Natural Heritage & Endangered Species Program

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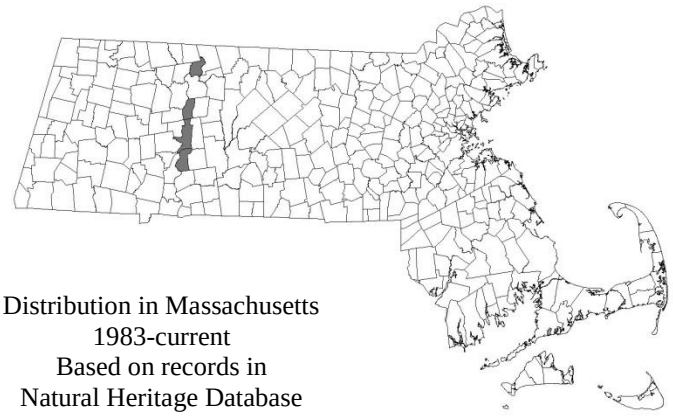
Massachusetts Division of Fisheries & Wildlife

Midland Clubtail
Gomphurus fraternus

State Status: **Endangered**
Federal Status: **None**

DESCRIPTION: The Midland Clubtail is a large, semi-aquatic insect in the order Odonata, suborder Anisoptera (the dragonflies). They are members of the family Gomphidae (the clubtails), a large, diverse group comprising nearly 100 species in North America. Clubtails are named for the lateral swelling at the tip of the abdomen (the seventh through ninth segments) that produces a club-like appearance. The extent of this swelling varies greatly, from extreme to non-existent, depending upon the species. The club is generally more pronounced in males. The purpose of the club is uncertain, but it may be used for displays, or it may serve an aerodynamic function. Clubtails are further distinguished from other dragonflies by their widely separated eyes, characteristics of their wing venation, and behavior. Many species are very elusive and are thus poorly known.

The Midland Clubtail is in the subgenus *Gomphurus*, a group of medium- to large-sized dragonflies characterized by having the broadest clubs of any of the Gomphidae. Midland Clubtails are dark brown dragonflies with pale yellow to greenish markings on the



Distribution in Massachusetts
1983-current
Based on records in
Natural Heritage Database

Photo © Blair Nikula

body and bright green eyes. The top of the thorax is marked with thick, pale stripes that form a rearward-facing U pattern. There are broad, pale, lateral stripes on the sides of the thorax. The pale thoracic markings are bright yellow in immatures but darken to a dull grayish-green in mature individuals. The dark abdomen has thin, yellow markings on the tops of segments one through eight, and yellow patches on the sides of the club. The face is plain, dull yellowish and the legs are blackish. The sexes are similar in appearance, though the females have thicker abdomens and a less developed, though still prominent, club.

Adult Midland Clubtails range in length from 1.9 to 2.1 inches (48 mm - 54 mm), with a wingspan averaging 2.7 inches (68 mm). The fully developed nymphs average about 1.2 inches in length (29 mm - 31.5 mm).

SIMILAR SPECIES: The Midland Clubtail is one of three species in the genus *Gomphurus* in Massachusetts. The other two, the Cobra Clubtail (*Gomphurus vastus*) and Skillet Clubtail (*G. ventricosus*), are very similar in appearance. As in most clubtails, the shape of the male

terminal appendages and hamules (located on the underside of the second abdominal segment) and the female vulvar lamina (located on the underside of the eighth and ninth abdominal segments) provide the most reliable means for identification. Midland Clubtails are the largest of the three *Gomphurus* species in the state, but have the narrowest club. They also have a small, yellow, triangular spot on the top of the eighth abdominal segment; Cobra Clubtails and Skillet Clubtails are entirely black on the top of the eighth segment. The Midland Clubtail has a plain yellow face, without the black cross-striping present on the Cobra Clubtail.

The nymphs can be distinguished by characteristics of the palpal lobes on the labium, as per the keys in Walker (1958), Soltesz (1996), and Needham et al. (2000).

HABITAT: Midland Clubtails inhabit medium- to large-sized rivers and large, wind-swept lakes. They are only known from the Connecticut River in Massachusetts.

LIFE-HISTORY/BEHAVIOR: The recorded flight season extends from late May into mid-July. There are two main life stages, the aquatic nymph and flying adult. The nymphs spend at least a year, possibly more, maturing, undergoing several molts during this period. They burrow shallowly into the substrate and are voracious predators, feeding upon a variety of aquatic life. When ready to emerge from the water as the adult, the nymphs crawl out onto exposed rocks, emergent vegetation, partially submerged logs, or the steeper sections of river banks, where they emerge from the nymphal exoskeleton as adults (a process known as "eclosion"). Emergence generally takes place very early in the morning, presumably to reduce exposure to predation.

As soon as the freshly emerged (teneral) adults are dry and the wings have hardened sufficiently, they fly off to seek refuge in the vegetation of adjacent uplands, leaving their larval exoskeletons behind. These cast exoskeletons, known as exuviae, are identifiable to species and provide a reliable, useful means of determining the presence of a species. The immature dragonflies spend several days or more feeding and maturing in upland areas, before returning to their breeding habitats. Adult clubtails feed on aerial insects which they capture in short sallies from their perches.

When mature, the males return to the water where they can be found resting on sandy stretches of shoreline, or perched on overhanging vegetation. They periodically make flights out over the water, particularly over rapids and riffles, presumably to search for females. Females generally appear at water only for a brief period when they are ready to mate and lay eggs. When a male encounters a female, he attempts to grasp the back of her head with claspers located on the end of his abdomen. If the female is receptive, she allows the male to grasp her, then curls the tip of her abdomen upward to connect with the male secondary sexual organs located on the underside of the second abdominal segment, thus forming the familiar heart-shaped "wheel" typical of all Odonata, with the male above, the female upside down underneath. In this position, the pair flies off to mate, generally hidden high in nearby trees where they are less vulnerable to predators. The duration of mating in Midland Clubtails has not been recorded, but in similar-sized odonates can range from several minutes to an hour or more.

Females oviposit by flying low over the water, periodically striking the surface with the tips of the abdomen to wash off the eggs. They seem to prefer the more turbulent areas of rivers and lakes for oviposition. It is not known how long the eggs of Midland Clubtails take to develop.

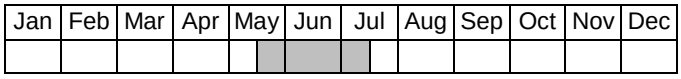
RANGE: Midland Clubtails range throughout northeastern North America from Maine, Quebec, Ontario, and Manitoba south to North Carolina, Tennessee and Missouri. In New England, the species has been recorded from Maine and from the Connecticut River in New Hampshire, Massachusetts, and Connecticut.

POPULATION STATUS IN MASSACHUSETTS: The Midland Clubtail is listed as an Endangered 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. Midland Clubtails have been recorded a handful of times in Massachusetts along the Connecticut River. The species also has been found along the Connecticut River just south of the Massachusetts border in Connecticut. Further field work along the river, particularly those areas where the flow is swifter and riffles occur, will likely provide additional Massachusetts records.

Whether the species inhabits other river systems in the state remains to be determined. A teneral female reportedly collected on Cape Cod in Brewster seems incongruous and requires confirmation.

MANAGEMENT RECOMMENDATIONS: As for many rare species, the exact management needs of Midland Clubtails are not known. With most odonates water quality is critical to their well-being, and Midland Clubtails are undoubtedly no exception. Potential threats to the water quality of the Connecticut River include industrial and agricultural pollution, sewage overflow, salt and other road contaminant run-off, and siltation from construction or erosion. The impact of the disruption of natural flooding regimes by damming and water diversion projects on Midland Clubtails and other riverine species is unknown but may be considerable. Extensive use of the river by power boats and jet skis is a serious concern, particularly during the early summer emergence period of Midland Clubtails (as well as several other clubtail species). Many species of clubtails, as well as other riverine odonates, eclose low over the water surface on exposed rocks, emergent or floating vegetation, or steep 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, particularly for the teneral adults. Development of these areas should be discouraged, and the preservation of remaining undeveloped upland should be a top priority.

MIDLAND CLUBTAIL FLIGHT PERIOD



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