



NONPOINT SOURCE SUCCESS STORY

Hawaii

Watershed Restoration Projects Improve He'eia Stream

Waterbody Improved

Streambank erosion and stormwater runoff within the He'eia watershed contributed to nutrient and sediment impairment in the He'eia Stream. In 2004, Hawaii placed He'eia Stream on the state's Clean Water Act (CWA) Section 303(d) List of Impaired Waters for failing to meet the nitrate+nitrite (NO₃+NO₂) Wet Season criteria. He'eia Stream was also listed as impaired for turbidity and total phosphorus (TP) in 2006 and 2014, respectively, during the Wet Season and in 2006 for total nitrogen (TN) during the Dry Season. Restoration efforts and implementation of best management practices within the watershed reduced the volume of runoff reaching He'eia Stream, resulting in improved water quality. He'eia Stream was subsequently removed from the impaired waters list in 2016 for TP and turbidity and in 2018 for NO₃+NO₂. He'eia Stream is currently attaining all uses for the Wet Season.

Problem

He'eia Stream is in the 2,843-acre He'eia subwatershed of the Kaneohe Watershed on the windward side of the island of Oahu. The approximately 7.4 miles of He'eia Stream and its tributaries flow from the forested Ko'olau Mountains, through residential development and the He'eia Wetland, and eventually into Kaneohe Bay (Figure 1). A portion of the stream also flows into the He'eia fishpond, one of many culturally significant archaeological sites within the watershed.

Severe erosion and stormwater runoff were identified as key issues contributing to the impairments in He'eia Stream. Invasive and non-native vegetation, such as Java Plum and Red Mangrove, in He'eia Stream riparian areas reduced important soil stabilizing ground cover, resulting in significant erosion during rain events. Erosion from upland hillside scarring contributed sediment loads to He'eia Stream during rain events. Nitrate pollution was largely attributed to residential use of fertilizers and pesticides in developed areas where impervious surfaces also increased stormwater runoff entering into He'eia Stream. Past agricultural practices in the watershed were also identified as potential sources of impairment.

The State of Hawai'i has specific inland water criteria depending on the time of year. Wet Season criteria apply November 1 to April 30; Dry Season criteria apply from May 1 to October 31. The Hawai'i

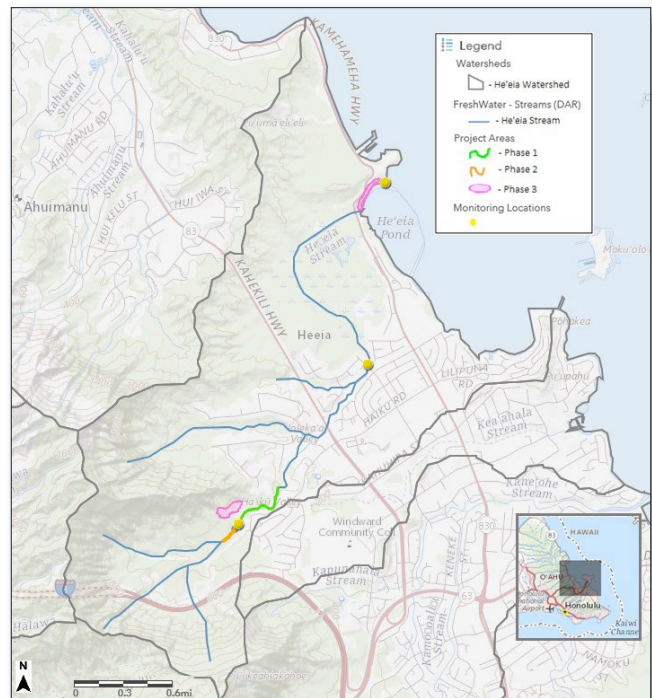


Figure 1. He'eia Stream is on the island of O'ahu.

Department of Health (DOH) determined that He'eia Stream was not meeting state criteria for nutrients and turbidity. The entire He'eia Stream network was added to the 2004 CWA Section 303(d) List of Impaired Waters for not meeting the Wet Season criteria for NO₃+NO₂. Subsequent impairments were included on

the 2006 list of impaired waters for turbidity during the Wet Season and for TN and NO₃+NO₂ during the Dry Season. TP was added to the impairment list in 2014 for not meeting Wet Season criteria.

Story Highlights

The DOH Polluted Runoff Control Program (PRCP) provided CWA section 319(h) grant funds to the community nonprofit Hui o Ko'olaupoko (HoK) to implement the Ko'olaupoko Watershed Restoration Action Strategy plan. This plan identifies the erosion control management measures in riparian and upland hillside scarring areas and the education and outreach efforts that are necessary to reduce pollutant sources and improve He'eia Stream water quality. HoK managed three phases of watershed restoration projects in 2009–2017, using thousands of volunteers and partnering with community organizations to complete riparian restoration and other projects (Figure 2).

Phases 1 and 2 concentrated on riparian restoration in the upper reaches of He'eia Stream. HoK and its volunteers restored over 4,000 linear feet of streambank by removing non-native invasive plants and replanting with over 20,000 native plants, sedges and trees (such as Hala, Mamaki, 'Ohi'a, Pu'uka'a and Uki). Over 1,000 feet of coir logs were also installed along streambanks to assist in erosion control. Additionally, four containers of trash along He'eia Stream were removed.

Phase 3 focused on riparian restoration near He'eia Stream mouth and erosion control in the upland hillside area. Four acres of invasive plants were removed near He'eia Stream mouth and replanted with over 2,000 native plants of 25 species. An upland area erosion scar was addressed by installing erosion control matting and native plants. HoK also constructed sediment basins between the erosion scar and He'eia Stream to capture additional sediment runoff.

HoK volunteers provided community outreach and education through community work days, hosting homeowner workshops focusing on personal fertilizer and pesticide use, direct mailing to homeowners, and curriculum development for classroom education. Additional erosion control and restoration efforts by other groups are currently ongoing in the lower riparian, wetland and fishpond areas.



Figure 2. Riparian restoration efforts removed invasive species and improved water quality of He'eia Stream.

Results

DOH PRCP collected water quality samples from three locations within He'eia Stream to assist in project effectiveness assessments. Samples were collected in 2013–2017 and were assessed for the 2016 and 2018 CWA Section 305(b) and 303(d) Integrated Reports. Data showed compliance with the following Wet Season state criteria: turbidity (< 5 Nephelometric Turbidity Units), NO₃+NO₂ (< 70 micrograms per liter [$\mu\text{g/L}$]), TN (< 250 $\mu\text{g/L}$) and TP (< 50 $\mu\text{g/L}$). Because water quality samples met the Wet Season criteria, Hawai'i removed He'eia Stream from the impaired waters list for multiple pollutants, including TP and turbidity in 2016 and NO₃+NO₂ in 2018. By 2018, all uses were attained during the Wet Season. Additional implementation is needed to address the remaining Dry Season impairments.

Partners and Funding

DOH PRCP awarded HoK a total of \$1,154,442 in CWA section 319(h) project grant funds to implement three phases of riparian restoration and outreach management measures between 2009 and 2017. HoK and community volunteers leveraged approximately \$737,000 in matching resources. Other project partners include native plant nursery Hui Ku Maoli Ola, Hawai'i Pacific University, nonprofit childcare organization Kama'aina Kids, and Papahana Kuaola, a Hawaiian educational and environmental community group.



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