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NEWLY DOCUMENTED POPULATIONS OF TWO STATE ENDANGERED *CAREX* SPECIES IN LAKE COUNTY, ILLINOIS

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Botanical nomenclature: Wilhelm and Rericha (2017)

Carex formosa Dewey (CYPERACEAE)

Carex formosa was first documented in Lake County, Illinois with a collection by Jane and John Balaban on July 1, 1992 (MOR 108106, Table 1). This collection was from a degraded habitat, at the edge between a *Rhamnus cathartica* invaded flatwoods and a mowed right-of-way (J. Balaban, personal communication, January 6, 2021). The Balabans previously found the species in Cook County on June 22, 1992, its first record in Illinois (MOR 108147, Table 1). *Carex formosa* was subsequently designated an Illinois endangered species, restricted in the state to Cook and Lake counties (Nyboer and Ebinger 2004). No more recent Lake County occurrences have been recorded (Illinois Natural Heritage Database 2021).

There are five extant naturally occurring populations of *Carex formosa* in Cook County, including the initial discovery site. Three of these sites are represented by collections (Table 1). A sixth population in a degraded Cook County woodland was extirpated as of 2013 (Kluge and Leavens, in preparation).

The original Lake County site had not been resurveyed since 1992. This site was recently visited (May 23, 2021) during field data collection for a detailed conservation assessment of *Carex formosa* in Illinois. No *Carex formosa* plants were found in this degraded habitat, and this population is now considered extirpated (Kluge and Leavens, in preparation).

Carex formosa was observed in two places at a second Lake County Forest Preserve site in 2013, but no voucher specimen was preserved (Ken Klick and Matt Ueltzen, personal communication, May 27, 2021). A survey of this site was performed on May 27, 2021. One population could not be relocated. A canopy opening project at the location of this population, performed in 2003 to facilitate more light to reach the ground layer,

apparently aided the aggressive growth of *Fraxinus nigra* seedlings and briar thickets, perhaps contributing to decline in this population. The flush of woody seedlings was also likely stimulated by the emerald ash borer causing further mature tree mortality. However, the second population at the site was relocated during the survey in a flatwoods habitat approximately 800m east of the Des Plaines River. This population is native to the site, growing in a matrix of remnant vegetation.

With the concurrence of the landowner, the authors collected a specimen from this population on June 15, 2021 (MOR 187082). An extensive list of associated species was recorded: *Agastache scrophulariifolia*, *Agrimonia gryposepala*, *Allium canadense*, *Amphicarpaea bracteata*, *Caltha palustris*, *Carex bromoides*, *C. cristatella*, *C. davisii*, *C. gracillima*, *C. grayi*, *C. lupulina*, *C. squarrosa*, *C. stipata*, *C. tenera*, *C. vulpinoidea*, *Cinna arundinacea*, *Cornus racemosa*, *Cryptotaenia canadensis*, *Dioscorea villosa*, *Dryopteris* sp., *Elymus virginicus*, *Festuca subverticillata*, *Fraxinus nigra*, *Galium concinnum*, *Geranium maculatum*, *Geum canadense*, *Glyceria striata*, *Helianthus* sp., *Impatiens capensis*, *Iris virginica* var. *shrevei*, *Micranthes pennsylvanica*, *Oxypolis rigidior*, *Parthenocissus* sp., *Penstemon calycosus*, *Quercus bicolor*, *Q. macrocarpa*, *Q. rubra*, *Ribes americanum*, *Rosa setigera*, *Rudbeckia laciniata*, *Sanicula odorata*, *Scirpus pendulus*, *Smilacina stellata*, *Smilax ecirrhata*, *Solidago canadensis*, *Thelypteris palustris*, *Thalictrum dasycarpum*, *Toxicodendron radicans*, and *Zizia aurea*. The total population of *Carex formosa* in these wet woods was estimated at 50 plants.

Significance: The previously recorded Lake County population of *Carex formosa* is now extirpated. To the authors' knowledge, our new record is the only currently persisting population of this species in Lake County and one of only six extant naturally occurring populations in Illinois. *Carex formosa* remains listed as state-endangered (Illinois Endangered Species Protection Board 2020).

Carex intumescens Rudge (CYPERACEAE)

S. B. Mead (1846) published the first record of *Carex intumescens* in Illinois (Hancock County). The Han-

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Table 1: Herbarium specimens reviewed for this study.

Species	Collector/ Date	Location	Specimen Accession #	Portal URL
<i>Carex formosa</i>	Balaban, J. July 1, 1992	Lake Co., IL	MOR 108106	(physical specimen examined)
<i>Carex formosa</i>	Balaban, J. June 22, 1992	Cook Co., IL	MOR 108147	(physical specimen examined)
<i>Carex formosa</i>	Milde, M. July 17, 1995	Cook Co., IL	MOR 127721	(physical specimen examined)
<i>Carex formosa</i>	Wilhelm, G., & L. Rericha June 19, 2015	Cook Co., IL	MOR 180899	(physical specimen examined)
<i>Carex intumescens</i>	Johnson, L. N. May 30, 1890	Cook Co., IL	Putnam Museum and Science Center [no number]	https://vplants.org/portal/index.php
<i>Carex intumescens</i>	Umbach, L. H. June 11, 1897	Cook Co., IL	Field Museum Herbarium 86312	https://collections-botany.fieldmuseum.org
<i>Carex intumescens</i>	Jones, M. May 20, 1985	Cook Co., IL	MOR 153419	(physical specimen examined)
<i>Carex intumescens</i>	Milde, M. August 4, 1994	Cook Co., IL	MOR 126150	(physical specimen examined)
<i>Carex grayi</i>	Evers, R. A. May 25, 1954	Livingston Co., IL	ILLIS 00021072	https://vplants.org/portal/index.php
<i>Carex grayi</i>	Bennett, H. R. July 2, 1955	Cook Co., IL	ILLIS 00021023	https://vplants.org/portal/index.php

cock County occurrence is extirpated; Kibbe (1952) and Myers and Henry (1976) stated there were no later records in the county. L. N. Johnson made the first collection in Cook County in 1890 (vPlants 2021, Table 1). Jones and Fuller (1955) cited early collections in Cook County by Umbach in 1897 (Field Museum 2021, Table 1), and Cowles in 1908 as well as a Peoria County record by Brendel (n.d.). Mohlenbrock and Voigt (1957) documented a 1952 Johnson County collection, noting that *Carex intumescens* had not been found in the state since 1908. Winterringer and Evers (1960) cited a 1955 Cook County record (later annotated to *Carex grayi*, vPlants 2021, Table 1) and the 1952 Johnson County record. *Carex intumescens* was designated an Illinois endangered species in 1981, based on the erroneous 1955 Cook County record along with records from Alexander and Johnson counties in southern Illinois (Sheviak and Thom 1981). Sheviak and Thom (1981) also listed a Livingston County specimen, later annotated as *Carex grayi* (vPlants 2021, Table 1).

The rediscovery of *Carex intumescens* in Cook County occurred when M. Jones collected a voucher specimen in 1985 (MOR 153419, Table 1). Another collection was made at a second Cook County site in 1994 (MOR 126150, Table 1). Currently, occurrences in far southern Illinois have been recorded from Alexander (Basinger *et al.* 1997), Jackson, Johnson, Massac,

Pope, Pulaski, Saline, and Union counties (Illinois Natural Heritage Database 2021). Thus, *Carex intumescens* has a widely disjunct distribution in the state. Bowles *et al.* (1991) cited Adams County in western Illinois, but this is not reflected in the Illinois Natural Heritage Database; we could not trace any corresponding specimen.

During August 6-7, 2021, a search was made for this species in a Lake County forest preserve, based on a 2006 sight record (Illinois Natural Heritage Database 2021). This site contains swampy flatwoods habitat appropriate to the species (Wilhelm and Rericha 2017). *Carex intumescens* was located during the survey, and its identification confirmed by Gerould Wilhelm of Conservation Research Institute and Paul Marcum of the Illinois Natural History Survey via field photographs. Approximately 15 fruiting plants were located while exploring only a portion of the suitable habitat; a voucher specimen was obtained with the concurrence of the landowner and deposited with Morton Arboretum (MOR 187083).

The local habitat is a seasonal streambed that contains a rich assortment of native wetland and low woods flora. Associates of this native population of *Carex intumescens* include: *Acer saccharinum*, *Amphicarpaea bracteata*, *Asclepias incarnata*, *Boehmeria cylindrica*, *Carex bromoides*, *C. cristatella*, *C. lupulina*, *C.*

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vulpinoidea, *Cephalanthus occidentalis*, *Cicuta maculata*, *Elymus virginicus*, *Eupatorium perfoliatum*, *Fraxinus nigra*, *Glyceria striata*, *Helenium autumnale*, *Impatiens capensis*, *Iris virginica* var. *shrevei*, *Lobelia cardinalis*, *Lycopus americanus*, *Lycopus uniflorus*, *Lysimachia ciliata*, *Muhlenbergia glomerata*, *Oxypolis rigidior*, *Pedicularis lanceolata*, *Penthorum sedoides*, *Persicaria hydropteroides*, *Prunella vulgaris* var. *lanceolata*, *Quercus bicolor*, *Ribes americanum*, *Scirpus atrovirens*, *Scutellaria lateriflora*, *Solidago gigantea*, *Thalictrum dasycarpum*, *Ulmus rubra*, and *Zizia aurea*.

Significance: This collection vouchers a county record for *Carex intumescens* in Lake County, Illinois. This species grows in scattered counties in northeastern and far southern Illinois but is considered rare in the state (Mohlenbrock 2011); it remains listed as state-endangered (Illinois Endangered Species Protection Board 2020).

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