



# Behaviors of Odonata in the Upper Mississippi River Valley, 2013-2018



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## INTRODUCTION

The family Odonata is comprised of dragonflies (Anisoptera) and damselflies (Zygoptera). Behavioral patterns of these insects have been studied and observed, leading to some interesting findings, such as the “percher vs. flier” hypothesis (Corbet and May 2008). Annual surveys were conducted for Odonata by a citizen scientist, Daniel Jackson, in Navigation Pools 6-10 of the Upper Mississippi River Valley from April-November, 2013-2018.

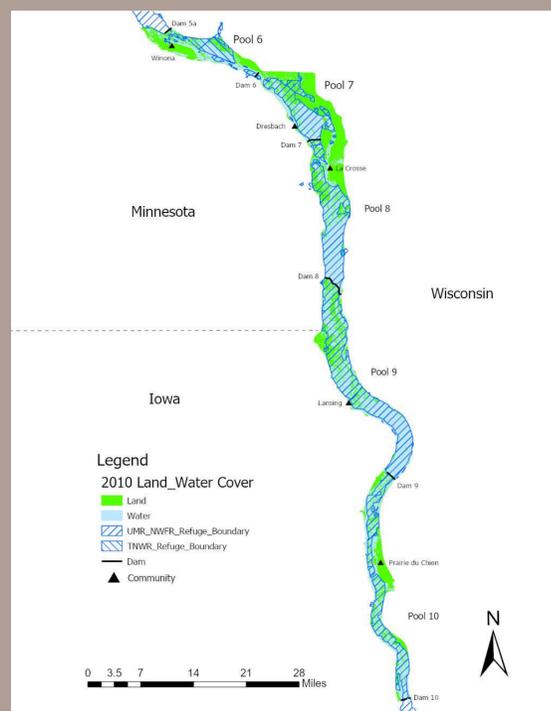
### Objectives

- 1) Increase knowledge of Odonata behavioral patterns within the Mississippi River Valley.
- 2) Find which time periods mating behavior is most commonly observed.

## METHODS

### Study Area

Odonata data was collected from Pools 6-10 of the Upper Mississippi River Valley from April-November, 2013-2018.



**Figure 1.** Pools 6-10 of the Upper Mississippi River. Credit – Jar Xiong

### Data Collection

Daniel Jackson conducted Odonata surveys from foot, vehicle, and boat. These surveys were done opportunistically or by convenience sampling. Observations were recorded only if a positive identification could be made.

Behavioral data was recorded in a “Comments” section, needing further analysis and description.

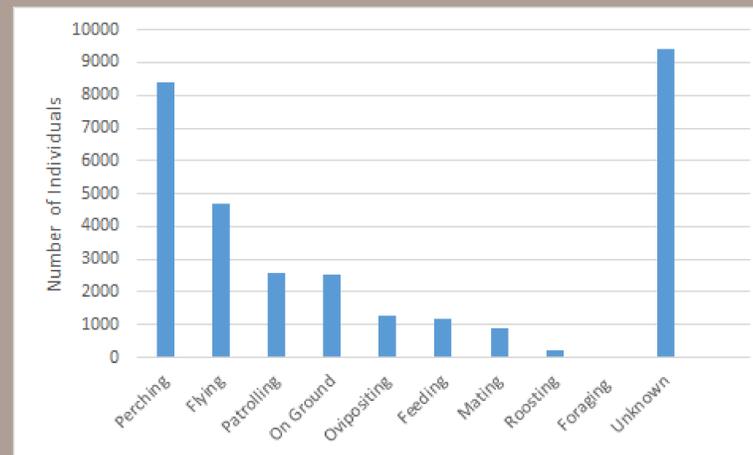
## Behavioral Categorization

Behaviors present within the comments section of the data were analyzed and categorized based on trends, scientific literature, and research. This resulted in nine behavioral categories, which were perching, flying, patrolling, on the ground, ovipositing, feeding, mating, roosting, and foraging. Some data within the comments section did not provide ample description to infer a behavior, resulting in an “unknown” category as well.

## RESULTS

### Relative Behaviors

31,159 individuals were observed throughout the duration of this study. The majority of these fell into the “unknown” category (30.2%). In descending order, the most observed behaviors were perching (26.9%), flying (15.1%), patrolling (8.2%), on the ground (8.1%), ovipositing (4.1%), feeding (3.7%), mating (2.9%), roosting (0.6%), and foraging (0.1%).



**Figure 2.** Total individual Odonates observed and their exhibited behaviors

### Mating Behavior

Observed mating was most prevalent in the month of August (34.1%). June (20.8%) and July (18.5%) also had high occurrence of mating.

Ovipositing occurred most frequently in July (57.2%). May accounted for 12.5% of ovipositing and April similarly with 10.5%. Patrolling behavior was also most common in the month of July (38.6%). This behavior was also prominent in the months of June (15.8%) and August (22.5%).

## DISCUSSION

### Odonata Behavior

A common problem with field studies of Odonates is unequal detection probability of individuals of differing species (MacKenzie et al. 2002). Characteristics that affect this detection probability can include color, size, and time period at which they are most

active. Different Odonata species also exhibit behaviors that are widely variable and conspicuous as well (Corbet 1999). Observations may be biased in favor of easily observed behaviors, such as perching and flying. It is important to note that behaviors like patrolling and ovipositing should be emphasized, even though they were not observed as frequently.



**Figure 3.** A pair of Odonates in wheel position. Credit – Daniel Jackson

### Mating Behavior

Most observed mating, patrolling, and ovipositing behavior was evident in July and August, indicating that these months are the most important for reproduction. Females are more likely to refuse a mating attempt from a male when there are fewer males present (Moore 1989). Similarly, females are more likely to oviposit where other females are ovipositing (Waage 1987). This may be the cause for a large increase in ovipositing behavior in the month of July, where overall abundance of individual Odonata was increased. Patrolling behavior was also more prevalent in July and August, which may have been the cause of sex ratios. Since the data does not indicate sex, however, this cannot be proven. Previous data on damselfly species has shown that 41% of males fail to mate in their lifetime as compared to 3.6% of female mating failure (Fincke 1982). Competition and territorial behavior, like patrolling, are common and seem to be necessary for males to achieve mating success.

## ACKNOWLEDGEMENTS

Great thanks to Daniel Jackson for the extensive hours he spent surveying to collect this data. The United States Fish and Wildlife Service and the University of Wisconsin – Stevens Point provided funding, guidance, and input for this project.

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