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The Great Lakes Entomologist

Volume 37
Numbers 3 & 4 - Fall/Winter 2004 *Numbers 3 & 4 - Fall/Winter 2004*

Article 3

October 2004

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Recommended Citation

DuBois, Robert B.; Pleski, Julie M.; Smith, William A.; Epstein, Eric J.; and Mead, Kurt 2004. "First Records for *Aeshna Sitchensis* (Odonata: Aeshnidae) and *Enallagma Clausum* (Odonata: Coenagrionidae), and a Northwestern Record for the State-Endangered *Somatochlora Incurvata* (Odonata: Corduliidae) in Wisconsin," *The Great Lakes Entomologist*, vol 37 (2)
Available at: https://scholar.valpo.edu/tgle/vol37/iss2/3

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FIRST RECORDS FOR *AESHNA SITCHENSIS* (ODONATA: AESHNIDAE) AND *ENALLAGMA CLAUSUM* (ODONATA: COENAGRIONIDAE), AND A NORTHWESTERN RECORD FOR THE STATE-ENDANGERED *SOMATOCHLORA INCURVATA* (ODONATA: CORDULIIDAE) IN WISCONSIN

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ABSTRACT

While surveying for Odonata in coastal peatlands and associated shoreline areas adjacent to Lake Superior in Wisconsin, we documented populations of two new state record species, the zig-zag darner (*Aeshna sitchensis* Hagen) and the alkali bluet (*Enallagma clausum* Morse). We also located a robust population of the state-endangered incurvate emerald (*Somatochlora incurvata* Walker) at the northwestern edge of the known range of this species. Adults and exuviae of *A. sitchensis* and *S. incurvata* were found at an insular fen on Stockton Island, Ashland County, within the Apostle Islands National Lakeshore (AINL). Breeding of both species had occurred in areas of the fen where small pools had dried by summer. Additionally, a single adult male *A. sitchensis* was collected in the City of Superior in Douglas County. Adult *E. clausum* were found at two sites: on the Lake Superior beach near the mouth of the Sand River within the AINL in Bayfield County, and along the northeast shore of Allouez Bay in the City of Superior in Douglas County.

Aeshna sitchensis and *Somatochlora incurvata*

The zig-zag darner (*Aeshna sitchensis* Hagen) is a boreal dragonfly distributed across Canada and the northern United States. It has been reported from northern Minnesota close to Wisconsin in the city of Duluth and the Upper Peninsula and northern Lower Peninsula of Michigan, but not from Wisconsin (O'Brien 2002, Smith et al. 2003, Donnelly 2004a). It prefers small pools or puddles that may dry during summer, usually 10 m^2 or less in size, without emergent plants, in sedge-dominated bogs or poor fens (Walker 1953, Cannings 1982). We collected adults and exuviae of *A. sitchensis* from a poor fen on Stockton Island in Ashland County, which represent first records for the species in Wisconsin. Additionally, a single adult male *A. sitchensis* was collected from a sidewalk in downtown Superior in Douglas County on 1 October 2004. The location of the breeding site that produced this specimen is unknown.

The state-endangered incurvate emerald (*Somatochlora incurvata* Walker) is distributed throughout the northeastern United States, its range extending only as far west as Wisconsin (Donnelly 2004b). Here, the species is known from small numbers of individuals at about two dozen sedge- and sphagnum-dominated poor fens in 10 of Wisconsin's 72 counties (Wisconsin Odonata Survey 2005). Most of these sites are located in the bed of former Glacial Lake Wisconsin in several of

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Wisconsin's central counties (Smith et al. 2003). We discovered a robust population of this species co-existing with *A. sitchensis* at the Stockton Island poor fen, which is at the northwestern edge of its known range. Other northern populations of *S. incurvata* are known from the Upper Peninsula of Michigan, including areas adjacent to the Lake Superior shore (Walker 1925, Donnelly 2004b, Michigan Odonata Survey 2005).

The Stockton Island Tombolo (T52N-R1W, Sec. 36) is a designated State Natural Area within the Apostle Islands National Lakeshore (AINL), which is managed by the National Park Service. The Apostle Islands lie in the Wisconsin waters of Lake Superior, with Stockton Island located about 7 km offshore in Ashland County. The Stockton Island Tombolo contains a complex combination of aquatic communities with many rare species of plants and animals (Epstein et al. 2002). Two sandspits connect Presque Isle Point to the main body of the island. The spits enclose a large wetland and lagoon, which are traversed by a series of narrow, parallel, sand ridges.

A large insular poor fen is located at the base of the Tombolo. We made four visits to this fen, on 29 June, 16 July, 20 July, and 25 August 2004. Although we searched the entire fen for exuviae and adults of Odonata, most of our efforts were focused along the slightly wetter south and east margins to which breeding activity of the two rare species appeared to be limited. Exuviae of both species were found in close proximity, indicating use of the same habitat. No surface water was present during any of our visits, but water was readily found just below the surface. The breeding areas of the fen were comprised of small islands of *Sphagnum* mounds, which were surrounded by interconnected, canal-like areas and drying pools of damp, dark peat forming a reticulated pattern. The pools averaged less than 10 m^2 in size with peaty banks of 2 to 5 cm. The soil had a dark, silty composition and was thickly interlaced with plant roots. The open mat was dominated by fine sedges, including running bog sedge (*Carex oligosperma*) and beaked sedge (*C. utriculata*), as well as cotton grasses (*Eriophorum spp.* and *Scirpus hudsonianus*), and pod-grass (*Scheuchzeria palustris*). The mounds of *Sphagnum spp.* also contained coast sedge (*C. exilis*), white beak-rush (*Rhynchospora alba*), and twig-rush (*Cladium mariscoides*). In or along the damp, peaty canals were bladderworts (*Utricularia spp.*) and sundews (*Drosera spp.*). The fen was edged with black spruce (*Picea mariana*), tamarack (*Larix laricina*), leatherleaf (*Chamaedaphne calyculata*), and pitcher plant (*Sarracenia purpurea*).

Two exuviae of *A. sitchensis* were collected on 29 June and again on 16 July, and a single exuviae was taken on 20 July. A total of 43 *S. incurvata* exuviae were found on 29 June, 16 July, and 20 July, and a single exuviae was found on 25 August. All exuviae of both species were found on sedge (Cyperaceae) stems in or along the edges of the damp, peaty canals and drying pools described above. Cannings (1982) and Walker (1922) previously documented breeding of *A. sitchensis* in shallow bog pools, largely devoid of vegetation, that had dried by summer. Shiffer (1969) also described oviposition of *S. incurvata* in small pools within a Pennsylvania bog that were nearly dry in summer. Adults of both species were seen in flight in the same areas during the July and August visits. At least 16 adult *A. sitchensis* and at least 6 dozen adult *S. incurvata* were observed in the fen during our visits. This evidence indicates at least a two-month flight period and asynchronous emergence for both species.

Five adults (4 males, 1 female) of *A. sitchensis* were netted and retained as vouchers. Considerable effort was required to net them because they would fly 50 m or more when startled by our approach. They often perched horizontally in sedges, mainly near the pools, or vertically in the nearby trees. Mating behavior of *A. sitchensis* was not observed. We netted more than 20 adult *S. incurvata* at the site. Most were examined in hand and released, with some vouchers retained. Many *S. incurvata* were observed while emerging, mating, and ovipositing. In mid-July females oviposited by tapping their abdomens in wetter areas

where a thin film of water lay over the peat. Shiffer (1969) also noted that females tapped their abdomens only into wet mud or water, not into *Sphagnum*. On 20 July, three newly emerged tenerals were flushed from small areas of damp peat where their exuviae were subsequently found. Male *S. incurvata* behaved aggressively toward each other and toward *A. sitchensis* males, chasing them out of defended territories. Males of *A. sitchensis* did not respond aggressively toward males of *S. incurvata* or each other. A lack of aggressive behavior on the part of *A. sitchensis* males was similarly observed by Cannings (1982). Other Odonata observed and likely breeding in the same areas used by *A. sitchensis* and *S. incurvata* were sedge sprite (*Nehalennia irene* (Hagen)), Hudsonian whiteface (*Leucorrhinia hudsonica* (Selys)), white-faced meadowhawk (*Sympetrum obtrusum* (Hagen)), and ebony boghaunter (*Williamsonia fletcheri* Williamson).

Enallagma clausum

The alkali bluet (*Enallagma clausum* Morse) is a damselfly found throughout the northern and western United States and southern and western Canada (Donnelly 2004c). It is typically found at lakes with saline or alkaline waters, or at large, freshwater lakes with little vegetation (Kennedy 1917, Walker 1953, Cannings and Stuart 1977, Westfall and May 1996). *E. clausum* is known from northern Minnesota and had been reported in previous years from several central Wisconsin counties (Donnelly 2004c). However, all previous Wisconsin records were of larvae and we were unable to confirm that any of them were this species. We collected adult and teneral *E. clausum* from sites in Bayfield County near the mouth of the Sand River, and in Douglas County on Wisconsin Point along the northeast shore of Allouez Bay.

The mouth of Sand River in Bayfield County (T51N-R6W, Sec. 32) is located in a complex of wetlands separated from Lake Superior by a narrow, forested sandspit. The lower portions of the Sand River are bordered by northern sedge meadow and an alder thicket. A mostly open peatland with coastal fen, coastal bog, and tamarack swamp habitats lies east of the river mouth. This wetland complex supports a diverse assemblage of plants, animals, and communities including many rare species (Epstein et al. 2002). On 19 August 2004, an adult male and adult female *E. clausum* were collected near each other on the Lake Superior beach among grasses close to the coastal fen. Conditions were sunny and cool with strong winds. The Lake Superior shore at this site has a sand and gravel substrate with no aquatic vegetation in the immediate vicinity. The breeding site was not discovered, and it is possible that the strong winds could have blown the pair from a considerable distance.

Wisconsin Point in Douglas County (T49N-R13W, Sec. 28) forms the eastern part of a long coastal barrier spit that separates Lake Superior from Allouez Bay. Allouez Bay is part of the St. Louis River estuary and is situated between the City of Superior's east-side neighborhood of Allouez and Wisconsin Point. Major site features at Wisconsin Point include several miles of open sand beach and dunes, small interdunal wetlands, and a pine forest. The northeast shoreline of Allouez Bay contains beds of graminoid plants, including lake sedge (*Carex lacustris*), water sedge (*C. aquatilis*), creeping spike-rush (*Eleocharis palustris*), softstem-bulrush (*Schoenoplectus tabernaemontani*), water-bulrush (*S. subterminalis*), broad-leaved arrowhead (*Sagittaria latifolia*), and cat-tails (*Typha spp.*). On 14 July 2004, a newly emerged teneral *E. clausum* was collected from an area of this shoreline containing mostly softstem-bulrush. Conditions were sunny and warm (26 °C). Adult white-faced meadowhawk, marsh bluet (*Enallagma ebrium* (Hagen)), Hagen's bluet *(E. hageni* (Walsh), and eastern forktail (*Ischnura verticalis* (Say)) were collected or observed in same area. On 7 August 2004, three adult *E. clausum* were collected from the 2-km northeast shoreline of Allouez Bay during a bioblitz by citizen volunteers. Thus, the exact locations where they were collected could not be determined. Conditions on this date were overcast and windy with intermittent light rains. Other adult

Odonata collected or observed on this date in the same general area were tule bluet (*E. carunculatum* Morse), familiar bluet (*E. civile* (Hagen), Hagen's bluet, eastern forktail, northern spreadwing (*Lestes disjunctus* Selys), sedge sprite, variable darner (*Aeshna interrupta* Walker), and white-faced meadowhawk. Subsequent searches for *E. clausum* larvae and exuviae at this site did not yield any specimens.

Although the exact breeding sites of *E. clausum* were not confirmed with larvae or exuviae at either site, the presence of a newly emerged teneral at Allouez Bay indicates that this species did breed in Wisconsin at that site in 2004. Large, open water habitats along the Lake Superior shoreline and its bays are consistent with published reports of *E. clausum* breeding at large, freshwater lakes with little vegetation at other locations. Further surveys should be conducted along additional shoreline areas of Lake Superior in Wisconsin to determine the status of *E. clausum* in the state.

ACKNOWLEDGMENTS

We thank the National Park Service for approving this study within the Apostle Islands National Lakeshore, and especially, J. Van Stappen for helping to select and access study sites. We thank S. Schram for transportation to Stockton and Michigan Islands. R. Besonen, J. Roth, S.Schram, and M. Seider provided able field assistance. We also thank J. Deragon, Tribal Chairman of the Red Cliff Band of Lake Superior Chippewa, for granting access to the Sand River fen through tribal land. This survey was supported by funds from the Wisconsin Department of Natural Resources.

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