# Observations on the response of dragonflies to the British Columbia 2021 historic heat wave

**By Rassim Khelifa**

The heat wave that hit British Columbia at the end of June 2021 is historic and had tragic repercussions on humans and animals. The sudden increase in temperature caused the death of coastal fauna in low tides such as mussels, clams, sea stars, and snails. Reports on insect response to the heat wave are still lacking. Given their thermal sensitivity, it is expected that they show marked responses. Here, I report some of the remarkable behavioral and community changes I recorded during the heatwave after studying Vancouver dragonflies for two years (2020 and 2021). These observations likely reflect thermal effects.

Like all insects, dragonflies are ectotherms, which makes them good barometers of climate change. In British Columbia, there are a total of 87 species living in different types of habitats — running or standing waters, natural or artificial. I studied dragonflies in 20 experimental ponds (15×25 m) at the University of British Columbia (UBC) in 2020 and 2021. My work in 2020 was quite extensive. I made daily visits to the site from late May to September, which helped me to have good knowledge of which species live there and how they commonly behave. I documented 17 species (12 dragonflies and five damselflies), including *Anax junius* (Common Green Darner), *Rhionaeschna multicolor* (Blue-eyed Darner), *Aeshna interrupta* (Variable Darner), *Libellula forensis* (Eight-spotted Skimmer), *Libellula quadrimaculata* (Four-spotted Skimmer), *Libellula julia* (Chalk-fronted Corporal), *Sympetrum illotum* (Cardinal Meadowhawk), *Sympetrum corruptum* (Variegated Meadowhawk), *Sympetrum vicinum* (Autumn Meadowhawk), *Pachydiplax longipennis* (Blue Dasher), *Erythemis collocata* (Western Pondhawk), *Pantala hymanaea* (Spot-winged Glider), *Enallagma carunculatum* (Tule Bluet), *Enallagma boreale* (Boreal Bluet), *Ischnura cervula* (Pacific Forktail), *Ischnura perparva* (Western Forktail), and *Lestes disjunctus* (Northern Spreadwing). These species are quite common in the Vancouver region. In the early season of 2021, I saw a similar dragonfly assemblage to that of 2020 with comparable abundances and behavior, a sort of déjà vu situation. Up until the heat wave in late June 2021, I observed a few unexpected changes in the composition and the behavior of the assemblage. First, the diversity increased. I saw two new species that I had not seen at the ponds or within a 5 km radius — *Libellula julia* and *Pantala hymenaea*. While the first species exists in lower British Columbia, the latter has rarely been observed in the entirety of British Columbia. In fact, this is the third historical record of the species in British Columbia. The first record of *P. hymenaea* goes back to

**Figure 1.** Variegated Meadowhawk (*Sympetrum corruptum*) copulation at the University of British Columbia, Vancouver, British Columbia.

**Figure 2.** Blue-eyed darner (*Rhionaeschna multicolor*) male harassing an ovipositing female at the University of British Columbia, Vancouver, British Columbia.

1986 by Robert A. Cannings who wrote that, "with climate warming, the species will be observed more often (Cannings 2002)." Besides that, I noticed an abrupt decline in the flight activity of the Blue-eyed Earner (*Rhionaeschna multicolor*) during mid-day; a species that used to stay active during the entire day. This species is probably the most abundant and one of the most visible dragonflies at the site (Khelifa 2021). So it was easily noticeable when it was not detected. Searching the surrounding bushes and trees, I found individuals perched in shaded areas during the hottest period of the day and they became active again later in the afternoon. Such behavior was not observed in 2020. Interestingly, I observed an increase in the frequency of bathing behavior in different species where individuals quickly drop on the water surface and splash their bodies a few times. This display allows dragonflies to cool down and drink water. Seeing this frequent bathing behavior reminded me of dragonflies in North Africa where temperatures are often extreme throughout the summer (Khelifa 2015). Additionally, there was an increase in the abundance of *Libellula quadrimaculata* and *Erythemis collocata* during the heatwave, probably due to the recent immigration from other sites.

All observations I made during the heatwave are likely indicative of thermal effects, showing noticeable repercussions on the distribution, ecology, and behavior of the dragonfly assemblage. With climate change, more frequent heat waves are projected to occur in the future and changes in the community composition and behavior of dragonflies are expected. We will likely see new dragonflies in Vancouver coming from the United States in the near future. A community science program will help scientists to track and predict future community dynamics.

**References**


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