

Survey and Collection of Non-native Zoanthid at He'eia Boat Harbor and Kualoa Beach, O'ahu



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May 2, 2024

Field Report

Executive Summary

On April 9th, 2024 the Division of Aquatic Resources Aquatic Invasive Species Team (DAR AIS) received a report of a possible non-native zoanthid at Kualoa Beach. The AIS team contacted Gerald Crow, a zoanthid biologist, to help collect a specimen for identification. Team members examined the former zoanthid eradication site at He'eia Boat Harbor, where they discovered various colonies of what is believed to be *Terrazoanthus* sp. The colonies were observed growing on thick mats of *Gracilaria salicornia* and various marine debris, consistent with previous observations during eradication efforts in 2017. The AIS team proceeded to Kualoa Beach to investigate the reported zoanthid colony. Zoanthid colonies were observed growing on pavement and other hard rubble within a 10 m radius of the collection site, approximately 40 m from shore. The zoanthid was initially suspected to be *Parazoanthis gracilis* (Yellow Colony Polyp), but after closer inspection by Gerald Crow it resembled *Terrazoanthus* sp.. The species remains unidentified as preserved samples from both sites have been sent to Japan for identification. Additional surveys are needed at He'eia Boat Harbor and Kualoa Beach to get a full range of the zoanthid distributions.

Background

Terrazoanthus sp. is a relatively new genus of zoanthids first described in 2010 and found throughout North America, South America, Africa, and Japan (**Fig. 1**) (Reimer and Fujii 2010). Species in this genus can be identified by variances in the number of tentacles and types of nematocysts present in the pharynx. Additionally, this species of zoanthids is commonly found in the aquarium trade. Aquarium and hobbyist websites note that *Terrazoanthus* sp. are of average difficulty to rear, though they contain a harmful poison. Due to propagation difficulties, there is reportedly a relatively low supply of *Terrazoanthus* sp. circulating in the aquarium industry. Websites also mentioned that these zoanthids are often traded under the name “yellow polyps”, and that trade occurs mostly in Indonesia.

Parazoanthis gracilis is a zoanthid species present across the Indo-Pacific, including sightings in Japan, Indonesia, and Madagascar. According to WoRMS, *P. gracilis* is synonymous with *Hydrozoanthus gracilis*, but *Hydrozoanthus* sp. characteristically settles on hydrozoans (Reimer and Fujii 2010). *Parazoanthis gracilis* has also been described as having large dark-brown or yellow tentacles, with a dark brown inner coenenchyme while other *Parazoanthis* sp. are classified by a dark red scapus, and small yellow tentacles (Camillo et al. 2008). The discrepancies within *P. gracilis* descriptions by both experts and hobbyists indicate the lack of an accepted scientific classification for the species. Aquarium and hobbyist websites also note that *P. gracilis* is a beginner-friendly species to rear. This species does have a powerful sting and can be semi-aggressive towards other aquarium species. These characteristics indicate the potential for *P. gracilis* to impact organisms outside its native range.



Figure 1: Map of recorded locations of *Terrazoanthus* sp. throughout the world (GBIF).

Introduction

On April 9th, 2024, the DAR AIS team received a report concerning a potentially non-native zoanthid at Kualoa Beach. The initial reporter, Stanford Wong, believed the zoanthid was *P. gracilis*. The AIS team contacted Biologist Gerald Crow, who specializes in zoanthids, to help collect a specimen for identification. Biologist Gerald Crow recommended an initial survey at a previous zoanthid eradication site at He'eia Boat Harbor prior to surveying for the zoanthid reported at Kualoa Beach. In 2017, a non-native zoanthid identified as *Terrazoanthus* sp. was found in He'eia Boat Harbor, Kāne'ohe Bay, as a product of an aquarium release. This species looks similar to the zoanthid species reported at Kualoa Beach. Eradication efforts were taken to remove the species from He'eia Boat Harbor. On April 22nd 2024, the AIS team, with the help of Gerald Crow, surveyed the previous eradication site at He'eia Boat Harbor and discovered various colonies of what is believed to be *Terrazoanthus* sp. growing on thick mats of *G. salicornia* and various marine debris. Samples were collected for species identification confirmation and additional examination under fluorescence. The AIS team and Gerald Crow then conducted a brief survey at Kualoa Beach to locate the reported zoanthid colony. The zoanthids found and sampled at Kualoa Beach shared similar morphological characteristics with the potential *Terrazoanthus* sp. specimens collected from He'eia Boat Harbor. Samples from both collection sites were sent to Japan for professional identification, knowledge of which will be used to inform future surveys assessing the scope of the zoanthids range.

Field Operation & Results

On April 22, 2024, the DAR AIS team convened with Gerald Crow at He'eia Boat Harbor and briefly inspected the previous eradication site on the northwest side of the harbor. Team members discovered various colonies of what is believed to be *Terrazoanthus* sp.. Notably, these colonies were observed growing on thick mats of *G. salicornia*, consistent with previous observations made during the 2017 eradication efforts. Elizabeth Monaghan, a DAR AIS Aquatic Biologist, collected a zoanthid colony and placed it in formalin for future species identification (**Fig. 2**). An additional zoanthid sample was collected and placed in seawater for Gerald Crow to inspect in a lab under fluorescent light. These samples were gathered using a net from a depth of approximately 1 m. Photographs and GPS points were collected as well. Team members then proceeded to visually survey the adjacent vicinity to see if there were any other easily identifiable zoanthid colonies. Additional colonies were observed growing on *G. salicornia* and various marine debris including bottles, rocks, and a stuffed animal (**Fig. 2**).



Figure 2: Survey and collection of zoanthids at He'eia Boat Harbor. **A)** A map denoting the surveyed area at He'eia Boat Harbor. Yellow points represent zoanthid colonies that were observed. The orange box represents the area that was visually surveyed. The collection site of zoanthids is also noted. **B)** Elizabeth Monaghan, a DAR AIS Biologist, collecting a sample of the zoanthid from a thick bed of *Gracilaria salicornia*. **C)** A colony of zoanthids growing on a stuffed animal.

Following the collection of zoanthids at He'eia Boat Harbor, the AIS team, accompanied by Gerald Crow, surveyed Kualoa Beach for the reported zoanthid colony (**Fig. 3**). The DAR AIS team searched a 75 m stretch of reef 40 m out from shore, in water approximately half a meter deep at low tide (<0.5 m at 10:00 AM). The reported zoanthid colonies were located approximately 30 m from shore. Samples were collected using a net in less than half a meter of water by a DAR AIS Aquatic Biologist. It is important to note that zoanthid colonies were observed growing on pavement and other hard rubble substances within a 10 m radius of the collection site. Collected zoanthid samples were preserved in formalin for future species identification. Additionally, a sample was collected and placed in seawater for fluorescent examination by Gerald Crow. Photographs and a GPS point of the collection site were also acquired.

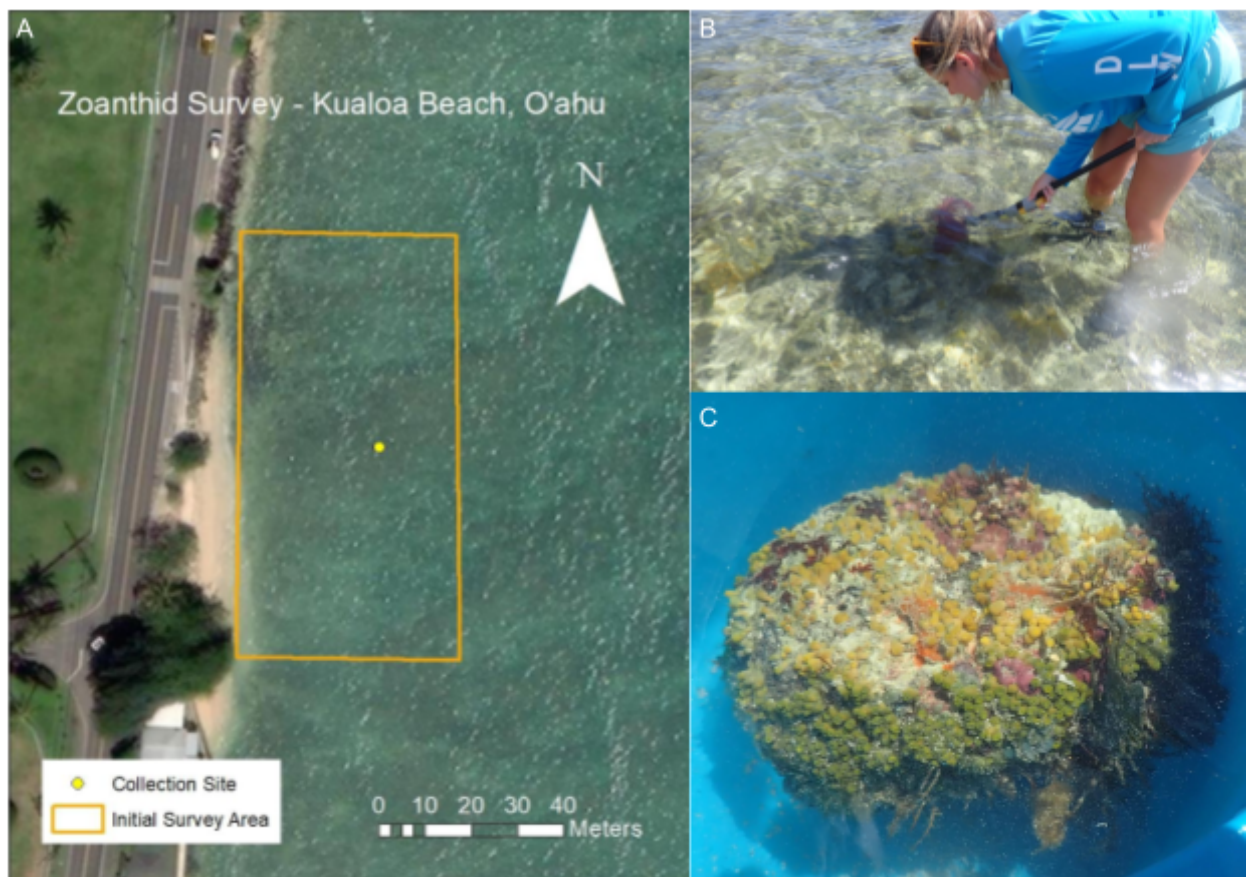


Figure 3: Survey and collection of zoanthids at Kualoa Beach. **A)** Surveyed area at Kualoa Beach. A yellow point represents the collection site of zoanthids. The orange box represents the initial survey area. **B)** DAR AIS team member, Ciara Branco, collecting a zoanthid sample with the net. **C)** A colony of zoanthids growing on a large rock.

Conclusion

On April 22, 2024 DAR AIS team members and Biologist Gerald Crow observed and collected non-native zoanthid colonies at He'eia Boat Harbor and Kualoa Beach. Results for the zoanthid species identification are pending, however, notable similarities between the unidentified zoanthid discovered at Kualoa Beach and the previously identified *Terrazoanthus* sp. from He'eia Boat Harbor have been observed (**Fig. 4**). Both exhibit a distinct yellow coloration, circular body morphology, tentacles of approximately equal length to their diameter, and a lighter yellow oral disk. Supporting Stanford Wong's initial identification, the reported zoanthid from Kualoa Beach closely resembles *P. gracilis*, a yellow-polyped species frequently sought after by reef aquarium hobbyists due to its vibrant and distinctive coloration. The zoanthids found at both He'eia Boat Harbor and Kualoa Beach may originate from the same source. This could be attributed to multiple aquarium dumps or potential transportation via ocean currents or biofouling, leading to the spread of the zoanthids from He'eia to Kualoa Beach.

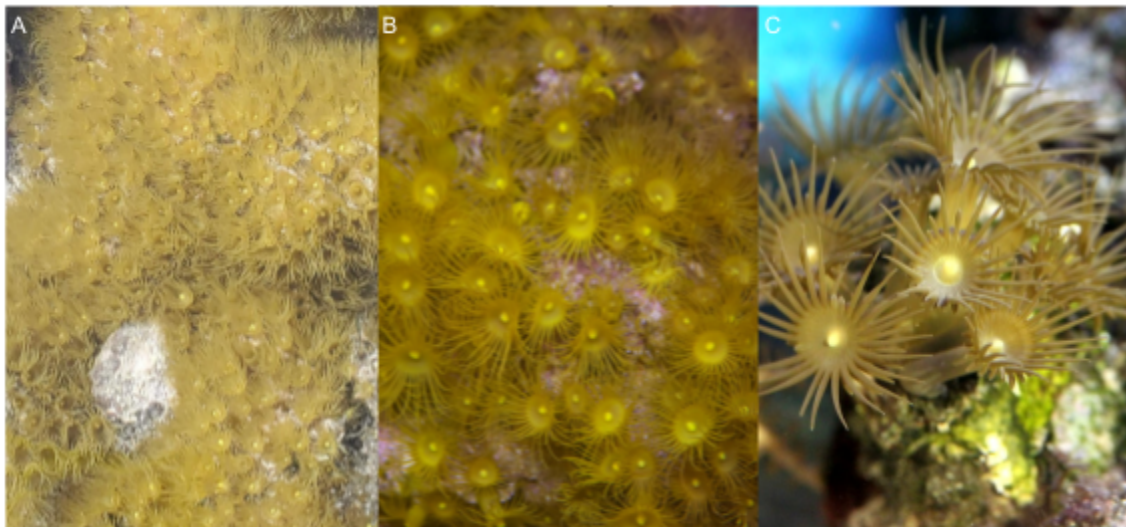


Figure 4: Photographs of various zoanthid colonies. **A)** Photograph of a zoanthid colony taken by Stanford Wong, from the initial report of the non-native yellow polyp zoanthid made to the DAR AIS team. **B)** Photograph of *Parazoanthus gracilis*, a zoanthid commonly found in the aquarium trade (Credits: La Ferme de Corail). **C)** Photograph of *Terrazoanthus* sp., previously eradicated from He'eia Boat Harbor (Credits: Mein Meerwasseraquarium).

Similarities in the increased nutrient density for He'eia Boat Harbor and Kualoa Beach support the possibility of a singular zoanthid species settling in both locations. According to a State of Hawai'i Department of Land and Natural Resources Commission on Water Resource Management water quality report in 2018, He'eia Boat Harbor did not pass water quality standards due to nitrogen and chlorophyll-a concentrations in the water. A 2012 report from the City and County of Honolulu also addressed the inadequate and aging wastewater systems at Kualoa Regional Park, which can contribute to the nutrient-dense pollution of Kualoa Beach waters. Online PacIOOS data on current forecasts around Kāne'ohe Bay also support the possibility of zoanthid spread from He'eia Boat Harbor to Kualoa Beach. It is unknown how long

after eradication zoanthid colonies reappeared in He'eia, as well as how long the potentially non-native zoanthid colonies have been present at Kualoa Beach, meaning official species identification can help narrow down the potential vector of introduction. Additional surveys are needed at both locations to determine the full range of zoanthid distributions and their potential impacts on native marine species.

References

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