2020 DELTA SCIENCE FELLOW FINAL REPORT

Chelsea Lam

Doctoral Fellow University of California, Davis

Focus Phytoplankton and cyanobacteria growth and response to stressors

Award $149,342

Research Mentor
Dr. Swee J. Teh, UC Davis

Community Mentors
Dr. P.W. Lehman, California Department of Water Resources

The effects of herbicides and nitrogen species on phytoplankton and cyanobacteria growth and health

Pesticide and nutrient inputs from human activities are present in the Sacramento-San Joaquin Bay-Delta (Bay-Delta), but the combined impact of these stressors on algae is not well known. Lam's research examined the impacts of herbicides and nutrients on the growth and stress responses of phytoplankton and cyanobacteria in the Bay-Delta. The algae in the Bay-Delta region are diverse, as are their ecological effects. Toxin-producing cyanobacteria form hazardous algal blooms. Meanwhile, benthic diatoms and green algae make up the bulk of the aquatic food web. Contaminants and herbicides can cause changes in algae cellular health that may impact population growth. Understanding algal sub-lethal stress responses will improve scientific understanding of stressors on the Bay-Delta food web and algae bloom formation.

Research Conclusions

The The research team set out to understand how sensitive the algae cyanobacteria, green algae and diatoms are to the herbicides diuron, fluridone, hexazinone and simazine, which are frequently detected in the Bay-Delta. The team found algal responses to the different herbicides were variable. While there did not appear to be any trends in the data indicating a specific algae to be more or less sensitive, all demonstrated varying sensitivities to the herbicides. These results have important implications for management of the Bay-Delta region, particularly regarding invasive aquatic weed control. Increased herbicide doses do not always elicit an increased negative algae response, and in some cases, higher herbicide concentrations can produce increased growth.