Monitoring Mosquito Larvae Population Density in the Ballona Wetlands Freshwater Marsh
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Abstract
Mosquitoes play an important role in wetland ecosystems. Their larvae feed on algae and plankton, and also provide a valuable food source for migrating bird species. However, adult mosquitoes can be a public health concern due to their possible transmittance of vector-borne diseases. The importance of protecting both the ecosystems used by mosquitoes and public health has prompted the monitoring of mosquito populations in the Ballona Wetlands. This research aims to investigate and understand how the freshwater marsh supports the early life history stages of mosquitoes, and what role the Ballona Wetlands play in mosquito population dynamics in west Los Angeles. The work presented here is the first phase: a pilot study that tests the utility of field-based surface water sampling methods to quantify the abundance and diversity of mosquito larvae in the freshwater marsh. This experimental study will provide temporal data of the appearance of mosquito larvae and pupae, numbers, and diversity in the freshwater marsh during the spring and summer, to better understand mosquito species in relation to public health.

Introduction
Constructed wetlands like the Ballona freshwater marsh function as effective water filtration systems and wildlife habitats while simultaneously harboring breeding mosquito populations, which increases the risks of vector-borne pathogenic and viral infections (Knight et al. 2003). In order to better understand mosquito species in relation to public health, a more complete assessment of mosquito community abundance, populations, and temporal changes is necessary (Crocker et al. 2017). In Southern California, mosquito season typically begins in early March and lasts until late September. The primary aim of this pilot study is to monitor mosquito larvae abundance at specific locations in the Ballona Wetlands freshwater marsh by forming a reliable research methodology for sampling and evaluating larval densities.

Methods
Sampling: Peristaltic pumps were used to pump water from sampling sites in the freshwater marsh through a net to capture organisms at the freshwater marsh sampling sites. Peristaltic pumps were calibrated before sampling and ran at a rate of 85 gallons/hour. The water was pumped through a 120um mesh net and the content of the water were collected in a connected container. Peristaltic pumps were powered by a portable generator and ran for 1 hour at each site per week.

Larvae counting: The contents of each 85 gallon water sample collected was concentrated down to a single 400 mL volume for counting. Water samples were assessed by examining 25 mL subsamples in petri dishes. Mosquito larvae were identified under a microscope and by their distinctive physical appearance and movement and subsequently counted and recorded. Other organisms within the samples were recorded by their phylum classifications.

Results
A total of 6 mosquito larvae were recorded during sampling, found in the last two weeks of February 2018. Only the inlet site reported mosquito larvae. The larvae that were sampled were of different sizes, indicating different molt/growth stages. No egg rafts or pupae were found in the samples.

Discussion
Implications: Preliminary data and results indicate that mosquitoes will breed year round in the freshwater marsh, so long as the temperature is at least 50 F.

Daytime and nighttime temperature fluctuations could be stabilizing breeding mosquito populations in the freshwater marsh during the colder fall and winter seasons.

Future Work:
Continue sampling and counting methodology through the spring and summer seasons, hypothesizing that samples will contain increasing numbers of larval progressing into mosquito breeding season.

Literature Cited

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