

PhD Dissertation
Department of Environmental Science and Policy
George Mason University

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Title: Temporal and Spatial Aspects of the Colonization and Re-Colonization of Dragonflies in Lentic Habitats

Dissertation Director: Dr. R. Chris Jones

Committee: Dr. Larry Rockwood, Dr. Nigel Waters, Dr. Rebecca Forkner

ABSTRACT

This dissertation describes dragonfly species of Hanover County, Virginia, which species are most likely to be first colonizers of a new or re-constructed impoundment, which species are never found as first colonizers, and which species are the dominant species three years after the impoundment fills with water. In this Piedmont region of Virginia, *Erythemis simplicicollis*, *Libellula incesta*, *Libellula luctuosa*, and *Perithemis tenera* were the first to colonize all sites researched. *Celithemis eponina* and *Pachydiplax longipennis* did appear as first colonizers, but not at all sites. Proximity to a source site appears to be a determinate for these six species, not any size or behavioral characteristics. Seventeen species, no matter what the proximity of a source site, never were first colonizer species for a new impoundment. During this research three species not previously noted on published species lists from government or organizations for this county were collected: *Anax junius*; *Libellula pulchella*; and *Pantala hymenaea*. Seven species found during this study are new additions for the Commonwealth of Virginia official species list for Hanover County: *A. junius*; *A. longipes*; *Celithemis eponina*; *C. fasciata*; *Libellula vibrans*; *Pantala flavescens*; and *Tramea lacerate*.

Investigations regarding dominance after three years indicated that dominance did not change; whichever species had arrived first maintained dominance. Additional community structure in the lentic habitat was observed.

This dissertation investigated the impact of wind on dispersal direction. In a manipulated mark and observation experiment, findings indicate that wind velocity in excess of 5 km/hr. resulted in the dragonflies' dispersal downwind. Less than 5 km/hr. results in varied direction of flight. Wind direction and velocity may impact direction of dispersal for adult dragonflies. Larval dragonflies were reared in an outdoor vivarium, the first of its kind, with documented survival of 74% or greater of the tenerals.