Response of a Reef to Sediment Overload: Moloka'i, Hawai'i

Michael Field*, Michael Bothner, Paul Jokiel, and Andrea Ogston.

*US Geological Survey, Pacific Science Center, University of California, Santa Cruz, CA, 95064 email: mfield@usgs.gov

The coral reef off southern Moloka'i hosts some of the most continuous and densest live coral in the Hawaiian chain. The reef consists of a broad (1 km) and shallow (1-1.5 m) reef flat succeeded seaward by extensive spur and groove development to depths of 25 m. Erosion rates of the adjacent volcano terrain appear to have dramatically increased due to deforestation, agriculture, and overgrazing; terrigenous mud is now accumulating on the reef flat and along the shoreline, and corals in a number of locations are degraded and necrotic. Our study focuses on the processes of mud transport and accumulation on the reef, and the impact on coral viability. Excessive sedimentation from land run-off and past reef dredging events appear to have a substantial impact on coral health that is superimposed on other stresses from natural processes (e.g. large waves) and anthropogenic activities (e.g. fishing, anchors). Corals are stressed and impoverished in several locations on the inner reef and fore reef (less than 50 % live coral coverage at 10 m depth, compared to ~90 % elsewhere). Their status reflects both excessively large sediment loads and also entrapment of fine sediment on the reef flat. The inner reef flat is typically mantled with 5-15 cm of mud, and no live coral is present. Sensors on an instrumented tripod show that mud is resuspended by trade winds, and that net transport is to the west and offshore towards the zone of impoverished coral. Pb 210, Cs137, and trace metal analysis are being conducted on sediment cores from expected depositional sites in the reef platform to investigate changes in sediment input resulting from major storms, land use and coastal development.