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Assessment of lake environment using dragonfly assemblage
A case study at Lake Takkobu, Kushiro Marsh, northern Japan

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Abstract

A periodical census of mature dragonflies (Odonata) was conducted at 11 investigation sites along the shore of Lake Takkobu, Kushiro Marsh, Hokkaido in 2004, resulting in a record of 2,572 individuals of 18 species belonging to six families. Dragonfly abundance is analyzed in relation with the following five environmental factors: i.e., width of reed bed, water depth, coverage of aquatic macrophytes, ratios of gravels(≥2mm) and silt(≤0.075mm). The two-dimensional pattern in the dispositions of investigation sites observed on a detrended correspondence analysis (DCA) diagram of dragonflies broadly coincided with that of an actual pattern on the map, whereas this was not the case for that of a DCA diagram of the environmental factors. As the result of a canonical correspondence analysis (CCA) using both dragonfly and environmental data, the investigation sites were separated into four clusters: i.e., deep sites with rich aquatic macrophytes and wide reed beds; deep sites scarce in macrophytes; shallow sites with poor macrophytes and narrow reed beds; and shallower sites with an abundance of macrophytes. Based on the results of the CCA, most dragonfly species are selected as possible indicators of the environmental conditions of the lake: e.g., *Cercion calamorum* (Ris), *Enallagma circulatum* Selys and six other species as those preferring sites rich in aquatic macrophytes, *E. circulatum*, *Epitheca bimaculata sibirica* and five others as those favoring wider reed beds and deeper water; *Sympetrum striolatum imitoides* Bartenef, *Trigomphus melampus* (Selys) and three others as those preferring sites scarce in macrophytes; *Orthetrum albistylum speciosum* (Uhler) preferring the shallowest water with the fewest macrophytes and reed beds; and *T. melampus* and *Sympetrum croceolum* (Selys) favoring deeper water. Finally, some other factors that may

influence the microdistribution of dragonflies in the lake are discussed.

Key Words: Kushiro Marsh, eutrophication, Odonata, bioindicator

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