Freezing Susceptibility of Two Chironomidae Taxa Larvae from Farmington Bay Wetlands Influenced by North Davis Sewer District Effluent

Preliminary Findings

Report Submitted to

North Davis Sewer District and Wasatch Front Water Quality Council

by

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Objective

This experiment was designed to determine if two of the most important secondary producers in the Farmington Bay sheetflow wetland that are dominated by North Davis Sewer District outfall, *Chironomus* sp. and *Tanypus* sp. (Family Chironomidae) larvae could survive freezing and thawing conditions. In winter months, a layer of ice can form on the surface of the wetland water and may penetrate into the sediments depending on temperatures, water depth, and flow rates where larvae reside and actively feed.

This experiment was prepared in conjunction with the sampling plan created by David Richards, Ph.D. and Theron Miller, Ph.D. (2020 SAP Monitoring Ecological Health Farmington Bay and Ogden Spur, Great Salt Lake).

Methods

A benthic invertebrate sediment sample was collected on 22 January 2021 within the boundary of site 4 of the sheet flow wetlands of Farmington Bay dominated by the North Davis Sewer District (NDSD) effluent. The sediment sample was collected after removing a layer of ice above the open water and sediment surface. Only vibrant *Chironomus sp*. larvae (n=99) and *Tanypus* sp. larvae (n=33) were selected and used in the experiment. Larvae were then blotted dry and separated into 3 vials (Chironomus *sp*. N=33 and Tanypodinae n=11) and labeled experiment 1, experiment 2 and experiment 3. The vials were then frozen and removed at 22, 72 and 120 hours, respectively. Experimental samples were then placed in 1 quart of refrigerated filtered water from the State Canal below the SDSD South Plant. The sample was then left at room temperature(≈24°C) for 2 hours before examination. Larvae were then examined under a dissecting microscope for vitality (moribund/morbidity) and body length measures for size class estimates.

Results

No larval movement (100 % morbidity/mortality) was observed for any of the treatments during the 2-hour observation periods. This indicates that larvae of these two ecosystem important chironomid taxa cannot survive freezing and thawing conditions longer than 22 hours. Size class frequencies of the two taxa are presented in Figure 1.

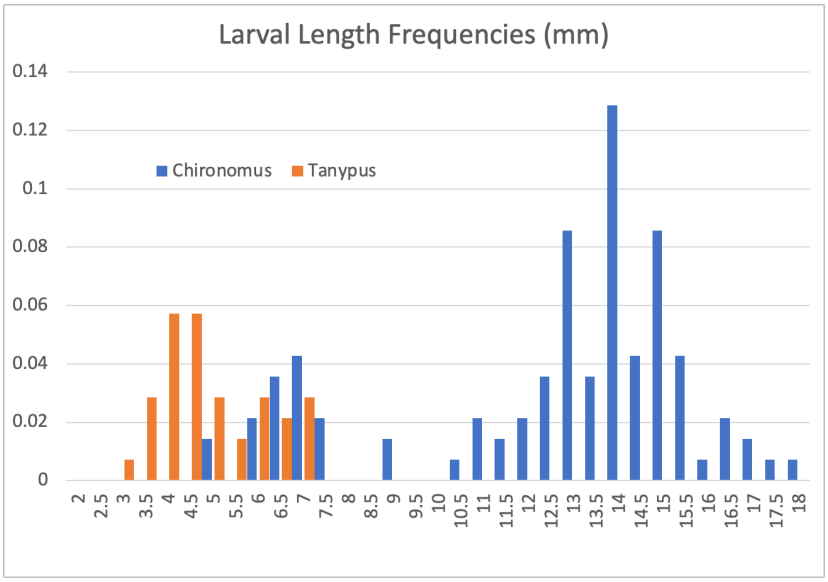

Figure 1. Larval length frequencies Chironomus sp. and Tanypus sp. (Family Chironomidae) collected from Farmington Bay wetlands 22 January 2021.

Discussion

This is the first experiment that we know of that determined that ecosystem important chironomid larvae cannot survive freezing for extended durations in Farmington Bay wetlands. This has important implications for understanding how these wetlands function, including chironomid population dynamics within the food web and as major food resources for migratory shorebirds and waterfowl. It also is an important component in the development of food web models as a scientific tool for managing these internationally important wetlands. Additional freezing experiments will be conducted at lower durations to determine the minimum freezing tolerance times of these taxa, as well as experiments to determine desiccation survivability.