



Natural Heritage & Endangered Species Program

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Beaver Pond Clubtail Dragonfly *Gomphus borealis*

State Status: **Delisted**
Federal Status: None

DESCRIPTION OF ADULT: The Beaver Pond Clubtail (*Gomphus borealis*) is a large, slender insect belonging to the order Odonata, suborder Anisoptera (the dragonflies), and family Gomphidae (the clubtails). The clubtails are one of the most diverse families of dragonflies in North America with nearly 100 species. Clubtails are unique among the dragonflies in having eyes that are separated from each other and, as their name implies, having a lateral swelling near the end of the abdomen, giving the abdomen a “club-like” appearance. The Beaver Pond Clubtail belongs to the sub-genus *Phanogomphus*, which are characterized by their small “club” and by dull coloring of grays, greens, browns and blacks. Beaver Pond Clubtails have a plain gray-green face and eyes that range in color from pale to deep aqua blue. The sides of the thorax (winged and legged section behind the head) are marked with three wide grayish green stripes that almost completely cover the brown base color. The top of the thorax also has a base color of dark brown and is marked with two gray-green stripes. The abdomen (section behind the thorax) is black. Segments 3 through 7 (dragonflies and damselflies have 10 abdominal segments) have thin grayish green dorsal stripes that are shorter towards the tip of the abdomen. Dorsally, segments 9 and 10 are entirely black, though they have gray-green to yellow patches on the sides. Recently emerged individuals are more brightly colored than mature individuals and can initially cause identification problems. Although the pattern is the same, the pale coloration, instead of the dull gray-green, can be bright yellow. Examination of the terminal abdominal appendages of the male and the vulvar laminae of the female (Needham *et al.* 2000; Walker 1958) under a microscope or magnifying lens is the most reliable method for identifying this species.

Adult Beaver Pond Clubtails range from about 1.8 to 1.9 inches (44 to 49 mm) in length. Although the female is similar in coloration, she is more stout than the male, with a “club” that is even smaller than the male’s.

SIMILAR SPECIES: Six species in the sub-genus *Phanogomphus* occur in Massachusetts. Although one can fairly quickly recognize a Clubtail as belonging to this group by a combination of factors, including its coloration and small “club,” identification to the species level can be difficult. Examination of certain anatomical features under a loupe is the most reliable way to identify the Beaver Pond Clubtail. Male Beaver Pond Clubtails are best identified by examination of the terminal abdominal appendages (Nikula *et al.* 2003) and hamules (organs located on the underside of segment two), while females may be identified to species by the shape of their



vulvar laminae (located underneath segments eight and nine) (Walker 1958).

The nymphs can be distinguished by characteristics of the labium as per the keys by Walker (1958) and Soltesz (1996).

HABITAT: As the name suggests, Beaver Pond Clubtails are often found at beaver-created wetlands. They can also be found at a variety of lakes and ponds, usually around an inlet or outlet, and occasionally on sluggish streams. The nymphs are aquatic and burrow in the bottom substrate while the adults also inhabit uplands.

LIFE CYCLE/BEHAVIOR: Beaver Pond Clubtails fly from late spring through early summer. Emergence may take place as early as mid-May. Adults have been observed in Massachusetts from late May through July.

There has been very little published on the life cycle and behavior of the Beaver Pond Clubtail, but information published on similar species is likely applicable. The nymph or larva is the first major life stage of the dragonfly following hatching from the egg. This stage of the life cycle is entirely aquatic. When the nymph is fully developed, it transforms into an adult and the adult emerges from the nymphal skin (the exuviae). The adult dragonfly is a free-flying insect that often wanders far from the water.

BEAVER POND CLUBTAIL FLIGHT PERIOD

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

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The nymphs probably spend much of their time burrowing in the bottom sediment. The habit of burrowing not only provides them with protection from predators, but may also provide them with camouflage or a hiding spot from which they can capture prey. Dragonfly and damselfly nymphs have a unique feeding apparatus: a moveable, hinged labium or lower lip that can be extended to capture prey. Dragonfly nymphs are voracious predators and feed on a variety of aquatic life from insects to small fish and tadpoles.

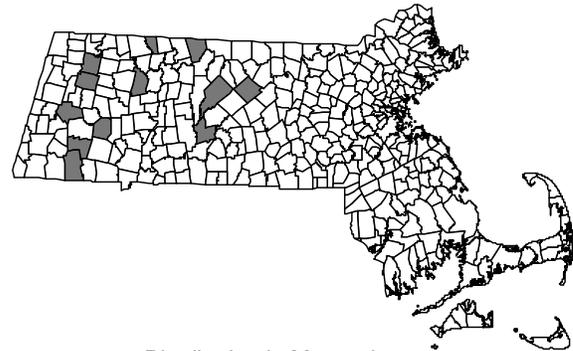
Although it is not known how long it takes for the nymph of the Beaver Pond Clubtail to fully develop, it typically takes about one year in similarly sized dragonflies. The final step before becoming a flying adult is eclosure (or emergence). This is the process by which the adults emerge from the nymphal exoskeleton (the exuviae). The nymph of the Beaver Pond Clubtail may crawl up onto the beaver dam or onto exposed rocks or logs to emerge. Upon finding a secure perch, usually just above the surface of the water, the adult pushes out of the exoskeleton and stretches its wings. The new adult is very soft and vulnerable at this time (called "teneral"). In the first few hours following emergence, adults can be damaged by rain showers or falling debris, and are easily taken by predators. As a result, the adult makes its maiden flight into the woods that surround the breeding habitat as soon as possible. Away from the water, the dragonfly can find relatively safe shelter among the leaves and branches of trees. During this time of wandering and maturation, Beaver Pond Clubtails can be found in fields and forest clearings, sometimes far away from the breeding site, perched horizontally on sunlit vegetation or the ground. From such perches, Beaver Pond Clubtails make periodic feeding forays to capture small aerial insects such as flies and mosquitoes. Following maturation, the adults return to the water to breed.

In Massachusetts, the Beaver Pond Clubtail may begin breeding as early as the first week of June and will continue to breed into early July. Upon returning to the breeding sites, males often perch on beaver dams, rocks, or other exposed perches. They make patrols out over the water, often returning to the same or a nearby perch. During these patrols, the males are primarily searching for mates and driving off any potential competitors. Females spend little time around the breeding habitat, except during the brief time when they are ready to mate and lay eggs.

When the male encounters a female, he attempts to grab her in back of her eyes with his terminal abdominal appendages. A receptive female will position the tip of her abdomen, where her reproductive organs are located, at the hamules of the males, which can be found on the underside of his second segment. This is known as the "wheel position", with the male on top and the female below. The joined pair will usually fly up into the surrounding forest, most often into the very tops of the trees, where mating occurs in relative safety. Mating may take from less than one minute to over an hour depending on the species. It is not known how long it takes in the Beaver Pond Clubtail.

When mating is completed, the female returns to the water in order to deposit her eggs. Female Beaver Pond Clubtails

oviposit (lay eggs) alone, flying rapidly back and forth, tapping the tip of their abdomen to the surface of the water every few feet to release eggs. Upon being laid, the eggs descend to the bottom of the pond where there is suitable larval habitat.



Distribution in Massachusetts
1977 - 2002

Based on records in Natural Heritage Database

RANGE: The Beaver Pond Clubtail is found in northeastern North America, from New Brunswick and Nova Scotia west to Ontario and south through the Appalachian region to North Carolina.

POPULATION STATUS IN MASSACHUSETTS: The Beaver Pond Clubtail was removed from Massachusetts list of rare species in 2005 after it was found to occur more widely than previously thought. The Beaver Pond Clubtail is known from the central and western portions of the state.

MANAGEMENT RECOMMENDATIONS: As for many rare species, the exact management needs of the Beaver Pond Clubtail are not known. Alteration of water quality is certainly a threat to the maintenance of their populations in Massachusetts. Threats to water quality include industrial pollution and sewage overflow, littering, and salts and other run-offs from roadways. The upland borders of the ponds and lakes 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 uplands bordering the water bodies should be a top priority.

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