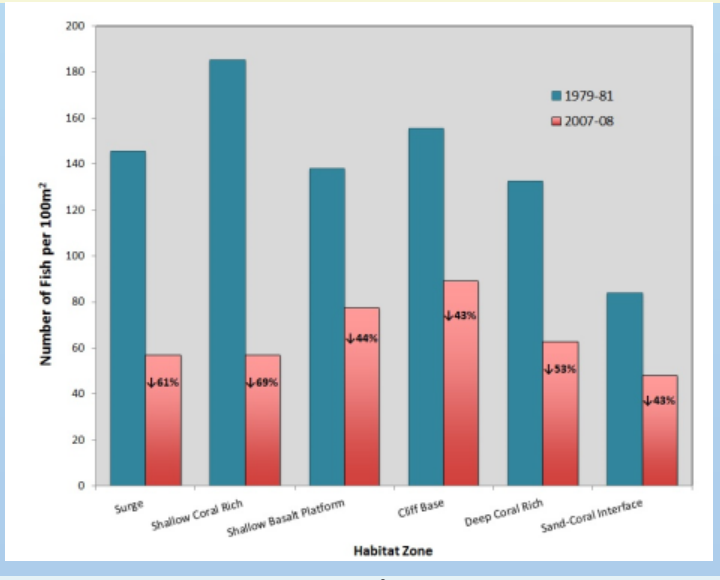
South Kohala Reefs in Dire Straits

Hawaii Division of Aquatic Resources

A long-term study at two South Kohala sites on the Island of Hawai′i has found drastic declines in reef fish abundance over the past quarter century and a marked deterioration of the area's coral reef habitat.

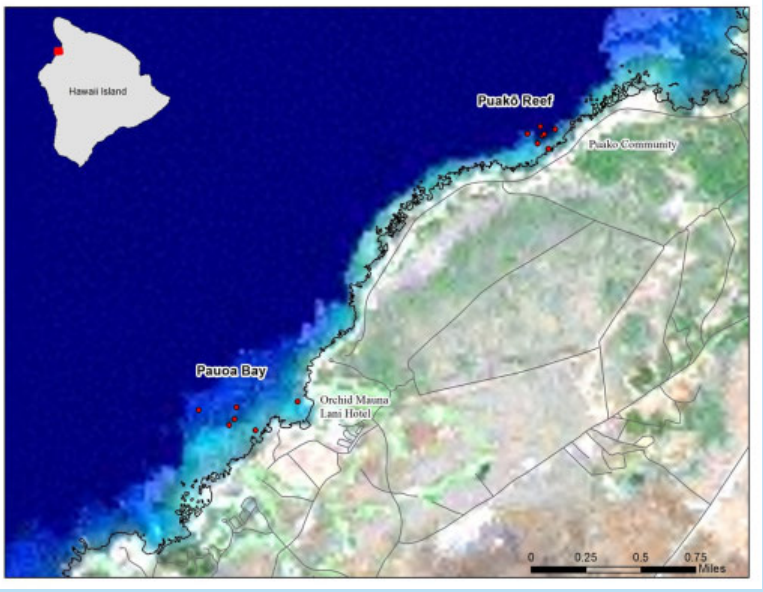
One of the study sites is Puakō which has been a Fishery Management Area (FMA) since 1985. The FMA prohibits the use of all nets except thrownets. The other site is at Pauoa Bay which became a Fish Replenishment Area (FRA) in 2000. The collecting of aquarium fishes is prohibited within the FRA. The FRA was also closed to all lay net fishing in 2005.
Prior to the establishment of the Puako FMA, a comprehensive study of the area's coastal resources, fisheries and fisheries ecology was conducted from 1979-1981 by the University of Hawai′i's Cooperative Fisheries Research Unit. They surveyed 6 transects at each site representing different coral reef habitats. During 2007-2008, Hawai′i Division of Aquatic Resources personnel re-surveyed each of the original 12 transects a total of 12 times. Data from each study was utilized to examine long-term changes in the coral communities at Puakō and Pauoa.



Total abundance of fishes per 100m^2 in six different habitat types at Puakō. Blue bars represent data from the original study, red bars represent the recent re-surveys.

Decline in Abundance of Fishes at Pauoa

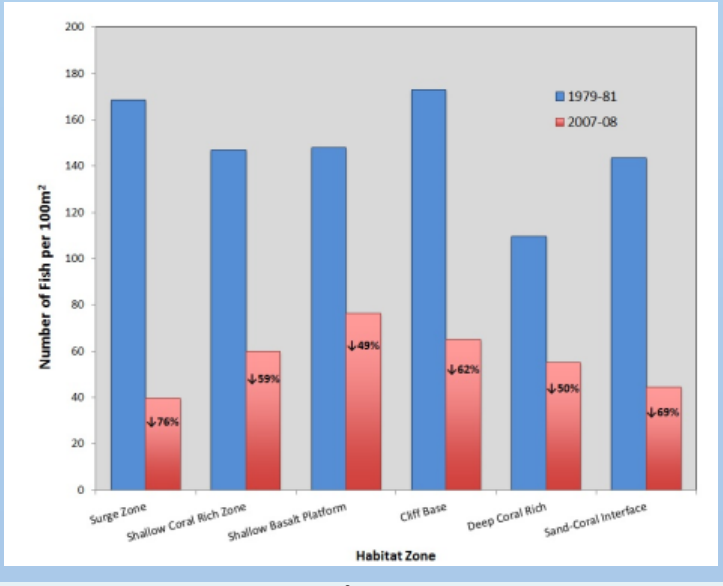
A similar, but slightly more pronounced downward trend was apparent at Pauoa. At this location, fish abundances declined between 49% - 76%. Of the 35 most abundant fish species again, 31 declined in abundance, ranging from 6% for the Bird Wrasse to 100% for the Threespot Chromis. Kole decreased by 71% and Mamo by 99%. Of the top 35 species, the only fishes that increased in abundance at Pauoa were Yellow Tang, the same two species of small damselfish and the Bullethead Parrotfish.



Location of Puakō and Pauoa study sites in South Kohala

Decline in Abundance of Fishes at Puakō

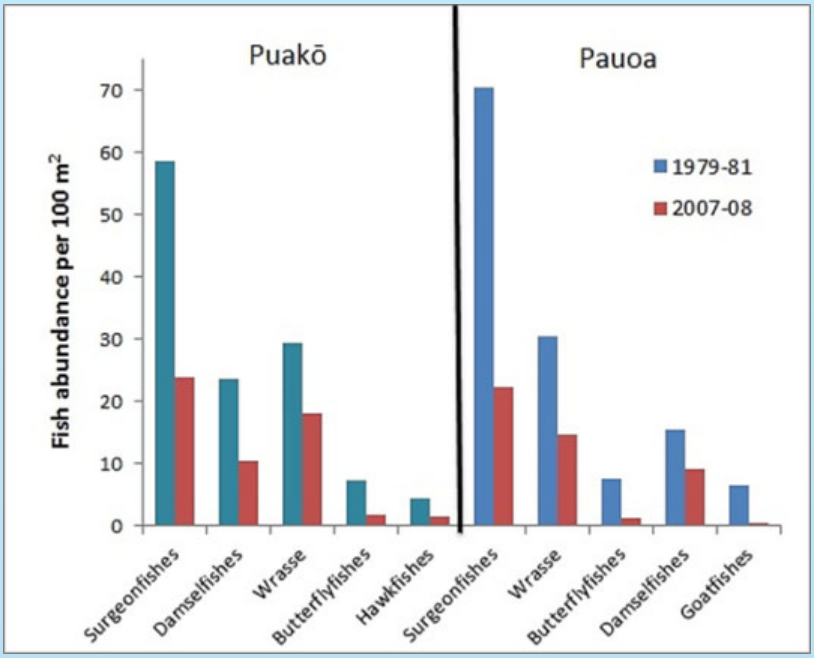
The total abundance of all species of fishes declined substantially (43% - 69%) on all transects at Puakō between the original and most recent surveys. Of the 35 most abundant reef fish species, comprising 92% of all fishes present in the initial surveys, 31 declined in abundance, ranging from a 9% decline of Yellow Tang to a 97% decline for Achilles Tang. Other notable declines were for Goldring Surgeonfish (Kole - 61%), Yellowstripe Goatfish (Weke′ā - 86%) and Hawaiian Sergeant (Mamo - 98%). The only fish species of the top 35 that increased in abundance at Puakō were two species of small damselfishes, the Belted Wrasse and the Black Triggerfish, the last by only 2%.

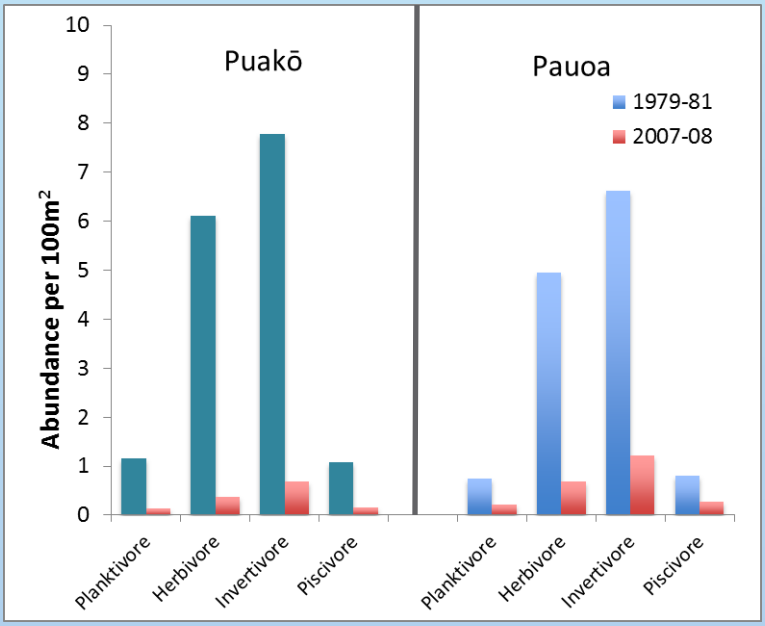


Total abundance of fishes per 100m^2 in six different habitat types at Pauoa. Blue bars represent data from the original study, red bars represent the recent re-surveys.

Abundance Trends by Fish Family

All of the top five most abundant fish families in the original study decreased in abundance at both Puakō and Pauoa. The declines ranged from 38% (wrasses at Puakō) to 90% (goatfishes at Pauoa). Declines of similar magnitude occurred at both sites. Nine of the top ten families, representing more than 97% of all fishes declined in abundance with only parrotfishes increasing - primarily due to an increase in the abundance of Bullethead Parrotfish. The widespread declines in families of fish not typically targeted either for food use or for the aquarium fishery suggest that other, more widespread factors are additionally contributing to the overall long term declines in fish abundances.





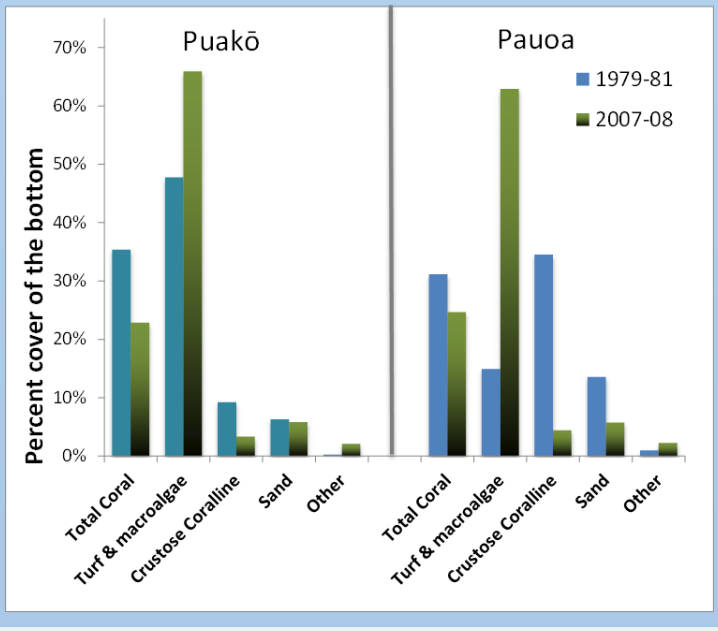
Abundance Trends by Trophic Group

The extensive long-term declines in fish abundance at both South Kohala sites were not limited only to fishes that eat a certain kind of food. All trophic categories of fishes decreased in abundance, ranging from a 66% decline of piscivores (fish eaters) at Pauoa to a 94% decrease in herbivores (limu eaters) at Puakō. Herbivores also decreased at Pauoa by 86%. Given the critical role that such herbivores play in maintaining a healthy coral reef ecosystem these decreases are likely to have profound implications for the ability of these stressed reefs to resist further loss and degradation as well as their ability to recover in the future.

Trends in Benthic Percent Cover

Coral cover decreased 35% at Puakō and 21% at Pauoa and crustose coralline algae decreased by 64% at Puakō, and 87% at Pauoa. These algae are critical components of coral reefs helping to build and stabilize reefs and inducing coral settlement. The loss of crustose coralline algae has huge implications for the potential regeneration of these coral reefs. Turf and macroalgal cover increased by 38% at Puakō, and a whopping 322% at Pauoa.

As noted in the original study the leeward coast of the Island of Hawai'i has some of the richest coral reefs and associated fish and invertebrate fauna in the Hawaiian Islands. Given the current trajectory of the coral reef communities at Puakō and Pahoa this is unlikely to be true for long if current stressors are not reduced.



For more information please contact William Walsh Ph.D @ Hawaii DAR Kona Office, (808) 327 6226 [email: darkona@hawaiiantel.net].