Stem glossy and feels smooth to the touch; typically chestnut-red in the lower part of the plant.

**Non-native**
Stem feels rough due to ridges in the stem; typically green, but may be red on the lower stem.

Note: For color and texture, be sure to assess the stem and not the sheath which covers the stem.

## Stem color with sheaths removed

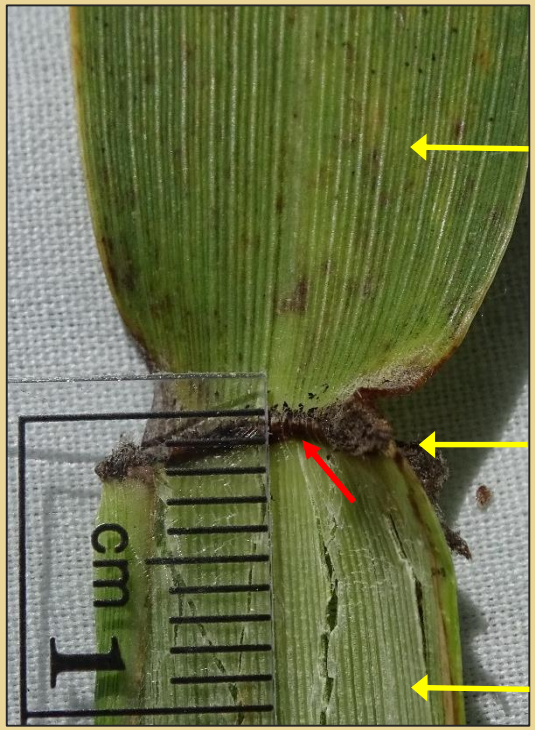
**Native**
Stems glossy and rosy to chestnut-red in the lower half of the plant, especially where exposed to light; stems green where sheath was removed.

**Non-native**
Stems dull and typically green throughout, but may be red on the lower stem.

# Ligule Height (Thickness)

Ligule height (thickness) is one of the stronger characters for identifying non-native *Phragmites*. Although it may not be easy to measure in the field, it can be visually determined with a little practice using the cues described here.

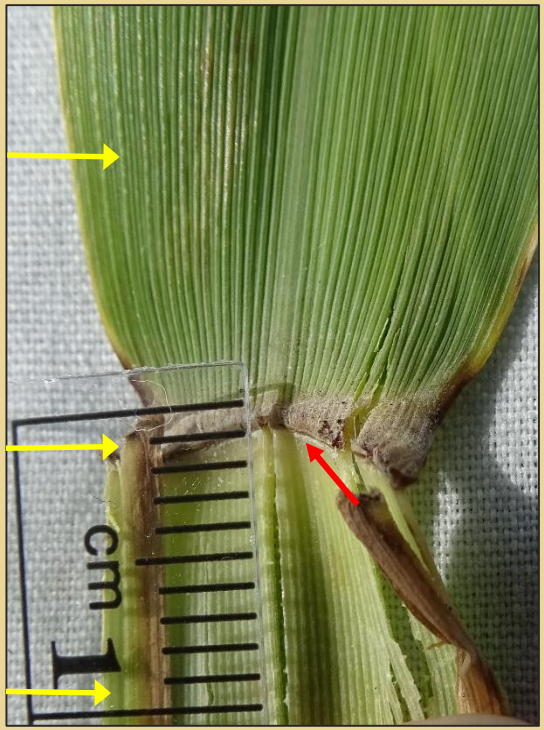
Measure ligule height on leaves from approximately the middle third of the plant. Ligules on upper, newly emerging leaves are not as well-developed. On lower leaves, ligules may be degraded.




Leaf Blade

Ligule

Sheath




**Native**
Thick smudgy line (red arrow)
>1 mm (1.0-1.7 mm)

**Non-native**
Thin discrete brown line (red arrow)
<1 mm (0.4-0.9 mm)

To find the ligule (see the red arrows), hold a leaf blade in one hand and the culm in the other, pull the leaf blade away from the culm to expose the ligule. Measure the height of the ligule from the point of attachment as indicated by the red arrows. Include the membranous tissue and the short, stiff fringe of hairs in the measurement. Do not include any longer thread-like hairs. A hand lens is helpful to determine the area to measure.

ID Tips: In early to mid summer, the ligule of the native type is brown and does not look smudged. In late summer and fall, the ligule of the native type is described as a thick smudged line as if drawn with a lead pencil. In summer and fall, the ligule of the non-native type can be described as a discrete thin, brown to black line as if drawn by a fine point marker.

# Stem Density, Persistence, and Height

**Native**
Stem density is often low (upper inset), allowing mixed species communities, though high density monocultures also occur. Dead stems persist through winter, but may not be as abundant the following season as in non-native stands. Plant height is up to 12 feet tall. The stand will be dark green early in the season, but will begin turning yellowish-green as early as mid-August, as it senesces earlier than the non-native (lower inset).

**Non-native**
Stem density is typically high with live and dead stems forming a dense monoculture; newly established populations may be less dense (inset). Standing dead stems persist into the following season. Plant height is as much as 15-18 feet tall. The stand may appear bluish-green and by late summer is usually darker than most populations of the native form. Stays green after early frosts.

# Leaf Blade Color

**Native -** Leaf blade color is deep green in early summer as the plants emerge. Plants begin to senesce and yellow as early as August and can readily be picked out by their yellow tone by early September (inset).

**Non-native -** Leaf blade color is typically darker bluish-green. Dark green lasts until after the first hard frost.

# Inflorescence

The large fluffy inflorescences along with the height of the plants may be the first thing that draw your attention to *Phragmites*. Don't rely on these characteristics alone to make an ID. Confirm the ID using characteristics of the sheath, stem texture, stem color, and ligule.

**Native**
Emerging inflorescences are green to purplish-green; may be more sparse compared to the invasive form; persist through winter at a lower density.

**Non-native**
Emerging inflorescences are green to purplish-green; may be more dense compared to the native form; persist through winter at a higher density.

Inset winter inflorescence photos courtesy B. Blossey.

# Late Winter and Early Summer ID Tips

## Inflorescences on Previous Year's Stems

**Native**
Inflorescence thin and few branched

**Non-native**
Inflorescence full and much branched

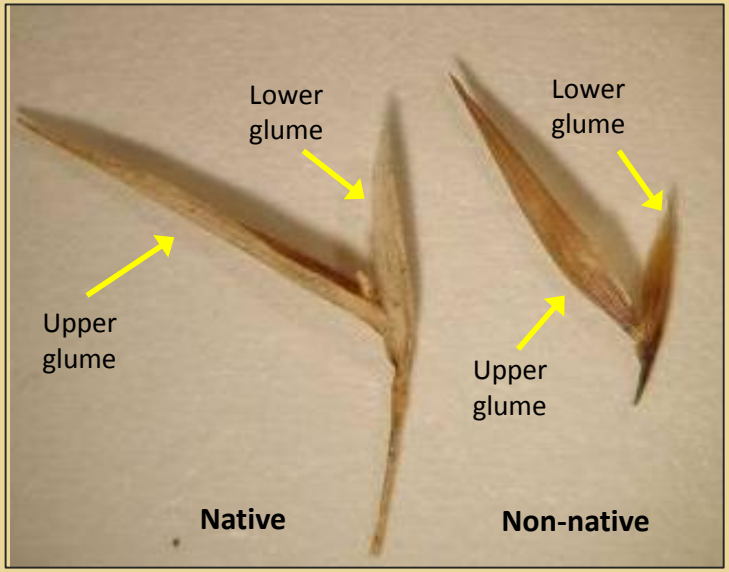
## Leaf Sheaths on Previous Year's Stems

**Native**
Sheaths loosely attached; most readily fall off stem when leaf blades die, leaving smooth glossy bare stems the following season. "Naked = Native"

**Non-native**
Sheaths closely attached; more likely to persist on stems the following season.

# More Difficult/Less Reliable Characteristics

## Glumes




**Native**
Lower glume
3.0-6.5 mm,
most >4 mm

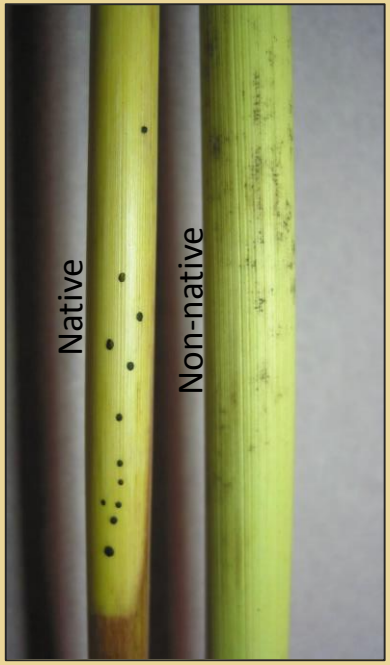
Upper glume
5.5-11.0 mm,
most >6.0 mm

**Non-native**
Lower glume
2.5-5.0 mm,
most <4 mm

Upper glume
4.5-7.5 mm,
most <6.0 mm

Glume characters are not easy to use in the field. Measurable glumes are not present in every season and measurement requires a microscope.

## Spots on Stems




**Native**
Fungal spots may occur on the stem after mid-summer. Many stands will not have spots.

**Non-native**
This image shows mildew on the stem. Some non-native stands have now been found with fungal spots as well.

Fungal spots alone should not be relied upon as an identifying characteristic.

Glume photo courtesy K. Saltonstall. Spots on culm photo courtesy R. Meadows.