

TREELINE EMERALD

Somatochlora sahlbergi Tryböm, 1889
(Corduliidae)

Global rank G4 (04Nov2004)

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.

Taxonomy

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).

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 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. Photo by O. Kosterin

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).

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).

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.

Global trend

Unknown.

State trend

Unknown.

Global protection

Unknown.

State protection

Unknown.

State threats

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.

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.

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.

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.

LITERATURE CITED

- Cannings, R.A. 2002. Introducing the dragonflies of British Columbia and the Yukon. Royal British Columbia Museum, Victoria, B.C.
- Cannings, S.G., and R.A. Cannings. 1985. The larva of *Somatochlora sahlbergi* Trybom, with notes on the species in the Yukon Territory, Canada (Anisoptera: Corduliidae). *Odonatologica* 14:319-330.
- Cannings, S.G., and R.A. Cannings. 1994. The Odonata of the northern Cordilleran peatlands of North America. *Memoirs of the Entomological Society of Canada* 169:89-110.
- Cannings, S.G., and R.A. Cannings. 1997. Dragonflies (Odonata) of the Yukon. pp. 169-200 in: Danks, H.V., and J.A. Downes (Eds.). *Insects of the Yukon. Biological Survey of Canada (Terrestrial Arthropods)*, Ottawa, ONT. 1034 pp.
- Cannings, S.G., R.A. Cannings, and R.J. Cannings. 1991. Distribution of the dragonflies (Insecta: Odonata) of the Yukon Territory, Canada with notes on ecology and behaviour. *Contributions to Natural Science*, No. 13. pp. 1-27. Royal British Columbia Museum, Victoria, B.C.

Corbet, P.S. 1999. *Dragonflies: behavior and ecology of Odonata*. Cornell University Press, Ithaca, NY.

Foster, S.E., and D.A. Soluk. 2004. Evaluating exuviae collection as a management tool for the federally endangered Hine's emerald dragonfly, *Somatochlora hineana* Williamson (Odonata: Cordulidae).

Gloyd, L.K. 1939. A synopsis of the Odonata of Alaska. *Entomological News* 50:11-16.

Paulson, D.R. 2004. The dragonflies (Odonata) of Alaska. Slater Museum of Natural History, University of Puget Sound, Tacoma, WA. Available online at: <http://www.ups.edu/biology/museum/AlaskaOD.html>. Accessed 23Feb2005.

Hudson, J. 2004. Unpublished data compiled from UBC Spencer Museum collection, Donnelly Dot Map Records and J. Hudson personal collections.

Kosterin, O.E. 1992. New findings of *Somatochlora sahlbergi* Tryböm (Insecta, Odonata). *Acta Hydroentomologica Latvica* 2:22-26. English translation available online at: <http://www.nsu.ru/community/nature/photos/kosterin/sahl.htm>. Accessed 25Aug2005.

Walker, E.M. 1953. *The Odonata of Canada and Alaska. Volume One. Part I: general*. University of Toronto Press, Toronto, ONT.

Acknowledgements

State Conservation Status, Element Ecology & Life History

Author(s): J.G. McClory and T.A. Gotthardt,

Alaska Natural Heritage Program, Environment and Natural Resources Institute, University of Alaska Anchorage, 707 A Street, Anchorage, AK, <http://aknhp.uaa.alaska.edu>.

State Conservation Status, Element Ecology & Life History Edition Date: 14Jun2006

Reviewers: Syd Cannings, Director, NatureServe Yukon, Whitehorse, Yukon Territory.



Life history and Global level information were obtained from the on-line database, NatureServe Explorer (www.natureserve.org/explorer). In many cases, life history and Global information were updated for this species account by Alaska Natural Heritage Program zoologist, Tracey Gotthardt. All Global level modifications will be sent to NatureServe to update the on-line version.

Copyright Notice: Copyright © 2005 NatureServe, 1101 Wilson Boulevard, 15th Floor, Arlington Virginia 22209, U.S.A. All Rights Reserved. Each document delivered from this server or web site may contain other proprietary notices and copyright information relating to that document.

NatureServe Conservation Status Factors
Edition Date: 20Feb1998

Photo credit: by O. Kosterin, obtained online at: <http://pisum.bionet.nsc.ru/kosterin/odonata/russia.htm>.
