

Water velocity preferences of water striders (Hemiptera: Gerridae) in Dominica

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Abstract

Water striders (Hemiptera: Gerridae) are inhabitants of freshwater streams and pools around the world. These water sources typically provide gerrids with shelter from the sun and also from predators. This study was conducted to find the range of water surface velocity preferred by water striders across the island of Dominica. Data was collected from six sites. Water surface velocities recorded ranged from 0.05 m/s to 0.1234 m/s. The mean velocity was 0.0579 m/s. _____

Introduction

Gerridae is a family of semiaquatic hemipterans that spend much of their time at the water's surface. They are commonly referred to as “water striders” or “Jesus bugs” because they can seemingly “walk on water.” Hydrofuge hairs on the tarsal segments of gerrids repel water and keep them atop the surface of the water (Song 2016). Additional characteristic features associated with gerrids include a slender body, short front legs used for food acquisition, and elongate middle and hind legs used for locomotion. Water striders can exhibit apterous and winged phenotypes, and live gregariously. They also seem to indiscriminately inhabit calm freshwater streams and pools that are somewhat sheltered rather than fast-moving bodies of water, although there is one genus (*Halobates*) that is found in marine habitats (Song 2016). Water striders are opportunistic predators that feed on other small insects trapped on the water surface (Triplehorn 2005).

Water striders have been the focal point of many behavioral studies due to their notorious displays of aggression, especially males. They create ripples on the water surface to communicate with one another, and these interactions can quickly escalate to mounting one another in displays of dominance as well as mating struggles (Sih 2005).

Past student projects on the Island of Dominica have made note of gerrids as part of broader surveys for insects at a variety of locations. This study was designed to specifically concentrate on members of the Gerridae with regards to the water velocity of the environments in which they are commonly found throughout the island.

Materials and Methods

Water velocity was measured with a Geopacks Flowmeter (MFP51). Flowmeter readings were taken in pools and streams where gerrids were observed throughout the island. At each site, the propeller of the flowmeter was positioned so that it was as near the water's surface as possible while still being completely submerged. This method was used in order to accurately measure the velocity of the surface water on which the gerrids were found. A time period of 60 seconds was allocated before recording the flowmeter readings. The equation used to calculate water velocity in meters per second was $(V) \text{ m/s} = 0.000854C + 0.05$. C represents the number of counts per minute.

Results

Water striders were consistently found on still or very slow-moving water. Of the data points recorded from locations throughout the island (Figure 1), water striders were present in water flowing at a velocity less than one meter per second, with 24% of all recorded samples having been collected from small, isolated pools and puddles with a flow rate of 0.05 m/s. Figure 2 represents the relative proportions of water velocities (m/s) where water striders were found, and the frequency in which the recorded velocities occurred. Water surface velocities recorded ranged from 0.05 m/s to 0.1234 m/s. The mean velocity was 0.0579 m/s.

Discussion

Based on the data collected during this study, the gerrids investigated on the island of Dominica appear to prefer still or very slow water. The fastest recorded water surface velocity was found to be 0.1234 m/s, but this was inconsistent with the trends of the other data collected and is likely the result of the insects maneuvering over the surface of faster water to avoid presumed predation or disturbance when they were approached. It is possible that gerrids prefer calm water surfaces because still water is most conducive for creating distinct ripple patterns on the water when sending warnings to approaching male striders, or as part of mating behavior. Since Gerrids are predators, calm water may also be a key factor for food attainment by identifying struggling insects on the water surface. If resource conditions are not ideal, water striders will migrate to alternate locations where there is less conflict with resource attainment. During the duration of this study, there were several days of heavy rainfall. It became notably harder to find Gerridae during and soon after rainfall, which could be because they dispersed into surrounding vegetation for shelter.

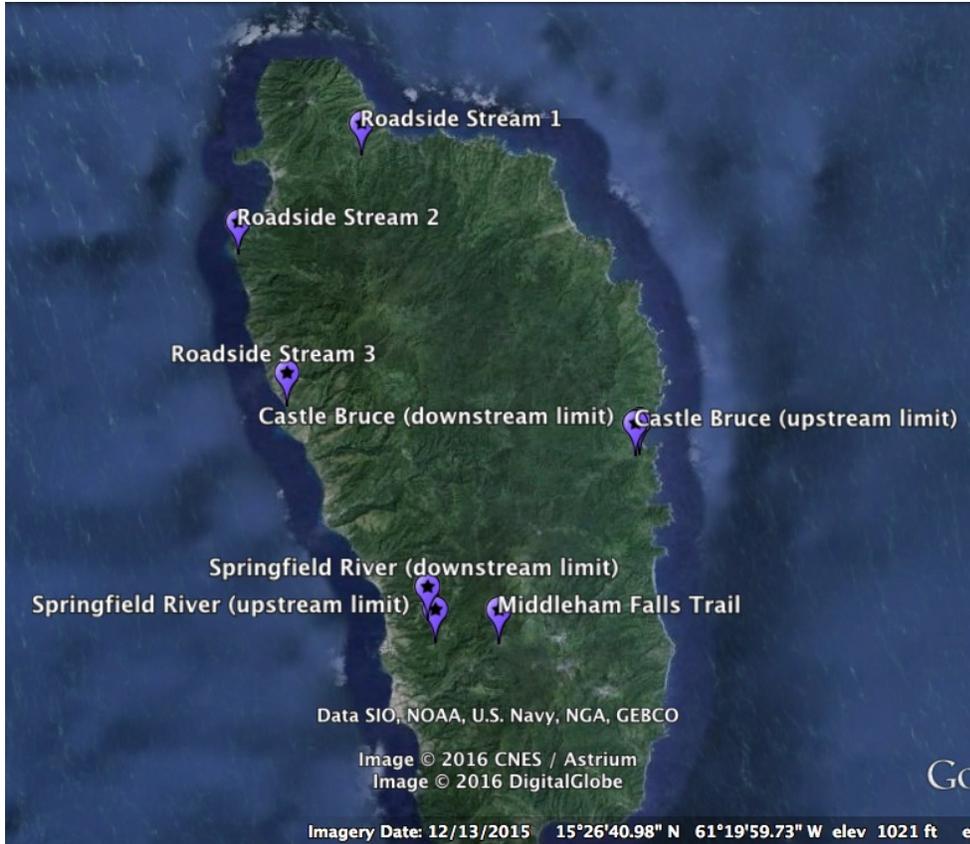


Figure 1. Map of Dominica showing the location of the eight study sites visited during this study.

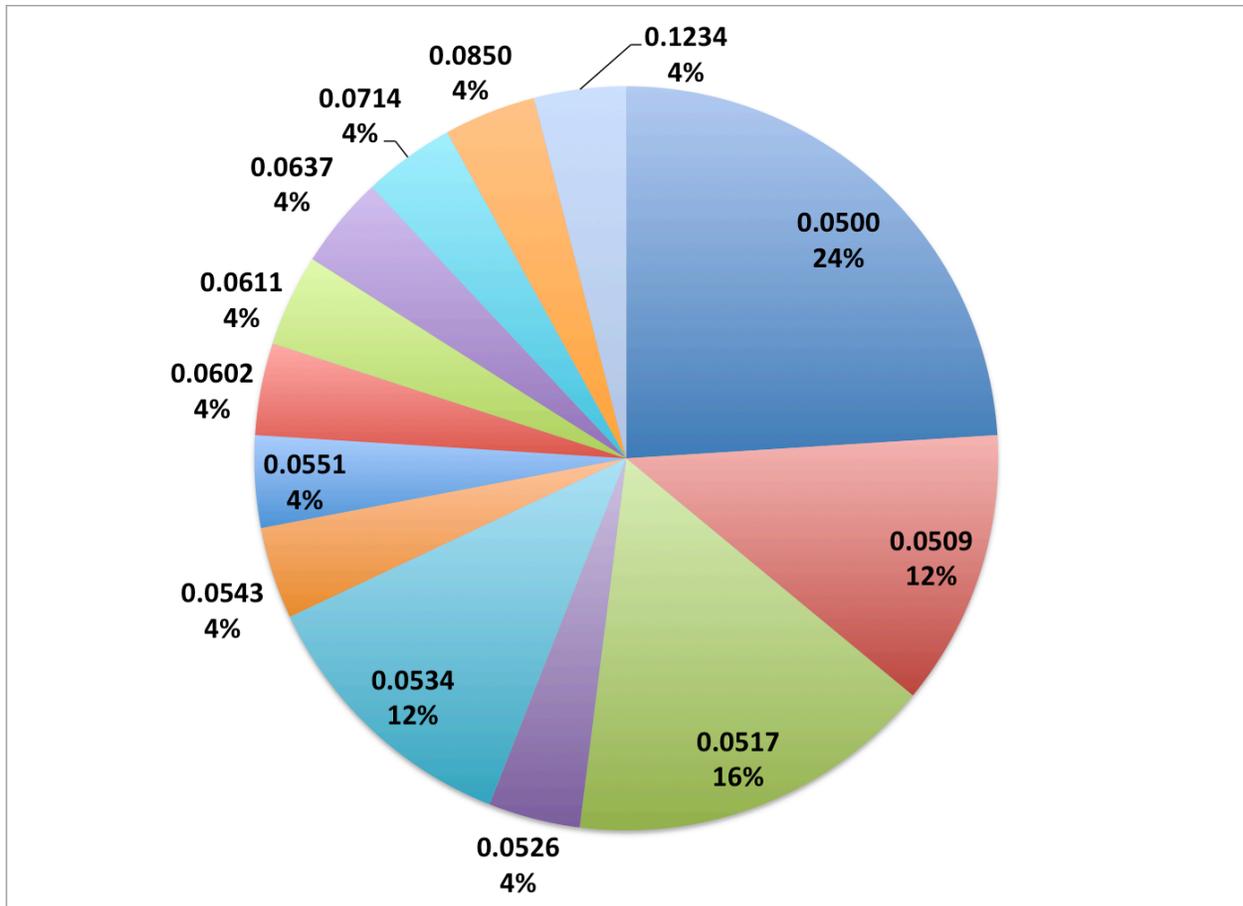


Figure 2. Pie chart depicting the relative proportions (given as percentages) of the all water velocities (m/s) recorded throughout the study

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