

Dragonflies of the Patoka River National Wildlife Refuge and Management Area (PRNWR&MA)

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Introduction

One of the goals of personnel working at the PRNWR&MA, as outlined in their Comprehensive Conservation Plan (McCoy, 2008), is the documentation of wildlife that inhabit the refuge. None of the species listed in the conservation plan are dragonflies. Very little is known of the dragonflies that inhabit the refuge, despite their ecological value. Dragonflies are known, for example, to be a vital component in assessing ecological health of ecosystems because they respond quickly to environmental change (Corbett, 1999).

The Patoka River refuge (Figure 1) offers one of the largest bottomland hardwood ecosystems in southern Indiana, with meandering oxbows, marshes, ponds, and moist-soil units that should provide diverse and suitable habitat for dragonflies. We conducted a survey, from May through September 2009, to document the presence of dragonflies at the refuge, with particular attention to rare, threatened, and endangered species.

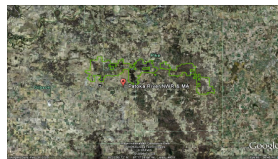
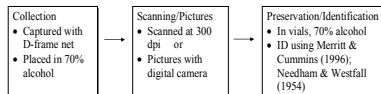


Figure 1. Map showing the location of the PRNWR&MA in Gibson and Pike counties, Indiana.

Materials and methods

Adult dragonflies and the aquatic larval forms were collected and processed using the methods highlighted in the flow charts below:

Aquatic Sampling



Terrestrial Sampling

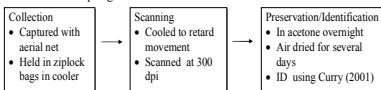


Figure 2. Example of scans of adult dragonflies. Top view (left) and side view (right) of a male *Libellula cyanea*.



Results

Dragonfly Species

A total of 29 species were collected and identified in the survey of the refuge (Table 1):

- All dragonfly families were represented except for Macromiidae
- Most species were from the Libellulidae (17), followed by Aeshidae (4), Gomphidae (4), Cordulidae (3), and Cordulegastriidae (1)
- Adults and nymphs were collected for 13 species; Adults only were collected for 12 species; and nymphs only were collected for 4 species

Table 1. Dragonfly species of the Patoka River National Wildlife Refuge and Management Area. Families listed, species identified, and life history stage.

FAMILY/SPECIES	ADULT	NYMPH
AESHNIDAE		
<i>Anax junius</i>	X	X
<i>Basiaeschna janata</i>		X
<i>Epiaeschna heros</i>	X	X
<i>Nasuaeschna pentacantha</i>		X
GOMPHIDAE		
<i>Arigomphus villosipes</i>		X
<i>Dromogomphus spinosus</i>	X	
<i>Hagenius brevistylus</i>	X	
<i>Stylurus plagiatus</i>	X	
CORDULEGASTRIDAE		
<i>Cordulegaster obliqua</i>		X
CORDULIIDAE		
<i>Epiheca cynosura</i>	X	
<i>Epiheca princeps</i>	X	X
<i>Somatochlora linearis</i>	X	X
LIBELLULIDAE		
<i>Celithemis elisa</i>	X	X
<i>Celithemis eponina</i>	X	
<i>Celithemis fasciata</i>	X	X
<i>Erythemis simplicicollis</i>	X	X
<i>Libellula cyanea</i>	X	
<i>Libellula incesta</i>	X	
<i>Libellula luctuosa</i>	X	X
<i>Libellula lydia</i>	X	X
<i>Libellula pulchella</i>	X	X
<i>Libellula vibrans</i>	X	
<i>Pachydiplax longipennis</i>	X	X
<i>Pantala flavescens</i>	X	
<i>Perithemis tenera</i>	X	X
<i>Sympetrum ambiguum</i>	X	
<i>Sympetrum corruptum</i>	X	
<i>Tramea carolina</i>	X	X
<i>Tramea lacerata</i>	X	

Dragonfly Status

To evaluate the presence of endangered, threatened, and rare species of dragonflies on the refuge we compared our list to the state species status ranking system (Table 2):

- Seventeen of the 29 species collected are considered state secure (S5 or S4)
- Nine species are considered uncommon or rare (S3)
- Three species are considered as imperiled (S2); *Hagenius brevistylus*, *Cordulegaster obliqua*, *Somatochlora linearis*
- None are considered critically imperiled (S1)
- The only federally endangered dragonfly, the Hine's Emerald (*Somatochlora hineana*), was not observed on the refuge.

Table 2. The state species status ranking system for dragonflies. The rank, description of the rank, and the number of species of that rank occurring at the refuge.

RANK	DESCRIPTION OF RANK	SPECIES
S5	Demonstrably secure in state, and essentially ineradicable under present conditions	12
S4	Apparently secure in state, with many occurrences	5
S3	Rare or uncommon in the state (21 to 100 occurrences)	9
S2	Imperiled in state because of rarity (6-20 occurrences) or because of some factor making it vulnerable to extirpation	3
S1	Critically imperiled in state because of extreme rarity (five or fewer occurrences) or because of some factor making it especially vulnerable to extirpation	0

New Species Records for Pike County

<i>Basiaeschna janata</i>	<i>Celithemis fasciata</i>
<i>Arigomphus villosipes</i>	<i>Libellula incesta</i>
<i>Dromogomphus spinosus</i>	<i>Libellula luctuosa</i>
<i>Hagenius brevistylus</i>	<i>Libellula pulchella</i>
<i>Stylurus plagiatus</i>	<i>Libellula vibrans</i>
<i>Cordulegaster obliqua</i>	<i>Sympetrum ambiguum</i>
<i>Celithemis elisa</i>	<i>Tramea carolina</i>
<i>Celithemis eponina</i>	<i>Tramea lacerata</i>

Conclusions

Before the PRNWR&MA was established in 1994, the Patoka River watershed was critically impacted from acid mine drainage from coal mining activities. The South Fork of the Patoka River was devoid of aquatic life for more than 50 years (McCoy 2008). Since the establishment of the refuge, the water quality and habitat quality in the Patoka River watershed has dramatically improved.

Dragonflies respond quickly to improvements in water quality and presence of suitable habitat (Corbett 1999). Our initial survey documents a diverse dragonfly community occurring in a wide variety of habitats on the refuge. In addition to a number of common dragonfly species, we were able to document the presence of several rare and imperiled species, indicating that the refuge may be providing necessary habitat for these species as aquatic and wetland areas are improved.

Prior to our survey, there were few records of dragonflies in this area. For example, Curry (2001) lists about seven species that have been recorded for Pike County. We were able to add 16 new species records for this county alone.

The results of this survey will be used by refuge personnel to assist in management decisions and pursue funding opportunities for additional habitat improvement and land acquisition.

Literature cited

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For further information

Please contact ab327@evansville.edu, dbatema@evansville.edu, or lindsay_landowski@fws.gov for more information on this project. A link to an online, PDF-version of the poster is available at <http://faculty.db28.edu>.

