Introduction: During a previous project PhD Candidate Christopher Kemp created 18 (6 treatments x 2-3 replicates) mesocosms (each of 1,000 cubic liters in size) for the purpose of quantifying the differences in growth of larval walleye at different zooplankton densities in Sandusky Bay, Ohio. Densities of zooplankton in the mesocosms consisted of 6 treatments created by pumping water through a zooplankton net (80 mesh size). The X treatment (Fig. 1) was created by filling mesocosms with unfiltered lake water, this represented the ambient zooplankton density (X) in Lake Erie during the 2019 spawning season. The other 5 treatments were created by filtering a proportion of the time required to fill the X treatment: X*5, X*0.5, X*0.25, X*0.1, X*0 (control; all water filtered). Three trials using the above design were conducted with larval Walleye beginning of three size classes (small = ~ 11 - 13 mm, medium = ~ 15 - 18 mm and large = ~ 21 - 25 mm). Walleye were placed in the mesocosms and allowed to feed on zooplankton for 3 days, at which time they were removed from the mesocosms and preserved in 70% ethanol. Replicate zooplankton samples were taken prior to addition of larval Walleye to the mesocosms and after the larvae were removed. Beginning and final Zooplankton biomass was quantified following the 100 species method (Mack et al., 2012). While Mr. Kemp has quantified larval fish growth using otolith incremental analyses (not explained here), I compared the actual diets and prey consumption at the end of the 3-day experiments.

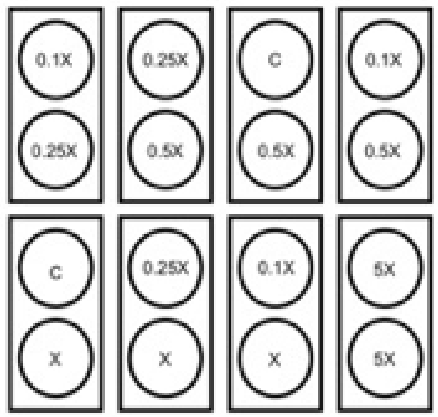

Figure 1. Mesocosm design in Sandusky Bay, Ohio to determine effects of zooplankton density on larval Walleye growth. Each mesocosm held $1m^3$ of water. '0.5X' indicates that half the water used to fill the mesocosm was filtered to remove 50% of the ambient zooplankton, where 'X' indicates ambient zooplankton densities. 'C' indicates a control treatment, where all zooplankton were filtered and removed. Note that only two replicate mesocosms were sampled for the control (C) and 5X conditions to optimize statistical design.

Procedure: Preserved larvae harvested at the end of each experiment were measured to total length (TL mm). The entire gut of the larvae was extracted from behind the pectoral fins to the anus under a dissecting microscope. Diet items were quantified under a dissecting microscope and measured (for the purpose of conversion to biomass following Culver et al., (1985). These data were then analyzed to assess the relationship between available zooplankton biomass (in mesocosms) and biomass consumed.

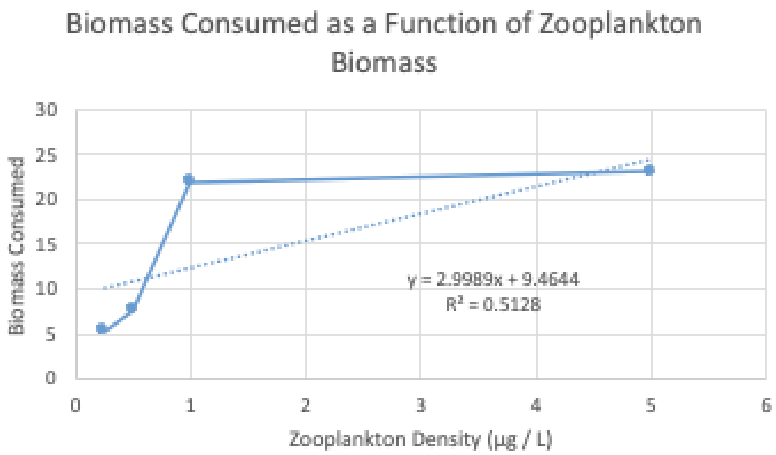

Figure 1. The Functional Response: Biomass consumed as a function of zooplankton biomass in mesocosms

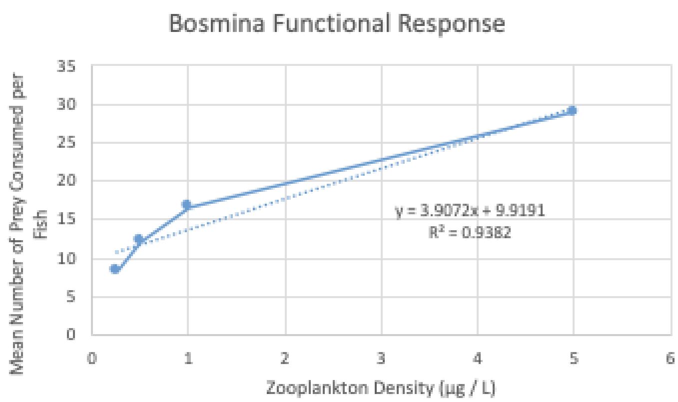

Figure 2. Walleye larvae consumption of Bosmina as a function of zooplankton biomass

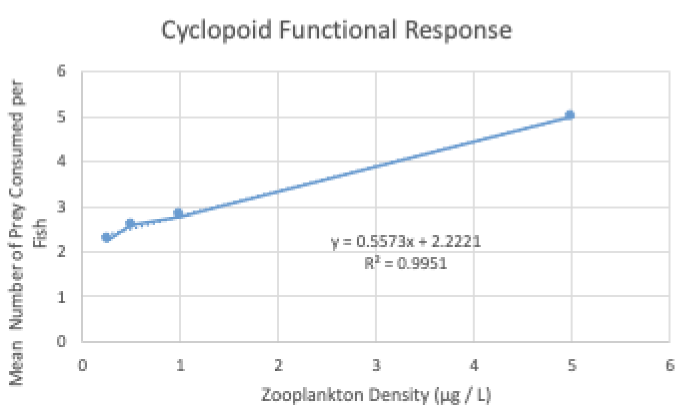

Figure 3. Walleye larvae consumption of cyclopoid copepods as a function of zooplankton biomass

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