Body Size and Stable Isotope Ratios of Adult Net-Spinning Caddisflies (*Hydropsyche oslari*) Reflect Growing Conditions for Aquatic Insects During Flow Experimentation on the Regulated Colorado River

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Hydropower operations at Glen Canyon Dam have contributed to low diversity and productivity of aquatic insect assemblages in the Colorado River. In 2018-2020 a steady flow experiment was tested to improve ecosystem health. During the three years of the experiment, caddisfly abundance in standardized light trapping was 400% higher and algae production increased by 58% compared to the six-year pre-experiment baseline. However, favorable growing conditions for aquatic insects are often associated with a syndrome of population level responses that includes both high abundance and large adult body size. To better understand the effects of the experiment on growing conditions for aquatic insects, we measured adult body size (length) and stable carbon isotope ratios (indicating feeding habits) of adult *Hydropsyche oslari* (net-spinning caddisflies) that were collected before and during the experiment. We predicted that years with high *H. oslari* abundance would be associated with larger female body size (indicating more favorable growing conditions) and more negative carbon isotope ratios (indicating greater consumption of high-quality algae resources) than years with low *H. oslari* abundance. We measured the length of 241 *H. oslari* females collected between 2015 and 2020. We only considered female *H. oslari* to eliminate variation in size associated with sexual dimorphism and because female size is an indicator of fecundity. We found that body size declined, and carbon stable isotope ratios became less negative as a function of day of year. Although there was significant variation in size and stable isotope ratios across years, length and isotope ratios for *H. oslari* were not consistently different in Bug Flow years compared to non-Bug Flow years. This investigation provides an example of how adaptive management can implement flow experimentation to improve growing conditions for insects and restore aquatic food web functionality in regulated rivers.

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