

NORTHERN ILLINOIS
ODONATA
OF SPECIAL INTEREST

- **POTENTIAL STATE RECORDS - All known from WI & IN**
- **STATE HISTORICAL – Records from about 100 - 120 years ago**
- **NOTABLE – Few occurrences, State or Federally listed**

POTENTIAL STATE RECORDS

All known from WI & IN

POTENTIAL STATE RECORDS

All known from WI & IN

Coenagrionidae (Pond Damselflies)

Coenagrion resolutum (Tiaga Bluet)

Enallagma boreale (Boreal Bluet)

Enallagma cyathigerum (Northern Bluet)

Enallagma vernale (Vernal Bluet)

Aeshnidae (Darners)

Aeshna tuberculifera (Black-tipped Darner)

Cordulegastriidae (Spiketails)

Cordulegaster maculata (Twin-spotted Spiketail)

Gomphidae (Clubtails)

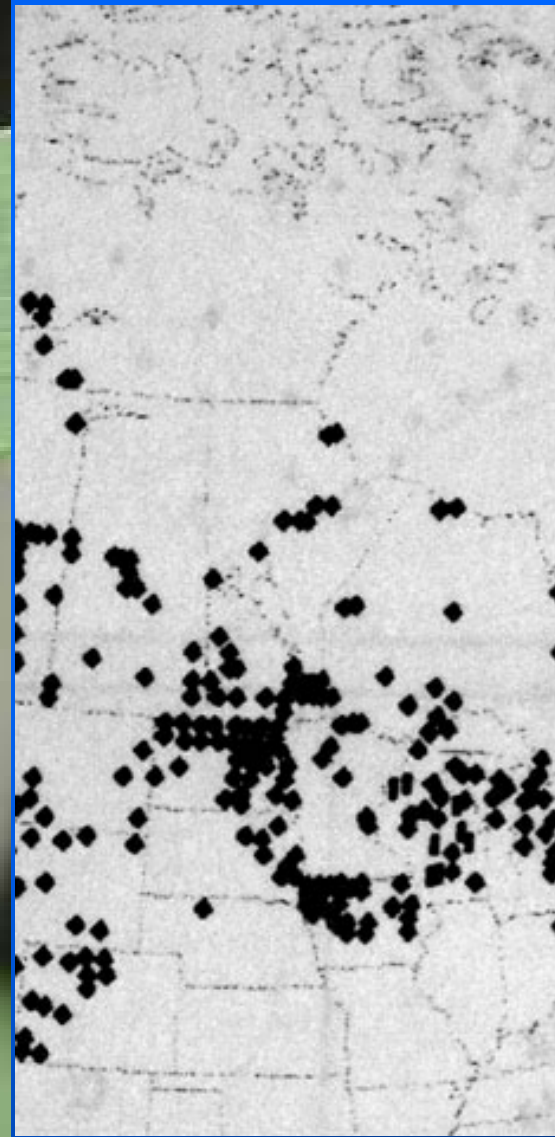
Gomphus lividus (Ashy Clubtail)

Corduliidae (Emeralds)

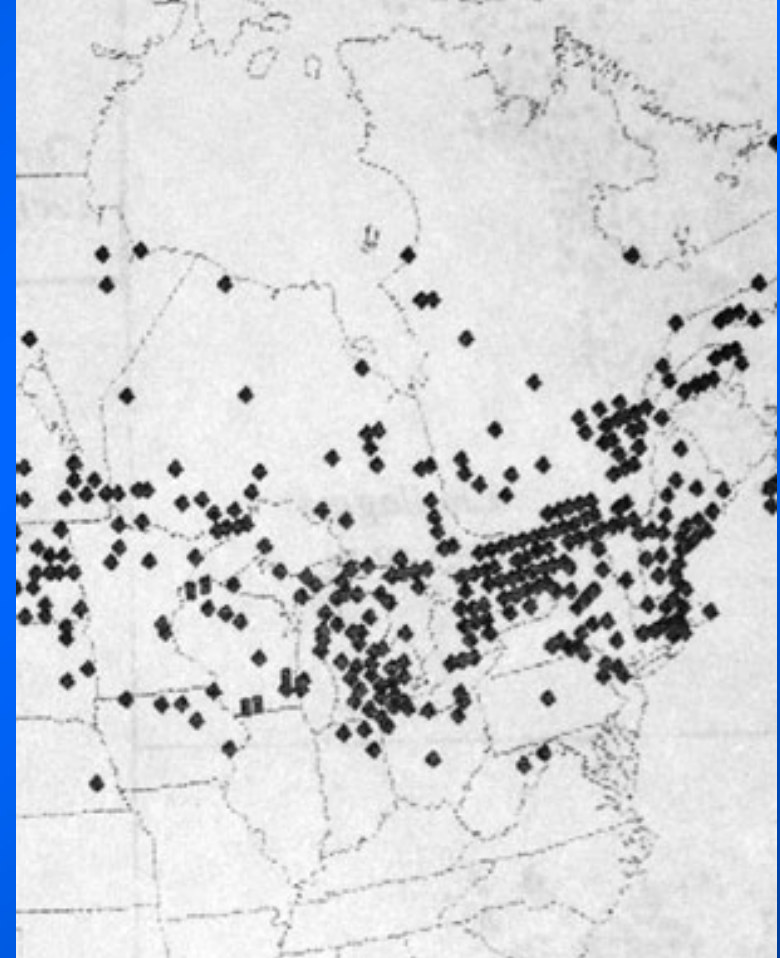
Cordulia shurtleffii (American Emerald)

Dorocordulia libera (Racket-tailed Emerald)

Somatochlora ensigera (Plaines Emerald)



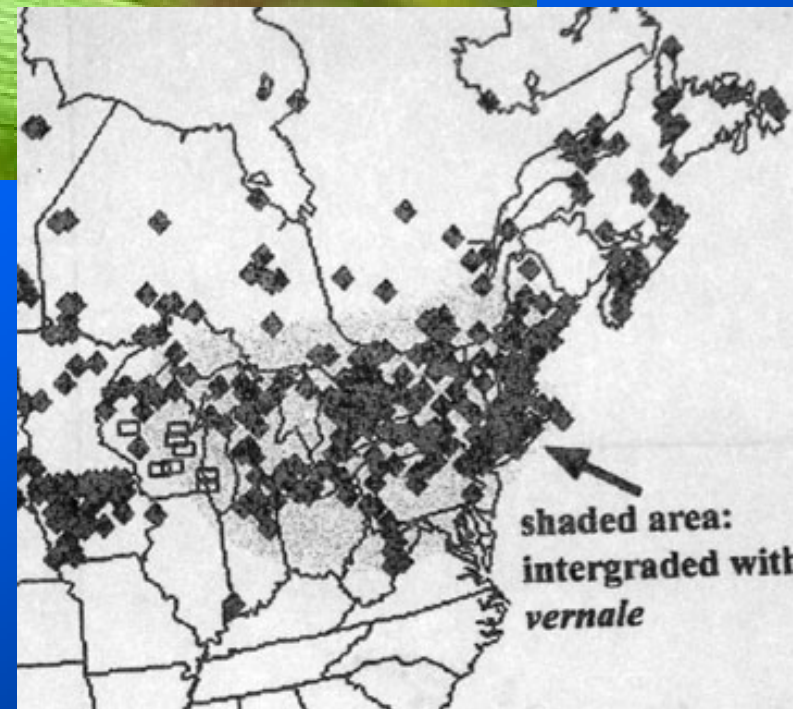
***Coenagrion resolutum* (Tiaga Bluet)**



***Enallagma boreale* (Boreal Bluet)**



Enallagma cyathigerum
(Northern Bluet)





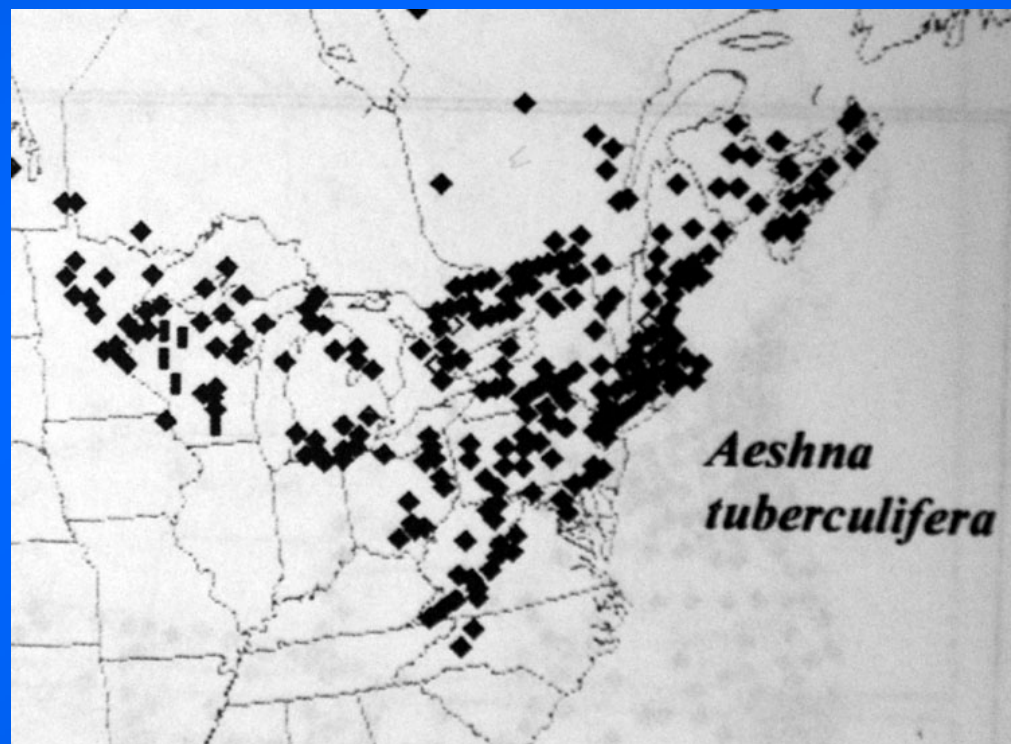
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Enallagma vernale (Vernal Bluet)





male



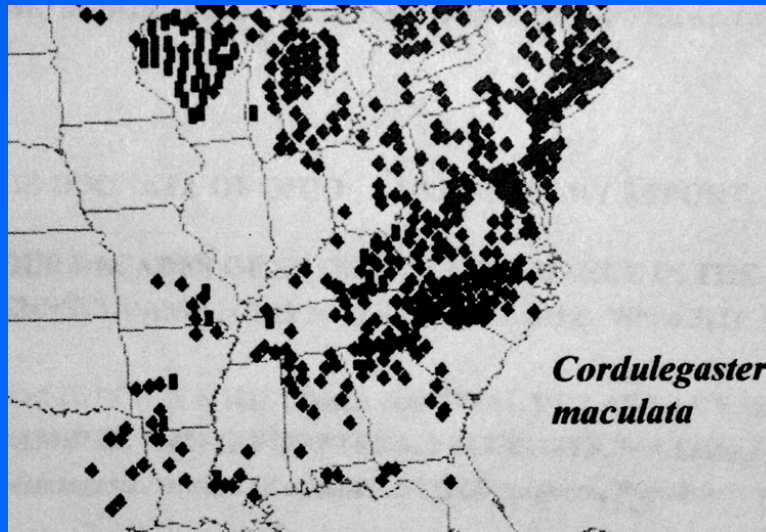
***Aeshna tuberculifera* (Black-tipped Darner)**



male



female

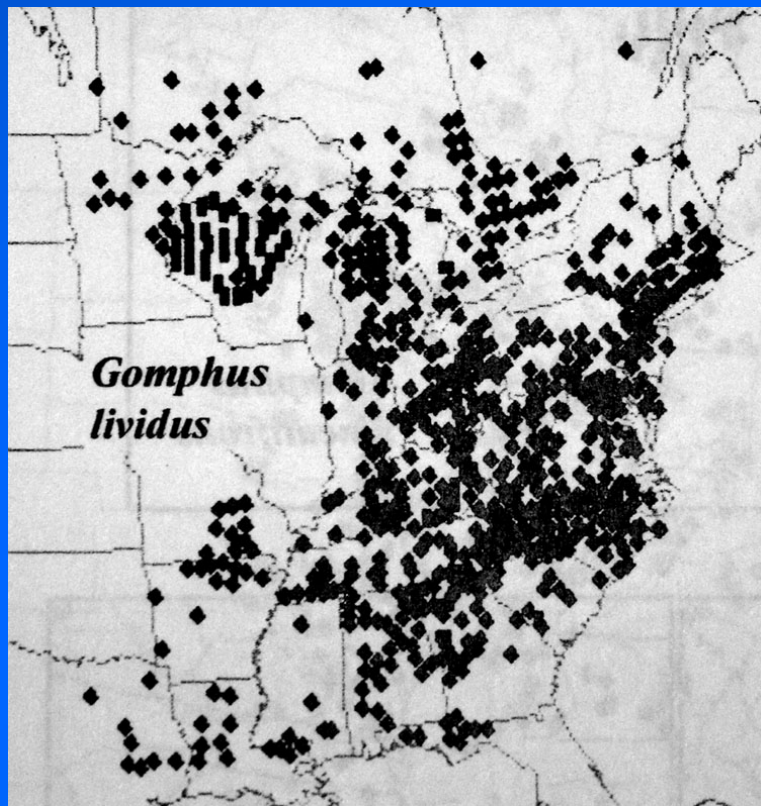


Cordulegaster maculata

Cordulegaster maculata
(Twin-spotted Spiketail)



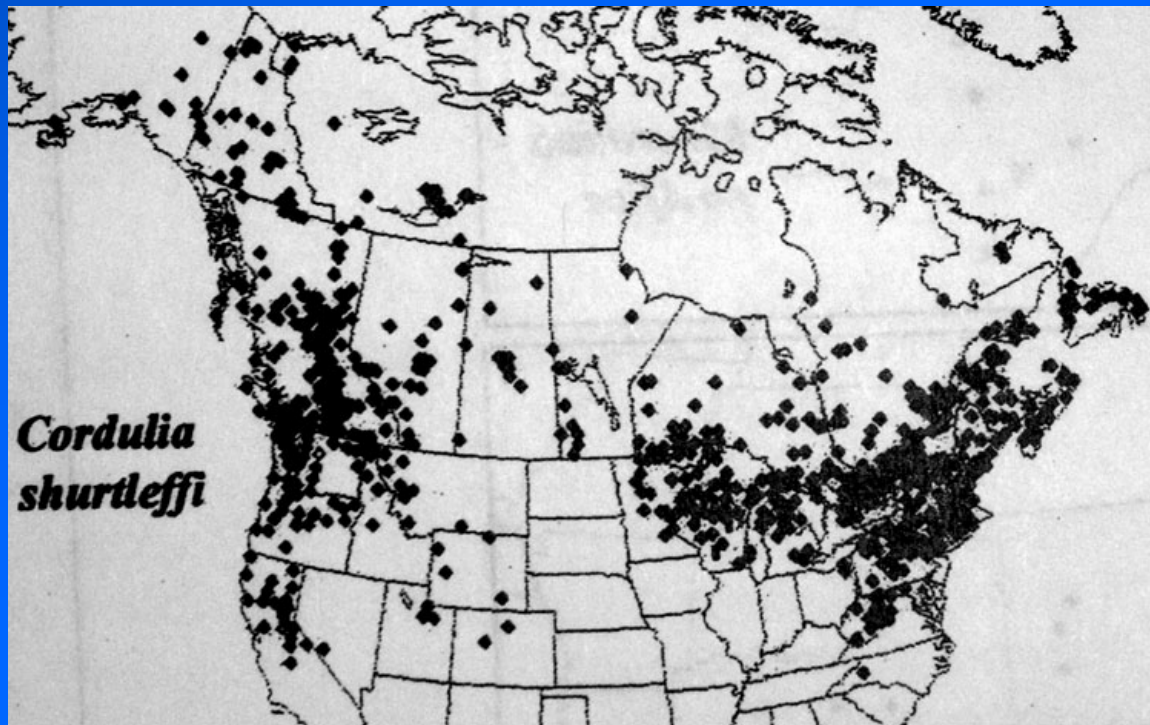
male



***Gomphus lividus* (Ashy Clubtail)**



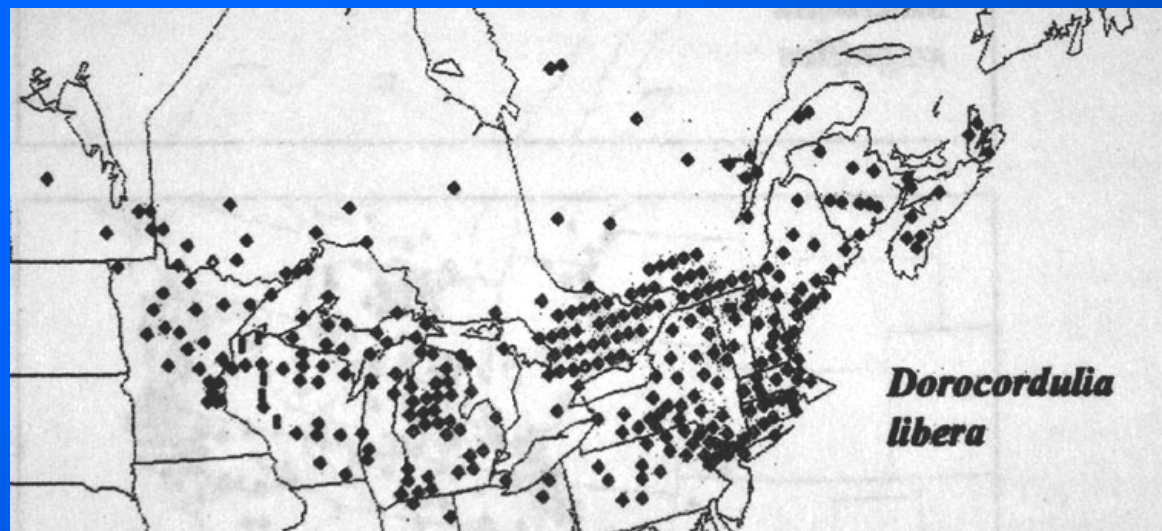
male



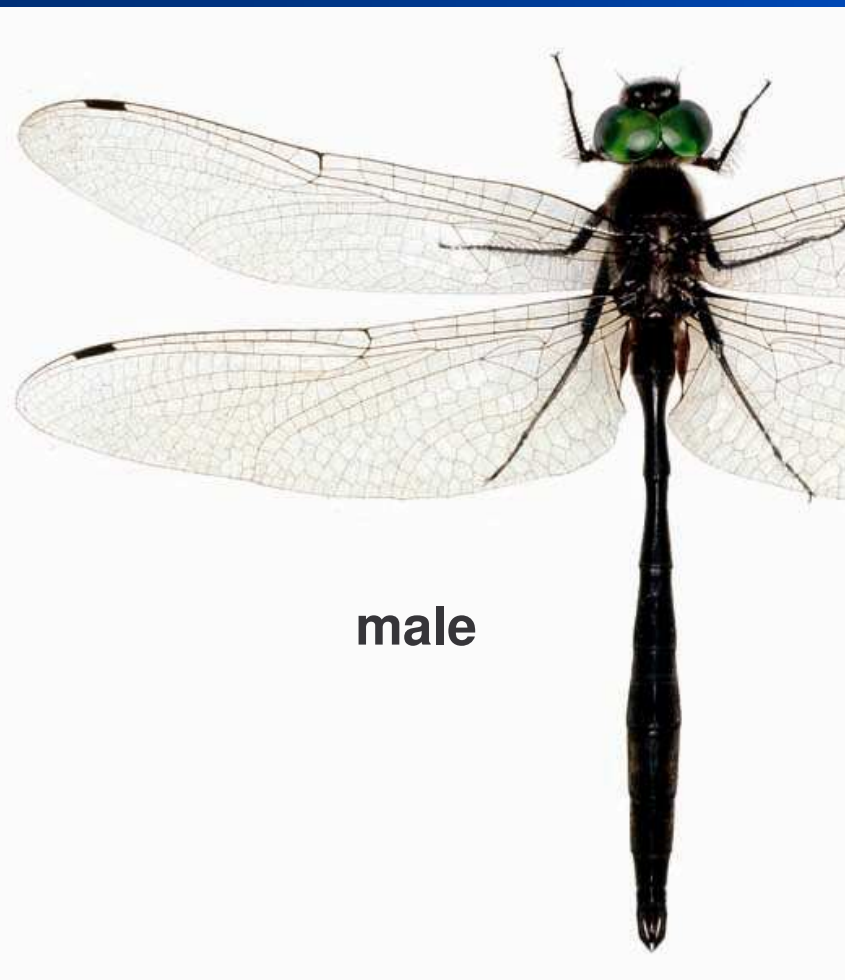
Cordulia shurtleffii
(American Emerald)



male



Dorocordulia libera
(Racket-tailed Emerald)



male



Somatochlora ensigera
(Plaines Emerald)



Somatochlora
ensigera

STATE HISTORICAL – records from approximately 100 - 120 years ago, but no recent records

Coenagrionidae

Chromagrion conditum (Aurora Damsel)

Aeshnidae

Aeshna clepsydra (Mottled Darner)

Cordulegastridae

Cordulegaster diastatops (Delta-spotted Spiketail)

Gomphidae

Arigomphus furcifer (Lilypad Clubtail)

Gomphus spicatus (Dusky Clubtail)

Corduliidae

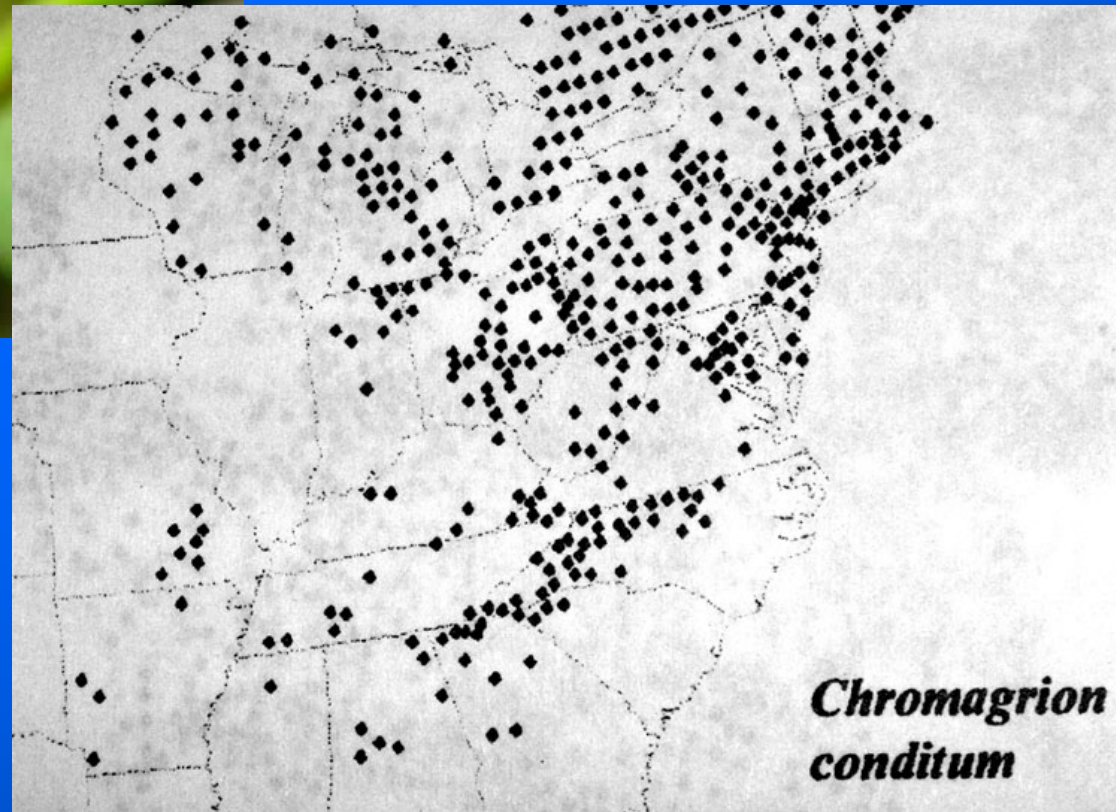
Epithea (Tetragoneuria) spinigera (Spiny Baskettail)

Libellulidae

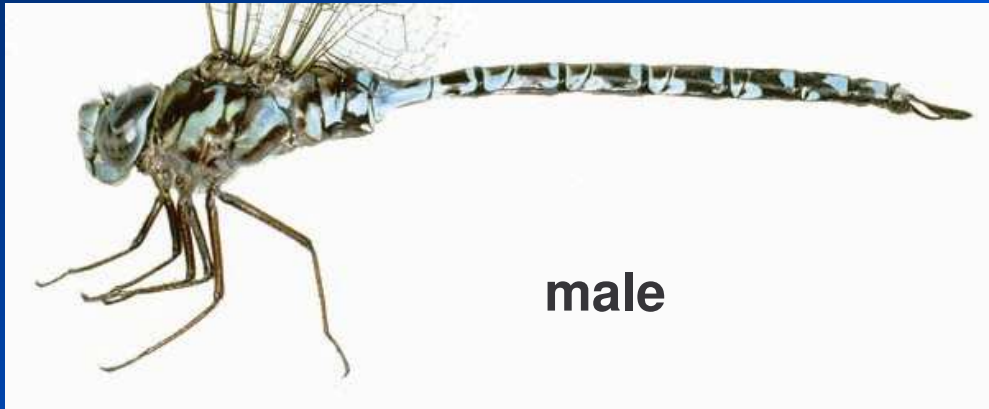
Ladona julia (Chalk-fronted Corporal)



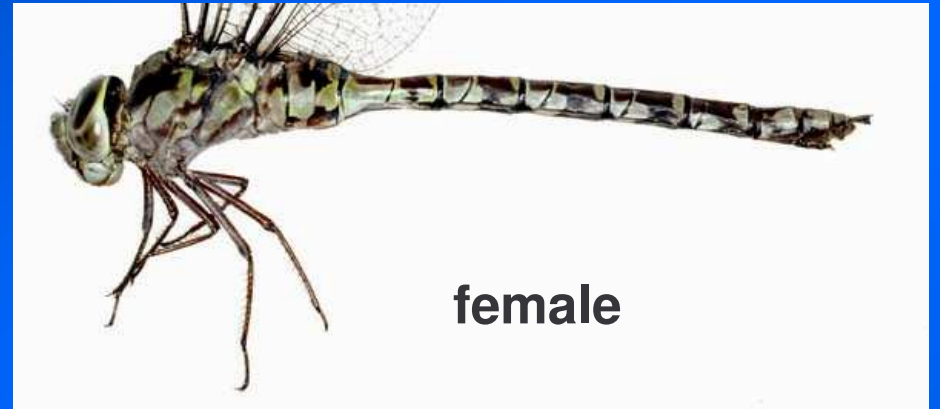
Chromagrion conditum
(Aurora Damsel)



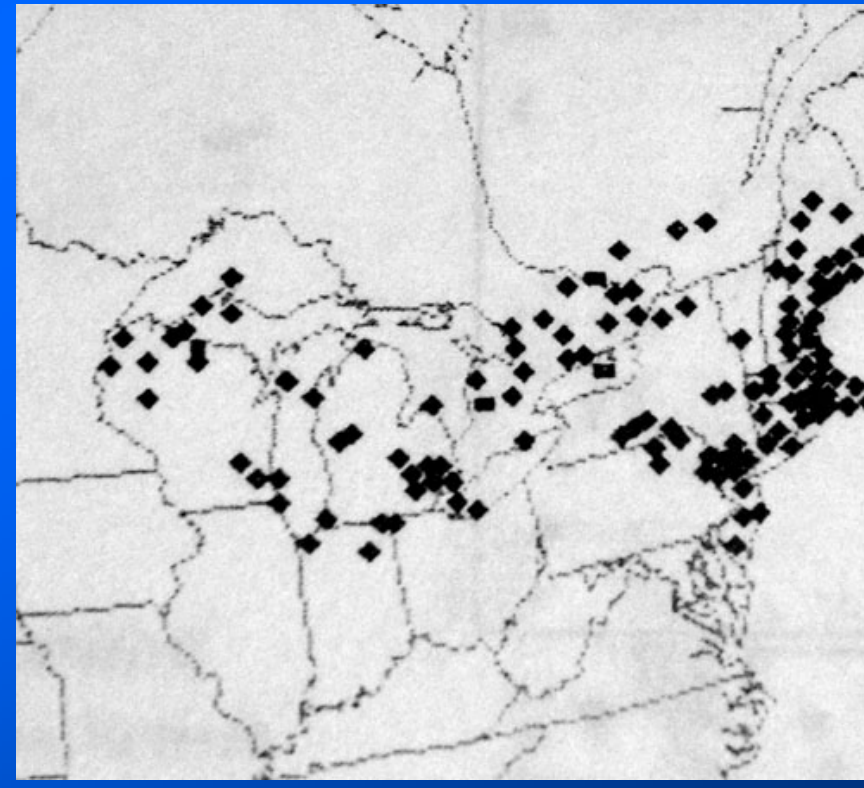
Chromagrion
conditum



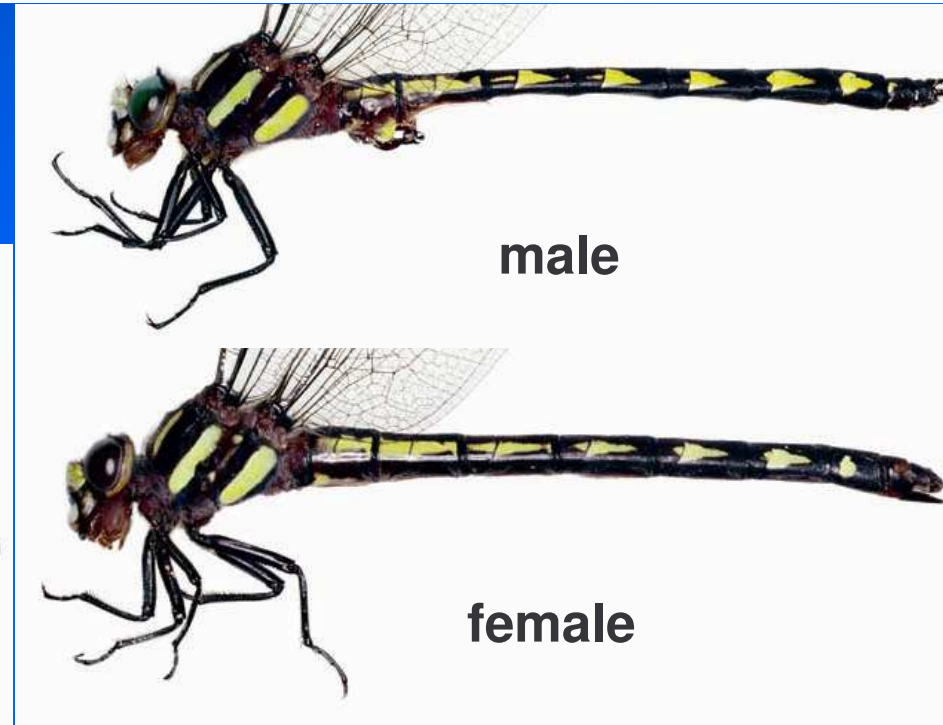
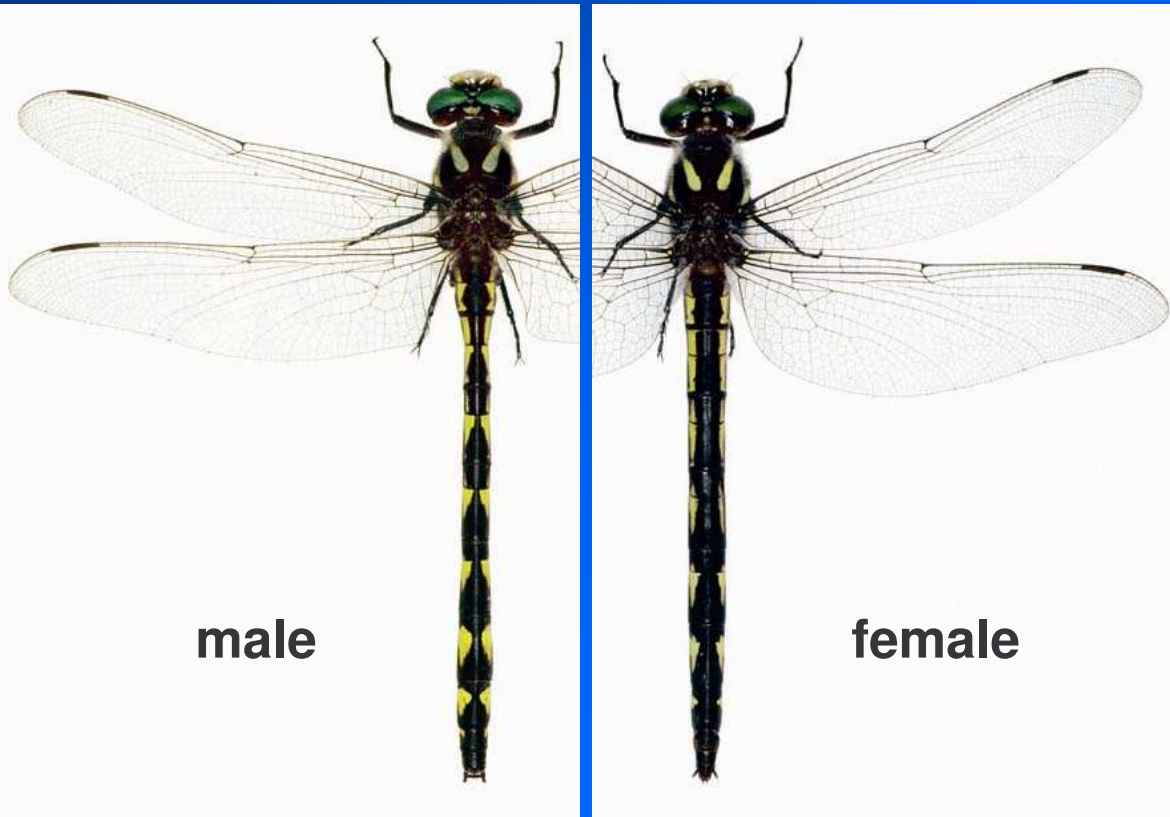
male



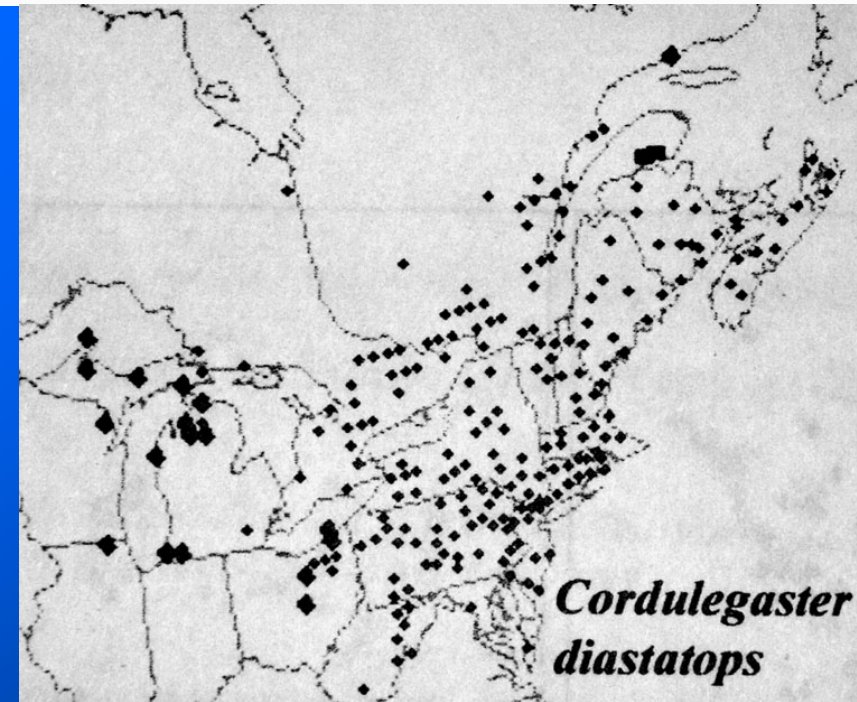
female

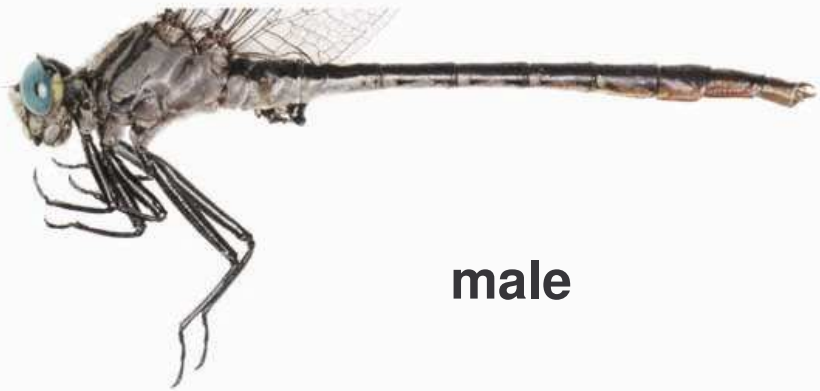


***Aeshna clepsydra* (Mottled Darner)**

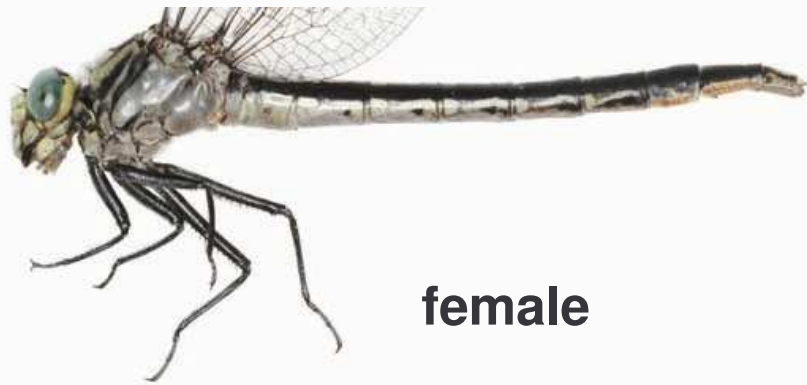


Cordulegaster diastatops
(Delta-spotted Spiketail)





male



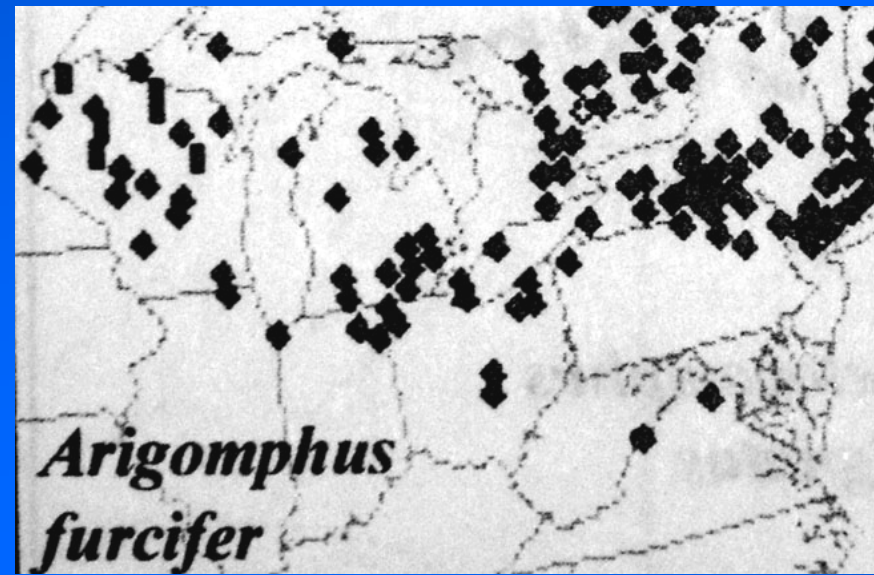
female



male



female



Arigomphus furcifer

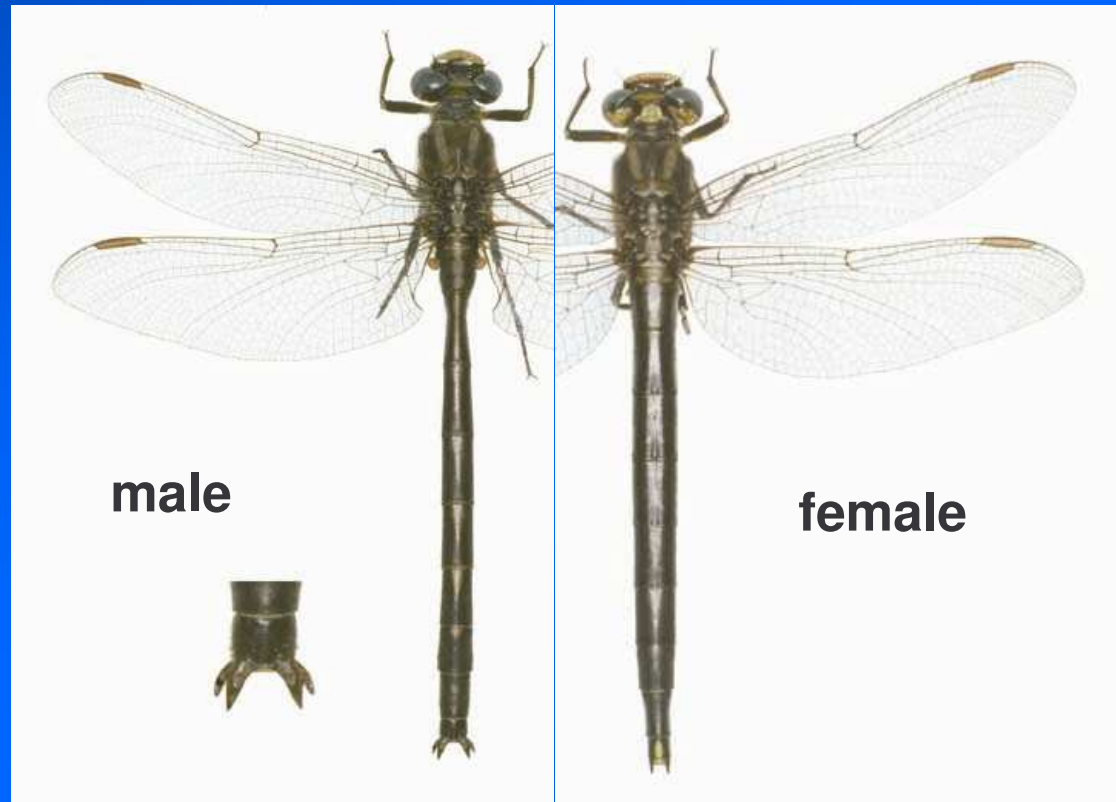
***Arigomphus furcifer*
(Lilypad Clubtail)**



male

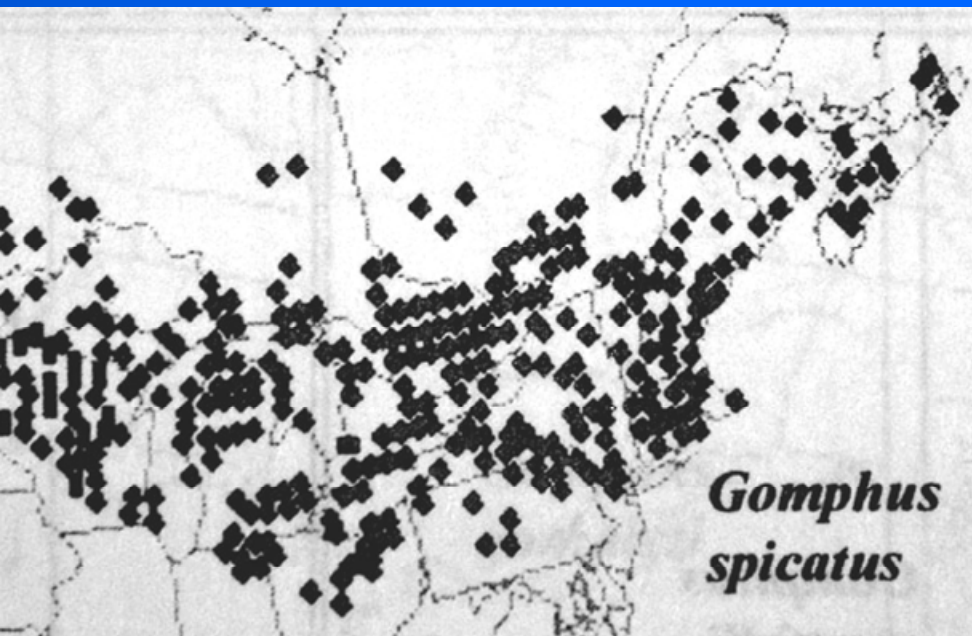


female

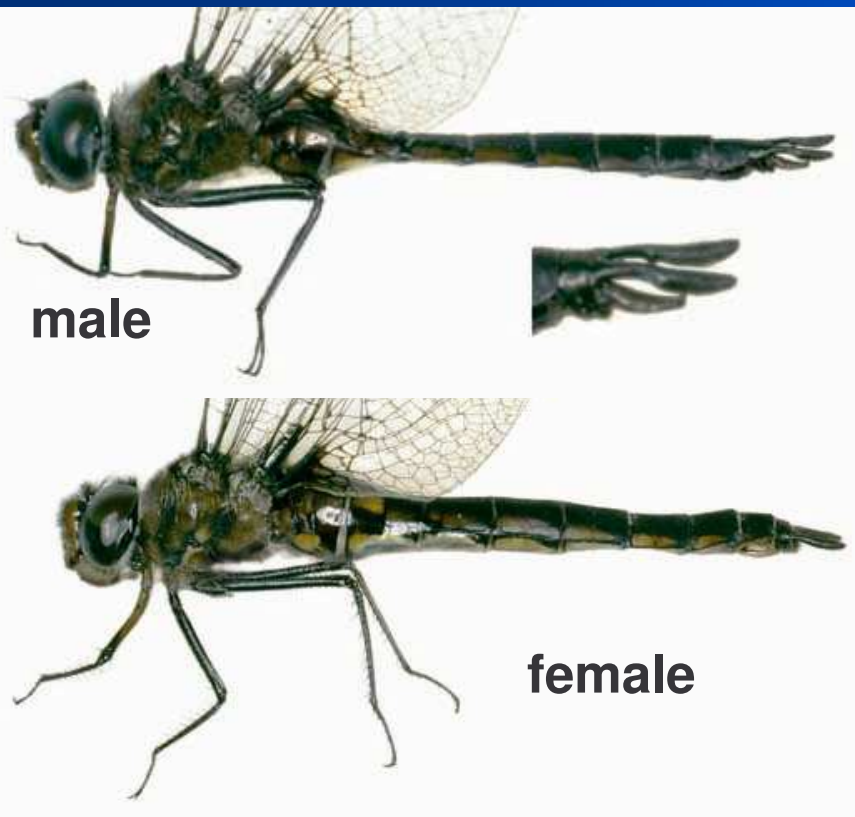


male

female

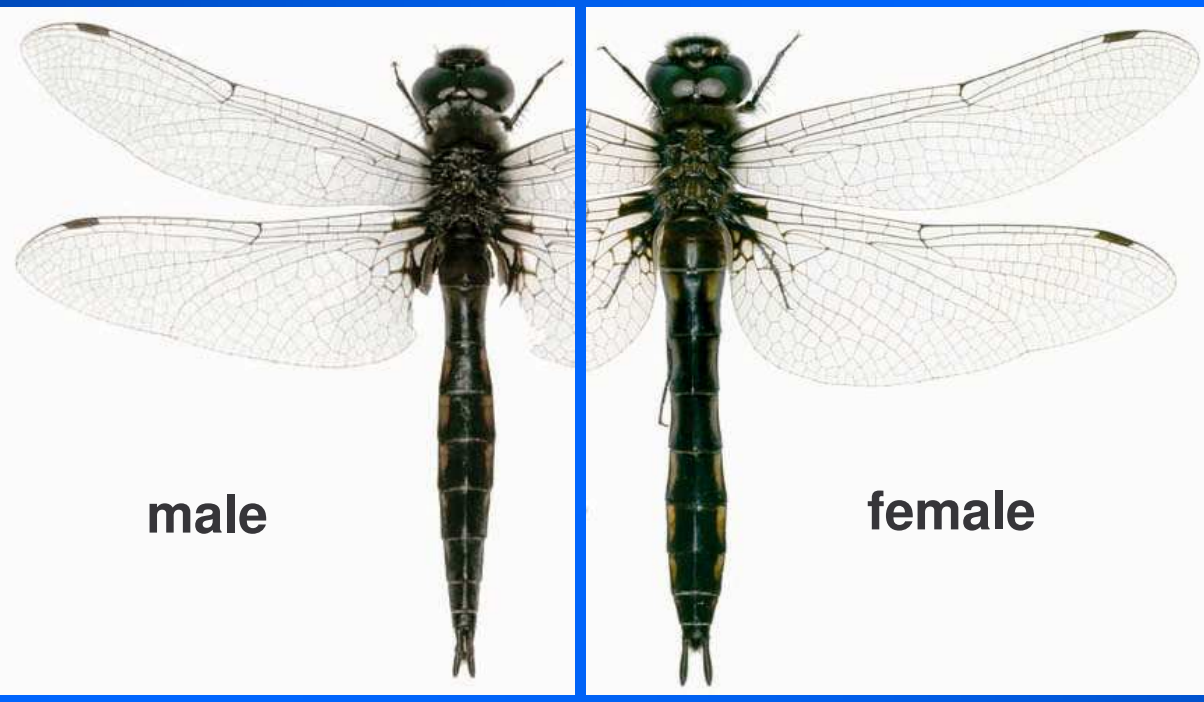


Gomphus spicatus
(Dusky Clubtail)



male

female



male

female

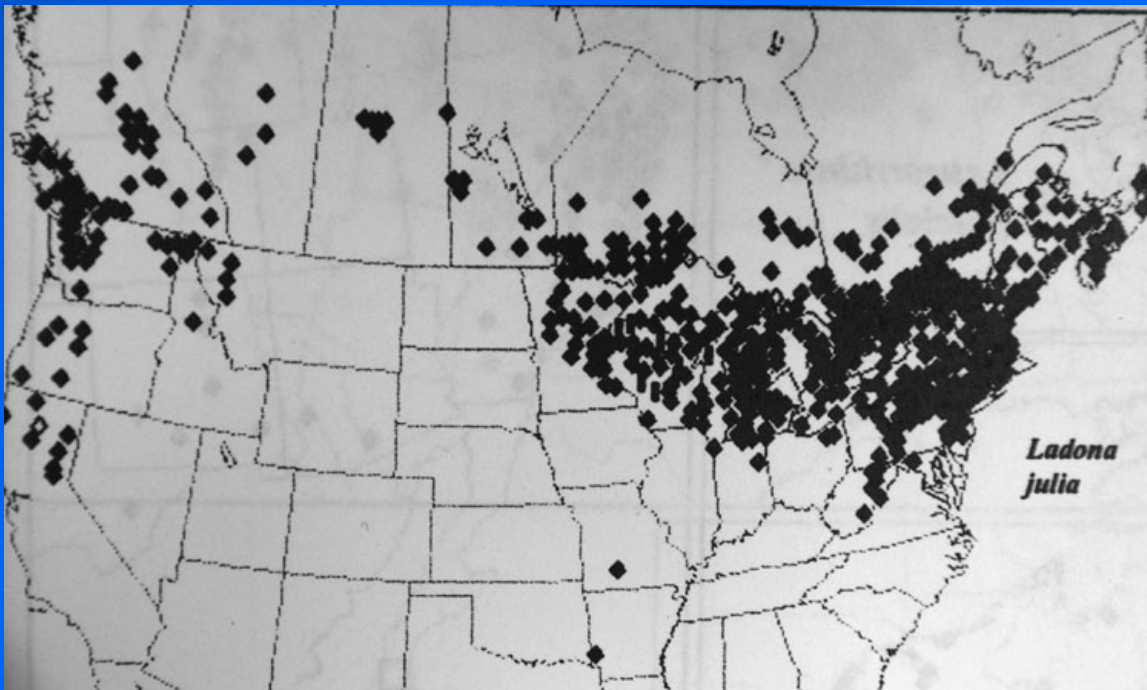
Epitheca spinigera
(Spiny Baskettail)



Epitheca spinigera



male



Ladona julia
(Chalk-fronted Corporal)

NOTABLE ODONATA

Calopterygidae (Broad-winged Damselflies)

Calopteryx aequabilis (River Jewelwing) - one known extant IL site
(Boone Co.)

Gomphidae (Clubtails)

Arigomphus cornutus (Horned Clubtail)- last known IL record, 1986
(Winnebago Co.)

Libellulidae (Skimmers)

Nannothemis bella (Elfin Skimmer)- state listed; fens, 2 NE IL
localities, populations large but isolated

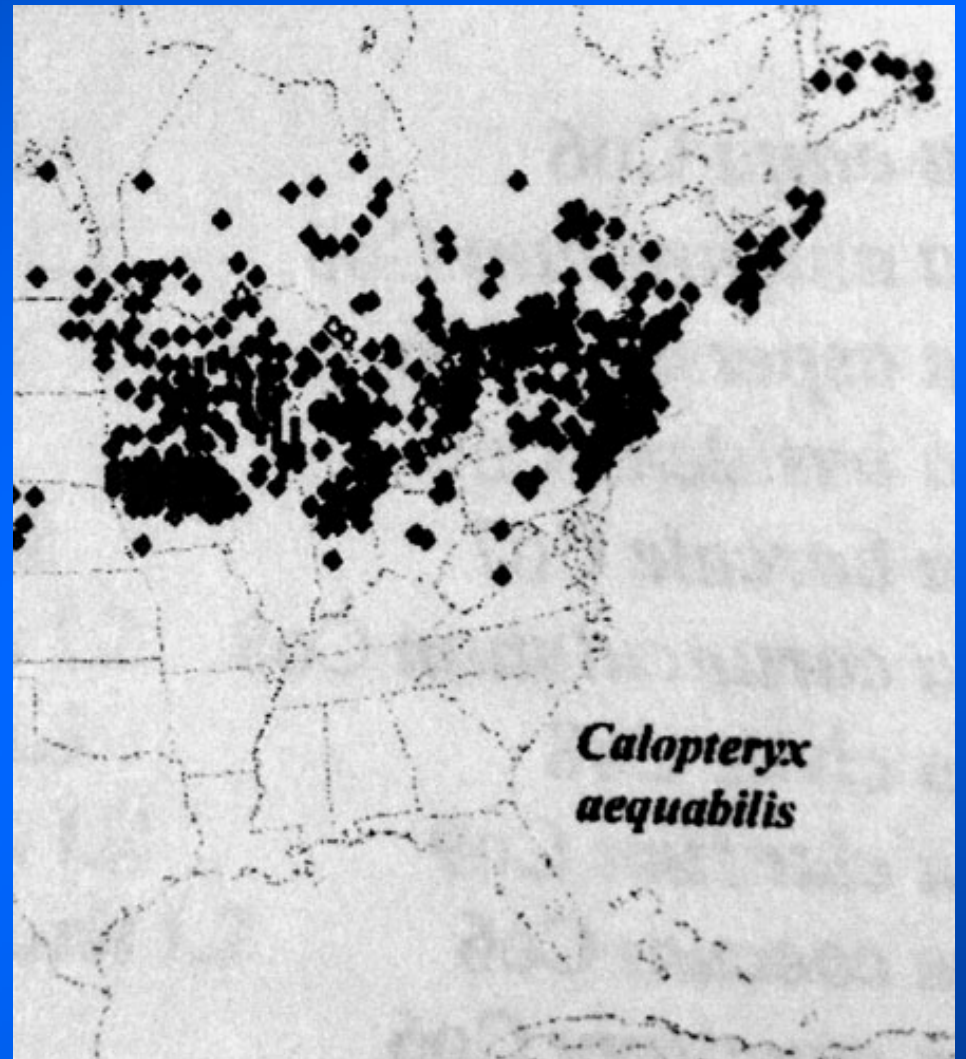
Corduliidae (Emeralds)

Somatochlora linearis (Mocha Emerald)- 2 occurrences documented
during the last 100 years from NE IL

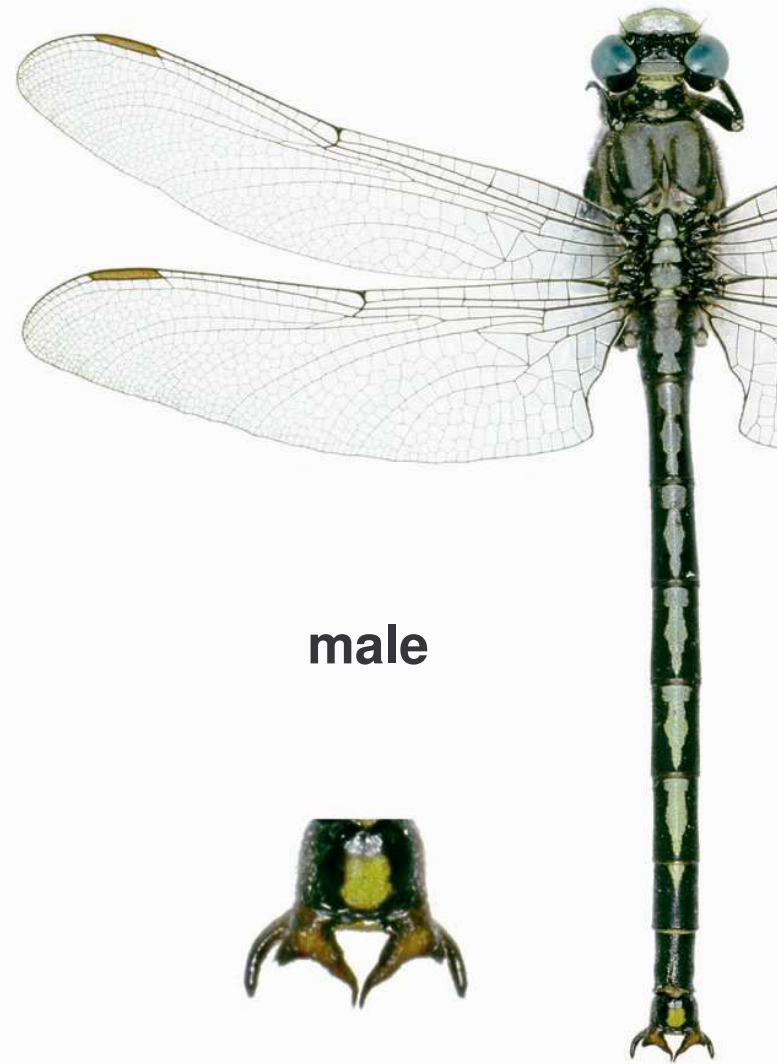
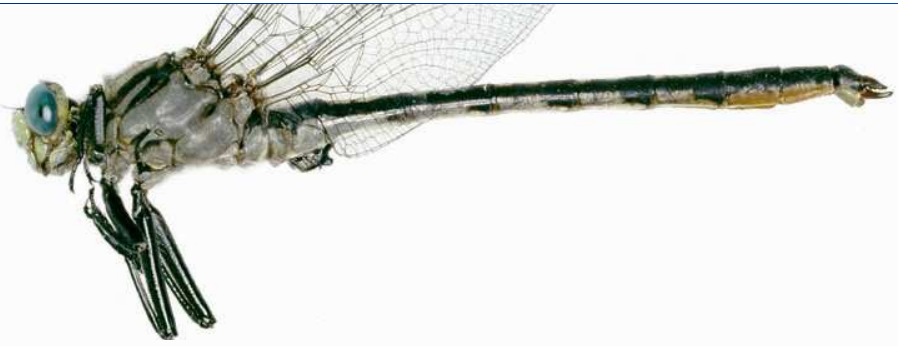
Somatochlora hineana (Hines Emerald) – Federal and State
endangered



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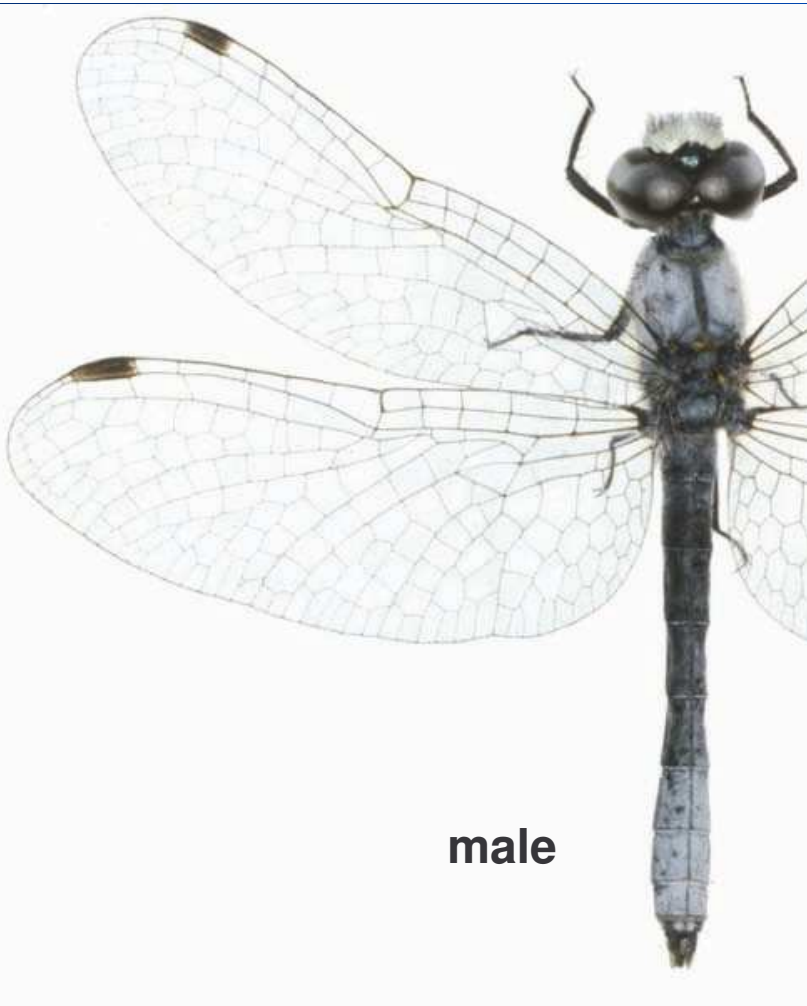
Calopteryx aequabilis
(River Jewelwing)



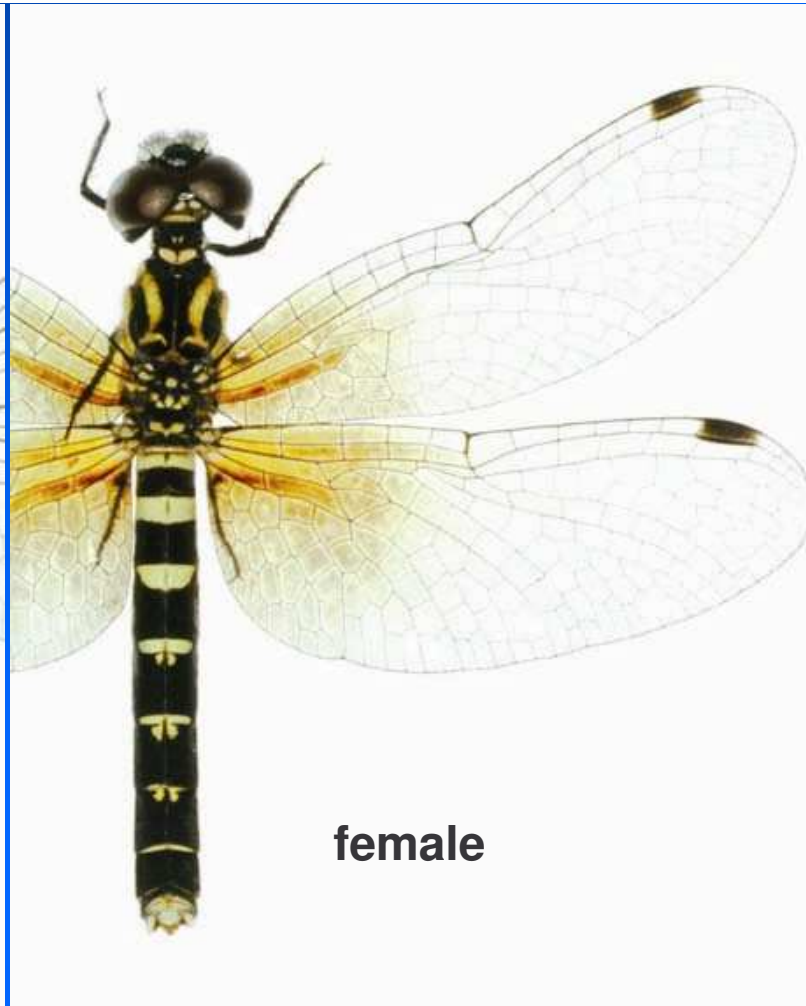
male



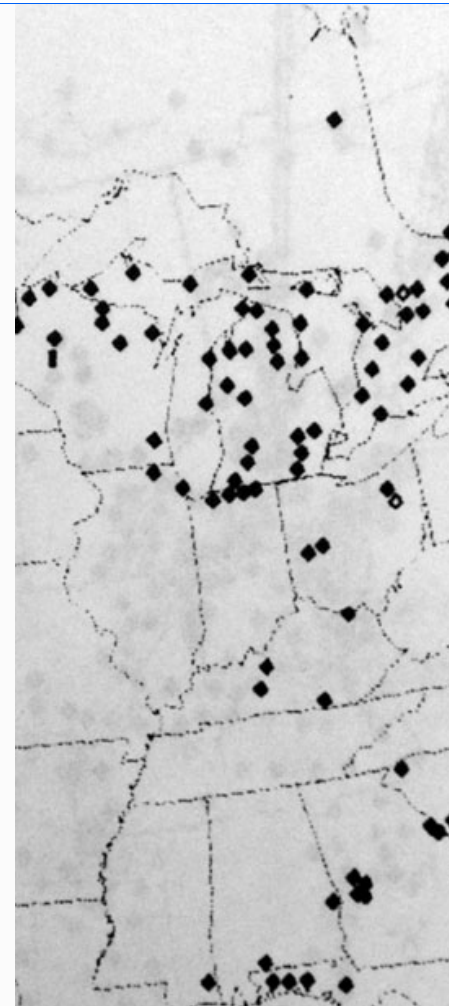
Arigomphus cornutus
(Horned Clubtail)



male



female

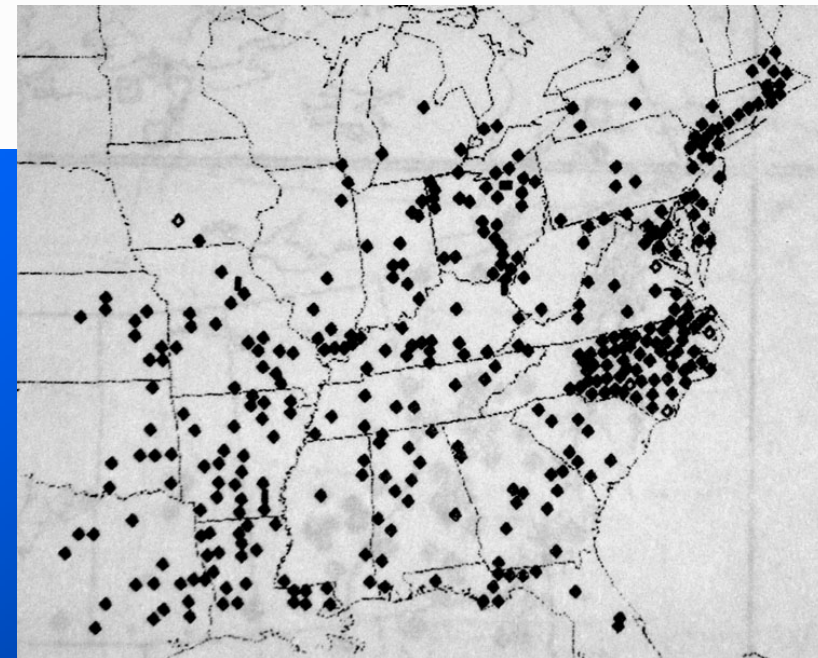


***Nannothemis bella* (Elfin Skimmer)**



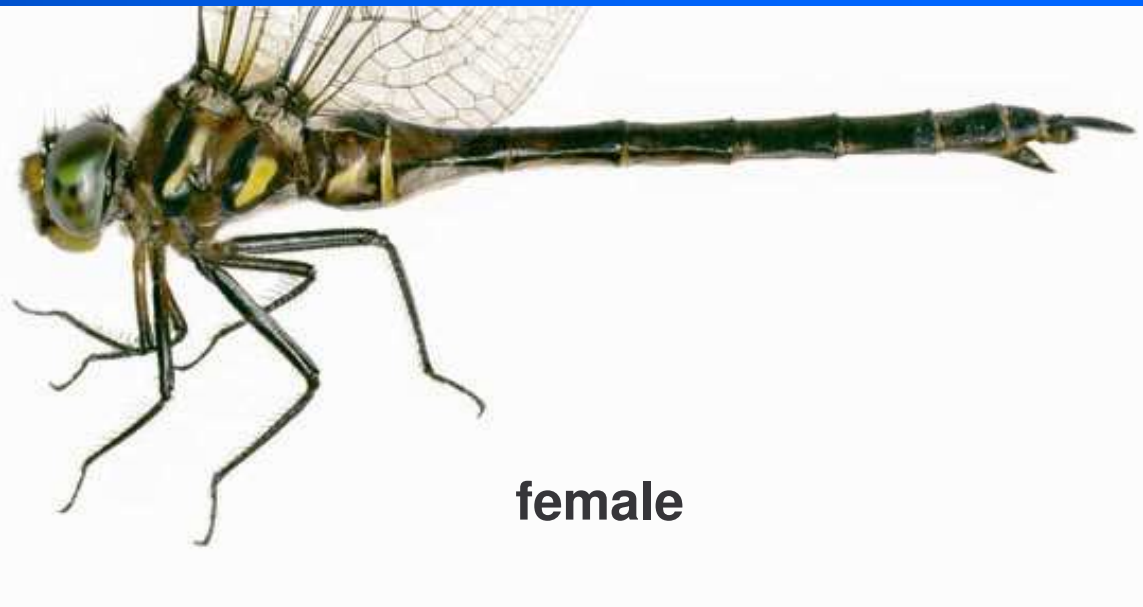
male

Somatochlora linearis
(Mocha Emerald)

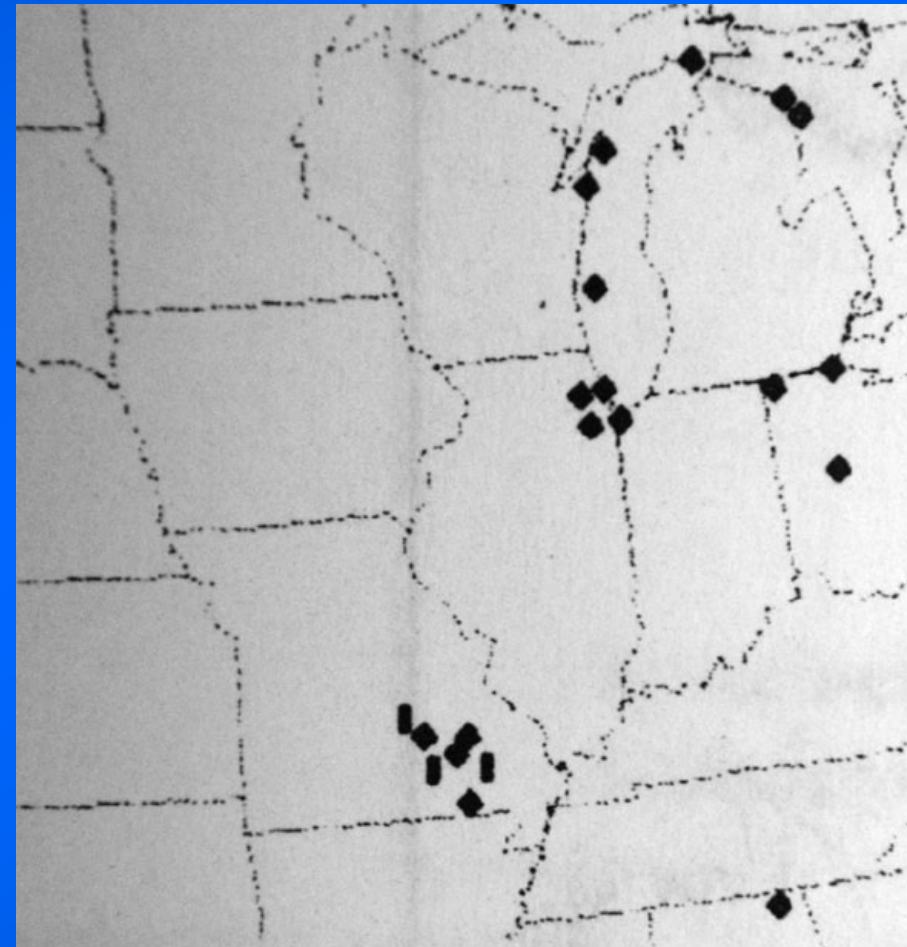




male

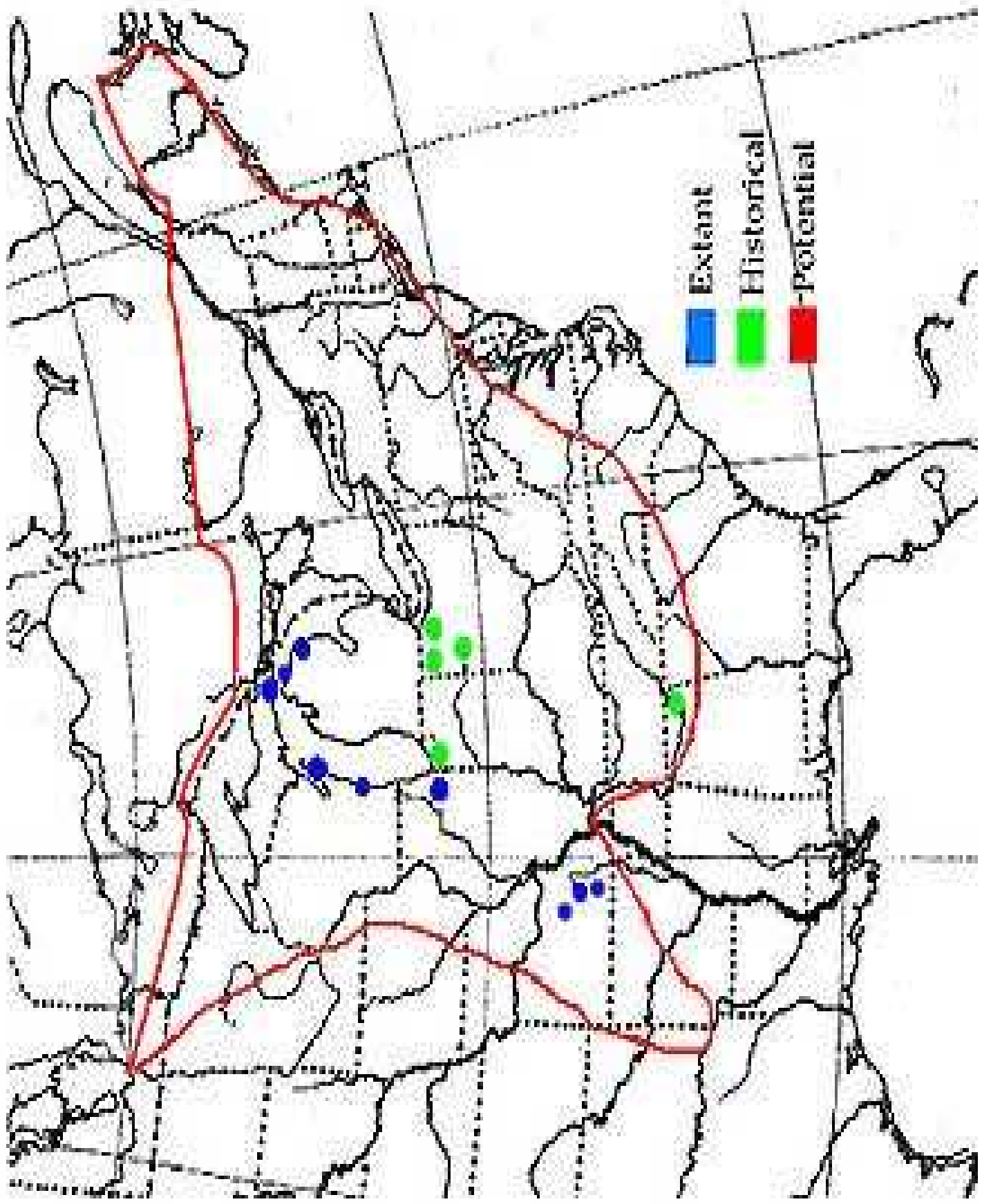


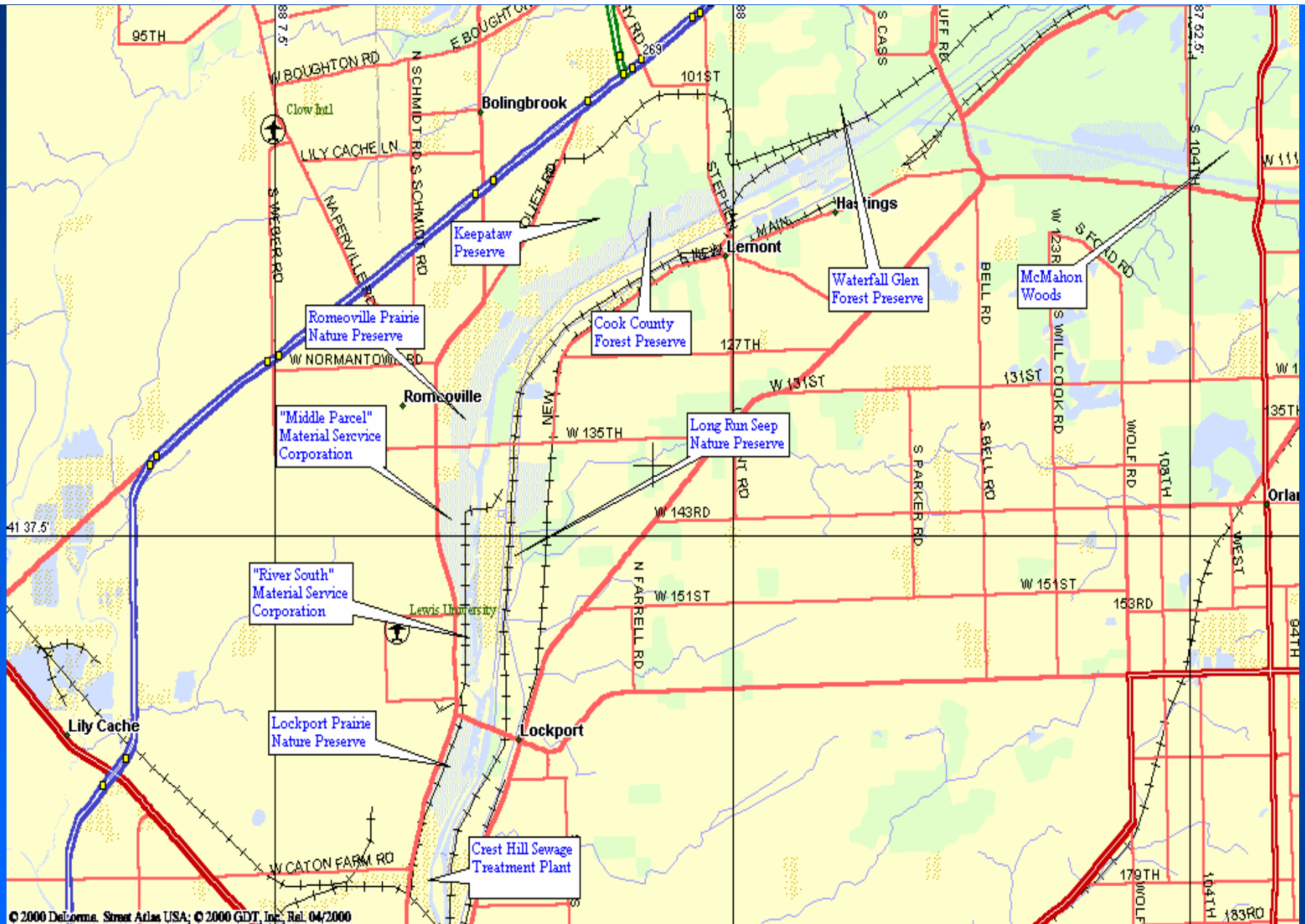
female



Somatochlora hineana
(Hine's Emerald)



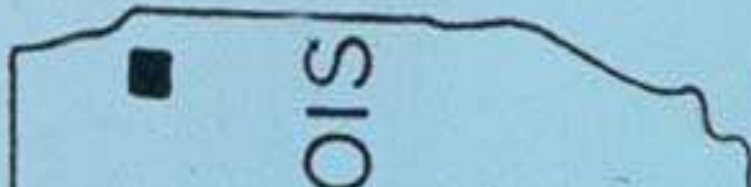




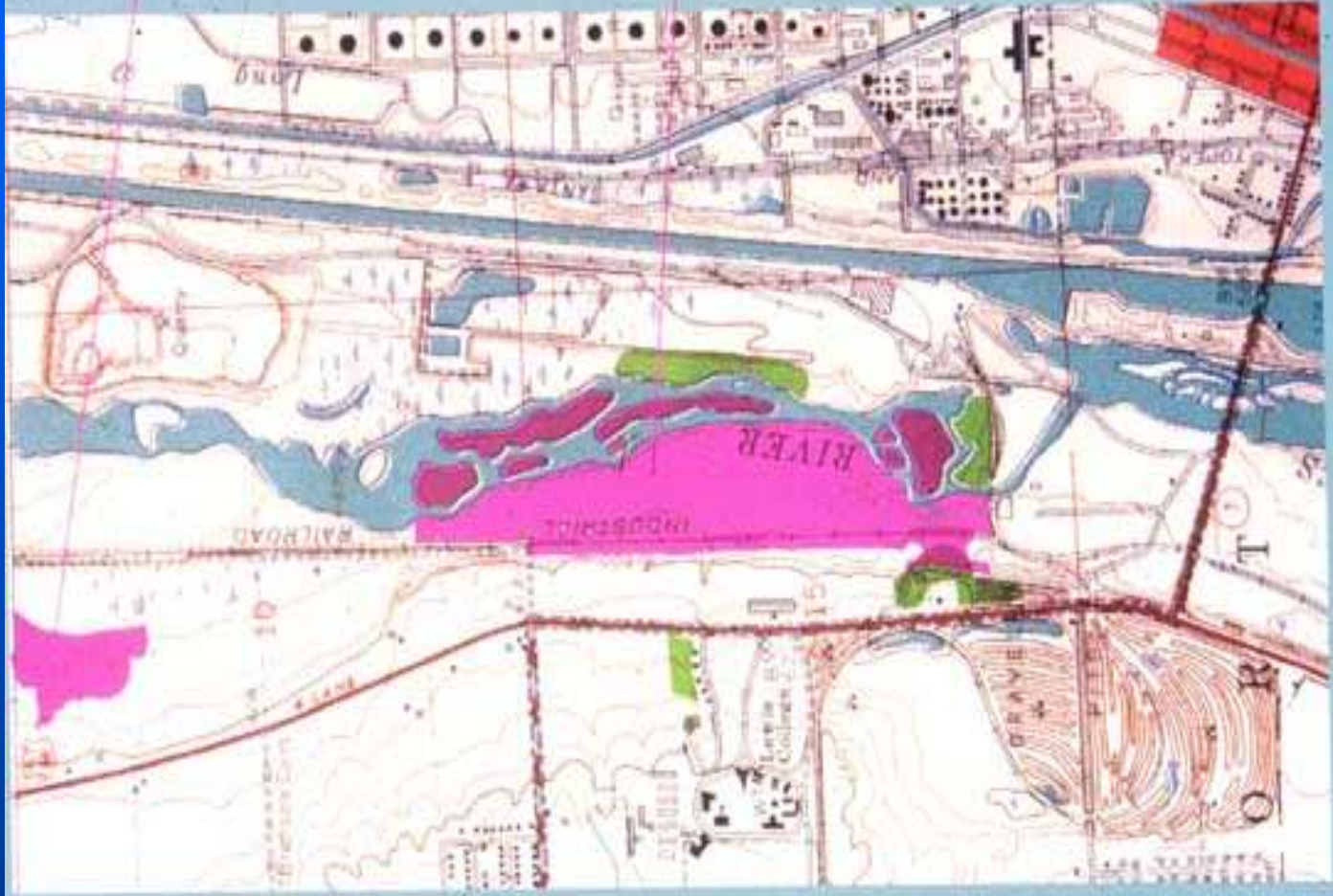
Hine's Emerald sites in Illinois



Area



1 km



Middle Parc

River South
Parcel

Emerald Meadow
Bulrush Hollow
South Meadow







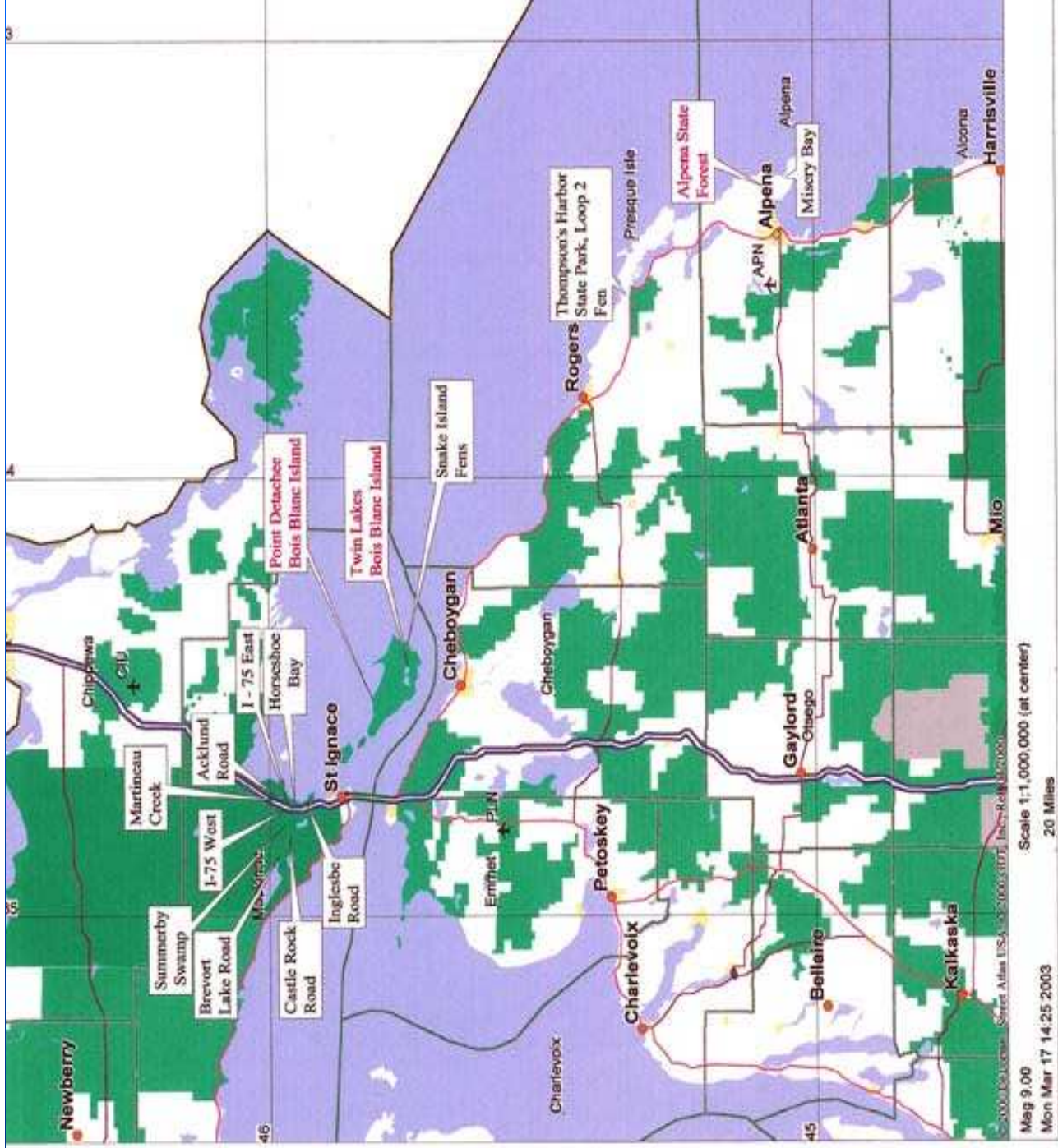


Figure 1. The known occurrences of Hine's emerald in Michigan. Sites discovered in 2002 are shown in red font. Others shown in black font are from previous surveys.

the \mathbb{R}^n is a linear space over \mathbb{R} with the usual addition and scalar multiplication. The inner product is defined by

$$\langle x, y \rangle = x_1 y_1 + x_2 y_2 + \dots + x_n y_n \quad (1)$$

where $x = (x_1, x_2, \dots, x_n)$ and $y = (y_1, y_2, \dots, y_n)$ are vectors in \mathbb{R}^n . The norm of a vector x is defined by

$$\|x\| = \sqrt{\langle x, x \rangle} = \sqrt{x_1^2 + x_2^2 + \dots + x_n^2} \quad (2)$$

The distance between two vectors x and y is defined by

$$d(x, y) = \|x - y\| = \sqrt{(x_1 - y_1)^2 + (x_2 - y_2)^2 + \dots + (x_n - y_n)^2} \quad (3)$$

The set of all vectors x such that $\|x\| = 1$ is called the unit sphere. The set of all vectors x such that $\|x\| \leq 1$ is called the unit ball.

The set of all vectors x such that $\|x\| = r$ is called the sphere of radius r . The set of all vectors x such that $\|x\| \leq r$ is called the ball of radius r .

The set of all vectors x such that $\|x\| = 0$ is called the origin. The set of all vectors x such that $\|x\| > 0$ is called the punctured origin.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ is called the lower hemisphere.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ and $x_2 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ and $x_2 = 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ and $x_2 = 0$ is called the lower hemisphere.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ and $x_2 = 0$ and $x_3 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ and $x_2 = 0$ and $x_3 = 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ and $x_2 = 0$ and $x_3 = 0$ is called the lower hemisphere.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ is called the lower hemisphere.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ is called the lower hemisphere.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ and $x_6 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ and $x_6 = 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ and $x_6 = 0$ is called the lower hemisphere.

The set of all vectors x such that $\|x\| = 1$ and $x_1 = 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ and $x_6 = 0$ and $x_7 = 0$ is called the equator. The set of all vectors x such that $\|x\| = 1$ and $x_1 > 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ and $x_6 = 0$ and $x_7 = 0$ is called the upper hemisphere. The set of all vectors x such that $\|x\| = 1$ and $x_1 < 0$ and $x_2 = 0$ and $x_3 = 0$ and $x_4 = 0$ and $x_5 = 0$ and $x_6 = 0$ and $x_7 = 0$ is called the lower hemisphere.