

WATER EXCHANGE AND CIRCULATION IN HE'EIA FISHPOND:
BUILDING BLOCKS FOR ESTABLISHING A WATER BUDGET

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ABSTRACT

Understanding the physical environment of He'eia Fishpond will further our knowledge of the dynamic biochemical and physical relationships in Hawaiian coastal estuarine ecosystems. This study quantified tidal and fluvial water exchange in He'eia Fishpond (HFP) by developing a series of rating curves for each mākāhā on the fishpond wall, as well as measured temperature and salinity in the fishpond's interior across twelve monthly sampling intervals in 2014. These data are used to determine the flux of water within the pond at any tidal phase and to infer circulation patterns within HFP. The flux rates can be further utilized along with a bathymetric map of HFP to estimate fishpond water residence time and establish a water budget. Two acoustic Doppler profilers were used to collect flow measurements during spring tides, and the water volume flux was calculated for each sluice gate, or mākāhā, on the fishpond wall and were plotted against the water level to produce a rating curve for each tidal state (flood and ebb). The northeast region of the fishpond experiences the most water exchange (~80%) between Kane'ohe Bay and He'eia Stream, suggesting tidally-driven ocean water exchange is the primary driver of water circulation in HFP under non-storm conditions.

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