

# TREELINE EMERALD

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## TAXONOMY

**Scientific name:** *Somatochlora sahlbergi* Tryböm, 1889

**Common name:** Treeline Emerald

**Family:** Corduliidae

**Taxonomic comments:**

*Somatochlora sahlbergi* hybridizes with Hudsonian Emerald (*S. hudsonica*) and Ringed Emerald (*S. albicincta*) in low valleys of the northern Yukon Territory where habitat requirements overlap (Cannings and Cannings 1985). Larvae of North American related species *S. sahlbergi*, *S. hudsonica*, *S. albicincta* and Lake Emerald *S. cingulata* are very similar but can be distinguished by various morphological characteristics including body size and number of setae present on body segments and mouthparts; in Eurasia, larvae of *S. sahlbergi* are distinguished from related Alpine Emerald (*S. alpestris*) by the presence of prominent lateral spines on the abdomen (Cannings and Cannings 1985, Cannings 2002).



Photo by O. Kosterin

## DESCRIPTION

**Basic description:** A medium-sized dragonfly.

**General description:**

Larvae are squat and hairy, orange-brown or reddish-brown in color, and generally measure 23-25 mm in length (Cannings and Cannings 1985). Adult females measure around 48 mm; males around 50 mm. Brilliant green eyes meet broadly on top of the head, wings are transparent with dark venation, thorax sides are coppery-green without obvious marks, and abdomen is blackish with metallic highlights. Adults are distinguished from similar species *S. albicincta* and *S. hudsonica* by the lack of white rings on the abdomen (Cannings 2002). Hybrids between *S. sahlbergi* and *S. albicincta* and *S. hudsonica* have intermediate size, abdominal rings and appendage shapes.

**Length (mm):** adult range 48-50

**Reproduction:**

During flight period (late June-late August), males fly usually at least 1 m offshore, patrolling open water surface often in a criss-cross pattern while searching for females. Males grab females by the head mid-air and copulation occurs usually in nearby protective vegetation. Females lay several hundred to several thousand eggs in small

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clusters from the end of the abdomen into open water underlain with aquatic moss, away from shoreline vegetation (Cannings and Cannings 1985, Cannings et al. 1991). Early development unknown, but eggs of *S. kennedyi* laid in August hatched the following spring; other *Somatochlora* species also exhibit delayed embryonic development, but it is unknown whether *S. sahlbergi* overwinters in the egg stage or in early larval stages in pools and ponds (Walker 1953). For many *Somatochlora* species, short northern summers mean that up to 4-5 years may be spent in the larval stage (Cannings and Cannings 1997). Metamorphosis to the adult stage occurs above the waterline; the larva crawls out of the water to shed its exoskeleton, dry its body and extend and dry its wings.

### **Ecology:**

The Treeline Emerald has the most northerly breeding range of any dragonfly. As suggested by its name, this species generally lives within 100 km of the arctic latitudinal treeline and 300 m of the altitudinal treeline (Cannings 2002). Larval stage is aquatic; adults are terrestrial but always associated with larval habitats. Adults are most vulnerable to predation immediately after emergence and metamorphosis (Walker 1953). Predators of larvae and adults include other insects, birds (especially waterfowl and shorebirds) and amphibians; fish are the most significant larval predator (Walker 1953).

**Migration:** Non-migratory.

### **Food:**

Both adults and larvae are carnivorous. Larvae prey upon zooplankton and other aquatic insects and insect larvae including beetles, mosquitoes, midges and even other dragonfly and damselfly larvae. Adults prey upon flying insects such as mosquitoes, deer flies, caddisflies, moths, midges and smaller Odonates (Walker 1953, Cannings and Cannings 1985, Cannings et al. 1991, Corbet 1999).

### **Phenology:**

Flight period in the Yukon is from late June to late August; recorded flight in Alaska from July 6-17 (Cannings and Cannings 1985, Paulson 2004). In general, adults are most active in the afternoon and inactive at night, in the shade, or during inclement weather.

### **Habitat:**

Pools, ponds and small lakes at the edge of shrub tundra near treeline; fens (minerotrophic waters) and bogs (ombrotrophic waters; Cannings and Cannings 1985, Cannings and Cannings 1994). Pools where this species may be found usually lined with sedges, contain aquatic mosses, and often underlain by permafrost (Cannings and Cannings 1985). Important habitat characteristics include deep, cold water and the occurrence of an aquatic moss (such as *Sphagnum lindbergii*, *Scorpidium scorpioides* and *Drepanocladus fluitans*) as the dominant vegetation (Cannings and Cannings 1985).

In Siberia, Belyshev (1973) observed this species in clear, cold, slow moving water surrounded by coniferous forest. However, in North America, *S. sahlbergi* has never been found in moving water except for a fen pond with a barely perceptible current through saturated vegetation (Cannings and Cannings 1985).

## STATUS

**Global rank:** G4 (04Nov2004)

**Global rank reasons:**

Circumpolar with several occurrences in northwestern Canada, Scandinavia and Russia (including Siberia), and a few occurrences in Alaska.

**State rank:** S3S4 (14Jun2006)

**State rank reasons:**

Distribution records for Alaska are limited and patchy; data is lacking. Abundance and trends unknown. Threats are likely minimal, although climate change may cause habitat reduction.

## DISTRIBUTION AND ABUNDANCE

**Range:**

**Global range:**

Circumboreal; occurs at or near the arctic (latitudinal) treeline in Alaska, the Mackenzie River Delta of Canada, and Finland; also in Siberian Russia (as far south as 18 km from the Mongolian border near Turan; Kosterin 1992); outside these extensions, however, the species apparently occurs only north of about 61°30'N (Cannings and Cannings 1985).

**State range:**

Northern Alaska. Specimens have been collected in the northwest along the Kuskokwim River (Eenayarak River south of Bethel), as far north as Sagwon on the Sagavanirktok River and around Prudhoe Bay, in northcentral around Donnelly Dome and Dot Lake near Delta Junction, and near Stibnite Creek (a tributary of the Tok River; Gloyd 1939, Paulson 2004, J. Hudson, unpubl. data).

**Abundance:**

**Global abundance:**

Unknown. In the Yukon Territory, Canada, locally abundant in valleys of the Ogilvie River and tributaries in the Ogilvie Mountains (Cannings and Cannings 1985). Described in Siberia as “rare and even in the northern part it could not be considered common” (Belyshev 1973 in Cannings and Cannings 1985).

**State abundance:**

Unknown. Most specimens were collected near Delta Junction, but this is not an accurate gauge of abundance.

**Trends:**

**Global trend:**

Unknown.

**State trend:**

Unknown.

## EXISTING PROTECTION

**Global protection:**

Unknown.

**State protection:**

Unknown.

## CHALLENGES

**Global challenges:**

See State threats comments.

**State challenges:**

Threats unknown, but probably few; does not appear to be threatened by habitat loss/change or human harvest of any form. Climate change may reduce the area underlain by permafrost, which could eliminate tundra pond habitat required by this species. Climate change could also have potentially adverse effects if increasing temperatures and northward movement of treeline encourage range expansion/shift of competitive dragonfly species that currently occur farther south. Range overlap could cause an increase in hybridization between *S. sahlbergi* and relatives *S. albicincta* and *S. hudsonica* which would threaten the genetic distinctiveness of *S. sahlbergi* in North America.

## RESEARCH AND INVENTORY NEEDS

**Global research needs:**

See state research needs.

**State research needs:**

Better understanding of life history and habitat requirements is needed. Determine the extent of hybridization with related species *S. hudsonica* and *S. albicincta*. Identify threats and limiting factors.

**Global inventory needs:**

See State inventory needs.

**State inventory needs:**

The sampling of exuviae (exoskeletons discarded when last instar larvae emerge into the adult stage) has been shown to be an effective method of estimating larval population size and locating larval habitat for the endangered Hines Emerald (*S. hineana*); this method could be employed for local determination of Treeline Emerald population size and habitat (Foster and Soluk 2004). Definition of Alaska range is needed; few surveys have been completed and little is known about current distribution and population size in the state.

## CONSERVATION AND MANAGEMENT NEEDS

**Global conservation and management needs:**

See State conservation and management needs.

**State conservation and management needs:**

Continue to expand the described range in Alaska by recording new observations; establish a survey program to better determine range and abundance. Document areas of overlap and hybridization between *S. sahlbergi* and *S. hudsonica* and *S. albicincta*; monitor changes in populations of all three species.

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