Natural Heritage & Endangered Species Program
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Zebra Clubtail Dragonfly

Stylurus scudderi

State Status: **Special Concern**
Federal Status: None

DESCRIPTION: The Zebra Clubtail (*Stylurus scudderi*) is a large insect belonging to the order Odonata, sub-order Anisoptera (the dragonflies), and family Gomphidae (clubtails). Clubtails are a distinctive group of dragonflies that generally inhabit flowing waters, though they can be found at a variety of habitats, including ponds and lakes. Clubtails also have the distinction of being the only group of dragonflies in Massachusetts to have widely separated eyes. The name clubtail refers to a swelling in the distal segments of these dragonflies' abdomens, creating a form not unlike a club that varies in width from species to species. The Zebra Clubtail possesses a rather wide club, nearly as wide as the thorax (section behind the head), which includes the seventh, eighth, and ninth segments (dragonflies and damselflies have ten abdominal segments). The Zebra Clubtail is a very striking insect with black and yellow patterning (which prompted its naming) and bright green eyes. The face is green with black cross stripes. The dark brown thorax has two large buff white stripes on each side. The black abdomen is marked with pale yellow rings. Abdominal segments eight and nine have a large yellowish spot located laterally on each side, while segment seven has a smaller spot in the same location. The three pairs of powerful legs are jet black and lined with spines which aid in catching the small aerial insects these insects feed on. Zebra Clubtails perch horizontally on rocks, logs, vegetation or the ground with their wings held horizontal, like those of an airplane.

Adult Zebra Clubtails range from 2 to 2.3 inches (52 to 59 mm) in length. Although male and female Zebra Clubtails appear similar in their coloration, the female is slightly larger with a reduced "club."

SIMILAR SPECIES: Although many of the clubtails are similar in appearance, the Zebra Clubtail is a large and distinctively marked species. A combination of factors, including its ringed abdomen, green eyes, terminal abdominal appendages (males), hamules (males) and vulvar lamina (females), help to easily distinguish this species from all other dragonflies in Massachusetts (Needham *et al.* 1999). The nymphs can be distinguished by characteristics of the abdominal segments and palpal lobes as shown in the keys in Walker (1958) and Soltesz (1996).

HABITAT: Zebra Clubtails inhabit medium-sized forested streams which usually have some intermittent rapids. These streams are generally sandy-bottomed with slow to moderate flow. Elsewhere within its range, the Zebra Clubtail has occasionally been found on large lakes.

LIFE-HISTORY/BEHAVIOR: The Zebra Clubtail is a late flying species. Emergence in Massachusetts probably occurs in early July. Following maturation, which may take a week, Zebra Clubtails can be seen at breeding habitat from mid-July through early September.

Dragonflies are an understudied group of insects. As a result there has been little published on their habits and general life histories. This is true for the Zebra Clubtail, for which there is a paucity of published material. However, information that has been published on other related species is most likely applicable.

During their complete life cycle, dragonflies go through two distinct stages, a nymph stage where they are wholly aquatic, and an aerial adult stage. Zebra Clubtail nymphs spend much of their time buried in the sand at the bottom of their stream habitat where they wait to ambush almost any animal that is a suitable size.

ZEBRA CLUBTAIL FLIGHT PERIOD

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

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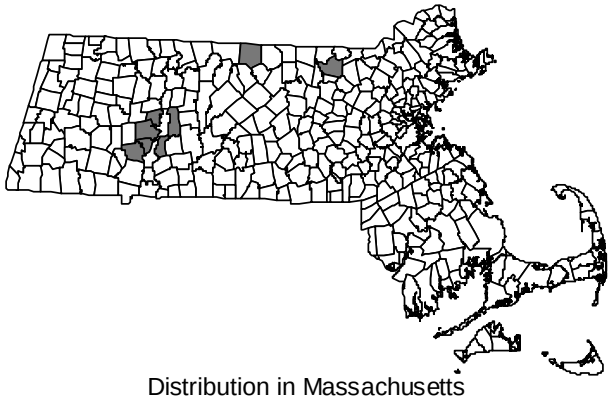
Dragonfly and damselfly nymphs are unique in their mode of prey capture. They have a hinged labium (lower lip) which can be extended rapidly to secure their prey. The victim can then be moved back to the mandibles to be eaten. The wide variety of prey includes aquatic insects, small fish, and tadpoles. While in the nymph stage, the dragonflies will molt up to 10 times, growing each time. When the nymph reaches a certain size, they enter the last developmental stage. Although it is not known how long it takes for Zebra Clubtail nymphs to fully develop, in similarly sized dragonflies it takes about a year.

The final stage of development in dragonflies is emergence from the nymph to the flying adult. The nymph of the Zebra Clubtail generally emerges on the bank of the stream no more than 3 feet above the surface of the water. Although most dragonflies emerge during the early morning, or at night, the Zebra Clubtail has often been found emerging during the middle part of the day. Most dragonflies do not emerge at this time, apparently because predation may be highest during these hours. Upon reaching a secure location, the adult pushes out of the nymphal skin. During the first few hours following emergence, the adult dragonfly is very soft and thus vulnerable to predators. To avoid predation, the newly emerged adults will disperse into surrounding woodlands where they will spend a week or more. This time of wandering is spent maturing and feeding. Dragonflies are aerial predators that feed on small flying insects such as flies and mosquitoes. When not feeding, Zebra Clubtails spend most of their time resting, sitting horizontally on the surfaces of leaves.

Zebra Clubtails breed in late summer, mostly from mid-July through August, though sometimes continuing into September. Male Zebra Clubtails patrol the stream, flying low and quickly over the surface of the water in search of females. They frequently land on the bank, logs, rocks and occasionally shoreline vegetation. When a female is found, the males grabs her and secures her with his terminal abdominal appendages which fit into special grooves in back of her eyes. The female swings the tip of her abdomen, where her reproductive organs are located, towards the male's hamules, located on the under side of the second abdominal segment, forming the "wheel position" with the male on top and the female below. When a male Zebra Clubtail secures a female, the pair leaves the stream and flies up into forest, usually to the tops of the trees, to mate. Oviposition occurs after mating has been completed. Female Zebra Clubtails oviposit alone by rapidly flying over the surface of the water and dipping the tip of her abdomen into the water every few feet. Her flight is very erratic, which may help protect her from potential predators during this time of vulnerability.

RANGE: The Zebra Clubtail is found throughout much of the eastern United States. It ranges from Nova Scotia west to Ontario and south to Georgia, Tennessee and Michigan. The Zebra Clubtail has been found in every New England state, though it appears to be absent from the southeast coastal plain.

POPULATION STATUS IN MASSACHUSETTS: The Zebra Clubtail is listed as a Special Concern Species in Massachusetts. As with all species listed in Massachusetts, individuals of the species are protected from take (picking, collecting, killing, etc…) and sale under the Massachusetts Endangered Species Act. The species is known from only a few rivers in the state. The secretive habits of this species have undoubtedly kept it from being found at more sites. However, the Zebra Clubtail has been found at very low densities at all known sites. Thus, this species deserves careful study and monitoring.



Distribution in Massachusetts
1977 - 2002
Based on records in Natural Heritage Database

MANAGEMENT RECOMMENDATIONS: As for many rare species, the exact management needs of Zebra Clubtails are not known. Water quality certainly is a primary concern. Potential threats to the water quality of the rivers in which this species lives include industrial pollution from businesses located along the river, salt and other road contaminant run-off, and siltation from construction or erosion. The disruption of natural flooding regimes by dams and water diversion projects also may have a negative impact on odonate populations. Extensive use of the river by power boats and jet skis is a serious concern, particularly during the mid- to late-summer emergence period of Zebra Clubtails. Many species of clubtails and other riverine odonates undergo emergence near the water on exposed rocks or vegetation, or exposed sections of the river bank, where they are imperiled by the wakes of high speed watercraft. Low-level recreational use from fisherman and canoeists probably has little impact on odonate populations, but should be monitored. The upland borders of these river systems are also crucial to the well-being of odonate populations as they are critical for feeding, resting, and maturation. Development of these areas should be discouraged and preservation of the remaining undeveloped upland bordering the river should be a top priority.

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Updated August 2008