

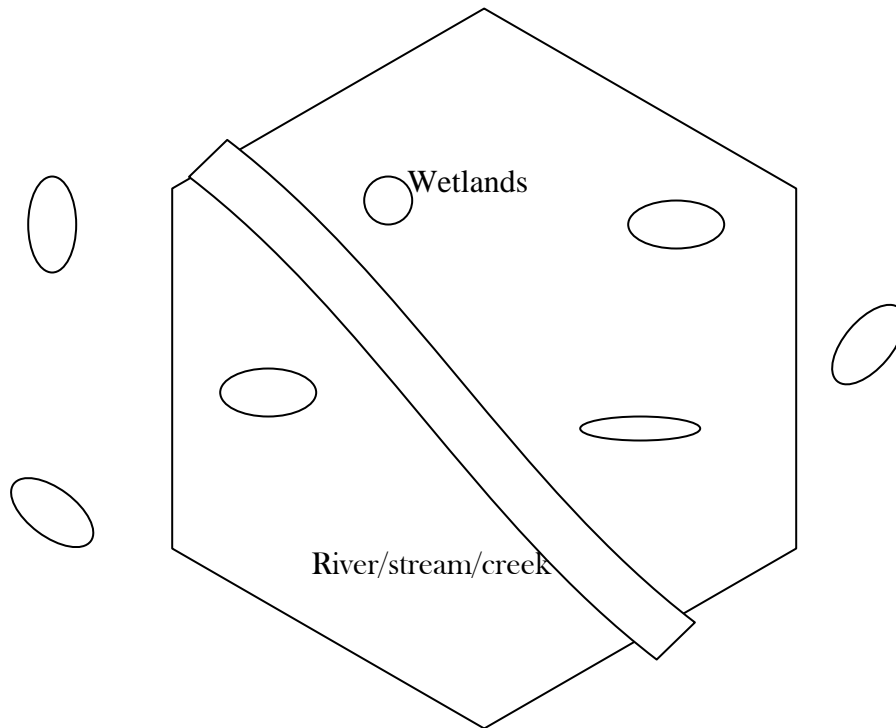
## Chapter Thirteen

### Damselfly and Dragonfly Monitoring Protocol

#### IOWA DRAGONFLY AND DAMSELFLY MONITORING:

Exuviae (the remains of the exoskeletons left behind when the dragonfly or damselfly has molted) are the most important indicators of resident populations of odonates. These exoskeletons can be collected without impacting odonate populations and identified at a later date in the lab. This protocol will search for adult dragonflies and damselflies as well.

Timed visual encounter surveys (VES) will be the primary method used in this protocol. VES is inexpensive, easy to implement, and efficient over diverse habitats (Manley et al. 2004). Additional benefits of VES include low site disturbance, low animal mortality, ease of implementation in terrestrial or aquatic environments, and other animals can be detected at the same time. The entire 26 acre (10 hectare) hexagon will serve as the primary sampling unit. This area is much larger than that usually incorporated into a VES, but will allow for a large variety of habitat types to be searched.



All relevant wetlands and also surrounding uplands should be searched during the timed VES. Odonates are known to fly into the surrounding uplands, primarily to forage, and therefore a smaller amount of time should be spent in these areas by the observer. If a hexagonal sampling plot has few wetlands, increase the search area to include wetlands within the 1-km<sup>2</sup> (~ 250 ac)

area around the center point. Stay on the property boundaries unless the adjacent landowner has granted permission for use of the adjacent property.

## SURVEY METHODS:

### Field Methods

All wetland habitats should be searched for both adult odonates and discarded exuviae. To find exuviae, a thorough search should be made of riparian vegetation, emergent plants, dead wood, and abiotic riparian structure (such as banks and graveled ground) during each sampling visit (Chovanec and Waringer 2001). Each site should be visited at least 6 times per year, twice between April through mid June, twice between mid-June through mid August, and twice between mid-August through mid October. The Iowa Odonata Survey website (last accessed December 6, 2006) (<http://www.iowaodes.com>) has time-of-year activity calendars for adult odonates in addition to records of odonates by county. This information should be used as a basis for choosing when to conduct site visits in each county for the species of greatest conservation need.

Each site visit should be for a minimum of 4 search-hours per visit. Therefore if 2 technicians are searching the same hexagonal plot, each should search for 2 hours. If 4 technicians are searching the plot, only one hour apiece is needed. Presence of all adult species is recorded for each microhabitat (e.g. Farm pond A, small creek B, prairie pond E, etc.). In addition to species presence, an abundance class or index should be assigned, following the classification of Chovanec and Waringer (2001). These categories include 1=single individual, 2=rare (for Iowa this would be 2-5 individuals), 3=frequent (6-10 individuals), 4=abundant (11-20 individuals), and 5=extremely abundant (>21 individuals). Remember that this ranking is per micro-habitat, not the entire property. It is possible that an observer would detect a species in more than one habitat creating a higher final density of these animals for the entire plot, but it is important to create a record of relative abundance indices based on the smaller microhabitat locations in addition to the overall site abundance.

In addition to the adult abundance indices, all exuviae should be collected in plastic containers for later identification in the lab using a dissection microscope. Plastic containers are best because they are rigid enough to prevent the exoskeleton from being crushed, but will not break like glass might. Old film containers, plastic tackle boxes, or plastic craft (bead) boxes are all potential exuviae transporters.

Similarly to the other VES conducted with this monitoring design, searches should be conducted at varying times of the day. Do not always return to the site between 9 and 11 am, for example, vary the visits to cover morning, afternoon, and evening times depending on the species being targeted during that search. Morning, noon, and afternoon visits are best.

### Lab Methods

The exuviae collected in the field need to be identified to species in the lab using field guides or keys and a dissecting scope. Any larval odonates that were collected during the aquatic invertebrate sampling can be identified at this time as well.

### **HABITAT & PLANT COMPOSITION DATA COLLECTION:**

See chapter 20 for information on aquatic habitat and chapter 19 for terrestrial habitat and plant composition measurements. As the same areas will be searched for amphibians, fish, and/or mussels, no additional habitat data is expected to be collected under the dragonfly & damselfly protocol. However, dragonfly and damselfly technicians should coordinate with other crews to ensure that all needed habitat data is collected.

### **EQUIPMENT NEEDED:**

Digital camera with macro lens

Butterfly net

Hand lens

Binoculars

Compass

Plastic containers for collecting exuviae

Glassine envelopes for collecting adults

Acetone and container for killing adults

Dissecting scope (leave in lab)

Standard field kit: Clip board, pencils, ruler, small scissors, Sharpie markers, hand sanitizer, & data sheets, nail polish or spray paint.

### **STAFF & TRAINING:**

Two weeks of training is recommended and should include 1) field guide use and id, 2) trips to University museums to discuss defining species characteristics, 3) field practice with an experienced observer, and 4) proficiency testing.

### **DATA QUALITY & MANAGEMENT:**

Female dragonflies and damselflies are difficult to identify as they are more subtly colored than the males. Rosche (2002) suggests the best time to identify the female is while she is attached to the male during mating.

This protocol will be difficult to rate for quality:

- Examination of data will not reveal missed detections or misidentifications.
  - o Misidentifications could be checked by either the use of digital cameras, or by the field supervisor working periodically with each technician.
- Crew member should be rotated such that each site is visited by more than one observer to reduce the effect of observer bias.
- All photographs should be reviewed by at least 2 additional people to verify species identifications.
- Some identifications will require the collection and examination of a specimen.

At the end of each trapping day, each observer should review data sheets to ensure all information present. At the end of the week, the field crew leader should review the collected data sheets as well.

### **DATA ANALYSIS:**

The basic information should allow the creation of a species list for each site, and data should at least be used to estimate the proportion of area occupied using program **PRESENCE** or **MARK**. The data collected with this technique will be used to compute abundance indices

when possible. However, given that different species will have differing detection probabilities, comparisons of abundance indices between species should be interpreted with caution.

**SAFETY ISSUES & CONSIDERATIONS:**

The odonate technicians may be working alone and therefore should carry a reliable cell phone or radio, GPS unit, maps, and first aid kit. The crew or section leader should maintain a sign in/sign out method to ensure everyone returned from the field as well as to know exactly where each crew member is assigned to work every day.

**TARGET SPECIES:**

The following list of target species represents the species of greatest conservation concern as chosen by the Steering committee for the Iowa Wildlife Action Plan (Zohrer et al. 2005). Distribution maps for these species can be found at [www.iowaodes.com](http://www.iowaodes.com). Appendix 1 contains a list of additional, more common, dragonfly and damselfly species which may be encountered during the monitoring efforts.

Target dragonflies & damselflies species:

<b>Common Name</b>	<b>Scientific Name</b>	<b>Habitat</b>
Spangled skimmer	<i>Libellula cyanea</i>	Artificial ponds, lakes
Slaty skimmer	<i>Libellula incesta</i>	Old river oxbow
Rusty snaketail	<i>Ophiogomphus rupinsulensis</i>	Sandy, rocky creeks
Sioux snaketail	<i>Ophiogomphus smithi</i>	Sand-bottomed creeks
Mocha emerald	<i>Somatochlora linearis</i>	Wooded edges
Brimstone clubtail	<i>Stylurus intricatus</i>	Sandy streams
Blue-faced meadowhawk	<i>Sympetrum ambiguum</i>	Temporary pools, oxbows
Carolina saddlebags	<i>Tramea Carolina</i>	Marsh
Emma’s dancer	<i>Argia emma</i>	Small streams
Spotted spreadwing	<i>Lestes congener</i>	Edge of pools, marsh
Elegant spreadwing	<i>Lestes inaequalis</i>	Ponds
Sweetflag spreadwing	<i>Lestes forcipatus</i>	Marsh, pond edge
Sulpher-tipped clubtail	<i>Gomphus militaris</i>	Artificial ponds, lakes
Rapids clubtail	<i>Gomphus quadricolor</i>	Rocky creeks
Canada darner	<i>Aeshna canadensis</i>	Marsh, pond edge
Variable darner	<i>Aeshna interrupta</i>	Lakes, ponds, streams
Blue-eyed darner	<i>Aeshna multicolor</i>	Small lakes, ponds
Green striped darner	<i>Aeshna verticalis</i>	Marshes, pond edges
Four-spotted skipper	<i>Libellula quadrimaculata</i>	Marshes, wooded ponds
Royal river cruiser	<i>Macromia taeniolata</i>	Lakes, rivers
Cyrano darner	<i>Nasiaeschno pentacantha</i>	Shaded creeks, lakes, oxbows
Smoky shadowdragon	<i>Neurocordulia molesta</i>	Large rivers
Stygian shadowdragon	<i>Neurocordulia yamaskanensis</i>	Mississippi River
Paiute dancer	<i>Argia Alberta</i>	Small streams, road ditches
Prairie bluet	<i>Coenagrion angulatum</i>	Lakes, ponds
Boreal bluet	<i>Enallagma boreale</i>	Marsh
Alkali bluet	<i>Enallagma clausum</i>	Pond edges without vegetation
Vesper bluet	<i>Enallagma vesperum</i>	Deep lakes, ponds

#### ADDITIONAL METHODS FOR SPECIAL LOCATIONS:

It may be necessary to collect a voucher specimen of adult odonates for later identification or proof of identification. Before doing this, be sure that you have written permission from the DNR. To collect adult odonates, they should be placed individually into glassine envelopes that are then dipped into acetone (completely covering the envelope) for 10 seconds (or longer). Be sure that the container holding the acetone is marked with "poison" as acetone can be absorbed by plastic - once it has been used with acetone, the container should never again be used for food storage. The acetone does more than kill the insects; it dries them out to preserve them. Place them in acetone and leave them overnight. Some of the larger dragonflies may need to be left a little longer. After about 5 minutes (long enough to make sure the individual is dead), straighten the body and wings so the specimen is in good shape. In the morning, pull them out of the acetone and let them dry during the day. Use an envelope of paper triangle to keep their wings flat. Individuals with pruinescence (grey, white, or light blue pigment on body) should not be dried with acetone as it will change these colors. These species should be freezer killed and then dried by a light bulb.

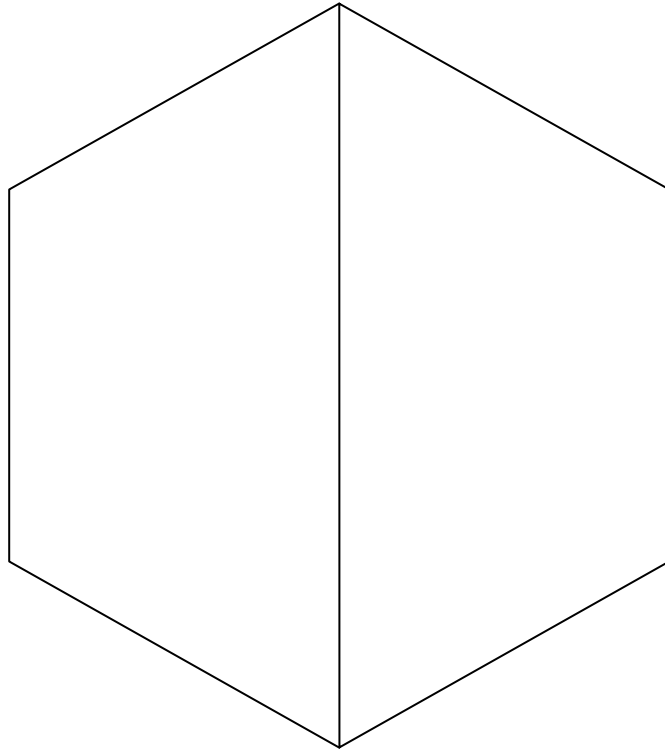
Post killing, odonates should be positioned in the desired manner (either pinned and flat as a standard insect collection or flat on its side with the wings over the abdomen and placed back into the envelope) for drying. If in the envelope, it can be returned back to the acetone for 24 hours, otherwise it can be placed into direct sunlight to dry (NCOS 2002).

#### LITERATURE CITED:

- Chovanec, A. and J Waringer. 2001. *Ecological Integrity of River-Floodplain Systems - Assessment by Dragonfly Surveys (Insecta: Odonata)*. Regulated Rivers Research and Management. 17: 493-507.
- Cruden, RW, and OJ Gode, Jr. 2000. *The Odonata of Iowa*. Bulletin of American Odonatology. 6(2): 13-48.
- NCOS (North Coast Odonata Survey). 2002. *North Coast Odonata Survey Manual*. Edition 1: 2002. Garfield Heights, Ohio.
- Rosche, L. 2002. Dragonflies and Damselflies of Northeast Ohio. The Cleveland Museum of Natural History. Cleveland, Ohio.

Damselfly/dragonfly habitat map. Observer: \_\_\_\_\_ Date: \_\_\_\_\_ Location: \_\_\_\_\_  
Sketch habitats/landmarks/roads:

Remember, each hexagonal side is 200 m in length and the dividing transect is 400 m long.



It may be possible to do this in the lab using the GIS database, however, this data should be groundtruthed on the first dragonfly data collection. Subsequent data collection will not need to re-confirm this information unless conditions have changed (i.e. the site was burned or logged or plowed, etc.)

Other notes:

