THE ILLINOIS ODONATE SURVEY

Guidelines for the Chicago Region
2019, Edition

CHICAGO ACADEMY OF SCIENCES

PEGGY NOTEBAERT NATURE MUSEUM

The Illinois Odonate Survey, 2019

These guidelines are based heavily on the Butterfly Monitoring Guidelines, Third Edition, many parts are taken verbatim, and have been adapted for Odonates. As such, credit should be expressed to the authors of the Butterfly Monitoring Guidelines. They are:

Ron Panzer, Biologist
Northeastern Illinois University

Don Stillwaugh, Consultant
Volunteer Stewardship Network

Doug Taron, Director
Butterfly Monitoring Network

Mel Manner, Administration
Butterfly Monitoring Network

Introduction

Dragonflies and Damselflies are in the class Insecta, subclass Pterygota (winged, and secondarily wingless insects), order Odonata. The Odonates are further broken down into three suborders, Zygoptera(damselflies), Anisozygoptera, and Anisoptera (dragonflies). Anisozygoptera are generally regarded as intermediate between the two main orders, and as a result have similar features derived from Zygopterans and Anisopterans. So, when we refer to Dragonflies and Damselflies it is easier to refer to them as the Odonates. This group of insects was discovered in the fossil record during the Carboniferous period as Protodonata, and as such is regarded as one of the more ancient group of insects. Their body plan has changed very little in the last 290 to 354 million years. Some species in the fossil record had wingspans of up to two and a half feet.

Odonata spend most of their life cycle in an aquatic nymph stage. The adult stage is spent as an aerial organism, and the eggs are then laid back in the aquatic environment. Because two life stages are based in the water, Odonates are good indicators of wetland health. Dragonfly nymphs are distinguished by a squat and stocky body. The gills are encased within the abdomen and are aerated by a pump that can also provide locomotion. Damselfly nymphs, on the other hand, are elongate and thin, have external gills on the tip of their abdomen, and move with a sinuous fish-like motion. Both groups have a labium (a set of extendable jaws), which they can fire out to catch passing prey.

In Illinois there is one federally endangered dragonfly, the Hines Emerald (*Somatochlora hineana*), andone state threatened species, the Elfin Skimmer (*Nanothemis bella*). Data on these organisms will help us track their populations in order to better protect them and may provide additional support for the protection of wetland areas.

It is very difficult to monitor actual insect population sizes, especially on larger sites. Fortunately, it is far simpler to monitor relative Odonata densities (the number of individuals recorded within an interval of space and time). One promising method of monitoring relative Odonata densities involves the establishment of permanent census routes which can help assess the relative density of an area over time (Pollard 1977). These routes called Pollard Transects were first established to effectively monitor butterflies. This technique is applicable to Odonata because, like butterflies, they are aerial organisms with relatively defined territories Odonata tend to come out on clear warm days and to some degree, range away from wetland sites. Both butterflies and dragonflies are remnant dependent; losing certain habitats would be detrimental to their populations.

By observing Odonates along a consistent route at a given time of day over a number of years, it is possible to establish relative density and population trends of these animals. It is important to remember this technique detects long-term changes. Fluctuations from one year to the next will have little significance.

Census Route Design

Census routes can be used to monitor all of the Odonates that inhabit, or visit, a site. These routes will ideally:

- transect a variety of habitat and/or management units
- take advantage of existing paths or trails wherever possible
- be easy to locate (by others) and repeat in subsequent years
- require anywhere from1/2 hour to 2 hours to complete. (Large sites may require 2 routes.)

It should be noted that although one would think that Odonates would primarily remain around water sources, they often seek prey some way from their normal water source. So, census routes do not have to remain close to wetland vegetation.

The following are wetland subdivisions in Northern Illinois:
Fen
Sedge meadow
Marsh
River
Shrub swamp
Bog

While monitoring on your census routes it is likely that you will walk through different vegetation types including communities more associated with dry landscapes. The following you will probably encounter when monitoring:

Prairie- subdivided into dry, mesic and wet.
Sand savanna- subdivided into dry, mesic and wet
Tall grass savanna- subdivided into dry, mesic, wet or sedge meadow
Old field- subdivided into, dry, mesic, wet or sedge meadow
Additional subdivisions might involve adjectives such as: “open”, “closed”, and “degraded”

It should be noted that sites with no wetland areas are not suitable for survey

Odonates may initially be concentrated around wetland areas; they may disperse the further from the wetland area. This could result in a lower incidence of sightings. Census routes should be conceptualized as corridors, 12 meters (approx. 40ft) in width. This will enable census takers to meander enough to avoid serious trampling in sensitive areas, such as sedge meadows. Narrowly defined routes can result in badly trampled paths, and can entice visitors to enter wet areas, and other sensitive areas, that they might otherwise avoid. Routes that work well on paper will often prove to be less then effective in the field. No problem. Remember that this is a long-term project. If your initial route proves to be less than

adequate after the first year, change it. **However, any further changes to the route must be approved by the Illinois Odonate Survey Coordinator and the land owners.**

Survey Procedures

Census data will be of real scientific value if the following criteria are met:

A single observer should take each census. This person may be accompanied by one or more "blind" assistants, which may help in record keeping, and identifications only. Only one person should be spotting the Odonates. If the observer fails to notice an Odonate, their partner should not point it out. **The census taker should:**

- proceed at a uniform pace (with route map and census form in hand)
- conduct censuses, between the hours of 10am and 3pm
- conduct censuses, only on days with less than 50 % cloud cover
- conduct censuses, only on days with light to moderate winds
- record all species sighted within a detection radius of roughly 6 meters (20 feet)
- pause briefly to identify fast-moving or elusive individuals, returning to departure
- point to resume route.

Note: this is a binoculars only protocol, we do not support capture (for ID) and release, anyone found using a net to ID during census will be eliminated from the Illinois Odonate Survey.

Census period: censuses should ideally be taken on 6 occasions throughout the summer period, from late May through late September/early October.

Record Keeping

Census Route Field Form:
Ubiquitous species are listed to minimize the need for writing during surveys.
Monitors must fill out this form each time they run their route and submit data to **PollardBase at pollardbase.org.** In order to submit data, you must create an account ay pollardbase.org. Please contact the Illinois Odonate Survey coordinator if you have difficulty or need guidance.

Maps:

Each route should be depicted, to scale if possible, on a site map. The plant communities, and/or management units traversed by the route should be clearly delineated, and prominent (and hopefully permanent) features, such as the telephone poles, large boulders, or official trails, should be clearly marked. Certain types of plant will hold different species of insect for which Odonates can feed upon. So, it will be important to classify the vegetation type that the Odonate is found in. As mentioned earlier, Odonates are not necessarily found exclusively near wetland areas.

We must have a map of your route on file. Please submit a KMZ or KML file map of your route if it has not already been submitted. If you need guidance or cannot do this please contact the Illinois Odonate Survey coordinator for guidance.

Odonate Identification

Dragonflies and damselflies can be distinguished by the following characteristics. Dragonfly's adults lay their wings out flat while at rest or while perching. In contrast, most Damselflies hold their wings up, and behind them. Dragonflies tend to be stockier in build, and Damselflies are more elongate, and fragile looking. The literal translation of Anisoptera, is unequal wings, and Zygoptera is equal wings. Zygoterans wings are of similar shape, and are held closed over or alongside the abdomen. Anisoptera, (wings are of dissimilar shape), hind wings are considerably broader at the base then at the end, they are held flat or even can be drooping downwards. Dragonfly eyes tend to be very large, and often touch on top of the head. Damselflies on the other hand, have widely separated eyes. These are the basis distinctions, but there can be other factors that increase difficulty in identification. Color dimorphism (color variance between male and female) can complicate accurate identification. Males and females can look wildly different and females of many species look very similar. Added problems include teneral adults. Adult odonata that have not yet reached their full color range, they may look similar to other species or have not developed the patterns that help distinguish them from other species. Many odonates after emerging from the last nymph stage are often brown in color. Sexual maturity may take a couple of days after emergence and this would be when the color develops.

Dragonfly and Damselfly Families of the Chicago Region

Anisoptera (Dragonfly)

Aeshnidae

This family contains the largest species you will see in the Chicago region. Eyes form a seam togetheracross the head. Species typically are 3 inches long.

Gomphidae

Found more often around flowing water such as streams and rivers. Eyes are separated in a style vaguely reminiscent to a hammerhead shark. Also, the abdomen is often flared near the final abdominal segments in to what is called a club. The eyes and club are diagnostic. This family is not on the beginner's checklist.

Cordulegastridae

Eyes meet in a single point on the top of the head, fairly large organisms, the eyes are diagnostic. This family is not on the beginner's checklist.

Macromiidae

Have a single stripe across their thorax, they often have a low rapid flight, in appearance are very similar to Corduliidae, only recently separated as a family. Eyes are bright green. This family is not on the beginner's checklist.

Corduliidae

Bright green eyes and may have a bronze or metallic sheen on their body. Have a foot shaped anal loop on the wing, they can be distinguished from skimmers by the lack of a developed toe. This family is not

on the beginner's checklist.

Libellulidae

One of the more common dragonfly families, anal loop has well developed toe on its anal loop. This is the family you will see the most.

Zygoptera (Damselfly)

Calopterygidae

Large damselflies often with colored wings, butterfly like flight.

Lestidae

Called the spreadwings, when perched will hold wings partially separated

Coenagrionidae

Wings are clear and will be held together when perched

Basic Guidelines

- **The minimum number of site visits per year should be 6**. Visits on most sites should take place between late May, and September. If you want to go out more, and if you want to extend your season earlier or later, that's OK, as long as there are 6 visits in that season.

- Monitoring is ideally done on sunny days with low wind and temperatures of at least 70 degrees. It can be difficult to get completely ideal conditions, but try to time your monitoring to coincide with at least relatively appropriate weather. Very warm (over 80 degrees), cloudy days can be good monitoring days also.

- **Start your monitoring no earlier than 10.00AM**. Be sure that you are done by 3.30PM. A typical monitoring route should take 1-2 hours to complete.

- **EXTREMELY IMPORTANT: Record your starting and ending time**. Observations are translated to individuals observed per hour of observation time. If you don't tell us when you started, and stopped, we can't make this essential calculation.

- T**he census route should cover all major habitats and management units within a site**. The site steward should be able to assist you with route setting. - Walk the route at a constant pace; stopping only to identify and record Odonates seen within 6 meters (about 20 feet) of the census route. This results in a corridor of 12 meters (about 40 feet). If you stop for a length of time in one spot, do not monitor while stopped, and record the time stopped in the comments section of your field form. Start monitoring once you resume walking.

- The Dragonfly Monitoring Network protocol does not include collection of specimens.

- Identify species only as far as you can with certainty. Many excellent reports include observations such as "2 unidentified Odonates in Transect A". Occasionally you will have to report things like "Emerald or Skimmer", if you don't get a good enough look at something. These less precise observations, are still useful data. Never guess. If you don't know, record it as unidentified.

- **Only one person should monitor at a time.** It is actually recommended to take someone else along with you, but only one person should spot the Odonates for consistency.

- Please submit data promptly at the end of the season.

Field Forms

A field form is provided on the next page. Make a copy of this form for each route that you run. Please use only the approved field form here.

Fill out all of the information in the top portion at the beginning of each route (fill in the end time at the end of your route). If more than one person goes out with you, list yourself as the monitor spotting the Odonates Round your starting, and ending times off to the nearest 5 minutes. If you start at 10.52, list 10.50. Get the temperature from an outside thermometer if you have one, or a weather update on the radio. Estimate the wind conditions, and circle the appropriate choice. Note that there is no choice for very windy. If it is very windy, do not monitor. Estimate the cloudiness of the sky, and circle the appropriate box. Note there is no choice for very cloudy (more than 50%). If it is very cloudy, do not monitor. List each habitat type next to the appropriate transect letter, corresponding to that column. For example, if your first area on your route is a wet prairie, list transect A as "wet prairie," and record all individuals seen in that habitat, in column A.

During monitoring, fill out the following information: If something is unusual or you feel needs explanation, use the comment section. For example, if you stop for more than two or three minutes for a rest, or to identify an Odonate, note the length of time you stopped monitoring, in the comment section. If there is a disturbance to an area along your route, you can also note that, in the comment section. Anything that you believe might influence your data should be noted here. Please do not use this section for personal notes. Use one line for each species of Odonate seen along your route (some people prefer to use a separate sheet of paper on the route, then transcribe their counts to the field form). Make a hatch mark for each individual of a species, in the column that represents that plant habitat, in which the individual was seen. For example, if you see a Green Darner in the wet prairie, make one hatch mark in a column A on the row for Green Darner. As you see more Green Darners in that habitat, make additional hatch marks for each individual. Once you move into habitat B, mark any Darners seen in that area in Column B, on the same row.

If a species that you see is not already listed on the field form fill in the name in, on any one of the blank lines provided. Note that the field form groups similar species together. You do not need to do this when adding species. After monitoring, fill out the following information Fill in the ending time in the top portion of the form, round off to the nearest 5 minutes. Total each species, in each row, in the right column Room has been left at the bottom of the form, to allow additional sightings of other species to be recorded.

Chicagoland Species List

Anisoptera *57 spp in the Chicago area*

Aeshnidae *8 recorded spp in Chicago area*

Canada Darner (*Aeshna canadensis*)

Mottled Darner (*Aeshna clepsydra*)

Lance-tipped Darner (*Aeshna constricta*)

Green-striped Darner (*Aeshna verticalis*)

Common Green Darner (*Anax junius*)

Fawn Darner (*Boyeria vinosa*)

Swamp Darner (*Epiaeschna heros*)

Cyrano Darner (*Nasiaeschna pentacantha*)

Gomphidae *15 recorded spp in Chicago area*

Horned Clubtail (*Arigomphus cornutus*)

Lilypad Clubtail (*Arigomphus furcifer*)

Jade Clubtail (*Arigomphus submedianus*)

Unicorn Clubtail (*Arigomphus villosipes*)

Black-shouldered Spinyleg (*Dromogomphus spinosus*)

Flag-tailed Spinyleg (*Dromogomphus spoliatus*)

Eastern Ringtail (*Erpetogomphus designatus*)

Plains Clubtail (*Gomphus externus*)

Midland Clubtail (*Gomphus fraternus*)

Cobra Clubtail (*Gomphus vastus*)

Pronghorn Clubtail (*Gomphus graslinellus*)

Dusky Clubtail (*Gomphus spicatus*)

Elusive Clubtail (*Stylurus notatus*)

Russet-tipped Clubtail (*Stylurus plagiatus*)

Arrow Clubtail (*Stylurus spiniceps*)

Cordulegastridae *1 recorded spp in Chicago area*

Delta-spotted Spiketail (*Cordulegaster diastatops*)

Macromiidae *1 recorded spp in Chicago area*

Illinois River Cruiser (*Macromia illinoiensis*)

Corduliidae *6 recorded spp in Chicago area*

Prince Baskettail (*Epitheca princeps*)

Stripe-winged Baskettail (*Epitheca costalis*)

Common Baskettail (*Epitheca cynosura*)

Spiny Baskettail (*Epitheca spinigera*)

Hine's Emerald (*Somatochlora hineana*)

Mocha Emerald (*Somatochlora linearis*)

Libellulidae *26 recorded spp in Chicago area*

Calico Pennant (*Celithemis elisa*)

Halloween Pennant (*Celithemis eponina*)

Eastern Pondhawk *(Erythemis simplicicollis)*

Dot-tailed Whiteface *(Leucorrhinia intacta)*

Chalk-fronted Corporal *(Libellula julia)*

Widow Skimmer *(Libellula luctuosa)*

Common Whitetail *(Libellula lydia)*

Twelve-spotted Skimmer *(Libellula pulchella)*

Four-spotted Skimmer *(Libellula quadrimaculata)*

Painted Skimmer *(Libellula semifasciata)*

Great Blue Skimmer *(Libellula vibrans)*

Elfin Skimmer *(Nannothemis bella)*

Blue Dasher *(Pachydiplax longipennis)*

Wandering Glider *(Pantala flavescens)*

Spot-winged Glider *(Pantala hymenaea)*

Eastern Amberwing *(Perithemis tenera)*

Variegated Meadowhawk *(Sympetrum corruptum)*

Saffron-winged Meadowhawk *(Sympetrum costiferum)*

Cherry-faced Meadowhawk *(Sympetrum internum)*

White-faced Meadowhawk *(Sympetrum obtrusum)*

Ruby Meadowhawk *(Sympetrum rubicundulum*)

Band-winged Meadowhawk *(Sympetrum semicinctum*)

Yellow-legged Meadowhawk *(Sympetrum vicinum)*

Carolina Saddlebags *(Tramea carolina)*

Black Saddlebags *(Tramea lacerata)*

Red-mantled Saddlebags *(Tramea onusta*)

Zygoptera *30 spp in Chicago Area*

Calopterygidae

Ebony Jewelwing (*Calopteryx maculata*)

American Rubyspot (*Hetaerina americana*)

Lestidae *7 spp in Chicago area*

Great Spreadwing (*Archilestes grandis*)

Spotted Spreadwing (*Lestes congener*)

Common Spreadwing (*Lestes disjunctus*)

Emerald Spreadwing (*Lestes dryas*)

Sweetflag Spreadwing (*Lestes forcipatus*)

Slender Spreadwing (*Lestes rectangularis*)

Lyre-tipped Spreadwing (*Lestes unguiculatus*)

Swamp Spreadwing (*Lestes vigilax*)

Coenagrionidae *21 spp in Chicago area*

Eastern Red Damsel (*Amphiagrion saucium*)

Blue-fronted Dancer (*Argia apicalis*)

Variable Dancer (*Argia fumipennis*)

Powdered Dancer (*Argia moesta*)

Blue-ringed Dancer (*Argia sedula*)

Blue-tipped Dancer (*Argia tibialis*)

River Bluet (*Enallagma anna*)

Rainbow Bluet (*Enallagma antennatum*)

Double-striped Bluet (*Enallagma basidens*)

Familiar Bluet (*Enallagma civile*)

Marsh Bluet (*Enallagma ebrium*)

Stream Bluet (*Enallagma exsulans*)

Skimming Bluet (*Enallagma geminatum*)

Hagen's Bluet (*Enallagma hageni*)

Orange Bluet (*Enallagma signatum*)

Slender Bluet (*Enallagma traviatum*)

Citrine Forktail (*Ischnura hastata*)

Fragile Forktail (*Ischnura posita*)

Eastern Forktail (*Ischnura verticalis*)

Sphagnum Sprite (*Nehalennia gracilis*)

Sedge Sprite (*Nehalennia irene*)

Supplies/Sources

Binoculars

A good pair of binoculars is essential. The following are requirements of binoculars for watching Odonata, taken from the Butterfly Guidelines.

Binoculars: Any reliable brand is acceptable. Several factors make a lot of difference; others are personal preference. The main factors to consider are listed as follows.

Close focusing: maximum is the 6 to 8 foot range. Jeffrey Gassberg warns that the close focus can vary greatly from pair to pair, even in the same model, so try out an individual pair before buying.
Power: between 7 and 10. This number is the first number in the binocular description (e.g. 7 in 7x42) and means that the object will appear that many times closer to you than it actually is. Try out various powers. In this range, personal preference is the main factor.
Brightness: This is not all that important, unless you are looking for species on the savanna. The second

number in the binocular description (i.e. 42 in 7x42) is the diameter of the lens in millimeters (mm). The larger the diameter the more light will be admitted. Other factors can also impact how much light is transmitted, but this is a good starting guide.
Weight: Remember, the binoculars may not feel all that heavy when you first hang them around your neck, but after some time in the field, they can feel like they weigh a ton. When deciding between two similar pair, go with the lighter on.

Cameras
Many people use photography, to document identification. We encourage this practice however we urge monitors to minimize photography during data collection. If possible, photograph before or after your route. Do not remove any Odonate from the site to photograph it.

Monitors for the butterfly network have asked for recommendations for equipment. Any 35mm SLR camera will work. The most widely suggested lens is a 90mm or 100mm macro lens. If a zoom lens is used, it should have a macro feature. Get a lens with as a short a close focus range as possible. Even 5 feet can sometimes be too far a distance to get a good shot of a smaller Odonate. The best lens for identification is side shots showing both the for wing and the hindwing for the underside and top shots showing the full wing spread for the upper side. Unlike Butterfly monitoring, the bodies of Odonates can be critical in identification.

Bibliography

Dunkle, S.W. 2000. Dragonflies through Binoculars (A field guide to dragonflies of North America). Oxford University Press.

Dunkle, S.W. 1989. Dragonflies of the Florida Peninsula, Bermuda and the Bahamas. Scientific Publishers Nature Guide.

Dunkle, S.W. 1990. Damselflies of Florida, Bermuda and the Bahamas. Scientific Publishers Nature Guide.

Curry, J, R. 2001. Dragonflies of Indiana. Indiana Academy of Sciences.

Lam, E. 2004. Damselflies of the Northeast. Biodiversity Books.

Legler. K., Legler. D. and Westover. D. 1996. Guide to common Dragonflies of Wisconsin. Karl Legler.

Needham, J, G. and Westfall, M, J. 1954. Dragonflies of North America. University of California Press.

Panzer. R., Stillwaugh. D., Taron. D., and Manner. M. 2001. Butterfly Monitoring Guidelines for the Chicago Region, Third Edition. Not Published.

Panzer, R. and M.W. Schwartz. 1998. Effects of Management Burning on Prairie Insect Species Richness Within a System of Small, Highly Fragmented Reserves. Biological Conservation 96:363-369

Panzer, R., D. Stillwaugh, R. Gnaedinger, and G. Derkovtz. 1995 Prevalence of Remnant Dependance among Prairie and Savanna- Inhabiting Insects of the Chicago Region. Natural Areas Journal 15:101-116.

Pollard, E. 1977. A Method for Assesing Changes in the Abundance of Butterflies. Biological Conservation 12:115 – 133

Rosche, L.2002. Dragonflies of Damselflies of Northeast Ohio. Cleveland Museum of Natural History.

Silsby, J. 2001. Dragonflies of the World. Smithsonian Institution Press.

Stokes.D., Stokes, L., Nikula, B. and Sones, J. 2002. Stokes Beginner's Guide to Dragonflies and Damselflies. Little, Brown and Company

Westfall, M. J. and May, M.L. 1996. Damselflies of North America. Scientific Publishers.