Identifying Photosynthetic Microeukaryotes and Cyanobacteria in the Diet of Tilapia in the ’Alekoko Fishpond Using eDNA

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Tilapia are held responsible for the localized decline of economically important native fish species in the ‘Alekoko Fishpond, namely the Striped Mullet known as the ‘ama‘ama. This novel research aims to understand the photosynthetic microeukaryotes and cyanobacteria contents of the Tilapia’s diet— baseline data of the fishpond that the restoration organization, Malama Hule’ia, currently does not have. Cutting-edge eDNA metabarcoding and Tilapia fecal samples pinpointed specific species, concentrations, and biodiversity of photosynthetic microeukaryotes in the Tilapia diet. The relative abundance survey revealed that Oreochromis Aureus and Sarotherodon Melanotheron— both sampled near the Makaha— predominantly consume the diatom Cyclotella. The O. Aureus exhibits a diet comprising a diverse range of phytoplankton with a Cyclotella concentration of 34%, whereas the S. Melanotheron’s diet reveals a higher Cyclotella abundance at 65% with a reduced variety of microeukaryotes in comparison. Furthermore, the O. Aureus' diet exhibits a unique presence of 0.95% Cryptomonas (algae), while S. Melanotheron's diet features a distinctive presence of 0.4% Chaetoceros (diatom). These findings suggest potential phytoplankton blooms in the fishpond, prompting inquiries into potential dietary preferences among tilapia species. My goal is to guide Malama Hule’ia in the direction of microbial understanding— of both its food web system, photosynthetic microeukaryotic diversity, and methods to cultivate (and eradicate) certain phytoplankton to decrease the population of Tilapia in the fishpond to shed light on the unknown information regarding the diet of these invasive fish— a step towards restoring the fishpond’s microbial health and native ecological balance between fish species.