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## TEN YEAR RESURVEYS OF THE BIODIVERSITY OF MARINE COMMUNITIES AND INTRODUCED SPECIES IN PEARL HARBOR, HONOLULU HARBOR, AND KE'EHI LAGOON, O'AHU, HAWAI'I

S. L. Coles, H. Bolick, B. Hauk and A. Montgomery

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**I**

Final Report prepared for the Department of Defense Legacy Program

**S. L. Coles  
H. Bolick  
B. Hauk  
A. Montgomery**

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## EXECUTIVE SUMMARY

The marine and estuarine algae, invertebrate, and fish communities in Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon Oahu, Hawai'i were surveyed between October 2007 and April 2008 for a comparison of the biotic communities with results determined by previous surveys in Pearl Harbor in 1996 (Coles et al. 1997) and Honolulu Harbor-Ke'ehi Lagoon in 1997 (Coles et al. 1999b). Both the 1996 Pearl Harbor study and the present study were conducted under the auspices and funding provided by the Department of Defense (DoD) Legacy Resource Management Program, which provides financial assistance to DoD efforts to preserve our natural and cultural heritage. The program assists DoD in protecting and enhancing resources while supporting military readiness while maintaining biological diversity and sustainable use of land and water resources for mission and other uses.

For the present study samples were taken and observations were made at fourteen stations at or near fifteen stations previously surveyed in Pearl Harbor and six stations in Honolulu Harbor-Ke'ehi Lagoon. Organisms were identified to species or the lowest practicable taxonomic level, and results were added to the lists determined by the previous study and other published and unpublished marine biological surveys conducted in Pearl Harbor, published taxonomic descriptions of organisms collected from the harbor and Pearl Harbor specimens cataloged in the Bernice P. Bishop Museum collections.

In addition to sampling and observations at the former collection stations, snorkeling surveys were conducted throughout Pearl Harbor and Ke'ehi Lagoon to estimate the abundance of introduced algae and in Pearl Harbor to document the occurrence of reef corals. An observer, either towed on a "Manta Board" or swimming freely, semi-quantitatively estimated abundance of *Acanthophora spicifera* and *Gracilaria salicornia* and other introduced invasive algae approximately every 50 m and recorded the location of observations using a GPS unit. Another snorkeling observer also recorded by GPS the locations of reef corals that were identified to species and photographed. The results from both data series were mapped using ArcGIS 9.1.

This study collected or observed a total of 298 species or higher taxa from the 14 stations sampled in Pearl Harbor and 195 in Honolulu Harbor-Ke'ehi Lagoon. Dendrographs based on Sorensen Indices of Similarity of species composition among stations indicate clustering of sites based on the physical environments of the sites, which is also reflected in the patterns of species richness. Sites located near harbor mouths had the most taxa, reflecting the oceanic conditions that support the presence of organisms characteristic of both harbor and reef environments, while fewest taxa occurred at sites furthest within Pearl Harbor and Ke'ehi Lagoon characterized by sluggish, highly turbid conditions and dominated by mangroves. The harbor mouth locations were also where the greatest number of the 91 new species reports for Pearl Harbor and the 41 new reports for Honolulu Harbor-Ke'ehi Lagoon occurred.

Ninety-six genera or species, or 32%, of the total taxa found in Pearl Harbor, are previously designated or newly reported as introduced or cryptogenic (i.e. of uncertain geographic origin). For Honolulu-Ke'ehi Lagoon 68, or 35%, of the total taxa are designated introduced or cryptogenic. These values are comparable to but somewhat higher than the percentages determined for the 1996-97 studies in the

same harbor areas, but the higher values are probably related to smaller samples sizes taken in the present study than previously, which reduced the total number of total taxa reports. However the higher numbers do indicate wide distribution of introduced and cryptogenic species throughout the harbors and lagoon, reflected in that most stations had higher percentages of introduced and cryptogenic than the overall averages. Only 17 of the genera or species found in the study, mostly sponges, were new reports for Hawaiian waters and these were tentatively designated as cryptogenic.

Only seven of the 95 introduced or cryptogenic genera or species that occurred in Pearl Harbor or the 68 in Honolulu Harbor-Ke'ehi Lagoon are considered invasive, i.e. have been found to substantially alter the environments of their area of introduction or interfere with the survival and propagation of native species. These invasive species include the red mangrove *Rhizophora mangle*, two red algae *Acanthophora spicifera* and *Gracilaria salicornia*, the orange keyhole sponge *Mycale armata*, the snowflake octocoral *Carijoa* aff. *riisei*, the Caribbean barnacle *Cthamalus proteus* and the Asian stomatopod *Gonodactylaceus falcatus*. With the exception of the red mangrove, which was first reported on O'ahu in 1922, all of these are recent introductions to Hawaiian waters that have proliferated in the last 30 years and either monopolize habitat space in their habits of introduction, pose a potential threat to native organisms in those habitats, or both. All seven have become dominant organisms elsewhere in Hawai'i where they have various degrees of invasiveness depending on local conditions, but it is the red alga *Gracilaria salicornia* that is the most problematic in both the present study locations and elsewhere in Hawai'i and especially on O'ahu.

*Gracilaria salicornia* was first introduced to O'ahu in 1971 and again in 1978 and has since become the most invasive algal species in shallow shoreline areas along south O'ahu and throughout Kāne'ohe Bay. At the time of the 1996 Pearl Harbor Legacy study it was found to be moderately abundant in shallow depths at only three of the 15 sampling and observation sites, although it was known to be established at the heads of all three lochs as early as 1946. For the present study it was found to occur at 10 of the 14 stations in Pearl Harbor and one in Ke'ehi Lagoon, where it did not occur in 1998. Moreover, it is now the dominant benthic organism throughout all of Pearl Harbor where shorelines have not been altered to vertical piers or jetties or it is too turbid to allow growth of this alga. Snorkeling survey observations found *G. salicornia* at 72% of 1215 sampled locations throughout the harbor, with 34% of the total having three dimensional dense mats, 24% with abundant coverage and 14% with low or patchy coverage. Only 8% of the locations surveyed had no *G. salicornia* present. In Ke'ehi Lagoon abundance was lower, with less than half of the locations having *G. salicornia* present and only 1.8% having abundant mats. However, the other invasive alga surveyed, *Acanthophora spicifera* was more abundant in Ke'ehi Lagoon than Pearl Harbor, occurring at 652 (83%) of the 778 locations, with 553 (78%) of those having low or patchy *A. spicifera* cover. *Acanthophora spicifera* is apparently highly stress resistant, being the only alga and one of the few organisms found growing in highly turbid conditions on fine silt among mangrove roots at the head of West Loch in Pearl Harbor.

The findings of the present study support the conclusion from the 1996 Legacy study that environmental physical conditions in the Pearl Harbor have improved since naval shipboard effluent release ceased in the 1970s and most sewage discharges were removed in the 1980s. The last of these, the Fort Kamehameha outfall that discharged into the main ship channel was closed in 2005. The present study

found considerably more organisms representative of less organic-rich conditions than the 1996 survey, with most of these occurring in areas of higher water circulation along the main channel and loch entrances. This and other recent surveys have found considerable numbers of reef corals and previously unreported species in addition to those that appeared to be beginning to colonize hard substrata in the harbor in 1996, and many previously unreported reef-associated invertebrates were found in the present study. The present study also found previously unreported reefs of *Porites compressa* well into West Loch that have apparently existed for at least decades, contrary to conclusions from studies conducted in the 1970s that no reef corals were present in Pearl Harbor in the early 1970s

Unfortunately, the improved environmental conditions that have developed in Pearl Harbor in the last two decades are being negated by the proliferation of the invasive alga *Gracilaria salicornia* and to a lesser extent, the alga, *Acanthophora spicifera*, and the sponge *Mycale grandis*. The 1996 Legacy study found “no indication of monopolization of resources by a single species or population outbreaks of a recently introduced species.” This is clearly not the case now. *Gracilaria* and *Acanthophora* cover large areas and exclude other benthic organisms throughout Pearl Harbor and much of Ke’ehi Lagoon, similar to their explosive spreading and growth in the last decade along much of O’ahu’s south shore and in Kāne’ohe Bay. *Mycale grandis* overgrowth threatens the survival of the apparently long-standing *Porites compressa* reefs recently discovered in West Loch, where other similar reefs have already been lost to *Gracilaria*. These invasive species are apparently preventing the possible recovery of biotic conditions that have probably not existed in Pearl Harbor since pre-European contact.

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## INTRODUCTION

### **A. Historical Perspective**

The harbors of the south shore of O'ahu have played a principal role in shaping the history of the Hawaiian Islands since the late 18<sup>th</sup> century when European contact with Hawaiians first occurred. The main Hawaiian Islands are the most isolated major island group in the world, lying more than 2666 miles (4300 kilometers) from the nearest major landfalls in North America and the South Pacific and more than 3968 miles (6400 kilometers) from Japan, the nearest Asian land mass. Prior to the arrival of Europeans to the Islands in the late eighteenth century, the only vessel movement was between neighboring islands or by infrequently arriving Polynesian canoes from the South Pacific.

This isolation of Hawai'i from the rest of the world rapidly decreased through the 19<sup>th</sup> century. In the 81 years after European discovery of the Hawaiian Islands in 1778, more than 300 ships from foreign ports made landfall in Hawaii, with the maximum number of arrivals (78) occurring in the 1840s, coinciding with the peak of whaling activity and the discovery of gold in California (Judd 1920). This was only the beginning of Hawaii's interaction with the outside world, and shipping traffic continued to increase as steam replaced sail and Hawai'i commercial and shipping requirements expanded with urbanization and development of the plantation-based economy.

This increased ship movement and requirement for harbor and port facilities occurred first in the Honolulu Harbor and then Pearl Harbor, both of which provided natural deep water ports that were later expanded and modified for the increased ship traffic that occurred with expanding populations, commercial development and military presence on the island of O'ahu. Honolulu Harbor was the focus of commercial ship traffic and, until the completion of the Kaleloa (Barber's Point) Deep Draft Harbor in 1985, provided the only docking and offloading facilities for shipping to the city of Honolulu and for interisland transport to the neighbor islands. Pearl Harbor became a focus of naval operations for U.S. Navy operations in the Pacific after its establishment as a coaling station and dry-dock at the beginning of the 20<sup>th</sup> century. Although its access has been restricted from commercial traffic, it nonetheless has long been a site of major movement of military vessels of all sizes, especially since before World War II in the late 1930s and 1940s.

The histories of the two harbor areas and of Ke'ehi Lagoon, which was highly modified in the early 1940s to accommodate seaplane runways, are described in detail in Coles et al. (1997, 1999a) for Pearl Harbor and in Coles et al (1999b) for Honolulu Harbor-Ke'ehi Lagoon, and detailed chronologies of important events in the histories of each harbor are provided in appendices in the Coles et al 1997 and Coles et al 1999b reports. No further detail will be provided here other than to note that modification and development of both harbors and of Ke'ehi Lagoon have had extensive and far reaching impacts on the environment and the ecology of marine communities at those locations.

## B. Environmental Characteristics

### Pearl Harbor

Pearl Harbor is a coastal plain estuary located between the Ko'olau and Waianae mountain ranges in central O'ahu, Hawai'i (Figure 1). The harbor is the most landlocked large estuarine body of water in the Hawaiian Islands and has about 8 square miles (21 square kilometers) of surface water area with a mean depth of 29.2 m and about 58 km of shoreline. It is divided into three main lochs (East, Middle and West Lochs) and one smaller loch (Southeast Loch), which are remnants of drowned river valleys joined together by a main channel connecting the harbor with the open ocean. With this relative isolation of the harbor from oceanic circulation, water exchange of the harbor with the open ocean is relatively slow, and residence time of water within the harbor has been estimated as about six days maximum for bottom water and one to three days for surface water (Grovhoug, 1992).

Water temperature in the harbor varies annually from 23 to 29°C, and salinities have ranged from 10 to 37‰ (mean 33‰). Salinity is highly influenced by terrestrial and ground water runoff, especially at the heads of the three main lochs. The harbor receives five perennial streams and three intermittent streams draining approximately 109 square miles (285 square kilometers) of watershed and the discharges from five large springs along the lochs' shorelines. Warming of surface water and freshwater discharge contributes to the development of a pronounced vertical stratification of harbor waters, which in turn promotes differing current conditions between surface and bottom and relative isolation between surface and bottom water masses. Surface water circulation is primarily offshore and driven by tradewinds, while weak tidal flood and ebb flows of 0.15-0.3 m/s control the movement of bottom water in and out of the harbor (Grovhoug, 1992).

Vegetation along much of the West, Middle and East Loch shorelines is dominated by introduced mangroves (*Rhizophora mangle*) at the heads of the three main lochs, which has formed dense growths of bushes and trees up to 10 m high. Elsewhere the shoreline vegetation is cultivated grass, trees and plants in populated areas and kiawe trees (*Prosopis* sp.) along channels. Where mangroves do not occur and the shore has not been altered by construction or dredging the nearshore subtidal zone is largely either vertical concrete walls or a shallow consolidated reef platform to about 2 m depth, which is often covered with fine sediments and, in recent years, introduced macroalgae. Further offshore the substratum slopes deeply to bottom covered with a thick layer of fine silt or mud.

The water of Pearl Harbor has apparently always been relatively turbid from stream runoff and other sources of sediment. A traditional Hawaiian chant recites "Ewa's lagoon is red with dirt/...A plumage red on the taro leaf/ An ochreous tint in the bay" (Emerson, 1909). However, runoff related sedimentation undoubtedly increased dramatically in the nineteenth century with deforestation, ranching and grazing of hillsides, declining use of taro ponds which would act to retain storm water, and development of sugar cane cultivation. S. Bishop (1901, in Sterling and Summers, 1978) described her memories of Pearl Harbor of 1836: "The lochs or lagoons of Pearl Harbor were not then as shoal as now. The subsequent occupation of the uplands by cattle denuded the country of herbage and caused vast quantities of earth to be washed down by storms into the lagoons..." This resulted in the harbor historically being a highly turbid environment, with thick deposits of fine silt on the bottom throughout most of the lochs. Stream



Figure 1. Aerial perspective of Pearl Harbor, Honolulu Harbor and Ke'e'hi Lagoon. Source: <http://terrainmap.com>.

input of sediments has been estimated to exceed 96 thousand tons annually, and maintenance dredging of about nine million cu. yd. has been required by the Navy on four to five year cycles (Nystedt, 1977 in Grovhoug, 1992). Turbidity measurements indicated by Secchi disk readings in 1990 averaged only 2.5 harbor-wide, resulting from suspended sediments and organic material produced by eutrophic conditions (Grovhoug, 1992).

Early reports describe an abundance of fish and shellfish in Pearl Harbor and the importance of the area as a major Hawaiian population center supported by numerous and extensive fish ponds. According to Handy and Handy (1972) the bays of the harbor “offered the most favorable locality in all the Hawaiian islands for the building of fish ponds and fish traps into which deep sea fish came on the inflow of tidal water...(the bays) provided a greater variety and abundance of edible shellfish, and were famous as the summer home of mullet”. Like many aspects of the Hawaiian culture, fish traps and fishing in the harbor declined in the nineteenth century. However, more than 30 fish traps still existed by the early 1930s (Costa-Pierce, 1987, Figure 2) and oysters introduced in the 1920s thrived for a time.

Since early in the 20<sup>th</sup> century, Pearl Harbor has been the center of Pacific Naval Operations and the Pearl Harbor Naval Base, with berthing and maintenance facilities for hundreds of ships. As part of this effort the harbor entrance channel was deepened from its natural depth of about 5 m to 9 m, widened to approximately 60 m, and opened to military ship traffic in 1911. Many nearshore habitats were soon drastically altered as shorelines, especially in Southeast Loch and around Ford Island, and were converted to docks and naval operations facilities. Formerly shallow areas were dredged to accommodate ship traffic, and fish ponds in the vicinity of the naval base were filled with dredge spoils. Urbanization of the East Loch area progressed as the Pearl City area was developed, and the Hawaiian Electric Company’s Waiiau Power Station began discharging heated effluent at the head of the harbor’s East Loch in 1938. In addition, two recreational marinas were placed in the harbor at Iroquois Point near the channel entrance and at Rainbow Bay at the head of East Loch.

From 1940 to 1970, Pearl Harbor ship traffic and shipyard activities were at their peak and the environmental quality of the harbor reached its lowest point. Alteration of the shoreline and near-shore areas in the harbor continued, and all but four of the more than 30 fish ponds that had still remained in 1920 were eliminated. Development of the naval base and urbanization of the watershed areas greatly altered the shoreline and quality of water entering the harbor in this century. At one time more than 100 treated or untreated sewage discharges were estimated to enter the harbor, and coliform bacterial levels indicated extremely polluted conditions. Sewage discharge from naval facilities reached an average 24,000 m<sup>3</sup>/day and City and County of Honolulu sewage discharges averaged 34,000 m<sup>3</sup>/day in the early 1970s (Evans et al. 1972). The high organic load and polluted conditions that existed at that time were indicated by depressed bottom water oxygen concentrations, especially toward the heads of West and Middle Lochs where sewage outfalls were still in operation (Evans, et al., 1974). Extreme dissolved oxygen lows for bottom water fell to 0.1 ppm, with annual averages as low as below 1.5 ppm at these sites, compared to surface values or bottom water in the channels that generally remained around 6 ppm. Heavy metals and pesticides in sediments indicated further environmental degradation Non-point

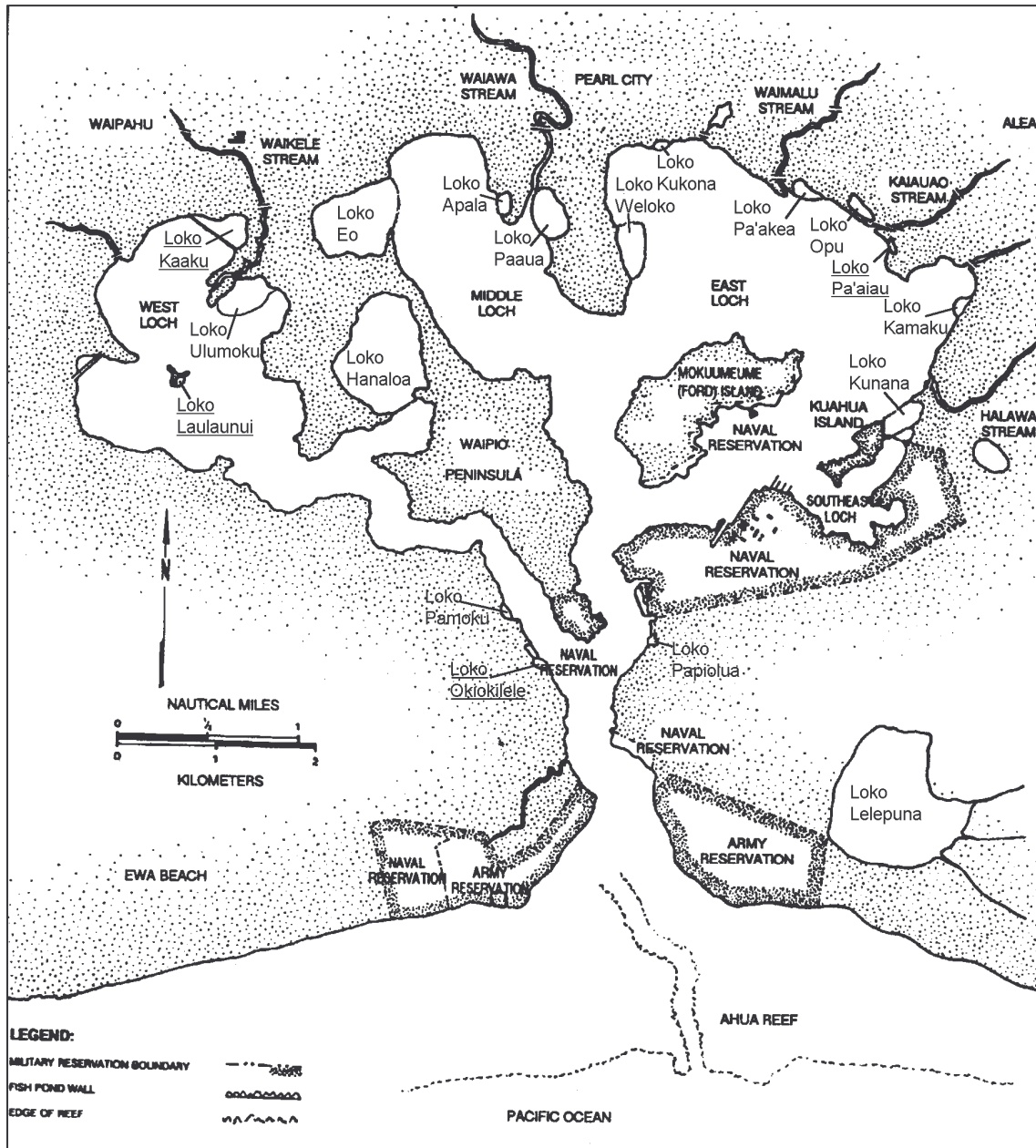


Figure 2. Pearl Harbor in ca. 1920, showing many of the fish ponds that still remained after the initial development of the naval base. Of these only the four underlined still existed in 1972 (adapted from Grovhoug, 1992 and based on an undated O'ahu Fisheries chart).

pollution sources from hillsides under urban development and naval shipyard activities further degraded water quality. Coliform bacterial counts at stream mouths in East Loch and near oyster beds in West Loch ranged from hundreds of thousands to billions of bacteria per 100 ml (Cox and Gordon 1970). Possibly because of such a ready, albeit polluted, supply of particulate food, the oyster population soared, reaching an estimated 36 million oysters in West Loch in the 1960s. However, this was followed by a massive die-off of 99% of the oyster population in West Loch and a fish and invertebrate kill in Middle Loch in 1972 (Kawamoto and Sakuda 1973).

These polluted conditions have been largely abated with the removal of sewage effluents from the harbor and changes in naval operations (Grovhoug 1992). In 1975 the Navy instituted shipboard wastewater collection, holding and transfer tank systems to replace release of vessel wastewater effluents into the harbor. Between 1982 and 1984 sewage effluent discharge ended from all major sources (Grovhoug 1992) except for the Fort Kamehameha outfall that discharged treated sewage into the main channel near the harbor entrance until January 2005, when the point of discharge was moved outside of the harbor entrance to a depth of 45 m in Mamala Bay. Sediment and pesticides from sugar cane production decreased through the years, ending in the 1990s, urbanization of hillsides of the East and Middle Loch watersheds moderated as developments were completed, and better land management practices during construction helped to alleviate surface runoff-related sedimentation. Generally, Pearl Harbor water quality was indicated to have generally improved substantially since its low point in the 1970s. A 1990 study in the East and Southeast Lochs indicated that water quality parameters were within state water quality standards, that there was no substantial difference between surface and bottom water oxygen concentrations, and that metal concentrations in sediments were significantly less than 1972 values for most metals (Grovhoug 1992). However polychlorinated biphenyl (PCB) concentrations were substantially elevated in the Southeast Loch shipyard area at that time (Grovhoug 1992), and urbanization related pollutants from additional road surfaces and automobile usage has probably increased from the Pearl Harbor watershed.

Two major petroleum hydrocarbon spills have occurred in Pearl Harbor, one of 100,000 gallons of aviation fuel at the head of Middle Loch in 1987 (AECOS 1987) and one in 1996 of an estimated 39,000 gallons (982 barrels) of bunker fuel oil from the Chevron pipeline supplying the HECO power station at the head of East Loch. The 1987 spill produced leaf yellowing, defoliation and some mortality on about 9.5 acres of mangroves (*Rhizophora mangle*) along the Middle Loch shoreline (AECOS 1987). The 1996 spill resulted in intense oiling of the intertidal flats at the point of discharge near the HECO station intake, and deposition of oil and tar in the intertidal zone along the shores of Ford Island and Waipio Peninsula that were in the direct path of the oil spill. Although initial mortality to marine organisms or birds was only four pufferfishes and two prawns, other organisms within the intertidal were directly exposed to oil and tar deposits which remained after the initial spill. The long term consequences of this spill on the intertidal and other communities in Pearl Harbor were apparently minimal and are briefly described in Brock (2007).

Opportunities for species introductions into Pearl Harbor have existed since the first Polynesians came to O'ahu and have continued to the present, and colonizing organisms could have established themselves for the last half century from hull fouling or discharge of ballast water by ships within the harbor as part of their normal operations. The probability of such introductions probably increased with the deepening and



widening of the entrance channel in the first decade of the 20<sup>th</sup> century, and reports of the ratio of newly reported introduced to native species increased during the war time related increased ship traffic (Coles et al. 1999a). Also, an event which triggered substantial renewed interest in species introductions into the harbor was the relocation of the floating dry-dock *Machinist* from Subic Bay, Philippines in 1992. In correspondence and public affairs releases the Navy affirmed that the hull had been thoroughly cleaned and inspected before leaving the Philippines and the dry-dock deballasted at sea, that water from ballast tanks had been microscopically inspected for pathogens, and that the hull had been inspected and additional cleaning performed on arrival. However, a number of newly reported species were found on the drydock and elsewhere in the harbor in 1996 that may have been brought on its surface as fouling. The drydock was later relocated to Apra Harbor on Guam in 1999 (DeFelice 1999) and was noted to bring a number of newly introduced organisms, most of which did not become established there (Paulay et al. 2002).

### Honolulu Harbor and Ke'ehi Lagoon

Honolulu Harbor (Figure 3) originally was a deep embayment formed by the outflow of Nu'uuanu Stream creating an opening in the shallow coral reef that lies along the south shore of O'ahu. It was first described scientifically by Agassiz (1889) as "nothing but a channel kept open by the flow of the Nu'uuanu River, which...has killed the corals in its path, scouring at the same in freshets the whole harbor and the adjacent limestone forming the channel.... The stream forming the original Honolulu Harbor basin brings down a large amount of volcanic mud in its short course, and has deposited this in the harbor and channel, so that there appears to be nothing but dark volcanic mud for a considerable distance towards the entrance to the channel, where the coral limestone reappears."

In its natural state the harbor consisted only of this river-formed main basin, which was only 6 m deep at its entrance. Its perimeter was enclosed by shallow reef and intertidal areas that were exposed at low tide. A small white sand beach extended along the eastern shoreline from the present Aloha Tower complex to the Pier 1 area. The reef extended across the present Kapālama Channel continuous with the area that is now Sand Island. Formerly this was a much smaller island (Immigration Island) surrounded by a large shallow reef flat.

Honolulu Harbor now consists of a main basin which has been substantially enlarged and deepened from the original natural embayment, Kapālama Channel, which was first dredged through the reef west of the main basin in 1915-20, and Kapālama Basin, first dredged to 10.6 m depth in 1941-45 (Figure 3). The harbor receives the runoff of two major fresh water sources, Nu'uuanu Stream at the head of the original harbor between Piers 15 and 16, and Kapālama Canal which empties into Kapālama Basin between Piers 38 and 39. The harbor originally had only one opening to the sea until the Kalihi Channel was completed in 1962, and the presence of this channel at the west end of the harbor has undoubtedly increased circulation and water quality. Limited salinity data (Oceanit 1990) suggests that surface salinities can be reduced in the harbor by freshwater runoff by as much as one third, but subsurface salinities remain at an oceanic 35 ‰. Overall average salinities in the harbor average 34 ‰ (Buske and McCain 1972).

The present harbor ranges in depth down to 13.5 m, maintained by periodic dredging. Very little natural substrata remain in the harbor. Extensive modifications by dredging and filling have greatly enlarged the deeper areas of the harbor and reduced the reef flats that enclosed the original main basin. More than 50 piers compose most of the shoreline throughout the harbor, and the original entrance channel is lined and reinforced with large basalt boulders. Natural coral reef substratum occurs only in two places in the harbor, between Piers 29 and 30 on the landward side of Kapālama Channel and on both sides of Kalihi channel. Elsewhere the benthic substratum above the silt or sand bottom is composed of concrete abutments or pilings supporting docks and piers, many of which jut out 10-25 m from the dredged shoreline. The bottom of most of the harbor is composed primarily of flocculent loose silt or mud, which becomes finer near the mouths of Nu'uanu Stream and Kapālama Canal. However, with approach to the harbor entrance at Piers 1 and 2 the bottom sediments become fine, white calcareous sand, as described by Agassiz (1989) over a century ago.

Honolulu Harbor remains the primary shipping port for commercial goods entering Honolulu or being trans-shipped to the neighbor islands, and port activity is dominated by container ships unloading at the Matson and Maersk Sealand Terminals at Pier 52 on Sand Island. Just eastward Pier 53 provides berthing for U.S. Coast Guard ships, and the University of Hawai'i berths its fleet of research vessels at Snug Harbor, near the Kalihi Channel entrance. Pier 2 is the foreign trade zone docking area, and cruise ships that transport thousands of passengers utilize Piers 10 and 11. Commercial fishing boats moor at Piers 16-18, and Piers 19-27 are berths for harbor and inter-island tugs. While in operation, the Hawai'i Superferry utilized docking facilities at Piers 22-23 for interisland transport of passengers and vehicles. The Clean Islands Council oil spill emergency response vessels dock at Pier 35, Young Brothers interisland tugs and barges utilize Piers 38-40, and a floating dry dock is in place at Pier 41. Although wastes from the pineapple canneries were originally discharged into Kapālama Canal until the early 1970s, resulting in some of the highest bacterial concentrations measured in the state waters at that time (Cox and Gordon 1970), the only significant industrial use of harbor water at the present time is for once-through cooling of the Hawaiian Electric Generating Station. This facility has, in the past, raised the temperature of up to 200,000 gpm cooling water 5-6°C circulating from its intake by Pier 7 to its discharge at Pier 5, but discharge of thermal effluent has decreased in recent decades as generation load has been shifted to more efficient newer power stations.

Ke'ehi Lagoon (Figure 3) was originally a large shallow reef and subtidal area no more than 1-2 m deep that extended more than two miles off the mouths of Kalihi and Moanalua Streams. Its present eastern boundary is formed by Kalihi Channel, which was originally a shallow channel across the reef through which the combined outflow of Kalihi and Moanalua Streams reached the sea. Much of the present land for Honolulu International Airport was originally reef, Ke'ehi Lagoon shoreline, ponds or marshes.

Dredge and fill activities in the 1940s and the 1970s drastically altered Ke'ehi Lagoon from its original state. A mooring basin and three seaplane runways two to three miles long by 30.3 m wide and 3 m deep were dredged in the lagoon in 1941-45 and the dredged material placed along the shore. Because these channels essentially trapped water that otherwise would have moved on and off shore with tidal exchange and wide movement, stagnant conditions and lowered water quality resulted, retaining pollutants in the deeper water in the runways.

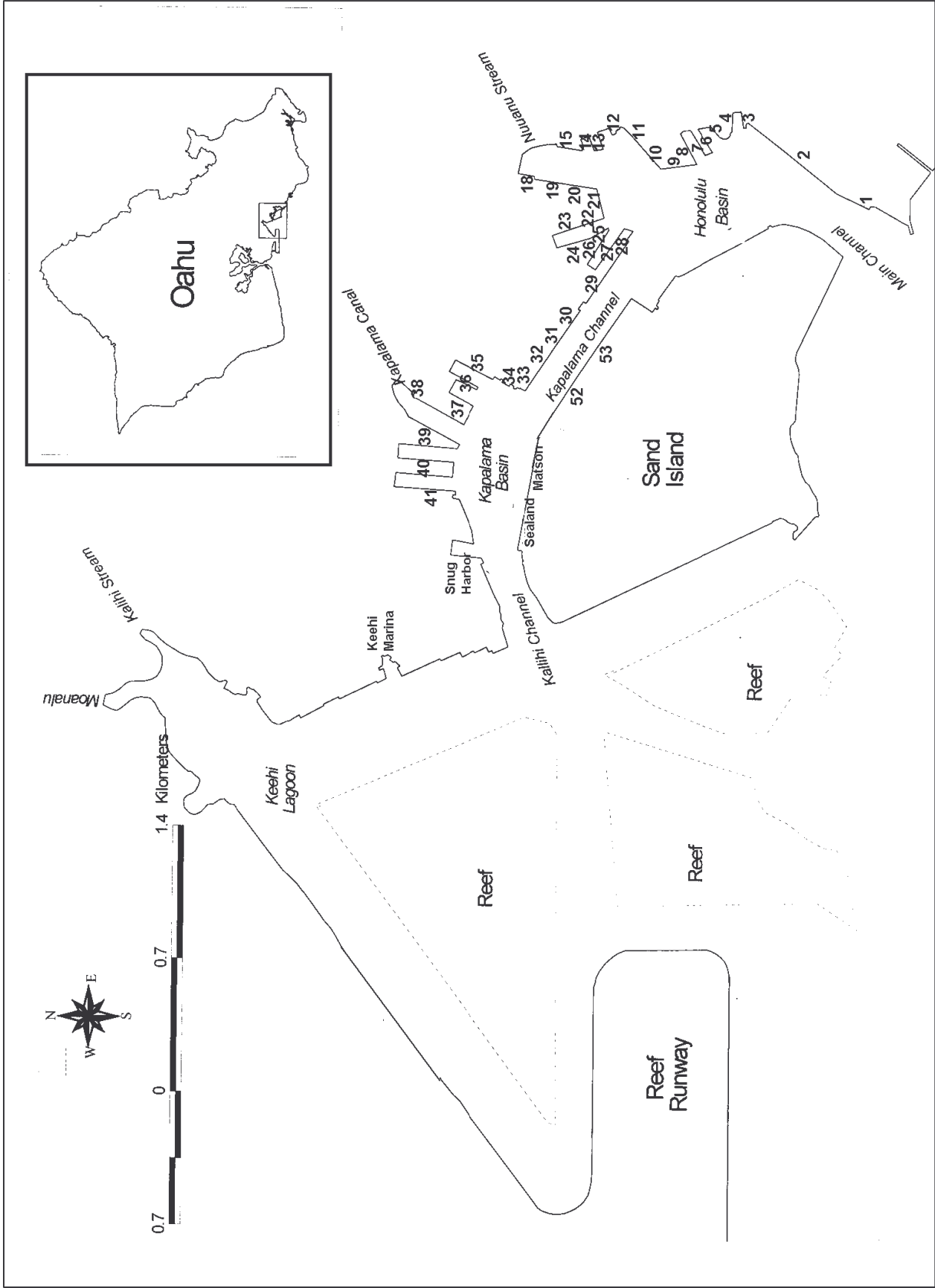


Figure 3. Map of Honolulu Harbor and Ke'ehi Lagoon showing Pier locations.

Further alteration of the lagoon resulted from the construction of the Honolulu International Airport Reef Runway, constructed in 1972-75. This effectively divided the lagoon into an eastern portion extending from the east end of the runway to the Kalihi channel entrance, and a western portion adjoining the Hickam small boat harbor. In the process of constructing the runway, some 1,240 acres of former reef and shallow flats were buried under 2.7 m of fill material. Also, to increase circulation and provide boat access, channels were dredged around the eastern end of the runway to the seaplane runways and to Hickam Harbor. Monitoring conducted prior to and following completion of the runway construction indicated a substantial improvement in water quality due to the increased circulation provided by these channels (Environmental Consultants 1977, 1979; OI Consultants 1986; Noda & Assoc. 1978).

The eastern portion of Keehi Lagoon sampled in this study consists of a shallow reef flat enclosed by the three seaplane runways, the Kahili Entrance Channel to Honolulu Harbor and the access channel east of the reef runway that was dredged in 1971-75. The lagoon receives the combined drainage of Kalihi and Moanalua Streams on its north apex, which is completely lined with a dense growth of red mangrove (*Rhizophora mangle*). A series of small islands line the northeast-southwest seaplane runway, and more are forming on the central reef flat where mangroves grow and accumulate sediments.

### **C. Study Objectives**

Pearl Harbor has a substantial information base for marine organisms that dates back to the 19<sup>th</sup> century that was reviewed in Coles et al. 1997, Coles et al. 1999a and Coles 2006. Although collections were made intermittently in 1920s, 1930s and early 1940s, the first comprehensive and extensive surveys were made in the early 1970s by the Naval Undersea Center (Evans et al. 1974). This was the primary baseline of comparison for the comprehensive survey conducted in 1996 for the Department of Defense Legacy Project Number 106 that described environmental conditions and the biota in Pearl Harbor at that time, with an emphasis on introduced marine species (Coles et al. 1997). This project determined that in Pearl Harbor 96 out of a total of 434 marine species, or 22%, were introduced or cryptogenic (i.e. of indeterminate) origin. Comparable figures for a 1997-98 study in Honolulu's commercial and public harbors, including Honolulu Harbor and Ke'ehi Lagoon were 100 introduced or cryptogenic species of a total of 585, or 17%. These introduction percentages are among the highest of any areas that have been surveyed in the world, suggesting that O'ahu's harbors have historically been major recipients of introduced marine species and a possible point from where they may have been distributed elsewhere in Hawaii.

The other major finding from the 1996 Pearl Harbor Legacy project was that reef corals, formerly considered missing from Pearl Harbor due to earlier poor water quality, were becoming re-established in the harbor. Subsequent studies by the Pearl Harbor Naval Facilities Engineering Command (Smith 2002, Smith et al. 2006) verified the increasing occurrence of corals within the harbor but noted that the invasive introduced alga *Gracilaria salicornia*, first reported in Pearl

Harbor by the 1996 Legacy surveys, was also becoming very abundant and overgrowing corals that had become recently established.

The present study was designed to compare environmental conditions and the marine biota in Pearl Harbor with the results of the 1996 surveys using similar sampling sites, sampling methods, and the same project manager as for the previous study, and to compare these results with those obtained for a few selected sites in Honolulu Harbor and Ke'ehi Lagoon that were surveyed in 1997. The sites surveyed in Pearl Harbor included those of the 15 stations surveyed in 1996 that were accessible in 2007-2008, and six sites in Honolulu Harbor or Ke'ehi Lagoon of the 20 that were surveyed in 1997. The results of these surveys conducted after ca. ten years were to be evaluated to determine whether biotic conditions in the harbors had changed substantially, especially in terms of the relative abundance of introduced or invasive species. Also, comprehensive observations throughout Pearl Harbor and Ke'ehi Lagoon were made beyond the locations of fixed sampling sites to determine the extent and impact of introduced invasive algae and the extent of occurrence of reef corals that have become established in areas formerly considered unsuitable for their survival.

## METHODS

Sampling and observations of biota were made at or near 14 of the 15 Pearl Harbor stations previously surveyed in 1996 and were intended to duplicate, wherever possible, the locations of stations previously surveyed. Station locations are shown in Figure 4, and the dates, coordinates, and depths of the stations are in Table 1. Station 3, surveyed in 1996, was not resurveyed because of warnings from the Hawai'i State Department of Health that diving in Walker Bay could be hazardous to divers having full body exposure to the water in the bay. The 1996 West Loch Stations 4 and 5 could not be resurveyed at the same locations because water at these sites was too shallow to access by boat and/or too turbid to see the bottom, so new Stations 4A and 5A were established 600-750 m SE of the original locations. Access to the 1996 Station 6 adjacent to Drydock 4 was restricted in 2008 by U.S. Navy security, so an adjacent site 6A about 300 m southeast of the original site was surveyed. The 1996 Station 9 was at the head of Middle Loch, on the surface of the floating drydock *Machinist*, which was moved to Guam in 1999. Therefore, collections and observations were made at Station 9A, about 60 m northeast of the original location. The pier where Station 10 was surveyed in 1996 was occupied at the time of sampling in 2008, so sampling was conducted on the nearest available pier at Station 10A, about 140 m northwest of the original location. Finally, although the location of Station 12 was the same in 2008 as in 1996, the habitat was greatly altered by the construction of the Ford Island Bridge, which was completed in 1997.

Sampling at each station in 2007-8 was conducted by S. L. Coles, who conducted the 1996 surveys with R. C. DeFelice, and by H. Bolick. Observations and collections were conducted in a similar manner as in 1996, although the quantities of material sampled were less than in 1996 and collections cannot be considered as comprehensive as in 1996. Sampling consisted of collecting fouling organisms growing on hard surfaces from the intertidal zone to the bottom,

which ranged in depth from 0.5 to 8 m. Collections were made by SLC from as large a variety of habitats as possible while using scuba. Both organisms and the substrata on which they were growing were collected, retained in a 500 nm mesh net, relaxed by adding magnesium sulfate on site and then returned to the laboratory where they were preserved in 70% ethanol until sorting and identification of organisms. Investigators also recorded on underwater paper the algae, invertebrates and fishes that were identifiable on site at each station and photographed organisms using digital cameras. Sponges collected were photographed in the laboratory and notes on color and texture recorded before they were preserved in 70% ethanol and sent to the sponge taxonomic expert.

In order to compare changes in biotic conditions in Pearl Harbor over the past decade with a similar harbor and estuarine area on O'ahu, six stations were resurveyed in Honolulu Harbor and Ke'ehi Lagoon that were previously surveyed in 1997 (Coles et al. 1999b). Three stations were selected from the 15 sites that were surveyed in Honolulu Harbor and three of the six sites that were surveyed in Ke'ehi Lagoon. Station locations are shown in Figure 5 and site information summarized in Table 1. One of the Honolulu Harbor sites was on a reef area that exists between Piers 29 and 30, one was on Pier 40 near the Pier 41 drydock, and one was on the slope from the shore along Sand Island Park. The Ke'ehi Lagoon sites were on the Ke'ehi Marina floating docks, on a barge wreck along the west seaplane channel, and in the mangrove area at the outlet of Moanalua-Kalihi Streams. These six stations therefore duplicated the full variety of environments that were sampled in Pearl Harbor.

Specimens collected were sorted and identified to species or the lowest practicable taxa, using dissecting or compound microscope magnification where necessary. Identifications were made using descriptions available in Reef and Shore Fauna of Hawaii Sections 1 to 4 (published) and 5 to 6 (unpublished), various taxonomic references, and voucher specimens in the Bishop Museum collections. Specimens from various groups were sent to taxonomic experts for identification or verification of preliminary identifications (see Acknowledgments).

All organisms identified from the field study were entered on an Access database relational with databases for previous literature reports and museum collections of organisms from Pearl Harbor. The combined information was used to track the occurrence of species chronologically as they were reported in Pearl Harbor.

The Sorenson's Index of Similarity, based on presence-absence of species at station pairs, was used to measure the degree of association between stations. By this index, the more species two stations share relative to their total species complements, the greater their ecological similarity. Based on a matrix of Sorensen Index values, cluster analysis was used to arrange stations into groups or clusters. Intercluster distances were calculated using an unweighted pair group average method. In this analysis, similar stations will form clusters distinct from other stations. These clusters are arranged in a hierarchical, treelike structure called a dendrograph. Calculation of the similarity measures and cluster analysis were performed using the Multi-Variate Statistical Package, ver. 2.1 (Kovach 1993).



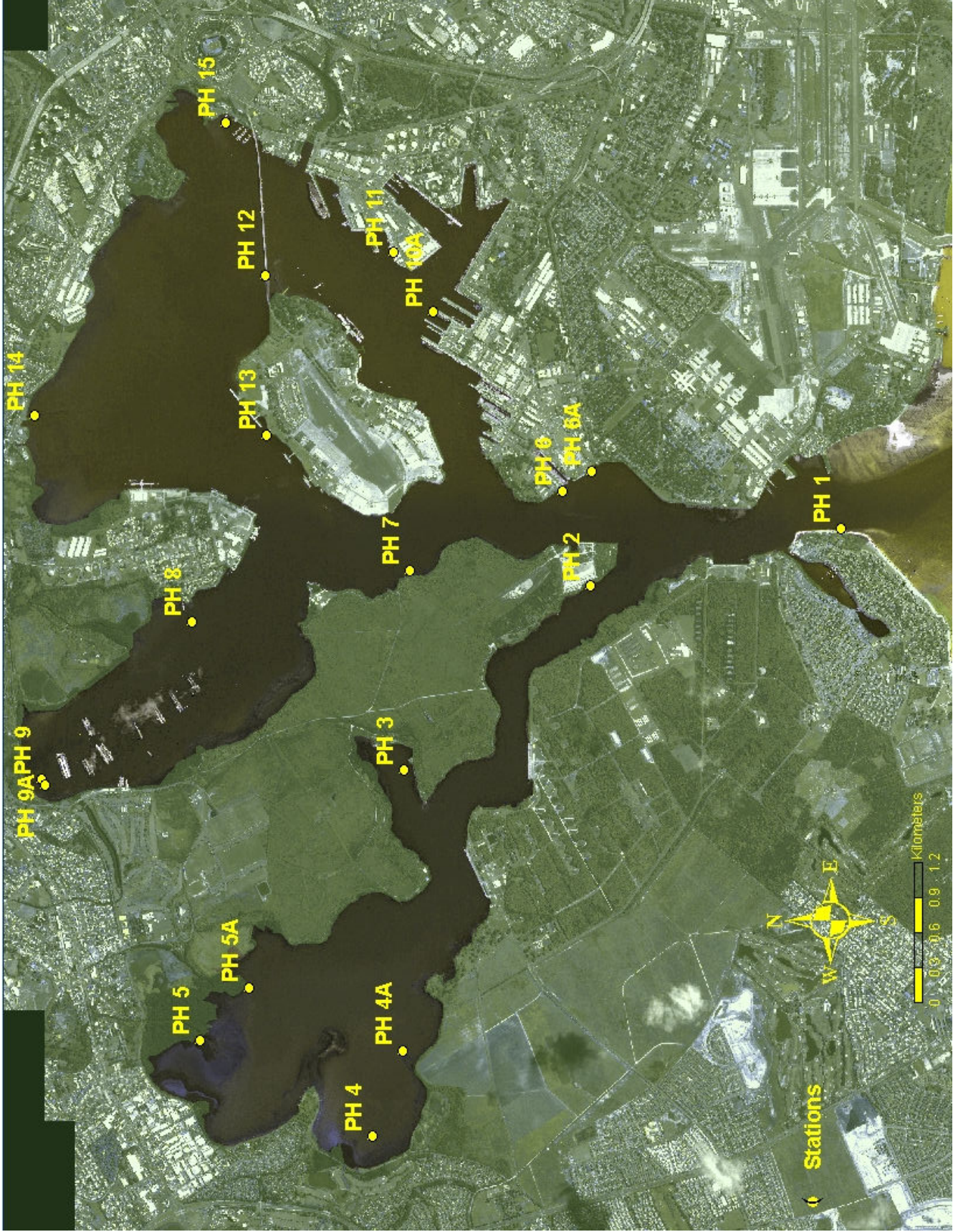


Figure 4. Pearl Harbor 1996 and 2008 sampling stations.



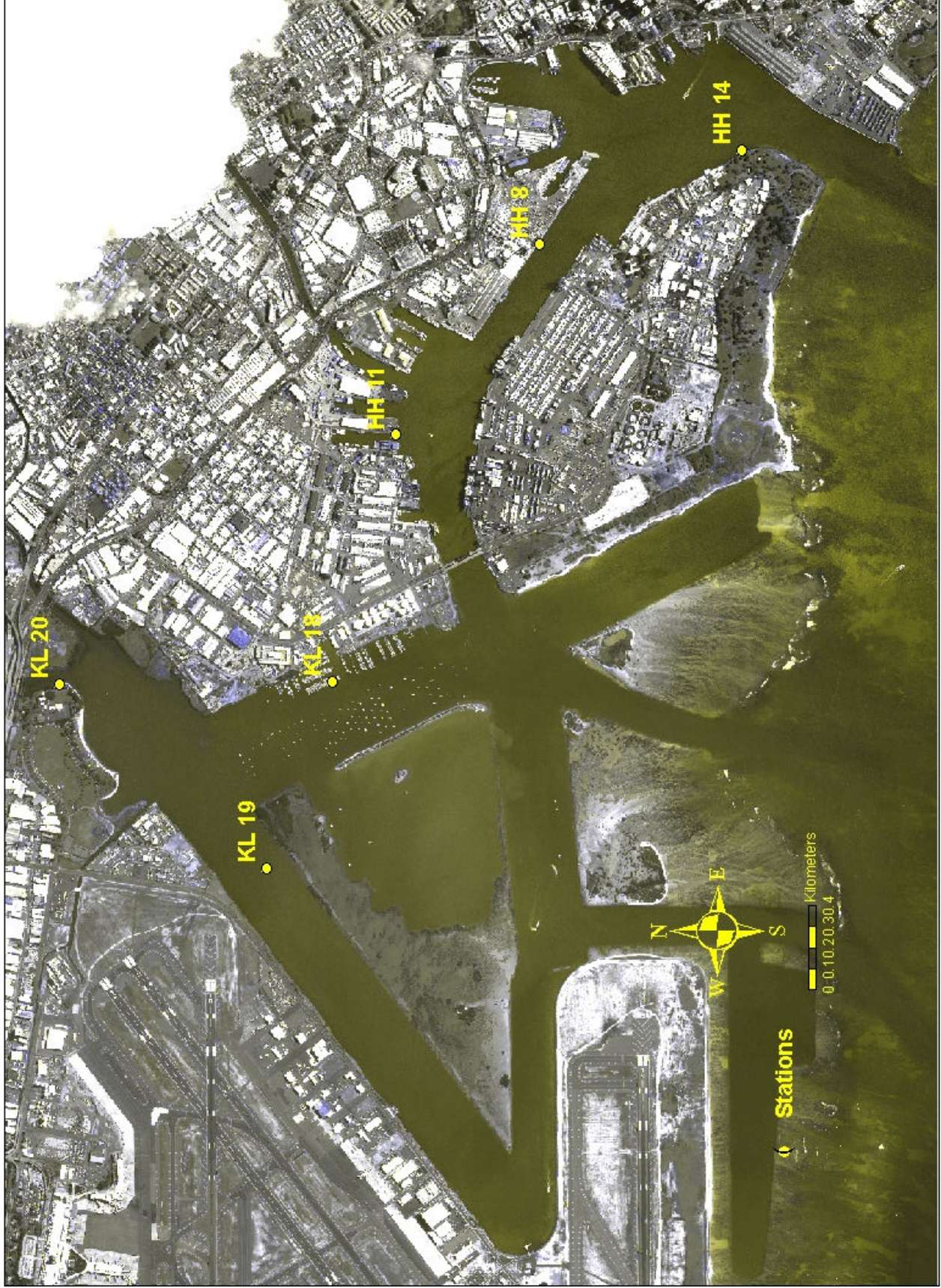


Figure 5. Honolulu Harbor and Ke'ehi Lagoon stations sampled in 1997 and 2008.

Table 1. Station locations, depths, sampling dates and coordinates in decimal degrees and UTM Nad83 Zone 4N for sites surveyed in Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon.

Area	Station	Location	Depth (m)	Date	Latitude	Longitude	NAD83 Northing	NAD83 Easting
Pearl Harbor	PH 1	Channel Entrance	0.5-4	12-FEB-08	21.32446834	-157.97030616	2358407.09314091	606786.13207475
	PH 2	West Loch Entrance	0.5-2	31-JAN-08	21.34393623	-157.97494872	2360558.85822251	606290.60229391
	PH 3	Walker Bay	0.5-1	04-APR-05	21.35849996	-157.99013992	2362160.73533542	604704.91427753
	PH 4	West Loch South	0.5-1	04-APR-05	21.36105551	-158.02044444	2362423.73733911	601560.87140570
	PH 4A	West Loch South	0.5-1	01-APR-08	21.35867824	-158.01335284	2362165.19434877	602297.83663466
	PH 5	West Loch North	0.5	04-APR-05	21.37448332	-158.01236663	2363915.29560966	602389.10860014
	PH 5A	West Loch North	0.5-1	01-APR-08	21.37065816	-158.00809102	2363494.68034371	602835.07033860
	PH 6	Hospital Point	0.5	30-OCT-07	21.34604244	-157.96705741	2360797.34553073	607107.41094805
	PH 6A	Hospital Point South	0.7	12-FEB-08	21.34372643	-157.96546041	2360542.07271489	607274.70486011
	PH 7	Waipi'o Peninsula	0.5-2	30-OCT-07	21.35795848	-157.97353663	2362111.94199827	606426.91273898
Honolulu Harbor	PH 8	Pan Am Landing	0.5-5	25-MAR-08	21.37488071	-157.97768625	2363982.27117574	605984.45548241
	PH 9	Machinist Hull	0.8	04-APR-05	21.38661663	-157.99066664	2365272.62784830	604630.31606684
	PH 9A	Machinist Hull Site	0.8	25-MAR-08	21.38632159	-157.99112840	2365239.66224813	604582.65479514
	PH 10A	Southeast Loch Dock Southeast Loch	0.8	26-FEB-08	21.35597834	-157.95217166	2361907.36452160	608643.74003113
	PH 11	Entrance	0.5	31-JAN-08	21.35901846	-157.94716070	2362247.34829986	609161.09070060
	PH 12	Northeast Ford Island	0.5	26-FEB-08	21.36898982	-157.94902434	2363349.79856134	608960.47139086
	PH 13	Utah Memorial	0.7	04-MAR-08	21.36895370	-157.96225886	2363336.68571914	607588.29007454
	PH 14	HECO Discharge	0.2	04-MAR-08	21.38696926	-157.96052875	2365332.03380055	607754.48536102
	PH 15	Rainbow Bay Marina	0.3	27-NOV-07	21.37201083	-157.93636339	2363693.02708832	610270.95072872
	HH 8	Pier 29-30	1-10	17-APR-08	21.31100139	-157.87365058	2356984.99782062	616821.53177409
Ke'ehi Lagoon	HH 11	Pier 40-41	0.5-8	17-APR-08	21.31721179	-157.88226147	2357666.08445840	615923.47701809
	HH 14	Sand Island Park	1-9	17-APR-08	21.30232997	-157.86941570	2356028.27947246	617267.68588190
	KL 18	Marina Docks	0.2	22-APR-08	21.31998260	-157.89349096	2357964.57174173	614756.57686395
	KL 19	Barge Wreck	0.5-5	22-APR-08	21.32284552	-157.90199968	2358275.30051185	613871.84472935
	KL 20	Stream Mouth	0.5	22-APR-08	21.33164962	-157.89354385	2359255.98231006	614742.02017091

## RESULTS

### A. Station Site Descriptions

#### Pearl Harbor

PH 1. (Latitude 21°19.468'N, Longitude 157°58.218'W). *North side of entrance channel to Pearl Harbor, adjacent to a now unused discharge pipeline from the Iroquois Point sewage treatment plant.* This station is the most exposed to oceanic conditions, with many characteristics of a coral reef environment. A shallow shoreline bench about 0.5 m deep lies along a calcareous sand beach and rises from the adjacent channel of about 10 m depth. The primary substrata are consolidated calcareous submerged beach rock, reef with minimal coverage of live corals, and intermittent coral boulders and cobbles. The site is frequently exposed to short period waves generated by northeast trade winds and shows characteristics of a windward reef environment. It also is directly exposed to large storm waves from the south generated by local Kona storms. A variety of reef fish are present. Benthic fauna are dominated by sponges, tunicates, bryozoans and macroalgae, with a few reef corals. Biota characteristic of both harbor and reef environments occur at this site, reflecting its transition between the two environments.

PH 2. (Latitude 21°20.636'N, Longitude 157°58.497'W). *North side of West Loch entrance channel about 600 m SE of Keka'a Point, on the western shore of Waipi'o Peninsula.* The substratum is consolidated limestone, within medium to fine calcareous white sand areas on the shore and channel sides of the hard substrata. Bottom depths range from 6 m outside of the hard substratum to 1-3 m inshore. Many abandoned wooden pilings provide habitat for wood borers and fouling organisms. Since the site was first surveyed in 1996 a monoculture of the invasive introduced algae *Gracilaria salicornia*, which was not noted at this site in 1996, has developed and now covers virtually 100% of the bottom. This is one of the few sites within the harbor where reef corals occurred in 1996. A single colony of *Porites compressa* at about 2.5 m depth that was approximately 15 cm in diameter in 1996 (Coles 1999) has maintained its growth above the *Gracilaria* and was approximately 0.75 X 1.5 m in diameter in January 2008. Small *Leptastrea purpurea* colonies also occur in shallow areas, but *Pocillopora damicornis*, which were relatively abundant in 1996, were not found in 2007-8, probably having been overgrown by *Gracilaria*.

PH 3. (Latitude 21°21.802'N, Longitude 157°58.555'W). *Walker Bay.* In the 1996 study this site was surveyed in 0.5 m depth near the shoreline of Walker Bay, on the west shore of Waipi'o Peninsula, about half way up West Loch. The water was highly turbid and sediment laden and the substratum was fine-grained silt and mud sediment, with abundant mangroves along a calcareous shoreline bench. Macrofauna growing in and on sponges occurred only on mangrove roots and on debris in shallow water offshore, and the principal macrofauna was *Crassostrea virginica* oysters abundant on mangrove prop roots. Due to warnings of potentially health-hazardous conditions in Walker Bay from the Hawai'i Department of Health, this site was not resurveyed in the present study

PH 4A. (Latitude 21°21.521'N, Longitude 158°00.801'W). *West Loch South.* The 1996 location for this site was 100 m offshore of the mangroves near the western part of West Loch, near the Pearl Harbor National Wildlife Refuge. The substratum was the remains of a metal hull of boat wreck covered with a heavy

growth of oysters and sponges in 0.5-1.0 m. Because of extremely high water turbidity at the time of the present survey sampling for this site was moved ca. 775 m southeast of the 1996 location to an emergent fossil reef platform that provides a hard surface supporting abundant sponges, barnacles and the invasive introduced algae *Acanthophora spicifera* and *Gracilaria salicornia*.

PH 5A. (Latitude 21°22.240'N, Longitude 158°00.485'W). *West Loch North.* The 1996 PH 5 site was in a mangrove area at the head of West Loch near the mouth of Waikele stream, with a substratum of mostly deep, soft, mud-silt sediments and intermittent sponges. The water was highly turbid and sediment laden and depth was 0.5 m. Large *Crassostrea virginica* oysters were very abundant on mangrove prop roots, and numerous shells of apparently recently dead Japanese little-neck clam *Venerupis (Ruditapes) philippinarum* were found in the sediments. Water depth was at the time of the 2008 survey too shallow to reach this site by boat, and the mud was too soft and deep to be able to reach it on foot. Consequently, the location of sampling for this site was moved ca. 615 m southeast of the original location, where only a very few macroinvertebrates and one alga, *Acanthophora spicifera* occurred on or under mangrove prop roots at ca. 1 m depth on a mud bottom.

PH 6A. (Latitude 21°20.624'N, Longitude 157°57.927'W). *Hospital Point South.* Due to security restrictions that prevented re-sampling at the 1996 Drydock Number 4 site, sampling and observations were made approximately 200 m southeast from the original location. The substrata for both locations are concrete pilings and a calcareous bench and slope ranging from 1 m depth to a flat fine sand bottom at 6 m. Macrofauna at 6A was a dense coverage of a suspension feeding fouling community on the pier pilings, especially chaetopterid polychaete worms and sponges, bryozoans and tunicates, and the introduced octocoral *Carijoa aff. riisei*.

PH 7. (Latitude 21°21.477'N, Longitude 157°58.412'W). *Waipio Peninsula along the Middle Loch Channel across from Ford Island.* This shallow bench is approximately 10 m wide, and at the edge of the bench depth increases to 2-3 m to a flat, coarse sand bottom with abundant coral rubble. The shallower area is densely covered with *Gracilaria salicornia*, which forms a habitat for numerous native and introduced macroinvertebrates. Density and thallus length of the *Gracilaria* have increased noticeably since 1996 survey, creating a near monoculture on the bottom. However, the coral *Leptastrea purpurea*, which did occur here in 1996 has also increased in abundance, with numerous colonies up to 5 cm in diameter occurring where hard substratum is still available.

PH 8. (Latitude 21°22.493'N, Longitude 157°58.661'W). *West side of Waiawa Peninsula at the former Pan American Clipper Landing Dock.* The substrata sampled was concrete and wood pilings offshore of the dock down to 5 m depth. This site had the greatest number of reef fishes noted at any site within the harbor, including abundant large *Acanthurus blochi* and *Kuhlia sandvicensis*. The introduced algae *Gracilaria salicornia* was noted to be very abundant in shallow water along the shoreline.

PH 9A. (Latitude 21°23.179'N, Longitude 157°59.468'W). *Head of Middle Loch in the vicinity of the former location of the floating dry-dock USS Machinist.* The dry-dock was brought to Pearl Harbor from the Philippines in 1992 and transferred to Guam in 1999. In 1996 samples were taken from the steel hull of the *Machinist* itself, from the shallow subtidal to the bottom of the hull at 8 m depth, and from nearby

wooden pilings from the intertidal to 4 m depth. Because the *USS Machinist* was moved from Pearl Harbor in 1999, 2008 samples and observations were taken within 100 m of its former location from the nearest stationary hard surface, which was a marker buoy with concrete pilings and adjacent wooden pilings that were highly eroded from shipworm feeding.

PH 10A. (Latitude 21°21.359'N, Longitude 157°57.131'W). *Southeast Loch Dock.* Because of ship activity at the 1996 site adjacent to Pearl Harbor Navy Shipyard in Southeast Loch, the site was moved to a docking basin just west of the 1996 Dock B-2 1 site. Both sites are in the vicinity of Navy and industrial operations, where considerable ship traffic, hull cleaning and ship maintenance occurs. Despite this high industrial use of the area, a very abundant fouling fauna was noted on all hard surfaces present. Sampling was conducted from and observations made among the wooden and concrete dock pilings from the shallow subtidal down to 6 m.

PH 11. (Latitude 21°21.541'N, Longitude 157°57.830'W). *Southeast Loch Entrance.* Observations were made along the pier pilings on the east side of the South Channel, near north side of the entrance to Southeast Loch. Samples were taken from 0.5 to 5 m depth. Although a few *Pocillopora damicornis* and *Leptastrea purpurea* reef corals were found at this site in 1996, none were found in January 2007 on any of the hard surfaces sampled, which were dominated by abundant fouling organisms, many of them introduced.

PH 12. (Latitude 21°22.139'N, Longitude 157°56.941'W). *Northeast Ford Island* The original site was northeast of Ford Island and the *USS Arizona* Memorial and just northwest of Mokunui Island, near the present Ford Island bridge terminus. In 1996 the substratum at this site was clay compacted to the consistency of soft rock but still capable of being broken apart by hand, and outcroppings of calcareous beach rock and reef. The concrete buttresses of the Ford Island Bridge now provide ample hard substratum for abundant fouling, especially for a variety of sponges, and the bottom in 2008 was covered with abundant *Gracilaria salicornia* invasive algae.

PH 13. (Latitude 21°22.137'N, Longitude 157°57.736'W). *Utah Memorial.* On the northwest side of Ford Island, on concrete dock pilings and on the surface of the *USS Utah* at the memorial along the north channel into East Loch. A highly diverse invertebrate fauna was noted, including abundant specimens of *Pocillopora damicornis* corals, the jewel box bivalve *Chama* sp. and the hoof shell *Hipponix imbricatus*.

PH 14. (Latitude 21°23.218'N, Longitude 157°57.632'W). *HECO Discharge.* Along the sheet piling separating the intake and discharge zones for cooling water from the Hawaiian Electric Waiiau Generating Station at the head of East Loch. Samples were taken from the discharge side from the sheet piling from the intertidal to the base of the piling at 2 m, from about 100 m beyond the thermal effluent discharge point to the outfall, where the temperature is approximately 5°C above ambient. Sponges dominate the benthos, especially in the vicinity of the outfall, where the substratum is largely a massive sponge "reef" that covers the entire bottom along the sheet piling side of the discharge. Other organisms abundant along the sheet piling are dense populations of the anemone *Aiptastia puchella*, hydroids and bryozoans.

PH 15. (Latitude 21°22.321'N, Longitude 157°56.182'W). *Rainbow Bay Marina, at the northeast head of East Loch.* Sampling was done from the surfaces of floating buoys and dock floats of the Marina's piers and docks, which are dominated by a dense cover of a variety of sponges. Offshore the substratum is a shallow, gently sloping intertidal to subtidal zone composed of calcareous rock and rubble with a thin sediment cover, and soft sediments dominating further offshore. Both substrata were dominated in 1996 by a moderately heavy growth of fine filamentous green algae (cf. *Chlorodesmis* sp.) and intermittent patches of high coverage of the branching leafy green macroalga *Caulerpa sertularoides*, but in 2008 the dominant benthic cover is patchy to dense mats of the invasive algae *Gracilaria salicornia*.

#### Honolulu Harbor-Ke'ehi Lagoon

HH 8. (Latitude 21° 18.660'N, Longitude 157° 52.419'W). *Pier 29-30.* This site lies between Piers 29 and 30 along the Kapālama Channel, and it represents a relatively natural environment compared to other areas in Honolulu Harbor. Although the structure of area was formed from dredging a channel through a former reef flat, it has the appearance of reef slope outside of a narrow fringing reef that extends about 5 m from the shoreline. This 1-2 m deep flat area is rubble strewn and quite barren, but the slope outside the reef has a variety of coral species with moderate coverage and numerous fishes, which are probably attracted to the rugose habitat provided by the numerous small holes and ledges on the slope. The reef slopes to nearly 10 m (depth where the bottom levels off to a fine silt substratum. Observations and sampling were also done just northwest of this site along Pier 30, where the concrete pilings of the pier and the reef substratum below have heavy fouling and abundant sponges with a heavy silt coating.

HH 11. (Latitude 21° 19.033'N, Longitude 157° 52.936'W). *Pier 40-41.* Sampling for this station was done in 1997 from the surface of the main dry-dock operating in Honolulu Harbor, located at the end of Pier 41. Sampling for the present study was made across the basin from Pier 41, on the concrete surfaces along the side and front of Pier 40, which provides a habitat for numerous corals, sponges and large tunicates.

HH 14. (Latitude 21° 18.140'N, Longitude 157° 52.165'W). *Sand Island Park.* Located at the border of Anuenue Fisheries Center and Sand Island Park, near the beginning of the harbor entrance channel. The substratum is a steep slope dredged from the reef and small boulders 1-2 m in diameter extending down to the fine sediment harbor bottom at 9 m depth. Corals and associated invertebrates were moderately abundant and a variety of fish species were present.

KL 18. (Latitude 21° 19.183'N, Longitude 157° 53.663'W). *Marina Docks.* Keehi Lagoon Marina floating docks located midway between Honolulu Harbor's Kalihi Channel and the mouths of Kalihi and Moanalua Streams. The dock surfaces are very heavily fouled and are anchored in 3 m of turbid water over a muddy sediment bottom.

KL 19. (Latitude 21° 19.087'N, Longitude 157° 54.446'W). *Barge Wreck.* Located midway along the reef side of the Lagoon Drive seaplane runway, the site is an iron barge hull stranded on the reef edge. Depth on the runway side of the barge was 4.5 m (and decreased to 1 m on the reef side of the barge. The hull had only moderate fouling in 1997 with a heavy sediment coating, and the bottom substratum was fine sand to silt. In 2008 the barge surface was heavily fouled, especially with sponges and tunicates

KL 20. (Latitude 21° 19.910'N, Longitude 157° 53.586'W). *Stream Mouth*. The site was at the mouth of Moanalua Stream where abundant red mangrove (*Rhizophora mangle*) roots provide the only solid substratum in the muddy bottom. Samples were taken from the roots at 0-0.5 depth.

**B. Biota Observations and Collections**

This study identified a total of 298 taxa observed or collected from the 14 stations sampled in Pearl Harbor and 195 taxa from the six stations in Honolulu Harbor and Ke'ehi Lagoon. These are listed and compared with previous reports from those locations in Appendix A and listed by station in Appendices B and C. The result of the Sorenson's similarity analysis for the results from all locations are shown in Figure 6 with the total numbers of taxa identified from each station, and the numbers of taxa found at each station are summarized on the maps in Figure 7.

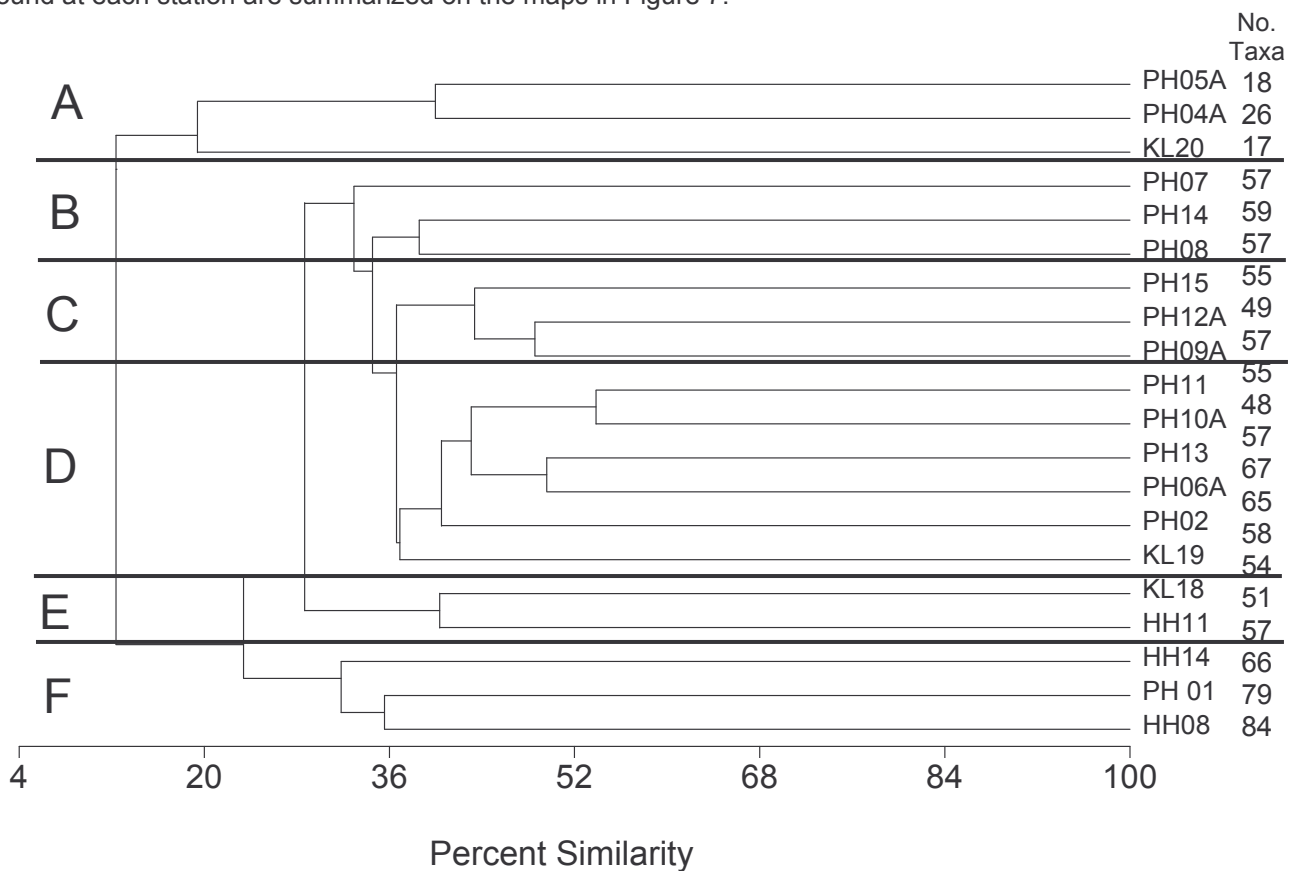


Figure 6. Dendrograph of Sorenson similarities and numbers of taxa for all sites sampled in Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon.

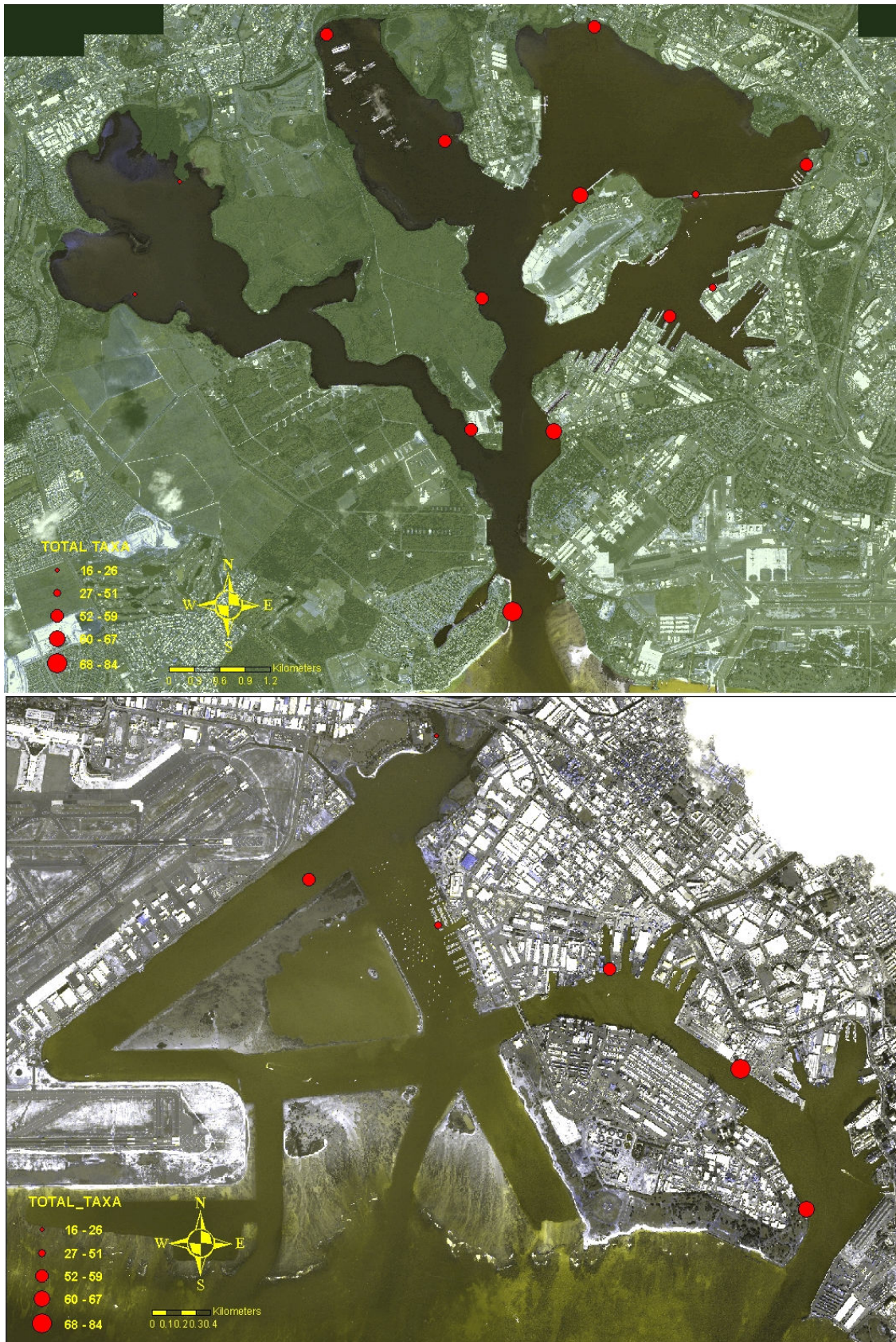


Figure 7. Distributions of numbers of taxa identified at Pearl and Honolulu Harbors and Ke'ehi Lagoon.



Both figures indicate that the distributions of the numbers of taxa are determined by proximity of the site to harbor mouths and oceanic conditions, and that number of taxa decrease as conditions become more isolated and water circulation becomes more stagnant. Six station clusters are indicated in the dendrograph in Figure 6 that are associated with numbers of taxa and the position of the sites within the harbors or Ke'ehi Lagoon. Cluster A consists of the three stations with the lowest taxa numbers that were in highly turbid mangrove areas in West Loch, Pearl Harbor or at the mouth of Moanalua Stream in Ke'ehi Lagoon. By contrast, Cluster F consists of the three stations with the highest numbers of taxa closest to harbor entrances at Pearl Harbor and Honolulu. All three of these sites showed characteristics of reef environments, with many reef corals and reef fishes that did not occur at most interior sites more remote from the open ocean, and the environment at these three stations can be considered transitional from ocean reefs to more typical harbor conditions. Clusters B and C consist of three stations each, with intermediate numbers of taxa, and Cluster B including sites from Waipio and Waiawa Peninsulas and the Wai'au Power Station outfall at the head of East Loch. Cluster C included two other East Loch stations at Rainbow Bay Marina and the Ford Island Bridge and one station at the head of Middle Loch. Cluster D is the largest and is composed of the remaining stations in Pearl Harbor, from the tip of Waipi'o Peninsula, Navy pier areas along the entrance to East Loch, and the *USS Utah* memorial on the northwest side of Ford Island. This cluster also included the station at the wrecked barge in Ke'ehi Lagoon, and may be considered the most representative of fouling communities associated with piers and hard surfaces in the harbors. Cluster E included stations near the Honolulu Harbor drydock and at the Ke'ehi Lagoon Marine, with similar substrata and environments as Cluster D, but most sites with slightly fewer taxa than in Cluster D.

Although Pearl Harbor was thoroughly sampled in two major studies in the 1971-72 and again in 1996 at many or all of the present sites, and collections in the harbor date back to the beginning of the 20<sup>th</sup> century, a substantial number of newly reported genera or species were identified from the present study. Likewise, the six sites in Honolulu Harbor and Ke'ehi Lagoon produced many new reports that were not recorded from 20 harbor or lagoon sites in the previous comprehensive sampling in 1997 or from previous studies. These newly reported genera are summarized for each station and all sites combined in Figure 8. Overall, 75, or about 25% of the 298 taxa identified by the present study for Pearl Harbor were new reports for genera or species, and 41 or about 20% of the 195 total were new for Honolulu Harbor-Ke'ehi Lagoon. The most new reports, by number or percent of total were near the entrances for both harbors, i.e. 24 (30.4%) at Station 1 in Pearl Harbor, and 18 (21.2%) at Honolulu Harbor Station 8, corresponding to sites of highest species numbers and transitional coral reef environments. In Pearl Harbor, the second and third lowest (2, 11.1% and 3, 11.5%) new reports occurred at the West Loch sites that had the fewest total taxa, and in Honolulu Harbor-Ke'ehi lagoon this occurred at KL20 (1, 5.3%), the site of fewest total taxa for the entire study.

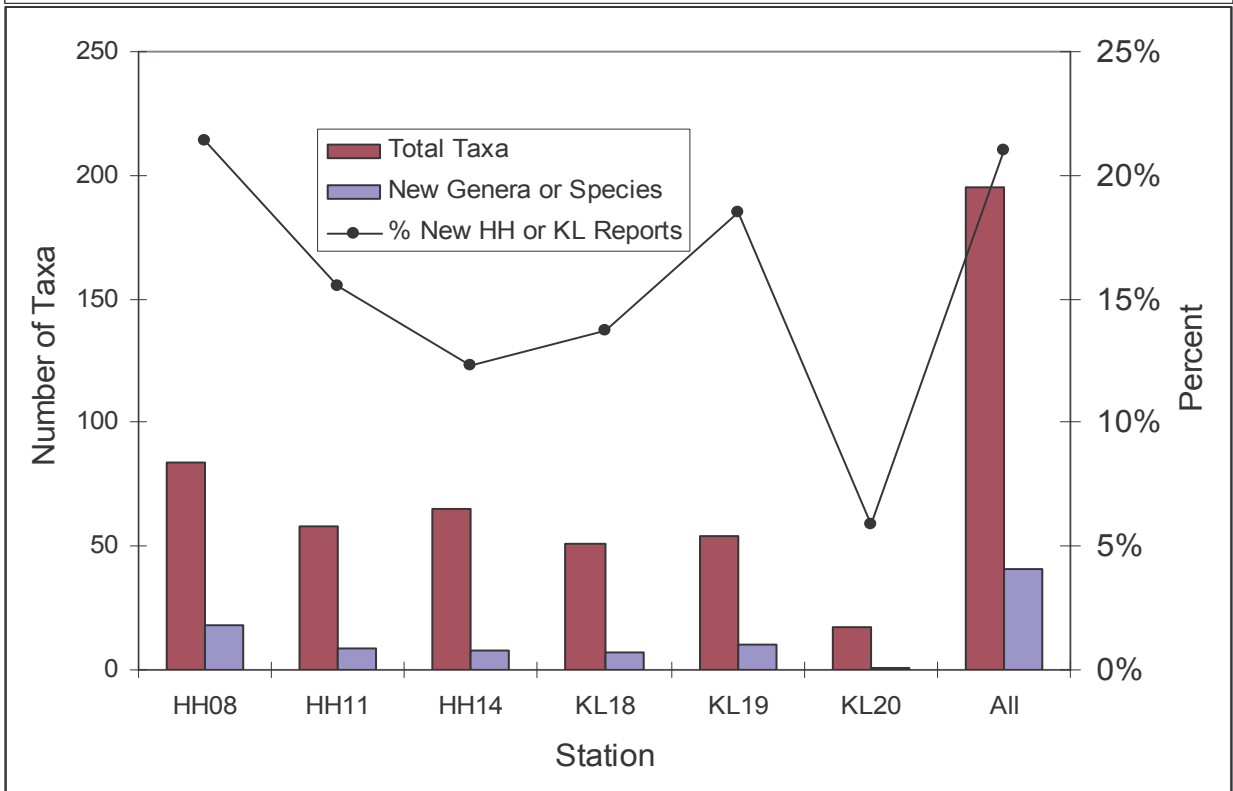
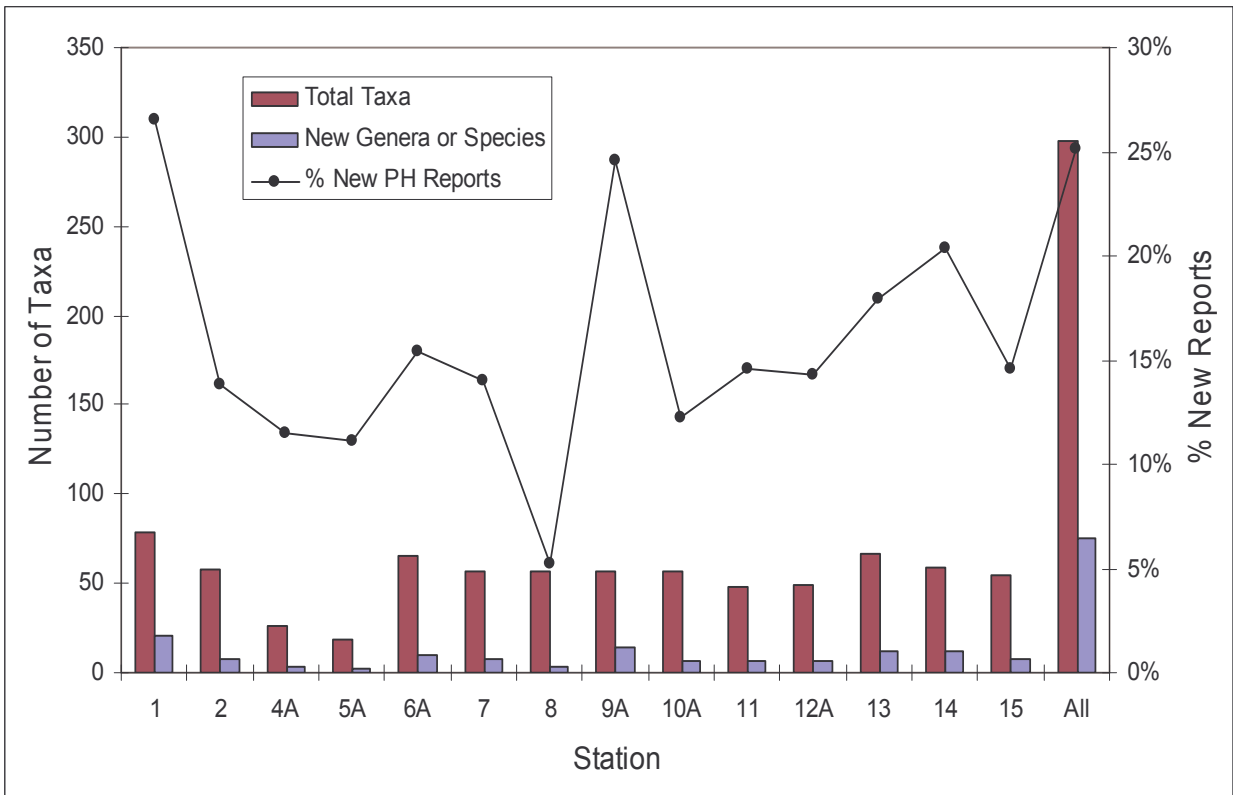


Figure 8. Total taxa and numbers of new genera or species found in Pearl and Honolulu Harbors and Ke'ehi Lagoon.

A substantial portion of the total taxa identified in the study are considered introduced or cryptogenic (i.e. of uncertain origin but with some introduced characteristics) for Hawai'i per the checklist developed by Carlton and Eldredge (2009). Previously unreported genera or species of sponges, hydroids, polychaetes and ascidians not designated by Carlton and Eldredge were also tentatively assigned cryptogenic status after consultation with taxonomic experts for those respective groups. Overall, 95 (32%) of the 298 taxa identified for all sites in Pearl Harbor are designated introduced or cryptogenic genera or species, and 68 (35%) of the 195 taxa from the six sites in Honolulu Harbor and Ke'ehi Lagoon. Figure 9 shows the distributions of introduced and cryptogenic species and their proportion of total reports for all the stations. Percent introduced or cryptogenic species ranged 29 to 65% of total taxa for individual stations in Pearl Harbor and from 18 to 59% for stations in Honolulu Harbor-Ke'ehi Lagoon. These values for individual stations were greater than overall means because many introduced and cryptogenic species were more widely distributed throughout the harbors than many of the native species. This is reflected by the low percent values near harbor entrances at Station 1 in Pearl Harbor and Station 14 in Honolulu Harbor, compared to the high values in the mangrove areas at Stations 4A and 5A, and in the vicinity of the Navy shipyard at Stations 10A, 11 and 12. Similarly, the highest percent component of total taxa that were introduced or cryptogenic in Honolulu Harbor-Ke'ehi Lagoon occurred at in the mangrove area at Ke'ehi Station 20, and at Ke'ehi Stations 18 and 19, relatively isolated from oceanic circulation and having fewer total taxa than at Honolulu Harbor stations.

The previous survey of 15 stations in Pearl Harbor in 1996 (Coles et al. 1997) identified 96 genera or species considered to be introduced or cryptogenic, and a similar study in 1997 identified 90 at 20 stations in Honolulu Harbor-Ke'ehi Lagoon (Coles et al 1999b). In Pearl Harbor 37 introduced or cryptogenic genera or species were not previously found in the 1996 survey, 33 were not previously found in Honolulu Harbor-Ke'ehi Lagoon. Of those 17 genera or species, mostly sponges, were new reports for Hawai'i, with eleven found in Pearl Harbor and eleven in Honolulu Harbor-Ke'ehi Lagoon (Table 2).

Of the 95 introduced or cryptogenic genera or species found in Pearl Harbor and the 68 in Honolulu Harbor-Ke'ehi Lagoon, seven are considered invasive, i.e. potentially alter the character of the environment in the introduction location and/or threaten the survival or propagation of native species through uncontrolled competition. The two most problematic of these are the red algae *Acanthophora spicifera* (Figure 10a) and *Gracilaria salicornia* (Figure 10b), and these were a focus of the present study that is described in the following Section C. The other invasive species are the Red Mangrove *Rhizophora mangle* (Figure 10c), the Orange Keyhole Sponge *Mycale grandis* (Figure 10d), the Snowflake Coral *Carijoa* aff. *riseii* (Figure 10e), the Caribbean Barnacle *Chthamalus proteus* (Figure 10f), and the Asian Stomatopod *Gonodactylaceus falcatus*.

The distribution of these species among the stations in both harbor areas is shown in Figure 11. *Rhizophora mangle* occurred at ten sites and was the dominant habitat former at all interior locations where the shorelines have not been hardened by construction of piers or seawalls. It also co-occurred

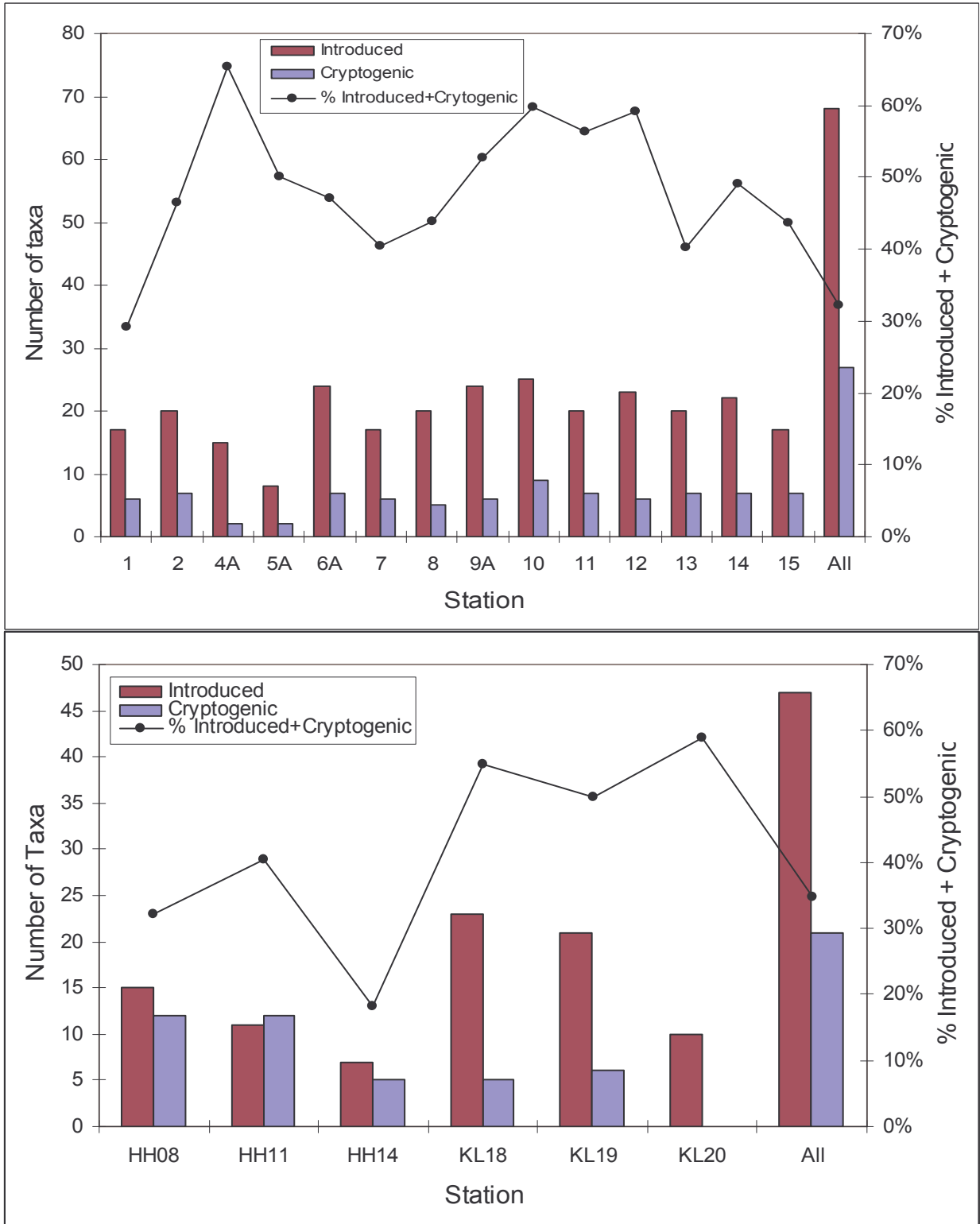


Figure 9. Numbers of introduced or cryptogenic genera or species and percent of total taxa observed or collected in Pearl and Honolulu Harbors and Ke'ehi Lagoon.

Table 2. New genera and species reports for Hawai'i identified from Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon.

Pearl Harbor	Scientific name	Author Date	Origin	1	2	4A	5A	6A	7	8	9A	10A	11	12A	13	14	15
Phylum																	
PORIFERA	<i>Iotrochota purpurea</i>	(Bowerbank, 1875)	Cryptogenic	x													
PORIFERA	<i>Topsentia halichondrioides</i>	(Dendy, 1905)	Cryptogenic	x				x	x								
CHORDATA	<i>Lissodendoryx (Lissodendoryx) similis</i>	Thiele, 1899															
PORIFERA	<i>Monanchora clathrata</i>	Carter, 1883	Cryptogenic	x				x									
PORIFERA	<i>Mycale phyllophila</i>	Hentschel, 1911	Cryptogenic		x												
PORIFERA	<i>Raspailia (Clathrodendron) darwinensis</i>	Hooper, 1991	Cryptogenic									x	x				
CNIDARIA	<i>Corydendrium parasiticum</i>	(Linnaeus, 1767)	Cryptogenic									x	x				
CNIDARIA	<i>Glytia cf. gracilis</i>	(M. Sars, 1850)	Cryptogenic		x			x									x
ANNELIDA	<i>Amphiglena mediterranea</i>	(Leydig, 1851)	Cryptogenic							x							
MOLLUSCA	<i>Liocncha faszigata</i>	Sowerby, 1851	Cryptogenic														
CHORDATA	<i>Diplosoma cf. spongiforme</i>	(Giard, 1872)	Cryptogenic									x	x				
CHORDATA	<i>Polycarpa cryptocarpa</i>	(Sluiter, 1885)	Cryptogenic														x
Honolulu Harbor-Ke'ehi Lagoon																	
Phylum																	
PORIFERA	<i>Scientific name</i>	Author Date de Laubenfels, 1935	Origin	HH08	HH11	HH14	KL18	KL19									
PORIFERA	<i>Monanchora dianchora</i>		Cryptogenic	x	x			x									
PORIFERA	<i>Iotrochota baculifera</i>	Ridley, 1884	Cryptogenic		x												
PORIFERA	<i>Iotrochota purpurea</i>	(Bowerbank, 1875)	Cryptogenic	x	x												
PORIFERA	<i>Raspailia (Clathrodendron) darwinensis</i>	Hooper, 1991	Cryptogenic	x	x												
PORIFERA	<i>Scopalina sp.</i>		Cryptogenic	x													
CNIDARIA	<i>Glytia cf. gracilis</i>	(M. Sars, 1850)	Cryptogenic														
CNIDARIA	<i>Halopteris plagiocampa</i>	(Pictet, 1893)	Cryptogenic	x		x											
ANNELIDA	<i>Oenone fulgida</i>	Savigny, 1818	Cryptogenic														
MOLLUSCA	<i>Zafra cf. hervieri</i>	(Pace, 1903),	Cryptogenic			x											
CHORDATA	<i>Diplosoma cf. spongiforme</i>	(Giard, 1872)	Cryptogenic														
CHORDATA	<i>Polycarpa cryptocarpa</i>	(Sluiter, 1885)	Cryptogenic	x	x												

with many of the other invasive species, such as *Mycale grandis*, which was present to common at ten stations throughout Pearl Harbor and two in Honolulu Harbor-Ke'ehi Lagoon. *Chthamalus proteus* occurred on hard surfaces in the intertidal zone at 11 sites in Pearl Harbor and two in Ke'ehi Lagoon. *Carijoa* aff. *riisei* occurred at four sites in Pearl Harbor, at the entrance and along the main channel to the Ford Island Bridge in East Loch. *Gonodactylaceus falcatus* was found at only one site along the east side of Waipi'o Peninsula in Pearl Harbor, but it is undoubtedly more common, based on its cryptic nature and numerous reports from previous studies in the harbors

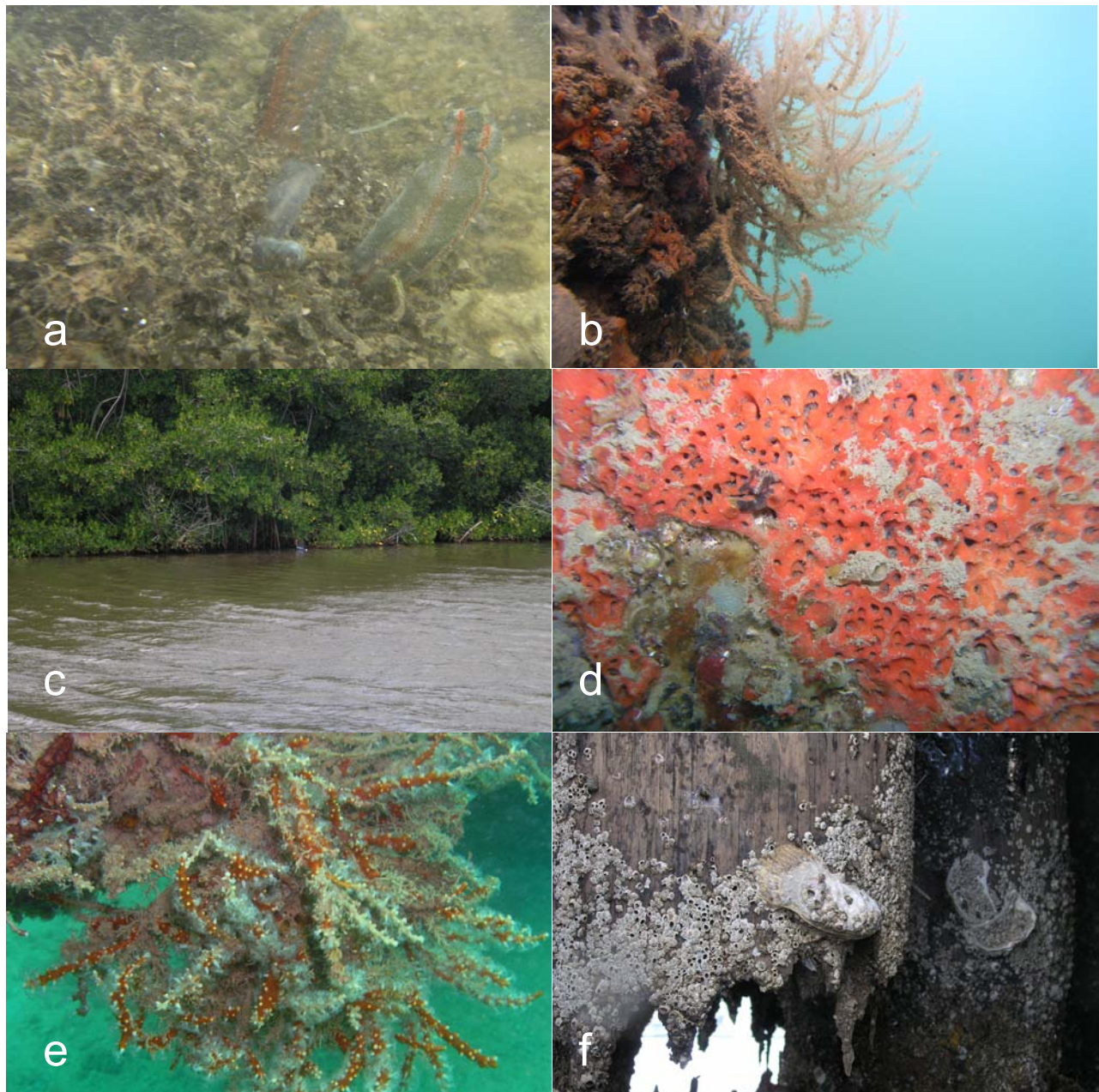


Figure 10. Invasive species in Pearl Harbor. **a**: Dense mat of *Gracilaria salicornia* with sea cucumber *Opheodesoma spectabilis* at PH Sta. 12; **b**: *Acanthophora spicifera* at PH Sta. 9A; **c**: *Rhizophora mangle* at PH Sta. 5A; **d**: *Mycale grandis* at PH Sta. 11; **e**: *Carijoa* cf. *riisei* at PH Sta. 1; **f**: *Chthamalus proteus* with *Crassostrea* sp. at PH Sta. 8.

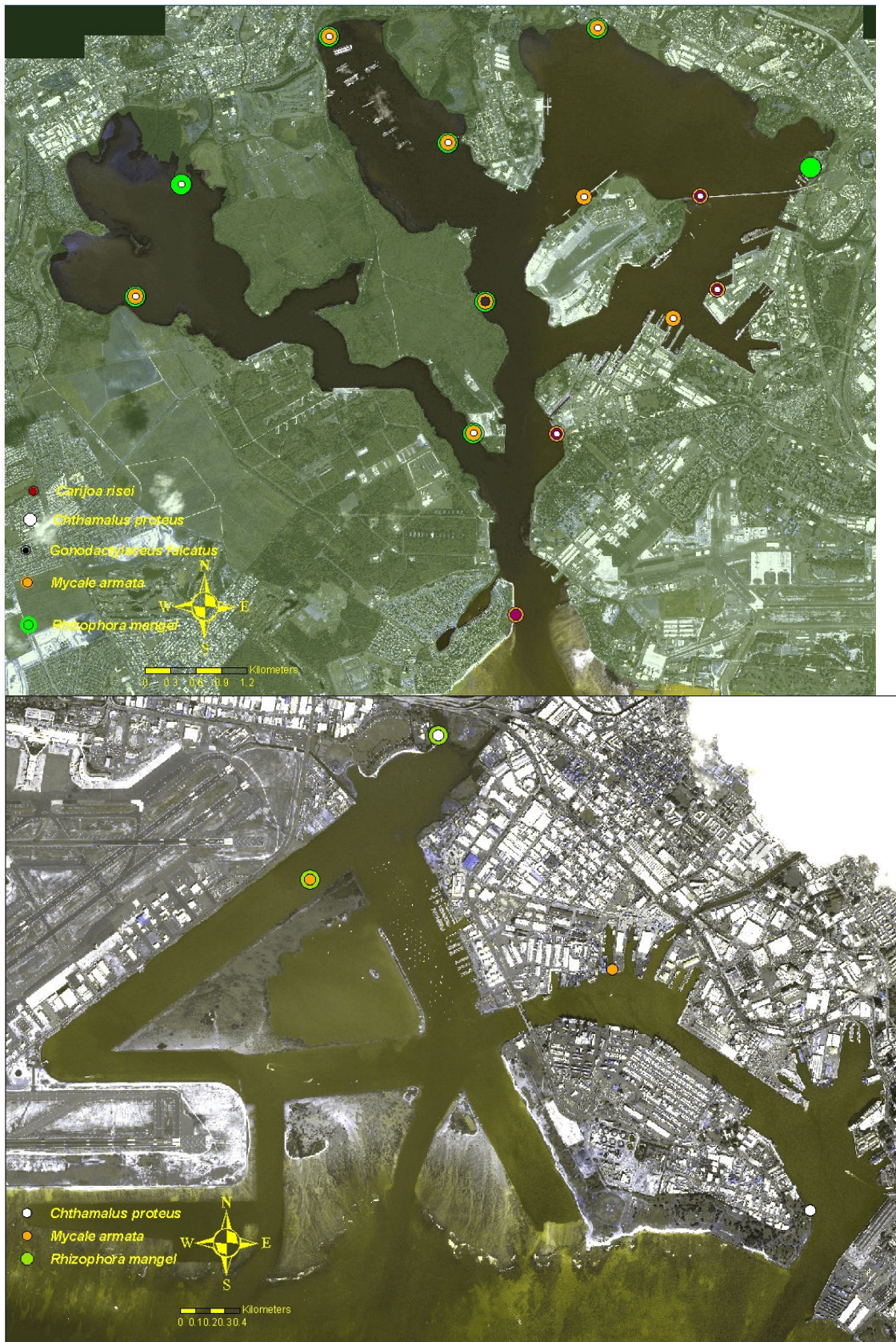


Figure 11. Locations of invasive introduced species in Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon.

### C. Introduced Invasive Algae

Table 3 compares the stations where the introduced invasive algae *Gracilaria salicornia* and *Acanthophora spicifera* occurred at Pearl Harbor collection sites in 1996 and 2007-8, and Table 4 for collection sites in Honolulu Harbor and Ke'ehi Lagoon in 1997 and 2008. The "A" station designations in Table 3 indicate sites where, for various reasons, the collection site in 2007-8 did not exactly correspond to 1996, but was located nearby (Figure 4). The results indicate that both *Gracilaria* and *Acanthophora* were substantially more widespread in Pearl Harbor and Ke'ehi Lagoon in 2007-8 than ten years earlier. *G. salicornia* was recorded 1996 only at Station 7 along Waipi'o Peninsula, Station 8 at the Pan Am Landing and Station 15 at the Rainbow Bay Marina dock. In 2007-8 *Gracilaria* was also found at Station 1 near the harbor entrance, Stations 2 and 4A in West Loch, 9A at the head of Middle Loch, and 12A northeast of Ford Island. Although it was not recorded at the Rainbow Bay Marina dock station, it was abundant on the bottom nearby.

*Acanthophora spicifera* was not recorded anywhere on the 1996 Pearl Harbor collection surveys, but did occur in 2007-8 at Stations 4A and 5A in West Loch, Station 7 along Waipi'o Peninsula, Station 13 at the Utah Memorial northwest of Ford Island and Station 14 along the HECO discharge sheet piling.

Table 3. Introduced algae observed at Pearl Harbor collection sites in 1996 and 2007-2008.

Algal Species	1		2		4A		5A		7		8		9A		12A		13		14		15	
	96	08	96	08	96	08	96	08	96	07	96	08	96	08	96	08	96	08	96	08	96	07
<i>Gracilaria salicornia</i>		x		x		x			x	x	x	x				x					x	x
<i>Acanthophora spicifera</i>						x		x		x								x		x		

*Gracilaria salicornia* was not found at any of the 22 Honolulu Harbor or Ke'ehi Lagoon collection sites in 1997 but was abundant at Station 19 in Ke'ehi Lagoon in 2008. *Acanthophora spicifera* occurred at Station 14 by Sand Island Park in both 1997 and 2008.

Table 4. Introduced algae observed at Honolulu Harbor and Ke'ehi Lagoon collection sites in 1997 and 2008.

Algal Species	KL14		KL19	
	1997	2008	1997	2008
<i>Gracilaria salicornia</i>				x
<i>Acanthophora spicifera</i>	x	x		

In order to obtain a more comprehensive view of distributions of these invasive algae, a series of snorkeling surveys were made in 2007-8 along the shorelines of Pearl Harbor and on shallow areas of Ke'ehi Lagoon. For these, trained observers made observations of algae relative abundance approximately every 50 m while swimming along the shoreline or being towed slowly while using a manta board. A Garmin 76 GPS was used to mark the locations of algal abundance observation, and these coordinates were later downloaded and mapped using ArcMap 9.1 software. The relative abundances of *Gracilaria salicornia* and *Acanthophora spicifera* were recorded corresponding to the following criteria:



- Category 0: not present
- Category 1: present in low abundance, patchy
- Category 2: abundant and forming mats
- Category 3: dense cover, thick 3 dimensional mats may resemble "tumbleweeds"

Figure 12 shows the results of these observations in Pearl Harbor for *Gracilaria salicornia* and Figure 13 for *Acanthophora spicifera*. Figure 14 summarizes the total number of observations for each of the four categories for both species. The data include all locations in Pearl Harbor where the shoreline could be accessed and observations could be made. This excluded militarily secure areas, areas where the shoreline has been altered to vertical concrete walls or piers, areas where bottom depths exceed the zone of algal growth, areas where the shoreline is mostly stands of the red mangrove *Rhizophora mangle*, areas where high water turbidity prevents sufficient light on the bottom to support algal growth, or areas where shallow depths prevented approaching the shoreline from offshore. Therefore it was not feasible to make observations at the heads of West Middle and East Lochs, along much of the main channel, or anywhere on the east side of the harbor from Hospital Point to Rainbow Bay Marina, including the entire shipyard area in Southeast Loch.

For those areas that were accessible, a total of 1215 observations were made in Pearl Harbor, with 876 or 72% of the locations showing *Gracilaria salicornia* to be present in categories 1 to 3. Figure 14 shows the frequencies in each category for both *Gracilaria* and *Acanthophora*. For *Gracilaria*, the most observations (34%) were in the maximum abundance Category 3, well exceeding the number of observations with no algae (8.3%), and followed by 23.6% for Category 2 and 14.4% in Category 1. Figure 14 shows that category distributions were patchy, with areas of highest abundance often separated by areas of no occurrence along much of West Loch, the Waipi'o and Waiawa Peninsulas and the west shore of Ford island. Virtually all sections of the harbor where observations could be taken had substantial cover of *Gracilaria* except along the north and east shores of East Loch and along the east side of the main channel entrance where wave turbulence probably inhibits *Gracilaria* recruitment and growth.

The distributions and summary of category values for *Acanthophora spicifera* (Figures 13 and 14) indicates that it is much less wide spread and abundant than *Gracilaria* in Pearl Harbor. Of the 1215 observations, 972 (80%) had no *Acanthophora*, and 149 (12.3%) were in Category 2, followed by 78 (6.4%) in Category 2 and only 16 (1.3%) in Category 3. Although the two algae often co-occurred, *Acanthophora* was frequently found in areas where high water turbidity and muddy sediments excluded *Gracilaria*, such as in the most inner reaches of West and Middle Lochs. For example, at collection Station 5A turbidity was so high that visibility was less than 0.25 m, but *A. spicifera* was among the few organisms growing among mangrove roots at ca. 1.5 m depth, indicating the tolerance to light low and the durability of this hardy introduced species. Since comprehensive surveys for introduced algae were not done in 1996, it is not possible to definitively know how much the extensive coverage of *Gracilaria salicornia* and *Acanthophora spicifera* found on the recent surveys occurred at that time. However, it is highly probable that coverage and abundance of these two invasive species has increased greatly in the last decade. Of the 15 stations where observations and collections were made in 1996, only two had

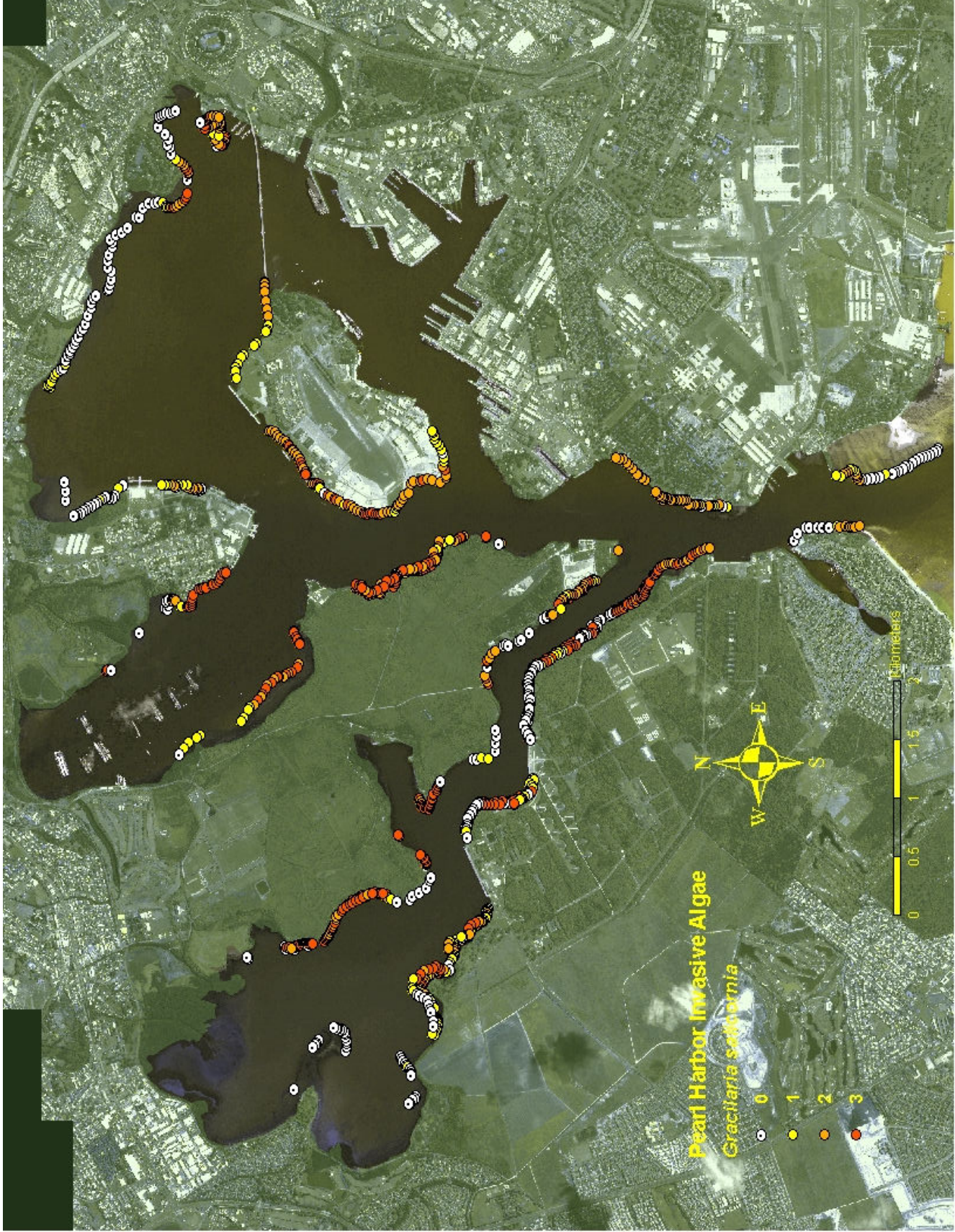


Figure 12. Distribution of *Gracilaria salicornia* in Pearl Harbor determined from snorkeling surveys, 2007-2008.

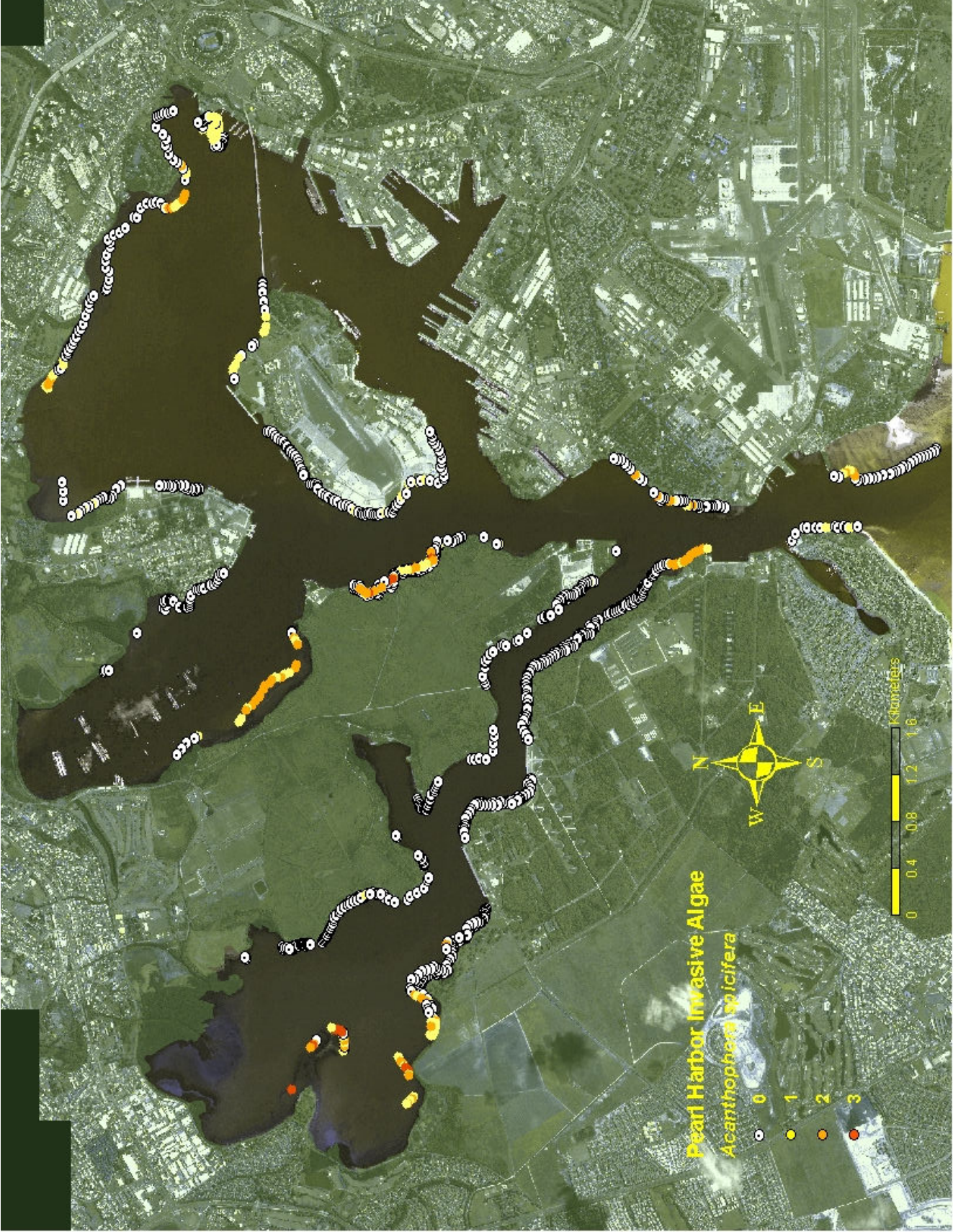


Figure 13. Distribution of *Acanthophora spicifera* in Pearl Harbor determined from snorkeling surveys, 2007-2008.

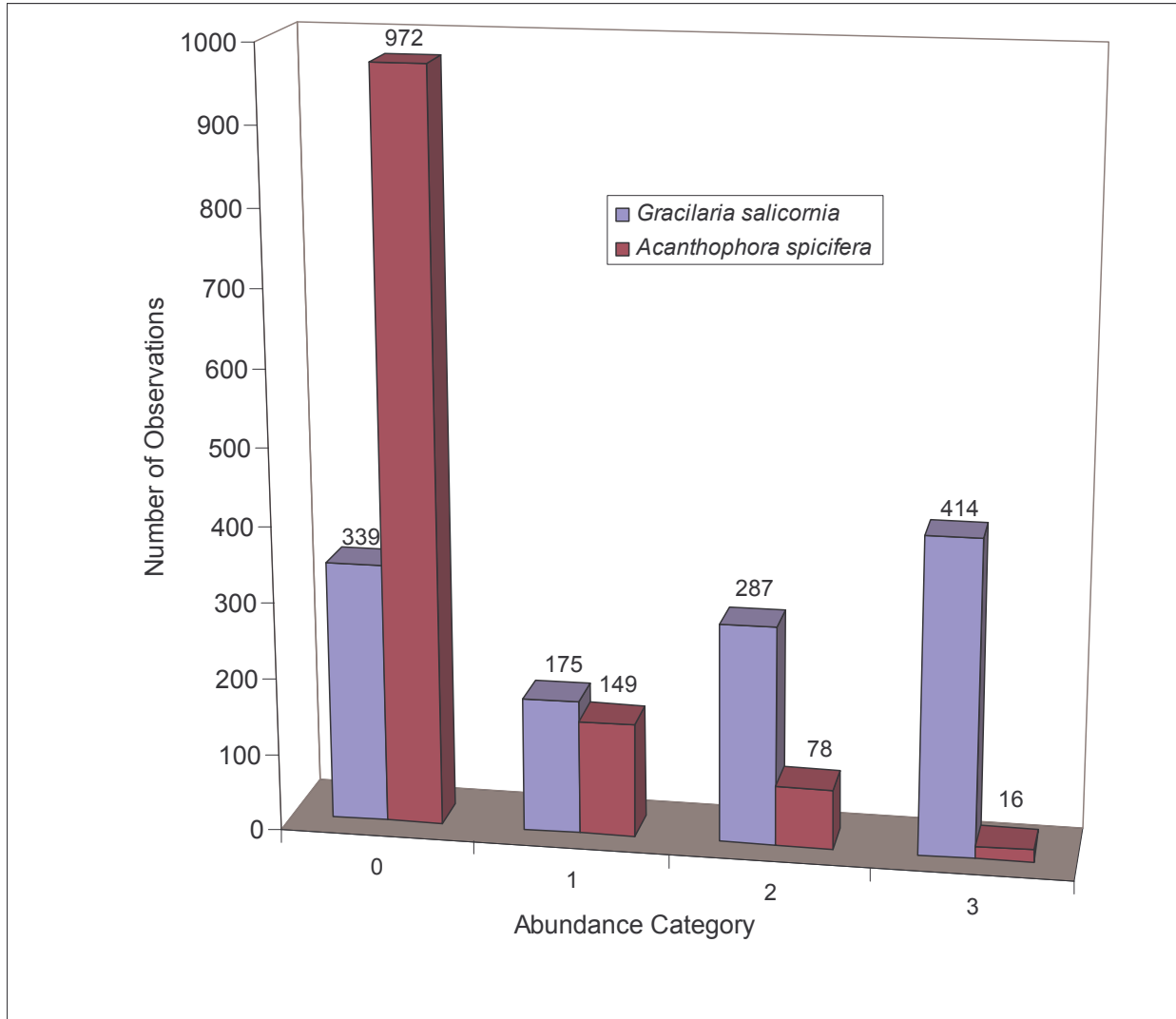


Figure 14. Frequencies of occurrence of *Gracilaria salicornia* and *Acanthophora spicifera* in the four abundance categories for the 1215 observations made in Pearl Harbor.

*Gracilaria* and none had *Acanthophora*, and *Gracilaria* was relatively abundant in 1996 only at Station 2 along Waipi'o Peninsula and station 8 near the Pan Am Clipper landing at Waiawa Peninsula.

Invasive algae surveys were also conducted in Ke'ehi Lagoon 2008 using the same technique as used in Pearl Harbor. A total of 768 observations were made on the reef area seaward of the northwest seaplane runway and on the reef outside of the lagoon east of the Honolulu International Airport Reef Runway. The distributions by category for the two algae species is shown in Figures 15 and 16 and the frequencies by category in Figure 17. In contrast to the pattern found for Pearl Harbor, *Acanthophora spicifera* dominated *Gracilaria salicornia* at Ke'ehi Lagoon sites. For *Gracilaria* 443 (57.7%) of the 768 observations had no algae, 207 (26.9%) were Category 1, 104 (13.5%) Category 2 and only 14 (1.8%) were in Category 3. All *Gracilaria* observed were on the inner lagoon reef or on the landward side of the outer reef, with abundance decreasing to zero going seaward. By contrast *Acanthophora* was present at



Figure 15. Distribution of *Gracilaria salicornia* in Ke'e'hi Lagoon determined from snorkeling surveys, 2007-2008.



Figure 16. Distribution of *Acanthophora spicifera* in Ke'ehi Lagoon determined from snorkeling surveys, 2007-2008.

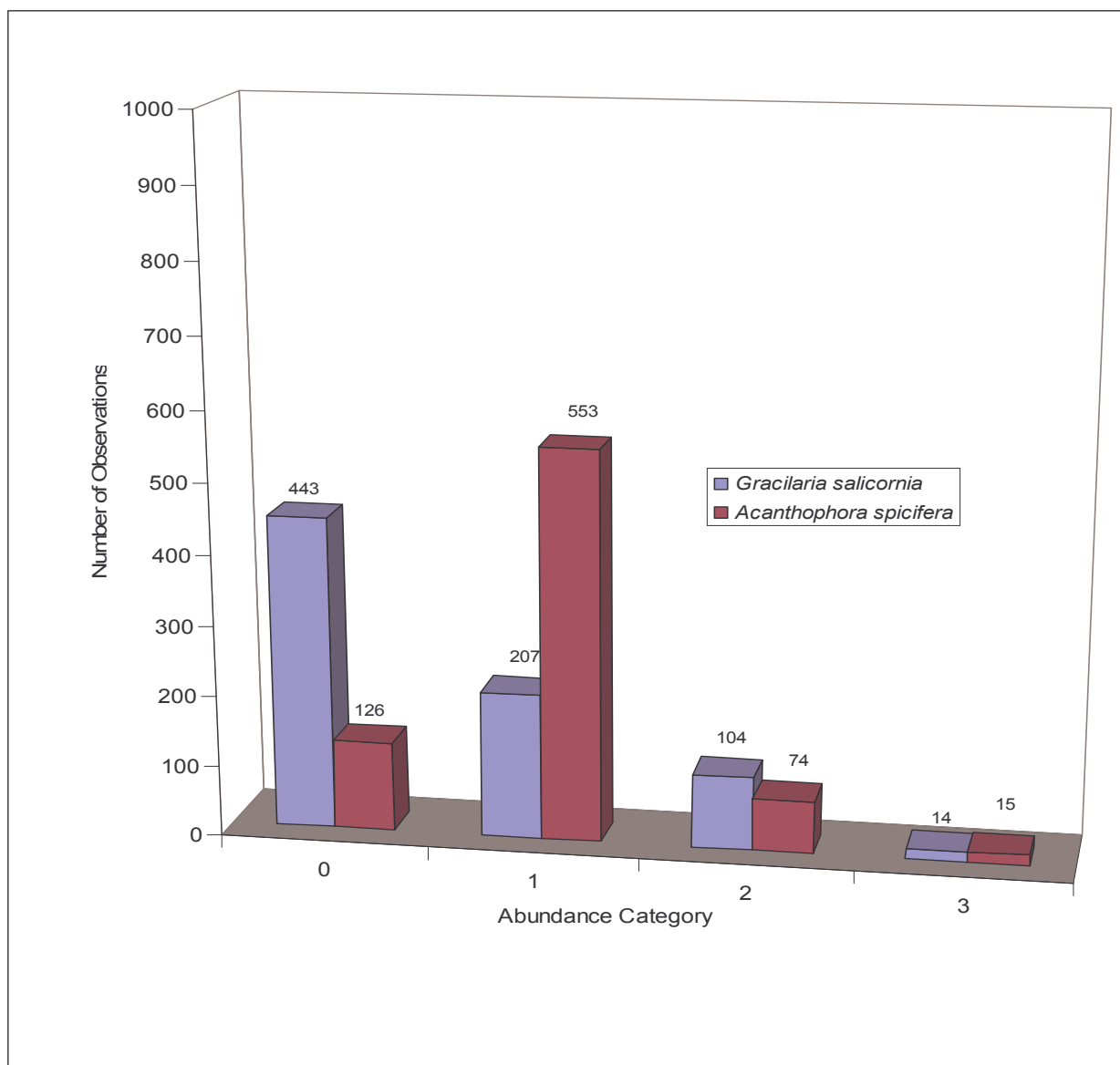


Figure 17. Frequencies of occurrence of *Gracilaria salicornia* and *Acanthophora spicifera* in the four abundance categories for the 768 observations made in Ke’ehi Lagoon.

439 (56%) of the 778 sites and increased in abundance going seaward on the outer reef, where it occurred at all locations. These distributions are clearly related to the propensity of *A. spicifera* to proliferate on high energy reefs subject to wave turbulence, while *G. salicornia* does not recruit or grow well under such conditions..

#### D. Reef Corals

Reef corals occurring at the 14 stations in Pearl Harbor were recorded and photographed as part of the observation and sampling protocol used on the diving surveys in the harbors, similar to the methodology followed on the 1996 Legacy Project surveys (Coles et al. 1997). In addition, searches for corals were made while snorkeling in conjunction with surveys for invasive algae throughout the perimeter of much of

Pearl Harbor. Whenever a live coral was encountered its species was noted, its GPS coordinates were recorded with a Garmin 76 carried by the snorkeler in a waterproof bag, and the coral was usually digitally photographed. GPS points were later downloaded to a computer and mapped using ArcMap 9.1 GIS software.

The species of corals that were found at any of the 14 observation and sampling sites surveyed in both 1996 and in 2007-2008 in Pearl Harbor are listed in Table 5.

Table 5. Corals observed on Pearl Harbor collection sites in 1996 and 2007-2008.

Coral Species	1		2		7		11		12		13		14		15	
	96	08	96	08	96	07	96	08	96	08	96	08	96	08	96	07
<i>Pocillopora damicornis</i>	x	x	x									x				
<i>Pocillopora meandrina</i>	x	x					x									
<i>Monitipora capitata</i>		x														
<i>Monitipora patula</i>	x															
<i>Porites compressa</i>		x	x	x								x				
<i>Leptastrea purpurea</i>				x	x	x			x			x	x			x
Total	3	4	1	2	1	1	1	0	1	0	0	3	1	0	1	1

By comparison the corals that were observed on the six stations surveys in Honolulu Harbor and Ke'ehi Lagoon in 2008 are compared with corals found at those sites in 1997 in Table 6.

Table 6. Corals observed on Honolulu Harbor and Ke'ehi Lagoon collection sites in both 1996 and 2008.

Coral Species	8		11		14		19	
	1997	2008	1997	2008	1997	2008	1997	2008
<i>Pocillopora damicornis</i>	x	x	x	x	x	x		
<i>Pocillopora meandrina</i>	x	x			x	x		
<i>Monitipora capitata</i>	x	x		x	x	x		
<i>Monitipora patula</i>	x	x		x	x	x		
<i>Porites compressa</i>	x	x	x	x	x	x		
<i>Porites lobata/lutea</i>	x	x	x	x	x			
<i>Pavona varians</i>	x			x	x	x		
<i>Leptastrea purpurea</i>	x	x	x	x	x			x
Total	8	7	4	6	8	7	0	1

Both harbor areas show similar numbers of coral species and species compositions at most of the same sites during both sampling years. Pearl Harbor Station 1, near the harbor's entrance had the most species of any site in Pearl Harbor, with three species in 1996 and four in 2008. Station 2, near the entrance to West Loch had the only *Porites compressa* found on the 1996 surveys (Figure 18), as well as many colonies of *Pocillopora damicornis*. The colony of *P. compressa* found at Station 2 in 1996 had grown substantially by 2008 (Figure 19), but the *Pocillopora damicornis* that were abundant at this site in 1996 (Coles 1999) were not found in 2008, apparently having been overgrown and killed by the invasive *Gracilaria salicornia* algae that covers the bottom at this site at depths shallower than where the *P. compressa* colony occurs.



The distribution of corals found at collection sites in 1996 are shown in Figure 20 and in Figure 21 for 2007-8, which also shows the species and locations of corals found on snorkeling surveys in 2007-8. Although it is not possible to rigorously compare the findings between the two sampling periods because the 2007-8 results include snorkeling survey observations, it is clear that reef corals in 2007-8 are far more common and widely distributed than indicated by the 1996 collection survey. The most common and widespread species is *Leptastrea purpurea*, a hardy coral that was especially common in 2008 along the east shores of Waipi'o and Waiawa Peninsulas and the west shore of Ford Island, along the main channel into Middle and East Lochs. However, virtually all of these corals were less than 5-10 cm in diameter (Figure 22). Brock (2007) also reported in 2007 small colonies of *L. purpurea* in the vicinity of Rainbow Bay Marina and along the west shore of Ford Island, southwest of the present study's Station 13. The second most common species was *Pocillopora damicornis*, which increased in numbers from Ford Island and Waipi'o Peninsula along the Main Channel toward the harbor entrance and also occurred in West Loch, where relatively large colonies of up to 0.5 m in diameter were found (Figure 23). A small colony of *P. damicornis* was also found by Brock (2007) on a sheet piling near the HECO discharge on surveys in 2001-2007. *Pocillopora meandrina* occurred in the present study at only two locations near the harbor entrance, at Station 1 where it was found in 1996 and at one site across the channel closer to the entrance (Figure 24). *Montipora capitata* (Figure 25) occurred at one location in West Loch and another near Station 7 east of Waipi'o Peninsula, where a single colony of *Montipora patula* was also found.

The most significant finding from the snorkeling surveys for the present study was the discovery of four relatively large (ca 10-15 m diameter) *Porites compressa* reefs (Figures 26-29) located well into West Loch along the west side of the channel. This is the furthest into West Loch that corals have been found, despite conditions that are hardly hospitable to coral survival and growth, i.e. highly turbid water, a bottom otherwise composed of fine silt sediments and abundant growth of invasive algae *Gracilaria salicornia*. Also, the *Porites compressa* on these reefs have moderate to abundant growths of the invasive sponge *Mycale grandis*, which has had a negative competitive impact on corals in Kāne'ohe Bay, O'ahu (Coles and Bolick 2007), and another competing sponge tentatively identified as *Hymeniacidon* sp. Nonetheless, these *Porites* reefs are apparently surviving these challenging environmental conditions and have apparently been growing for decades, if not centuries, judging from the size of the reefs.

The patterns of coral distribution shown for the six stations resurveyed in Honolulu Harbor and Ke'ehi Lagoon indicate that more species were found there than on the present surveys in Pearl Harbor, and that little change has occurred since the last survey in 1997. Some species, e.g. *Pavona varians* and *Leptastrea purpurea*, had differences between 1997 and 2008, but these were rare and cryptic and could have been missed during either survey. The finding of *L. purpurea* at Station 19 marks the first report for reef coral in Ke'ehi Lagoon.

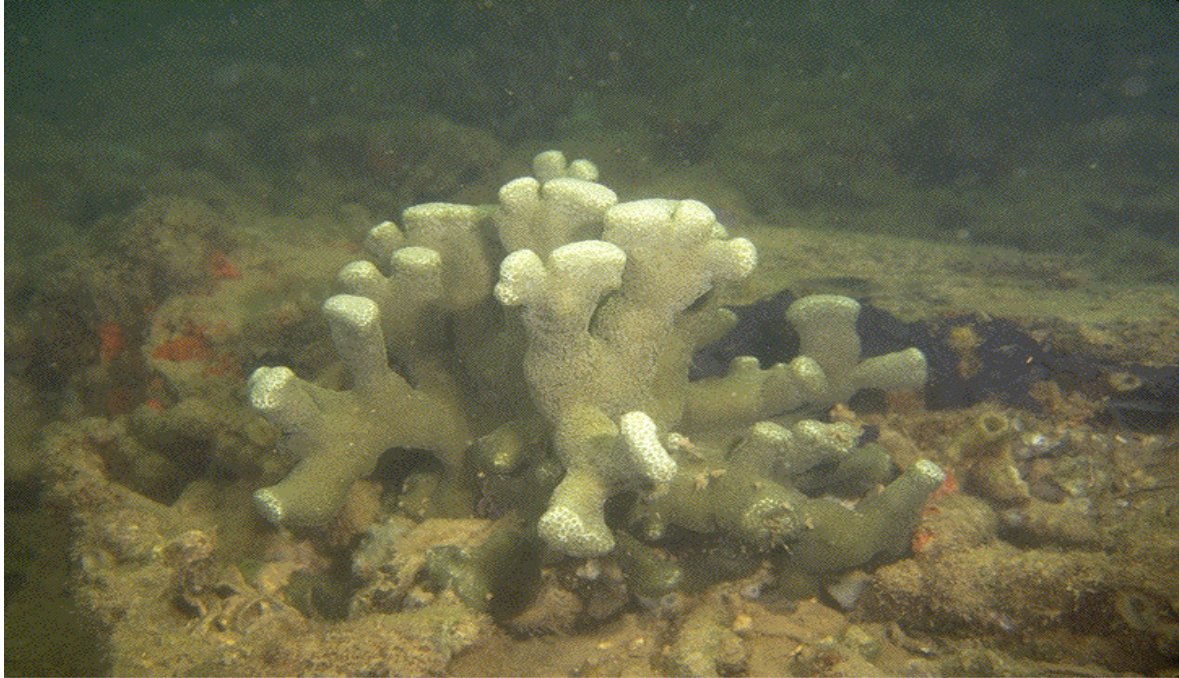


Figure 18. *Porites compressa* coral at Station 2, West Loch Channel at 4 m depth, April 1996.

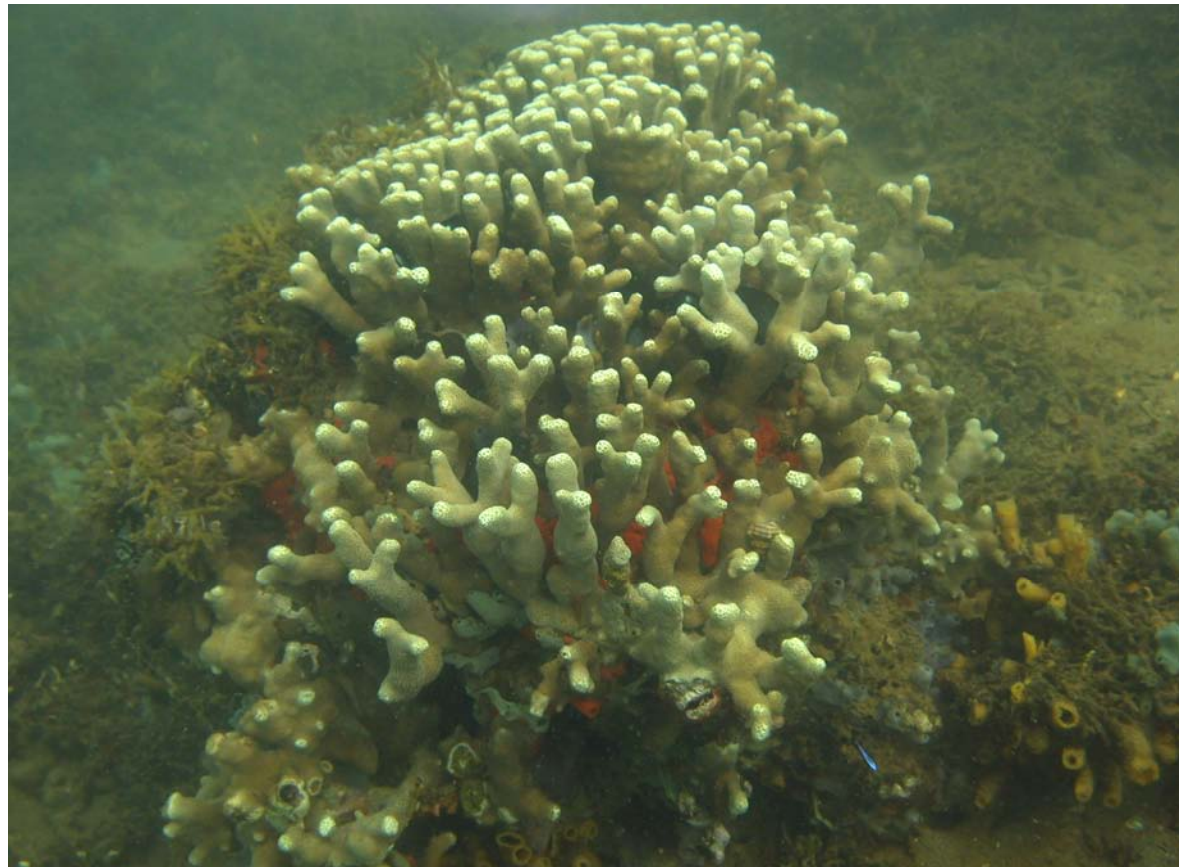


Figure 19. Same *Porites compressa* colony at Station 2, January 2008.



Figure 20. Pearl Harbor corals at collection stations in 1996.

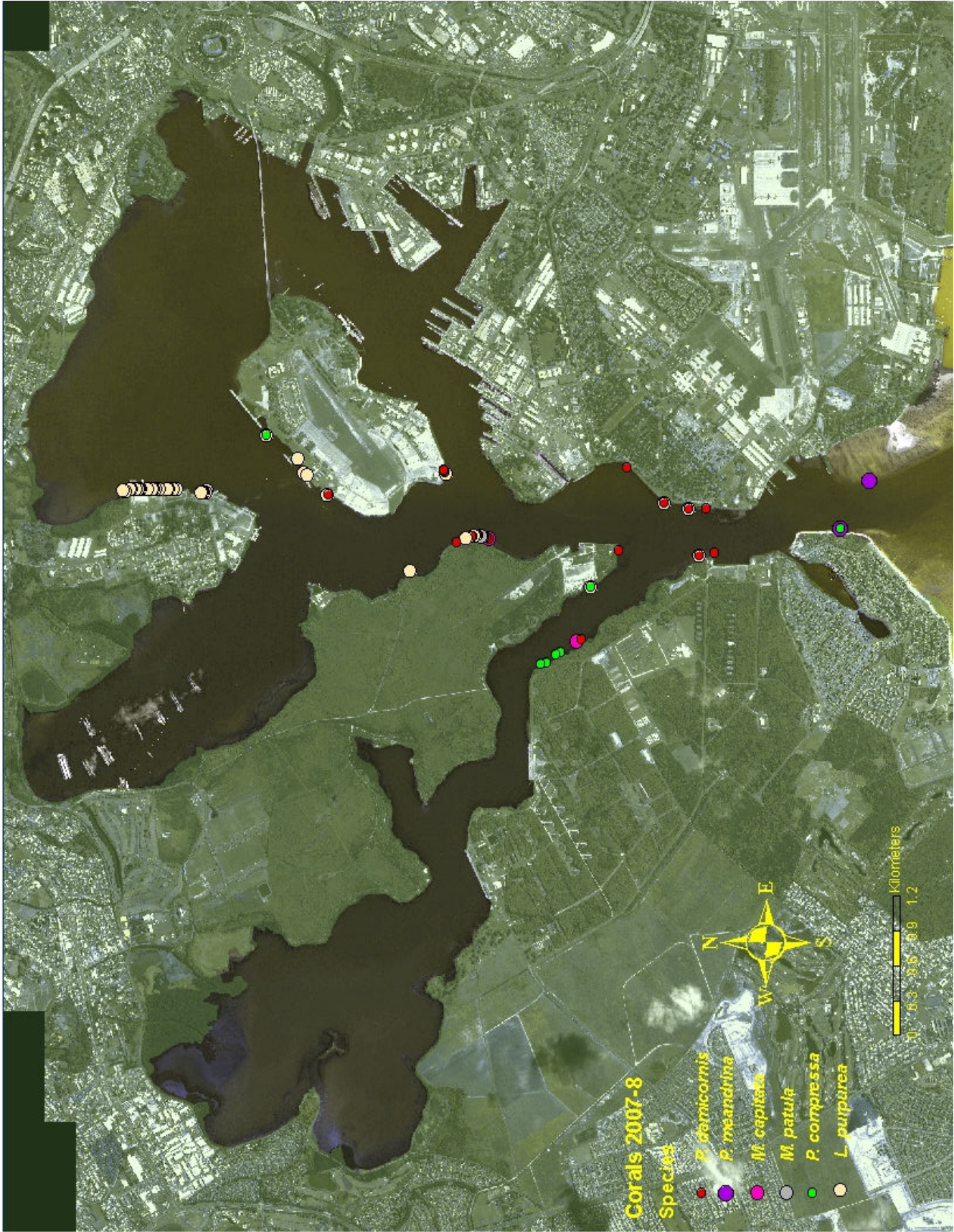


Figure 21. Pearl Harbor corals at collection stations from snorkel surveys in 2007-2008.



Figure 22. *Leptastrea purpurea* colony ca. 5 cm diameter near Waipi'o Peninsula June 12, 2008.

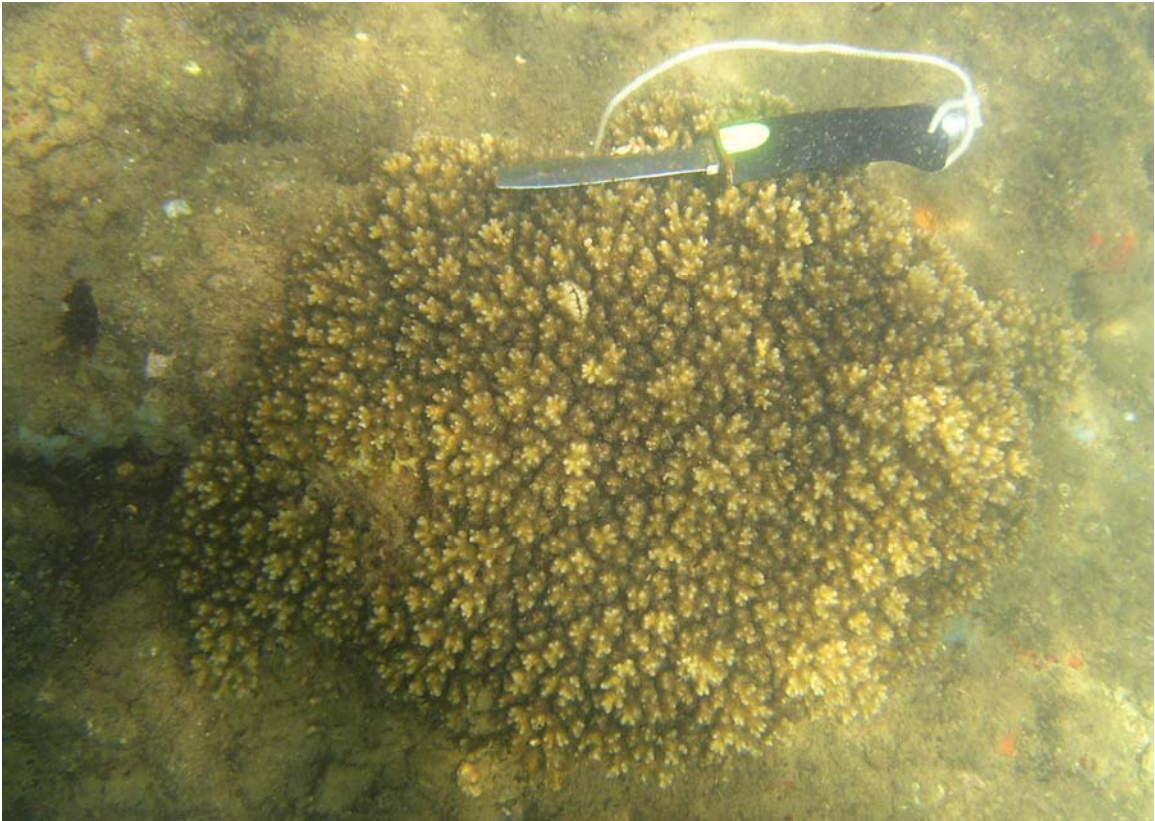


Figure 23. *Pocillopora damicornis* colony ca 0.5 m diameter near West Loch entrance, November 27, 2007.

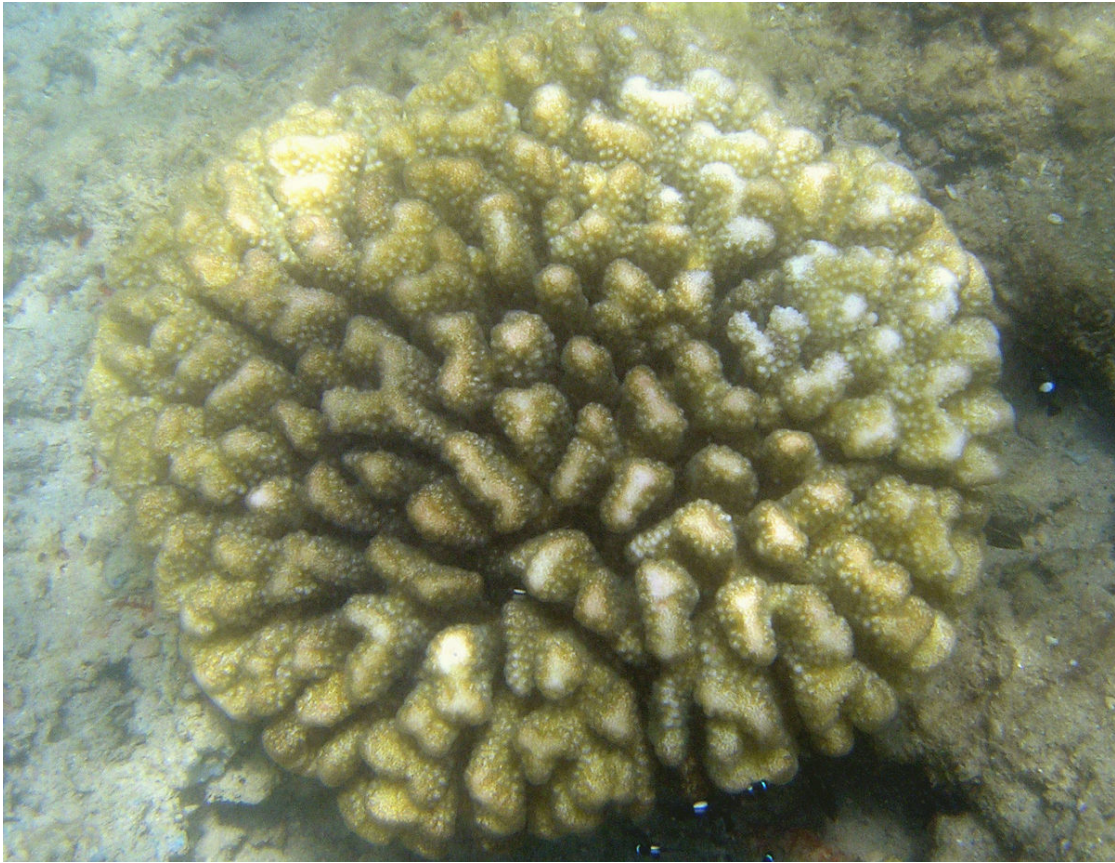


Figure 24. *Pocillopora meandrina* colony ca 0.5 m diameter near harbor entrance June 12, 2008.



Figure 25. *Montipora capitata* colony in West Loch November 27, 2007.



Figure 26. *Porites* Reef 1 in West Loch November 27, 2007.



Figure 27. *Porites* Reef 2 in West Loch November 27, 2007 with heavy growth of *Mycale grandis* sponge.



Figure 28. *Porites* Reef 3 in West Loch November 27, 2007.

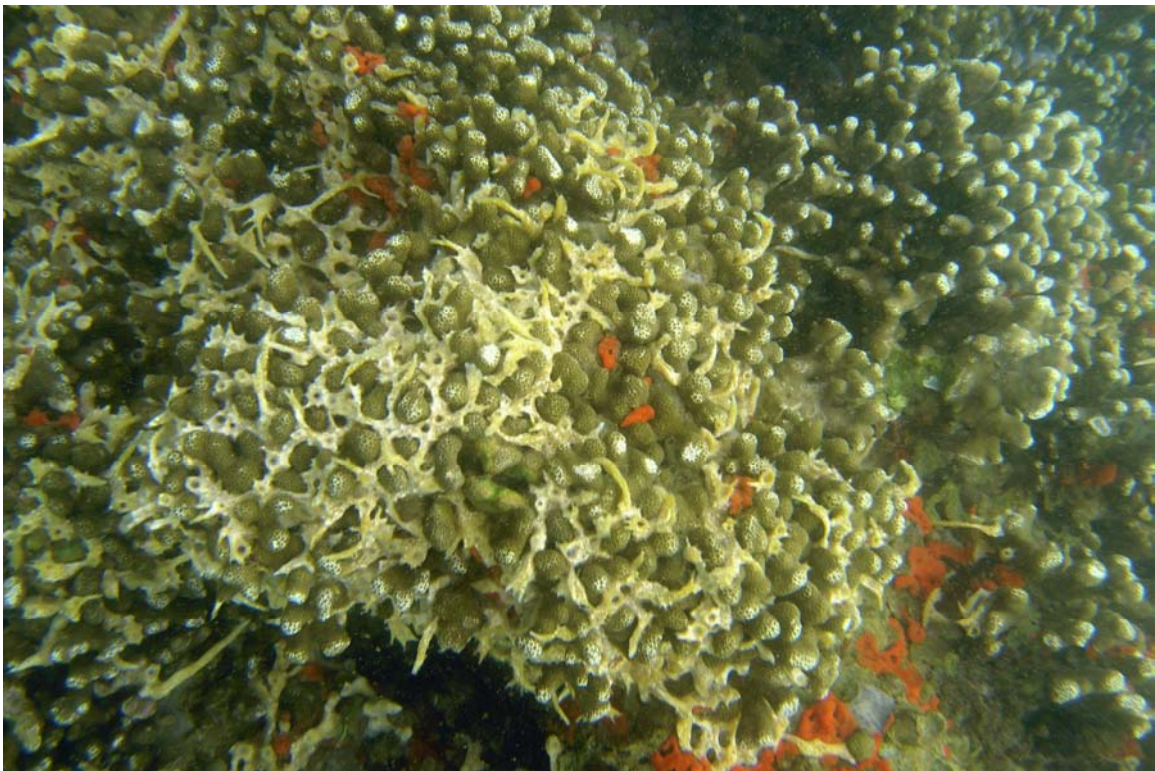


Figure 29. *Porites* Reef 4 in West Loch November 27, 2007 with growth of *Hymeniacidon* sp. sponge (tentative identification).



#### IV. DISCUSSION

Pearl Harbor is the major U.S. Navy base and shipyard in the Pacific Ocean between the west coast of the United States and the territory of Guam and has been an active port of call for Navy ships for nearly a century. Foreign ships have been coming to Honolulu Harbor for over 200 years since European arrival in Hawai'i. Thus there has been ample opportunity for introduced marine species to reach these Hawaiian ports, and this was reflected by the relatively large component of introduced and cryptogenic species that were determined in the two previous studies in the harbors for surveys conducted in 1996 and 1997 (Coles et al. 1997, 1999a, 1999b). These studies each found approximately 100 introduced or cryptogenic species comprising 17-22% of the total biota identified. This is substantially less than the 359 introduced and cryptogenic species that were identified at that time in San Francisco Bay (Cohen and Carlton 1998), but much more than the 46 introduced and cryptogenics found in Guam's Apr Harbor (Paulay et al. 2002) or the 26 that were found in Pago Pago Harbor, American Samoa (Coles et al. 2003).

Using less intensive sampling than was done in 1996 and 1997, the present study identified 298 taxa from observations and collections at 14 sites in Pearl Harbor and 195 taxa from six sites in Honolulu Harbor-Ke'ehi Lagoon. Numbers of taxa per station generally increased with approach to the harbor mouths, reflecting the influence of open ocean circulation that favors the development of benthic and fish communities that included species found in both harbor and coral reef environments. This pattern was also found in the previous studies of the harbors, in Kāne'ōhe Bay, O'ahu Hawai'i (Coles et al 2002) and at Pago Pago Harbor, American Samoa (Coles et al 2003). Of the total taxa identified, 32% were introduced or cryptogenic genera or species in Pearl Harbor and 36% in Honolulu Harbor-Ke'ehi Lagoon. Although these introduced or cryptogenic percentages are higher than were determined in the previous studies, they do not reliably indicate that their proportions of the total biota are significantly higher than 10 years ago in either harbor area, since fewer total taxa were identified from observations and collections than in either previous study. The results suggest, however, that introduced and cryptogenics occur frequently and are widely distributed among most stations in both harbors, especially since their proportions of the total taxa identified at most stations substantially exceeded the means for the two harbor areas.

The 1996 survey of Pearl Harbor identified 166 taxa not previously reported in the harbor and the 1997 survey of Honolulu Harbor-Ke'ehi Lagoon identified 190 that had not been reported in those areas. The present study added 75 taxa for Pearl Harbor and 41 for Honolulu Harbor-Ke'ehi Lagoon. These increases are largely due to focus in the present study on sponges (Porifera), hydroids (Hydrozoa) and tunicates (Ascidacea) that were identified by taxonomic experts not available for the earlier studies. Most of the new reports for the present harbor areas were previously known in Hawai'i and only 17 genera or species are new reports for the Hawaiian Islands. These have been tentatively designated cryptogenic species, in consultation with taxonomists familiar with their worldwide distributions.

The 1996 survey of Pearl Harbor identified 96 introduced or cryptogenic species (Coles et al 1997) later revised to 95 species (Coles et al 1999a) and 69 were identified in the 1997 survey of Honolulu Harbor-Ke'ehi Lagoon (Coles et al 1999b). The present study increases the number not previously reported in

Pearl Harbor by 37 and by 33 in Honolulu Harbor-Ke'ehi Lagoon, The 17 new reports that are designated cryptogenic consist of eight sponges, three hydroids, two polychaete worms, two mollusks and two tunicates. Most of these are organisms with limited planktonic residence times that are likely to have been introduced through anthropogenic means, possibly as hull fouling. However, it is quite possible that they have been present in the harbors for a long time and that they have now been identified because of the additional taxonomic attention that was directed to these groups in the present study. The amount of new attention given to any taxonomic group can significantly influence the numbers of species and new reports for a location and therefore the estimates of cryptogenic taxa based on those new reports.

Most of the total 135 introduced or cryptogenic species found in either Pearl Harbor or Honolulu Harbor-Ke'ehi Lagoon in this study are considered noninvasive and, although widespread in the harbors, do not proliferate to a point that they exclude native species or invade marine environments outside of the quiescent conditions in harbors or enclosed embayments. However, one flowering plant, two red algae, one sponge, one octocoral, one barnacle and one stomatopod found on the study are considered invasive and have altered some nearshore ecosystems with various levels of resource monopolization and competition with native organisms in these harbor areas and elsewhere in Hawai'i. It should be noted, however, that the consideration of an introduced species as noninvasive can change any time, since it takes at least a decade for a species to show invasive characteristics after it has been introduced. For example, neither Hawai'i's most invasive invertebrate *Carijoa* aff. *riisei* was considered invasive at the time of the of the last Pearl Harbor study, and it has since become recognized to threaten Hawai'i's Clack Coral industry and appears to be continuing to proliferate through the Main Hawaiian Islands (Grigg 2003, 2004).

Of the invasive species found in the present study, the Red Mangrove *Rhizophora mangle* is the most conspicuous in Pearl Harbor and Ke'ehi Lagoon, occurring along most interior shorelines that have not been altered or hardened by pier or jetty construction. This species is native to the western Atlantic and Caribbean and was introduced from Florida to southwestern Moloka'i in 1902 by the American Sugar Company to stabilize mudflats and as a source of honey flora (MacCaughey 1917, Wester, 1981). It was first observed on O'ahu in 1922 in a Kalihi fishpond as a single plant planted "many years ago" (Wester, 1981) and in flourishing condition at the time of the 1922 observation. It is not known whether it spread naturally from that location near the present study's Station KL20 to Pearl Harbor, or if it was introduced by further unrecorded plantings, but by 1946 it was established at the heads of all three lochs in Pearl Harbor (Fosberg 1948; Chimner et al. 2006). Unlike most of the world, where mangroves are considered to provide valuable habitat and shoreline protection, in Hawai'i *R. mangle* is considered an invasive pest that reduces habitat for endangered aquatic birds and native species, overgrows fish ponds, and substantially alters natural shorelines (Allen, 1998, Chimner et al. 2006). Chimner et al. (2006) found that mangroves were expanding from 1977-2001 at an average rate of 2.3-3.4% year in areas where they occur on O'ahu, and that approximately 70% (102 hectares) of all mangroves on Oahu in 2001 occurred in Pearl Harbor.

The orange keyhole sponge *Mycale grandis* was first reported in Hawai'i (as *Mycale armata*) at 12 sites in Pearl Harbor in the 1996 survey (.Coles et al. 1997, 1999a). It has since been found in virtually all of Hawai'i's harbors (Coles et al. 1999b, 2004) and is a highly invasive competitor with native corals in

Kāneʻohe Bay (Coles and Bolick 2007a, 2007b). In the present study it occurred at 12 of the 14 sites in Pearl Harbor and two sites in Keʻehi Lagoon. Moreover, it is apparently competing with *Porites compressa* on the reefs that were first discovered in West Loch in the present study (Figures 28-31), similar to Kāneʻohe Bay where this sponge dominates corals on some reefs in the south bay and was determined to be increasing its coverage by up to of 12% per year (Coles and Bolick 2007a, 2007b). The original species name used in Hawaiʻi for this sponge of *Mycale armata* is a junior synonym of *Mycale grandis* (Hadju, pers. comm.), which has a natural distribution is from the Great Barrier Reef to the Red Sea, and it probably was introduced here sometime after the 1960s. Its distinctive morphology and bright color is almost certain assurance that it would have been noted by previous sponge taxonomists working in Hawaiʻi, and that it is therefore a recent introduction that is having an invasive impact on native Hawaiian corals and their habitat.

The snowflake octocoral *Carijoa* aff. *riisei* occurred at four stations in Pearl Harbor in the present study and was reported at eight sites in the 1996 survey of Pearl Harbor. It was not seen at any of the present study's Honolulu Harbor-Keʻehi lagoon sites, but it was reported at nine of the 15 sites surveyed in Honolulu Harbor in 1997, including the present study's Stations HH8 and HH14. The first documented report of *Carijoa* aff. *riisei* was from Pearl Harbor in 1972 as *Telesto riisei* (Evans et al. 1974, Devaney and Eldredge 1977, Coles and Eldredge 2002) and it was later reported from coral reef sites around Oʻahu from Koko Head to Haleʻiwa and in harbors throughout the Hawaiian Islands (Coles et al. 2004). It commonly occurs in caves and under ledges along Oʻahu's north shore and has been reported by sport divers in offshore areas around most of the main Hawaiian Islands (Kahng 2006). It was originally believed to be the Caribbean species *Carijoa riisei* based on taxonomic characteristics, but recent genomic analysis has shown that it is genetically distinct from Caribbean *Carijoa*, and results suggest that there have been multiple introductions from various Pacific locations (Concepcion et al. Ms in review). Previously considered by Coles and Eldredge (2002) to be "a relatively benign introduction occupying previously underutilized habitat" in harbors, under ledges and in caves along reef slopes, more recent information indicates *Carijoa* to be the most invasive introduced invertebrate with the most serious ecological and economic impact that occurs in Hawaiʻi (Grigg 2003, 2004, Kahng and Grigg 2005). It continues to be reported at new sites on reefs throughout the Hawaiian Islands, but it is at depths of 80-100 m in the channel between Maui and Lanaʻi that it is having its greatest impact by overgrowing black coral trees (*Antipatharia* sp.) which provide a source of larval replenishment for black corals that are harvested in shallow depths for jewelry production. Black coral colonies up to 4 m tall in the affected depths are usually completely covered and killed by the *Carijoa* octocoral, which is highly fecund and grows rapidly in reduced light (Kahng et al. 2008). However, in the area of the present study it as yet appears to be a relatively minor component of the total fouling communities that inhabit the harbors.

The Caribbean barnacle *Chthamalus proteus* that was recorded at 11 Pearl Harbor stations and one Honolulu site in the present study was also recorded at 11 Pearl Harbor sites in 1996 and six Honolulu Harbor-Keʻehi Lagoon sites in 1997. *C. proteus* is native to the western Atlantic from the Caribbean to Brazil and is the best documented invertebrate introduction to Hawaiian waters (Southward et al. 1998, Zardus and Hadfield 2005, Zabin et al. 2007). It was first recorded in Kāneʻohe Bay in 1995 (Hoover 1998) and later in Pearl Harbor in 1996 (Coles et al. 1997, 1999a), and was not present on Oʻahu when a comprehensive barnacle survey was done around the island in 1972-73 (Matsuda 1973). It now occurs in

extremely high densities (e.g. Figure 10f) in many enclosed harbors and embayments throughout the main Hawaiian Islands and has been recorded as far west as Midway (DeFelice et al 1997) at the end of the Northwestern Hawaiian Island and in Guam (Southward 1998). Although apparently it does not compete with or exclude any native Hawaiian species in its high intertidal habitat, it clearly alters the character of this environment where it occurs.

Although the Asian stomatopod *Gonodactylaceus falcatus* was observed at only one station in this study it is highly cryptic and undoubtedly is more widespread in the harbors, having been reported at five Pearl Harbor sites in 1996 and 14 of 20 sites in Honolulu Harbor-Ke'ehi lagoon in 1997. It is also a well documented introduction to Hawai'i, having first been reported by Kinzie (1968) as not having occurred here before 1954 and possibly having come from the Philippines on concrete barges at the end of World War II. It is considered invasive (Coles and Eldredge 2002) based on its exclusion of smaller and less aggressive native stomatopod species from their normal coral rubble habitats. It is abundant and frequently found in Kāne'ohe Bay, where it was found at all 21 stations sampled from coral rubble (Coles et al 2002).

The two most problematic invasive introduced species found in this study were the red algae *Acanthophora spicifera* and *Gracilaria salicornia*. *A. spicifera* occurred at seven Pearl Harbor sites and one Honolulu Harbor site. In 1996 it was found at only two sites in Pearl and was not found in Honolulu Harbor-Ke'ehi lagoon in 1997. This species was the first introduced algae reported in Hawai'i, believed by Doty (1961) to have arrived on a barge brought to Pearl Harbor prior to 1950. It is now the most widespread introduced algae in the Hawaiian Islands and abundant from Hawai'i to Kaua'i (Smith et al 2002). It also is probably the most tolerant algal species in Hawai'i to extreme environmental conditions, as witnessed by its survival in the most turbid sections of West Loch in Pearl Harbor where no other macroalgae and few invertebrate species were found in the present study. It appears to be continuing to spread in the tropical Pacific, having recently been first reported at Majuro Atoll in Micronesia (Tsuda et al. 2008). Its distributions as determined by the snorkeling surveys in the present study reflects its wide range of environmental tolerance, since it showed its maximal coverages in both interior and outer areas of Pearl Harbor and Ke'ehi Lagoon.

*Gracilaria salicornia* is the most invasive species encountered in the present study and has shown a dramatic increase in Pearl Harbor since the last major survey in 1996. Its increased occurrence from three collection stations in 1996 to seven in 2007 is verified by the widespread occurrence and high abundance that was determined from snorkeling surveys throughout Pearl Harbor. It occurred for 72% of the over 1200 observations made throughout the harbor and it was in the highest abundance category for 34% of the observations. Often these areas had "tumbleweeds" of *Gracilaria* up to 0.5 m in diameter that were free to drift along the bottom and further spread the algae, at others locations the algae occurred in dense mats that virtually covered the bottom. This algae was not found in Honolulu Harbor or Ke'ehi Lagoon in 1997 but did occur at one Ke'ehi Lagoon station in 2008, and snorkeling surveys also showed high coverage in the inner lagoon outside of the seaplane runway and medium abundance along the outer lagoon. Although not generally as abundant as in Pearl Harbor, *Gracilaria* in Ke'ehi Lagoon has still increased enough in the last decade to represent a phase shift in the biotope dominating organism.

This increasing dominance of nearshore environments by *Gracilaria* reflects the pattern that has occurred island wide on O'ahu in the last three decades since it was introduced to Waikīkī in 1971 and to Kāne'ōhe Bay in 1978. It was found to rapidly increase its range along the south O'ahu shoreline westward to Ala Moana Park and eastward to Diamond Head and Hawai'i Kai between 2000 and 2002 (Smith et al. 2004). By 2000 it was found throughout Kāne'ōhe Bay (Rodgers and Cox 1999, Smith et al. 2002) and was found to have a continuous population at the south end of Kualoa Park in North Kāne'ōhe Bay in 2002 (Smith et al. 2004).

Attempts to remove this invasive alga in areas where it has become dominant have met with little success. In 2002 a collaboration that initially involved 62 volunteers began to remove *Gracilaria* from the reef and channels off Waikīkī. Five events between 2002 and April 2006 removed over 20,000 kg of the algae (Smith et al. 2004). This effort continued until November 2006, eventually involving a total of >2500 volunteers and removed >120,000 kg (C. Hunter, pers. comm.). Unfortunately, the recovery and growth rate of this alga exceeded this concerted effort and *Gracilaria* still monopolizes the benthos off Waikīkī, with little visible decrease in its abundance. A subsequent effort has focused on using a mechanical device, the "Supersucker", to remove *Gracilaria* and species of *Kappaphycus* from reefs in Kāne'ōhe Bay (Conklin et al. 2008). This device requires only a small group of trained operators and is efficient in removing large quantities of algae and epiphytic introduced invertebrates, reducing algal cover from 65% to 15% on two test sites, with continued decrease in algal cover following removal at two test sites. However, given the magnitude and extent of the coverage that has been determined along south O'ahu shores and now in Pearl Harbor, it is unlikely that this removal method could provide a long-range cost-effective solution.

On a more positive note, reef corals have apparently continued settlement and growth that was noted in the 1996 Legacy study (Coles et al. 1997, Coles 1999) and earlier by Brock (1994). The first comprehensive survey of the biota of Pearl Harbor was conducted in the early 1970s and sampled at 10 sites throughout the main channel, East and Middle Lochs and as far into West Loch as Station 2 of the present study. From that study Grovhoug noted in 1971-72 (in Evans et al 1974) that "stony corals were conspicuously absent from all biostations". About 20 years later Brock (1994) first reported small colonies of *Leptastrea purpurea* corals from the west shore of Ford Island in 1993, and the 1996 Legacy study (Coles et al. 1997, 1999a) found the five coral species at the eight locations shown in Figure 22, which corresponded to the sites of eight of the ten stations surveyed by the Evans (1974) study.

Although similar species occurrences were recorded at the collection stations in the present study as in 1996 (Table 5), the snorkeling surveys showed a wider ranging distribution and greater abundance of corals in the harbor than anticipated (Figure 23). Also, Smith (2002) reported eight coral species to occur at five of the Evans (1974) sites and eleven species from a 2005 survey throughout the perimeter of much of the harbor (Smith et al. 2006). No information is provided on the distribution of these eleven species, and they include five (*Montipora flabellata*, *Leptoseris incrustans*, *Pavona varians*, *Porites lobata*, *Psammocora explanata*) that were not found on the present snorkeling surveys. Corals appear to be most common along the main channel leading into East and Middle Lochs and around Ford Island. Coral colonization in this area has even been noted recently in the news media, which reported hard coral

growing on the USS Arizona where none had been found during the most recent survey of the memorial ship in 1990 (Kakaesako 2009).

The single *Porites compressa* colony found in West Loch in 1996 has continued to grow and may achieve the size of a small reef if it continues to survive (Figure 21), and four large *Porites* reefs were found for the first time in the present study to occur well into West Loch. Smith et al (2006) also noted the presence of large (>100 cm diameter) *Porites compressa* colonies in West Loch in 2002 that they estimated were more than 50 years old. However, these corals had been overgrown by *Gracilaria salicornia* by the time of their 2005 survey. The location indicated for these *Porites* reefs on their site map in Smith (2006) appears to have been 250-500 m toward the West Loch entrance from the four large *Porites* reefs found on the present study. This suggests that *Porites compressa* reefs in West Loch were more extensive in the past, but those remaining are in jeopardy of being eliminated, either by the orange keyhole sponge *Mycale grandis*, or more likely by the continued proliferation of *Gracilaria salicornia*.

Overall the historical trends suggest that, despite previous reports to the contrary, that reef corals were present in Pearl Harbor prior to 1970. Their abundance and distribution range appear to have been increasing in the last 30 years due to increased water quality, but they face a continued threat from competition from introduced invasive species. Brock (2007) also noted a decline in coverage of the *Leptastrea purpurea* occurring along the west shore of Ford Island in 2001-2007 after due to competition from *Gracilaria*. Similarly, the group of *Pocillopora damicornis* colonies growing in shallower water in 1996 near the *P. compressa* shown in Figure 21 were not found in 2007, apparently having been overgrown by the *Gracilaria* mat that covers the bottom at that site.

In summary, the present study indicates that introduced species are still a major component of the total biota of Pearl Harbor, similar to or greater than was determined in the 1996 Legacy Study. Most of the species found were previously reported in the harbor either by the 1996 or by previous surveys. The relatively few newly found species designated cryptogenic may represent actual new introductions or be an artifact of greater focus on these taxonomic groups in the present study. A similar pattern was found for the stations surveyed in Honolulu Harbor-Ke'ehi Lagoon, supporting the latter conclusion. However the disturbing proliferation and increasing dominance of the introduced algae *Gracilaria salicornia* and *Acanthophora spicifera* in Pearl Harbor and Ke'ehi Lagoon is an unfortunate finding that reflects the steady spread of these invasive species around O'ahu and ultimately, probably throughout the Main Hawaiian Islands. This is particularly unfortunate to be occurring in Pearl Harbor, where an apparent colonization of corals and incipient development of conditions that might support the development or restoral of coral reefs may be prevented by the domination of shallow depth by these highly invasive algae.

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## APPENDIX A

Station Records for Organisms Collected or Observed in Pearl Harbor in 2007-2008  
(Origin: I=Introduced, C=Cryptogenic, Blank Native)

Taxa	Scientific name	Author_Date	Orig	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
Chlorophyta	<i>Cladophora</i> sp.								x								
Phaeophyta	<i>Dictyota</i> sp.								x								
Phaeophyta	<i>Lobophora variegata</i>	(J.V.Lamour.) Womersley													x		
Phaeophyta	<i>Padina</i> sp.														x		
Rhodophyta	<i>Acanthophora spicifera</i>	(Vahl)	I		x	x	x		x	x				x		x	
RHODOPHYTA	<i>Gelidiella</i> sp.								x								
RHODOPHYTA	<i>Gracilaria salicornia</i>	(C. Agardh) Dawson	I	x	x				x				x				
RHODOPHYTA	<i>Spyridia</i> sp.								x								
		Total Algae	8	1	1	2	1	0	6	1	1	0	1	1	2	1	0
RHIZOPHORAC EAE	<i>Rhizophora mangle</i>	Linnaeus, 1758	I		x	x	x			x						x	x
CILIOPHORA	<i>Foraminifera unid. sp.</i>			1													
PORIFERA	? <i>Ciocalypa</i> sp. 1						x										
PORIFERA	? <i>Ciathria</i> sp.			x													
PORIFERA	? <i>Gelliodes</i> sp.												x				
PORIFERA	? <i>Halichondria</i> sp.																x
PORIFERA	? <i>Stylinos</i> sp.			x													
PORIFERA	? <i>Topsentia</i> sp.												x				
PORIFERA	<i>Biemna fistulosa</i>	(Topsent, 1897)	C	x	x			x	x	x		x	x	x			
PORIFERA	<i>Chelonaplysilla violacea</i>	(Lendenfeld, 1883)						x									x
PORIFERA	<i>Ciocalypa</i> sp.					x											
PORIFERA	<i>Cladocroce burapha</i>	Putchakam, de Weerd, Sonchaeng & van Soest, 2004	C					x		x				x		x	x
PORIFERA	<i>Ciathria</i> sp.							x									
PORIFERA	<i>Dictyodendrilla</i> sp.												x				
PORIFERA	<i>Dysidea arenaria</i>	(Schmidt, 1862)	I	x	x			x	x	x		x	x	x	x		
PORIFERA	<i>Dysidea</i> sp.											x					
PORIFERA	<i>Gelliodes fibrosa</i>	(Wilson, 1925)	I					x						x			
PORIFERA	<i>Haliclona (Reniera) sp. 1</i>												x				
PORIFERA	<i>Haliclona (Reniera) sp. 2</i>																
PORIFERA	<i>Haliclona (Soestella) coerulea</i>	(Hechtel, 1965)	I	x	x			x	x	x		x	x	x	x	x	x
PORIFERA	<i>Haliclona</i> sp.								x								
PORIFERA	<i>Hamigera cf. sp.</i>								x								
PORIFERA	<i>Iotrochota purpurea</i>	(Bowerbank, 1875)	C	x													
PORIFERA	<i>Iotrochota</i> sp.								x				x				
PORIFERA	<i>Leucecetta solida</i>	de Laubenfels, 1950		x													

Taxa	Scientific name	Author_Date	Orig	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
PORIFERA	<i>Lissodendoryx similis</i>	Thiele, (1859)	C													X	
PORIFERA	<i>Monanchora clathrata</i>	Carter, 1883	C	X				X							X		
PORIFERA	<i>Mycale (Carmia) cecilia</i>	de Laubenfels, 1936	I							X						X	
PORIFERA	<i>Mycale (Mycale) grandis parishi</i>	Gray, 1867	I	X	X	X		X	X	X	X	X	X	X	X	X	
PORIFERA	<i>Mycale (Zygomycale)</i>	(Bowerbank, 1875)	I					X									
PORIFERA	<i>Mycale phylophila</i>	Hentschel, 1911	C		X												
PORIFERA	<i>Petrosia</i> sp.			X													
PORIFERA	<i>Pseudosuberites</i> sp.																
PORIFERA	<i>Raspailia (Clathriodendron) danwinensis</i>	Hooper, 1991	C									X	X				
PORIFERA	<i>Strongylacidon kaneohe</i>	(de Laubenfels, 1950)								X							
PORIFERA	<i>Suberites aurantiacus</i>	(Duchassaing & Michelotti, 1864)	I			X			X		X	X	X	X		X	X
PORIFERA	<i>Tedania (Tedania) ignis</i>	(Duchassaing & Michelotti, 1864)	C		X				X	X		X		X		X	X
PORIFERA	<i>Topsentia halichondrioides</i>	(Dendy, 1905)	C	X				X	X				X				
		Total Sponges	36	11	8	3	X	12	10	8	4	11	10	9	6	9	6
CNIDARIA	<i>Actinaria unid.</i> sp.				X	X					X			X			
CNIDARIA	<i>Aiptasia pulchella</i>	Carlgren, 1943									X				X	X	
CNIDARIA	<i>Bougainvillidae unid.</i> spp.											X					
CNIDARIA	<i>Campanularidae unid.</i> sp.									X		X				X	
CNIDARIA	<i>Carijoa cf. risei</i>	(Duchassaing & Michelotti, 1860)	I	X				X					X	X			
CNIDARIA	<i>Clytia cf. gracilis</i>	(M. Sars, 1850)	C		X			X									X
CNIDARIA	<i>Clytia latithea</i>	Millard and Bouillon, 1973	C									X					
CNIDARIA	<i>Corydendrium parasiticum</i>	(Linnaeus, 1767)	C									X	X				
CNIDARIA	<i>Halecium</i> sp.			X	X			X							X	X	
CNIDARIA	<i>Hydrozoa unid.</i> sp.																
CNIDARIA	<i>Leptastrea purpurea</i>	Dana, 1846			X				X						X		
CNIDARIA	<i>Montipora capitata</i>	(Dana, 1846)		X													
CNIDARIA	<i>Nereididae unid.</i> sp.									X							
CNIDARIA	<i>Obelia dichotoma</i>	(Linnaeus, 1758)	I													X	X
CNIDARIA	<i>Pennaria disticha</i>	(Goldfuss, 1820)	I	X	X			X				X	X			X	
CNIDARIA	<i>Phyllococcidae unid.</i> sp.											X					
CNIDARIA	<i>Pocillopora damicornis</i>	(Linnaeus, 1758)		X											X		
CNIDARIA	<i>Pocillopora meandrina</i>	Dana, 1846		X													
CNIDARIA	<i>Porites compressa</i>	Dana, 1846		X	X										X		
CNIDARIA	<i>Porites lobata</i>	Dana, 1846															
CNIDARIA	<i>Protopolythoa</i> sp.				X			X									
CNIDARIA	<i>Zoanthus</i> sp. (white)				X				X								
		Total Cnidarians	22	7	8	1	0	6	2	3	2	6	3	2	5	5	2

Taxa	Scientific name	Author_Date	Orig	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
SIPUNCULA	<i>Phascosoma stephensoni</i>	(Stephen, 1942)							x								
SIPUNCULA	<i>Sipuncula unid. sp.</i>					x									x		
	Total Sipunculids		2	0	0	1	0	0	1	0	0	0	0	0	1	0	0
POLYCHAETA	? <i>Potamilla sp.</i>							x		x			x				x
POLYCHAETA	<i>Amphiglena mediterranea</i>	(Leydig, 1851)	C								x						
POLYCHAETA	<i>Amphiglena sp.</i>		C				x										
POLYCHAETA	<i>Branchioma nigromaculata</i>	(Baird, 1865)	C						x						x		x
POLYCHAETA	<i>Branchioma sp.</i>																
POLYCHAETA	<i>Chaetopteridae unid. sp.</i>			1	x			x				x	x				x
POLYCHAETA	<i>Chaetopterus sp.</i>		C					x							x	x	
POLYCHAETA	<i>Cirratulidae unid. sp.</i>			1	x			x				x	x				x
POLYCHAETA	<i>Cirriformia sp.</i>											x					
POLYCHAETA	<i>Dorvilleidae unid. sp.</i>																x
POLYCHAETA	<i>Eunice antennata</i>	(Savigny, 1820)													x		
POLYCHAETA	<i>Eunice cariboea</i>	(Grube, 1856)						x									
POLYCHAETA	<i>Eunice unid. sp.</i>			x				x				x	x			x	x
POLYCHAETA	<i>Eurythoe complanata</i>	(Pallas, 1766)		x													
POLYCHAETA	<i>Glyceridae unid. sp.</i>																
POLYCHAETA	<i>Hydroides brachyacantha</i>	Rioja, 1941	I			x	x										
POLYCHAETA	<i>Hydroides crucigera</i>	(Morch, 1863)	I			x											
POLYCHAETA	<i>Hydroides dirampha</i>	(Morch, 1863)	I			x	x										
POLYCHAETA	<i>Hydroides elegans</i>	(Haswell, 1883)	I	x	x		x					x	x				x
POLYCHAETA	<i>Hydroides sp.</i>											x					x
POLYCHAETA	<i>Loimia medusa</i>	(Savigny, 1818)							x								
POLYCHAETA	<i>Lumbrineridae unid. sp.</i>							x		x		x					
POLYCHAETA	<i>Lumbrineris dentata</i>	Hartmann-Schroder, 1965															
POLYCHAETA	<i>Marphysa corallina</i>	Kinberg, 1865															
POLYCHAETA	<i>Marphysa sp.</i>							x									
POLYCHAETA	<i>Nematoneis unicoloris</i>	Schmarda, 1861															
POLYCHAETA	<i>Nereididae unid. sp.</i>			x	x			x		x							x
POLYCHAETA	<i>Perinereis curvata</i>	Holly, 1935															
POLYCHAETA	<i>Phyllococidae unid. sp.</i>								x								
POLYCHAETA	<i>Pileolaria militaris</i>	Ciaparede, 1868	I														
POLYCHAETA	<i>Pomatoleios kraussii</i>	Baird, 1865	I			x											
POLYCHAETA	<i>Potamethus sp.</i>																
POLYCHAETA	<i>Potamilla sp.</i>				x												
POLYCHAETA	<i>Sabellastarte indica</i>	(Savigny, 1818)							x								
POLYCHAETA	<i>Sabellastarte spectabilis</i>	(Grube, 1878)	I	x				x	x	x		x	x		x	x	x

Taxa	Scientific name	Author_Date	Orig	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
POLYCHAETA	<i>Sabellidae unid. sp.</i>			x	x		x	x	x	x	x	x	x	x	x		x
POLYCHAETA	<i>Salmacina dysteri</i>	(Huxley, 1855)	I	x	x			x	x	x			x	x	x		
POLYCHAETA	<i>Schistomeringos sp.</i>															x	
POLYCHAETA	<i>Serpula sp.</i>				x					x							
POLYCHAETA	<i>Serpula vermicularis</i>	Linnaeus, 1767	C			x	x			x		x					x
POLYCHAETA	<i>Serpulidae unid. sp.</i>			x			x										x
POLYCHAETA	<i>Simplicaria pseudomilitaris</i>	(Thiriot-Quievreux, 1965)	C	x													
POLYCHAETA	<i>Spinther japonicus</i>	Imajima and Hartman, 1964	C	x													
POLYCHAETA	<i>Spionidae unid. sp</i>									x							
POLYCHAETA	<i>Spionidae unid. sp.</i>							x									
POLYCHAETA	<i>Spirorbidae unid. sp.</i>				x												
POLYCHAETA	<i>Syllidae unid. sp.</i>			x	x	x	x		x	x	x	x	x	x	x	x	x
POLYCHAETA	<i>Terebellidae unid. sp.</i>			1	x					x	x			x	x		x
POLYCHAETA	<i>Thelepus setosus</i>	(Quatrefages, 1865)															
POLYCHAETA	<i>Trypanosyllis sp.</i>															x	
		Total Polychaetes	50	11	15	7	9	13	9	11	16	12	9	10	19	7	16
MOLLUSCA	<i>Anomia nobilis</i>	Reeve, 1859	I			x						x	x				x
MOLLUSCA	<i>Aplysiidae unid. sp.</i>									x							
MOLLUSCA	<i>Atys debilis</i>	Pease, 1860						x									
MOLLUSCA	<i>Balcis spp.</i>			x													
MOLLUSCA	<i>Cerithium zebrum</i>	Kiener, 1841		2													
MOLLUSCA	<i>Chama cf. fibula</i>	Reeve, 1846	C	x											x		
MOLLUSCA	<i>Chama fibula</i>	Reeve, 1846	C									x	x				
MOLLUSCA	<i>Chama iostoma</i>	Conrad, 1837										x			x	x	x
MOLLUSCA	<i>Chama sp.</i>				x												
MOLLUSCA	<i>Conus eugrammatus</i>	Bartsch and Rehder, 1943		x													
MOLLUSCA	<i>Crassostrea sp.</i>		I			x				x						x	
MOLLUSCA	<i>Crassostrea virginica</i>	(Gmelin, 1971)	I			x											
MOLLUSCA	<i>Crepidula aculeata</i>	(Gmelin, 1791)	I					x				x			x		x
MOLLUSCA	<i>Crucibula spinosum</i>	(Sowerby, 1824)	I														x
MOLLUSCA	<i>Ctena bella</i>	(Conrad, 1837)		x													
MOLLUSCA	<i>Cuspidaria hawaiiensis</i>	Dall, Bartsch, and Rehder, 1938			x	x					x	x		x	x		x
MOLLUSCA	<i>Cuspidaria spp.</i>							x									
MOLLUSCA	<i>Cymatium sp.</i>									x							
MOLLUSCA	<i>Cypraea spp.</i>																
MOLLUSCA	<i>Dendostrea sandvicensis</i>	(Sowerby, 1871)			x			x				x	x		x	x	
MOLLUSCA	<i>Diodora ?ruppelli</i>	(Sowerby, 1834)	I	x													
MOLLUSCA	<i>Diodora octagona</i>	(Reeve, 1850)		x										x			
MOLLUSCA	<i>Diodora sp.</i>												x				



Taxa	Scientific name	Author_Date	Orig	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
MOLLUSCA	<i>Fissulariidae unid. sp.</i>				x												
MOLLUSCA	<i>Hiatella arctica</i>	(Linnaeus, 1767)	I							x							
MOLLUSCA	<i>Hinemoa indica</i>	(Melvill, 1896)	I	x													
MOLLUSCA	<i>Hipponix (Cochlear)</i>	Gould, 1846															
MOLLUSCA	<i>Hipponix (Pliosabia) pilosus</i>	(Deshayes, 1832)		x													
MOLLUSCA	<i>Hypselodoris infucata</i>	(Ruppell and Leuckart, 1828)			x			x	x			x	x	x			
MOLLUSCA	<i>Isognomon californicum</i>	(Conrad, 1837)								x							
MOLLUSCA	<i>Isognomon legumen</i>	(Gmelin, 1791)	x														
MOLLUSCA	<i>Isognomon perna</i>	(Linnaeus, 1767)								x							
MOLLUSCA	<i>Isognomon sp.</i>			x								x	x				
MOLLUSCA	<i>Lioconcha faszigata</i>	Sowerby, 1851	C														
MOLLUSCA	<i>Littoraria scabra</i>	(Linnaeus, 1758)		x				2		x					x	x	
MOLLUSCA	<i>Mitra (Nebularia) spp.</i>	Cernohorsky, 1977		x													
MOLLUSCA	<i>Nerita picea</i>	(Recluz, 1841)						x									
MOLLUSCA	<i>Ostrea cf. hanleyana</i>	Sowerby, 1871									x						
MOLLUSCA	<i>Ostreidae unid. sp.</i>						x			x							x
MOLLUSCA	<i>Ostreidae unid. spp.</i>				x												
MOLLUSCA	<i>Petaloconchus keenae</i>	Hadfield and Kay, 1972														x	x
MOLLUSCA	<i>Pinctada margaritifera</i>	(Linnaeus, 1758)															
MOLLUSCA	<i>Pinctada sp.</i>																x
MOLLUSCA	<i>Pusillina marmorata</i>	Ponder, 1985		x													
MOLLUSCA	<i>Rissoina cerithiiformis</i>	Tryon, 1887		x													
MOLLUSCA	<i>Rocherfortina sandwicensis</i>	Hayami & Kase, 1993		x													
MOLLUSCA	<i>Salmacina dysteri</i>	(Huxley, 1855)	I									x					
MOLLUSCA	<i>Serpulorbis variabilis</i>	Hadfield and Kay, 1972						x									x
MOLLUSCA	<i>Siphonaria normalis</i>	Gould, 1846											x				x
MOLLUSCA	<i>Tambja morosa</i>	(Bergh, 1877)						x									
MOLLUSCA	<i>Teredo sp.</i>						x										
MOLLUSCA	<i>Vermetidae unid. sp.</i>							x									
MOLLUSCA	<i>Vermetus alli</i>	Hadfield & Kay, 1972	I		x			x	x	x	x	x	x				x
		Total Molluscs	53	x7	6	5	2	x3	2	9	4	x0	8	3	xx	6	xx
PYCNOGONIDA	<i>Pycnogonida unid. sp.</i>									x							x
CRUSTACEA	<i>Apseudes sp. 1</i>																
CRUSTACEA	<i>Amphipoda unid. sp.</i>													x			x
CRUSTACEA	<i>Balanus amphitrite</i>	Darwin 1854	I							x				x			
CRUSTACEA	<i>Balanus eburneus</i>	Gould, 1841	I			x	x			x	x						
CRUSTACEA	<i>Balanus reticulatus</i>	Utinomi, 1967	I			x				x	x	x	x	x			x

Taxa	Scientific name	Author_Date	Orig	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
CRUSTACEA	<i>Balanus</i> sp.		I		x										x		
CRUSTACEA	<i>Caprellidae unid.</i> sp.															x	
CRUSTACEA	<i>Chthamalus proteus</i>	Dando & Southward, 1980	I	x	x	x	x	x		x	x	x	x	x	x	x	
CRUSTACEA	<i>Colomastix kapiolani</i>	Barnard, 1970															x
CRUSTACEA	<i>Colomastix lunallo</i>	Barnard, 1970							x					x			x
CRUSTACEA	<i>Colomastix pusilla</i>	Grube, 1864									x						
CRUSTACEA	<i>Corophium baconi</i>	Shoemaker, 1934	I											x			
CRUSTACEA	<i>Corophium</i> sp.		I														x
CRUSTACEA	<i>Crab Larvae unid.</i> Sp.				x					x							
CRUSTACEA	<i>Elasmopus</i> sp.										x					x	
CRUSTACEA	<i>Erichthonius brasiliensis</i>	(Dana, 1853)	I								x					x	
CRUSTACEA	<i>Erichthonius</i> sp.						x					x					
CRUSTACEA	<i>Gonodactylaceus falcatus</i>	(Forsk., 1775)	I						x								
CRUSTACEA	<i>Grandierella</i> sp											x					
CRUSTACEA	<i>Hyastenus tenuicornis</i>	(Pocock , 1895)															
CRUSTACEA	<i>Lembos</i> sp.																
CRUSTACEA	<i>Leptochelia dubia</i>	Krøyer, 1842	C						x					x			x
CRUSTACEA	<i>Leucothoe hyhelia</i>	Barnard, 1965							x					x			x
CRUSTACEA	<i>Leucothoe</i> sp.1																
CRUSTACEA	<i>Lysianassa ewa</i>	Barnard, 1970									x						
CRUSTACEA	<i>Maera pacifica</i>	Schellenberg, 1938									x					x	
CRUSTACEA	<i>Maera</i> sp.								x								
CRUSTACEA	<i>Metopograpsus messor</i>	(Forsk., 1775)									x					x	x
CRUSTACEA	<i>Metopograpsus thukuhar</i>	(Owen, 1893)								x					x		
CRUSTACEA	<i>Monocorophium ascherusicum</i>	(Costa, 1853)	I				x										
CRUSTACEA	<i>Pachygrapsus</i> sp.															x	
CRUSTACEA	<i>Pachynidae unid.</i> sp.																x
CRUSTACEA	<i>Panopeus lacustris</i>	Desbonne, 1867	I								x						
CRUSTACEA	<i>Panopeus pacificus</i>	Edmondson, 1931	I			x											
CRUSTACEA	<i>Parasterope</i> sp									x							
CRUSTACEA	<i>Paravargula</i> sp.										x			x			x
CRUSTACEA	<i>Parthenope</i> sp.													x			
CRUSTACEA	<i>Photis hawaiiensis</i>	Barnard, 1955	C								x			x			
CRUSTACEA	<i>Phymodius nitidus</i>	(Dana, 1852)							x								
CRUSTACEA	<i>Phymodius</i> sp.																
CRUSTACEA	<i>Pilumnus ?taeniola</i>	Rathbun, 1906															
CRUSTACEA	<i>Pilumnus oahuensis</i>	Edmondson, 1931	I	x	x			x	x	x	x	x	x	x	x	x	x
CRUSTACEA	<i>Pilumnus vespertilio</i>	(Fabricus, 1793)															
CRUSTACEA	<i>Podocerus brasiliensis</i>	Dana, 1853	I														x

Taxa	Scientific name	Author_Date	Orig	x	2	4A	5A	6A	7	8	9A	x0A	xx	x2	x3	x4	x5
CRUSTACEA	<i>Stenopus hispidus</i>	(Olivier, 1811)		x												x	
CRUSTACEA	<i>Stenothoidae unid. spp.</i>																
CRUSTACEA	<i>Synalpheus streptodactylus</i>	Coutiere, 1905							x								
CRUSTACEA	<i>Synalpheus thai</i>	Banner & Banner, 1966							x								
CRUSTACEA	<i>Thalaimita dakini</i>	Montgomery, 1931						x			x						
CRUSTACEA	<i>Thalaimita integra</i>	Dana, 1852			x												
CRUSTACEA	<i>Thalaimita sp.</i>															x	
		Total Crustaceans	50	3	4	5	4	3	9	8	18	5	4	15	5	18	
BRYOZOA	<i>Amathia distans</i>	Busk, 1886	I		x					x		x	x	x			x
BRYOZOA	<i>Bugula dentata</i>	(Lamouroux, 1816)	I					x				x	x	x			
BRYOZOA	<i>Bugula neritina</i>	(Linnaeus, 1758)	I	x					x		x	x			x		
BRYOZOA	<i>Celleporaria sp.</i>			x				x									x
BRYOZOA	<i>Diaperoforma sp.</i>			x				x					x				
BRYOZOA	<i>Ectoprocta unid. sp.</i>																x
BRYOZOA	<i>Schizoporella cf. errata</i>	(Waters, 1878)	I	x	x			x	x	x	x	x	x	x			x
BRYOZOA	<i>Watersipora edmondsoni</i>	Soule and Soule, 1968	I					x									
BRYOZOA	<i>Zoobotryon verticillatum</i>	(delle Chiaje, 1828)	I		x						x						
		Total Bryozoans	9	4	3	0	0	5	1	3	3	3	5	3	3	0	4
ECHINODERMS	<i>Echinometra mathaei</i>	(Blainville, 1825)															
ECHINODERMS	<i>Echinothrix calamaris</i>	(Pallas, 1774)		x													
ECHINODERMS	<i>Echinothrix diadema</i>	(Linnaeus, 1758)		x													
ECHINODERMS	<i>Eucidaris metularia</i>	Lamarck, 1816		x													
ECHINODERMS	<i>Heterocentrotus mamillatus</i>	(Linnaeus, 1758)															
ECHINODERMS	<i>Holothuria (Lessonothuria) pardalis</i>	Selenka, 1867		x													
ECHINODERMS	<i>Holothuria (Thymiosycia) impatiens</i>	(Forsk., 1775)															
ECHINODERMS	<i>Holothuria unid. sp.</i>																
ECHINODERMS	<i>Labidodemas semperianum</i>	Selenka, 1867			x												
ECHINODERMS	<i>Ophiodemas spectabilis</i>	Fisher, 1907							x					x			
ECHINODERMS	<i>Ophiactis savignyi</i>	(Muller and Troschel, 1842)	C	x	x			x	x	x	x	x	x	x	x	x	x
ECHINODERMS	<i>Ophiocoma erinaceus</i>	(Muller and Troschel, 1842)		x													
ECHINODERMS	<i>Polyplectana kefersteini</i>	(Selenka, 1867)		x													
ECHINODERMS	<i>Tripeustes gratilla</i>	(Linnaeus, 1758)		x													
		Total Echinoderms	14	11	2	0	0	1	2	1	1	1	1	2	2	1	1
ASCIDACEA	? <i>Polyclinum sp.</i>																
ASCIDACEA	<i>Ascidia sp. A</i>		I						x								

Taxa	Scientific name	Author_Date	Orig	x	2	4A	5A	6A	7	8	9A	x0A	xx	x2	x3	x4	x5
ASCIDACEA	<i>Ascidia</i> sp. B		I	x	x			x				x				x	
ASCIDACEA	<i>Ascidia</i> spp.														x		
ASCIDACEA	<i>Ascidia sydneyensis</i>	Stimpson, 1855	I					x	x		x			x	x		x
ASCIDACEA	<i>Botrylloides</i> sp.										x						
ASCIDACEA	<i>Cnemidocarpa irene</i>	(Hartmeyer, 1906)	I												x	x	
ASCIDACEA	<i>Didemnum cf. candidum</i>	Savigny, 1816	I					x		x	x	x	x	x	x	x	x
ASCIDACEA	<i>Didemnum edmondsoni</i>	Eldredge, 1967								x							
ASCIDACEA	<i>Didemnum perlucidum</i>	Monniot, 1983	I						x								
ASCIDACEA	<i>Didemnum</i> sp.	Savigny, 1816	I		x												
ASCIDACEA	<i>Diplosoma cf. spongiforme</i>	(Giard, 1872)	I								x	x					
ASCIDACEA	<i>Diplosoma listerianum</i>	(Milne Edwards, 1841)	I									x					
ASCIDACEA	<i>Herdmania mauritiana</i>	(Drasche, 1884)	I		x										x	x	
ASCIDACEA	<i>Herdmania pallida</i>	(Savigny, 1816)	I	x	x			x	x			x					
ASCIDACEA	<i>Herdmania</i> sp.				x												
ASCIDACEA	<i>Microcosmus exasperatus</i>	Heller, 1878	I					x		x							
ASCIDACEA	<i>Phallusia nigra</i>	Savigny, 1816	I	x				x	x		x	x	x	x	x		x
ASCIDACEA	<i>Polyandrocarpa</i>													x			
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>	Tokioka, 1953	I					x				x					
ASCIDACEA	<i>Polyandrocarpa zooritensis</i>	Van Name, 1931	I								x						
ASCIDACEA	<i>Polycarpa aurita</i>	(Sluiter, 1890)											x			x	
ASCIDACEA	<i>Polycarpa cryptocarpa</i>	(Sluiter, 1885)	C										x			x	
ASCIDACEA	<i>Polycarpa</i> sp.			x													
ASCIDACEA	<i>Styela canopus</i>	Savigny, 1816	I								x						x
ASCIDACEA	<i>Symplegma</i> sp.																
		Total Ascidiaceans	25	4	5	0	0	8	5	3	7	8	4	4	7	6	4
Osteichthyes	<i>Abudefduf abdominalis</i>	(Quoy and Gaimard, 1824)							x								
Osteichthyes	<i>Acanthurus ?dussumieri</i>	Valenciennes 1835								x			x		x	x	
Osteichthyes	<i>Acanthurus blochii</i>	Valenciennes 1835		x				x									
Osteichthyes	<i>Acanthurus dussumieri</i>	Valenciennes 1835							x								
Osteichthyes	<i>Acanthurus leucopareus</i>	(Jenkins, 1903)								x							
Osteichthyes	<i>Acanthurus triostegus</i>	(Linnaeus, 1758)		x					x	x							
Osteichthyes	<i>Arothron hispidus</i>	(Linnaeus, 1758)			x			x	x	x						x	x
Osteichthyes	<i>Blenniidae unid. species</i>									x							
Osteichthyes	<i>Canthigaster jactator</i>	(Jenkins, 1901)		x													
Osteichthyes	<i>Chaetodon auriga</i>	Forskål 1775			x				x								
Osteichthyes	<i>Chromis vanderbilti</i>	(Fowler, 1941)															
Osteichthyes	<i>Dascyllus albisella</i>	Gill 1862			x				x								
Osteichthyes	<i>Diodon hystrix</i>	Linnaeus 1758		x													
Osteichthyes	<i>Gnathanodon speciosus</i>	(Forskål, 1775)											x				

Taxa	Scientific name	Author_Date	Orig	x	2	4A	5A	6A	7	8	9A	x0A	xx	x2	x3	x4	x5
Osteichthyes	<i>Kuhlia sandvicensis</i>	(Steindachner, 1876)								x							
Osteichthyes	<i>Labroides phthirophagus</i>	Randall 1958		x	x												
Osteichthyes	<i>Lutjanus fulvus</i>	(Forster in Bloch and Schneider, 1801)	I						x						x	x	
Osteichthyes	<i>Naso unicornis</i>	(Forskål, 1775)							x								
Osteichthyes	<i>Ostracion meleagris</i>	(Shaw and Nodder, 1796)		x		x											
Osteichthyes	<i>Parupeneus multifasciatus</i>	(Quoy and Gaimard, 1825)							x								
Osteichthyes	<i>Scarus sp. juv.</i>			x											x		
Osteichthyes	<i>Stethojulis balteata</i>	(Quoy and Gaimard, 1824)							x								
Osteichthyes	<i>Thalassoma duperrey</i>	(Quoy and Gaimard, 1824)		x													
Osteichthyes	<i>Zebrasoma flavescens</i>	(Bennett, 1828)							x								
	Total Fish		24	8	4	0	0	3	10	8	0	1	3	0	6	4	1
	Total Taxa		298	79	58	26	21	66	57	57	57	57	48	49	67	59	55
	Cryptogenic		27	6	7	2	2	7	6	5	6	9	7	6	7	7	7
	Introduced		69	17	20	15	8	24	17	20	24	25	20	23	20	22	17
	Intr+Crypto		96	23	27	17	10	31	23	25	30	34	27	29	27	29	24
	% NIS		32.2	29.1	46.6	65.4	47.6	47.0	40.4	43.9	52.6	59.6	56.3	59.2	40.3	49.2	43.6

APPENDIX B

Introduced or Cryptogenic Species Collected in Pearl Harbor in 2007-2008

Taxa	Scientific name	Origin	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
PORIFERA	<i>Biernia fistulosa</i>	Cryptogenic	x	x			x	x	x		x	x	x	x		
PORIFERA	<i>Ciocalypa sp.</i>	Cryptogenic			x											
PORIFERA	<i>Cladocroce burapha</i>	Cryptogenic				x			x		x		x		x	x
PORIFERA	<i>Iotrochota purpurea</i>	Cryptogenic	x													
PORIFERA	<i>Lissodendoryx similis</i>	Cryptogenic													x	
PORIFERA	<i>Monanchora clathrata</i>	Cryptogenic	x			x								x		
PORIFERA	<i>Mycale phyllophila</i>	Cryptogenic		x												
PORIFERA	<i>Raspailia (Clathrodendron) danwinensis</i>	Cryptogenic									x	x				
PORIFERA	<i>Tedania (Tedania) ignis</i>	Cryptogenic		x				x	x		x		x		x	x
PORIFERA	<i>Topsentia halichondrioides</i>	Cryptogenic	x			x		x				x				
CNIDARIA	<i>Clytia cf. gracilis</i>	Cryptogenic		x		x										x
CNIDARIA	<i>Clytia latithea</i>	Cryptogenic									x					
CNIDARIA	<i>Corydendrium parasiticum</i>	Cryptogenic									x	x				
POLYCHAETA	<i>Amphiglena mediterranea</i>	Cryptogenic								x						
POLYCHAETA	<i>Amphiglena sp.</i>	Cryptogenic			x					x						
POLYCHAETA	<i>Branchiommma nigromaculata</i>	Cryptogenic						x						x		x
POLYCHAETA	<i>Chaetopterus sp.</i>	Cryptogenic				x				x				x		x
POLYCHAETA	<i>Serpula vermicularis</i>	Cryptogenic			x				x		x					
POLYCHAETA	<i>Simplicaria pseudomilitaris</i>	Cryptogenic		x												
POLYCHAETA	<i>Spinther japonicus</i>	Cryptogenic		x												
MOLLUSCA	<i>Chama cf. fibula</i>	Cryptogenic	x													
MOLLUSCA	<i>Chama fibula</i>	Cryptogenic									x					
MOLLUSCA	<i>Lioconcha fasigata</i>	Cryptogenic														
CRUSTACEA	<i>Leptochelia dubia</i>	Cryptogenic						x					x			x
CRUSTACEA	<i>Photis hawaiiensis</i>	Cryptogenic								x			x			
ECHINODERMATA	<i>Ophiactis savignyi</i>	Cryptogenic	x				x	x	x	x	x	x	x	x	x	x
ASCIDACEA	<i>Polycarpa cryptocarpa</i>	Cryptogenic										x				
Rhodophyta	<i>Acanthophora spicifera</i>	Introduced			x			x	x	x			x			
RHODOPHYTA	<i>Gracilaria salicornia</i>	Introduced	x	x	x			x				x				
RHIZOPHORACEAE	<i>Rhizophora mangle</i>	Introduced		x	x	x			x	x					x	x
PORIFERA	<i>Dysidea arenaria</i>	Introduced	x	x			x	x	x		x		x	x		
PORIFERA	<i>Gelliodes fibrosa</i>	Introduced				x					x		x			
PORIFERA	<i>Haliclona (Soestella) coerulea</i>	Introduced	x	x		x		x	x	x	x	x	2	x	x	x
PORIFERA	<i>Mycale (Carmia) cecilia</i>	Introduced							x							
PORIFERA	<i>Mycale (Mycale) grandis</i>	Introduced	x	x	x		x	x	x	x	x	x	x	x	x	
PORIFERA	<i>Mycale (Zygomycale) parishii</i>	Introduced				x										
PORIFERA	<i>Suberites aurantiacus</i>	Introduced			x			x		x	x	x	x			x
CNIDARIA	<i>Cariljoa cf. riisei</i>	Introduced	x			x						x	x			

Taxa	Scientific name	Origin	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
CNIDARIA	<i>Obelia dichotoma</i>	Introduced													X	X
CNIDARIA	<i>Pennaria disticha</i>	Introduced	X	X		X					X	X			X	
POLYCHAETA	<i>Hydroides brachyacantha</i>	Introduced			X											
POLYCHAETA	<i>Hydroides crucigera</i>	Introduced			X											
POLYCHAETA	<i>Hydroides dirampha</i>	Introduced			X	X				X						
POLYCHAETA	<i>Hydroides elegans</i>	Introduced	X	X	X					X	X	X	X	X		X
POLYCHAETA	<i>Pileolaria militaris</i>	Introduced		X												
POLYCHAETA	<i>Pomatoleios kraussii</i>	Introduced			X											
POLYCHAETA	<i>Sabellastarte spectabilis</i>	Introduced	X			X		X	X	X	X	X	X	X	X	X
POLYCHAETA	<i>Salmacina dysteri</i>	Introduced	X	X		X		X	X			X	X	X		X
MOLLUSCA	<i>Anomia nobilis</i>	Introduced			X						X	X				
MOLLUSCA	<i>Crassostrea sp.</i>	Introduced			X				X						X	
MOLLUSCA	<i>Crassostrea virginica</i>	Introduced			X											
MOLLUSCA	<i>Crepidula aculeata</i>	Introduced				X					X			X		X
MOLLUSCA	<i>Crucibula spinosum</i>	Introduced														X
MOLLUSCA	<i>Diodora ?ruppelli</i>	Introduced	X													
MOLLUSCA	<i>Hiatella arctica</i>	Introduced							X							
MOLLUSCA	<i>Hinemoa indica</i>	Introduced	X													
MOLLUSCA	<i>Salmacina dysteri</i>	Introduced									X					
MOLLUSCA	<i>Vermetus alli</i>	Introduced		X			X	X	X	X	X	X	X	X	X	X
CRUSTACEA	<i>Balanus amphitrite</i>	Introduced							X				X			
CRUSTACEA	<i>Balanus eburneus</i>	Introduced			X			X	X	X			X			
CRUSTACEA	<i>Balanus reticulatus</i>	Introduced			X			X	X	X	X	X	X	X	X	
CRUSTACEA	<i>Balanus sp.</i>	Introduced		X												
CRUSTACEA	<i>Chthamalus proteus</i>	Introduced		X	X	X	X	X	X	X	X	X	X	X	X	X
CRUSTACEA	<i>Corophium baconii</i>	Introduced								X			X			
CRUSTACEA	<i>Corophium sp.</i>	Introduced														X
CRUSTACEA	<i>Erichthonius brasiliensis</i>	Introduced								X					X	
CRUSTACEA	<i>Gonodactylaceus falcatus</i>	Introduced						X								
CRUSTACEA	<i>Monocorophium ascherusicum</i>	Introduced														
CRUSTACEA	<i>Panopeus lacustris</i>	Introduced								X						
CRUSTACEA	<i>Panopeus pacificus</i>	Introduced			X											
CRUSTACEA	<i>Pilumnus oahuensis</i>	Introduced	X	X		X	X	X	X	X	X	X	X	X	X	X
CRUSTACEA	<i>Podocerus brasiliensis</i>	Introduced													X	
BRYOZOA	<i>Amathia distans</i>	Introduced		X					X		X	X	X	X		X
BRYOZOA	<i>Bugula dentata</i>	Introduced				X						X	X			
BRYOZOA	<i>Bugula neritina</i>	Introduced	X						X	X	X	X	X	X		
BRYOZOA	<i>Schizoporella cf. errata</i>	Introduced	X	X		X	X	X	X	X	X	X	X	X	X	X



Taxa	Scientific name	Origin	1	2	4A	5A	6A	7	8	9A	10A	11	12	13	14	15
BRYOZOA	<i>Watersipora edmondsoni</i>	Introduced					X									
BRYOZOA	<i>Zoobotryon verticillatum</i>	Introduced		X						X						
ASCIDACEA	<i>Ascidia sp. A</i>	Introduced						X								
ASCIDACEA	<i>Ascidia sp. B</i>	Introduced	X	X		X					X				X	
ASCIDACEA	<i>Ascidia sydneiensis</i>	Introduced				2	X			X			X	X		X
ASCIDACEA	<i>Cnemidocarpa irene</i>	Introduced												X		
ASCIDACEA	<i>Didemnum cf. candidum</i>	Introduced				X			X	X	X	X	X	X	X	X
ASCIDACEA	<i>Didemnum perlucidum</i>	Introduced						X								
ASCIDACEA	<i>Didemnum sp.</i>	Introduced		X												
ASCIDACEA	<i>Diplosoma cf. spongiforme</i>	Introduced								X	X					
ASCIDACEA	<i>Diplosoma listerianum</i>	Introduced									X					
ASCIDACEA	<i>Herdmania mauritiana</i>	Introduced		X										X	X	
ASCIDACEA	<i>Herdmania pallida</i>	Introduced	X	X			X	X			X					
ASCIDACEA	<i>Microcosmus exasperatus</i>	Introduced					X		X					X		X
ASCIDACEA	<i>Phallusia nigra</i>	Introduced	X				X	X			X	X	X	X		X
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>	Introduced					X				X					
ASCIDACEA	<i>Polyandrocarpa zooritensis</i>	Introduced								X						
ASCIDACEA	<i>Styela canopus</i>	Introduced								X						X
Osteichthyes	<i>Lutjanus fulvus</i>	Introduced						X						X	X	
	Total Taxa	298	79	58	26	21	66	57	57	57	57	48	49	67	59	55
	Cryptogenic	27	6	7	2	2	7	6	5	6	9	7	6	7	7	7
	Introduced	68	17	20	15	8	24	17	20	24	25	20	23	20	22	17
	Intr+Crypto	95	23	27	17	10	31	23	25	30	34	27	29	27	29	24
	% NIS	32.2	29.1	46.6	65.4	47.6	47.0	40.4	43.9	52.6	59.6	56.3	59.2	40.3	49.2	43.6

## APPENDIX C

Genera and Species not Previously Reported in Pearl Harbor

Taxa	Scientific name	1	2	4A	6A	6A	7	8	09A	10A	PH11	12A	13	14	15
PORIFERA	<i>Ciocalypta sp.</i>			x											
PORIFERA	<i>Cladocroce burapha</i>				x			x		x		x		x	x
PORIFERA	<i>Hamigera cf. sp.</i>						x								
PORIFERA	<i>Iotrochota purpurea</i>	x													
PORIFERA	<i>Iotrochota sp.</i>		x				x		x		x		x		
PORIFERA	<i>Leucetta solida</i>	x													
PORIFERA	<i>Lissodendoryx similis</i>													x	
PORIFERA	<i>Monanchora clathrata</i>	x			x								x		
PORIFERA	<i>Petrosia sp.</i>	x													
PORIFERA	<i>Pseudosuberites sp.</i>														
PORIFERA	<i>Raspailia (Clathrodendron) darwinensis</i>									x	x			x	
PORIFERA	<i>Strongylacidon kaneoche</i>							x							
Total Porifera	12	4	1	1	0	2	2	2	1	2	2	1	2	3	1
CNIDARIA	<i>Clytia cf. gracilis</i>		x			x									x
CNIDARIA	<i>Clytia latitheca</i>									x					
CNIDARIA	<i>Corydendrium parasiticum</i>									x	x				
CNIDARIA	<i>Montipora capitata</i>	x													
CNIDARIA	<i>Porites lobata</i>														
CNIDARIA	<i>Protopalythoa sp.</i>		x			x									
CNIDARIA	<i>Zoanthus sp. (white)</i>		x				x								
Total Cnidaria	7	1	3	0	0	2	1	0	0	2	1	0	0	0	1
SIPUNCULA	<i>Phascolosoma stephensoni</i>						x								
POLYCHAETA	<i>Amphiglena mediterranea</i>								x						
POLYCHAETA	<i>Amphiglena sp.</i>				x				x						
POLYCHAETA	<i>Hydroides brachyacantha</i>			x	x										
POLYCHAETA	<i>Loimia medusa</i>						x					x			
POLYCHAETA	<i>Lumbrineris dentata</i>												x		
POLYCHAETA	<i>Marphysa corallina</i>												x		
POLYCHAETA	<i>Perinereis curvata</i>														
POLYCHAETA	<i>Pileolaria militaris</i>		x												
POLYCHAETA	<i>Potamethus sp.</i>								x						
POLYCHAETA	<i>Sabellastarte indica</i>						x						x		
POLYCHAETA	<i>Schistomeringos sp.</i>													x	
POLYCHAETA	<i>Serpulorbis variabilis</i>												x		x
Total Polychaeta	12	0	1	1	2	1	2	0	3	0	0	1	4	1	1

Taxa	Scientific name	1	2	4A	6A	6A	7	8	09A	10A	PH11	12A	13	14	15
MOLLUSCA	<i>Alys debilis</i>				X										
MOLLUSCA	<i>Cerithium zebrum</i>	X													
MOLLUSCA	<i>Conus eugrammatus</i>	X													
MOLLUSCA	<i>Cuspidaria hawaiiensis</i>		X						X			X	X		X
MOLLUSCA	<i>Diodora octagona</i>	X										X			
MOLLUSCA	<i>Isognomon californicum</i>							X					X		
MOLLUSCA	<i>Lioconcha fasigata</i>													X	X
MOLLUSCA	<i>Petalioconchus keenae</i>														
MOLLUSCA	<i>Pusillina marmorata</i>	X													
MOLLUSCA	<i>Rissoina cerithiiformis</i>	X													
MOLLUSCA	<i>Rochefortina sandwicensis</i>	X													
MOLLUSCA	<i>Tambja morosa</i>				X										
Total Molluscs	12	7	1	1	0	2	0	1	1	1	0	2	2	1	2
CRUSTACEA	<i>Colomastix kapiolani</i>													X	
CRUSTACEA	<i>Hyasterus tenuicornis</i>														
CRUSTACEA	<i>Lysianassa ewa</i>								X						X
CRUSTACEA	<i>Metopograpsus messor</i>								X						X
CRUSTACEA	<i>Pachygrapsus sp.</i>													X	
CRUSTACEA	<i>Panopeus lacustris</i>								X						X
CRUSTACEA	<i>Paravargula sp.</i>	X										X			
CRUSTACEA	<i>Pilumnus ?taeniola</i>														
CRUSTACEA	<i>Thalamita dakini</i>				X				X			X			
Total Crustacea	9	1	0	0	1	0	0	0	5	0	0	2	0	3	2
BRYOZOA	<i>Diaperoforma sp.</i>	X			X						X		X		
BRYOZOA	<i>Zoobotryon verticillatum</i>		X						X		X				
Total Bryozoa	2	1	1	0	1	0	0	0	1	0	2	0	1	0	0
ECHINODERMS	<i>Echinothrix calamaris</i>	X													
ECHINODERMS	<i>Echinothrix diadema</i>	X													
ECHINODERMS	<i>Holothuria (Lessonothuria) pardalis</i>	X													
ECHINODERMS	<i>Labidodemas semperianum</i>	X													
ECHINODERMS	<i>Ophiocoma erinaceus</i>	X													
ECHINODERMS	<i>Polyplectana kefersteinii</i>	X													
Total Echinoderms	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0
ASCIDACEA	<i>?Polyclinum sp.</i>														
ASCIDACEA	<i>Ascidia sp. A</i>						X								
ASCIDACEA	<i>Cnemidocarpa irene</i>												X		X
ASCIDACEA	<i>Didemnum perlucidum</i>						X								

Taxa	Scientific name	x	2	4A	6A	6A	7	8	09A	x0A	PHxx	x2A	x3	x4	x5
ASCIDACEA	<i>Diplosoma cf. spongiforme</i>								1	1					
ASCIDACEA	<i>Herdmania mauritiana</i>		x										x	x	
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>				x					x		x			
ASCIDACEA	<i>Polyandrocarpa zooritensis</i>								x						
ASCIDACEA	<i>Polycarpa aurita</i>										x			x	
ASCIDACEA	<i>Polycarpa cryptocarpa</i>										x			x	
ASCIDACEA	<i>Polycarpa sp.</i>	x													
ASCIDACEA	<i>Styela canopus</i>								x						x
Total Ascidacea	12	1	1	0	0	1	2	0	3	2	2	1	2	4	1
Osteichthyes	<i>Acanthurus leucopareilus</i>												x		
Total Fish	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0
		1	2	4A	5A	6A	7	8	9A	10A	11	12A	13	14	15
Total Taxa	298	79	58	26	18	65	57	57	57	57	48	49	67	59	55
New Genera or Species	75	21	8	3	2	11	7	3	14	7	7	7	12	12	9
% New PH Reports	25.2%	26.6%	13.8%	11.5%	11.1%	16.9%	12.3%	5.3%	24.6%	12.3%	14.6%	14.3%	17.9%	20.3%	16.4%

APPENDIX D

Station Records for Organisms Collected or Observed in Honolulu Harbor  
or Ke'ehi lagoon in 2008

Taxa	Scientific name	Author Date	Origin	HH08	HH11	HH14	KL18	KL19	KL20
Chlorophyta	<i>Acanthophora spicifera</i>	(Vahl)	Introduced			x			
Chlorophyta	<i>Dictyosphaeria versluysii</i>	Weber Bosse	Native	x	x				
Chlorophyta	<i>Dictyota sp.</i>		Native		x				
Chlorophyta	<i>Neomeris sp.</i>		Native		x				
Chlorophyta	<i>Padina sp.</i>		Native		x			x	
Chlorophyta	<i>Ulva lactuca</i>	Linn.	Native			x			
Rhodophyta	<i>Amansia glomerata</i>	C.Agardh	Native		x				
Rhodophyta	<i>Gracilaria salicornia</i>	(C. Agardh) Dawson	Introduced					x	
Rhodophyta	<i>Hypnea sp.</i>		Native			x			
		Total Algae	9	1	5	3	0	2	0
Rhizophoraceae	<i>Rhizophora mangle</i>	Linnaeus, 1758	Introduced					x	x
CILIOPHORA	<i>Foraminifera unid. sp.</i>		Native	x					
PORIFERA	? <i>Haliclona (Soestella) coerulea</i>	Hechtel, 1965	Introduced		x		x		
PORIFERA	? <i>Stylinos sp.</i>		Native	x		x			
PORIFERA	? <i>Tedania sp.</i>		Cryptogenic			x			
PORIFERA	<i>Biemna fistulosa</i>	(Topsent, 1897)	Cryptogenic	x	x	x		x	
PORIFERA	<i>Chelonaplysilla violacea</i>	(Lendenfeld, 1883)	Native						
PORIFERA	<i>Dysidea arenaria</i>	(Schmidt, 1862)	Introduced		x		x	x	
PORIFERA	<i>Haliclona (Soestella) coerulea</i>	(Hechtel, 1965)	Introduced	x				x	
PORIFERA	<i>Iotrochota baculifera</i>	Ridley, 1884	Cryptogenic		x				
PORIFERA	<i>Iotrochota purpurea</i>	(Bowerbank, 1875)	Cryptogenic	x	x				
PORIFERA	<i>Iotrochota sp.</i>		Native			x			
PORIFERA	<i>Monanchora dianchora</i>	de Laubenfels, 1935	Cryptogenic	x	x			x	
PORIFERA	<i>Mycale (Mycale) grandis</i>	Gray, 1867	Introduced		x			x	
PORIFERA	<i>Mycale (Zygomycale) parishi</i>	(Bowerbank, 1875)	Introduced				x	x	
PORIFERA	<i>Raspailia (Clathriodendron) ?darwinensis</i>	Hooper, 1991	Cryptogenic	x					
PORIFERA	<i>Raspailia (Clathriodendron) darwinensis</i>	Hooper, 1991	Cryptogenic		x				
PORIFERA	<i>Raspailia (Clathriodendron) sp.</i>		Cryptogenic	x	x				
PORIFERA	<i>Scopalina sp.</i>		Cryptogenic	x					
PORIFERA	<i>Suberites aurantiacus</i>	(Duchassaing & Michelotti, 1864)	Introduced				x		
PORIFERA	<i>Tedania (Tedania) ignis</i>	(Duchassaing & Michelotti, 1864)	Cryptogenic	x				x	
PORIFERA	<i>Tedania sp.</i>		Cryptogenic		x				
		Total Sponges	20	9	10	4	4	7	0
CNIDARIA	<i>Bougainvillidae unid. sp.</i>		Native		x				
CNIDARIA	<i>Clytia cf. gracilis</i>	(M. Sars, 1850)	Cryptogenic				x		
CNIDARIA	<i>Cyphastrea ocellina</i>	(Dana, 1846)	Native	x					
CNIDARIA	<i>Halecium sp.</i>		Native		x		x	x	x
CNIDARIA	<i>Halopteris plagiocampa</i>	(Pictet, 1893)	Cryptogenic	x		x			
CNIDARIA	<i>Hydrozoa unid. sp.</i>		Native	x					
CNIDARIA	<i>Leptastrea purpurea</i>	Dana, 1846	Native	x	x			x	
CNIDARIA	<i>Montipora capitata</i>	(Dana, 1846)	Native	x	x	x			
CNIDARIA	<i>Montipora patula</i>	Verrill, 1864	Native	x	x	2			
CNIDARIA	<i>Obelia bidentata</i>	Clarke, 1875	Introduced						x
CNIDARIA	<i>Pavona varians</i>	Verrill, 1864	Native		x	x			
CNIDARIA	<i>Pennaria disticha</i>	(Goldfuss, 1820)	Introduced	x			x	x	
CNIDARIA	<i>Pocillopora damicornis</i>	(Linnaeus, 1758)	Native	x	x	x			
CNIDARIA	<i>Pocillopora meandrina</i>	Dana, 1846	Native	x		x			

Taxa	Scientific name	Author Date	Origin	HH08	HH11	HH14	KL18	KL19	KL20
CNIDARIA	<i>Porites compressa</i>	Dana, 1846	Native	x	x	x			
CNIDARIA	<i>Porites evermanni</i>	Vaughan, 1907	Native	x	x	x			
CNIDARIA	<i>Porites lobata</i>	Dana, 1846	Native	x	x				
CNIDARIA	<i>Ventromma halecioides</i>	(Alder, 1859)	Cryptogenic				1		
		Total Cnidarians	18	12	10	9	4	3	2
SIPUNCULA	<i>Sipuncula unid. sp.</i>		Native		x	x			
ANNELIDA	? <i>Demonax sp.</i>		Native	x					
ANNELIDA	<i>Amphigena sp.</i>		Cryptogenic		x				
ANNELIDA	<i>Branchiomma nigromaculata</i>	(Baird, 1865)	Cryptogenic	x	x		x		
ANNELIDA	<i>Branchiomma sp.</i>		Native			x			
ANNELIDA	<i>Cerratulidae unid. sp.</i>		Native	x					
ANNELIDA	<i>Cirratulidae unid. sp.</i>		Native					x	
ANNELIDA	<i>Dorvilleidae unid. sp.</i>		Native	x					
ANNELIDA	<i>Eunice antennata</i>	(Savigny, 1820)	Native		x				
ANNELIDA	<i>Eunicidae unid. sp.</i>		Native	x		x	x	x	
ANNELIDA	<i>Glyceridae unid. sp.</i>		Native	x					
ANNELIDA	<i>Hydroides sp.</i>		Native			x			
ANNELIDA	<i>Lepidonotus sp.</i>		Native				x		
ANNELIDA	<i>Loimia medusa</i>	(Savigny, 1818)	Native	x					
ANNELIDA	<i>Lumbrineridae unid. sp.</i>		Native					x	
ANNELIDA	<i>Marphysa sp.</i>		Native		x				
ANNELIDA	<i>Nematoneis unicornis</i>	Schmarda, 1861	Native		x		x	x	
ANNELIDA	<i>Nereididae unid. sp.</i>		Native	x	x				
ANNELIDA	<i>Oenone fulgida</i>	Savigny, 1818	Cryptogenic					x	
ANNELIDA	<i>Perinereis curvata</i>	Holly, 1935	Native		x				
ANNELIDA	<i>Phyllodocidae unid. sp.</i>		Native	x			x		
ANNELIDA	<i>Polynoidae unid. sp.</i>		Native	x				x	
ANNELIDA	<i>Pomatoleios kraussii</i>	Baird, 1865	Introduced				x		
ANNELIDA	<i>Sabellastarte spectabilis</i>	(Grube, 1878)	Introduced	x	x	x	x	x	
ANNELIDA	<i>Sabellidae unid. sp.</i>		Native	x	x		x	x	
ANNELIDA	<i>Salmacina dysteri</i>	(Huxley, 1855)	Introduced	x			x		
ANNELIDA	<i>Spionidae unid. sp.</i>		Native	x					
ANNELIDA	<i>Spirobranchus giganteus</i>	(Grube, 1862)	Native	x		x			
ANNELIDA	<i>Syllidae unid. sp.</i>		Native	x					
ANNELIDA	<i>Syllidae unid. sp.</i>		Native		x	x	x	x	
ANNELIDA	<i>Terebellidae unid. sp.</i>		Native	x				x	
		Total Polychaetes	30	17	10	6	10	10	0
MOLLUSCA	<i>Brachidontes crebristriatus</i>	(Conrad, 1837)	Native				x		
MOLLUSCA	<i>Chama iostoma</i>	Conrad, 1837	Native					x	
MOLLUSCA	<i>Conus miles</i>	Linnaeus, 1758	Native	x					
MOLLUSCA	<i>Crassostrea sp.</i>		Introduced		x	x	x		x
MOLLUSCA	<i>Cymatium sp.</i>		Native			x			
MOLLUSCA	<i>Cypraea isabella</i>	Linnaeus, 1758	Native		x	x			
MOLLUSCA	<i>Cypraea spp.</i>		Native			x			
MOLLUSCA	<i>Dendostrea sandvicensis</i>	(Sowerby, 1871)	Native		x	x	x		
MOLLUSCA	<i>Hipponix (Cochlear) imbricatus</i>	Gould, 1846	Native			x			
MOLLUSCA	<i>Hypselodoris infucata</i>	(Ruppell and Leuckart, 1828)	Native					x	
MOLLUSCA	<i>Isognomon perna</i>	(Linnaeus, 1767)	Native			x			
MOLLUSCA	<i>Isognomon sp.</i>		Native	x					
MOLLUSCA	<i>Littoraria pintado</i>	(Wood, 1828)	Native			x			



Taxa	Scientific name	Author Date	Origin	HH08	HH11	HH14	KL18	KL19	KL20
MOLLUSCA	<i>Littoraria scabra</i>	(Linnaeus, 1758)	Native			x			
MOLLUSCA	<i>Mollusca unid. spp.</i>		Native					x	
MOLLUSCA	<i>Nodilittorina hawaiiensis</i>		Native			x			
MOLLUSCA	<i>Ostreidae unid. sp.</i>		Native						x
MOLLUSCA	<i>Pinctada margaritifera</i>	(Linnaeus, 1758)	Native	x					
MOLLUSCA	<i>Tambja morosa</i>	(Bergh, 1877)	Native	x					
MOLLUSCA	<i>Thaididae unid. sp.</i>		Native			x			
MOLLUSCA	<i>Vermetidae unid. spp.</i>		Native			x			
MOLLUSCA	<i>Vermetus alli</i>	Hadfield & Kay, 1972	Introduced					x	
MOLLUSCA	<i>Zafra cf. hervieri</i>	(Pace, 1903),	Cryptogenic			x			
		Total Molluscs	23	4	3	13	3	4	2
PYCNOGONIDA	<i>Pycnogonida unid. sp.</i>		Native			x			
CRUSTACEA	<i>Ampithoe sp.</i>	Barnard, 1970	Native				x		
CRUSTACEA	<i>Ampithoe waiialua</i>	Barnard, 1970	Native	x					
CRUSTACEA	<i>Anatanaia insularis</i>	Miller, 1940	Native		x		x		
CRUSTACEA	<i>Balanus amphitrite</i>	Darwin 1854	Introduced						x
CRUSTACEA	<i>Balanus eburneus</i>	Gould, 1841	Introduced						x
CRUSTACEA	<i>Balanus reticulatus</i>	Utinomi, 1967	Introduced				x		x
CRUSTACEA	<i>Balanus sp.</i>		Introduced						x
CRUSTACEA	<i>Bemlos macromanus</i>	Shoemaker, 1925	Native			x			
CRUSTACEA	<i>Chthamalus proteus</i>	Dando & Southward, 1980	Introduced			x			x
CRUSTACEA	<i>Colomastix kapiolani</i>	Barnard, 1970	Native		x		x		
CRUSTACEA	<i>Colomastix lunailo</i>	Barnard, 1970	Native	x			x	x	x
CRUSTACEA	<i>Colomastix pusilla</i>	Grube, 1864	Native					x	
CRUSTACEA	<i>Corophium sp.</i>		Introduced						x
CRUSTACEA	<i>Erichthonius brasiliensis</i>	(Dana, 1853)	Introduced					x	
CRUSTACEA	<i>Glabropilumnus seminudus</i>	(Miers.)	Introduced	x					
CRUSTACEA	<i>Grapsus tenuicrustatus</i>	(Herbst, 1783)	Native			x			
CRUSTACEA	<i>Hyastenus tenuicornis</i>	(Pocock, 1895)	Native					x	
CRUSTACEA	<i>Lembos sp.</i>		Native	x					
CRUSTACEA	<i>Leptochelia dubia</i>	Krøyer, 1842	Cryptogenic	x	x	x	x	x	
CRUSTACEA	<i>Leucothoe hyhelia</i>	Barnard, 1965	Native		x	x	x	x	x
CRUSTACEA	<i>Leucothoe sp.1</i>		Native	x	x		x	x	
CRUSTACEA	<i>Lysianassa ewa</i>	Barnard, 1970	Native					x	
CRUSTACEA	<i>Maera pacifica</i>	Schellenberg, 1938	Native				x		
CRUSTACEA	<i>Metopograpsus thukuhar</i>	(Owen, 1893)	Native						x
CRUSTACEA	<i>Parapseudes neglectus</i>	Miller, 1940	Native	x		x			
CRUSTACEA	<i>Phymodius nitidus</i>	(Dana, 1852)	Native					x	x
CRUSTACEA	<i>Phymodius sp.</i>		Native			x	x		
CRUSTACEA	<i>Pilumnus oahuensis</i>	Edmondson, 1931	Introduced	x	x			x	
CRUSTACEA	<i>Pilumnus vespertilio</i>	(Fabricius, 1793)	Native					x	
CRUSTACEA	<i>Stenopus hispidus</i>	(Olivier, 1811)	Native	x					
CRUSTACEA	<i>Thalamita dakini</i>	Montgomery, 1931	Native	x		x			
		Total Crustaceans	31	10	6	8	10	11	10
BRYOZOA	<i>Amathia distans</i>	Busk, 1886	Introduced	x	x		x	x	
BRYOZOA	<i>Bugula dentata</i>	(Lamauroux, 1816)	Introduced	x	x	x	x		
BRYOZOA	<i>Bugula neritina</i>	(Linnaeus, 1758)	Introduced					x	x
BRYOZOA	<i>Diaperoforma sp.</i>		Native	x	x	x	x		
BRYOZOA	<i>Ectoprocta unid. sp.</i>		Native						
BRYOZOA	<i>Schizoporella cf. errata</i>	(Waters, 1878)	Introduced		x		x	x	
BRYOZOA	<i>Watersipora edmondsoni</i>	Soule and Soule, 1968	Introduced				x	x	

Taxa	Scientific name	Author Date	Origin	HH08	HH11	HH14	KL18	KL19	KL20
BRYOZOA	<i>Zoobotryon verticillatum</i>	(delle Chiaje, 1828)	Introduced				x		
		Total Bryozoans	8	3	4	2	6	4	1
ECHINODERMS	<i>Diadema paucispinum</i>	Agassiz, 1863	Native			x			
ECHINODERMS	<i>Echinometra mathaei</i>	(Blainville, 1825)	Native	x		x			
ECHINODERMS	<i>Echinothrix calamaris</i>	(Pallas, 1774)	Native	x		x			
ECHINODERMS	<i>Eucidaris metularia</i>	Lamarck, 1816	Native			x			
ECHINODERMS	<i>Heterocentrotus mammillatus</i>	(Linnaeus, 1758)	Native			x			
ECHINODERMS	<i>Holothuria (Thymiosycia) impatiens</i>	(Forsk. 1775)	Native			x			
ECHINODERMS	<i>Holothuria unid. sp.</i>		Native			x			
ECHINODERMS	<i>Ophiactis savignyi</i>	(Muller and Troschel, 1842)	Cryptogenic	x	x		x	x	
ECHINODERMS	<i>Ophiocoma erinaceus</i>	Muller and Troschel, 1842	Native	x		x			
ECHINODERMS	<i>Tripneustes gratilla</i>	(Linnaeus, 1758)	Native			x			
		Total Echinoderms	10	4	1	9	1	1	0
ASCIDACEA	<i>Ascidea unid. sp.</i>		Native				x		
ASCIDACEA	<i>Ascidia sp. B</i>		Introduced				x		
ASCIDACEA	<i>Ascidia sydneiensis</i>	Stimpson, 1855	Introduced	x					
ASCIDACEA	<i>Botrylloides simodensis</i>	Saito & Watanabe, 1981	Introduced				x		
ASCIDACEA	<i>Botrylloides sp.</i>		Native					x	
ASCIDACEA	<i>Botryllus spp.</i>		Native				x		
ASCIDACEA	<i>Didemnum cf. candidum</i>	Savigny, 1816	Introduced	x			x	x	
ASCIDACEA	<i>Didemnum perlucidum</i>	Monniot, 1983	Introduced	x					
ASCIDACEA	<i>Diplosoma cf. spongiforme</i>	(Giard, 1872)	Introduced					x	
ASCIDACEA	<i>Eusynstyela hartmeyer</i>	Michaelson, 1904	Introduced				x		
ASCIDACEA	<i>Herdmania mauritiana</i>	(Drasche, 1884)	Introduced		x				
ASCIDACEA	<i>Herdmania pallida</i>	(Savigny, 1816)	Introduced	x			x	x	
ASCIDACEA	<i>Microcosmus exasperatus</i>	Heller, 1878	Introduced	x			x	x	
ASCIDACEA	<i>Phallusia nigra</i>	Savigny, 1816	Introduced		x	x	x	x	
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>	Tokioka, 1953	Introduced	x					
ASCIDACEA	<i>Polycarpa aurita</i>	(Sluiter, 1890)	Native					x	
ASCIDACEA	<i>Polycarpa cryptocarpa</i>	(Sluiter, 1885)	Cryptogenic	x	x				
ASCIDACEA	<i>Polyclinum cf. constellatum</i>	Savigny, 1816	Introduced				x		
ASCIDACEA	<i>Pyura sp.</i>		Native	x					
ASCIDACEA	<i>Styela canopus</i>	Savigny, 1816	Introduced					x	
		Total Ascidiaceans	20	8	3	1	10	8	0
Osteichthyes	<i>Abudefduf abdominalis</i>	(Quoy and Gaimard, 1824)	Native	x		x	x	x	x
Osteichthyes	<i>Acanthurus blochii</i>	Valenciennes 1835	Native	x					
Osteichthyes	<i>Acanthurus leucopareius</i>	(Jenkins, 1903)	Native	x					
Osteichthyes	<i>Acanthurus triostegus</i>	(Linnaeus, 1758)	Native	x	x	x	x		
Osteichthyes	<i>Canthigaster jactator</i>	(Jenkins, 1901)	Native	x	x	x		x	
Osteichthyes	<i>Centropyge loriculus</i>	(Günther, 1860)	Introduced			x			
Osteichthyes	<i>Chaetodon auriga</i>	Forsskål 1775	Native		x				
Osteichthyes	<i>Chromis vanderbilti</i>	(Fowler, 1941)	Native	x					
Osteichthyes	<i>Dascyllus albisella</i>	Gill 1862	Native	x	x				
Osteichthyes	<i>Diodon hystrix</i>	Linnaeus 1758	Native					x	
Osteichthyes	<i>Echidna nebulosa</i>	(Ahl, 1789)	Native	x					
Osteichthyes	<i>Kuhlia sandvicensis</i>	(Steindachner, 1876)	Native				x		
Osteichthyes	<i>Lutjanus fulvus</i>	(Forster in Bloch and Schneider, 1801)	Introduced	x					
Osteichthyes	<i>Mullidichthys vanicolensis</i>	(Valenciennes, 1831)	Native	x					
Osteichthyes	<i>Plectroglyphidodon imparipennis</i>	(Vaillant and Sauvage, 1875)	Native			x			

Taxa	Scientific name	Author Date	Origin	HH08	HH11	HH14	KL18	KL19	KL20
Osteichthyes	<i>Saurida sp.</i>	Waples 1981	Native	x					
Osteichthyes	<i>Scarus sp. juv.</i>		Native	x		x			
Osteichthyes	<i>Stegastes fasciolatus</i>	(Ogilby, 1889)	Native			x			
Osteichthyes	<i>Thalassoma duperrey</i>	(Quoy and Gaimard, 1824)	Native	x		x			
Osteichthyes	<i>Thalassoma purpurum</i>	(Forsskål, 1775)	Native			x			
Osteichthyes	<i>Zanclus cornutus</i>	(Linnaeus, 1758)	Native	x					
Osteichthyes	<i>Zebrasoma flavescens</i>	(Bennett, 1828)	Native	x					
		Total Fish	22	15	4	9	3	3	1
		Total Taxa	195	84	57	66	51	54	17
		Cryptogenic	21	12	12	5	5	6	0
		Introduced	47	15	11	7	23	21	10
		Intr+Crypto	68	27	23	12	28	27	10
		% NIS	34.9%	32.1%	40.4%	18.2%	54.9%	50.0%	58.8%

APPENDIX E

Introduced or Cryptogenic Species Collected in Honolulu Harbor or Ke'ehi  
Lagoon in 2007-2008

Taxa	Scientific name	Origin	HH08	HH11	HH14	KL18	KL19	KL20
Chlorophyta	<i>Acanthophora spicifera</i>	Introduced			x			
Rhodophyta	<i>Gracilaria salicornia</i>	Introduced					x	
Rhizophoraceae	<i>Rhizophora mangle</i>	Introduced					x	x
PORIFERA	? <i>Tedania sp.</i>	Cryptogenic			x			
PORIFERA	<i>Biemna fistulosa</i>	Cryptogenic	x	x	x		x	
PORIFERA	<i>Iotrochota baculifera</i>	Cryptogenic		x				
PORIFERA	<i>Iotrochota purpurea</i>	Cryptogenic	x	x				
PORIFERA	<i>Monanchora dianchora</i>	Cryptogenic	x	x			x	
PORIFERA	<i>Raspailia (Clathriodendron) ?darwinensis</i>	Cryptogenic	x					
PORIFERA	<i>Raspailia (Clathriodendron) darwinensis</i>	Cryptogenic		x				
PORIFERA	<i>Raspailia (Clathriodendron) sp.</i>	Cryptogenic	x	x				
PORIFERA	<i>Scopalina sp.</i>	Cryptogenic	x					
PORIFERA	<i>Tedania (Tedania) ignis</i>	Cryptogenic	x				x	
PORIFERA	<i>Tedania sp.</i>	Cryptogenic		x				
PORIFERA	? <i>Haliclona (Soestella) coerulea</i>	Introduced		x		x		
PORIFERA	<i>Dysidea arenaria</i>	Introduced		x		x	x	
PORIFERA	<i>Haliclona (Soestella) coerulea</i>	Introduced	x				x	
PORIFERA	<i>Mycale (Mycale) grandis</i>	Introduced		x			x	
PORIFERA	<i>Mycale (Zygomycale) parishi</i>	Introduced				x	x	
PORIFERA	<i>Suberites aurantiacus</i>	Introduced				x		
CNIDARIA	<i>Clytia cf. gracilis</i>	Cryptogenic				x		
CNIDARIA	<i>Halopteris plagiocampa</i>	Cryptogenic	x		x			
CNIDARIA	<i>Ventromma halecioides</i>	Cryptogenic				x		
CNIDARIA	<i>Obelia bidentata</i>	Introduced						x
CNIDARIA	<i>Pennaria disticha</i>	Introduced	x			x	x	
ANNELIDA	<i>Amphiglena sp.</i>	Cryptogenic		x				
ANNELIDA	<i>Branchiomma nigromaculata</i>	Cryptogenic	x	x		x		
ANNELIDA	<i>Oenone fulgida</i>	Cryptogenic					x	
ANNELIDA	<i>Pomatoleios kraussii</i>	Introduced				x		
ANNELIDA	<i>Sabellastarte spectabilis</i>	Introduced	x	x	x	x	x	
ANNELIDA	<i>Salmacina dysteri</i>	Introduced	x			x		
MOLLUSCA	<i>Zafra cf. hervieri</i>	Cryptogenic			x			
MOLLUSCA	<i>Crassostrea sp.</i>	Introduced		x	x	x		x
MOLLUSCA	<i>Vermetus alli</i>	Introduced					x	
CRUSTACEA	<i>Leptocheilia dubia</i>	Cryptogenic	x	x	x	x	x	
CRUSTACEA	<i>Balanus amphitrite</i>	Introduced						x
CRUSTACEA	<i>Balanus eburneus</i>	Introduced						x
CRUSTACEA	<i>Balanus reticulatus</i>	Introduced				x		x
CRUSTACEA	<i>Balanus sp.</i>	Introduced						x
CRUSTACEA	<i>Chthamalus proteus</i>	Introduced			x			x
CRUSTACEA	<i>Corophium sp.</i>	Introduced						x
CRUSTACEA	<i>Erichthonius brasiliensis</i>	Introduced					x	
CRUSTACEA	<i>Glabropilumnus seminudus</i>	Introduced	x					
CRUSTACEA	<i>Pilumnus oahuensis</i>	Introduced	x	x			x	
BRYOZOA	<i>Amathia distans</i>	Introduced	x	x		x	x	
BRYOZOA	<i>Bugula dentata</i>	Introduced	x	x	x	x		
BRYOZOA	<i>Bugula neritina</i>	Introduced					x	x
BRYOZOA	<i>Schizoporella cf. errata</i>	Introduced		x		x	x	
BRYOZOA	<i>Watersipora edmondsoni</i>	Introduced				x	x	
BRYOZOA	<i>Zoobotryon verticillatum</i>	Introduced				x		
ECHINODERMS	<i>Ophiactis savignyi</i>	Cryptogenic	x	x		x	x	
ASCIDACEA	<i>Polycarpa cryptocarpa</i>	Cryptogenic	x	x				
ASCIDACEA	<i>Ascidia sp. B</i>	Introduced				x		

Taxa	Scientific name	Origin	HH08	HH11	HH14	KL18	KL19	KL20
ASCIDACEA	<i>Ascidia sydneiensis</i>	Introduced	x					
ASCIDACEA	<i>Botrylloides simodensis</i>	Introduced				x		
ASCIDACEA	<i>Didemnum cf. candidum</i>	Introduced	x			x	x	
ASCIDACEA	<i>Didemnum perlucidum</i>	Introduced	x					
ASCIDACEA	<i>Diplosoma cf. spongiforme</i>	Introduced					x	
ASCIDACEA	<i>Eusynstyela hartmeyeri</i>	Introduced				x		
ASCIDACEA	<i>Herdmania mauritiana</i>	Introduced		x				
ASCIDACEA	<i>Herdmania pallida</i>	Introduced	x			x	x	
ASCIDACEA	<i>Microcosmus exasperatus</i>	Introduced	x			x	x	
ASCIDACEA	<i>Phallusia nigra</i>	Introduced		x	x	x	x	
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>	Introduced	x					
ASCIDACEA	<i>Polyclinum cf. constellatum</i>	Introduced				x		
ASCIDACEA	<i>Styela canopus</i>	Introduced					x	
Osteichthyes	<i>Centropyge loriculus</i>	Introduced			x			
Osteichthyes	<i>Lutjanus fulvus</i>	Introduced	x					
	Total Taxa	195	84	57	66	51	54	17
	Cryptogenic	21	12	12	5	5	6	0
	Introduced	47	15	11	7	23	21	10
	Intr+Crypto	68	27	23	12	28	27	10
	% NIS	34.9%	32.1%	40.4%	18.2%	54.9%	50.0%	58.8%

## APPENDIX F

Genera and Species not Previously Reported in Honolulu Harbor or Ke'ehi Lagoon

Taxa	Scientific name	HH08	HH11	HH14	KL18	KL19	KL20
Rhodophyta	<i>Gracilaria salicornia</i>					x	
Total Algae	1						
PORIFERA	? <i>Stylinos sp.</i>	x		x			
PORIFERA	<i>Iotrochota baculifera</i>		x				
PORIFERA	<i>Iotrochota purpurea</i>	x	x				
PORIFERA	<i>Monanchora dianchora</i>	x	x			x	
PORIFERA	<i>Raspailia (Clathriodendron) darwinensis</i>		x				
PORIFERA	<i>Raspailia (Clathriodendron) sp.</i>	x	x				
PORIFERA	<i>Scopalina sp.</i>	x					
PORIFERA	<i>Suberites aurantiacus</i>				x		
PORIFERA	<i>Tedania (Tedania) ignis</i>	x				x	
Total Sponges	9	6	5	1	1	2	0
CNIDARIA	<i>Clytia cf. gracilis</i>				x		
CNIDARIA	<i>Halopteris plagiocampa</i>	x		x			
CNIDARIA	<i>Obelia bidentata</i>						x
CNIDARIA	<i>Ventromma halecioides</i>				x		
Total Cnidarians	4	x	0	x	2	0	x
MOLLUSCA	<i>Chama iostoma</i>					x	
MOLLUSCA	<i>Conus miles</i>	x					
MOLLUSCA	<i>Hypselodoris infucata</i>					x	
Total Molluscs	3	1	0	0	0	2	0
ANNELIDA	? <i>Demonax sp.</i>	x					
ANNELIDA	<i>Amphiglena sp.</i>		x				
ANNELIDA	<i>Oenone fulgida</i>					x	
ANNELIDA	<i>Perinereis curvata</i>		x				
Total Polychaetes	4	1	2	0	0	1	0
ARTHROPODA	<i>Ampithoe sp.</i>				x		
ARTHROPODA	<i>Glabropilumnus seminudus</i>	x					
ARTHROPODA	<i>Grapsus tenuicrustatus</i>			x			
ARTHROPODA	<i>Hyastenus tenuicornis</i>					x	
ARTHROPODA	<i>Pilumnus vespertilio</i>					x	
ARTHROPODA	<i>Thalamita dakini</i>	x		x			
Total Crustaceans	6	2	0	2	1	2	0
ECHINODERMATA	<i>Holothuria (Thymiosyca) impatiens</i>			x			
ECHINODERMATA	<i>Ophiocoma erinaceus</i>	x		x			
Total Echinoderms	2	1	0	2	0	0	0
ASCIDACEA	<i>Botryllus spp.</i>				x		
ASCIDACEA	<i>Didemnum perlucidum</i>	x					
ASCIDACEA	<i>Diplosoma cf. spongiforme</i>					x	
ASCIDACEA	<i>Eusynstyela hartmeyeri</i>				x		
ASCIDACEA	<i>Herdmania mauritiana</i>		x				
ASCIDACEA	<i>Herdmania pallida</i>	x			x	x	
ASCIDACEA	<i>Polycarpa cryptocarpa</i>	x	x				
ASCIDACEA	<i>Pyura sp.</i>	x					
Total Ascidacea	8	4	2	0	3	2	0
Osteichthyes	<i>Centropyge loriculus</i>			x			
Osteichthyes	<i>Chromis vanderbilti</i>	x					
Osteichthyes	<i>Echidna nebulosa</i>	x					
Osteichthyes	<i>Plectroglyphidodon imparipennis</i>			x			
Total Fish	4	2	0	2	0	0	0



<b>Taxa</b>	<b>Scientific name</b>	<b>HH08</b>	<b>HH11</b>	<b>HH14</b>	<b>KL18</b>	<b>KL19</b>	<b>KL20</b>
Total Taxa	195	84	58	65	51	54	17
New Genera or Species	41	18	9	8	7	10	1
% New HH or KL Reports	21.0%	21.4%	15.5%	12.3%	13.7%	18.5%	5.9%

## APPENDIX G

Listing of Marine or Estuarine Organisms Collected or Observed in Pearl Harbor  
from all Available Sources, Including Present Study

# Legacy Project - Species Report

## KINGDOM: MONERA

Phylum: CYANOPHYCOTA

Class: CYANOPHYCEAE

Order: NOSTOCALES

Family: OSCILLATORIACEAE

Genus: *Lyngbya*

*Lyngbya sp.*

1996 Legacy Project (Coles et al., 1997)

*Lyngbya majuscula*

2007 Ref - Brock, 2007

(Dillwyn) Harv. Ex Gomont

Genus: *Phormidium*

*Phormidium crosbyamum*

1982 Spec - BPBM-AL 523155

E shore of entrance; reef at Fort Kamehameha.

## KINGDOM: PROTISTA

Phylum: CHRYSOPHYTA

Class: CHRYSOPHYCEAE

Genus: *Chrysonephos*

*Chrysonephos lewisii*

1972 Ref - Long, 1974

(Taylor, 1951)

Phylum: BACILLARIOPHYTA

Class: BACILLARIOPHYCEAE

Order: CENTRALES

Family: CHAETOCERACEAE

Genus: *Chaetoceros*

*Chaetoceros sp.*

1978 Ref - Grovhoug, 1979

Family: COSCINODISCACEAE

Genus: *Coscinodiscus*

*Coscinodiscus sp.*

1973 Ref - Evans et al., 1974

Family: MELOSIRACEAE

Genus: *Melosira*

*Melosira sp.*

1978 Ref - Grovhoug, 1979

Family: THALASSIOSIRACEAE

Genus: *Skeletonema*

*Skeletonema sp.*

1978 Ref - Grovhoug, 1979

Order: PENNALES

Unidentified Pennales

1978 Ref - Grovhoug, 1979

Family: DIATOMACEAE

Genus: *Thalassionema*

*Thalassionema sp.*

1978 Ref - Grovhoug, 1979

## Legacy Project - Species Report (Cont.)

### Family: NAVICULACEAE

#### Genus: *Navicula*

##### *Navicula* sp.

1978 Ref - Grovhoug, 1979

### Family: NITZSCHIACEAE

#### Genus: *Nitzschia*

##### *Nitzschia* sp.

1978 Ref - Grovhoug, 1979

### Phylum: CHLOROPHYCOTA

#### Family: Derbesiaceae

#### Genus: *Derbesia*

##### *Derbesia tenuissima*

2007 Ref - Brock, 2007

(Moris & De Notaris) Crouan & Crouan

Recorded as *Derbesia tenuissima*.

### Class: CHLOROPHYCEAE

#### Order: ULOTRICHALES

#### Family: ULVACEAE

#### Genus: *Enteromorpha*

##### *Enteromorpha intestinalis*

1972 Ref - Long, 1974

1979 Ref - AECOS, 1979

((Linnaeus) Link, 1820)

Off Pearl Harbor.

Off Pearl Harbor.

#### Genus: *Ulva*

##### *Ulva* sp.

1943 Ref - Hutchins, 1949

##### *Ulva fasciata*

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

1979 Ref - AECOS, 1979

Delile, 1813

Off Pearl Harbor.

##### *Ulva lactuca*

1973 Ref - Evans et al., 1974

Linnaeus, 1753 Indigenous. Hawaiian name(s): koku/ lipehe.

##### *Ulva reticulata*

1973 Ref - Evans et al., 1974

1979 Ref - AECOS, 1979

Forsskål, 1775

Off Pearl Harbor.

#### Order: CLADOPHORALES

#### Family: CLADOPHORACEAE

#### Genus: *Chaetomorpha*

##### *Chaetomorpha indica*

1979 Ref - AECOS, 1979

Kützting

Off Pearl Harbor.

#### Genus: *Cladophora*

##### *Cladophora* sp.

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

2007 This Project

Indigenous.

##### *Cladophora fascicularis*

1979 Ref - AECOS, 1979

(Mertens)

Off Pearl Harbor.

#### Order: CAULERPALES

#### Family: CAULERPACEAE

#### Genus: *Caulerpa*

##### *Caulerpa racemosa*

1979 Ref - AECOS, 1979

(Forsskal) J. Agardh, 1872

Off Pearl Harbor.

##### *Caulerpa sertularioides*

Unknown Spec - BPBM-AL 515478

1973 Ref - Evans et al., 1974

(Gmelin) Howe, 1905

Middle Loch.

## Legacy Project - Species Report (Cont.)

1996 Legacy Project (Coles et al., 1997)

***Caulerpa verticillata*** J. Agardh, 1847  
1973 Ref - Evans et al., 1974

### Family: CODIACEAE

#### Genus: *Chlorodesmis*

***Chlorodesmis caespitosa*** J. Agardh  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Codium*

***Codium arabicum*** Kützinger, 1856  
1979 Ref - AECOS, 1979 Off Pearl Harbor.

***Codium dichotomum*** (Hudson, 1762)  
1972 Ref - Long, 1974 Off Pearl Harbor.

***Codium edule*** Silva, 1952  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

***Codium reediae*** Silva, in Egerod, 1952  
1979 Ref - AECOS, 1979 Off Pearl Harbor.

#### Genus: *Halimeda*

***Halimeda discoidea*** Decaisne, 1842  
1979 Ref - AECOS, 1979 Off Pearl Harbor.

### Order: SIPHONOCLADALES

#### Family: SIPHONOCLADACEAE

#### Genus: *Cladophoropsis*

***Cladophoropsis luxurians*** Gilbert, 1962  
1979 Ref - AECOS, 1979 Off Pearl Harbor.

### Family: VALONIACEAE

#### Genus: *Boodlea*

***Boodlea composita*** ((Harvey & Hooker) Brand, 1905)  
Unknown Spec - BPBM-AL 92645  
1996 Legacy Project (Coles et al., 1997)

***Boodlea hiloense*** (Pilsbry & Vanatta, 1908)  
1973 Ref - Evans et al., 1974

#### Genus: *Dictyosphaeria*

***Dictyosphaeria versluysii*** Weber-van Bosse, 1905 Indigenous.  
1996 Legacy Project (Coles et al., 1997)

### Phylum: PYRRROPHYCOPHYTA

#### Class: DINOPHYCEAE

#### Order: PROROCENTRALES

#### Family: PROROCENTRACEAE

#### Genus: *Prorocentrum*

***Prorocentrum gracile*** Schott  
1973 Ref - Evans et al., 1974

#### Order: DINOPHYSIALES

#### Family: DINOPHYSIACEAE

#### Genus: *Dinophysis*

***Dinophysis sp.?***  
1978 Ref - Grovhoug, 1979

***Dinophysis caudatum*** (Kent)  
1973 Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

Order: PERIDINIALES

Family: CERATIACEAE

Genus: *Ceratium*

*Ceratium ferka* (Ehrenberg)

1973 Ref - Evans et al., 1974

Family: GONYAULACEAE

Genus: *Gonyaulax*

*Gonyaulax minutum* Michener

1973 Ref - Evans et al., 1974

Family: GYMNODINIACEAE

Genus: *Cochlodinium*

*Cochlodinium catenatum* Okamura

1973 Ref - Evans et al., 1974

Family: NOCTILUCACEAE

Genus: *Noctiluca*

*Noctiluca minuta* (McCartney & Kofoid)

1973 Ref - Evans et al., 1974

Family: PERIDINIACEAE

Genus: *Peridinium*

*Peridinium crassipes* (Kofoid)

1973 Ref - Evans et al., 1974

Family: POLYKRIKACEAE

Genus: *Polykrikos*

*Polykrikos schwartzi* (Butschli)

1973 Ref - Evans et al., 1974

Phylum: PHAEOPHYCOPHYTA

Class: PHAEOPHYCEAE

Order: ECTOCARPALES

Family: RALFSIACEAE

Genus: *Ralfsia*

*Ralfsia occidentalis* Hollenberg

1979 Ref - AECOS, 1979 Off Pearl Harbor.

Order: DICTYOTALES

Family: DICTYOTACEAE

Genus: *Dictyota*

*Dictyota sp.* Indigenous.

2007 This Project

*Dictyota sp.?* Indigenous.

1978 Ref - Grovhoug, 1979 Recorded as Dictyocha.

*Dictyota acutiloba* J. Agardh, 1848

1979 Ref - AECOS, 1979 Off Pearl Harbor.

*Dictyota bartayresii* Lamouroux

2007 Ref - Brock, 2007

*Dictyota divaricata* Lamouroux, 1809

1972 Ref - Long, 1974 Off Pearl Harbor.

1979 Ref - AECOS, 1979 Off Pearl Harbor.

Genus: *Lobophora*

*Lobophora variegata* (Lamouroux) Indigenous.

1979 Ref - AECOS, 1979 Off Pearl Harbor.

1996 Legacy Project (Coles et al., 1997)

2008 This Project

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Padina</i></b>			
<b><i>Padina</i> sp.</b>		<b>Indigenous.</b>	
2008	This Project		
<b><i>Padina japonica</i></b>		<b>Boergesen</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b><i>Padina pavonica</i></b>		<b>(Linnaeus, 1758)</b>	
1972	Ref - Long, 1974		Off Pearl Harbor.
<b>Order: FUCALES</b>			
<b>Family: SARGASSACEAE</b>			
<b>Genus: <i>Sargassum</i></b>			
<b><i>Sargassum echinocarpum</i></b>		<b>J. Agardh</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b><i>Sargassum obtusifolium</i></b>		<b>J. Agardh</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b><i>Sargassum polyphyllum</i></b>		<b>J. Agardh</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b>Order: SCYTOSIPHONALES</b>			
<b>Family: SCYTOSIPHONACEAE</b>			
<b>Genus: <i>Colpomenia</i></b>			
<b><i>Colpomenia sinuosa</i></b>		<b>(Roth)</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b>Genus: <i>Hydroclathrus</i></b>			
<b><i>Hydroclathrus clathratus</i></b>		<b>(C. Agardh)</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b>Phylum: RHODOPHYCOTA</b>			
<b>Family: GELIDIACEAE</b>			
<b>Genus: <i>Gelidium</i></b>			
<b><i>Gelidium</i> sp.</b>			
1996	Legacy Project (Coles et al., 1997)		
<b><i>Gelidium arenaria</i></b>		<b>Kylin</b>	
1996	Legacy Project (Coles et al., 1997)		
<b><i>Gelidium pusillum</i></b>		<b>(Stackhouse) Lejolis, 1863</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Family: PEYSONNELIACEAE</b>			
<b>Genus: <i>Peysonnelia</i></b>			
<b><i>Peysonnelia</i> sp.</b>			
1996	Legacy Project (Coles et al., 1997)		
<b>Class: RHODOPHYCEAE</b>			
<b>Order: NEMALIALES</b>			
<b>Family: BONNEMAISONIACEAE</b>			
<b>Genus: <i>Asparagopsis</i></b>			
<b><i>Asparagopsis taxiformis</i></b>		<b>(Delile)</b>	
1979	Ref - AECOS, 1979		Off Pearl Harbor.
<b>Family: GELIDIELLACEAE</b>			
<b>Genus: <i>Gelidiella</i></b>			
<b><i>Gelidiella</i> sp.</b>		<b>Indigenous.</b>	
1982	Spec - BPBM-AL 585470		E shore of entrance; reef at Fort Kamehameha.
2007	This Project		
<b><i>Gelidiella</i> sp. 1</b>			
1996	Legacy Project (Coles et al., 1997)		

## Legacy Project - Species Report (Cont.)

***Gelidiella sp. 2***

1996 Legacy Project (Coles et al., 1997)

***Gelidiella myrocladia***

(Borgeses) Feldmann & Hamel, 1934

1996 Legacy Project (Coles et al., 1997)

**Order: GIGARTINALES**

**Family: GRACILARIACEAE**

**Genus: *Gracilaria***

***Gracilaria bursapastoris***

(Gmelin)

1979 Ref - AECOS, 1979

Off Pearl Harbor.

***Gracilaria coronopifolia***

J. Agardh, 1852

1978 Spec - BPBM-AL 561794

Reef flat between W end of the Reef Runway & entrance to

Pearl Harbor;

opposite the National Guard hanger area.

1978 Spec - BPBM-AL 561795

Reef flat between W end of the Reef Runway & entrance to

Pearl Harbor;

opposite the National Guard hanger area.

1979 Ref - AECOS, 1979

Off Pearl Harbor.

***Gracilaria lichenoides***

Linnaeus

1973 Ref - Evans et al., 1974

***Gracilaria parvispora***

Abbott, 1985

1978 Spec - BPBM-AL 562094

Reef flat between W end of the Reef Runway & entrance to

Pearl Harbor;

opposite the National Guard hanger area. Identified by

fide.I.A.Abbott 1994.

***Gracilaria salicornia***

(Agardh) Dawson Introduced. Common name(s): Gorilla Ogo.

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

**Family: HYPNEACEAE**

**Genus: *Hypnea***

***Hypnea cervicornis***

J. Agardh

1973 Ref - Evans et al., 1974

1979 Ref - AECOS, 1979

Off Pearl Harbor.

***Hypnea spinella***

(C. Agardh) Kützting, 1849

1996 Legacy Project (Coles et al., 1997)

***Hypnea valentiae***

(Turner) Montagne, 1841

1996 Legacy Project (Coles et al., 1997)

**Family: PLOCAMIACEAE**

**Genus: *Plocamium***

***Plocamium sandvicense***

J. Agardh

1979 Ref - AECOS, 1979

Off Pearl Harbor.

**Order: CRYPTONEMIALES**

**Family: CORALLINACEAE**

**Genus: *Amphiroa***

***Amphiroa fragilissima***

(Linnaeus)

1979 Ref - AECOS, 1979

Off Pearl Harbor.

**Genus: *Corallina***

***Corallina sp.***

1979 Ref - AECOS, 1979

Off Pearl Harbor.

**Genus: *Jania***

***Jania sp.***

1979 Ref - AECOS, 1979

Off Pearl Harbor.



## Legacy Project - Species Report (Cont.)

- Genus: *Lithothamnium***  
***Lithothamnium byssoides***  
1979 Ref - AECOS, 1979 Off Pearl Harbor.
- Genus: *Porolithon***  
***Porolithon onkodes*** (Heydrich) Foslie, 1909  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)
- Family: CRYPTONEMIACEAE**  
**Genus: *Halymenia***  
***Halymenia formosa*** Harvey  
1979 Ref - AECOS, 1979 Off Pearl Harbor.
- Family: RHIZOPHYLLIDACEAE**  
**Genus: *Chondrococcus***  
***Chondrococcus hornemannii*** (Harvey)  
1979 Ref - AECOS, 1979 Off Pearl Harbor.
- Order: RHODYMENIALES**  
**Family: CHAMPIACEAE**  
**Genus: *Champia***  
***Champia parvula*** (C. Agardh)  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)
- Family: RHODYMENIACEAE**  
**Genus: *Coelothrix***  
***Coelothrix irregularis*** (Harv.) Børgesen  
2007 Ref - Brock, 2007  
***Coelothrix irregularis*** (Harvey)  
1979 Ref - AECOS, 1979 Off Pearl Harbor.
- Order: CERAMIALES**  
**Family: CERAMIACEAE**  
**Genus: *Aglaothamnion***  
***Aglaothamnion sp. 1***  
1996 Legacy Project (Coles et al., 1997)  
***Aglaothamnion sp. 2***  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Anotricium***  
***Anotricium sp.***  
1996 Legacy Project (Coles et al., 1997)  
***Anotricium secundum*** Caormaci, Funari & Pizzuto  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Centroceras***  
***Centroceras clavulatum*** (C. Agardh)  
1973 Ref - Evans et al., 1974  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Centrocerus***  
***Centrocerus sp.***  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Ceramium***  
***Ceramium sp.***  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

<b><i>Ceramium sp. 1</i></b>		
1996	Legacy Project (Coles et al., 1997)	
<b><i>Ceramium sp. 2</i></b>		
1996	Legacy Project (Coles et al., 1997)	
<b><i>Ceramium clarionense</i></b>		<b>Setchell and Gardner, 1930</b>
1996	Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Griffithsia</i></b>		
<b><i>Griffithsia sp.</i></b>		
1973	Ref - Evans et al., 1974	Recorded as Griffithsia.
1979	Ref - AECOS, 1979	Off Pearl Harbor. Recorded as Griffithsia.
<b><i>Griffithsia heteromorpha</i></b>		<b>Kützing, 1863</b>
1996	Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Spyridia</i></b>		
<b><i>Spyridia sp.</i></b>		<b>Indigenous.</b>
2007	This Project	
<b><i>Spyridia filamentosa</i></b>		<b>(Wulfen)</b>
1973	Ref - Evans et al., 1974	
1979	Ref - AECOS, 1979	Off Pearl Harbor.
<b>Genus: <i>Tolypocladia</i></b>		
<b><i>Tolypocladia sp.</i></b>		
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Tolypocladia glomerulata</i></b>		<b>(C. Agardh) Schmitz, 1897</b>
1996	Legacy Project (Coles et al., 1997)	
<b>Family: RHODOMELACEAE</b>		
<b>Genus: <i>Acanthophora</i></b>		
<b><i>Acanthophora spicifera</i></b>		<b>(Vahl, 1802) Introduced. Common name(s): Spiny Seaweed; Hawaiian name(s): 'o'opu-hue.</b>
1961	Ref - Doty, 1961	
1973	Ref - Evans et al., 1974	
1979	Ref - AECOS, 1979	Off Pearl Harbor.
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	
2007	Ref - Brock, 2007	
2007	This Project	
2008	This Project	
<b>Genus: <i>Laurencia</i></b>		
<b><i>Laurencia brachyclados</i></b>		<b>Pilger</b>
1996	Legacy Project (Coles et al., 1997)	
<b><i>Laurencia nidifica</i></b>		<b>J. Agardh</b>
1979	Ref - AECOS, 1979	Off Pearl Harbor.
<b>Genus: <i>Polysiphonia</i></b>		
<b><i>Polysiphonia sp.</i></b>		
1979	Ref - AECOS, 1979	Off Pearl Harbor.
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Polysiphonia mollis</i></b>		<b>J. Hooker &amp; Harvey in Harvey, 1847</b>
Unknown	Spec - BPBM-AL 189658	

## Legacy Project - Species Report (Cont.)

Unknown Spec - BPBM-AL 189659 West Loch.

*Polysiphonia scopulorum* (Harvey) Hollenberg, 1968  
1996 Legacy Project (Coles et al., 1997)

*Polysiphonia subtilissima* Montagne  
1973 Ref - Evans et al., 1974

### Phylum: PROTOZOA

#### Class: GRANULORETICULOSEA

##### Order: FORAMINIFERIDA

###### Unidentified Foraminiferida

1978 Ref - Grovhoug, 1979

1982 Spec - BPBM-A 174

2008 This Project

Pearl Harbor dredge spoil dumping site.

###### Family: AMPHISTEGINIDAE

###### Genus: *Amphistegina*

###### *Amphistegina lessonii*

1977 Spec - BPBM-A 160

d'Orbigny, 1826

Off Pearl Harbor. Identified by Philip Papish, 1980.

###### *Amphistegina lobifera*

1977 Spec - BPBM-A 161

Larsen, 1976

Off Pearl Harbor. Identified by Philip Papish, 1980.

#### Class: CILIATEA

##### Family: FOLLICULINIDAE

###### Genus: *Parafolliculina*

###### *Parafolliculina violaceae*

1975 Ref - Grovhoug, 1976

Giard, 1888

## KINGDOM: PLANTAE

### Phylum: BRYOPHYTA

#### Class: HEPATICOPSIDA

##### Order: JUNGERMANNIALES

###### Family: MASTIGOPHORACEAE

###### Genus: *Mastigophora*

###### *Mastigophora sp.*

1972 Ref - Long, 1974

Off Pearl Harbor.

### Phylum: MAGNOLIOPHYTA

#### Class: MAGNOLIOPSIDA

##### Order: ROSALES

###### Family: LEGUMINOSAE

###### Genus: *Lathyrus*

###### *Lathyrus sp.*

1933 Spec - BPBM-MO 205313

Ford Island. Catalogue XIV.

##### Order: CORNALES

###### Family: RHIZOPHORACEAE

###### Genus: *Rhizophora*

###### *Rhizophora mangle*

1996 Legacy Project (Coles et al., 1997)

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

Linnaeus Introduced. Common name(s): Red Mangrove.

## Legacy Project - Species Report (Cont.)

### KINGDOM: ANIMALIA

#### Phylum: PORIFERA

##### Unidentified Porifera

1979	Ref - AECOS, 1979	orange.
1979	Ref - AECOS, 1979	blue-green.
1979	Ref - AECOS, 1979	light-purple.
1982	Spec - BPBM-C 437	Off Pearl Harbor dredge spoil dumping site.
1987	Ref - Brewer & Assoc., 1987	encrust. red.
1987	Ref - Brewer & Assoc., 1987	branch. brown.
1987	Ref - Brewer & Assoc., 1987	blue-green.

##### Family: CRAMBEIDAE

###### Genus: *Monanchora*

###### *Monanchora clathrata*

2008 This Project

Carter, 1883 New record for Hawaii. Cryptogenic.

##### Family: DESMACIDIDAE

###### Genus: *Ietrochota*

###### *Ietrochota* sp.

2007 This Project

2008 This Project

Indigenous. Common name(s): Black Staining Sponge.

###### *Ietrochota purpurea*

2008 This Project

(Bowerbank,, 875 ) New record for Hawaii. Cryptogenic.

##### Family: PETROSIIDAE

###### Genus: *Petrosia*

###### *Petrosia* sp.

2008 This Project

Indigenous.

##### Family: PHORIOSPONGIIDAE

###### Genus: *Strongylacidon*

###### *Strongylacidon kaneohe*

2008 This Project

(de Laubenfels, 1950) Indigenous.

#### Class: CALCAREA

##### Order: LEUCETTIDA

##### Family: LEUCASCIDAE

###### Genus: *Leucetta*

###### *Leucetta solida*

2008 This Project

de Laubenfels, 1950 Indigenous.

##### Order: LEUCOLENIIDA

##### Family: LEUCOLENIIDAE

###### Genus: *Leuconia*

###### *Leuconia n. sp.*

1996 Legacy Project (Coles et al., 1997)

Known only from Hawaii.

##### Order: SYCETTIDA

##### Family: HETEROPIIDAE

###### Genus: *Heteropia*

###### *Heteropia glomerosa*

1996 Legacy Project (Coles et al., 1997)

(Bowerbank, 1873) Cryptogenic.

##### Family: SYCETTIDAE

###### Genus: *Sycon*

###### *Sycon* sp.

1972 Ref - Long, 1974

Off Pearl Harbor.

## Legacy Project - Species Report (Cont.)

Class: DEMOSPONGIAE

Order: DICTYOCERATIDA

Family: SPONGIIDAE

Genus: *Hyatella*

*Hyatella intestinalis* Lamarck, 1814 Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)

Genus: *Spongia*

*Spongia oceania* de Laubenfels, 1950  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

Order: DENDROCERATIDA

Family: APLYSELLIDAE

Genus: *Aplysilla*

*Aplysilla cf. rosea* Barrois, 1876  
1996 Legacy Project (Coles et al., 1997)

Genus: *Chelonaplysilla*

*Chelonaplysilla violacea* Lendenfeld, 1883 Indigenous.  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

Family: DICTYODEDRILLIDAE

Genus: *Dictyodendrilla*

*Dictyodendrilla n. sp.* Known only from Hawaii.  
1996 Legacy Project (Coles et al., 1997)

*Dictyodendrilla sp.* Indigenous.  
2008 This Project

Family: DYSIDEIDAE

Genus: *Dendrilla*

*Dendrilla cactus* (Selenka, 1867)  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

Genus: *Dysidea*

*Dysidea n. sp. 1* Known only from Hawaii.  
1996 Legacy Project (Coles et al., 1997)

*Dysidea n. sp. 2* Known only from Hawaii.  
1996 Legacy Project (Coles et al., 1997)

*Dysidea n. sp. 3* Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)

*Dysidea sp.* Indigenous.  
2008 This Project

*Dysidea arenaria* (Schmidt, 1862) Introduced. Common name(s): Acquistive Sponge.  
2007 This Project  
2008 This Project

*Dysidea avara* sensu de Laubenfels 1950  
1996 Legacy Project (Coles et al., 1997)

*Dysidea cf. arenaria* Bergquist, 1965 Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)

*Dysidea herbacea* (Keller, 1889)  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

## Legacy Project - Species Report (Cont.)

Genus: *Euryspongia*

*Euryspongia lobata*

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

Order: HAPLOSCLERIDA

Family: CALLYSPONGIIDAE

Genus: *Callyspongia*

*Callyspongia diffusa* (Ridley, 1884)

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

1996 Legacy Project (Coles et al., 1997)

Family: CHALINIDAE

Genus: *Cladocroce*

*Cladocroce burapha*

Putchakarn, de Weerd, Sonchaeng & van Soest, 2004 New record for

Hawaii.

Cryptogenic.

2007 This Project

2008 This Project

Genus: *Toxiclona*

*Toxiclona n. sp.*

Known only from Hawaii.

1996 Legacy Project (Coles et al., 1997)

Family: HALICLONIDAE

Genus: *Gellius*

*Gellius n. sp.*

1996 Legacy Project (Coles et al., 1997)

Genus: *Haliclona*

*Haliclona sp.*

Indigenous.

2007 This Project

*Haliclona (Reniera) sp. 1*

Indigenous.

2008 This Project

*Haliclona (Reniera) sp. 2*

Indigenous.

2008 This Project

*Haliclona (Soestella) caerulea*

(Hechtel, 1965) Introduced.

1996 Legacy Project (Coles et al., 1997)

2007 This Project

2008 This Project

*Haliclona aquaeducta*

Schmidt, 1862

1993 Ref - Brock, 1994

Recorded as *H. aquaedactyla*.

1994 Ref - Brock, 1995

Recorded as *H. aquaedactyla*.

2007 Ref - Brock, 2007

Family: NIPHATIDAE

Genus: *Gelliodes*

*Gelliodes sp.*

Indigenous.

2008 This Project

*Gelliodes fibrosa*

(Wilson) Introduced.

1996 Legacy Project (Coles et al., 1997)

2008 This Project

Order: POECILOSCLERIDA

Family: ADOCIIDAE

Unidentified Adociidae n. gen. n. sp.

1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Pellina</i></b>		
<b><i>Pellina eusiphonia</i></b>		<b>Ridley, 1884</b>
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
<b>Genus: <i>Toxadocia</i></b>		
<b><i>Toxadocia violacea</i></b>		<b>de Laubenfels, 1950</b>
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
<b>Family: AMPHILECTIDAE</b>		
<b>Genus: <i>Biemna</i></b>		
<b><i>Biemna fistulosa</i></b>		<b>Topsent, 1897</b> Cryptogenic. Common name(s): Tubular Biemna.
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
2008	This Project	
<b>Family: Coelosphaeridae</b>		
<b>Genus: <i>Lissodendoryx</i></b>		
<b><i>Lissodendoryx (Lissodendoryx) similis</i></b>		<b>New record for Hawaii.</b> Cryptogenic.
2008	This Project	
<b>Family: Hymedesmiidae</b>		
<b>Genus: <i>Hamigera</i></b>		
<b><i>Hamigera sp.</i></b>		<b>Indigenous.</b> Common name(s): Red Boring Sponge.
2007	This Project	
<b>Family: MICROCIONIDAE</b>		
<b>Genus: <i>Clathria</i></b>		
<b><i>Clathria sp.</i></b>		<b>Indigenous.</b> Common name(s): Vermilion Clathria.
2008	This Project	
<b><i>Clathria (Microcionia) n. sp.</i></b>		<b>Known only from Hawaii.</b>
1996	Legacy Project (Coles et al., 1997)	
<b><i>Clathria (Microcionia) maunaloa</i></b>		<b>de Laubenfels, 1951</b>
1993	Ref - Brock, 1994	Recorded as Microcionia maunaloa.
1994	Ref - Brock, 1995	Recorded as Microcionia maunaloa.
2007	Ref - Brock, 2007	Recorded as Microcionia maunaloa.
<b>Family: MYCALIDAE</b>		
<b>Genus: <i>Mycale</i></b>		
<b><i>Mycale sp.</i></b>		<b>Cryptogenic.</b>
1973	Ref - McCain, 1974	
1973	Ref - McCain, 1975	
<b><i>Mycale (Carmia) cecilia</i></b>		<b>(de Laubenfels, 1936)</b> Introduced.
1973	Ref - Evans et al., 1974	Recorded as Mycale sp..
1973	Ref - McCain, 1974	Recorded as Mycale cecilia.
1973	Ref - McCain, 1975	Recorded as Mycale cecilia.
1993	Ref - Brock, 1994	Recorded as Mycale cecilia.
1994	Ref - Brock, 1995	Recorded as Mycale cecilia.
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as Mycale cecilia.
2008	This Project	
<b><i>Mycale (Carmia) contarenii</i></b>		<b>sensu de Laubenfels, 1951</b>
1996	Legacy Project (Coles et al., 1997)	
<b><i>Mycale (Carmia) maunakea</i></b>		<b>de Laubenfels, 1936</b> Known only from Hawaii.
1996	Legacy Project (Coles et al., 1997)	
<b><i>Mycale (Mycale) grandis</i></b>		<b>Gray, 1867</b> Introduced. Common name(s): Orange Keyhole Sponge.
1996	Legacy Project (Coles et al., 1997)	Recorded as Mycale armata
2007	Ref - Brock, 2007	Recorded as Mycale armata.

## Legacy Project - Species Report (Cont.)

2007 This Project  
2008 This Project

### ***Mycale (Zygomycale) parishii***

**Bowerbank, 1875 Introduced.**

1947	Ref - de Laubenfels, 1950	Recorded as Zygomycale parishii.
1973	Ref - McCain, 1974	Recorded as Zygomycale parishii.
1973	Ref - McCain, 1975	Recorded as Zygomycale parishii.
1993	Ref - Brock, 1994	Recorded as Zygomycale parishii.
1994	Ref - Brock, 1995	Recorded as Zygomycale parishii.
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as Zygomycale parishii.
2008	This Project	

### ***Mycale phyllophila***

**Hentschel, 1911 New record for Hawaii. Cryptogenic.**

2008 This Project

**Genus: *Stylinos***

***Stylinos* sp.**

**Indigenous. Common name(s): Orange Stylinos.**

2008 This Project

**Family: MYXILLIDAE**

**Genus: *Tedania***

***Tedania (Tedania) ignis***

**(Duchassaing & Michelotti, 1864) Cryptogenic. Common name(s): Fire**

**Sponge.**

1973	Ref - McCain, 1974	Recorded as Tedania ignis.
1973	Ref - McCain, 1975	Recorded as Tedania ignis.
1993	Ref - Brock, 1994	Recorded as Tedania ignis.
1994	Ref - Brock, 1995	Recorded as Tedania ignis.
2007	Ref - Brock, 2007	Recorded as Tedania ignis.
2007	This Project	
2008	This Project	

### ***Tedania macrodactyla***

**(Lamarck, 1814) Cryptogenic.**

1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

### ***Tedania reticulata***

**Thiele, 1903**

1996 Legacy Project (Coles et al., 1997)

**Family: PHORBASIDAE**

**Genus: *Damiriana***

***Damiriana hawaiiiana***

**de Laubenfels, 1951**

1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

**Family: RASPAILIIDAE**

**Genus: *Echinodictyum***

***Echinodictyum asperum***

**Ridley and Dendy, 1886 Cryptogenic.**

1996 Legacy Project (Coles et al., 1997)

**Genus: *Phycopsis***

***Phycopsis aculeata***

**(Wilson)**

1973 Ref - Evans et al., 1974

**Genus: *Raspailia***

***Raspailia (Clathriodendron) darwinensis***

**Hooper, 1991 New record for Hawaii. Indigenous.**

2008 This Project



## Legacy Project - Species Report (Cont.)

Order: HALICHONDRIDA

Family: HALICHONDRIDAE

Genus: *Amorphinopsis*

*Amorphinopsis n. sp.*

1996 Legacy Project (Coles et al., 1997)

Known only from Hawaii.

Genus: *Ciocalypta*

*Ciocalypta sp.*

1963 Spec - BPBM-C 196

outlets 3, 4, 5, 6.

2008 This Project

Cryptogenic.

Waiau; Hawaiian Electric Company condensers and tunnel

*Ciocalypta sp. 1*

2008 This Project

Indigenous.

Genus: *Halichondria*

*Halichondria sp.*

1963 Spec - BPBM-C 195

outlets 3, 4, 5, 6.

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

2007 This Project

Indigenous.

Waiau; Hawaiian Electric Company condensers and tunnel

*Halichondria coerulea*

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

2007 Ref - Brock, 2007

Bergquist, 1967 Cryptogenic.

*Halichondria dura*

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

Lundgren, 1897

*Halichondria melanadocia*

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

1996 Legacy Project (Coles et al., 1997)

2007 Ref - Brock, 2007

de Laubenfels, 1936 Introduced.

Genus: *Topsentia*

*Topsentia sp.*

2008 This Project

Indigenous.

*Topsentia cf. halichondrioides*

1996 Legacy Project (Coles et al., 1997)

Dendy, 1905 Cryptogenic.

*Topsentia dura*

2007 Ref - Brock, 2007

Lindgren, 1897

Recorded as *Halichondria dura*.

*Topsentia halichondrioides*

2007 This Project

2008 This Project

(Dendy, 1905) New record for Hawaii. Cryptogenic.

Family: HYMENIACIDONIDAE

Genus: *Hymeniacidon*

*Hymeniacidon sp.*

1973 Ref - Evans et al., 1974

Order: HADROMERIDA

Family: CLIONIDAE

Genus: *Cliona*

*Cliona sp.*

1996 Legacy Project (Coles et al., 1997)

Introduced.

*Cliona vastifica*

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

Hancock, 1849

## Legacy Project - Species Report (Cont.)

### Family: SPIRASTRELLIDAE

#### Genus: *Spirastrella*

*Spirastrella coccinea* (Duchassaing & Michelotti, 1864)

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

### Family: SUBERITIDAE

#### Genus: *Prosuberites*

*Prosuberites oleteira* de Laubenfels, 1957 Known only from Hawaii.

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Pseudosuberites*

*Pseudosuberites* sp. Indigenous.

2008 This Project

#### Genus: *Suberites*

*Suberites aurantiacus* (Duchassaing & Michelotti, 1864) Introduced.

1948 Spec - BPBM-C 201

1978 Ref - Grovhoug, 1979 Recorded as *Terpios zeteki*.

1993 Ref - Brock, 1994 Recorded as *Terpios zeteki*.

1994 Ref - Brock, 1995 Recorded as *Terpios zeteki*.

1996 Legacy Project (Coles et al., 1997)

2007 Ref - Brock, 2007 Recorded as *Terpios zeteki*.

2007 This Project

2008 This Project

#### Genus: *Terpios*

*Terpios granulosa* Bergquist, 1967

1993 Ref - Brock, 1994

Recorded as *Terpios granuloma*.

1994 Ref - Brock, 1995

Recorded as *Terpios granuloma*.

### Order: CHORISTIDA

#### Family: CHONDROSIIDAE

#### Genus: *Chondrosia*

*Chondrosia chucalla* de Laubenfels, 1936

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

2007 Ref - Brock, 2007

#### Family: STELLETTIDAE

#### Genus: *Stelletta*

*Stelletta n. sp. (cf. purpurea)* Ridley Known only from Hawaii.

1996 Legacy Project (Coles et al., 1997)

### Phylum: CNIDARIA

#### Unidentified Cnidaria

1996 Legacy Project (Coles et al., 1997)

#### Family: AGARICIIDAE

#### Genus: *Leptoseris*

*Leptoseris incrustans* (Quelch, 1886)

2006 Ref - Smith et al., 2006

#### Genus: *Pavona*

*Pavona varians* Verrill, 1864 Indigenous. Common name(s): Corrugated Coral.

2006 Ref - Smith et al., 2006

#### Family: SIDERASTREIDAE

#### Genus: *Psammocora*

*Psammocora explanulata* Van der Horst, 1922

2006 Ref - Smith et al., 2006

## Legacy Project - Species Report (Cont.)

### Class: HYDROZOA

#### Unidentified Hydrozoa

1982	Spec - BPBM-D 753	Off Pearl Harbor.
1983	Spec - BPBM-D 971	Mamala Bay; Pearl Harbor disposal site.
1987	Ref - Brewer & Assoc., 1987	
1996	Legacy Project (Coles et al., 1997)	

### Order: HYDROIDA

#### Unidentified Hydroida

1948	Spec - BPBM-D 283
1950	Spec - BPBM-D 307
1950	Spec - BPBM-D 308

### Family: BOUGAINVILLIIDAE

#### Unidentified Bougainvilliidae

2007	This Project
2008	This Project

#### Genus: *Garveia*

*Garveia humilis* (McCrary, 1856) Cryptogenic.

1975	Ref - Grovhoug, 1976
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### Family: CAMPANULARIIDAE

#### Unidentified Campanulariidae

2008	This Project
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#### Genus: *Clytia*

*Clytia cf. gracilis* (M. Sars, 1850) New record for Hawaii. Cryptogenic.

2007	This Project
2008	This Project

#### *Clytia hemisphaerica*

(Linnaeus, 1767) Introduced.

1978	Ref - Grovhoug, 1979
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#### *Clytia latithecata*

Millard and Bouillon, 1973 Cryptogenic.

2008	This Project
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#### Genus: *Obelia*

#### *Obelia sp.*

1972	Ref - Long, 1974	Off Pearl Harbor.
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#### *Obelia bidentata?*

Introduced.

1978	Ref - Grovhoug, 1979
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#### *Obelia dichotoma*

(Linnaeus, 1758) Introduced.

1975	Ref - Grovhoug, 1976
1978	Ref - Grovhoug, 1979
2007	This Project
2008	This Project

### Family: CLAVIDAE

#### Genus: *Corydendrium*

*Corydendrium parasiticum* (Linnaeus, 1767) New record for Hawaii. Cryptogenic.

2008	This Project
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#### Genus: *Turritopsis*

#### *Turritopsis nutricula*

(McCrary, 1856) Introduced.

1975	Ref - Grovhoug, 1976
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### Family: HALECIIDAE

#### Genus: *Halecium*

#### *Halecium sp.*

Indigenous.

2008	This Project
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## Legacy Project - Species Report (Cont.)

<i>Halecium</i> sp.?		Indigenous.
1948	Spec - BPBM-D 288	Drydock #2.
<b>Family: PENNARIIDAE</b>		
<b>Genus: <i>Pennaria</i></b>		
<i>Pennaria disticha</i> (Goldfuss, 1820) Introduced. Common name(s): Christmas Tree		
<b>Hydroid.</b>		
1929	Spec - BPBM-D 183	
1943	Ref - Hutchins, 1949	Recorded as <i>Pennaria</i> sp..
1944	Spec - BPBM-D 250	Off Pearl Harbor.
1948	Spec - BPBM-D 289	Drydock #4.
1972	Ref - Long, 1974	Recorded as <i>Pennaria tiarella</i> McCrady.
1973	Ref - Evans et al., 1974	Recorded as <i>Pennaria tiarella</i> McCrady.
1978	Ref - Grovhoug, 1979	Recorded as <i>Halocordyle disticha</i> .
1986	Ref - Lenihan, 1990	Recorded as <i>Pennaria tiarella</i> .
1993	Ref - Brock, 1994	Recorded as <i>Halocordyle disticha</i> .
1994	Ref - Brock, 1995	Recorded as <i>Halocordyle disticha</i> .
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as <i>Halocordyle disticha</i> .
2008	This Project	
<b>Family: PLUMULARIIDAE</b>		
<b>Unidentified Plumulariidae</b>		
1948	Spec - BPBM-D 290	Drydock #4.
<b>Genus: <i>Plumularia</i></b>		
<i>Plumularia goodei?</i> Nutting, 1900		
1972	Ref - Long, 1974	Off Pearl Harbor.
<b>Family: TUBULARIIDAE</b>		
<b>Genus: <i>Tubularia</i></b>		
<i>Tubularia</i> sp.		
1978	Ref - Grovhoug, 1979	
<b>Class: SCYPHOZOA</b>		
<b>Unidentified Scyphozoa</b>		
1929	Spec - BPBM-D 240	
1982	Spec - BPBM-D 751	Off Pearl Harbor.
<b>Order: SEMAEOSTOMEAE</b>		
<b>Family: ULMARIDAE</b>		
<b>Genus: <i>Aurelia</i></b>		
<i>Aurelia labiata?</i> Chamisso & Eysenhardt, 1820		
1973	Ref - Evans et al., 1974	Recorded as <i>Balanus labiata</i> .
<b>Order: RHIZOSTOMEAE</b>		
<b>Family: CASSIOPEIDAE</b>		
<b>Genus: <i>Cassiopea</i></b>		
<i>Cassiopea medusa</i> Light, 1914 Introduced.		
1941	Ref - Doty, 1961	
<b>Family: MASTIGIIDAE</b>		
<b>Genus: <i>Phyllorhiza</i></b>		
<i>Phyllorhiza punctata</i> von Ledenfeld, 1884 Introduced.		
1941	Ref - Doty, 1961	Recorded as <i>Cotylorhizoides pacificus</i> .
1973	Ref - Evans et al., 1974	
1978	Ref - Grovhoug, 1979	
<b>Class: ANTHOZOA</b>		
<b>Unidentified Anthozoa</b>		
1937	Spec - BPBM-D 227	
1948	Spec - BPBM-D 291	Drydock #4.

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Actinaria</i></b>		
<b><i>Actinaria</i></b>		<b>Indigenous.</b>
2008	This Project	
<b>Order: TELESTACEA</b>		
<b>Family: TELESTIDAE</b>		
<b>Genus: <i>Carijoa</i></b>		
<b><i>Carijoa aff. riisei</i></b>		<b>Duchassaing &amp; Michelotti, 1860 Introduced. Common name(s):</b>
<b>Snowflake Coral.</b>		
1972	Spec - BPBM-D 454	Near channel buoy #11. Identified by Rees.
1973	Ref - Evans et al., 1974	Recorded as <i>Telesto riisei</i> .
1974	Ref - Cuttress, 1977	Recorded as <i>Telesto riisei</i> .
1978	Ref - Grovhoug, 1979	Recorded as <i>Telesto riisei</i> .
1986	Ref - Lenihan, 1990	Recorded as <i>Telesto riisei</i> .
1993	Ref - Brock, 1994	Recorded as <i>Telesto riisei</i> .
1994	Ref - Brock, 1995	Recorded as <i>Telesto riisei</i> .
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as <i>Telesto riisei</i> .
2008	This Project	
<b>Order: ALCYONACEA</b>		
<b>Family: ALCYONIIDAE</b>		
<b>Genus: <i>Anthomastus</i></b>		
<b><i>Anthomastus sp.</i></b>		
1982	Spec - BPBM-D 637	Off Pearl Harbor. Identified by D.M. Devaney, 21 April 1982.
<b><i>Anthomastus fisheri</i></b>		<b>Bayer</b>
1982	Spec - BPBM-D 750	Off Pearl Harbor. Identified by D.M. Devaney.
<b>Order: GORGONACEA</b>		
<b>Unidentified Gorgonacea</b>		
1950	Spec - BPBM-D 309	
1950	Spec - BPBM-D 310	
1982	Spec - BPBM-D 752	Off Pearl Harbor.
<b>Order: ZOANTHIDEA</b>		
<b>Family: ZOANTHIDAE</b>		
<b>Genus: <i>Protopalythoa</i></b>		
<b><i>Protopalythoa sp.</i></b>		<b>Indigenous.</b>
2008	This Project	
<b>Genus: <i>Zoanthus</i></b>		
<b><i>Zoanthus pacificus</i></b>		<b>Walsh &amp; Bowers, 1971</b>
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
2007	Ref - Brock, 2007	
<b><i>Zoanthus sp. (white)</i></b>		<b>Indigenous. Common name(s): White Zoanthid.</b>
2007	This Project	
2008	This Project	
<b>Order: ACTINIARIA</b>		
<b>Family: ACTINIIDAE</b>		
<b>Genus: <i>Cladactella</i></b>		
<b><i>Cladactella sp.</i></b>		
1973	Ref - Evans et al., 1974	
<b><i>Cladactella manni?</i></b>		<b>(Verrill, 1899)</b>
1979	Ref - AECOS, 1979	Off Pearl Harbor.
<b>Family: AIPTASIIDAE</b>		
<b>Genus: <i>Aiptasia</i></b>		
<b><i>Aiptasia pulchella</i></b>		<b>Carlgren, 1943 Indigenous. Common name(s): Glass Anemone.</b>
1978	Ref - Grovhoug, 1979	

## Legacy Project - Species Report (Cont.)

1986 Ref - Lenihan, 1990  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)  
 2007 Ref - Brock, 2007  
 2008 This Project

### Family: DIADUMENIDAE

#### Genus: *Diadumene*

*Diadumene leucolena* (Verrill, 1866) Introduced.  
 1977 Ref - Cuttress, 1977

### Family: HORMATHIIDAE

#### Genus: *Calliactis*

*Calliactis polypus?* (Forsskål, 1775)  
 1973 Ref - Evans et al., 1974

### Family: ISOPHELLIIDAE

#### Genus: *Epiphellia*

*Epiphellia humilis* (Verrill, 1928)  
 1973 Ref - Evans et al., 1974

### Family: STOICHACTINIDAE

#### Genus: *Antheopsis*

*Antheopsis papillosa* (Kwietniewski, 1898)  
 1973 Ref - Evans et al., 1974 Recorded as *Radianthus cookei* (Verrill 1928).

## Order: SCLERACTINIA

### Family: ACROPORIDAE

#### Genus: *Montipora*

*Montipora sp.*  
 1973 Ref - Evans et al., 1974 Off Pearl Harbor.

*Montipora capitata* (Dana, 1846) Indigenous. Common name(s): Rice Coral.  
 2006 Ref - Smith et al., 2006  
 2008 This Project

*Montipora flabellata* Studer, 1902  
 2006 Ref - Smith et al., 2006

*Montipora patula* Verrill, 1864 Indigenous. Common name(s): Sandpaper Rice Coral.  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006

### Family: DENDROPHYLLIIDAE

#### Genus: *Tubastraea*

*Tubastraea sp.*  
 1950 Spec - BPBM-SC 340 Pearl Harbor drydock.

### Family: FAVIIDAE

#### Genus: *Leptastrea*

*Leptastrea purpurea* Dana, 1846 Indigenous. Common name(s): Crust Coral.  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006  
 2007 Ref - Brock, 2007  
 2007 This Project  
 2008 This Project

## Legacy Project - Species Report (Cont.)

- Family: FUNGIIDAE  
Genus: *Fungia*  
ko`akohe; hu`ahu`a  
Common name(s): mushroom coral; Hawaiian name(s): akai.
- Fungia* sp.  
Unknown Spec - BPBM-SC 399
- Family: POCILLOPORIDAE  
Genus: *Pocillopora*  
*Pocillopora damicornis* Linnaeus, 1758 Indigenous. Common name(s): Lace Coral; Hawaiian name(s): `ako`ako`a.  
1972 Ref - Long, 1974 Off Pearl Harbor. Recorded as *Pocillopora cespitosa*  
laysanensis Vaughan.  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006  
2008 This Project
- Pocillopora ligulata*  
1904 Spec - BPBM-SC 142
- Pocillopora meandrina* Dana, 1846 Indigenous. Common name(s): Cauliflower Coral.  
1972 Ref - Long, 1974 Off Pearl Harbor.  
1973 Ref - Evans et al., 1974 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006  
2008 This Project
- Family: PORITIDAE  
Genus: *Porites*  
*Porites compressa* Dana, 1846 Indigenous. Common name(s): Finger Coral; Hawaiian name(s): `ako`ako`a. Hawaiian name(s): pokahu puna.  
1904 Spec - BPBM-SC 456 Outside Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006  
2008 This Project
- Porites lobata* Dana, 1846 Indigenous. Common name(s): Lobe Coral.  
2006 Ref - Smith et al., 2006
- Phylum: CTENOPHORA  
Class: TENTACULATA  
Order: CYDIPPIDA  
Family: PLEUROBRACHIIDAE  
Genus: *Pleurobrachia*  
*Pleurobrachia* sp.  
1973 Ref - Evans et al., 1974
- Phylum: PLATYHELMINTHES  
Unidentified Platyhelminthes  
1979 Ref - AECOS, 1979 Off Pearl Harbor. Black polyclad.  
1996 Legacy Project (Coles et al., 1997)
- Class: TURBELLARIA  
Order: POLYCLADIDA  
Family: PLANOCERIDAE  
Genus: *Planocera*  
*Planocera* sp.  
1973 Ref - Evans et al., 1974
- Class: CESTODA  
Genus: *Tylocephalum*  
*Tylocephalum* sp.  
1965 Ref - Rifkin & Cheng, 1968

## Legacy Project - Species Report (Cont.)

### Phylum: NEMATODA

#### Unidentified Nematoda

1996 Legacy Project (Coles et al., 1997)

### Phylum: ANNELIDA

#### Class: POLYCHAETA

##### Unidentified Polychaeta

1982 Spec - BPBM-R 1584 Pearl Harbor dredge spoil dumping site.  
1982 Spec - BPBM-R 1585 Off Pearl Harbor; dredge spoil dumping site.  
1982 Spec - BPBM-R 1586 Off Pearl Harbor; dredge spoil dumping site.

#### Family: AMPHINOMIDAE

##### Unidentified Amphinomidae

1978 Ref - Grovhoug, 1979

##### Genus: *Eurythoe*

##### *Eurythoe complanata* (Pallas, 1776) Indigenous.

1973 Ref - Evans et al., 1974  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project

#### Family: APHRODITIDAE

##### Unidentified Aphroditidae

1978 Ref - Grovhoug, 1979

#### Family: ARABELLIDAE

##### Genus: *Arabella*

##### *Arabella sp.*

1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

##### *Arabella iridescens* Treadwell, 1906

1973 Ref - Evans et al., 1974

#### Family: CAPITELLIDAE

##### Unidentified Capitellidae

1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)

##### Genus: *Dasybranchus*

##### *Dasybranchus lumbricoides* Grube, 1878

1973 Ref - Evans et al., 1974

#### Family: CHAETOPTERIDAE

##### Unidentified Chaetopteridae

1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

##### Genus: *Chaetopterus*

##### *Chaetopterus sp.* (Renier, 1804) Cryptogenic. Common name(s): Parchment Worm.

1976 Ref - Grovhoug & Rastetter, 1980 Recorded as *Chaetopterus variopodectus*.  
1993 Ref - Brock, 1994 Recorded as *C. variopodus*.  
1994 Ref - Brock, 1995 Recorded as *C. variopodus*.  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project

##### *Chaetopterus variopodatus* Renier, 1804

2007 Ref - Brock, 2007



## Legacy Project - Species Report (Cont.)

### Genus: *Phyllochaetopterus*

*Phyllochaetopterus verrilli* Treadwell, 1943  
1973 Ref - Evans et al., 1974  
1979 Ref - AECOS, 1979 Off Pearl Harbor.

### Family: CIRRATULIDAE

#### Unidentified Cirratulidae

1978 Ref - Grovhoug, 1979  
2007 This Project  
2008 This Project

### Genus: *Cirratulus*

#### *Cirratulus* sp.

1929 Spec - BPBM-R 1451  
1973 Ref - Evans et al., 1974

### Genus: *Cirriformia*

#### *Cirriformia* sp. Indigenous.

1973 Ref - Evans et al., 1974  
2008 This Project

#### *Cirriformia hawaiiensis*

Hartman, 1956

1966 Ref - Hartman, 1966  
1973 Ref - Evans et al., 1974

#### *Cirriformia punctata*

(Grube, 1856)

1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1996 Legacy Project (Coles et al., 1997)

### Family: COSSURIDAE

#### Unidentified Cossuridae

1978 Ref - Grovhoug, 1979

### Family: DORVILLEIDAE

#### Unidentified Dorvilleidae

1996 Legacy Project (Coles et al., 1997)  
2007 This Project

### Genus: *Dorvillea*

#### *Dorvillea* sp.

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975

### Genus: *Schistomeringos*

#### *Schistomeringos* sp. Indigenous.

2008 This Project

### Family: EUNICIDAE

#### Unidentified Eunicidae

1978 Ref - Grovhoug, 1979  
2007 This Project  
2008 This Project

### Genus: *Eunice*

#### *Eunice* sp.

1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

#### *Eunice antennata*

(Savigny, 1820) Indigenous.

1973 Ref - Evans et al., 1974  
2008 This Project

## Legacy Project - Species Report (Cont.)

- Eunice australis*** **Quatrefages, 1865**  
 1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)
- Eunice cariboea*** **(Grube, 1856) Indigenous.**  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project
- Eunice filamentosa*** **Grube, 1856**  
 1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)
- Eunice vittata*** **(Delle Chiaje, 1828)**  
 1973 Ref - Evans et al., 1974
- Genus: *Lysidice***  
***Lysidice ninetta*** **Audoin & Milne Edwards, 1833**  
 1973 Ref - Evans et al., 1974 Recorded as *Lysidice collaris* Grube, 1870.  
 1996 Legacy Project (Coles et al., 1997)
- Genus: *Marphysa***  
***Marphysa sp.*** **Indigenous.**  
 1931 Spec - BPBM-R 1504 Identified by G. Tien.  
 1931 Spec - BPBM-R 1505 Identified by G. Tien.  
 1931 Spec - BPBM-R 1508 Identified by G. Tien.  
 2008 This Project
- Marphysa corallina*** **Kinberg, 1865 Indigenous.**  
 2008 This Project
- Marphysa sanguinea*** **(Montagu, 1815)**  
 1938 Spec - BPBM-R 1364 Identified by G. Tien.  
 1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)
- Genus: *Nematoneis***  
***Nematoneis unicornis*** **Schmarda, 1861 Indigenous.**  
 1973 Ref - Evans et al., 1974  
 1973 Ref - McCain, 1974  
 1973 Ref - McCain, 1975  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project
- Genus: *Palola***  
***Palola siciliensis*** **Borradaile, 1898**  
 1973 Ref - Evans et al., 1974 Recorded as *Eunice siciliensis*.  
 1996 Legacy Project (Coles et al., 1997)
- Genus: *Paramarphysa***  
***Paramarphysa sp.***  
 1973 Ref - Evans et al., 1974
- Family: GLYCERIDAE**  
**Genus: *Glycera***  
***Glycera tessellata*** **Grube, 1863**  
 1996 Legacy Project (Coles et al., 1997)
- Family: HESIONIDAE**  
**Unidentified Hesionidae**  
 1978 Ref - Grovhoug, 1979
- Genus: *Syllidia***  
***Syllidia armata*** **Quatrefages, 1865**  
 1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

### Family: LUMBRINERIDAE

#### Unidentified Lumbrineridae

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
2008 This Project

#### Genus: *Lumbrineris*

##### *Lumbrineris* sp.

1996 Legacy Project (Coles et al., 1997)

##### *Lumbrineris dentata*

Hartmann-Schroder, 1965 Indigenous.

2008 This Project

### Family: LYSARETIDAE

#### Genus: *Oenone*

##### *Oenone fulgida*

(Savigny) Cryptogenic.

1973 Ref - Evans et al., 1974

### Family: NEREIDIDAE

#### Unidentified Nereididae

1931 Spec - BPBM-R 1488  
1978 Ref - Grovhoug, 1979 Recorded as Nereidae.  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

#### Genus: *Ceratonereis*

##### *Ceratonereis* sp.

1973 Ref - Evans et al., 1974

#### Genus: *Laeonereis*

##### *Laeonereis* sp.

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975

#### Genus: *Leonnates*

##### *Leonnates* sp.

1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975

#### Genus: *Micronereis*

##### *Micronereis* sp.

1973 Ref - Evans et al., 1974

#### Genus: *Nereis*

##### *Nereis* sp.

1973 Ref - Evans et al., 1974  
1987 Ref - Brewer & Assoc., 1987

##### *Nereis* sp. 1

1973 Ref - McCain, 1974 Recorded as *Nereis* sp. 1.  
1973 Ref - McCain, 1975 Recorded as *Nereis* sp. 1.

##### *Nereis* sp. 2

1973 Ref - McCain, 1974 Recorded as *Nereis* sp. 2.  
1973 Ref - McCain, 1975 Recorded as *Nereis* sp. 2.

##### *Nereis areanacoedonta*

Moore, 1903 Introduced.

1973 Ref - Evans et al., 1974 Recorded as *Nereis* (*Neanthes*) *caudata* (Delle Chiaje).

##### *Nereis corallina*

Kinberg, 1866

1966 Ref - Hartman, 1966

## Legacy Project - Species Report (Cont.)

**Genus: *Perinereis***

***Perinereis* sp.**

1929 Spec - BPBM-R 1502 Identified by G. Tien.  
1973 Ref - Evans et al., 1974  
1987 Ref - Brewer & Assoc., 1987

***Perinereis cultifera floridana* Iwajima, 1972**

1973 Ref - Evans et al., 1974 Recorded as *Perinereis cultrifera*.

**Genus: *Platynereis***

***Platynereis* sp.**

1973 Ref - Evans et al., 1974

**Family: ONUPHIDAE**

**Genus: *Diopatra***

***Diopatra* sp.**

1973 Ref - Evans et al., 1974

**Family: OPHELIIDAE**

**Unidentified Opheliidae**

1978 Ref - Grovhoug, 1979

**Genus: *Armandia***

***Armandia* sp.**

1996 Legacy Project (Coles et al., 1997)

**Family: ORBINIIDAE**

**Unidentified Orbiniidae**

1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979

**Family: PARAONIDAE**

**Unidentified Paraonidae**

1978 Ref - Grovhoug, 1979

**Family: PHYLLODOCIDAE**

**Unidentified Phyllodocidae**

1978 Ref - Grovhoug, 1979  
2007 This Project  
2008 This Project

**Genus: *Eulalia***

***Eulalia* sp.**

1996 Legacy Project (Coles et al., 1997)

***Eulalia sanguinea* Oersted, 1843**

1966 Ref - Hartman, 1966  
1996 Legacy Project (Coles et al., 1997)

**Genus: *Eumida***

***Eumida sanguinea* (Oersted, 1843)**

1966 Ref - Hartman, 1966

**Unidentified Eumida**

1996 Legacy Project (Coles et al., 1997)

**Genus: *Phyllodoce***

***Phyllodoce* sp.**

1996 Legacy Project (Coles et al., 1997)

**Family: POLYNOIDAE**

**Unidentified Polynoidae**

1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

**Genus: *Hololepidella***

*Hololepidella nigropunctata* (Horst, 1915)  
1972 Spec - BPBM-R 563 Harbor entrance, from buoy "1". Identified by D.M. Devaney.

**Genus: *Iphione***

*Iphione muricata* (Savigny, 1818)  
1973 Ref - Evans et al., 1974

**Genus: *Paralepidonotus***

*Paralepidonotus ampulliferus* (Grube, 1878)  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

**Family: SABELLARIIDAE**

**Unidentified Sabellariidae**

1978 Ref - Grovhoug, 1979

**Family: SABELLIDAE**

**Unidentified Sabellidae**

1972 Ref - Long, 1974 Off Pearl Harbor.  
1978 Ref - Grovhoug, 1979  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
2007 This Project  
2008 This Project

**Genus: *Amphiglena***

*Amphiglena* sp. Cryptogenic.  
2008 This Project

*Amphiglena mediterranea* (Leydig, 1851) Cryptogenic.  
2008 This Project

**Genus: *Branchiomma***

*Branchiomma nigromaculata* (Baird, 1865) Cryptogenic.  
1966 Ref - Hartman, 1966:235  
1975 Ref - Grovhoug, 1976 Recorded as *Branchiomma cingulata*.  
1976 Ref - Cooke et al., 1980 Recorded as *B. cingulata*.  
1976 Ref - Grovhoug & Rastetter, 1980 Recorded as *Branchiomma cingulata*.  
1986 Ref - Henderson, 1990 Arizona Memorial.  
1986 Ref - Lenihan, 1990 Recorded as *B. cingulata*.  
1996 Legacy Project (Coles et al., 1997)  
2007 Ref - Brock, 2007  
2007 This Project  
2008 This Project

**Genus: *Demonax***

*Demonax* sp. Indigenous.  
2008 This Project

*Demonax leucaspis* Kinberg, 1867  
1975 Ref - Grovhoug, 1976  
1976 Ref - Cooke et al., 1980

**Genus: *Potamethus***

*Potamethus* sp. Indigenous.  
2008 This Project

**Genus: *Potamilla***

*Potamilla* sp. Indigenous.  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

## Legacy Project - Species Report (Cont.)

**Genus: *Sabella***

***Sabella* sp.**

1973 Ref - Evans et al., 1974

**Genus: *Sabellastarte***

***Sabellastarte indica***

**(Savigny, 1818) Indigenous.**

2007 This Project

2008 This Project

***Sabellastarte spectabilis***

**(Grube, 1878)**

**Introduced. Common name(s): Feather Duster Worm.**

1976 Ref - Grovhoug & Rastetter, 1980

Recorded as *Sabellastarte sanctijosephi*.

1979 Ref - AECOS, 1979

Off Pearl Harbor. Recorded as *Sabellastarte sanctijosephi*.

1980 Ref - Grovhoug & Rastetter, 1980

Recorded as *Sabellastarte sanctijosephi*.

1986 Ref - Lenihan, 1990

Recorded as *Sabellastarte sanctijosephi*.

1987 Ref - AECOS, 1987

Recorded as *Sabellastarte sanctijosephi*.

1993 Ref - Brock, 1994

Recorded as *Sabellastarte sanctijosephi*.

1994 Ref - Brock, 1995

Recorded as *Sabellastarte sanctijosephi*.

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

**Family: SERPULIDAE**

**Unidentified Serpulidae**

1978 Ref - Grovhoug, 1979

1979 Ref - AECOS, 1979

Off Pearl Harbor.

1996 Legacy Project (Coles et al., 1997)

2007 This Project

2008 This Project

**Genus: *Ficopomatus***

***Ficopomatus enigmaticus***

**(Fauvel, 1923) Introduced.**

1937 Spec - BPBM-R 1330

1937 Ref - Straughan, 1969

Recorded as *Mercierella* sp..

1973 Ref - Evans et al., 1974

Recorded as *Mercierella* sp..

1976 Ref - Bailey-Brock, 1976

**Genus: *Hydroides***

***Hydroides* sp.**

**Indigenous.**

1937 Spec - BPBM-R 1235

Identified by D. Straughan.

1938 Spec - BPBM-R 1238

Identified by D. Straughan.

1978 Ref - Grovhoug, 1979

1986 Ref - Lenihan, 1990

1987 Ref - Brewer & Assoc., 1987

2007 This Project

2008 This Project

***Hydroides brachyacantha***

**Rioja, 1941 Introduced.**

2008 This Project

***Hydroides crucigera***

**(Morch, 1863) Introduced.**

1937 Ref - Straughan, 1969

1938 Ref - Straughan, 1969

1972 Ref - Long, 1974

1973 Ref - Evans et al., 1974

2008 This Project

***Hydroides dirampha***

**(Morch, 1863) Introduced.**

1929 Spec - BPBM-R 1083

1929 Ref - Straughan, 1969

Recorded as *H. lunulifera* (Claparede, 1868).

1935 Ref - Edmondson, 1944

Recorded as *H. lunulifera* (Claparede, 1868).

## Legacy Project - Species Report (Cont.)

1935	Ref - Ingram, 1937	Recorded as <i>H. lunulifera</i> .
1937	Spec - BPBM-R 1089	
1937	Spec - BPBM-R 1090	
1937	Spec - BPBM-R 1093	
1937	Spec - BPBM-R 1231	Identified by D. Straughan.
1937	Ref - Straughan, 1969	Recorded as <i>H. lunulifera</i> (Claparede, 1868).
1938	Spec - BPBM-R 1094	
1938	Spec - BPBM-R 1095	
1972	Ref - Long, 1974	
1973	Ref - Evans et al., 1974	Recorded as <i>H. lunulifera</i> (Claparede, 1868).
1973	Ref - McCain, 1974	Recorded as <i>H. lunulifera</i> .
1973	Ref - McCain, 1975	Recorded as <i>H. lunulifera</i> .
1975	Ref - Grovhoug, 1976	Recorded as <i>Hydroides norvegica</i> Gunnerus, 1768.
1976	Ref - Cooke et al., 1980	Recorded as <i>H. lunulifera</i> (Claparede, 1868).
1996	Legacy Project (Coles et al., 1997)	
2008	This Project	
<b><i>Hydroides elegans</i> (Haswell, 1883) Introduced.</b>		
1929	Spec - BPBM-R 1101	Identified by D. Straughan.
1929	Ref - Straughan, 1969	Recorded as <i>H. norvegica</i> Gunnerus, 1768.
1935	Ref - Edmondson, 1944	Recorded as <i>H. norvegica</i> Gunnerus, 1768.
1935	Ref - Ingram, 1937	Recorded as <i>H. norvegica</i> Gunnerus, 1768.
1937	Spec - BPBM-R 1108	
1937	Spec - BPBM-R 1120	Identified by D. Straughan.
1938	Spec - BPBM-R 1109	
1938	Spec - BPBM-R 1110	
1938	Spec - BPBM-R 1111	
1938	Spec - BPBM-R 1113	
1938	Spec - BPBM-R 1114	
1940	Spec - BPBM-R 1115	
1940	Spec - BPBM-R 1366	Identified by D. Straughan.
1941	Spec - BPBM-R 1122	Identified by D. Straughan.
1947	Spec - BPBM-R 1123	Identified by D. Straughan.
1948	Spec - BPBM-R 1118	
1948	Spec - BPBM-R 1121	Identified by D. Straughan.
1972	Ref - Long, 1974	Recorded as <i>H. norvegica</i> Gunnerus, 1768.
1973	Ref - Evans et al., 1974	Recorded as <i>H. norvegica</i> Gunnerus, 1768.
1973	Ref - McCain, 1974	Recorded as <i>H. norvegica</i> .
1973	Ref - McCain, 1975	Recorded as <i>H. norvegica</i> .
1975	Ref - Grovhoug, 1976	Recorded as <i>Hydroides norvegica</i> Gunnerus, 1768.
1976	Ref - Cooke et al., 1980	
1978	Ref - Grovhoug, 1979	
1985	Ref - Hurlbut, 1990	
1987	Ref - Brewer & Assoc., 1987	
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
2008	This Project	
<b><i>Hydroides sanctaerucis</i> Morch, 1863</b>		
1972	Ref - Long, 1974	Off Pearl Harbor.
<b><i>Hydroides uncinata</i> Phillipe, 1844</b>		
1972	Ref - Long, 1974	
<b>Genus: <i>Neodexiospira</i></b>		
<b><i>Neodexiospira foraminosa</i> (Moore &amp; Bush, 1904) Introduced.</b>		
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	

## Legacy Project - Species Report (Cont.)

### Genus: *Pileolaria*

*Pileolaria militaris* Claparede, 1868 Introduced.  
2008 This Project

*Pileolaria semimilitaris* Vine, 1972  
1975 Ref - Grovhoug, 1976

### Genus: *Pomatoleios*

*Pomatoleios kraussii* (Baird, 1865) Introduced.  
1976 Ref - Grovhoug & Rastetter, 1980  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
1996 Legacy Project (Coles et al., 1997)  
2007 Ref - Brock, 2007  
2008 This Project

### Genus: *Salmacina*

*Salmacina dysteri* Huxley, 1855 Introduced. Common name(s): Sea Frost.  
1972 Ref - Long, 1974  
1986 Ref - Lenihan, 1990  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
1996 Legacy Project (Coles et al., 1997)  
2007 Ref - Brock, 2007  
2007 This Project  
2008 This Project

### Genus: *Serpula*

*Serpula sp.* Indigenous.  
2008 This Project

*Serpula vermicularis* Linnaeus, 1767 Cryptogenic.  
1938 Ref - Straughan, 1969  
1940 Ref - Straughan, 1969  
1948 Ref - Straughan, 1969  
1996 Legacy Project (Coles et al., 1997)  
2007 Ref - Brock, 2007  
2007 This Project  
2008 This Project

### Genus: *Simplicaria*

*Simplicaria pseudomilitaris* (Thirèot-Quièvreux, 1965) Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project

### Genus: *Spirobranchus*

*Spirobranchus tricornis* Morch, 1863  
1972 Ref - Long, 1974 Off Pearl Harbor.

### Genus: *Spirorbis*

*Spirorbis sp.*  
1973 Ref - Evans et al., 1974  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

### Genus: *Vermiliopsis*

*Vermiliopsis torquata* Treadwell, 1943  
1937 Spec - BPBM-R 1317 Identified by D. Straughan.

## Family: SPINTHERIDAE

### Genus: *Spinther*

*Spinther japonicus* Iwajima & Hartman, 1964 Cryptogenic.  
1976 Ref - Grovhoug & Rastetter, 1980



## Legacy Project - Species Report (Cont.)

1987 Ref - Bailey-Brock & Hartman, 1987  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project

### Family: SPIONIDAE

#### Unidentified Spionidae

1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project

#### Genus: *Polydora*

*Polydora websteri* Hartman, 1943 Introduced.  
1966 Ref - Hartman, 1966

#### Genus: *Streblospio*

*Streblospio benedicti* Webster, 1879 Introduced.  
1987 Ref - Ward, 1987

### Family: SPIRORBIDAE

#### Unidentified Spirorbidae

1996 Legacy Project (Coles et al., 1997)  
2008 This Project

### Family: SYLLIDAE

#### Unidentified Syllidae

1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

#### Genus: *Autolytus*

*Autolytus sp.*  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Branchiosyllis*

*Branchiosyllis exilis* (Gravier, 1900)  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Brania*

*Brania rhopalophora* (Ehlers, 1897)  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Exogone*

*Exogone verugera* (Claparède, 1869)  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Haplosyllis*

*Haplosyllis spongicola* (Grube, 1855)  
1973 Ref - Evans et al., 1974 Recorded as *Syllis spongicola*.  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Langerhansia*

*Langerhansia cornuta* (Rathke, 1843)  
1973 Ref - Evans et al., 1974 Recorded as *Syllis cornuta*.  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Myrianida*

*Myrianida crassicirrata*  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Opisthosyllis*

*Opisthosyllis sp.*  
1973 Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

**Genus: *Syllis***

***Syllis* sp.**

1973 Ref - Evans et al., 1974

***Syllis gracilis***

1996 Legacy Project (Coles et al., 1997)

***Typosyllis variegata* (Grube, 1860)**

1973 Ref - Evans et al., 1974 Recorded as *Syllis variegata*.

**Genus: *Trypanosyllis***

***Trypanosyllis* sp.**

2008 This Project **Indigenous.**

***Trypanosyllis zebra* (Grube, 1860)**

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

**Genus: *Typosyllis***

***Typosyllis* sp.**

1996 Legacy Project (Coles et al., 1997)

***Typosyllis hawaiiensis* Hartmann-Schröder, 1965**

1996 Legacy Project (Coles et al., 1997)

***Typosyllis hyalina* (Grube, 1863)**

1996 Legacy Project (Coles et al., 1997)

***Typosyllis prolifera***

1996 Legacy Project (Coles et al., 1997)

**Family: TERESELLIDAE**

**Unidentified Terebellidae**

1978 Ref - Grovhoug, 1979

2007 This Project

2008 This Project

**Genus: *Loimia***

***Loimia medusa***

(Savigny, 1818) **Indigenous.** Common name(s): Medusa Spaghetti

Worm; Hawaiian

name(s): kauna'oa.

2007 This Project

2008 This Project

**Genus: *Thelepus***

***Thelepus setosus***

(Quatrefages, 1865) **Indigenous.**

1973 Ref - Evans et al., 1974

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2007 Ref - Brock, 2007

2007 This Project

**Class: OLIGOCHAETA**

**Order: RHYNCHOBELLIDA**

**Family: PISCICOLIDAE**

**Unidentified Piscicolidae**

1973 Ref - Evans et al., 1974

**Phylum: MOLLUSCA**

**Unidentified Mollusca**

1914 Spec - BPBM-MO 65001

1917 Spec - BPBM-MO 18

1922 Spec - BPBM-MO 37

Ford Island. Catalogue V.  
Off Pearl Harbor.

## Legacy Project - Species Report (Cont.)

1934	Spec - BPBM-MO 205580	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205581	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205584	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205585	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205586	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205587	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205588	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205591	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205592	Dredge. Catalogue XIV.
1947	Spec - BPBM-MO 41	Bottom of ship Jacona.
1947	Spec - BPBM-MO 42	Bottom of ship Jacona.
1947	Spec - BPBM-MO 47	Bottom of ship Jacona.
1947	Spec - BPBM-MO 61	Drydock, hull of ship Jacona.
1948	Spec - BPBM-MO 44	Drydock.
1948	Spec - BPBM-MO 59	Hull of Barge YC-1024, Dry Dock #3..
1950	Spec - BPBM-MO 5	Power House intake tunnel..
1950	Spec - BPBM-MO 56	U.S.S. Deal.
1950	Spec - BPBM-MO 66	

### Family: APLYSIIDAE

#### Unidentified Aplysiidae

2008 This Project

#### Genus: *Tambja*

##### *Tambja morosa*

2008 This Project

(Bergh, 1877) Indigenous. Common name(s): Gloomy Nudibranch.

### Family: CUSPIDARIIDAE

#### Genus: *Cuspidaria*

##### *Cuspidaria* sp.

2008 This Project

Indigenous.

##### *Cuspidaria hawaiiensis*

Dall, Bartsch, and Rehder, 1938 Indigenous. Common name(s): Noble

#### Vermitid.

2007 This Project

2008 This Project

### Family: MESODESMATIDAE

#### Genus: *Rocheffortina*

##### *Rocheffortina sandwichensis*

2008 This Project

Hayami & Kase, 1993 Indigenous.

### Class: GASTROPODA

#### Family: CAECIDAE

#### Genus: *Caecum*

##### *Caecum sepimentum*

1996 Legacy Project (Coles et al., 1997)

de Folin, 1867

### Family: CEPHALASPIDAE

#### Unidentified Cephalaspidae

1996 Legacy Project (Coles et al., 1997)

### Family: DIALIDAE

#### Genus: *Cerithidium*

##### *Cerithidium perparvulum*

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

(Watson, 1886)

Recorded as *Obtortio perparvulum*.

#### Genus: *Diala*

##### *Diala semistriata*

1973 Ref - Evans et al., 1974

Recorded as *Diala varia*.

##### *Diala varia*

1996 Legacy Project (Coles et al., 1997)

A. Adams, 1861

## Legacy Project - Species Report (Cont.)

### Family: EATONIELLIDAE

#### Genus: *Eatoniella*

#### *Eatoniella* sp.

1996 Legacy Project (Coles et al., 1997)

### Order: ARCHAEOGASTROPODA

### Family: FISSURELLIDAE

#### Unidentified Fissurellidae

2008 This Project

#### Genus: *Diodora*

#### *Diodora* sp.

2008 This Project

Indigenous.

#### *Diodora granifera*

(Pease, 1861)

Hawaiian name(s): `opihi.

Unknown Spec - BPBM-MO 225792 Opposite Ford Island on Railroad Wharf on Peninsula.  
Catalogue XVI.

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

#### *Diodora octagona*

(Reeve, 1850)

Indigenous. Common name(s): Sea Frost.

2008 This Project

#### *Diodora octogona*

Reeve, 1850

1996 Legacy Project (Coles et al., 1997)

#### *Diodora ruppelli*

(Sowerby, 1834)

Introduced.

1962 Ref - Kay, 1979

1996 Legacy Project (Coles et al., 1997)

2008 This Project

### Family: NERITIDAE

#### Genus: *Nerita*

#### *Nerita* sp.

1932 Spec - BPBM-MO 199261

Catalogue XIV.

#### *Nerita picea*

Recluz, 1841

Indigenous. Common name(s): Black Nerite; Hawaiian

name(s): pipipi kai;

pipipi; pipipi; pipipi.

1912 Spec - BPBM-MO 64253

Catalogue V.

1912 Spec - BPBM-MO 64264

Catalogue V.

1923 Spec - BPBM-MO 228140

Along shore near Railroad Wharf opposite Ford Island.

Catalogue XVI.

1930 Spec - BPBM-MO 195621

Catalogue XIV.

1930 Spec - BPBM-MO 195622

Pearl Locks, Peninsula. Catalogue XIV.

1930 Spec - BPBM-MO 195623

Pearl Locks, Peninsula. Catalogue XIV.

1930 Spec - BPBM-MO 195624

Pearl Locks, Peninsula. Catalogue XIV.

1932 Spec - BPBM-MO 198798

Fishpond wall on Eastern side of Pearl City Peninsula.

Catalogue XIV.

1932 Spec - BPBM-MO 198800

Fishpond wall on Eastern side of Pearl City Peninsula.

Catalogue XIV.

1932 Spec - BPBM-MO 198801

Pearl City Peninsula, shore along Cobb's place. Catalogue

XIV.

2008 This Project

#### Genus: *Theodoxus*

#### *Theodoxus cariosa*

Gray Known only from Hawaii.

1912 Spec - BPBM-MO 64294

Catalogue V.

#### *Theodoxus kanaka*

Pilsbry

1912 Spec - BPBM-MO 64313

Catalogue V.

#### *Theodoxus neglectus*

Pease, 1861

1932 Spec - BPBM-MO 198799

Fishpond wall on Eastern side of Pearl City Peninsula.

Catalogue XIV.

1932 Spec - BPBM-MO 198802

Pearl City Peninsula, shore along Cobb's place. Catalogue

XIV.

### Family: PATELLIDAE

#### Genus: *Cellana*

Hawaiian name(s): ka`ala; ko`ele; `opihi kapua`i lio.

#### *Cellana* sp.

1934 Spec - BPBM-MO 205577

Dredge. Catalogue XIV.

## Legacy Project - Species Report (Cont.)

1950	Spec - BPBM-MO 55		
1973	Ref - Evans et al., 1974		
<b>Family: PHASIANELLIDAE</b>			
<b>Genus: <i>Tricolia</i></b>			
	<b><i>Tricolia variabilis</i></b>	<b>(Pease, 1861)</b>	<b>Hawaiian name(s): pupu kanaloa.</b>
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
<b>Family: PHENACOLEPADIDAE</b>			
<b>Genus: <i>Phenacolepas</i></b>			
	<b><i>Phenacolepas sp.</i></b>		
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
<b>Family: SCISSURELLIDAE</b>			
<b>Genus: <i>Scissurella</i></b>			
	<b><i>Scissurella sp.</i></b>		
1973	Ref - Evans et al., 1974		
<b>Family: SKENEIDAE</b>			
<b>Genus: <i>Lophocaclias</i></b>			
	<b><i>Lophocaclias minutissimus</i></b>	<b>(Pilsbry, 1921)</b>	
1973	Ref - Evans et al., 1974		Off Pearl Harbor. Recorded as <i>Cyclostremiscus minutissimus</i>
(Pilsbry, 1921).			
<b>Family: STOMATELLIDAE</b>			
<b>Genus: <i>Syncera</i></b>			
	<b><i>Syncera giffardi</i></b>	<b>Dall</b>	
Unknown	Spec - BPBM-MO 65725		Pearl City. Catalogue V.
<b>Family: TROCHIDAE</b>			
<b>Genus: <i>Danilia</i></b>			
	<b><i>Danilia eucheliformis</i></b>	<b>(Nomura &amp; Hatai, 1940)</b>	
1961	Spec - BPBM-MO 217634		Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Euchelus</i></b>			
	<b><i>Euchelus gemmatus</i></b>	<b>Gould, 1845</b>	
1973	Ref - Evans et al., 1974		
<b>Genus: <i>Tholotia</i></b>			
	<b><i>Tholotia subangulata</i></b>	<b>(Pease, 1861)</b>	
1917	Ref - Pilsbry, 1917		Recorded as <i>Alcyna lineata</i> Pease, 1861. MCZ 31724.
<b>Genus: <i>Trochus</i></b>			
	<b><i>Trochus sp.</i></b>		
1934	Spec - BPBM-MO 205576		Dredge. Catalogue XIV.
	<b><i>Trochus histrio</i></b>	<b>Reeve</b>	
1973	Ref - Evans et al., 1974		
	<b><i>Trochus intextus</i></b>	<b>Kiener, 1850</b>	<b>Hawaiian name(s): pupu o Ha`upu; ha`upu; haupu; `okole</b>
Unknown	Spec - BPBM-MO 200688		<b>Haupu.</b> Catalogue XIV.
Unknown	Spec - BPBM-MO 227198		Catalogue XVI.
1918	Spec - BPBM-MO 198674		Catalogue XIV.
1918	Spec - BPBM-MO 198675		Catalogue XIV.
1923	Spec - BPBM-MO 227202		Catalogue XVI.
1924	Spec - BPBM-MO 240750		Catalogue XVII.
1930	Spec - BPBM-MO 195331		Pearl Locks Peninsula, makai face of little pier just mauka of Dr.
Whitney's place..			
			Catalogue XIV.
1932	Spec - BPBM-MO 198940		Eastside of Pearl City Peninsula. Catalogue XIV.
1932	Spec - BPBM-MO 198941		Peninsula; Railroad Wharf. Catalogue XIV.
1932	Spec - BPBM-MO 198942		End of Waipio Peninsula. Catalogue XIV.
1932	Spec - BPBM-MO 200036		Pearl Harbor channel. Catalogue XIV.
1996	Legacy Project (Coles et al., 1997)		

## Legacy Project - Species Report (Cont.)

### Family: TURBINIDAE

#### Genus: *Leptothyra*

##### *Leptothyra candida*

(Pease, 1861)  
1973 Ref - Evans et al., 1974 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)

##### *Leptothyra rubricincta*

(Mighels, 1845) Hawaiian name(s): Kahelelani eilaula; Kahelelani `okala.  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Turbo*

##### *Turbo chrysostomus*

Unknown Spec - BPBM-MO 200698 Catalogue XIV.

##### *Turbo sandwicensis*

(Menke, 1846)  
Unknown Spec - BPBM-MO 200699 Catalogue XIV.  
Unknown Spec - BPBM-MO 64380 Catalogue V.

### Order: MESOGASTROPODA

#### Family: ARCHITECTONICIDAE

#### Genus: *Architectonica*

##### *Architectonica sp.*

1934 Spec - BPBM-MO 205570 Dredge. Catalogue XIV.

##### *Architectonica perspectiva*

(Linnaeus, 1758) Common name(s): Sundial shell; Hawaiian name(s): pupu pui.  
1906 Spec - BPBM-MO 217662 Off Fort Kamehameha. Catalogue XV.

#### Genus: *Heliacus*

##### *Heliacus sp.*

1973 Ref - Evans et al., 1974

#### Genus: *Philippia*

##### *Philippia sp.*

Unknown Spec - BPBM-MO 220737 Off Fort Kamehameha. Catalogue XV.

#### Family: BARLEEIIDAE

#### Genus: *Barleeia*

##### *Barleeia sp.*

Unknown Spec - BPBM-MO 230902 Pearl City. Catalogue XVI.

#### Family: BURSIDAE

#### Genus: *Bursa*

##### *Bursa cruentata*

(Sowerby, 1841)  
1950 Spec - BPBM-MO 233988 Fort Kamehameha reef. Catalogue XVI.

##### *Bursa granularis*

(Röding, 1798)  
1932 Spec - BPBM-MO 199149 Reef off Fort Kamehameha. Catalogue XIV.

#### Family: CALYPTRAEIDAE

#### Genus: *Crepidula*

##### *Crepidula sp.*

1932 Spec - BPBM-MO 200164 Waipio Peninsula, end. Catalogue XIV.  
1932 Spec - BPBM-MO 200185 Peninsula; Railroad Wharf. Catalogue XIV.  
1932 Spec - BPBM-MO 201516 Pearl City Peninsula, Railroad Wharf. Catalogue XIV.  
2007 Ref - Brock, 2007 Recorded as *Crepidula sp.*

##### *Crepidula aculeata*

(Gmelin, 1791) Introduced. Common name(s): Hoof Shell.  
Unknown Spec - BPBM-MO 64006 Catalogue V.  
Unknown Spec - BPBM-MO 64798 Ford Island. Catalogue V.  
1915 Spec - BPBM-MO 231366 Ford Island. Catalogue XVI.  
1923 Spec - BPBM-MO 231368 At Railroad Wharf, opposite Ford Island, Peninsula. Catalogue  
XVI.  
1950 Spec - BPBM-MO 231370 Fort Kamehameha reef. Catalogue XVI.  
1972 Ref - Long, 1974  
1973 Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

1973	Ref - McCain, 1974
1973	Ref - McCain, 1975
1975	Ref - Grovhoug, 1976
1978	Ref - Grovhoug, 1979
1987	Ref - Brewer & Assoc., 1987
1993	Ref - Brock, 1994
1994	Ref - Brock, 1995
1996	Legacy Project (Coles et al., 1997)
2007	This Project
2008	This Project

### Genus: *Crucibulum*

<b><i>Crucibulum spinosum</i></b>		<b>(Sowerby, 1824) Indigenous.</b>
1950	Spec - BPBM-MO 231372	Fort Kamehameha. Catalogue XVI.
1950	Spec - BPBM-MO 76	Reef at Fort Kamehameha.
1972	Ref - Long, 1974	
1973	Ref - Evans et al., 1974	
1993	Ref - Brock, 1994	Recorded as <i>Calyptrea spinosum</i> .
1994	Ref - Brock, 1995	Recorded as <i>Calyptrea spinosum</i> .
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	

### Family: CAPULIDAE

#### Genus: *Capulus*

<b><i>Capulus bicarinatus</i></b>		<b>Pease</b>	
Unknown	Spec - BPBM-MO 65647		Catalogue V.
1922	Spec - BPBM-MO 77		

### Family: CASSIDIDAE

#### Genus: *Casmaria*

<b><i>Casmaria vibex</i></b>		
1961	Spec - BPBM-MO 218261	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 218262	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 218263	Off Fort Kamehameha. Catalogue XV.

#### Genus: *Cassis*

<b><i>Cassis viber</i></b>		
1932	Spec - BPBM-MO 200430	Channel entrance, seaward. Catalogue XIV.

#### Genus: *Phalium*

<b><i>Phalium (Semicassis) umbilicatum</i></b>		<b>(Pease, 1861)</b>
1961	Spec - BPBM-MO 218248	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 218249	Off Fort Kamehameha. Catalogue XV.

### Family: CERITHIIDAE

#### Unidentified Cerithiidae

Unknown	Spec - BPBM-MO 229571	Dredged in entrance channel to Pearl Harbor. Catalogue XVI.
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#### Genus: *Bittium*

<b><i>Bittium impendens</i></b>		<b>(Hedley, 1899)</b>
1973	Ref - Evans et al., 1974	

#### *Bittium manti*

Unknown	Spec - BPBM-MO 65642	<b>Dall</b>	Catalogue V.
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#### *Bittium parcum*

		<b>(Gould, 1861)</b>
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	

#### *Bittium zebrum*

		<b>(Kiener, 1841)</b>
Unknown	Spec - BPBM-MO 229462	Catalogue XVI.
1923	Spec - BPBM-MO 229463	At Railroad Wharf on Peninsula opposite Ford Island.

Catalogue XVI.

1973	Ref - Evans et al., 1974	
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## Legacy Project - Species Report (Cont.)

1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Cerithiopsis</i></b>			
<b><i>Cerithiopsis sp. A</i></b>			
1973	Ref - Evans et al., 1974		Recorded as <i>Cerithiopsis sp. A</i> .
1996	Legacy Project (Coles et al., 1997)		
<b><i>Cerithiopsis sp. B</i></b>			
1973	Ref - Evans et al., 1974		Recorded as <i>Cerithiopsis sp. B</i> .
<b><i>Cerithiopsis acaria sp.</i></b>			
Unknown	Spec - BPBM-MO 65649		Catalogue V.
<b><i>Cerithiopsis acaria sp.?</i></b>			
1934	Spec - BPBM-MO 205561		Dredge. Catalogue XIV.
<b>Genus: <i>Cerithium</i></b>			
<b><i>Cerithium articulatus</i></b>			
1961	Spec - BPBM-MO 217761		Off Fort Kamehameha?. Catalogue XV.
<b><i>Cerithium diminutirum</i> Phil.</b>			
Unknown	Spec - BPBM-MO 63339		Ford Island. Catalogue V.
<b><i>Cerithium locticum</i> Pease</b>			
Unknown	Spec - BPBM-MO 63176		Catalogue V.
Unknown	Spec - BPBM-MO 63229		Ford Island. Catalogue V.
<b><i>Cerithium matukense</i> Watson, 1886</b>			
1961	Spec - BPBM-MO 217694		Off Pearl Harbor. Catalogue XV.
1982	Spec - BPBM-MO 207403		Catalogue XIV.
<b><i>Cerithium nesoticum</i> Pilsbry &amp; Vanatta, 1905 Hawaiian name(s): pupu maka`aha; maka`aha.</b>			
1973	Ref - Evans et al., 1974		
<b><i>Cerithium zebrum</i> Kiener, 1841 Indigenous.</b>			
2008	This Project		
<b>Genus: <i>Finella</i></b>			
<b><i>Finella pupoides</i> A. Adams, 1860</b>			
Unknown	Spec - BPBM-MO 229372		Catalogue XVI.
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Rhinoclavis</i></b>			
<b><i>Rhinoclavis fasciata</i> Bruguiere</b>			
1961	Spec - BPBM-MO 217848		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 217849		Off Fort Kamehameha?. Catalogue XV.
<b>Family: CERITHIOPSIDAE</b>			
<b>Unidentified <i>Cerithiopsidae</i></b>			
Unknown	Spec - BPBM-MO 230301		Catalogue XVI.
<b>Family: CYMATIIDAE</b>			
<b>Genus: <i>Cymatium</i></b>			
<b><i>Cymatium sp.</i> Indigenous.</b>			
1934	Spec - BPBM-MO 205568		Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205569		Dredge. Catalogue XIV.
1973	Ref - Evans et al., 1974		
2008	This Project		
<b><i>Cymatium aquatile</i> Reeve, 1844</b>			
1927	Spec - BPBM-MO 240863		Entrance Channel. Catalogue XVII.
1936	Spec - BPBM-MO 240862		Reef off Fort Kamehameha. Catalogue XVII.
1961	Spec - BPBM-MO 218307		Off Fort Kamehameha. Catalogue XV.
<b><i>Cymatium gemmatum</i> Reeve, 1844</b>			
Unknown	Spec - BPBM-MO 249233		Catalogue XVII.
1927	Spec - BPBM-MO 69		Naval Station.



## Legacy Project - Species Report (Cont.)

1928	Spec - BPBM-MO 240865	Reef off Fort Kamehameha. Catalogue XVII.
1936	Spec - BPBM-MO 233927	Reef at Fort Kamehameha. Catalogue XVI.
1996	Legacy Project (Coles et al., 1997)	
<b><i>Cymatium intermedium</i> Pease, 1869</b>		
Unknown	Spec - BPBM-MO 240869	Catalogue XVII.
Unknown	Spec - BPBM-MO 240872	Catalogue XVII.
1927	Spec - BPBM-MO 240868	Entrance Channel off Fort Kamehameha. Catalogue XVII.
1936	Spec - BPBM-MO 233764	Reefs at Fort Kamehameha. Catalogue XVI.
1936	Spec - BPBM-MO 240866	Reef off Fort Kamehameha. Catalogue XVII.
1936	Spec - BPBM-MO 240867	Reef off Fort Kamehameha, under loose coral blocks.
Catalogue XVII.		
1996	Legacy Project (Coles et al., 1997)	
<b><i>Cymatium muricinum</i> Röding, 1798</b>		
Unknown	Spec - BPBM-MO 240859	<b>Hawaiian name(s): pupu `ole kiwi; naunau; `anaunau.</b> Catalogue XVII.
1915	Spec - BPBM-MO 233908	Ford Island. Catalogue XVI.
1923	Spec - BPBM-MO 233913	Ewa side, near entrance. Catalogue XVI.
1927	Spec - BPBM-MO 233974	Naval Station. Catalogue XVI.
1932	Spec - BPBM-MO 198709	Naval Station, Hospital Pt.. Catalogue XIV.
1932	Spec - BPBM-MO 198710	Railroad Wharf. Catalogue XIV.
1932	Spec - BPBM-MO 198711	Watertown. Catalogue XIV.
1932	Spec - BPBM-MO 198712	Pearl Harbor channel, at Watertown. Catalogue XIV.
1936	Spec - BPBM-MO 233919	Reefs at Fort Kamehameha. Catalogue XVI.
<b><i>Cymatium nicobaricum</i> (Röding, 1798)</b>		
1932	Spec - BPBM-MO 199158	Fort Kamehameha. Catalogue XIV.
1961	Spec - BPBM-MO 218320	Off Fort Kamehameha. Catalogue XV.
1996	Legacy Project (Coles et al., 1997)	
<b><i>Cymatium pileare</i> Linnaeus, 1758</b>		
Catalogue XIV.		
1932	Spec - BPBM-MO 198718	Pearl Harbor entrance Channel, off Fort Kamehameha.
1932	Spec - BPBM-MO 198719	Reef off Fort Kamehameha. Catalogue XIV.
1932	Spec - BPBM-MO 198726	Naval Station, Hospital Point. Catalogue XIV.
1932	Spec - BPBM-MO 198728	Watertown. Catalogue XIV.
1932	Spec - BPBM-MO 199880	Watertown, Pear Harbor Channel. Catalogue XIV.
1932	Spec - BPBM-MO 199950	Pearl City Peninsula, Railroad Wharf. Catalogue XIV.
1932	Spec - BPBM-MO 199951	Waipio Peninsula, end. Catalogue XIV.
1961	Spec - BPBM-MO 218337	Off Fort Kamehameha. Catalogue XV.
<b><i>Cymatium rubeculum</i> (Linnaeus, 1758)</b>		
1932	Spec - BPBM-MO 200063	Fort Kamehameha, reef. Catalogue XIV.
1932	Spec - BPBM-MO 200065	Pearl Harbor Channel; Watertown. Catalogue XIV.
1936	Spec - BPBM-MO 240875	Reef off Fort Kamehameha, under loose coral blocks.
Catalogue XVII.		
1936	Spec - BPBM-MO 70	Reefs at Fort Kamahameha.
1973	Ref - Evans et al., 1974	
<b>Genus: <i>Distorsio</i></b>		
<b><i>Distorsio</i> sp.</b>		
1934	Spec - BPBM-MO 205565	Dredge. Catalogue XIV.
<b>Genus: <i>Gyrineum</i></b>		
<b><i>Gyrineum pusillum</i> Broderip</b>		
1936	Spec - BPBM-MO 233981	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
1936	Spec - BPBM-MO 71	Reef at Fort Kamehameha.
1961	Spec - BPBM-MO 218370	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Triton</i></b>		
<b><i>Triton tuberosus</i> Lamarck</b>		
Unknown	Spec - BPBM-MO 62157	Catalogue V.

## Legacy Project - Species Report (Cont.)

Family: CYPRAEIDAE

Genus: *Cypraea*

*Cypraea* sp.

Hawaiian name(s): leho; leholeho; leho `oma`o.  
Indigenous.

1934	Spec - BPBM-MO 215701	Dredgings. Catalogue XV.
1934	Spec - BPBM-MO 215704	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215705	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215706	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215707	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215708	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215709	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215710	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215711	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215712	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215713	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215714	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215715	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215716	Dredging. Catalogue XV.
1934	Spec - BPBM-MO 215717	Dredging. Catalogue XV.

*Cypraea alisonae*

Burgess, 1983

Unknown	Spec - BPBM-MO 247888	Fort Kamehameha. Catalogue XVII.
1982	Spec - BPBM-MO 9953	Fort Kamehameha, 4ft under large coral slab. Catalogue I.

*Cypraea arabica*

(Linnaeus, 1758)

1976	Ref - Burgess, 1995	Off Pearl Harbor.
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*Cypraea caputserpentis*

Linnaeus, 1758

Hawaiian name(s): leho kupa; leho maoli.

1932	Spec - BPBM-MO 196399	Fort Kamehameha. Catalogue XIV.
1932	Spec - BPBM-MO 197104	Fort Kamehameha, reef off. Catalogue XIV.
1932	Spec - BPBM-MO 197112	End of Waipio Peninsula. Catalogue XIV.
1939	Spec - BPBM-MO 246606	Pearl City T.H.. Catalogue XVII.
1957	Spec - BPBM-MO 246610	Fort Kaahamaha (Fort Kamehameha). Catalogue XVII.

*Cypraea carneola*

Linnaeus, 1758

Indigenous. Hawaiian name(s): leho pauhu.

1932	Spec - BPBM-MO 197216	Pearl Harbor channel. Catalogue XIV.
1950	Ref - Burgess, 1959	Off Pearl Harbor.

*Cypraea childreni*

Gray, 1825

1996	Legacy Project (Coles et al., 1997)	
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*Cypraea chinensis*

Gmelin, 1791

1932	Spec - BPBM-MO 198042	Pearl Harbor channel, Watertown. Catalogue XIV.
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*Cypraea clandestina*

Linnaeus, 1767

Introduced.

1950	Ref - Burgess, 1959	Off Pearl Harbor.
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*Cypraea cribaria*

Linnaeus, 1758

Introduced.

1950	Ref - Burgess, 1959	Off Pearl Harbor.
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*Cypraea cylindrica*

Born Introduced.

1950	Ref - Burgess, 1959	Off Pearl Harbor.
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*Cypraea depressa*

Grey, 1825 Introduced.

1991	Ref - Burgess, 1995	Off Pearl Harbor.
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*Cypraea fimbriata*

Gmelin, 1791

1932	Spec - BPBM-MO 197303	Fort Kamehameha; along edge of channel. Catalogue XIV.
1936	Spec - BPBM-MO 231689	Reefs at Fort Kamehameha. Catalogue XVI.
1957	Spec - BPBM-MO 247674	Fort Kamehameha. Catalogue XVII.

*Cypraea gaskoini*

Reeve, 1846

Unknown	Spec - BPBM-MO 247840	Pearl City. Catalogue XVII.
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*Cypraea gaspardi*

Biraghi & Nicolay, 1993 Introduced.

1993	Ref - Burgess, 1995	Off Pearl Harbor.
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## Legacy Project - Species Report (Cont.)

<b><i>Cypraea helvola</i></b>	<b>Linnaeus, 1758</b>	<b>Indigenous.</b>	<b>Hawaiian name(s):</b> leho `opule.
Unknown Spec - BPBM-MO 231763			Entrance. Catalogue XVI.
1932 Spec - BPBM-MO 197225			Pearl Harbor Channel; Watertown. Catalogue XIV.
1936 Spec - BPBM-MO 231768			Reefs at Fort Kamehameha. Catalogue XVI.
1939 Spec - BPBM-MO 246957			Catalogue XVII.
1958 Spec - BPBM-MO 246958			Catalogue XVII.
1960 Spec - BPBM-MO 246923			Fort Kamehameha. Catalogue XVII.
<b><i>Cypraea hirundo</i></b>	<b>Linnaeus, 1758</b>	<b>Introduced.</b>	
1993 Ref - Burgess, 1995			Off Pearl Harbor.
<b><i>Cypraea isabella</i></b>	<b>Linnaeus, 1758</b>	<b>Indigenous.</b>	<b>Common name(s):</b> Isabella Cowry; Hawaiian
<b>name(s):</b>			<b>puleho; puleho holei; puleho kani`o; puleholeho; puleho palaoa; puleho</b>
<b>`ula; puleholeho;</b>			<b>leho kupe`e lima; momi ke`oke`o.</b>
1932 Spec - BPBM-MO 197271			Pearl Harbor Channel; Watertown. Catalogue XIV.
1932 Spec - BPBM-MO 197272			Pearl Harbor entrance channel. Catalogue XIV.
1932 Spec - BPBM-MO 197273			Fort Kamehameha; along edge of channel. Catalogue XIV.
1936 Spec - BPBM-MO 231793			Reef at Fort Kamehameha. Catalogue XVI.
1957 Spec - BPBM-MO 246270			Fort Kamehameha. Catalogue XVII.
<b><i>Cypraea labrolineata</i></b>	<b>Gaskoin, 1849</b>	<b>Indigenous.</b>	
1993 Ref - Burgess, 1995			Off Pearl Harbor.
<b><i>Cypraea maculifera</i></b>	<b>Shilder, 1932</b>	<b>Hawaiian name(s):</b> kuoho; leho; leho kolea.	
1957 Spec - BPBM-MO 246540			Fort Kaahamaha (Fort Kamehameha). Catalogue XVII.
<b><i>Cypraea moneta</i></b>	<b>Linnaeus, 1758</b>	<b>Hawaiian name(s):</b> leho palaoa; leho puna; leho `uala;	
<b>`uwala; pupu</b>			<b>leholeho.</b>
Unknown Spec - BPBM-MO 231864			At Naval Station. Catalogue XVI.
Unknown Spec - BPBM-MO 240815			Catalogue XVII.
1932 Spec - BPBM-MO 197205			Fort Kamehameha, about 150 ft. S.E. of the Ft. Kam. Wharf,
100 ft. from shore.			Catalogue XIV.
<b><i>Cypraea poraria</i></b>	<b>Linnaeus, 1758</b>	<b>Introduced.</b>	
1950 Ref - Burgess, 1959			Off Pearl Harbor.
<b><i>Cypraea reticulata</i></b>	<b>Martyn</b>		
1916 Spec - BPBM-MO 67			Reef Waikiki of entrance to Pearl Harbor.
1932 Spec - BPBM-MO 196358			Reef off Fort Kamehameha. Catalogue XIV.
<b><i>Cypraea scurra</i></b>	<b>Gmelin, 1791</b>		
1932 Spec - BPBM-MO 198044			Keahi Point. Catalogue XIV.
<b><i>Cypraea semiplota</i></b>	<b>Mighels, 1845</b>	<b>Hawaiian name(s):</b> puleholeho.	
1926 Spec - BPBM-MO 231883			Fort Kamehameha reef. Catalogue XVI.
1926 Spec - BPBM-MO 231884			Fort Kamehameha reef. Catalogue XVI.
1932 Spec - BPBM-MO 198045			Fort Kamehameha. Catalogue XIV.
<b><i>Cypraea shilderorum</i></b>			
1932 Spec - BPBM-MO 197146			Pearl Harbor Channel; Watertown. Catalogue XIV.
<b><i>Cypraea staphylaea</i></b>	<b>Linnaeus, 1758</b>		
1939 Spec - BPBM-MO 247051			Pearl City T.H.. Catalogue XVII.
1939 Spec - BPBM-MO 247052			Pearl City T.H.. Catalogue XVII.
1950 Ref - Burgess, 1959			Off Pearl Harbor.
<b><i>Cypraea sulcidentata</i></b>	<b>Gray, 1824</b>		
1932 Spec - BPBM-MO 197173			Fort Kamehameha, reef off. Catalogue XIV.
<b><i>Cypraea talpa</i></b>	<b>Linnaeus, 1758</b>		
1928 Spec - BPBM-MO 240832			Reef off Fort Kamehameha, under loose coral blocks.
Catalogue XVII.			
1932 Spec - BPBM-MO 197277			Fort Kamehameha, off. Catalogue XIV.
1932 Spec - BPBM-MO 198046			Pearl Harbor channel. Catalogue XIV.
1936 Spec - BPBM-MO 60			Reef at Fort Kamehameha.

## Legacy Project - Species Report (Cont.)

<b><i>Cypraea teres</i></b>		<b>Gmelin, 1791</b>	
1932	Spec - BPBM-MO 197286		Fort Kamehameha; along edge of channel. Catalogue XIV.
1932	Spec - BPBM-MO 198043		Pearl Harbor channel, Watertown. Catalogue XIV.
1936	Spec - BPBM-MO 68		Reef at Fort Kamehameha.
1954	Spec - BPBM-MO 246850		Fort Kamehamaha reef. Catalogue XVII.
1957	Spec - BPBM-MO 246865		Fort Kaahamaha (Fort Kamehameha). Catalogue XVII.
1961	Spec - BPBM-MO 218101		Off Fort Kamehameha. Catalogue XV.
<b><i>Cypraea tessellata</i></b>		<b>Swainson, 1822</b>	
1932	Spec - BPBM-MO 197197		Keahi Point. Catalogue XIV.
1932	Spec - BPBM-MO 198047		Pearl Harbor channel. Catalogue XIV.
<b>Family: DIASTOMIDAE</b>			
<b>Genus: <i>Alaba</i></b>			
<b><i>Alaba goniochila</i></b>		<b>(A. Adams, 1860)</b>	
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
<b>Genus: <i>Alabina</i></b>			
<b><i>Alabina pearlensis</i></b>		<b>Dall</b>	
Unknown	Spec - BPBM-MO 65635		Catalogue V.
<b>Genus: <i>Obtortio</i></b>			
<b><i>Obtortio fulva</i></b>		<b>Watson</b>	
1973	Ref - Evans et al., 1974		
<b>Family: EULIMIDAE</b>			
<b>Genus: <i>Balcis</i></b>			
<b><i>Balcis</i> sp.</b>		<b>Indigenous.</b>	
1976	Ref - Cooke et al., 1980		
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<b><i>Balcis thaanumi</i></b>		<b>Pilsbry, 1917</b>	
1936	Spec - BPBM-MO 230613		Reef at Fort Kamehameha. Catalogue XVI.
<b>Genus: <i>Leiostraca</i></b>			
<b><i>Leiostraca</i> sp.</b>			
1973	Ref - Evans et al., 1974		
<b>Family: HIPPONICIDAE</b>			
<b>Genus: <i>Amalthea</i></b>			
<b><i>Amalthea</i> sp.</b>		<b>(?W.H.)</b>	
1930	Spec - BPBM-MO 195332		Pearl Locks Peninsula, makai face of little pier just mauka of Dr. Whitney's place..
			Catalogue XIV.
1932	Spec - BPBM-MO 200163		Waipio Peninsula, end. Catalogue XIV.
<b><i>Amalthea barbatus</i></b>			
1932	Spec - BPBM-MO 200171		Fort Kamehameha and Barber's Point, beach between. Catalogue XIV.
<b>Genus: <i>Antisabia</i></b>			
<b><i>Antisabia foliacea</i></b>			
Unknown	Spec - BPBM-MO 209902		Fort Kamehameha Army Housing (S.C.) 910509AS. Catalogue XIV.
<b>Genus: <i>Hipponix</i></b>			
<b><i>Hipponix</i> sp.</b>			
1973	Ref - Evans et al., 1974		
1996	Legacy Project (Coles et al., 1997)		
<b><i>Hipponix (Cochlear) imbricatus</i></b>		<b>Gould, 1846</b>	<b>Indigenous. Common name(s): Hoof Shell.</b>
Unknown	Spec - BPBM-MO 64817		Catalogue V.
<b><i>Hipponix (Pilosabia) pilosus</i></b>		<b>(Deshayes, 1832)</b>	<b>Indigenous.</b>
2008	This Project		
<b><i>Hipponix australis</i></b>			
1961	Spec - BPBM-MO 217888		Off Fort Kamehameha. Catalogue XV.

## Legacy Project - Species Report (Cont.)

	<i>Hipponix foliaceus</i>		<b>Quoy &amp; Gaimard, 1835</b>	
	1930	Spec - BPBM-MO 196836		Peninsula. Catalogue XIV.
	<i>Hipponix grayanus</i>			
	1961	Spec - BPBM-MO 217892		Off Fort Kamehameha. Catalogue XV.
	<i>Hipponix imbricatus</i>		<b>Gould, 1846</b>	
	Unknown	Spec - BPBM-MO 204603		Catalogue XIV.
	Unknown	Spec - BPBM-MO 63956		Ford Island. Catalogue V.
	1927	Spec - BPBM-MO 231294		Ford Island, on pearl oyster, along shore, on rocks. Catalogue
XVI.				
	1949	Spec - BPBM-MO 231301		Fort Kamehameha. Catalogue XVI.
	1996	Legacy Project (Coles et al., 1997)		
	<i>Hipponix pilosus</i>		<b>(Deshayes, 1832)</b>	
	1973	Ref - Evans et al., 1974		
	1979	Ref - AECOS, 1979		Off Pearl Harbor. Recorded as Hipponyx cf. barbatus.
	1996	Legacy Project (Coles et al., 1997)		
	<b>Family: LITTORINIDAE</b>			
	<b>Genus: <i>Littoraria</i></b>			<b>Common name(s): Periwinkle; Hawaiian name(s): pupu kolea.</b>
	<i>Littoraria coccinea</i>		<b>(Gmelin, 1791)</b>	
XIV.	1930	Spec - BPBM-MO 196989		Peninsular, Pearl Lochs, N. of Dr. Whitney's place. Catalogue
	<i>Littoraria intermedia</i>			
	1930	Spec - BPBM-MO 196735		S.E. coast of peninsular Pearl Lochs. Catalogue XIV.
	1930	Spec - BPBM-MO 196745		Pearl Lochs. Catalogue XIV.
	<i>Littoraria pintada</i>		<b>(Wood, 1828)</b>	<b>Indigenous.</b>
	1996	Legacy Project (Coles et al., 1997)		
	<i>Littoraria scabra</i>		<b>(Linnaeus, 1758)</b>	<b>Indigenous. Common name(s): Feather Duster Worm;</b>
Hawaiian				<b>name(s): kukae kolea; pupu kolea; kolealea; pipipi kolea.</b>
	Unknown	Spec - BPBM-MO 204655		Ford Island. Catalogue XIV.
	Unknown	Spec - BPBM-MO 63606		Catalogue V.
	Unknown	Spec - BPBM-MO 63608		Catalogue V.
	Unknown	Spec - BPBM-MO 64830		Catalogue V.
	1915	Spec - BPBM-MO 228535		Ford Island. Catalogue XVI.
	1923	Spec - BPBM-MO 228540		Peninsula; sea wall at Dowsett's Wharf. Catalogue XVI.
	1923	Spec - BPBM-MO 228541		Peninsula; along shore near Railroad Wharf. Catalogue XVI.
	1930	Spec - BPBM-MO 196741		Peninsular Pearl Lochs, North of Dr. Whitney's place.
Catalogue XIV.				
	1930	Spec - BPBM-MO 197004		Peninsular, Pearl Lochs. Catalogue XIV.
	1930	Spec - BPBM-MO 197005		Peninsular, Pearl Lochs. Catalogue XIV.
	1930	Spec - BPBM-MO 197006		Peninsular, Pearl Lochs. Catalogue XIV.
	1932	Spec - BPBM-MO 200143		Peninsula. Catalogue XIV.
	1973	Ref - Evans et al., 1974		Recorded as <i>Littorina scabra</i> .
	1993	Ref - Brock, 1994		Recorded as <i>Littorina scabra</i> .
	1994	Ref - Brock, 1995		Recorded as <i>Littorina scabra</i> .
	1996	Legacy Project (Coles et al., 1997)		
	2007	Ref - Brock, 2007		Recorded as <i>Littorina scabra</i> .
	2008	This Project		
	<b>Family: MODULIDAE</b>			
	<b>Genus: <i>Modulus</i></b>			
	<i>Modulus sp.</i>			
	1934	Spec - BPBM-MO 205575		Dredge. Catalogue XIV.
	<i>Modulus tectum</i>		<b>Gmelin</b>	<b>Hawaiian name(s): pupu.</b>
	1932	Spec - BPBM-MO 199280		Reef off Fort Kamehameha. Catalogue XIV.
	<b>Family: NATICIDAE</b>			
	<b>Genus: <i>Natica</i></b>			
	<i>Natica sp.</i>			
	1961	Spec - BPBM-MO 218130		Off Fort Kamehameha. Catalogue XV.

## Legacy Project - Species Report (Cont.)

1973	Ref - Evans et al., 1974		
<b><i>Natica gualteriana</i></b>		<b>Recluz, 1844</b>	<b>Hawaiian name(s): pupu kui; kio noho one.</b>
1915	Spec - BPBM-MO 64034		Catalogue V.
1932	Spec - BPBM-MO 199329		Reef off Fort Kamehameha. Catalogue XIV.
1932	Spec - BPBM-MO 199336		Entrance Channel. Catalogue XIV.
1932	Spec - BPBM-MO 199337		Pearl City. Catalogue XIV.
1973	Ref - Evans et al., 1974		
<b><i>Natica tessellata</i></b>			
1961	Spec - BPBM-MO 218143		Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Polinices</i></b>			
<b><i>Polinices</i> sp.</b>			
1934	Spec - BPBM-MO 205566		Dredge. Catalogue XIV.
1961	Spec - BPBM-MO 218188		Off Fort Kamehameha. Catalogue XV.
1962	Spec - BPBM-MO 218195		Just Ewa of restricted area. Catalogue XV.
<b>Family: RISSOELLIDAE</b>			
<b>Genus: <i>Rissoella</i></b>			
<b><i>Rissoella</i> sp.</b>			
1973	Ref - Evans et al., 1974		
<b>Family: RISSOIDAE</b>			
<b>Genus: <i>Cithna</i></b>			
<b><i>Cithna</i> sp.</b>			
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
<b>Genus: <i>Merelina</i></b>			
<b><i>Merelina</i> sp.</b>			
1973	Ref - Evans et al., 1974		
<b>Genus: <i>Parashiela</i></b>			
<b><i>Parashiela beetsi</i></b>			
1973	Ref - Evans et al., 1974	<b>Ladd, 1966</b>	Off Pearl Harbor.
<b>Genus: <i>Pusillina</i></b>			
<b><i>Pusillina marmorata</i></b>			
2008	This Project	<b>Ponder, 1985</b>	<b>Indigenous.</b>
<b>Genus: <i>Rissoina</i></b>			
<b><i>Rissoina ambigua</i></b>			
1973	Ref - Evans et al., 1974	<b>(Gould, 1849)</b>	
<b><i>Rissoina cerithiiformis</i></b>			
2008	This Project	<b>Tryon, 1887</b>	<b>Indigenous.</b>
<b><i>Rissoina miltozona</i></b>			
1973	Ref - Evans et al., 1974	<b>Tomlin, 1915</b>	
1996	Legacy Project (Coles et al., 1997)		
<b><i>Rissoina rhyssa</i></b>			
Unknown	Spec - BPBM-MO 228923	<b>Dall</b>	Catalogue XVI.
Unknown	Spec - BPBM-MO 65714		Catalogue V.
<b><i>Rissoina turricula</i></b>			
1973	Ref - Evans et al., 1974	<b>Pease, 1861</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Schwartziella</i></b>			
<b><i>Schwartziella gracilis</i></b>			
1973	Ref - Evans et al., 1974	<b>(Pease, 1861)</b>	Recorded as <i>Rissoina gracilis</i> .
<b>Genus: <i>Zebina</i></b>			
<b><i>Zebina tridentata</i></b>			
Unknown	Spec - BPBM-MO 63855	<b>(Michaud, 1830)</b>	Catalogue V.

## Legacy Project - Species Report (Cont.)

1973	Ref - Evans et al., 1974	Off Pearl Harbor.
1996	Legacy Project (Coles et al., 1997)	
<b>Family: STROMBIDAE</b>		
<b>Genus: <i>Strombus</i></b>		
<b><i>Strombus dentatus</i> (Linnaeus, 1758)</b>		
1961	Spec - BPBM-MO 217932	Off Fort Kamehameha. Catalogue XV.
<b><i>Strombus helli</i> Kiener, 1843</b>		
1961	Spec - BPBM-MO 217953	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 217954	Off Fort Kamehameha. Catalogue XV.
<b><i>Strombus maculatus</i> Sowerby, 1842 Hawaiian name(s): mamaiki; pupu mamaiki; pu leholeho.</b>		
1932	Spec - BPBM-MO 199101	Reef off Fort Kamehameha. Catalogue XIV.
<b>Family: TONNIDAE</b>		
<b>Genus: <i>Tonna</i> Hawaiian name(s): pu`oni`oni`o.</b>		
<b><i>Tonna perdit</i> Linnaeus, 1758 Hawaiian name(s): puleho.</b>		
1936	Spec - BPBM-MO 240897	Reef off Fort Kamehameha. Catalogue XVII.
<b>Family: TRIPHORIDAE</b>		
<b>Genus: <i>Triforis</i></b>		
<b><i>Triforis flammulata</i> Pease</b>		
Unknown	Spec - BPBM-MO 62886	Ford Island. Catalogue V.
<b>Genus: <i>Triphora</i></b>		
<b><i>Triphora</i> {<i>Triphoridae</i>}</b>		
1932	Spec - BPBM-MO 198048	Pearl Harbor entrance channel. Catalogue XIV.
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Viriola</i></b>		
<b><i>Viriola incisa</i> Pease, 1861</b>		
1936	Spec - BPBM-MO 230149	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
<b>Family: VERMETIDAE</b>		
<b>Unidentified Vermetidae</b>		
Unknown	Spec - BPBM-MO 229146	Catalogue XVI.
Unknown	Spec - BPBM-MO 51	
Unknown	Spec - BPBM-MO 65695	Catalogue V.
1934	Spec - BPBM-MO 205562	Dredge. Catalogue XIV.
1948	Spec - BPBM-MO 43	Bottom of portable dry dock in Dry Dock #4..
1978	Ref - Grovhoug, 1979	
2008	This Project	
<b>Genus: <i>Dendropoma</i></b>		
<b><i>Dendropoma</i> sp.</b>		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Dendropoma platypus</i> Morch, 1861</b>		
1973	Ref - Evans et al., 1974	
1987	Ref - Brewer & Assoc., 1987	
<b><i>Dendropoma psarocephala</i> Hadfield &amp; Kay, 1972</b>		
1975	Ref - Grovhoug, 1976	
<b><i>Dendropoma psarocephala?</i> Hadfield &amp; Kay, 1972</b>		
1973	Ref - Evans et al., 1974	
<b>Genus: <i>Eualetes</i></b>		
<b><i>Eualetes tulipa</i> (Chenu, 1843) Introduced. Common name(s): Noble Vermitid.</b>		
1973	Ref - Evans et al., 1974	Recorded as Vermetus alii.
1975	Ref - Grovhoug, 1976	Recorded as Vermetus alii.
1986	Ref - Lenihan, 1990	Recorded as Vermetus alii.

## Legacy Project - Species Report (Cont.)

1993	Ref - Brock, 1994	Recorded as <i>Vermetus</i> alii.
1994	Ref - Brock, 1995	Recorded as <i>Vermetus</i> alii.
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as <i>Vermetus</i> alii.
2007	This Project	
2008	This Project	
<b>Genus: <i>Petalococonchus</i></b>		
<b><i>Petalococonchus keenae</i></b> Hadfield and Kay, 1972 Indigenous. Common name(s): Periwinkle.		
2007	This Project	
2008	This Project	
<b>Genus: <i>Serpulorbis</i></b>		
<b><i>Serpulorbis variabilis</i></b> Hadfield and Kay, 1972 Indigenous.		
2007	This Project	
2008	This Project	
<b>Genus: <i>Vermetus</i></b>		
<b><i>Vermetus</i> sp.</b> Hawaiian name(s): pohokupele; kauno`a.		
Unknown	Spec - BPBM-MO 63578	Catalogue V.
1973	Ref - Evans et al., 1974	
<b>Family: VITRINELLIDAE</b>		
<b>Genus: <i>Cyclostremiscus</i></b>		
<b><i>Cyclostremiscus</i> sp. A</b>		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. A.
<b><i>Cyclostremiscus</i> sp. B</b>		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. B.
<b><i>Cyclostremiscus</i> sp. C</b>		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. C.
<b><i>Cyclostremiscus</i> sp. D</b>		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. D.
<b><i>Cyclostremiscus emeryi</i></b> Ladd, 1966		
1973	Ref - Evans et al., 1974	Off Pearl Harbor.
<b>Family: XENOPHORIDAE</b>		
<b>Genus: <i>Xenophora</i></b>		
<b><i>Xenophora pallida</i></b>		
1961	Spec - BPBM-MO 217922	Off Fort Kamehameha. Catalogue XV.
<b>Order: NEOGASTROPODA</b>		
<b>Family: BUCCINIDAE</b>		
<b>Genus: <i>Cantharus</i></b>		
<b><i>Cantharus farinosus</i></b> (Gould, 1850)		
1973	Ref - Evans et al., 1974	
<b>Genus: <i>Colubraria</i></b>		
<b><i>Colubraria obscura</i></b> Reeve, 1844		
Unknown	Spec - BPBM-MO 240920	Channel. Catalogue XVII.
<b>Genus: <i>Engina</i></b>		
<b><i>Engina</i> sp.</b>		
1973	Ref - Evans et al., 1974	
<b>Genus: <i>Prodotia</i></b>		
<b><i>Prodotia ignea</i></b> Gmelin, 1791		
Unknown	Spec - BPBM-MO 235895	Catalogue XVI.
Unknown	Spec - BPBM-MO 65702	Catalogue V.
1928	Spec - BPBM-MO 240939	Reef off Fort Kamehameha. Catalogue XVII.
1932	Spec - BPBM-MO 199738	Fort Kamehameha, reef off. Catalogue XIV.



## Legacy Project - Species Report (Cont.)

<i>Prodotia iostomus</i>	1932 Spec - BPBM-MO 199731	Fort Kamehameha, reef off. Catalogue XIV.
<b>Family: COLUMBELLIDAE</b>		
<b>Genus: <i>Anachis</i></b>		
<i>Anachis miser</i>	1973 Ref - Evans et al., 1974	(Sowerby, 1844) Recorded as <i>A. zebra</i> .
<b>Genus: <i>Columbella</i></b>		
<i>Columbella varians</i>	1932 Spec - BPBM-MO 199827	Sowerby Hawaiian name(s): pupu Ni`ihau. Fort Kamehameha, reef off. Catalogue XIV.
<b>Genus: <i>Euplica</i></b>		
<i>Euplica varians</i>	1996 Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Mitrella</i></b>		
<i>Mitrella margarita</i>	1961 Spec - BPBM-MO 221163	Reeve, 1859 Off Fort Kamehameha?. Catalogue XV.
<b>Genus: <i>Seminella</i></b>		
<i>Seminella sp.</i>	1996 Legacy Project (Coles et al., 1997)	
<b>Family: CONIDAE</b>		
<b>Genus: <i>Conus</i></b>		
Common name(s): Cone shell; Hawaiian name(s): pupu`ala; pupu poniuniu.		
<i>Conus sp.</i>	1961 Spec - BPBM-MO 220384	Off Fort Kamehameha. Catalogue XV.
<i>Conus abbreviatus</i>	1932 Spec - BPBM-MO 199015	Reeve, 1843 Fort Kamehameha. Catalogue XIV.
<i>Conus acutangulus</i>	1961 Spec - BPBM-MO 220118 1961 Spec - BPBM-MO 220119	Lamarck, 1810 Off Fort Kamehameha. Catalogue XV. Off Fort Kamehameha. Catalogue XV.
<i>Conus catus</i>	1932 Spec - BPBM-MO 198911 1936 Spec - BPBM-MO 238941	Hwass, 1792 Reef off Fort Kamehameha. Catalogue XIV. Fort Kamehameha. Catalogue XVI.
<i>Conus clavus</i>	1929 Spec - BPBM-MO 63	Linnaeus Brought up by dredger operations in entrance to Pearl Harbor.
<i>Conus dactylasus</i>	1929 Spec - BPBM-MO 64	Kiener Brought up by dredger operations in entrance to Pearl Harbor.
<i>Conus ebraeus</i>	1932 Spec - BPBM-MO 199614	Linnaeus, 1758 Hawaiian name(s): ohana o ka pupu`ala; ke`oke`o; Fort Kamehameha. Catalogue XIV.
<i>Conus eugrammatus</i>	2008 This Project	Bartsch and Rehder, 1943 Indigenous.
<i>Conus flavidus</i>	1932 Spec - BPBM-MO 199052	Lamarck, 1810 Fort Kamehameha. Catalogue XIV.
<i>Conus lividus</i>	1932 Spec - BPBM-MO 198981	Hwass, 1792 Fort Kamehameha. Catalogue XIV.
<i>Conus marmoreus</i>	1932 Spec - BPBM-MO 200269	Linnaeus, 1758 Pearl Harbor channel; entrance, near seaward end. Catalogue XIV.
<i>Conus miles</i>	1932 Spec - BPBM-MO 199134 1932 Spec - BPBM-MO 199135 1936 Spec - BPBM-MO 2 1936 Spec - BPBM-MO 239251	Linnaeus, 1758 Indigenous. Common name(s): Soldier Cone. Fort Kamehameha, near outer edge of the reef. Catalogue XIV. Reef off Fort Kamehameha. Catalogue XIV. Off Fort Kamehameha, on the reef. Off Fort Kamehameha, on the reef. Catalogue XVI.

## Legacy Project - Species Report (Cont.)

	<b><i>Conus nussatella</i></b>	<b>Linnaeus, 1758</b>	
XVII.	1927	Spec - BPBM-MO 241003	Off Fort Kamehameha, under loose, dead coral. Catalogue
	1936	Spec - BPBM-MO 239257	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
	1936	Spec - BPBM-MO 62	Reef at Fort Kamehameha.
	<b><i>Conus pennaccus</i></b>		
	Unknown	Spec - BPBM-MO 239602	Catalogue XVI.
	1932	Spec - BPBM-MO 199642	Watertown. Catalogue XIV.
	1932	Spec - BPBM-MO 200257	Fort Kamehameha, reef. Catalogue XIV.
	<b><i>Conus quercinus</i></b>	<b>Lightfoot, 1786</b>	
	1932	Spec - BPBM-MO 199691	Pearl Harbor Channel; Watertown. Catalogue XIV.
	1961	Spec - BPBM-MO 220303	Off Fort Kamehameha. Catalogue XV.
	1961	Spec - BPBM-MO 220304	Off Fort Kamehameha. Catalogue XV.
	1961	Spec - BPBM-MO 220305	Off Fort Kamehameha. Catalogue XV.
	<b><i>Conus rattus</i></b>	<b>Hwass, 1792</b>	
	1932	Spec - BPBM-MO 199084	Fort Kamehameha. Catalogue XIV.
	<b><i>Conus sponsalis</i></b>	<b>Hass in Brugière, 1792</b>	
	1932	Spec - BPBM-MO 199201	Reef off Fort Kamehameha. Catalogue XIV.
	<b><i>Conus textile</i></b>	<b>Linnaeus, 1758</b>	
feet of water.	1915	Spec - BPBM-MO 239129	Reef Waikiki of entrance to Pearl Harbor, under a rock in five
			Catalogue XVI.
	1936	Spec - BPBM-MO 65	Fort Kamehameha Reef.
	<b><i>Conus vexillum</i></b>	<b>Gmelin, 1791</b>	
	1932	Spec - BPBM-MO 199346	Reef off Fort Kamehameha. Catalogue XIV.
	1932	Spec - BPBM-MO 199347	Fort Kamehameha. Catalogue XIV.
	<b><i>Conus vitulinus</i></b>	<b>Hwass, 1792</b>	
	1932	Spec - BPBM-MO 199673	Fort Kamehameha, reef off. Catalogue XIV.
	1932	Spec - BPBM-MO 199674	Fort Kamehameha. Catalogue XIV.
	1936	Spec - BPBM-MO 239424	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
	1936	Spec - BPBM-MO 52	Reef at Fort Kamehameha.
	<b>Family: CORALLIOPHILIDAE</b>		
	<b>Genus: <i>Quoyula</i></b>		
	<b><i>Quoyula madreporarum</i></b>	<b>Sowerby, 1834</b>	
	1932	Spec - BPBM-MO 198765	Reef off Fort Kamehameha. Catalogue XIV.
	<b>Family: FASCIOLARIIDAE</b>		
	<b>Genus: <i>Fusinus</i></b>		
	<b><i>Fusinus sp.</i></b>		
	1934	Spec - BPBM-MO 205567	Dredge. Catalogue XIV.
	1961	Spec - BPBM-MO 218747	Off Fort Kamehameha, Station 2. Catalogue XV.
	<b><i>Fusinus sandvicensis</i></b>	<b>Saverly</b>	
	1934	Spec - BPBM-MO 215733	West Lock, Dredging. Catalogue XV.
	1940	Spec - BPBM-MO 249147	Dredging. Catalogue XVII.
	<b>Genus: <i>Fusolatirus</i></b>		
	<b><i>Fusolatirus kuroseanus?</i></b>		
	1961	Spec - BPBM-MO 222218	Off Fort Kamehameha. Catalogue XV.
	<b>Genus: <i>Peristernia</i></b>		
	<b><i>Peristernia chlorostoma</i></b>	<b>(Sowerby, 1825)</b>	<b>Hawaiian name(s): kolealea.</b>
	Unknown	Spec - BPBM-MO 204253	Catalogue XIV.
	Unknown	Spec - BPBM-MO 240953	Catalogue XVII.
	1923	Spec - BPBM-MO 237440	At Railroad Wharf. Catalogue XVI.
	1923	Spec - BPBM-MO 237442	Near inside entrance to Pearl Harbor. Catalogue XVI.
	1924	Spec - BPBM-MO 237447	At Naval Station. Catalogue XVI.
	1932	Spec - BPBM-MO 198883	Fort Kamehameha. Catalogue XIV.

## Legacy Project - Species Report (Cont.)

1932	Spec - BPBM-MO 198891	Peninsula; Railroad Wharf. Catalogue XIV.
1932	Spec - BPBM-MO 198892	End of Waipio Peninsula. Catalogue XIV.
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	

### Family: MAGILIDAE

#### Genus: *Coralliophila*

##### *Coralliophila d'orbignyana* Petit

1932	Spec - BPBM-MO 198738	Reef off Fort Kamehameha. Catalogue XIV.
1936	Spec - BPBM-MO 235759	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.

##### *Coralliophila violacea* Kiener, 1836

1928	Spec - BPBM-MO 240915	Reef off Fort Kamehameha. Catalogue XVII.
1932	Spec - BPBM-MO 198753	Reef off Fort Kamehameha. Catalogue XIV.

##### Unidentified *Coralliophila erosa* (Röding, 1798)

1932	Spec - BPBM-MO 198732	Reef off Fort Kamehameha. Catalogue XIV.
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### Family: MARGINELLIDAE

#### Genus: *Cystiscus*

##### *Cystiscus* sp.

1973	Ref - Evans et al., 1974	
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#### Genus: *Granula*

<i>Granula sandwicensis</i>	(Pease, 1860)	Hawaiian name(s): pupu `aha`aha.
1973	Ref - Evans et al., 1974	Recorded as <i>Kogomea sandwicensis</i> (Pease).

#### Genus: *Marginella*

##### *Marginella* sp. a-1

Unknown	Spec - BPBM-MO 61271	Catalogue V.
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### Family: MITRIDAE

#### Genus: *Cancilla*

##### *Cancilla granatina* Lamarck, 1811

1961	Spec - BPBM-MO 219301	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219302	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219303	Off Fort Kamehameha. Catalogue XV.

#### Genus: *Imbricaria*

##### *Imbricaria punctata* Swainson, 1821

1961	Spec - BPBM-MO 219471	Off Fort Kamehameha. Catalogue XV.
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#### Genus: *Mitra*

##### *Mitra* sp. Indigenous.

1973	Ref - Evans et al., 1974	
2008	This Project	

##### *Mitra assimilis* Reeve, 1868

1932	Spec - BPBM-MO 199442	Fort Kamehameha. Catalogue XIV.
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##### *Mitra brunnea* Pease, 1861

1915	Spec - BPBM-MO 6	Fort Kamahameha.
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##### *Mitra litterata* Lamarck, 1811

1936	Spec - BPBM-MO 238093	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
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##### *Mitra mitra* Linnaeus, 1758

1961	Spec - BPBM-MO 219381	Off Fort Kamehameha. Catalogue XV.
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##### *Mitra pellisserpentis* Reeve, 1844

1932	Spec - BPBM-MO 199367	Fort Kamehameha. Catalogue XIV.
1932	Spec - BPBM-MO 199470	Fort Kamehameha, reef off. Catalogue XIV.
1936	Spec - BPBM-MO 238107	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.

##### *Mitra ticaonica* Reeve, 1844

1932	Spec - BPBM-MO 199503	Fort Kamehameha, reef off. Catalogue XIV.
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## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Neocancilla</i></b>		
<b><i>Neocancilla waikikiensis</i></b>	<b>Pilsbry, 1921</b>	
1961	Spec - BPBM-MO 219594	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Scabricola</i></b>		
<b><i>Scabricola newcombii</i></b>	<b>Pease, 1869</b>	
1961	Spec - BPBM-MO 219413	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Subcancilla</i></b>		
<b><i>Subcancilla flammea</i></b>	<b>(Quoy &amp; Gaimard, 1833)</b>	
1982	Spec - BPBM-MO 242714	Entrance to west. Catalogue XVII.
<b>Genus: <i>Vexillum</i></b>		
<b><i>Vexillum (Pusia) lautum</i></b>	<b>(Reeve, 1845)</b>	
1932	Spec - BPBM-MO 199456	Fort Kamehameha, reef off. Catalogue XIV.
<b><i>Vexillum alveolus</i></b>	<b>Reeve, 1845</b>	
1938	Spec - BPBM-MO 12	Fossil near Yacht Club.
<b><i>Vexillum bellum</i></b>	<b>Pease, 1860</b>	
1962	Spec - BPBM-MO 219200	Off Fort Kamehameha. Catalogue XV.
<b><i>Vexillum filistriatum</i></b>	<b>(Sowerby, 1874)</b>	
1982	Spec - BPBM-MO 243097	Entrance to west. Catalogue XVII.
<b><i>Vexillum pacificum</i></b>	<b>Reeve</b>	
1961	Spec - BPBM-MO 219231	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219232	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219233	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219234	Off Fort Kamehameha. Catalogue XV.
<b>Family: MURICIDAE</b>		
<b>Genus: <i>Aspella</i></b>		
<b><i>Aspella producta</i></b>	<b>(Pease, 1861)</b>	
1932	Spec - BPBM-MO 200760	Fort Kamehameha, reef off. Catalogue XIV.
1973	Ref - Evans et al., 1974	
<b>Genus: <i>Chicoreus</i></b>		
<b><i>Chicoreus insularum</i></b>	<b>(Pilsbry, 1921)</b>	
1961	Spec - BPBM-MO 218423	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Drupella</i></b>		
<b><i>Drupella elata</i></b>	<b>Blainville, 1832</b>	
1932	Spec - BPBM-MO 198217	Fort Kamehameha. Catalogue XIV.
1961	Spec - BPBM-MO 218493	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 218494	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Morula</i></b>		
<b><i>Morula sp.</i></b>		
1932	Spec - BPBM-MO 198193	End of Waipio Peninsula. Catalogue XIV.
1932	Spec - BPBM-MO 198194	End of Waipio Peninsula. Catalogue XIV.
1932	Spec - BPBM-MO 198196	Peninsula; Railroad Wharf. Catalogue XIV.
1932	Spec - BPBM-MO 198197	Peninsula; Railroad Wharf. Catalogue XIV.
<b><i>Morula dermosa</i></b>		
1932	Spec - BPBM-MO 198253	Fort Kamehameha. Catalogue XIV.
1932	Spec - BPBM-MO 198254	Fort Kamehameha. Catalogue XIV.
1996	Legacy Project (Coles et al., 1997)	
<b><i>Morula foliacea</i></b>	<b>Conrad</b>	
1932	Spec - BPBM-MO 198180	Reef off Fort Kamehameha. Catalogue XIV.
1936	Spec - BPBM-MO 234727	Reefs at Fort Kamehameha. Catalogue XVI.
<b><i>Morula granulata</i></b>	<b>Duclos, 1832</b>	<b>Hawaiian name(s): pupu maka`awa; maka`awa.</b>
Unknown	Spec - BPBM-MO 204188	Fort Kamehameha. Catalogue XIV. May be <i>M. uva</i> .

## Legacy Project - Species Report (Cont.)

Unknown	Spec - BPBM-MO 62001	Catalogue V.
1927	Spec - BPBM-MO 234751	Naval Station. Catalogue XVI.
1927	Spec - BPBM-MO 74	Naval Station.
1932	Spec - BPBM-MO 198242	Fort Kamehameha. Catalogue XIV. May be <i>M. uva</i> .
1932	Spec - BPBM-MO 198243	Fort Kamehameha. Catalogue XIV. May be <i>M. uva</i> .
1932	Spec - BPBM-MO 198300	End of Waipio Peninsula. Catalogue XIV.
1932	Spec - BPBM-MO 198301	End of Waipio Peninsula. Catalogue XIV.
<b><i>Morula mitosa?</i></b>		
	<b>Dall</b>	
1927	Spec - BPBM-MO 73	Naval Station.
<b><i>Morula spinosa</i></b>		
	<b>H. and A. Adams, 1853</b>	
1932	Spec - BPBM-MO 198280	Fort Kamehameha. Catalogue XIV.
<b><i>Morula uva</i></b>		
	<b>Röding, 1798</b>	
1949	Spec - BPBM-MO 234787	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
<b><i>Morula vexilla</i></b>		
	<b>(Kuroda, 1953)</b>	
1961	Spec - BPBM-MO 222217	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Murex</i></b>		
<b><i>Murex sandwichensis</i></b>		
	<b>Pease</b>	
1932	Spec - BPBM-MO 198399	Fort Kamehameha, reef off. Catalogue XIV.
<b>Genus: <i>Vitularia</i></b>		
<b><i>Vitularia miliaris</i></b>		
	<b>Gmelin, 1791</b>	<b>Cryptogenic.</b>
1916	Spec - BPBM-MO 234532	Reef Waikiki of entrance to Pearl Harbor. Catalogue XVI.
1936	Spec - BPBM-MO 234537	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
1950	Ref - Burgess, 1963	Recorded as <i>Vitularia miliaris</i> .
<b>Family: NASSARIIDAE</b>		
<b>Genus: <i>Nassarius</i></b>		
<b><i>Nassarius crematus</i></b>		
	<b>(Hinds, 1844)</b>	
1961	Spec - BPBM-MO 220604	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 220605	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 220606	Off Fort Kamehameha. Catalogue XV.
<b>Family: NEPTUNEIDAE</b>		
<b>Genus: <i>Caducifer</i></b>		
<b><i>Caducifer decapitata</i></b>		
	<b>Reeve</b>	
1936	Spec - BPBM-MO 235879	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
<b>Genus: <i>Clathurella</i></b>		
<b><i>Clathurella fuscomaculata</i></b>		
	<b>Pease, 1860</b>	
1932	Spec - BPBM-MO 200762	Fort Kamehameha, reef off. Catalogue XIV.
<b>Family: PYRAMIDELLIDAE</b>		
<b>Genus: <i>Evalea</i></b>		
<b><i>Evalea peasei</i></b>		
	<b>Dautzenberg &amp; Bouge, 1933</b>	<b>Hawaiian name(s): pupu po`ai.</b>
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia eclecta</i> Pilsbry.
<b>Genus: <i>Herviera</i></b>		
<b><i>Herviera patricia</i></b>		
	<b>Pilsbry, 1918</b>	
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia patricia</i> Pilsbry.
<b>Genus: <i>Hinemoa</i></b>		
<b><i>Hinemoa indica</i></b>		
	<b>(Melvill, 1896)</b>	<b>Introduced.</b>
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia indica</i> Melvill.
1996	Legacy Project (Coles et al., 1997)	
2008	This Project	
<b>Genus: <i>Miralda</i></b>		
<b><i>Miralda paulbartschi</i></b>		
	<b>Pilsbry, 1918</b>	
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia paulbartschi</i> Pilsbry.

## Legacy Project - Species Report (Cont.)

<i>Miralda scopulorum</i>	<b>Watson, 1886</b>	
1973 Ref - Evans et al., 1974		Recorded as <i>Odostomia scopulorum</i> Watson.
<b>Genus: <i>Odostomia</i></b>		
<b><i>Odostomia</i> sp.</b>		
1943 Spec - BPBM-MO 11		From Railroad Wharf, Peninsula.
1973 Ref - Evans et al., 1974		
<i>Odostomia stearnsiella</i>	<b>Pilsbry, 1918</b>	
1973 Ref - Evans et al., 1974		
1996 Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Pyramidella</i></b>		
<b><i>Pyramidella</i> sp.</b>		
1996 Legacy Project (Coles et al., 1997)		
<i>Pyramidella dolabrata</i>	<b>Linnaeus, 1758</b>	
1961 Spec - BPBM-MO 220403		Off Fort Kamehameha. Catalogue XV.
<i>Pyramidella miralis hawaiiensis</i>	<b>Dall</b>	
1932 Spec - BPBM-MO 200124		Fort Kamehameha, reef. Catalogue XIV.
<i>Pyramidella nitida</i>	<b>A. Adams</b>	
Unknown Spec - BPBM-MO 64185		Ford Island. Catalogue V.
<i>Pyramidella oahuuanus</i>	<b>Pilsbry</b>	
1932 Spec - BPBM-MO 200126		Fort Kamehameha, reef. Catalogue XIV.
<i>Pyramidella sulcata</i>	<b>A. Adams, 1859</b>	<b>Hawaiian name(s): pupu `ole.</b>
1915 Spec - BPBM-MO 64201		Catalogue V.
1961 Spec - BPBM-MO 220435		Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Pyrgulina</i></b>		
<b><i>Pyrgulina oodes</i></b>		
1973 Ref - Evans et al., 1974	<b>(Watson, 1886)</b>	<b>Cryptogenic.</b>
1996 Legacy Project (Coles et al., 1997)		Recorded as <i>Odostomia oodes</i> Watson.
<b>Genus: <i>Turbonilla</i></b>		
<b><i>Turbonilla</i> sp.</b>		
1973 Ref - Evans et al., 1974		
<b>Family: TEREBRIDAE</b>		
<b>Unidentified Terebridae</b>		
1961 Spec - BPBM-MO 222351		Off Fort Kamehameha. Catalogue XV.
1961 Spec - BPBM-MO 222352		Off Fort Kamehameha. Catalogue XV.
1961 Spec - BPBM-MO 222353		Off Fort Kamehameha. Catalogue XV.
1982 Spec - BPBM-MO 246144		Entrance to west. Catalogue XVII.
<b>Genus: <i>Hastula</i></b>		
<b><i>Hastula matheroniana</i></b>		
1961 Spec - BPBM-MO 219838	<b>Deshayes, 1859</b>	Off Fort Kamehameha. Catalogue XV.
<b><i>Hastula nitida</i></b>		
1961 Spec - BPBM-MO 220973	<b>Hinds, 1844</b>	Off Fort Kamehameha. Catalogue XV.
1961 Spec - BPBM-MO 221008		Off Fort Kamehameha. Catalogue XV.
<b><i>Hastula penicillata</i></b>		
1961 Spec - BPBM-MO 220950	<b>Hinds, 1844</b>	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Terebra</i></b>		
<b><i>Duplicaria gouldi</i></b>		
1915 Spec - BPBM-MO 54	<b>Deshayes</b>	Off entrance, M. 5, l. 1.
1961 Spec - BPBM-MO 219771		Off Fort Kamehameha. Catalogue XV.
1961 Spec - BPBM-MO 219772		Off Fort Kamehameha. Catalogue XV.
1961 Spec - BPBM-MO 219773		Off Fort Kamehameha. Catalogue XV.

## Legacy Project - Species Report (Cont.)

<i>Terebra sp.</i>			
1932	Spec - BPBM-MO 199570		Fort Kamehameha, reef off. Catalogue XIV.
<i>Terebra achates</i>		<b>Weaver, 1960</b>	
1932	Spec - BPBM-MO 199574		Catalogue XIV.
<i>Terebra amoena</i>		<b>Deshayes, 1859</b>	
1961	Spec - BPBM-MO 222344		Off Fort Kamehameha. Catalogue XV.
<i>Terebra cerithina</i>		<b>Lamarck, 1822</b>	
1961	Spec - BPBM-MO 220041		Off Fort Kamehameha. Catalogue XV.
<i>Terebra cerithina?</i>		<b>Lamarck, 1822</b>	
1991	Spec - BPBM-MO 246085		Fort Kamehameha south end housing area. Catalogue XVII.
<i>Terebra columellaris</i>		<b>Hinds, 1844</b>	
1961	Spec - BPBM-MO 219725		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 221205		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 222330		Off Fort Kamehameha. Catalogue XV.
<i>Terebra funiculata</i>		<b>Hinds, 1844</b>	
1915	Spec - BPBM-MO 19		Dredged off entrance to Pearl Harbor, Map 35, loc. 1.
1961	Spec - BPBM-MO 219728		Off Fort Kamehameha. Catalogue XV.
<i>Terebra lanta</i>		<b>Pease</b>	
1915	Spec - BPBM-MO 9		Dredged off entrance to Pearl Harbor, Map 34, loc. 1.
<i>Terebra maculata</i>		<b>Linnaeus, 1758</b>	<b>Hawaiian name(s): pupu `ole.</b>
1961	Spec - BPBM-MO 219863		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219864		Off Fort Kamehameha. Catalogue XV.
<i>Terebra pertusa</i>		<b>Born</b>	
1917	Spec - BPBM-MO 29		Off Pearl Harbor.
<i>Terebra plumbea</i>		<b>Quoy</b>	
1915	Spec - BPBM-MO 7		Dredged off entrance to Pearl Harbor, Map 35, loc. 1.
<b>Family: THAIDIDAE</b>			
<b>Genus: <i>Muricodrupa</i></b>			
<i>Muricodrupa funiculus</i>		<b>Wood</b>	
Unknown	Spec - BPBM-MO 234516		Catalogue XVI.
<b>Genus: <i>Nassa</i></b>			
<b><i>Nassa sp.</i></b>			
1934	Spec - BPBM-MO 205582		Dredge. Catalogue XIV.
<b><i>Nassa sarta</i></b>			
1932	Spec - BPBM-MO 198407		Fort Kamehameha, reef off. Catalogue XIV.
<b>Genus: <i>Pinaxia</i></b>			
<i>Pinaxia versicolor</i>		<b>Gray, 1839</b>	
1936	Spec - BPBM-MO 234832		E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
<b>Genus: <i>Vexilla</i></b>			
<b><i>Vexilla sp.</i></b>			
1932	Spec - BPBM-MO 198326		Fort Kamehameha, reef off. Catalogue XIV.
<b>Family: TURRIDAE</b>			
<b>Unidentified Turridae</b>			
1973	Ref - Evans et al., 1974		
<b>Genus: <i>Anacithara</i></b>			
<i>Anacithara perfecta</i>		<b>Kay, 1979</b>	
Unknown	Spec - BPBM-MO 9817		Honouliuli, West Loch. Catalogue I.
<b>Genus: <i>Carinapex</i></b>			
<b><i>Carinapex sp.</i></b>			
1973	Ref - Evans et al., 1974		

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Cymatosyrinx</i></b>			
<b><i>Cymatosyrinx mighelsi</i></b>	<b>Dall</b>		
Unknown	Spec - BPBM-MO 65654		Catalogue V.
<b>Genus: <i>Etrema</i></b>			
<b><i>Etrema sp.?</i></b>			
1961	Spec - BPBM-MO 220816		Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Gemmula</i></b>			
<b><i>Gemmula interpolata</i></b>	<b>Powell, 1967</b>		
1961	Spec - BPBM-MO 220825		Off Fort Kamehameha. Catalogue XV.
<b><i>Gemmula monilifera</i></b>	<b>Pease, 1861</b>		
1961	Spec - BPBM-MO 220764		Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Kermia</i></b>			
<b><i>Kermia sp.</i></b>			
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Lora</i></b>			
<b><i>Lora sp. a-7</i></b>			
Unknown	Spec - BPBM-MO 61097		Catalogue V.
<b>Genus: <i>Philbertia</i></b>			
<b><i>Philbertia katharia</i></b>	<b>Dall</b>		
Unknown	Spec - BPBM-MO 65696		Catalogue V.
<b><i>Philbertia lutea</i></b>	<b>Pease</b>		
Unknown	Spec - BPBM-MO 65697		Catalogue V.
<b>Genus: <i>Turris</i></b>			
<b><i>Turris crispa intricata</i></b>			
1961	Spec - BPBM-MO 220826		Off Fort Kamehameha. Catalogue XV.
<b>Order: CEPHALASPIDEA</b>			
<b>Family: ACTEONIDAE</b>			
<b>Genus: <i>Pupa</i></b>			
<b><i>Pupa tessellata</i></b>			
1961	Spec - BPBM-MO 220460		Off Fort Kamehameha. Catalogue XV.
<b>Family: ATYIDAE</b>			
<b>Genus: <i>Haminea</i></b>			
<b><i>Haminoea galba</i></b>	<b>Pease, 1861</b>		
1936	Spec - BPBM-MO 13		Fossil near Yacht Club.
<b>Family: BULLIDAE</b>			
<b>Genus: <i>Bulla</i></b>			
<b><i>Bulla vernicosa</i></b>	<b>Gould, 1855</b>	<b>Hawaiian name(s): pupu waha loa.</b>	
1961	Spec - BPBM-MO 220487		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 220488		Off Fort Kamehameha. Catalogue XV.
1996	Legacy Project (Coles et al., 1997)		
<b>Family: HAMINOEIDAE</b>			
<b>Genus: <i>Atys</i></b>			
<b><i>Atys debilis</i></b>	<b>Pease, 1860</b>	<b>Indigenous.</b>	
2008	This Project		
<b><i>Atys kuhnsi</i></b>	<b>Pilsbry, 1917</b>		
1996	Legacy Project (Coles et al., 1997)		
<b><i>Atys kuhnsi?</i></b>	<b>Pilsbry, 1917</b>		
1961	Spec - BPBM-MO 220543		Off Fort Kamehameha. Catalogue XV.
<b><i>Atys semistriata</i></b>	<b>Pease, 1860</b>		
1921	Ref - Pilsbry, 1921		Recorded as <i>Atys semistriata fordinsulæ</i> .



## Legacy Project - Species Report (Cont.)

Family: HYDATINIDAE

Genus: *Hydatina*

*Hydatina amplustris*

(Linnaeus, 1758) Hawaiian name(s): pupu leholeho oni`oni`o; pupu lei

hala.

1961 Spec - BPBM-MO 220478

Off Fort Kamehameha. Catalogue XV.

Order: BASOMMATOPHORA

Family: ELLOBIIDAE

Genus: *Melampus*

*Melampus castaneus*

1923 Spec - BPBM-MO 1

Montfort Hawaiian name(s): `aoa.

Near Railroad Wharf.

Family: SIPHONARIIDAE

Genus: *Siphonaria*

*Siphonaria normalis*

name(s): `opihia awa;

Gould, 1846 Indigenous. Common name(s): False `opihia; Hawaiian

`opihia maikauli.

Unknown Spec - BPBM-MO 60569

Catalogue V.

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

1996 Legacy Project (Coles et al., 1997)

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

Genus: *Williamia*

*Williamia cf. radiata* sp.

(Pease, 1861)

1996 Legacy Project (Coles et al., 1997)

Order: SACOGLOSSA

Family: CALIPHYLLIDAE

Genus: *Cyerce*

*Cyerce elegans*

1996 Legacy Project (Coles et al., 1997)

Family: JULIIDAE

Genus: *Julia*

*Julia exquisita*

Gould, 1862

1973 Ref - Evans et al., 1974

Off Pearl Harbor.

Order: NOTASPIDEA

Family: UMBRACULIDAE

Genus: *Umbraclum*

*Umbraclum* sp.

1996 Legacy Project (Coles et al., 1997)

*Umbraclum sinicum*

(Gmelin, 1791)

1932 Spec - BPBM-MO 200038

Pearl Harbor channel. Catalogue XIV.

1932 Spec - BPBM-MO 200039

Fort Kamehameha, reef. Catalogue XIV.

Order: NUDIBRANCHIA

Unidentified Nudibranchia

1996 Legacy Project (Coles et al., 1997)

Family: DENDRODORIDIDAE

Genus: *Dendrodoris*

*Dendrodoris nigra*

(Stimpson, 1856)

1975 Ref - Grovhoug, 1976

## Legacy Project - Species Report (Cont.)

### Family: TETHYIDAE

#### Genus: *Tethya*

##### *Tethya* sp.

1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

##### *Tethya dipoderma*

Schmidt, 1870

1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

### Order: CRYPTOBRANCHIA

#### Family: DORIDIDAE

#### Genus: *Hypselodoris*

##### *Hypselodoris infucata*

(Ruppell & Leuckart, 1828) Indigenous. Common name(s): Painted

#### Nudibrach.

1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

### Family: HEXABRANCHIDAE

#### Genus: *Hexabranchnus*

##### *Hexabranchnus sanguineus*

(Ruppell & Leuckart, 1831)

1949 Spec - BPBM-MO 209630 Found at Pearl Harbor (#15). Catalogue XIV.  
1949 Spec - BPBM-MO 209631 (#16). Catalogue XIV.  
1949 Spec - BPBM-MO 209632 From open shore (#17). Catalogue XIV.  
1950 Spec - BPBM-MO 209633 (#18). Catalogue XIV.  
1950 Spec - BPBM-MO 209634 (#19). Catalogue XIV.  
1950 Spec - BPBM-MO 209636 Probably Pearl Harbor (#21). Catalogue XIV.

### Order: ARCHAEOPULMONATA

#### Family: MELAMPODIDAE

#### Genus: *Allochroa*

##### *Allochroa bronnii*

Unknown Spec - BPBM-MO 10998 Catalogue II.  
Unknown Spec - BPBM-MO 64832 Hoaiai. Catalogue V.

#### Genus: *Laemodonta*

##### *Laemodonta octanfracta*

Unknown Spec - BPBM-MO 64874 Hoaiai. Catalogue V.  
Unknown Spec - BPBM-MO 64875 Hoaiai. Catalogue V.  
1915 Spec - BPBM-MO 14 Ford Island.  
1915 Spec - BPBM-MO 16 Ford Island.  
1923 Spec - BPBM-MO 15 Under rocks near Railroad Wharf, opposite Ford Island.  
1923 Spec - BPBM-MO 17 Near Railroad Wharf, opposite Ford Island.  
1923 Spec - BPBM-MO 67478 Pearl City Peninsula. Catalogue V.  
1932 Spec - BPBM-MO 199237 Fort Kamehameha, shore at. Catalogue XIV.  
1932 Spec - BPBM-MO 199238 Peninsula; along shore at Cobb's place. Catalogue XIV.  
1932 Spec - BPBM-MO 199241 Pearl City Peninsula, near Railroad Wharf, along shore at  
Cobb's place.  
Catalogue XIV.  
1932 Spec - BPBM-MO 199242 Eastern side of Peninsula, Fish Pond wall. Catalogue XIV.

#### Genus: *Plectotrema*

##### *Plectotrema* sp.

1932 Spec - BPBM-MO 199243 Eastern side of Peninsula, Fish Pond wall. Catalogue XIV.

### Class: POLYPLACOPHORA

#### Order: ISCHNOCHITONIDA

#### Family: ISCHNOCHITONIDAE

#### Genus: *Ischnochiton*

##### *Ischnochiton petaloides*

Gould Hawaiian name(s): pupu mo`o.

Unknown Spec - BPBM-MO 64604 Ford Island. Catalogue V.  
1931 Spec - BPBM-MO 78  
1932 Spec - BPBM-MO 199796 Peninsula, Railroad Wharf. Catalogue XIV.

## Legacy Project - Species Report (Cont.)

### Family: MOPALIIDAE

#### Genus: *Plaxiphora*

#### *Plaxiphora kamehamehae*

1977 Spec - BPBM-MO 207066

#### Ferreira & Bertsch, 1979

Fort Kamehameha Beach. Catalogue XIV.

### Order: ACANTHOCHITONIDA

#### Family: ACANTHOCHITONIDAE

#### Genus: *Acanthochiton*

#### *Acanthochiton viridis*

Unknown Spec - BPBM-MO 64598

Unknown Spec - BPBM-MO 64600

Unknown Spec - BPBM-MO 64601

Unknown Spec - BPBM-MO 64783

#### Pease, 1872

Hawaiian name(s): kuakulu; kuapa`a; pe`elua; pupu pe`elua.

Ford Island. Catalogue V.

Ford Island. Catalogue V.

Ford Island. Catalogue V.

Ford Island. Catalogue V.

### Class: BIVALVIA

#### Unidentified Bivalvia

1996 Legacy Project (Coles et al., 1997)

### Family: EURYCYNIDAE

#### Unidentified Eurycynidae

1996 Legacy Project (Coles et al., 1997)

### Order: ARCOIDA

#### Family: ANOMIIDAE

#### Genus: *Anomia*

#### *Anomia nobilis*

Unknown Spec - BPBM-MO 60317

1912 Spec - BPBM-MO 68170

1915 Spec - BPBM-MO 20

1915 Ref - Bryan, 1915

1919 Spec - BPBM-MO 60319

1923 Spec - BPBM-MO 30

1923 Spec - BPBM-MO 67480

1932 Spec - BPBM-MO 200174

1932 Spec - BPBM-MO 200175

1932 Spec - BPBM-MO 201515

1935 Ref - Edmondson, 1944

1936 Ref - Edmondson & Ingram, 1939

1938 Ref - Dall et al., 1938

1938 Ref - Dall et al., 1938

1938 Ref - Dall et al., 1938

1947 Spec - BPBM-MO 46

1948 Spec - BPBM-MO 40

1948 Spec - BPBM-MO 48

1972 Ref - Long, 1974

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1978 Ref - Grovhoug, 1979

1985 Ref - Hurlbut, 1990

1986 Ref - Lenihan, 1990

1987 Ref - Brewer & Assoc., 1987

1996 Legacy Project (Coles et al., 1997)

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

#### Reeve, 1856

Introduced. Hawaiian name(s): pa; papaua.

Ford Island. Catalogue V.

(Pliocene). Catalogue V.

Map 35, I.2.

Drydock. Catalogue V.

At Railroad Wharf opposite Ford Island, Peninsula.

Railroad Wharf, Pearl City Peninsula. Catalogue V.

Pearl City Peninsula, end. Catalogue XIV.

Pearl Harbor Channel; Watertown. Catalogue XIV.

Pearl City Peninsula, Railroad Wharf. Catalogue XIV.

USNM 337554.

USNM 337552.

USNM 321285.

Bottom of barge in dry dock..

Motile dry dock in Dry Dock #2..

Bottom of steel barge..

## Legacy Project - Species Report (Cont.)

### Family: ARCIDAE

#### Genus: *Anadara*

##### *Anadara antiquata*

1923 Spec - BPBM-MO 21  
1938 Ref - Dall et al., 1938

(Linnaeus, 1758) Fossil.

Near Ford Island Wharf in short bluffs.  
Recorded as *Arca vetula*. USNM 36158.

#### Genus: *Arca*

##### *Arca* sp.

1973 Ref - Evans et al., 1974

Hawaiian name(s): kupukele.

##### *Arca* sp. a-3

Unknown Spec - BPBM-MO 60151

Catalogue V.

#### Genus: *Barbatia*

##### *Barbatia* sp.

1982 Spec - BPBM-MO 207410

Off Pearl Harbor. Catalogue XIV.

##### *Barbatia divaricata*

1959 Spec - BPBM-MO 218776

Sowerby, 1833

Off Fort Kamehameha. Catalogue XV.

##### *Barbatia foliata*

1938 Ref - Dall et al., 1938  
1950 Spec - BPBM-MO 250728

Forsskål, 1775 Fossil.

Recorded as *Barbatia hendersoni*. BPBM 351286.  
Ship bottom (with Mytilidae). Catalogue XVII.

##### *Barbatia nuttingi*

1973 Ref - Evans et al., 1974

(Dall, Bartsch & Rehder, 1938) Indigenous.

##### *Barbatia tenella*

1938 Ref - Dall et al., 1938

Reeve, 1844

Off Pearl Harbor. Recorded as *Calloarca hua*. USNM 427760.

#### Genus: *Bentharca*

##### *Bentharca asperula*

1959 Spec - BPBM-MO 221099

Dall, 1881

Off Pearl Harbor. Catalogue XV.

### Family: GLYCYMERIDIDAE

#### Genus: *Glycymeris*

##### *Glycymeris molokaia*

1961 Spec - BPBM-MO 218786

Dall, Bartsch & Rehder

Off Fort Kamehameha. Catalogue XV.

### Family: GRYPHAEIDAE

#### Genus: *Hyotissa*

##### *Hyotissa hyotis*

1950 Ref - Paulay, 1996  
1950 Ref - Paulay, 1996

Linnaeus, 1758 Introduced.

USNM 700474.  
USNM 699996.

#### Genus: *Parahyotissa*

##### *Parahyotissa numisma*

Unknown Spec - BPBM-MO 60242  
1902 Ref - Dall et al., 1938  
1932 Spec - BPBM-MO 200507  
1935 Ref - Ingram, 1937  
1973 Ref - Evans et al., 1974

(Lamarck, 1819) Indigenous.

Catalogue V.  
Recorded as *O. thaanami* Dall et al., 1938. USNM 335600.  
Fort Kamehameha, reef off. Catalogue XIV.  
Recorded as *O. thaanumi*.  
Recorded as *Ostrea hanleyana*.

### Family: ISOGNOMONIDAE

#### Genus: *Isognomon*

##### *Isognomon* sp.

1934 Spec - BPBM-MO 205583  
1973 Ref - Evans et al., 1974  
1979 Ref - AECOS, 1979  
1986 Ref - Lenihan, 1990  
2008 This Project

Indigenous.

Dredge. Catalogue XIV.  
Off Pearl Harbor.

##### *Isognomon* sp. m-2

Unknown Spec - BPBM-MO 60199

Catalogue V.

## Legacy Project - Species Report (Cont.)

<i>Isognomon anomioides</i>		<b>Reeve</b>	
1932	Spec - BPBM-MO 200513		Fort Kamehameha. Catalogue XIV.
<i>Isognomon californicum</i>		<b>(Conrad, 1837)</b>	<b>Indigenous.</b>
2008	This Project		
<i>Isognomon incisum</i>		<b>Conrad</b>	
Unknown	Spec - BPBM-MO 203996		Fort Kamehameha. Catalogue XIV.
Unknown	Spec - BPBM-MO 60162		Catalogue V.
1936	Spec - BPBM-MO 22		Reef at Fort Kamahameha.
1949	Spec - BPBM-MO 23		Reef at Fort Kamahameha.
<i>Isognomon legumen</i>		<b>(Gmelin, 1791)</b>	<b>Indigenous.</b>
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<i>Isognomon perna</i>		<b>(Linnaeus, 1767)</b>	<b>Indigenous. Hawaiian name(s): nahawele.</b>
Unknown	Spec - BPBM-MO 60176		Catalogue V.
1920	Ref - Dall et al., 1938		Recorded as <i>Isognomon costellatum</i> . USNM 337484.
1920	Ref - Dall et al., 1938		Recorded as <i>Isognomon costellatum</i> . USNM 428275.
1973	Ref - Evans et al., 1974		
2008	This Project		
<b>Family: LIMIDAE</b>			
<b>Genus: <i>Lima</i></b>			
<i>Lima aperta</i>		<b>Sowerby</b>	
1932	Spec - BPBM-MO 200194		Fort Kamehameha; along edge of channel. Catalogue XIV.
Questionable ID.			
<b>Family: MALLEIDAE</b>			
<b>Genus: <i>Malleus</i></b>			
<i>Malleus daemonicus?</i>		<b>Reeve, 1858</b>	
1950	Spec - BPBM-MO 250727		Ship bottom. Catalogue XVII.
<i>Malleus regula</i>		<b>(Forsskål, 1775)</b>	
1943	Ref - Hutchins, 1949		Recorded as <i>Malleus nuttalli</i> .
<b>Family: MYTILIDAE</b>			
<b>Unidentified Mytilidae</b>			
1950	Spec - BPBM-MO 250729		Ship bottom (with BPBM 250728). Catalogue XVII.
<b>Genus: <i>Brachidontes</i></b>			
<i>Brachidontes crebristriatus</i>		<b>(Conrad, 1837)</b>	<b>Indigenous. Hawaiian name(s): `owa`owaka;</b>
<b>nahawelepahikaua;</b>			
<b>nahawele li`ili`i; kio nahawele.</b>			
Unknown	Spec - BPBM-MO 60320		Catalogue V.
1902	Ref - Dall et al., 1938		USNM 335839.
1920	Ref - Dall et al., 1938		USNM 428391.
1920	Ref - Dall et al., 1938		Recorded as <i>Brachidontes crebristriatus maritimus</i> . USNM
428270.			
1921	Ref - Pilsbry, 1921		Recorded as <i>Mytilus crebristriatus</i> .
1923	Spec - BPBM-MO 196317		Peninsula; Railroad Wharf. Catalogue XIV.
1938	Ref - Dall et al., 1938		USNM 337445.
1938	Ref - Dall et al., 1938		BPBM 159.
1973	Ref - Evans et al., 1974		Recorded as <i>Hormomya crebristriatus</i> (Conrad).
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Lithophaga</i></b>			
<i>Lithophaga fasciola</i>		<b>Dall, Bartsch &amp; Rehder, 1938</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Musculus</i></b>			
<i>Musculus oahuensis</i>		<b>Dall, Bartsch &amp; Rehder, 1938</b>	
1920	Ref - Dall et al., 1938		USNM 484181.

## Legacy Project - Species Report (Cont.)

### Genus: *Septifer*

*Septifer bryanae* Pilsbry, 1921  
1972 Ref - Long, 1974 Off Pearl Harbor.

### Family: OSTREIDAE

#### Unidentified Ostreidae

1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

### Genus: *Crassostrea*

#### *Crassostrea* sp. Introduced.

1996 Legacy Project (Coles et al., 1997)  
2008 This Project

#### *Crassostrea gigas* (Thunberg, 1793) Introduced.

1938 Ref - Brock, 1960  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
2007 Ref - Brock, 2007

#### *Crassostrea retusa* Sowerby, 1871 Fossil.

1899 Spec - BPBM-MO 67990 1/4 mile E. of Waipio Station in Railway cut near Pearl Harbor  
30ft. above Tide..

1912 Spec - BPBM-MO 68168 Catalogue V.  
1923 Spec - BPBM-MO 67483 (Pliocene). Catalogue V.  
1932 Spec - BPBM-MO 200301 Shore. Eastside of Waipio Peninsula. Catalogue V.  
Waipio Peninsula. Catalogue XIV.

#### *Crassostrea virginica* (Gmelin, 1791) Introduced.

Unknown Spec - BPBM-MO 50  
1866 Ref - Kay, 1979  
1893 Ref - Kay, 1979  
1920 Ref - Edmondson & Wilson, 1940  
1962 Ref - Sparks, 1963  
1964 Ref - Sakuda, 1964  
1965 Ref - Rifkin & Cheng, 1968  
1972 Ref - Kawamoto & Sakuda, 1973  
1973 Ref - Evans et al., 1974  
1987 Ref - AECOS, 1987  
1987 Ref - Brewer & Assoc., 1987  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006  
2008 This Project

### Genus: *Dendostrea*

#### *Dendostrea sandvicensis* Sowerby, 1871 Indigenous. Common name(s): Noble Vermitid.

Unknown Spec - BPBM-MO 60225 Catalogue V.  
Unknown Spec - BPBM-MO 60226 Catalogue V.  
Unknown Spec - BPBM-MO 60228 Catalogue V.  
Unknown Spec - BPBM-MO 60231 Catalogue V.  
1902 Ref - Dall et al., 1938 Recorded as *Ostrea sandvichensis*. USNM 335584.  
1902 Ref - Dall et al., 1938 Recorded as *O. kupua* Dall et al., 1938. USNM 335586.  
1912 Spec - BPBM-MO 68169 (Pliocene). Catalogue V.  
1915 Spec - BPBM-MO 31 Ford Island.  
1915 Ref - Bryan, 1915 Recorded as *O. rosacea*.  
1920 Ref - Dall et al., 1938 Recorded as *O. kupua* Dall et al., 1938. USNM 321289.  
1920 Ref - Dall et al., 1938 Recorded as *O. kupua* Dall et al., 1938. USNM 484156.  
1920 Ref - Dall et al., 1938 Recorded as *O. kupua* Dall et al., 1938. USNM 321284.  
1921 Ref - Pilsbry, 1921 Recorded as *Ostrea sandvichensis*.  
1921 Ref - Pilsbry, 1921 Recorded as *Ostrea sandvichensis*. MCZ 31714.  
1923 Spec - BPBM-MO 32 At Railroad Wharf opposite Ford Island, Peninsula.

## Legacy Project - Species Report (Cont.)

1932	Spec - BPBM-MO 200209	Pearl City Peninsula, East side. Catalogue XIV.
1932	Spec - BPBM-MO 200508	Peninsula, Railroad Wharf. Catalogue XIV.
1935	Ref - Edmondson, 1944	Recorded as <i>Ostrea sandvichensis</i> .
1936	Ref - Edmondson & Ingram, 1939	Recorded as <i>Ostrea sandvichensis</i> .
1938	Ref - Dall et al., 1938	Recorded as <i>Ostrea sandvichensis</i> . USNM 337472.
1938	Ref - Dall et al., 1938	Recorded as <i>O. kupua</i> Dall et al., 1938. BPBM 60225.
1972	Ref - Long, 1974	Recorded as <i>O. sandvichensis</i> var. <i>thaanumi</i> .
1973	Ref - Evans et al., 1974	Recorded as <i>Ostrea sandvichensis</i> .
1987	Ref - Brewer & Assoc., 1987	Recorded as <i>Ostrea sandvichensis</i> .
1993	Ref - Brock, 1994	Recorded as <i>Ostrea sandvichensis</i> .
1994	Ref - Brock, 1995	Recorded as <i>Ostrea sandvichensis</i> .
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as <i>Ostrea sandvichensis</i> .
2008	This Project	
<b>Genus: <i>Lopha</i></b>		
<b><i>Lopha cristigalli</i> (Linnaeus, 1758) Introduced.</b>		
1951	Ref - Paulay, 1996	USNM 699998.
<b>Genus: <i>Nanostrea</i></b>		
<b><i>Nanostrea exigua</i> Harry, 1985</b>		
1985	Ref - Harry, 1985	
1996	Ref - Paulay, 1996	USNM 337556.
<b>Genus: <i>Ostrea</i></b>		
<b><i>Ostrea</i> sp.</b>		
1923	Spec - BPBM-MO 241135	Pearl City Peninsula, Railroad Wharf. Catalogue XVII.
1932	Spec - BPBM-MO 198727	Naval Station, Hospital Point. Catalogue XIV.
1932	Spec - BPBM-MO 200186	Peninsula; Railroad Wharf. Catalogue XIV.
1932	Spec - BPBM-MO 201517	Pearl City Peninsula, Railroad Wharf. Catalogue XIV.
1950	Spec - BPBM-MO 57	Pahu, Ship bottom..
1950	Spec - BPBM-MO 58	
1972	Ref - Long, 1974	Recorded as <i>Ostrea frons</i> .
1973	Ref - Evans et al., 1974	
1986	Ref - Lenihan, 1990	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Ostrea cf. hanleyana</i> Sowerby, 1871 Indigenous.</b>		
2008	This Project	
<b><i>Ostrea lima</i> Sowerby, 1871 Indigenous.</b>		
1972	Ref - Long, 1974	Recorded as <i>O. kavaia</i> Dall et al., 1938.
<b><i>Ostrea margaritae</i> Pisbry, 1918</b>		
Unknown	Spec - BPBM-MO 65691	Catalogue V.
<b>Genus: <i>Saccostrea</i></b>		
<b><i>Saccostrea cucullata</i> (Born, 1778)</b>		
1996	Legacy Project (Coles et al., 1997)	
<b>Family: PECTINIDAE</b>		
<b>Genus: <i>Anguipecten</i></b>		
<b><i>Anguipecten lamberti</i> Sowerby, 1874</b>		
1961	Spec - BPBM-MO 218856	Off Fort Kamehameha. Catalogue XV. Questionable ID.
<b>Genus: <i>Chlamys</i></b>		
<b><i>Chlamys</i> sp.</b>		
1934	Spec - BPBM-MO 205571	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205572	Dredge. Catalogue XIV.
<b><i>Chlamys irregularis</i> (Sowerby, 1842) Indigenous.</b>		
Unknown	Spec - BPBM-MO 60247	Catalogue V.
1923	Spec - BPBM-MO 39	Ford Island Wharf on Penisula.

## Legacy Project - Species Report (Cont.)

1927	Spec - BPBM-MO 196278	Pearl Harbor channel, at Watertown. Catalogue XIV.
1961	Spec - BPBM-MO 218823	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 218824	Off Fort Kamehameha. Catalogue XV.
<b>Genus: <i>Pecten</i></b>		
<b><i>Pecten n. sp. p-4</i></b>		
Unknown	Spec - BPBM-MO 60291	Ford Island. Catalogue V. Questionable ID.
<b><i>Pecten n. sp. p-5</i></b>		
Unknown	Spec - BPBM-MO 60292	Catalogue V. Questionable ID.
<b>Family: PINNIDAE</b>		
<b>Genus: <i>Pinna</i></b>		
<b><i>Pinna sp.</i></b>		
1973	Ref - Evans et al., 1974	
<b><i>Pinna muricata</i></b>		
1972	Ref - Long, 1974	Linnaeus, 1758 Off Pearl Harbor.
<b>Family: PTERIIDAE</b>		
<b>Genus: <i>Pinctada</i></b>		
<b><i>Pinctada sp.</i></b>		
Unknown	Spec - BPBM-MO 45	Indigenous.
2007	This Project	
<b><i>Pinctada cumingi</i></b>		
1923	Spec - BPBM-MO 196332	Reeve End of Wipio Peninsula. Catalogue XIV. Questionable ID.
1927	Spec - BPBM-MO 196322	Reef off Fort Kamehameha, shallow water, in hole in reef. Questionable ID.
Catalogue XIV.		
<b><i>Pinctada margaritifera</i></b>		
<b>(Linnaeus, 1758) Indigenous. Common name(s): mother-of-pearl shell;</b>		
<b>Hawaiian name(s): pa; pa hau.</b>		
1915	Ref - Bryan, 1915	Recorded as <i>Avicula margaritifera</i> .
1926	Spec - BPBM-MO 208454	Shore, rocks east of Mokapu. Catalogue XIV.
1936	Spec - BPBM-MO 24	Reef at Fort Kamahameha.
1972	Ref - Long, 1974	Off Pearl Harbor.
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	
<b><i>Pinctada radiata</i></b>		
<b>(Leach, 1814) Indigenous. Hawaiian name(s): unahi pipi; pipi.</b>		
Unknown	Spec - BPBM-MO 203988	Catalogue XIV.
Unknown	Spec - BPBM-MO 203989	Catalogue XIV.
Unknown	Spec - BPBM-MO 60216	Catalogue V.
Unknown	Spec - BPBM-MO 67565	Catalogue V.
1915	Spec - BPBM-MO 25	
1915	Ref - Bryan, 1915	Recorded as <i>Margaritifera fimbriata</i> .
1917	Spec - BPBM-MO 60222	Catalogue V.
1923	Spec - BPBM-MO 196320	Waipio Peninsula, extreme seaward end. Catalogue XIV.
1923	Spec - BPBM-MO 26	At Railroad Wharf, Ford Island, Peninsula..
1924	Spec - BPBM-MO 67482	Railroad Wharf, Pearl City Peninsula. Catalogue V.
1936	Ref - Edmondson & Ingram, 1939	Recorded as <i>P. nebulosa</i> .
1938	Ref - Dall et al., 1938	Recorded as <i>P. nebulosa</i> (Conrad, 1837). BPBM 9.
1938	Ref - Dall et al., 1938	Recorded as <i>P. nebulosa</i> (Conrad, 1837). USNM 337475.
1939	Ref - Dall et al., 1938	Recorded as <i>P. nebulosa</i> (Conrad, 1837). USNM 382878.
1996	Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Pteria</i></b>		
<b><i>Pteria loveni</i></b>		
1972	Ref - Long, 1974	(Dunker, 1872) Off Pearl Harbor. Questionable ID.



## Legacy Project - Species Report (Cont.)

### Family: SPONDYLIDAE

#### Genus: *Spondylus*

##### *Spondylus sp.*

1950 Spec - BPBM-MO 250726  
 1950 Spec - BPBM-MO 53  
 1973 Ref - Evans et al., 1974

Ship bottom. Catalogue XVII.  
 Bottom of YOC-41 in Dry Dock #2..

##### *Spondylus sp.?*

1950 Spec - BPBM-MO 49

##### *Spondylus linguaefelis*

1972 Ref - Long, 1974

**Sowerby, 1847**

Off Pearl Harbor. Recorded as *Spondylus gloriosus*.

##### *Spondylus linguaefelis?*

1961 Spec - BPBM-MO 221073

**Sowerby, 1847**

Off Fort Kamehameha. Catalogue XV.

##### *Spondylus sparsispinosus*

1918 Spec - BPBM-MO 28

##### *Spondylus tenebrosus*

2007 Ref - Brock, 2007

**Reeve, 1856**

##### *Spondylus violacescens*

Unknown Spec - BPBM-MO 60310  
 1932 Spec - BPBM-MO 200223  
 1973 Ref - Evans et al., 1974  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995

**Reeve, 1856**

**Hawaiian name(s): `okupe; pupu momi.**

Catalogue V.  
 Fort Kamehameha; along edge of channel. Catalogue XIV.  
 Recorded as *Spondylus hawaiiensis* Dall et al., 1938.  
 Recorded as *Spondylus tenebrosus*.  
 Recorded as *Spondylus tenebrosus*.

### Order: VENEROIDA

#### Family: CARDIIDAE

##### Genus: *Trachycardium*

##### *Trachycardium orbita*

1920 Ref - Dall et al., 1938  
 1932 Spec - BPBM-MO 200248

**Sowerby, 1833**

**Hawaiian name(s): `olepe kupa; pupu kupa.**

Recorded as *T. hawaiiensis*. USNM 346229.  
 Pearl Harbor Channel; Watertown. Catalogue XIV.

#### Family: CHAMIDAE

##### Genus: *Chama*

##### *Chama sp.*

1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project

**Indigenous.**

##### *Chama brassica*

1951 Ref - Paulay, 1996

**Reeve, 1847**

**Introduced.**

USNM 700006.

##### *Chama cf. fibula*

2008 This Project

**Reeve, 1846**

**Cryptogenic.**

##### *Chama elatensis*

1996 Legacy Project (Coles et al., 1997)

**Delsaerd, 1986**

**Introduced.**

##### *Chama fibula*

1920 Ref - Dall et al., 1938  
 1920 Ref - Dall et al., 1938  
 1935 Spec - BPBM-MO 35  
 1979 Ref - Kay, 1979  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project

**Reeve, 1846**

**Cryptogenic.**

Recorded as *C. hendersoni*. USNM 341296.  
 Recorded as *C. hendersoni*. USNM 484174.  
 Near Yacht Club.

##### *Chama iostoma*

Unknown Spec - BPBM-MO 60395  
 1920 Ref - Dall et al., 1938  
 1923 Spec - BPBM-MO 36  
 2007 This Project

**Conrad, 1837**

**Indigenous.**

Catalogue V.  
 USNM 484173.  
 Near entrance.

## Legacy Project - Species Report (Cont.)

2008 This Project

**Chama lazarus** Linnaeus, 1758 Introduced.  
 1950 Ref - Paulay, 1996 USNM 699558.  
 1996 Legacy Project (Coles et al., 1997)

**Chama macerophylla** Gmelin, 1791  
 2006 Ref - Smith et al., 2006 Recorded as Chama elatensis.

**Chama pacifica** Brodrip, 1835 Introduced.  
 1950 Ref - Paulay, 1996 USNM 699558.  
 1950 Ref - Paulay, 1996 USNM 699565.  
 1950 Ref - Paulay, 1996 USNM 699561.  
 1951 Ref - Paulay, 1996 USNM 699563.  
 1996 Legacy Project (Coles et al., 1997)

### Family: GLOSSIDAE

#### Genus: *Meiocardia*

**Meiocardia hawaiiiana** Dall, Bartsch & Rehder  
 1961 Spec - BPBM-MO 218932 Off Fort Kamehameha. Catalogue XV.

### Family: KELLIIDAE

#### Genus: *Lasaea*

**Lasaea hawaiiensis** Dall, Bartsch & Rehder, 1938  
 1923 Spec - BPBM-MO 240097 Crevices in shore rocks, Peninsula. Catalogue XVI.  
 1923 Ref - Dall et al., 1938 Recorded as Lasaea hawaiiensis. BPBM 3.

### Family: LUCINIDAE

#### Genus: *Ctena*

Hawaiian name(s): `olepe kupe.

**Ctena sp.**  
 1934 Spec - BPBM-MO 205589 Dredge. Catalogue XIV.

**Ctena bella** (Conrad, 1837) Indigenous. Hawaiian name(s): `olepe kupe `opiopio.  
 1920 Ref - Dall et al., 1938 USNM 341291.  
 1920 Ref - Dall et al., 1938 USNM 428228.  
 1920 Ref - Dall et al., 1938 USNM 428390.  
 1923 Spec - BPBM-MO 196300 Peninsula; Railroad Wharf. Catalogue XIV.  
 1923 Spec - BPBM-MO 33 At Railroad Wharf opposite Ford Island, Peninsula.  
 1938 Spec - BPBM-MO 34 Near Yacht Club.  
 1961 Spec - BPBM-MO 218950 Off Fort Kamehameha. Catalogue XV.  
 1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project

#### Genus: *Lucina*

**Lucina edentula** (Linnaeus, 1758)  
 1961 Spec - BPBM-MO 218798 Off Fort Kamehameha. Catalogue XV.

#### Genus: *Pillucina*

**Pillucina spaldingi** (Pilsbry, 1921)  
 1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)

### Family: MACTRIDAE

#### Genus: *Maetra*

**Maetra thaanumi** Dall, Bartsch & Rehder  
 1963 Spec - BPBM-MO 221087 Off Pearl Harbor. Catalogue XV.

### Family: SEMELIDAE

#### Genus: *Abra*

**Abra sp. A sp.** Introduced.  
 1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

### Genus: *Semele*

#### *Semele australis*

Sowerby, 1832

Unknown Spec - BPBM-MO 209617

Catalogue XIV.

### Family: TELLINIDAE

#### Unidentified Tellinidae

1996 Legacy Project (Coles et al., 1997)

### Genus: *Macoma*

#### *Macoma dispar*

(Conrad, 1837)

Unknown Spec - BPBM-MO 60512

Ford Island. Catalogue V.

1915 Spec - BPBM-MO 27

Ford Island.

1920 Ref - Dall et al., 1938

Recorded as *Scissulina dispar*. USNM 341298.

1935 Spec - BPBM-MO 3

In a road cut near Yacht Club.

1938 Ref - Dall et al., 1938

Recorded as *Scissulina dispar*. USNM 337353.

1938 Ref - Dall et al., 1938

Recorded as *Scissulina dispar*. USNM 33754.

#### *Macoma obliquilineata*

(Conrad, 1837)

1920 Ref - Dall et al., 1938

Recorded as *Jactellina obliquilineata*. USNM 331294.

### Genus: *Pharoanella*

#### *Pharoanella variabilis*

Unknown Spec - BPBM-MO 64344

Catalogue V. Questionable ID.

### Genus: *Tellina*

#### *Tellina sp.*

1934 Spec - BPBM-MO 205593

Dredge. Catalogue XIV.

1961 Spec - BPBM-MO 219133

Off Fort Kamehameha. Catalogue XV.

1996 Legacy Project (Coles et al., 1997)

#### *Tellina sp. A*

1996 Legacy Project (Coles et al., 1997)

#### *Tellina sp.?*

1934 Spec - BPBM-MO 205579

Dredge. Catalogue XIV.

#### *Tellina (Arcopagia) robusta*

(Hanley, 1844)

1920 Ref - Dall et al., 1938

Recorded as *Pinquitellina robusta*. USNM 341229.

1938 Ref - Dall et al., 1938

Recorded as *Pinquitellina robusta*. USNM 337359.

1973 Ref - Evans et al., 1974

Recorded as *Angulus nucella* Dall et al., 1938.

#### *Tellina palatam*

Iredale, 1929

Unknown Spec - BPBM-MO 209618

Catalogue XIV.

Unknown Spec - BPBM-MO 60526

Ford Island. Catalogue V.

Unknown Spec - BPBM-MO 60527

Catalogue V.

1902 Ref - Dall et al., 1938

Recorded as *Quidnipagus palatum*. USNM 335579.

1915 Spec - BPBM-MO 60524

Catalogue V.

1920 Ref - Dall et al., 1938

Recorded as *Quidnipagus palatum*. USNM 341287.

1924 Spec - BPBM-MO 8

1927 Spec - BPBM-MO 196248

E. side Pearl City Peninsula. Catalogue XIV.

1930 Spec - BPBM-MO 196571

Pearl Lochs. Catalogue XIV.

1938 Ref - Dall et al., 1938

Recorded as *Quidnipagus palatum*. BPBM.

### Family: TRAPEZIIDAE

#### Genus: *Trapezium*

#### *Trapezium sp.*

1934 Spec - BPBM-MO 205590

Dredge. Catalogue XIV.

### Family: VENERIDAE

#### Genus: *Lioconcha*

#### *Lioconcha fasigata*

Sowerby, 1851 New record for Hawaii. Cryptogenic. Common name(s):

Hawaiian Oyster.

2008 This Project

## Legacy Project - Species Report (Cont.)

### *Lioconcha hieroglyphica* (Conrad, 1837)

Unknown	Spec - BPBM-MO 196259	E. side Pearl City Peninsula. Catalogue XIV.
Unknown	Spec - BPBM-MO 204102	Catalogue XIV.
Unknown	Spec - BPBM-MO 209620	Catalogue XIV.
1920	Ref - Dall et al., 1938	USNM 42195.
1927	Spec - BPBM-MO 196258	E. side Pearl City Peninsula. Catalogue XIV.
1930	Spec - BPBM-MO 196449	Pearl Lochs. Catalogue XIV.
1938	Ref - Dall et al., 1938	BPBM 165.
1961	Spec - BPBM-MO 218979	Off Fort Kamehameha. Catalogue XV.
1996	Legacy Project (Coles et al., 1997)	

### Genus: *Periglypta*

#### *Periglypta* sp.

1934	Spec - BPBM-MO 205573	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205574	Dredge. Catalogue XIV.

### *Periglypta reticulata* (Linnaeus, 1758)

Unknown	Spec - BPBM-MO 196218	Fort Kamehameha, 100 ft. inland from outer edge of reef. Catalogue XIV.
Unknown	Spec - BPBM-MO 209622	Catalogue XIV.
1916	Spec - BPBM-MO 38	Reef Waikiki of Pearl Harbor channel entrance.
1920	Ref - Dall et al., 1938	Recorded as <i>P. edmonsoni</i> . USNM 428286.
1938	Ref - Dall et al., 1938	Recorded as <i>P. edmonsoni</i> . BPBM 2016c.

### Genus: *Venerupis*

#### *Venerupis (Ruditapes) philippinarum* (A. Adams & Reeve) Introduced.

Unknown	Spec - BPBM-MO 209621	Catalogue XIV.
1918	Ref - Dall et al., 1938	Recorded as <i>Venerupis philippinarum</i> . USNM 337389.
1919	Ref - Bryan, 1919	Recorded as <i>Tapes philippinarum</i> okupi.
1920	Ref - Edmondson & Wilson, 1940	Recorded as <i>Tapes philippinarum</i> .
1920	Ref - Thanaum, 1921	Recorded as <i>Tapes philippinarum</i> .
1924	Spec - BPBM-MO 10	Bought in fish market in Honolulu.
1924	Spec - BPBM-MO 67484	Catalogue V.
1937	Ref - Edmondson & Wilson, 1940	Recorded as <i>Tapes philippinarum</i> .
1996	Legacy Project (Coles et al., 1997)	

### Genus: *Venus*

#### *Venus* sp.

1934	Spec - BPBM-MO 205578	Dredge. Catalogue XIV.
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## Order: MYOIDA

### Family: GASTROCHAENIDAE

#### Genus: *Gastrochaena*

##### *Gastrochaena gigantea*

Spengler, 1783 Hawaiian name(s): `olepe waha nui;.

Unknown	Spec - BPBM-MO 204046	Ford Island. Catalogue XIV.
Unknown	Spec - BPBM-MO 60547	Catalogue V.
Unknown	Spec - BPBM-MO 60548	Ford Island. Catalogue V.
Unknown	Spec - BPBM-MO 60549	Ford Island. Catalogue V.
Unknown	Spec - BPBM-MO 60550	Ford Island. Catalogue V.
1915	Spec - BPBM-MO 4	Ford Island.
1920	Ref - Dall et al., 1938	Recorded as <i>Rocellaria hawaiiensis</i> . USNM 341293.
1938	Ref - Dall et al., 1938	Recorded as <i>Rocellaria hawaiiensis</i> . BPBM 60549.
1938	Ref - Dall et al., 1938	Recorded as <i>Rocellaria hawaiiensis</i> . BPBM 94.
1938	Ref - Dall et al., 1938	Recorded as <i>Rocellaria hawaiiensis</i> . USNM 337310.
1938	Ref - Dall et al., 1938	Recorded as <i>Rocellaria hawaiiensis</i> . USNM 361952.

### Genus: *Rocellaria*

#### *Rocellaria* sp.

1973	Ref - Evans et al., 1974	
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#### *Rocellaria gigantea*

Deshayes Hawaiian name(s): `olepe waha nui; pupu olepe waha nui.

1923	Spec - BPBM-MO 196238	End of Waipio Peninsula. Catalogue XIV.
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## Legacy Project - Species Report (Cont.)

1925 Spec - BPBM-MO 196241 Peninsula; Railroad Wharf. Catalogue XIV.  
 1927 Spec - BPBM-MO 196237 Pearl Harbor channel, off Fort Kamehameha. Catalogue XIV.

### Family: HIATELLIDAE

#### Genus: *Hiatella*

##### *Hiatella arctica*

(Linnaeus, 1767) Introduced.

1973 Ref - Evans et al., 1974 Recorded as *Hiatella hawaiiensis* Dall et al., 1938.  
 1973 Ref - McCain, 1974  
 1973 Ref - McCain, 1975  
 1975 Ref - Grovhoug, 1976 Recorded as *Hiatella hawaiiensis* Dall et al., 1938.  
 1978 Ref - Grovhoug, 1979 *Hiatella hawaiiensis* Dall, Bartsch & Rehder, 1938.  
 1987 Ref - Brewer & Assoc., 1987 Recorded as *Hiatella hawaiiensis* Dall et al., 1938.  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project

##### *Sphenia lenticola*

(H. & A. Adams, 1854) Introduced.

1972 Ref - Long, 1974 Recorded as *S. cf. fragilis* (H. & A. Adams, 1846).

### Family: MYIDAE

#### Genus: *Sphenia*

##### *Sphenia sp. A sp.*

Introduced.

1996 Legacy Project (Coles et al., 1997)

### Family: PHOLADIDAE

#### Genus: *Martesia*

##### *Martesia sp.*

1939 Spec - BPBM-MO 205356 Catalogue XIV.

##### *Martesia striata*

(Linnaeus, 1758) Introduced. Hawaiian name(s): `olepe makalao.

Unknown Spec - BPBM-MO 60554 Catalogue V.  
 1920 Ref - Dall et al., 1938 Recorded as *M. hawaiiensis*. USNM 484213.  
 1920 Ref - Dall et al., 1938 Recorded as *M. hawaiiensis*. USNM 218042.  
 1920 Ref - Dall et al., 1938 Recorded as *M. hawaiiensis*. BPBM 30.  
 1920 Ref - Dall et al., 1938 Recorded as *M. hawaiiensis*. USNM 484214.  
 1973 Ref - McCain, 1974  
 1973 Ref - McCain, 1975  
 1986 Ref - Lenihan, 1990  
 1996 Legacy Project (Coles et al., 1997)

#### Genus: *Pholas*

##### *Pholas sp.*

Unknown Spec - BPBM-MO 67987 Said by Dr. C.M. Cooke to have come from Pearl Harbor.  
 Catalogue V. Questionable ID.

### Family: TEREDINIDAE

#### Unidentified Teredinidae

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Bankia*

##### *Bankia bipalmulata*

(Lamarck, 1801) Introduced.

1936 Ref - Edmondson, 1942 Recorded as *Bankia hawaiiensis*.  
 1976 Ref - Cooke et al., 1980

#### Genus: *Lyrodus*

##### *Lyrodus affinis*

Deschayes, 1863 Introduced.

1973 Ref - McCain, 1974 Recorded as *Teredo ?milleri*.  
 1973 Ref - McCain, 1975 Recorded as *Teredo ?milleri*.  
 1976 Ref - Cooke et al., 1980

##### *Lyrodus pedicillatus*

(Quatrefages, 1849) Introduced.

1935 Ref - Edmondson, 1940 Recorded as *Bankia hawaiiensis*.  
 1938 Ref - Dall et al., 1938 Recorded as *Teredo kauaiensis*.  
 1976 Ref - Cooke et al., 1980

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Teredo</i></b>		<b>Hawaiian name(s): wawahi wa`a.</b>
<b><i>Teredo</i> sp.</b>		<b>Indigenous.</b>
Catalogue V.	Unknown Spec - BPBM-MO 67988	Said by Dr. C.M. Cooke to have come from Pearl Harbor.
	1973 Ref - Evans et al., 1974	
	1986 Ref - Lenihan, 1990	
	2008 This Project	
<b><i>Teredo bartschi</i></b>		<b>Clapp, 1923 Introduced.</b>
	1935 Ref - Edmondson, 1940	
	1935 Ref - Edmondson, 1942	
	1976 Ref - Cooke et al., 1980	
	1996 Legacy Project (Coles et al., 1997)	
<b><i>Teredo clappi</i></b>		<b>Bartsch, 1923 Introduced.</b>
	1923 Ref - Dall et al., 1938	Recorded as <i>T. trulliformis</i> Miller, 1924. USNM 361888.
	1924 Ref - Miller, 1924	Recorded as <i>T. trulliformis</i> Miller, 1924.
	1976 Ref - Cooke et al., 1980	
<b><i>Teredo diegensis</i></b>		<b>Bartsch, 1916</b>
	1924 Ref - Edmondson, 1940	
	1924 Ref - Edmondson, 1942	
	1973 Ref - McCain, 1974	
	1973 Ref - McCain, 1975	
<b><i>Teredo furcifera</i></b>		<b>van Martens, 1894 Introduced.</b>
	1921 Ref - Bartsch, 1921	Recorded as <i>T. parksii</i> Bartsch, 1921.
	1921 Ref - Dall et al., 1938	Recorded as <i>T. parksii</i> Bartsch, 1921. USNM 345311.
	1921 Ref - Dall et al., 1938	Recorded as <i>T. parksii</i> Bartsch, 1921. USNM 489211.
	1921 Ref - Dall et al., 1938	Recorded as <i>T. parksii</i> Bartsch, 1921. USNM 341132.
	1935 Ref - Edmondson, 1942	Recorded as <i>T. parksii</i> Bartsch, 1921.
	1976 Ref - Cooke et al., 1980	
<b><i>Teredo oahuensis</i></b>		<b>Edmondson, 1942</b>
	1973 Ref - McCain, 1974	
	1973 Ref - McCain, 1975	
<b>Class: SCAPHOPODA</b>		
<b>Order: DENTALIDA</b>		
<b>Family: DENTALIIDAE</b>		
<b>Genus: <i>Dentalium</i></b>		
<b><i>Dentalium</i> sp.</b>		
	1961 Spec - BPBM-MO 220733	Off Fort Kamehameha. Catalogue XV.
<b>Class: CEPHALOPODA</b>		
<b>Order: OCTOPODA</b>		
<b>Family: OCTOPODIDAE</b>		
<b>Genus: <i>Polypus</i></b>		
<b><i>Polypus</i> sp.</b>		
	1973 Ref - Evans et al., 1974	Off Pearl Harbor.
<b>Phylum: ARTHROPODA</b>		
<b>Unidentified Arthropoda</b>		
	Unknown Spec - BPBM-S 5962	Identified by J.L. Barnard.
	Unknown Spec - BPBM-S 5963	Identified by J.L. Barnard.
	1948 Spec - BPBM-S 5323	
	1950 Spec - BPBM-S 5628	
<b>Class: PYCNOGONIDA</b>		
<b>Unidentified Pycnogonida</b>		
	1973 Ref - McCain, 1974	
	1973 Ref - McCain, 1975	
	1996 Legacy Project (Coles et al., 1997)	

## Legacy Project - Species Report (Cont.)

2008 This Project

### Order: PANTOPODA

#### Family: AMMOTHEIDAE

##### Genus: *Achelia*

##### *Achelia plicata*

1973 Ref - Evans et al., 1974

Dillwyn

Off Pearl Harbor.

#### Family: ENDEIDAE

##### Genus: *Endeis*

##### *Endeis nodosa*

1973 Ref - Evans et al., 1974

Hilton, 1942

##### *Endeis procera*

1996 Legacy Project (Coles et al., 1997)

(Loman)

#### Family: PYCNOGONIDAE

##### Genus: *Anoplodactylus*

##### *Anoplodactylus sp.*

1948 Spec - BPBM-S 8605

Identified by C.A. Child, 1969.

##### *Anoplodactylus californicus*

1996 Legacy Project (Coles et al., 1997)

Hall

##### *Anoplodactylus portus*

1937 Spec - BPBM-S 4963

1945 Spec - BPBM-S 7219

1947 Spec - BPBM-S 7227

1948 Spec - BPBM-S 7243

1948 Spec - BPBM-S 8786

1973 Ref - Evans et al., 1974

Calman

Identified by J.H. Stock, 1967 (Loan #1616).

Drydock.

##### *Anoplodactylus projectus*

1938 Spec - BPBM-S 4702

Hilton

Identified by Dr. Hilton.

##### *Anoplodactylus pyncnosoma*

1996 Legacy Project (Coles et al., 1997)

(Helfer)

##### Genus: *Pigrogromitus*

##### *Pigrogromitus robustus*

1948 Spec - BPBM-S 8606

Calman

Identified by C.A. Child, 1969.

##### *Pigrogromitus timsanus*

1996 Legacy Project (Coles et al., 1997)

Calman

Introduced.

### Class: CRUSTACEA

#### Unidentified Cirripedia

1931 Spec - BPBM-B 277

1976 Spec - BPBM-B 587

1982 Spec - BPBM-B 499

1982 Spec - BPBM-B 513

Merry Point.

Off Pearl Harbor; from dredge spoil dumping site.

Off Pearl Harbor; from dredge spoil dumping site.

#### Unidentified Copepoda

1996 Legacy Project (Coles et al., 1997)

#### Unidentified Ostracoda

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

#### Family: CYLINDROLEBERIDIDAE

##### Genus: *Parasterope*

##### *Parasterope sp.*

2008 This Project

Indigenous.

## Legacy Project - Species Report (Cont.)

### Family: CYPRIDIDAE

#### Genus: *Paravargula*

##### *Paravargula* sp.

2007 This Project  
2008 This Project

Indigenous.

### Order: CYCLOPOIDA

#### Family: SAPPHIRINIDAE

#### Genus: *Copilia*

##### *Copilia* sp.

1973 Ref - Evans et al., 1974

### Order: THORACICA

#### Family: BALANIDAE

##### Unidentified Balanidae

1934 Spec - BPBM-MO 205563 Dredge. Catalogue XIV.  
1934 Spec - BPBM-MO 205564 Dredge. Catalogue XIV.

#### Genus: *Balanus*

##### *Balanus* sp.

1973 Ref - Evans et al., 1974  
1975 Spec - BPBM-B 565  
1976 Ref - Cooke et al., 1980  
1986 Ref - Lenihan, 1990  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project

Introduced. Common name(s): Acorn Barnacle.

##### *Balanus amphitrite*

2008 This Project

Darwin Introduced. Common name(s): Acorn Barnacle.

##### *Balanus amphitrite amphitrite*

Unknown Spec - BPBM-B 332  
1913 Ref - Pilsbry, 1928  
1915 Spec - BPBM-B 233  
1929 Spec - BPBM-B 270  
1929 Spec - BPBM-B 272  
1931 Spec - BPBM-B 276  
1933 Ref - Edmondson, 1933  
1935 Ref - Edmondson & Ingram, 1939  
1935 Ref - Edmondson, 1944  
1935 Ref - Ingram, 1937  
1943 Ref - Hutchins, 1949  
1944 Spec - BPBM-B 312  
1944 Spec - BPBM-B 313  
1944 Spec - BPBM-B 314  
1944 Spec - BPBM-B 315  
1944 Spec - BPBM-B 316  
1944 Spec - BPBM-B 331  
1946 Ref - Edmondson, 1946  
1948 Ref - Henry & Mclaughlin, 1975:33  
1972 Ref - Long, 1974  
1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1975 Ref - Grovhoug, 1976  
1987 Ref - Brewer & Assoc., 1987  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
1996 Legacy Project (Coles et al., 1997)

Darwin, 1854 Introduced.

Identified by Pilsbry.  
Weinrich's place.  
Middle Loch.

Recorded as *Balanus amphitrite*.  
Recorded as *Balanus amphitrite*.  
Recorded as *B. amphitrite hawaiiensis* Broch.  
Recorded as *Balanus amphitrite*.  
Recorded as *Balanus amphitrite*.  
Off Pearl Harbor.  
Off Pearl Harbor.  
Off Pearl Harbor.  
Off Pearl Harbor.  
Off Pearl Harbor.  
Off Pearl Harbor.  
Recorded as *B. amphitrite hawaiiensis*.

Recorded as *B. amphitrite hawaiiensis* Broch.

Recorded as *B. amphitrite hawaiiensis* Broch.  
Recorded as *B. amphitrite hawaiiensis* Broch.



## Legacy Project - Species Report (Cont.)

	<b><i>Balanus amphitrite?</i></b>	<b>Darwin</b>	<b>Introduced. Common name(s): Acorn Barnacle.</b>
	1975 Spec - BPBM-B 568		Identified by T.L. Smalley.
	1977 Spec - BPBM-B 615		Pearl Harbor?. Identified by T.L. Smalley.
	<b><i>Balanus crenatus</i></b>	<b>Bruguiere, 1789</b>	
	1972 Ref - Long, 1974		Off Pearl Harbor.
	<b><i>Balanus eburneus</i></b>	<b>Gould, 1841</b>	<b>Introduced. Common name(s): Reticulated Barnacle.</b>
	1929 Spec - BPBM-B 271		
	1943 Ref - Hutchins, 1949		
	1946 Ref - Edmondson, 1946		
	1948 Spec - BPBM-B 349		
	1950 Spec - BPBM-B 368		
	1972 Ref - Long, 1974		
	1973 Ref - Evans et al., 1974		
	1973 Ref - McCain, 1974		
	1973 Ref - McCain, 1975		
	1975 Spec - BPBM-B 567		Identified by T.L. Smalley.
	1975 Ref - Grovhoug, 1976		
	1975 Ref - Henry & Mclaughlin, 1975		Station number obtained from specimen cited in this
publication.	1993 Ref - Brock, 1994		
	1994 Ref - Brock, 1995		
	1996 Legacy Project (Coles et al., 1997)		
	2008 This Project		
	<b><i>Balanus reticulatus</i></b>	<b>Utinomi, 1960</b>	<b>Introduced. Common name(s): Reticulated Barnacle.</b>
	Unknown Spec - BPBM-B 350		
	1915 Ref - Henry & Mclaughlin, 1975:90		
	1948 Ref - Henry & Mclaughlin, 1975		
	1973 Ref - McCain, 1974		
	1973 Ref - McCain, 1975		
	1975 Ref - Grovhoug, 1976		
	1996 Legacy Project (Coles et al., 1997)		
	2008 This Project		
	<b><i>Balanus tintinnabulum</i></b>	<b>(Linnaeus, 1758)</b>	
	1943 Ref - Hutchins, 1949		Off Pearl Harbor.
	1972 Ref - Long, 1974		Off Pearl Harbor.
	<b><i>Balanus trigonus</i></b>	<b>Darwin, 1854</b>	
	1943 Ref - Hutchins, 1949		
	1948 Spec - BPBM-B 345		
	1948 Spec - BPBM-B 350		
	1972 Ref - Long, 1974		
	1973 Ref - Evans et al., 1974		
	<b>Genus: <i>Chelonibia</i></b>		
	<b><i>Chelonibia</i> sp.</b>		
	1973 Ref - Evans et al., 1974		
	<b>Family: CHTHAMALIDAE</b>		
	<b>Genus: <i>Chthamalus</i></b>		
	<b><i>Chthamalus</i> sp.</b>	<b>Introduced.</b>	
	1993 Ref - Brock, 1994		Recorded as <i>Chthamalus hembeli</i> .
	1994 Ref - Brock, 1995		Recorded as <i>Chthamalus hembeli</i> .
	<b><i>Chthamalus proteus</i></b>	<b>Darbo &amp; Southward, 1980</b>	<b>Introduced. Common name(s): Proteus Rock</b>
<b>Barnacle.</b>	1996 Legacy Project (Coles et al., 1997)		
	2006 Ref - Smith et al., 2006		
	2007 Ref - Brock, 2007		
	2008 This Project		

## Legacy Project - Species Report (Cont.)

### Family: LEPADIDAE

#### Genus: *Lepas*

##### *Lepas anatifera*

1943 Ref - Hutchins, 1949

1944 Spec - BPBM-B 330

Linnaeus, 1758

Off Pearl Harbor.

##### *Lepas anserifera anserifera*

1943 Ref - Hutchins, 1949

Linnaeus, 1759

Recorded as *L. anserifera*.

### Order: MYSIDACEA

#### Unidentified Mysidacea

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

### Order: CUMACEA

#### Unidentified Cumacea

1996 Legacy Project (Coles et al., 1997)

### Order: TANAIDACEA

#### Family: APSEUDIDAE

##### Genus: *Apseudes*

##### *Apseudes sp.*

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

##### *Apseudes sp. 1*

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

Recorded as *Apseudes sp. 1*.

Recorded as *Apseudes sp. 1*.

##### *Apseudes sp. 2*

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

Recorded as *Apseudes sp. 2*.

Recorded as *Apseudes sp. 2*.

##### *Apseudes sp. A*

1996 Legacy Project (Coles et al., 1997)

##### *Apseudes sp. 1*

2007 This Project

Indigenous.

##### *Apseudes tropicalis*

1996 Legacy Project (Coles et al., 1997)

##### Genus: *Parapseudes*

##### *Parapseudes neglectus*

1996 Legacy Project (Coles et al., 1997)

Indigenous.

##### *Parapseudes pedispinis*

1996 Legacy Project (Coles et al., 1997)

Cryptogenic.

### Family: PSEUDOZEUXIDAE

#### Genus: *Leptochelia*

##### *Leptochelia dubia*

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1978 Ref - Grovhoug, 1979

1996 Legacy Project (Coles et al., 1997)

2007 This Project

2008 This Project

(Kroyer, 1852) Cryptogenic.

### Family: TANAIDAE

#### Genus: *Anatanais*

##### *Anatanais insularis*

1973 Ref - Evans et al., 1974

Miller, 1940 Indigenous.

## Legacy Project - Species Report (Cont.)

1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)

### Order: ISOPODA

#### Family: ANTHURIDAE

##### Genus: *Mesanthura*

*Mesanthura* sp. A Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)

*Mesanthura hieroglyphica* Miller & Menzies, 1952  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979

#### Family: CIROLANIDAE

##### Unidentified Cirolanidae

1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975

##### Genus: *Cirolana*

*Cirolana* sp.  
1973 Ref - Evans et al., 1974

*Cirolana parva?* Hansen  
1978 Ref - Grovhoug, 1979

##### Genus: *Hansenolana*

*Hansenolana sphaeroformis* (Hansen)  
1973 Ref - Evans et al., 1974

#### Family: IDOTEIDAE

##### Genus: *Colidotea*

*Colidotea edmondsoni* Miller, 1940  
1973 Ref - Evans et al., 1974

#### Family: JAEROPSIDIDAE

##### Genus: *Jaeropsis*

*Jaeropsis hawaiiensis* Miller, 1941  
1927 Ref - Miller, 1941

#### Family: JANIRIDAE

##### Genus: *Carpias*

*Carpias* sp.  
1996 Legacy Project (Coles et al., 1997)

##### Genus: *Cerpias*

*Cerpias algicola*  
1996 Legacy Project (Coles et al., 1997)

##### Genus: *Janira*

*Janira algicola* Miller, 1941  
1927 Ref - Miller, 1941

#### Family: LIMNORIIDAE

##### Genus: *Limnoria*

*Limnoria* sp.  
1973 Ref - Evans et al., 1974  
1976 Ref - Cooke et al., 1980  
1996 Legacy Project (Coles et al., 1997)

*Limnoria lignorum*  
1996 Legacy Project (Coles et al., 1997)

*Limnoria tripunctata* Menzies, 1957 Introduced.  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

### Family: MUNNIDAE

#### Genus: *Munna*

##### *Munna acarina*

1996 Legacy Project (Coles et al., 1997)

### Family: SCYPHACIDAE

#### Genus: *Armadilloniscus*

##### *Armadilloniscus litoralis*

1996 Legacy Project (Coles et al., 1997)

### Family: SPHAEROMATIDAE

#### Genus: *Dynamenella*

##### *Dynamenella sp.*

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1978 Ref - Grovhoug, 1979

#### Genus: *Exosphaeroma*

##### *Exosphaeroma sp. A sp.* Cryptogenic.

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Paracerceis*

##### *Paracerceis sculpta* (Holmes, 1909) Introduced.

1968 Ref - Miller, 1968

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1978 Ref - Grovhoug, 1979

#### Genus: *Sphaeroma*

##### *Sphaeroma walkeri* (Stebbing, 1905) Introduced.

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

#### Unidentified *Sphaeroma*

1996 Legacy Project (Coles et al., 1997)

### Family: STENETRIIDAE

#### Genus: *Stenetrium*

##### *Stenetrium medipacificum* Miller, 1941 Indigenous.

1929 Ref - Miller, 1941

### Family: TEREDICOLIDAE

#### Genus: *Teredicola*

##### *Teredicola typicus* Wilson, 1942

1976 Ref - Cooke et al., 1980

### Order: AMPHIPODA

#### Unidentified Amphipoda

1979 Ref - AECOS, 1979 Off Pearl Harbor.

2007 This Project

2008 This Project

### Family: AMPHILOCHIDAE

#### Genus: *Amphilocheus*

##### *Amphilocheus kailua* Barnard, 1970

1996 Legacy Project (Coles et al., 1997)

##### *Amphilocheus likelike* Barnard, 1970

1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

Genus: *Gitanopsis*

*Gitanopsis pele* Barnard, 1970  
1996 Legacy Project (Coles et al., 1997)

Family: AMPITHOIDAE

Genus: *Ampithoe*

*Ampithoe waialua* Barnard, 1970 Indigenous.  
1996 Legacy Project (Coles et al., 1997)

Genus: *Paragrubia*

*Paragrubia vorax* Chevreux, 1901  
1996 Legacy Project (Coles et al., 1997)

Family: AORIDAE

Genus: *Bemlos*

*Bemlos sp.* Indigenous.  
1973 Ref - Evans et al., 1974 Recorded as Lembos.

*Bemlos macromanus* Shoemaker, 1925 Indigenous.  
1973 Ref - Evans et al., 1974 Recorded as Lembos macromanus.  
1978 Ref - Grovhoug, 1979 Recorded as Lembos macromanus.  
1996 Legacy Project (Coles et al., 1997)

*Bemlos pualani* (Barnard, 1970)  
1996 Legacy Project (Coles et al., 1997)

*Bemlos waipio* (Barnard, 1970)  
1996 Legacy Project (Coles et al., 1997)

Genus: *Grandidierella*

*Grandidierella sp.*  
2008 This Project

*Grandidierella bispinosa* Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)

*Grandidierella japonica* Introduced.  
1996 Legacy Project (Coles et al., 1997)

Family: CAPRELLIDAE

Unidentified Caprellidae

2008 This Project

Genus: *Caprella*

*Caprella scaura* Hawaiian name(s): `ami kai.  
Templeton, 1836 Introduced.  
1929 Spec - BPBM-S 5251  
1929 Spec - BPBM-S 5252  
1948 Ref - Edmondson & Mansfield, 1948  
1973 Ref - Evans et al., 1974

Genus: *Paracaprella*

*Paracaprella pusilla* Mayer, 1890  
1978 Ref - Grovhoug, 1979

Family: COLOMASTIGIDAE

Genus: *Colomastix*

*Colomastix kapiolani* Barnard, 1970 Indigenous.  
2008 This Project

*Colomastix lunailo* Barnard, 1970 Indigenous.  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project

*Colomastix pusilla* Grube, 1855 Indigenous.  
1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

2008 This Project

### Family: COROPHIIDAE

#### Genus: *Corophium*

*Corophium* sp. Introduced.

2007 This Project

*Corophium baconi* Shoemaker, 1934 Introduced.

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

1996 Legacy Project (Coles et al., 1997)

2008 This Project

*Corophium insidiosum* Crawford, 1937 Introduced.

1978 Ref - Grovhoug, 1979

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Erichthonius*

##### *Erichthonius* sp.

2008 This Project

*Erichthonius brasiliensis* (Dana, 1853) Introduced.

1938 Ref - Barnard, 1955

1938 Spec - BPBM-S 5947

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

1996 Legacy Project (Coles et al., 1997)

2008 This Project

Recorded as *Erichthonius brasiliensis*.

Identified by J.L. Barnard.

Recorded as *Erichthonius brasiliensis*.

Recorded as *Erichthonius brasiliensis*.

#### Genus: *Monocorophium*

*Monocorophium ascherusicum* (Costa, 1857) Introduced.

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

2008 This Project

Recorded as *Corophium ascherusicum*.

### Family: GAMMARIDAE

#### Genus: *Elasmopus*

*Elasmopus* sp. Indigenous.

2008 This Project

*Elasmopus diplonyx* Schellenberg, 1938

1996 Legacy Project (Coles et al., 1997)

*Elasmopus ecuadorensis hawaiiensis* Schellenberg, 1938

1973 Ref - Evans et al., 1974

*Elasmopus molokai* Barnard, 1970

1996 Legacy Project (Coles et al., 1997)

*Elasmopus pectenicrus* (Bate, 1862)

1937 Ref - Barnard, 1955

1937 Spec - BPBM-S 5993

1944 Ref - Barnard, 1970

1948 Ref - Barnard, 1970

1948 Spec - BPBM-S 5994

1948 Spec - BPBM-S 8717

1948 Spec - BPBM-S 8718

1948 Spec - BPBM-S 8719

1950 Spec - BPBM-S 5995

1950 Spec - BPBM-S 6010

Off Pearl Harbor. Recorded as *Elasmopus pectenicrus*.

Identified by J.L. Barnard.

Off Pearl Harbor. Recorded as *Elasmopus pectenicrus*.

Recorded as *Elasmopus pectenicrus*.

Identified by J.L. Barnard.

Drydock. Identified by J.L. Barnard.

Drydock. Identified by J.L. Barnard.

Drydock. Identified by J.L. Barnard.

Identified by J.L. Barnard.

Identified by J.L. Barnard.

*Elasmopus piikoi* Barnard, 1970

1978 Ref - Grovhoug, 1979

## Legacy Project - Species Report (Cont.)

<b><i>Elasmopus rapax</i></b>		<b>(Costa, 1853)</b>	<b>Introduced.</b>
1948	Ref - Barnard, 1955		
1948	Ref - Barnard, 1970		
1948	Spec - BPBM-S 5989		Identified by J.L. Barnard.
1948	Spec - BPBM-S 5991		Identified by J.L. Barnard.
1950	Spec - BPBM-S 5990		Identified by J.L. Barnard.
1973	Ref - Evans et al., 1974		
1978	Ref - Grovhoug, 1979		
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Eriopisa</i></b>			
<b><i>Eriopisa hamakua</i></b>		<b>Barnard, 1970</b>	
1967	Spec - BPBM-S 7273		Off W end of Pearl Harbor.
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Eriopisella</i></b>			
<b><i>Eriopisella sechellensis upolu</i></b>			
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Maera</i></b>			
<b><i>Maera sp.</i></b>		<b>Indigenous.</b>	
2007	This Project		
<b><i>Maera kaiulani</i></b>		<b>Barnard, 1970</b>	
1967	Spec - BPBM-S 7276		Off W end of Pearl Harbor.
<b><i>Maera pacifica</i></b>		<b>Indigenous.</b>	
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<b>Family: HYALIDAE</b>			
<b>Genus: <i>Hyale</i></b>			
<b><i>Hyale grandicornis bishopae</i></b>		<b>Barnard, 1970</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Family: ISAEIDAE</b>			
<b>Genus: <i>Gammaropsis</i></b>			
<b><i>Gammaropsis alamoana</i></b>		<b>Barnard, 1970</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Photis</i></b>			
<b><i>Photis hawaiiensis</i></b>		<b>Barnard, 1955</b>	<b>Cryptogenic.</b>
2008	This Project		
<b><i>Photis hawaiiensis</i></b>		<b>Barnard, 1955</b>	
1973	Ref - Evans et al., 1974		
1978	Ref - Grovhoug, 1979		
1996	Legacy Project (Coles et al., 1997)		
<b>Family: LEUCOTHOIDAE</b>			
<b>Genus: <i>Leucothoe</i></b>			
<b><i>Leucothoe sp.</i></b>			
1973	Ref - Evans et al., 1974		
<b><i>Leucothoe hyhelia</i></b>		<b>Barnard, 1965</b>	<b>Indigenous.</b>
1973	Ref - Evans et al., 1974		
1978	Ref - Grovhoug, 1979		
1996	Legacy Project (Coles et al., 1997)		
2007	This Project		
2008	This Project		
<b><i>Leucothoe tridens</i></b>		<b>Stebbing, 1888</b>	
1996	Legacy Project (Coles et al., 1997)		

## Legacy Project - Species Report (Cont.)

- Paraleucothoe flindersi* Stebbing, 1888 Cryptogenic.  
1996 Legacy Project (Coles et al., 1997)
- Family: LILJEBORGIIDAE  
Genus: *Liljeborgia*  
*Liljeborgia heeia* Baranard, 1970  
1996 Legacy Project (Coles et al., 1997)
- Family: LYSIANASSIDAE  
Genus: *Lysianassa*  
*Lysianassa ewa* Barnard, 1970 Indigenous.  
2008 This Project
- Family: PACHYNIDAE  
Unidentified Pachynidae  
2007 This Project
- Family: PODOCERIDAE  
Genus: *Podocerus*  
*Podocerus brasiliensis* (Dana, 1853) Introduced.  
Unknown Spec - BPBM-S 5964 Identified by J.L. Barnard.  
1938 Ref - Barnard, 1955  
1938 Spec - BPBM-S 5959 Identified by J.L. Barnard.  
1948 Ref - Barnard, 1955  
1948 Spec - BPBM-S 5958 Identified by J.L. Barnard.  
1948 Spec - BPBM-S 5960 Identified by J.L. Barnard.  
1950 Spec - BPBM-S 5961 Identified by J.L. Barnard.  
1951 Ref - Barnard, 1955  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project
- Podocerus talegus lawai*  
1996 Legacy Project (Coles et al., 1997)
- Family: STENOTHOIDAE  
Unidentified Stenothoidae  
2008 This Project
- Genus: *Stenothoe*  
*Stenothoe cattai*  
1950 Spec - BPBM-S 5966 Identified by J.L. Barnard.
- Stenothoe gallensis* Walker, 1904 Introduced.  
1937 Ref - Barnard, 1955  
1944 Ref - Barnard, 1955 Off Pearl Harbor.  
1948 Spec - BPBM-S 5965 Identified by J.L. Barnard.  
1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)
- Stenothoe valida* Dana, 1853 Cryptogenic.  
1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)
- Order: DECAPODA  
Unidentified Caridea  
1996 Legacy Project (Coles et al., 1997)
- Family: ALPHEIDAE  
Unidentified Alpheidae  
1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)



## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Alpheopsis</i></b>	
<b><i>Alpheopsis equalis</i></b>	<b>Coutiere, 1896</b>
1973	Ref - Evans et al., 1974
<b>Genus: <i>Alpheus</i></b>	
<b><i>Alpheus sp.</i></b>	
1973	Ref - Evans et al., 1974
1986	Ref - Lenihan, 1990
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus sp. 1</i></b>	
1987	Ref - Brewer & Assoc., 1987
	Recorded as <i>Alpheus sp. 1</i> .
<b><i>Alpheus brevipes</i></b>	
	<b>De Haan, 1849</b>
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus collumianus</i></b>	
	<b>Stimpson, 1860</b>
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus crassimanus</i></b>	
	<b>Heller, 1865</b>
1929	Spec - BPBM-S 8928
1938	Spec - BPBM-S 6442
	Identified by Banner.
	Identified by A.H. Banner.
<b><i>Alpheus diadema</i></b>	
	<b>Dana, 1852</b>
1973	Ref - Evans et al., 1974
<b><i>Alpheus gracilipes</i></b>	
	<b>Stimpson, 1860</b>
1973	Ref - Evans et al., 1974
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus gracilis simplex</i></b>	
	<b>(Banner, 1953)</b>
1973	Ref - Evans et al., 1974
<b><i>Alpheus heeia</i></b>	
	<b>Banner &amp; Banner, 1974</b>
1973	Ref - Evans et al., 1974
<b><i>Alpheus lanceoloti</i></b>	
	<b>Coutiere, 1905</b>
1973	Ref - Evans et al., 1974
<b><i>Alpheus lobidens</i></b>	
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus lobidens polynesica</i></b>	
	<b>Banner &amp; Banner, 1974</b>
1973	Ref - Evans et al., 1974
<b><i>Alpheus lottini</i></b>	
	<b>Guèrin, 1829</b>
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus mackayi</i></b>	
	<b>Banner &amp; Banner, 1974</b>
1973	Ref - Evans et al., 1974
1978	Ref - Grovhoug, 1979
1993	Ref - Brock, 1994
1994	Ref - Brock, 1995
1996	Legacy Project (Coles et al., 1997)
2007	Ref - Brock, 2007
<b><i>Alpheus pacificus</i></b>	
	<b>Dana, 1852</b>
1947	Spec - BPBM-S 5302
1947	Spec - BPBM-S 5317
1948	Spec - BPBM-S 5337
<b><i>Alpheus paracrinitus</i></b>	
	<b>Miers, 1881</b>
1973	Ref - Evans et al., 1974
1996	Legacy Project (Coles et al., 1997)
<b><i>Alpheus paralcycone</i></b>	
	<b>Coutiere, 1905</b>
1973	Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

- Alpheus platyunguiculatus*** (Banner, 1953)  
1973 Ref - Evans et al., 1974
- Alpheus rapacida*** deMan, 1911  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979
- Alpheus rapax*** Fabricius, 1798  
1973 Ref - Evans et al., 1974
- Genus: *Leptalpheus***  
***Leptalpheus pacificus*** Banner & Banner, 1974  
1972 Spec - BPBM-S 8550  
1973 Ref - Evans et al., 1974
- Genus: *Metalpheus***  
***Metalpheus paragracilis*** (Coutière, 1897)  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Synalpheus***  
***Synalpheus bituberculatus*** deMan, 1911  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)
- Synalpheus pachymeris*** Coutiere, 1905  
1973 Ref - Evans et al., 1974
- Synalpheus paraneomeris*** Coutière, 1905  
1996 Legacy Project (Coles et al., 1997)
- Synalpheus streptodactylus*** Coutiere Indigenous. Common name(s): Snapping Shrimp.  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project
- Synalpheus thai*** Banner & Banner, 1966 Indigenous. Common name(s): Snapping Shrimp.  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project
- Unidentified *Synalpheus***  
1996 Legacy Project (Coles et al., 1997)
- Family: AXIIDAE**  
**Genus: *Enoplometopus***  
***Enoplometopus occidentalis*** (Randall) Common name(s): Western Lobster; Hawaiian name(s): `opae; ula.  
1973 Ref - Evans et al., 1974
- Family: CALAPPIDAE**  
**Genus: *Calappa*** Hawaiian name(s): pokipoki; papai pokipoki.  
***Calappa gallus*** (Herbst, 1803)  
1979 Ref - AECOS, 1979 Off Pearl Harbor.
- Calappa hepatica*** (Linnaeus, 1767) Common name(s): Hepatic Box Crab; Hawaiian name(s): pokipoki; pokipoki `au moana; pokipoki kuapa`a; popoki.  
1973 Ref - Evans et al., 1974
- Genus: *Cryptosoma***  
***Cryptosoma granulosum*** Alcock  
Unknown Spec - BPBM-S 1500
- Family: CALLIANASSIDAE**  
**Genus: *Callianassa***  
***Callianassa sp.***  
1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

- Callianassa variabilis*  
1996 Legacy Project (Coles et al., 1997)
- Family: CHIROSTYLIDAE**  
**Unidentified Chirostylidae**  
1982 Spec - BPBM-S 10099 Off Pearl Harbor.
- Family: DIOGENIDAE**  
**Genus: *Calcinus***  
*Calcinus latens* (Randall, 1839)  
1973 Ref - Evans et al., 1974
- Family: DROMIIDAE**  
**Genus: *Cryptodromiopsis***  
*Cryptodromiopsis tridens* Borradaile  
1950 Spec - BPBM-S 5626
- Family: DYNOMENIDAE**  
**Genus: *Dynomene***  
*Dynomene devaneyi* Takeda, 1977  
1982 Spec - BPBM-S 10098 Off Pearl Harbor.
- Family: GERYONIDAE**  
**Genus: *Progeryon***  
*Progeryon guinotae* Crosnier, 1976  
1977 Spec - BPBM-S 10626 3 miles off Pearl Harbor.
- Family: GNATHOPHYLLIDAE**  
**Genus: *Gnathophylloides***  
*Gnathophylloides mammillatus* (Edmondson)  
1973 Ref - Evans et al., 1974 Recorded as *Gnathophylloides mammalatus*.
- Family: GRAPSIDAE**  
**Unidentified Grapsidae**  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Metopograpsus***  
*Metopograpsus thukuhar* (Owen, 1839)  
1906 Ref - Rathbun , 1906  
1929 Spec - BPBM-S 3157  
1931 Spec - BPBM-S 3368 Middle Loch.  
1939 Spec - BPBM-S 4427  
1948 Spec - BPBM-S 5331  
1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1987 Ref - AECOS, 1987  
1993 Ref - Brock, 1994 Recorded as *M. messor*.  
1994 Ref - Brock, 1995 Recorded as *M. messor*.  
1996 Legacy Project (Coles et al., 1997)
- Genus: *Metopograpsus***  
*Metopograpsus messor* (Forskal, 1775) Indigenous. Common name(s): Shore Crab.  
2007 This Project  
2008 This Project
- Metopograpsus thukuhar* (Owen, 1893) Indigenous. Common name(s): Shore Crab.  
2007 Ref - Brock, 2007 Recorded as *M. messor*.  
2008 This Project
- Genus: *Nanosesarma***  
*Nanosesarma minutum* (De Man, 1887) Introduced.  
1996 Legacy Project (Coles et al., 1997)

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Pachygrapsus</i></b>			
<b><i>Pachygrapsus sp.</i></b>		<b>Indigenous.</b>	
2008	This Project		
<b>Genus: <i>Plagusia</i></b>			
<b><i>Plagusia depressa tuberculata</i></b>		<b>Lamarck, 1818</b>	
1947	Spec - BPBM-S 5306		
1973	Ref - Evans et al., 1974		Off Pearl Harbor. Recorded as <i>Plagusia depressa tuberculata</i>
(Lameroux).			
<b>Family: HAPALOCARCINIDAE</b>			
<b>Genus: <i>Hapalocarcinus</i></b>			
<b><i>Hapalocarcinus marsupialis</i></b>		<b>Stimpson, 1859</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Family: HIPPOLYTIDAE</b>			
<b>Genus: <i>Hippolysmata</i></b>			
<b><i>Hippolysmata sp.</i></b>			
1948	Spec - BPBM-S 6079		
<b><i>Hippolysmata vittata</i></b>			
1936	Spec - BPBM-S 4222		
1947	Spec - BPBM-S 5316		
1948	Spec - BPBM-S 5330		
1948	Spec - BPBM-S 5338		
1948	Spec - BPBM-S 5572		
<b>Genus: <i>Leptodius</i></b>			
<b><i>Leptodius exaratus</i></b>		<b>Milne Edwards</b>	
1906	Ref - Rathbun , 1906		
<b><i>Leptodius sanguineus</i></b>		<b>(H. Milne Edwards, 1834)</b>	
1973	Ref - Evans et al., 1974		
<b>Genus: <i>Lysmata</i></b>			
<b><i>Lysmata acicula</i></b>		<b>(Rathbun)</b>	
1948	Spec - BPBM-S 5329		
1973	Ref - Evans et al., 1974		
<b>Genus: <i>Saron</i></b>			
<b><i>Saron marmoratus</i></b>		<b>(Olivier, 1811)</b>	<b>Hawaiian name(s): `opae.</b>
1993	Ref - Brock, 1994		
1994	Ref - Brock, 1995		
<b>Genus: <i>Spirontocaris</i></b>			
<b><i>Spirontocaris marmoratus</i></b>			
1950	Spec - BPBM-S 5634		
<b>Family: HOMOLIDAE</b>			
<b>Genus: <i>Homola</i></b>			
<b><i>Homola ikedai</i></b>		<b>Sakai, 1879</b>	
1976	Spec - BPBM-S 10637		Entrance to Pearl Harbor; 2.5 miles off Buoy 1.
<b>Genus: <i>Paromola</i></b>			
<b><i>Paromola japonica</i></b>		<b>Parisi, 1915</b>	
1976	Spec - BPBM-S 10811		Entrance to Pearl Harbor; 2.5 miles off Buoy 1. Identified by
Guinot and Forges,			10 January 1990.
1982	Spec - BPBM-S 10072		Off Pearl Harbor dredge spoil site. Identified by Guinot and
Forges.			
<b>Family: LEUCOSIIDAE</b>			
<b>Genus: <i>Randallia</i></b>			
<b><i>Randallia distincta</i></b>		<b>Rathbun</b>	
1983	Spec - BPBM-S 11187		Mamala Bay; Pearl Harbor disposal site. Identified by E.H.
Chave.			

## Legacy Project - Species Report (Cont.)

### Family: MAJIDAE

#### Genus: *Hyastenus*

##### *Hyastenus spinosus*

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Schizophroidea*

##### *Schizophroidea hilensis*

1996 Legacy Project (Coles et al., 1997) Rathbun, 1906

#### Genus: *Schizophrys*

##### *Schizophrys aspera*

1950 Spec - BPBM-S 5620 H. Milne Edwards, 1834 Introduced.  
1951 Ref - Edmondson, 1951

### Family: OCYPODIDAE

#### Genus: *Macrophthalmus*

##### *Macrophthalmus telescopicus*

name(s):

(Owen, 1839) Common name(s): Telescope-Eyed Ghost Crab; Hawaiian

maka`aloa; `aloa; `ohiki makaloa.

1930 Spec - BPBM-S 3476 Middle Loch.  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Ocypode*

##### *Ocypode ceratophthalma*

1979 Ref - AECOS, 1979 (Pallas, 1872) Common name(s): sand crab; Hawaiian name(s): `ohiki.

Off Pearl Harbor.

##### *Ocypode laevis*

1996 Legacy Project (Coles et al., 1997) Dana

### Family: PALAEMONIDAE

#### Unidentified Palaemonidae

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Brachycarpus*

##### *Brachycarpus biunguiculatus*

1996 Legacy Project (Coles et al., 1997) (Lucas, 1846)

#### Genus: *Conchodytes*

##### *Conchodytes tridacnae*

1973 Ref - Evans et al., 1974 Peters, 1852 Off Pearl Harbor.

#### Genus: *Harpiliopsis*

##### *Harpiliopsis depressa*

1996 Legacy Project (Coles et al., 1997) (Stimpson, 1860)

#### Genus: *Leander*

##### *Leander sp.*

1973 Ref - Evans et al., 1974

#### Genus: *Macrobrachium*

##### *Macrobrachium grandimanus*

1922 Spec - BPBM-S 717 (Randall) Hawaiian name(s): `opae `oeha`a.

#### Genus: *Palaemon*

##### *Palaemon debelis*

1934 Spec - BPBM-S 3833 Dana, 1852

##### *Palaemon dibilis*

1906 Ref - Rathbun, 1906 Dana, 1852

##### *Palaemon pacificus*

1996 Legacy Project (Coles et al., 1997) (Simpson)

##### *Palaemon pacificus?*

1978 Ref - Grovhoug, 1979 (Simpson)

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Palaemonella</i></b>			
<b><i>Palaemonella sp.</i></b>			
1973	Ref - Evans et al., 1974		
1996	Legacy Project (Coles et al., 1997)		
<b><i>Palaemonella rotumana</i></b>			
1996	Legacy Project (Coles et al., 1997)		
<b><i>Palaemonella tenuipes</i></b>		<b>Dana, 1852</b>	
1948	Spec - BPBM-S 5339		
1987	Ref - AECOS, 1987		Recorded as <i>Palaemonella tenuides</i> .
1996	Legacy Project (Coles et al., 1997)		
<b><i>Palaemonella tenuipes?</i></b>		<b>Dana, 1852</b>	
1973	Ref - McCain, 1974		Recorded as <i>Palaemonella tenuides</i> .
1973	Ref - McCain, 1975		Recorded as <i>Palaemonella tenuides</i> .
<b>Family: PALINURIDAE</b>			
<b>Genus: <i>Panulirus</i></b>			
<b><i>Panulirus marginatus</i></b>		<b>(Quoy &amp; Gaimard, 1825)</b>	
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
<b><i>Panulirus penicillatus</i></b>		<b>(Olivier, 1791)</b>	
1973	Ref - Evans et al., 1974		
<b>Family: PANDALIDAE</b>			
<b>Genus: <i>Heterocarpus</i></b>			
<b><i>Heterocarpus sp.</i></b>			
1982	Spec - BPBM-S 10095		Off Pearl Harbor dredge spoil site. Identified by D.M. Devaney.
<b><i>Heterocarpus ensifer</i></b>		<b>Milne-Edwards</b>	
1983	Spec - BPBM-S 11149		Mamala Bay; Pearl Harbor disposal site. Identified by R.M. Moffitt.
<b>Genus: <i>Plesionika</i></b>			
<b><i>Plesionika sp.</i></b>			
1982	Spec - BPBM-S 10096		Off Pearl Harbor dredge spoil site; in vicinity of hard outcrop. Identified by D.M. Devaney.
<b><i>Plesionika alcocki</i></b>		<b>(Anderson)</b>	
1983	Spec - BPBM-S 11150		Mamala Bay; Pearl Harbor disposal site.
<b>Family: PARTHENOPIIDAE</b>			
<b>Genus: <i>Parthenope</i></b>			
<b><i>Parthenope sp.</i></b>		<b>Indigenous.</b>	
2008	This Project		
<b><i>Parthenope stellata</i></b>		<b>Rathbun, 1906</b>	
1982	Spec - BPBM-S 10097		Off Pearl Harbor dredge spoil site; in vicinity of hard outcrop. Identified by D.M. Devaney.
<b><i>Parthenope whitei</i></b>		<b>(Adams &amp; White)</b>	
1973	Ref - Evans et al., 1974		
<b>Family: PORTUNIDAE</b>			
<b>Unidentified Portunidae</b>			
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Charybdis</i></b>			
<b><i>Charybdis erythroductyla</i></b>		<b>(Lamarck)</b>	<b>Common name(s): Red-Legged Swimming Crab; Hawaiian</b>
name(s): papa`i			<b>ako`ako`a.</b>
1902	Spec - BPBM-S 4991		
<b><i>Charybdis hellerii</i></b>		<b>(A. Milne Edwards)</b>	<b>Introduced.</b>
1950	Spec - BPBM-S 5622		
1950	Ref - Edmondson, 1954		
<b><i>Charybdis orientalis</i></b>		<b>Dana, 1852</b>	
1902	Spec - BPBM-S 4992		

## Legacy Project - Species Report (Cont.)

- Genus: *Libystes***  
***Libystes nitidus*** A. Milne Edwards, 1868  
 1973 Ref - Evans et al., 1974
- Genus: *Podophthalmus***  
***Podophthalmus vigil*** (Weber, 1795) Common name(s): Long-Eyed Swimming Crab; Hawaiian name(s): mo`ala.  
 1906 Ref - Rathbun, 1906  
 1973 Ref - Evans et al., 1974 Recorded as *Podophthalmus vigil* (Fabricus).  
 2006 Ref - Smith et al., 2006
- Genus: *Portunus*** Hawaiian name(s): `ala`eke.  
***Portunus longispinosus*** (Dana, 1852)  
 1973 Ref - Evans et al., 1974 Recorded as *Portunus longispinosus* Rathbun.  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995
- Portunus sanguinolentus*** (Herbst, 1899) Common name(s): Blood-Spotted Swimming Crab; Hawaiian name(s): kuhonu; papa`i kuahonu; kuohonu.  
 1973 Ref - Evans et al., 1974  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 2006 Ref - Smith et al., 2006  
 2007 Ref - Brock, 2007
- Genus: *Scylla***  
***Scylla serrata*** (Forsskål, 1775) Introduced. Common name(s): Serrate Swimming Crab; Samoan Crab; Mangrove Crab; Red Crab.  
 1973 Ref - Evans et al., 1974 Recorded as *Scylla serrata* de Man.  
 1987 Ref - Brewer & Assoc., 1987  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)
- Genus: *Thalamita***  
***Thalamita admete*** (Herbst, 1803)  
 1973 Ref - Evans et al., 1974
- Thalamita crenata*** Latreille, 1900  
 1973 Ref - Evans et al., 1974  
 1987 Ref - AECOS, 1987  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006
- Thalamita crenata?*** Latreille, 1900  
 1950 Spec - BPBM-S 5621
- Thalamita dakini*** Montgomery, 1931 Indigenous.  
 2008 This Project
- Thalamita edwardsi***  
 1950 Spec - BPBM-S 5619  
 2007 Ref - Brock, 2007
- Thalamita edwardsi?***  
 1948 Spec - BPBM-S 5335
- Thalamita integra*** Dana, 1852 Indigenous.  
 1915 Spec - BPBM-S 1590  
 1916 Spec - BPBM-S 741  
 1922 Spec - BPBM-S 1597  
 1922 Spec - BPBM-S 718

## Legacy Project - Species Report (Cont.)

1922	Spec - BPBM-S 724	
1929	Spec - BPBM-S 3155	
1931	Spec - BPBM-S 3343	
1931	Spec - BPBM-S 3370	Middle Loch.
1938	Spec - BPBM-S 4418	
1938	Spec - BPBM-S 4478	
1939	Spec - BPBM-S 4426	
1947	Spec - BPBM-S 5305	
1947	Spec - BPBM-S 5312	
1948	Spec - BPBM-S 5322	
1948	Spec - BPBM-S 5332	
1948	Spec - BPBM-S 5334	
1950	Spec - BPBM-S 5618	
1973	Ref - Evans et al., 1974	
1973	Ref - McCain, 1974	
1973	Ref - McCain, 1975	
1978	Ref - Grovhoug, 1979	
1987	Ref - Brewer & Assoc., 1987	
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	
2008	This Project	

***Thalamita medipacifica*** Edmondson, 1954

1923 Spec - BPBM-S 3210

***Thalamita quadridens***

1950 Spec - BPBM-S 5623

**Unidentified *Thalamita***

1996 Legacy Project (Coles et al., 1997)

2008 This Project

**Family: RANINIDAE**

**Genus: *Ranina***

***Ranina ranina***

Linnaeus, 1758

1902 Spec - BPBM-S 4993

**Family: SCYLLARIDAE**

**Genus: *Parribacus***

***Parribacus antarcticus***

(Lund, 1793) Common name(s): Antarctic Slipper Lobster; Hawaiian

name(s): ula papapa.

1973 Ref - Evans et al., 1974

Off Pearl Harbor.

**Genus: *Scyllarides***

***Scyllarides squamosus***

(Milne Edwards, 1837)

1973 Ref - Evans et al., 1974

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

**Family: SERGESTIDAE**

**Genus: *Lucifer***

***Lucifer sp.***

1973 Ref - Evans et al., 1974

***Lucifer chacei***

Bowman, 1966

1978 Ref - Grovhoug, 1979

**Family: STENOPODIDAE**

**Genus: *Stenopus***

***Stenopus hispidus***

(Olivier, 1811) Indigenous. Common name(s): Banded Shrimp; Hawaiian

name(s): `opae

huna.

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)



## Legacy Project - Species Report (Cont.)

2008 This Project

### Family: XANTHIDAE

#### Unidentified Xanthidae

1979 Ref - AECOS, 1979 Off Pearl Harbor.  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project

#### Genus: *Atergatopsis*

*Atergatopsis immigrans* (Edmondson, 1962) Introduced.  
1950 Ref - Edmondson, 1962 Recorded as *Neoliomera immigrans*.

#### Genus: *Carpilodes*

*Carpilodes bellus* (Dana, 1852)

1916 Spec - BPBM-S 740  
1973 Ref - Evans et al., 1974

#### *Carpilodes ruber*

1906 Ref - Rathbun, 1906 A. Milne Edwards, 1865

#### Genus: *Chlorodiella*

*Chlorodiella laevissima* (Dana, 1852)

1973 Ref - Evans et al., 1974

#### Genus: *Etisus*

*Etisus electra* (Herbst, 1801)

1937 Spec - BPBM-S 4382  
1973 Ref - Evans et al., 1974

*Etisus laevimanus* (Randall, 1839)

Unknown Spec - BPBM-S 10394  
1906 Ref - Rathbun, 1906  
1929 Spec - BPBM-S 3276  
1931 Spec - BPBM-S 3342  
1931 Spec - BPBM-S 3369 Middle Loch.  
1973 Ref - Evans et al., 1974  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Glabropilumnus*

*Glabropilumnus seminudus* (Miers, 1884) Introduced.  
1950 Spec - BPBM-S 5640 Pearl Harbor drydock.  
1950 Ref - Edmondson, 1952 Pearl Harbor drydock.  
1962 Ref - Edmondson, 1962  
1973 Ref - Evans et al., 1974

#### Genus: *Liocarpilodes*

*Liocarpilodes binnguis*  
1996 Legacy Project (Coles et al., 1997)

*Liocarpilodes integerrimus* (Dana, 1852)

1973 Ref - Evans et al., 1974

#### Genus: *Lophozozymus*

*Lophozozymus sp.*  
1987 Ref - Brewer & Assoc., 1987

*Lophozozymus dodone* (Herbst, 1801)

1973 Ref - Evans et al., 1974

#### Genus: *Madaeus*

*Madaeus simplex* (A. Milne Edwards, 1873)  
1973 Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

**Genus: *Medaeus***

***Medaeus simplex***

1929 Spec - BPBM-S 3162

**Genus: *Neoliomera***

***Neoliomera immigrans***

1950 Spec - BPBM-S 5625

1962 Ref - Edmondson, 1962

**Edmondson, 1962 Introduced.**

**Genus: *Neopanope***

***Neopanope sp.***

1929 Spec - BPBM-S 3437

**Genus: *Panopeus***

***Panopeus herbstii***

1947 Spec - BPBM-S 5314

1947 Ref - Edmondson, 1962

**Milne-Edwards Introduced.**

Recorded as *Panopeus herbstii*.

***Panopeus lacustris***

2008 This Project

**Desbonne, 1867 Introduced.**

***Panopeus pacificus***

1929 Spec - BPBM-S 3280

1929 Spec - BPBM-S 3435

1929 Ref - Edmondson, 1931

1930 Spec - BPBM-S 5298

1930 Ref - Edmondson, 1962

1937 Spec - BPBM-S 4397

1947 Spec - BPBM-S 5304

1948 Spec - BPBM-S 5325

1948 Spec - BPBM-S 5333

1948 Spec - BPBM-S 5336

1948 Spec - BPBM-S 6135

1949 Spec - BPBM-S 5578

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1996 Legacy Project (Coles et al., 1997)

2008 This Project

**(Edmondson, 1931) Introduced.**

Identified by Takeda, Aug. 1979.

Identified by Edmondson.

Middle Loch.

**Genus: *Paramedeus***

***Paramedeus simplex***

1996 Legacy Project (Coles et al., 1997)

**(Milne Edwards, 1873)**

**Genus: *Phymodius***

***Phymodius sp.***

2008 This Project

**Indigenous.**

***Phymodius nitidus***

1929 Spec - BPBM-S 3161

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

2007 This Project

2008 This Project

**(Dana, 1852) Indigenous.**

***Phymodius unguulatus***

1996 Legacy Project (Coles et al., 1997)

**Milne Edwards, 1834**

**Genus: *Pilumnus***

***Pilumnus longicornis***

1950 Spec - BPBM-S 5624

**Hilgendorf, 1878**

## Legacy Project - Species Report (Cont.)

<i>Pilumnus minutus</i>		<b>De Haan, 1833</b>	
1996	Legacy Project (Coles et al., 1997)		
<i>Pilumnus oahuensis</i>		<b>Edmondson, 1931</b>	<b>Introduced. Common name(s): Pilumnid Crab.</b>
1929	Spec - BPBM-S 3279		
1929	Spec - BPBM-S 3432		
1929	Ref - Edmondson, 1931		
1930	Ref - Edmondson, 1962		
1931	Spec - BPBM-S 3433		
1932	Spec - BPBM-S 3852		
1947	Spec - BPBM-S 5303		
1948	Spec - BPBM-S 5324		
1950	Spec - BPBM-S 5613		
1950	Spec - BPBM-S 6131		
1973	Ref - Evans et al., 1974		
1973	Ref - McCain, 1974		
1973	Ref - McCain, 1975		
1987	Ref - Brewer & Assoc., 1987		
1996	Legacy Project (Coles et al., 1997)		
2007	This Project		
2008	This Project		
<i>Pilumnus taeniola</i>		<b>Rathbun, 1906</b>	<b>Indigenous.</b>
2008	This Project		
<b>Genus: <i>Platypodia</i></b>			
<i>Platypodia eydouxi</i>		<b>(A. Milne Edwards, 1865)</b>	
1916	Spec - BPBM-S 735		
1929	Spec - BPBM-S 3156		
1931	Spec - BPBM-S 3344		
1973	Ref - Evans et al., 1974		Recorded as <i>Platypodia eydouxi</i> .
1996	Legacy Project (Coles et al., 1997)		
<i>Platypodia semigranosa</i>			
1950	Spec - BPBM-S 5638		
<b>Unidentified <i>Platypodia</i></b>			
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Trapezia</i></b>			
<i>Trapezia guttata</i>		<b>Rüppell, 1830</b>	
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
<i>Trapezia intermedia</i>		<b>(Miers)</b>	
1996	Legacy Project (Coles et al., 1997)		
<i>Trapezia wardi</i>		<b>Serène, 1970</b>	
1996	Legacy Project (Coles et al., 1997)		
<b>Genus: <i>Xanthias</i></b>			
<i>Xanthias sp.</i>			
1973	Ref - Evans et al., 1974		
<b>Order: STOMATOPODA</b>			
<b>Family: GONODACTYLIDAE</b>			
<b>Genus: <i>Gonodactylaceus</i></b>			
<i>Gonodactylaceus falcatus</i>		<b>(Forsskål, 1775)</b>	<b>Introduced. Common name(s): Snapping Shrimp.</b>
1973	Ref - Evans et al., 1974		Recorded as <i>Gonodactylus falcatus</i> .
1987	Ref - AECOS, 1987		Recorded as <i>Gonodactylus falcatus</i> .
1993	Ref - Brock, 1995		Recorded as <i>Gonodactylus alohoa</i> .
1996	Legacy Project (Coles et al., 1997)		
2006	Ref - Smith et al., 2006		Recorded as <i>Gonodactylaceus mutates</i> .
2007	Ref - Brock, 2007		Recorded as <i>Gonodactylus falcatus</i> .

## Legacy Project - Species Report (Cont.)

2007 This Project

**Genus: *Pseudosquilla***

*Pseudosquilla ciliata* (Fabricius, 1787) Hawaiian name(s): aloalo.

1938 Spec - BPBM-S 4567

1973 Ref - Evans et al., 1974

Recorded as *Pseudosquilla ciliata* Miers.

1996 Legacy Project (Coles et al., 1997)

**Family: LYSIOSQUILLIDAE**

**Genus: *Lysiosquilla***

*Lysiosquilla maculatus* (Fabricius.)

1923 Spec - BPBM-S 2522

**Genus: *Lysiosquillina***

*Lysiosquillina maculata* (Fabricius, 1793)

2006 Ref - Smith et al., 2006

2007 Ref - Brock, 2007

**Family: SQUILLIDAE**

**Genus: *Squilla***

*Squilla sp.*

1986 Ref - Lenihan, 1990

**Class: INSECTA**

**Order: COLLEMBOLA**

**Unidentified Collembola**

1996 Legacy Project (Coles et al., 1997)

**Phylum: SIPUNCULA**

**Class: SIPUNCULIDA**

**Unidentified Sipunculida**

1996 Legacy Project (Coles et al., 1997)

**Family: PHASCOLOSOMATIDAE**

**Genus: *Phascolosoma***

*Phascolosoma perlucens* Baird, 1868

1973 Ref - Evans et al., 1974

Recorded as *Phascolosoma dentigerum* (Selenka, deMan &

Bulo.

*Phascolosoma stephensoni* (Stephen, 1942) Indigenous.

2007 This Project

**Phylum: BRYOZOA**

**Unidentified Bryozoa**

Unknown Spec - BPBM-K 649

1975 Spec - BPBM-K 684

1976 Spec - BPBM-K 661

Hospital Point.

1976 Ref - Cooke et al., 1980

2007 This Project

**Family: CLEIDOCHASMATIDAE**

**Genus: *Diaperoforma***

*Diaperoforma sp.* Indigenous.

2008 This Project

**Class: GYMNOLEMMATA**

**Order: CTENOSTOMATA**

**Family: VESICULARIIDAE**

**Genus: *Amathia***

*Amathia sp.*

1950 Spec - BPBM-K 214

1972 Ref - Long, 1974

Off Pearl Harbor.

## Legacy Project - Species Report (Cont.)

- Amathia sp.?***  
1947 Spec - BPBM-K 234
- Amathia distans*** Busk, 1886 Introduced. Common name(s): Bushy Bryozoan.  
1948 Spec - BPBM-K 207  
1948 Spec - BPBM-K 210  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2007 This Project  
2008 This Project
- Amathia distans?*** Busk, 1886 Introduced. Common name(s): Bushy Bryozoan.  
Unknown Spec - BPBM-K 455
- Genus: *Bowerbankia***  
***Bowerbankia sp.***  
1972 Ref - Long, 1974 Off Pearl Harbor.
- Genus: *Zoobotryon***  
***Zoobotryon sp.***  
1996 Legacy Project (Coles et al., 1997)
- Zoobotryon verticillatum*** (Della Chiaje) Introduced.  
1921 Spec - BPBM-K 236  
1940 Spec - BPBM-K 233  
1940 Spec - BPBM-K 310  
1948 Spec - BPBM-K 216  
1948 Spec - BPBM-K 346  
1975 Spec - BPBM-K 601 Merry Point; off Fuel Pier Array. Identified by J. Grovhoug.  
2008 This Project
- Order: CYCLOSTOMATA**  
**Family: LICHENOPORIDAE**  
**Genus: *Lichenopora***  
***Lichenopora sp.***  
1972 Ref - Long, 1974
- Family: TUBULIPORIDAE**  
**Genus: *Tubulipora***  
***Tubulipora sp.***  
1972 Ref - Long, 1974 Off Pearl Harbor.
- Order: CHEILOSTOMATA**  
**Family: AETEIDAE**  
**Genus: *Aetea***  
***Aetea rufopuncta***  
1916 Spec - BPBM-S 736
- Aetea truncata*** (Landsborough, 1852) Introduced.  
1972 Ref - Long, 1974 Off Pearl Harbor.  
1975 Ref - Grovhoug, 1976  
1996 Legacy Project (Coles et al., 1997)
- Family: BEANIIDAE**  
**Genus: *Beania***  
***Beania discodermiae*** (Ortmann, 1890)  
1972 Ref - Long, 1974 Off Pearl Harbor.
- Family: BUGULIDAE**  
**Genus: *Bugula***  
***Bugula sp.***  
1929 Spec - BPBM-K 232  
1978 Ref - Grovhoug, 1979

## Legacy Project - Species Report (Cont.)

1996 Legacy Project (Coles et al., 1997)

***Bugula dentata*** (Lamauroux, 1816) Introduced. Common name(s): Blue Fan Bryozoan.

Unknown	Spec - BPBM-K 466	
1940	Spec - BPBM-K 223	
1940	Spec - BPBM-K 226	
1940	Spec - BPBM-K 230	
1946	Spec - BPBM-K 231	
1948	Spec - BPBM-K 208	
1948	Spec - BPBM-K 227	
1948	Spec - BPBM-K 229	
1950	Spec - BPBM-K 212	
1950	Spec - BPBM-K 228	
1972	Ref - Long, 1974	Off Pearl Harbor. Recorded as <i>Bugula californica</i> .
1973	Ref - Evans et al., 1974	Recorded as <i>Bugula californica</i> .
1975	Ref - Grovhoug, 1976	Recorded as <i>Bugula californica</i> .
1993	Ref - Brock, 1994	Recorded as <i>Bugula californica</i> .
1994	Ref - Brock, 1995	Recorded as <i>Bugula californica</i> .
1996	Legacy Project (Coles et al., 1997)	
2008	This Project	

***Bugula neritina*** (Linnaeus, 1758) Introduced. Common name(s): Red Fan Bryozoan.

Unknown	Spec - BPBM-K 240
1921	Spec - BPBM-K 235
1921	Spec - BPBM-K 239
1935	Spec - BPBM-K 217
1935	Spec - BPBM-K 220
1935	Ref - Edmondson, 1944
1935	Ref - Ingram, 1937
1940	Spec - BPBM-K 218
1940	Spec - BPBM-K 219
1940	Spec - BPBM-K 224
1940	Spec - BPBM-K 225
1940	Spec - BPBM-K 238
1947	Spec - BPBM-K 237
1948	Spec - BPBM-K 206
1948	Spec - BPBM-K 215
1950	Spec - BPBM-K 209
1950	Spec - BPBM-K 211
1950	Spec - BPBM-K 213
1972	Ref - Long, 1974
1973	Ref - Evans et al., 1974
1975	Ref - Grovhoug, 1976
1978	Ref - Grovhoug, 1979
1993	Ref - Brock, 1994
1994	Ref - Brock, 1995
1996	Legacy Project (Coles et al., 1997)
2008	This Project

**Family: CELLEPORARIIDAE**

**Genus: *Celleporaria***

***Celleporaria* sp. Indigenous.**

2007	This Project
2008	This Project

***Celleporaria costazii*** (Audouin, 1826)  
 1972 Ref - Long, 1974 Off Pearl Harbor.

## Legacy Project - Species Report (Cont.)

<b>Genus: <i>Holoporella</i></b>		
<b><i>Holoporella</i> sp.</b>		
1975	Ref - Grovhoug, 1976	
1978	Ref - Grovhoug, 1979	
<b>Family: CELLEPORIDAE</b>		
<b>Genus: <i>Cellepora</i></b>		
<b><i>Cellepora vagans</i></b> (Busk, 1855)		
1972	Ref - Long, 1974	Recorded as Celleporaria vagans.
<b>Family: CRIBRILINIDAE</b>		
<b>Genus: <i>Cribrilaria</i></b>		
<b><i>Cribrilaria radiata</i></b> (Moll, 1803)		
1972	Ref - Long, 1974	Off Pearl Harbor.
<b>Family: MICROPORELLIDAE</b>		
<b>Genus: <i>Microporella</i></b>		
<b><i>Microporella ciliata</i></b> (Pallas, 1766)		
1972	Ref - Long, 1974	
<b>Family: MUCRONELLIDAE</b>		
<b>Genus: <i>Parasmittina</i></b>		
<b><i>Parasmittina</i> sp.</b>		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Parasmittina spathulata</i></b> (Smitt, 1873)		
1972	Ref - Long, 1974	Off Pearl Harbor.
<b>Family: RETEPORIDAE</b>		
<b>Genus: <i>Reteporellina</i></b>		
<b><i>Reteporellina denticulata</i></b> (Busk, 1884)		
1972	Ref - Long, 1974	Off Pearl Harbor.
1996	Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Rhynchozoon</i></b>		
<b><i>Rhynchozoon</i> sp.</b>		
1972	Ref - Long, 1974	Off Pearl Harbor.
<b>Family: SAVIGNYELLIDAE</b>		
<b>Genus: <i>Savignyella</i></b>		
<b><i>Savignyella lafontii</i></b> (Audouin, 1826)		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
<b>Family: SCHIZOPORELLIDAE</b>		
<b>Genus: <i>Schizoporella</i></b>		
<b><i>Schizoporella cf. errata</i></b> (Waters, 1878) <b>Introduced. Common name(s): Erratic Bryozoan.</b>		
Unknown	Spec - BPBM-K 253	
1973	Ref - McCain, 1974	Recorded as Schizoporella sp..
1973	Ref - McCain, 1975	Recorded as Schizoporella sp..
1985	Ref - Hurlbut, 1990	Recorded as S. unicornis (Johnston, 1847).
1986	Ref - Lenihan, 1990	Recorded as Schizoporella errata.
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
2008	This Project	
<b><i>Schizoporella unicornis</i></b> (Johnston, 1847) <b>Introduced.</b>		
1935	Ref - Edmondson, 1944	
1935	Ref - Ingram, 1937	
1972	Ref - Long, 1974	
1975	Ref - Grovhoug, 1976	
1993	Ref - Brock, 1994	Recorded as S. unicornis (Johnston, 1847).

## Legacy Project - Species Report (Cont.)

1994 Ref - Brock, 1995 Recorded as *S. unicornis* (Johnston, 1847).  
1996 Legacy Project (Coles et al., 1997)  
2007 Ref - Brock, 2007

### Unidentified Schizoporella

1996 Legacy Project (Coles et al., 1997)

### Family: SCRUPOCELLARIIDAE

#### Genus: *Scrupocellaria*

##### *Scrupocellaria sinuosa*

1972 Ref - Long, 1974

Canu & Bassler, 1927

Off Pearl Harbor.

### Family: STEGANOPORELLIDAE

#### Genus: *Steganoporella*

##### *Steganoporella* sp.

1972 Ref - Long, 1974

Off Pearl Harbor.

### Family: THALAMOPORELLIDAE

#### Genus: *Thalamoporella*

##### *Thalamoporella hawaiiiana*

1972 Ref - Long, 1974

Soule & Soule, 1970

Off Pearl Harbor.

### Family: VITTATICELLIDAE

#### Genus: *Vittaticella*

##### *Vittaticella elegans*

1972 Ref - Long, 1974

(Busk, 1852)

Off Pearl Harbor.

### Family: WATERISPORIDAE

#### Genus: *Waterispora*

##### *Waterispora edmondsoni*

1972 Ref - Long, 1974

1975 Ref - Grovhoug, 1976

1978 Ref - Grovhoug, 1979

1996 Legacy Project (Coles et al., 1997)

Soule & Soule, 1968 Introduced.

#### Genus: *Watersipora*

##### *Watersipora edmondsoni*

2008 This Project

Soule and Soule, 1968 Introduced.

## Phylum: ECHINODERMATA

### Class: STELLEROIDEA

### Order: PLATYASTERIDA

### Family: LUIDIIDAE

#### Genus: *Luidia*

##### *Luidia hystrix*

1902 Spec - BPBM-W 1023

1902 Spec - BPBM-W 654

Fisher, 1906 Hawaiian name(s): la kai; pe`a.

### Order: VALVATIDA

### Family: GONIASTERIDAE

#### Genus: *Plinthaster*

##### *Plinthaster ceramoidea*

1978 Spec - BPBM-W 3014

(Fisher, 1906)

Off Pearl Harbor; dredge spoil site. Identified by D.M. Devaney.

### Family: OPHIODIASTERIDAE

#### Genus: *Linckia*

##### *Linckia multifora*

1972 Spec - BPBM-W 2010

(Lamarck, 1816)

150 yds NW from Buoy "1" at harbor entrance. Identified by

D.M. Devaney.

### Family: OREASTERIDAE

#### Genus: *Culcita*

##### *Culcita novaeguineae* f. *arenosa*

Unknown Spec - BPBM-W 627

Hawaiian name(s): pe`a.



## Legacy Project - Species Report (Cont.)

	1902	Spec - BPBM-W 1026		
		<i>Culcita novaeguineae f. nesiotis</i>	<b>Fisher, 1925</b>	
		Unknown Spec - BPBM-W 626		
		<b>Order: FORCIPULATIDA</b>		
		<b>Family: ASTERIIDAE</b>		
		<b>Genus: <i>Distolasterias</i></b>		
		<i>Distolasterias euplecta</i>	<b>Fisher, 1906</b>	
1982.	1982	Spec - BPBM-W 3028		Off Pearl Harbor; dredge spoil site. Identified by D.M. Devaney,
		<b>Order: OPHIURIDA</b>		
		<b>Family: AMPHIURIDAE</b>		
		<b>Genus: <i>Amphipholis</i></b>		
		<i>Amphipholis squamata</i>	<b>(Delle Chiaje, 1829)</b>	
facility. Identified	1972	Spec - BPBM-W 2480		On the N dolphin piling (wooden) near the sound measurement
				by D.M. Devaney.
	1973	Ref - Evans et al., 1974		
	1979	Ref - AECOS, 1979		Off Pearl Harbor.
		<b>Genus: <i>Ophionereis</i></b>		
		<i>Ophionereis porrecta</i>	<b>Lyman</b>	
	1967	Spec - BPBM-W 2579		Ewa End.
		<b>Family: OPHIACTIDAE</b>		
		<b>Genus: <i>Histampica</i></b>		
		<i>Histampica cythera</i>	<b>(A. H. Clark, 1949)</b>	
May 1982.	1982	Spec - BPBM-W 3011		Off Pearl Harbor; dredge spoil site. Identified by D.M. Devaney.
13 Oct 1982.	1982	Spec - BPBM-W 3052		Off Pearl Harbor; dredge spoil site. Identified by D.M. Devaney,
		<b>Genus: <i>Ophiactis</i></b>		
		<i>Ophiactis sp.</i>		
May 1982.	1982	Spec - BPBM-W 3012		Off Pearl Harbor; dredge spoil site. Identified by D.M. Devaney.
		<i>Ophiactis dyscrita</i>	<b>Clark, 1911</b>	
	1949	Ref - Clark, 1949		USNM 6927.
		<i>Ophiactis modesta</i>	<b>Brock, 1888</b>	
	1938	Spec - BPBM-W 1031		
	1942	Ref - Ely, 1942		
		<i>Ophiactis savignyi</i>	<b>(Müller &amp; Troschel, 1842)</b>	<b>Cryptogenic. Common name(s): Sponge Brittle</b>
Star.	Unknown	Spec - BPBM-W 370		
	1929	Spec - BPBM-W 766		
	1933	Ref - Edmondson, 1933		
	1937	Spec - BPBM-W 957		
	1938	Spec - BPBM-W 965		
	1939	Spec - BPBM-W 969		
	1942	Ref - Ely, 1942		
	1949	Spec - BPBM-W 1180		
	1949	Ref - Clark, 1949		
	1973	Ref - Evans et al., 1974		
	1973	Ref - McCain, 1974		
	1973	Ref - McCain, 1975		
	1979	Ref - AECOS, 1979		Off Pearl Harbor.
	1987	Ref - AECOS, 1987		
	1996	Legacy Project (Coles et al., 1997)		
	2007	This Project		
	2008	This Project		

## Legacy Project - Species Report (Cont.)

### Family: OPHIOCOMIDAE

#### Genus: *Ophiocoma*

##### *Ophiocoma erinaceus*

2008 This Project

Indigenous. Common name(s): Spiny Brittle Star.

##### *Ophiocoma sexradia*

1973 Ref - Evans et al., 1974

(Duncan, 1887)

### Family: OPHIOTHRICIDAE

#### Genus: *Macrophiothrix*

##### *Macrophiothrix demessa*

1967 Spec - BPBM-W 2580

(Lyman)

Ewa End.

### Class: ECHINOIDEA

#### Order: CIDAROIDA

#### Family: CIDARIDAE

#### Genus: *Eucidaris*

##### *Eucidaris metularia*

Hawaiian name(s):

1973 Ref - Evans et al., 1974

2008 This Project

(Lamarck, 1816) Indigenous. Common name(s): Ten-lined Urchin;

ha`ue`ue; peni.

#### Order: DIADEMATOIDA

#### Family: DIAEMATIDAE

#### Genus: *Diadema*

##### *Diadema paucispinum*

Hawaiian name(s):

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

Agassiz, 1863 Indigenous. Common name(s): Long-spined Urchin;

wana hālula.

#### Genus: *Echinothrix*

##### *Echinothrix calamaris*

2006 Ref - Smith et al., 2006

2008 This Project

(Pallas, 1774) Indigenous. Common name(s): Banded Urchin.

##### *Echinothrix diadema*

2006 Ref - Smith et al., 2006

2008 This Project

(Linnaeus, 1758) Indigenous. Common name(s): Blue-Black Sea Urchin.

#### Order: TEMNOPLEUROIDA

#### Family: TEMNOPLEURIDAE

#### Genus: *Mespilia*

##### *Mespilia globulus*

1950 Spec - BPBM-W 1200

(Linnaeus, 1758)

From boat in dry dock.. Identified by D.M. Devaney.

#### Family: TOXOPNEUSTIDAE

#### Genus: *Pseudoboletia*

##### *Pseudoboletia indiana*

1979 Ref - AECOS, 1979

(Michelin, 1863)

Off Pearl Harbor.

#### Genus: *Tripneustes*

##### *Tripneustes gratilla*

Hawaiian name(s):

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2008 This Project

(Linnaeus, 1758) Indigenous. Common name(s): Collector Urchin;

hawa`e; hawa`e maoli; hawa`e po`ohina.

#### Order: ECHINOIDA

#### Family: ECHINOMETRIDAE

#### Genus: *Echinometra*

##### *Echinometra mathaei*

1979 Ref - AECOS, 1979

1996 Legacy Project (Coles et al., 1997)

(de Blainville, 1825) Indigenous. Common name(s): Rock-boring Urchin.

Off Pearl Harbor.

## Legacy Project - Species Report (Cont.)

2008 This Project

Genus: *Heterocentrotus*  
*Heterocentrotus mammillatus* (Linnaeus, 1758) Indigenous. Common name(s): Red Pencil Urchin;  
 Hawaiian name(s):

ha`uke`uke iwi loloa; ha`ue`ue; `ina `ula; ha`uke`uke.

1973 Ref - Evans et al., 1974

Class: HOLOTHUROIDEA

Order: ASPIDOCHIROTIDA

Family: HOLOTHURIIDAE

Genus: *Actinopyga*

*Actinopyga mauritiana* (Quoy & Gaimard, 1833)

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

Genus: *Holothuria*

*Holothuria sp.* Indigenous.

2008 This Project

*Holothuria (Lessonothuria) pardalis* Selenka, 1867 Indigenous. Common name(s): Leopard Sea Cucumber.

2008 This Project

*Holothuria atra* Jager, 1833

1996 Legacy Project (Coles et al., 1997)

*Holothuria impatiens* Forsskål, 1775

1979 Ref - AECOS, 1979 Off Pearl Harbor.

*Holothuria pervicax* (Selenka, 1867)

1973 Ref - Evans et al., 1974

Genus: *Labidodemas*

*Labidodemas semperianum* Selenka, 1867 Indigenous. Common name(s): White Sea Cucumber.

2008 This Project

Order: APODIDA

Family: SYNAPTIDAE

Genus: *Ophiodesoma*

*Ophiodesoma spectabilis* Fisher, 1907 Indigenous. Common name(s): Conspicuous Sea

Cucumber.

1907 Ref - Fisher, 1907 Recorded as *Ophiodesoma spectabilis*. USNM 21226.

1955 Spec - BPBM-W 1234 On beach.

1973 Ref - Evans et al., 1974 Recorded as *Ophiodesoma spectabilis*.

1987 Ref - AECOS, 1987 Recorded as *Ophiodesoma spectabilis*.

1993 Ref - Brock, 1994 Recorded as *Ophiodesoma spectabilis*.

1994 Ref - Brock, 1995 Recorded as *Ophiodesoma spectabilis*.

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

Genus: *Polyplectana*

*Polyplectana kefersteinii* (Selenka, 1867) Indigenous. Common name(s): Keferstan's Sea

Cucumber.

2008 This Project

Phylum: CHAETOGNATHA

Class: SAGITTOIDEA

Order: APHRAGMOPHORA

Family: PTEROSAGITTIDAE

Genus: *Pterosagitta*

*Pterosagitta sp.*

1973 Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

### Family: SAGITTIDAE

#### Genus: *Sagitta*

##### *Sagitta* sp.

1973 Ref - Evans et al., 1974

##### *Sagitta enflata*

1978 Ref - Grovhoug, 1979

**Grassi, 1883**

##### *Sagitta regularis*

1978 Ref - Grovhoug, 1979

**Aida, 1897**

### Phylum: CHORDATA

#### Unidentified Chordata

1921 Spec - BPBM-Y 121  
 1924 Spec - BPBM-Y 112  
 1929 Spec - BPBM-Y 128  
 1929 Spec - BPBM-Y 129  
 1929 Spec - BPBM-Y 130  
 1942 Spec - BPBM-Y 111  
 1947 Spec - BPBM-Y 167  
 1948 Spec - BPBM-Y 171  
 1948 Spec - BPBM-Y 172  
 1948 Spec - BPBM-Y 174  
 1948 Spec - BPBM-Y 176  
 1948 Spec - BPBM-Y 177  
 1948 Spec - BPBM-Y 178

#### Unidentified Urochordata

1996 Legacy Project (Coles et al., 1997)

### Class: ASCIDIACEA

#### Unidentified Ascidiacea

1979 Ref - AECOS, 1979

1996 Legacy Project (Coles et al., 1997)

Off Pearl Harbor.

### Order: APLOUSOBRANCHIA

#### Family: CLAVELINIDAE

##### Genus: *Clavelina*

##### *Clavelina* sp.

1973 Ref - Evans et al., 1974

### Family: DIDEMNIDAE

#### Unidentified Didemnidae

1986 Ref - Lenihan, 1990

1996 Legacy Project (Coles et al., 1997)

##### Genus: *Didemnum*

##### *Didemnum* sp.

1972 Ref - Long, 1974

1985 Ref - Hurlbut, 1990

##### *Didemnum candidum*

2007 Ref - Brock, 2007

**Savigny, 1816**

##### *Didemnum cf. candidum*

1985 Ref - Hurlbut, 1990

1993 Ref - Brock, 1994

1994 Ref - Brock, 1995

2007 This Project

2008 This Project

**Savigny, 1816** Introduced. Common name(s): White Didemnid.

Recorded as *Didemnum candidum*.

Recorded as *Didemnum candidum*.

Recorded as *Didemnum candidum*.

##### *Didemnum edmondsoni*

1993 Ref - Brock, 1994

**Eldredge, 1966** Indigenous.

## Legacy Project - Species Report (Cont.)

1994	Ref - Brock, 1995		
2008	This Project		
<b><i>Didemnum perlucidum</i></b>		<b>Monniot, 1983</b>	<b>Introduced.</b>
2007	This Project		
<b>Genus: <i>Diplosoma</i></b>			
<b><i>Diplosoma cf. spongiforme</i></b>		<b>(Giard, 1872)</b>	<b>New record for Hawaii. Introduced.</b>
2008	This Project		
<b><i>Diplosoma listerianum</i></b>		<b>(Milne-Edwards, 1841)</b>	<b>Introduced.</b>
1975	Ref - Grovhoug, 1976		Recorded as <i>Diplosoma macdonaldi</i> .
1978	Ref - Grovhoug, 1979		Recorded as <i>Diplosoma macdonaldi</i> .
1985	Ref - Hurlbut, 1990		
1987	Ref - Brewer & Assoc., 1987		Recorded as <i>Diplosoma macdonaldi</i> .
2008	This Project		
<b>Genus: <i>Trididemnum</i></b>			
<b><i>Trididemnum savignyi</i></b>		<b>(Herdman, 1886)</b>	
1975	Ref - Grovhoug, 1976		
<b>Family: POLYCLINIDAE</b>			
<b>Unidentified Polyclinidae</b>			
1947	Spec - BPBM-Y 168		
1948	Spec - BPBM-Y 173		
1948	Spec - BPBM-Y 175		
<b>Genus: <i>Polyclinum</i></b>			
<b><i>Polyclinum sp.</i></b>			<b>Indigenous.</b>
1975	Ref - Grovhoug, 1976		
<b><i>Polyclinum constellatum</i></b>		<b>Savigny, 1816</b>	
1973	Ref - McCain, 1974		
1973	Ref - McCain, 1975		
1993	Ref - Brock, 1994		
1994	Ref - Brock, 1995		
1996	Legacy Project (Coles et al., 1997)		
2007	Ref - Brock, 2007		
<b><i>Polyclinum vasculosum</i></b>		<b>Pizon, 1908</b>	
1920	Ref - Tokioka, 1967		USNM 11755.
1972	Ref - Long, 1974		
<b>Order: PHLEBOBRANCHIA</b>			
<b>Family: ASCIDIIDAE</b>			
<b>Genus: <i>Ascidia</i></b>			
<b><i>Ascidia n. sp.</i></b>			<b>Known only from Hawaii.</b>
1996	Legacy Project (Coles et al., 1997)		
<b><i>Ascidia sp.</i></b>			<b>Indigenous.</b>
Unknown	Spec - BPBM-Y 205		Identified by D.P. Abbott, Nov 1980.
1973	Ref - Evans et al., 1974		
1973	Ref - McCain, 1974		
1973	Ref - McCain, 1975		
1976	Spec - BPBM-Y 245		Identified by P. Ching.
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<b><i>Ascidia sp. B</i></b>			<b>Introduced.</b>
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<b><i>Ascidia interrupta</i></b>			
1993	Ref - Brock, 1994		Recorded as <i>Ascidia interrupta</i> ..

## Legacy Project - Species Report (Cont.)

1994	Ref - Brock, 1995	Recorded as <i>Ascidia interrupta</i> ..
<b><i>Ascidia melanostoma</i> (Sluiter, 1885)</b>		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Ascidia sp. A</i> Introduced.</b>		
2007	This Project	
<b><i>Ascidia sydneiensis</i> (Stimpson, 1855) Introduced. Common name(s): Yellow-green Sea Squirt.</b>		
Unknown	Spec - BPBM-Y 217	Scraped from bottom of U.S.S. Dobin. Identified by D.P. Abbott, Nov 1980.
1976	Spec - BPBM-Y 244	Pearl Harbor?. Identified by P. Ching.
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
2008	This Project	
<b>Genus: <i>Phallusia</i></b>		
<b><i>Phallusia nigra</i> Savigny, 1816 Introduced. Common name(s): Black Sea Squirt.</b>		
1985	Ref - Hurlbut, 1990	
1993	Ref - Brock, 1994	Recorded as <i>Ascidia nigra</i> .
1994	Ref - Brock, 1995	Recorded as <i>Ascidia nigra</i> .
1996	Legacy Project (Coles et al., 1997)	
2007	Ref - Brock, 2007	Recorded as <i>Ascidia nigra</i> .
2007	This Project	
2008	This Project	
<b>Family: CIONIDAE</b>		
<b>Genus: <i>Ciona</i></b>		
<b><i>Ciona intestinalis</i> (Linnaeus, 1767) Introduced.</b>		
Unknown	Spec - BPBM-Y 218	Scraped from bottom of U.S.S. Dobin. Identified by D.P. Abbott, Nov 1980.
1975	Ref - Grovhoug, 1976	
1976	Ref - Cooke et al., 1980	
<b>Family: PEROPHORIDAE</b>		
<b>Genus: <i>Perophora</i></b>		
<b><i>Perophora sp.</i></b>		
1975	Ref - Grovhoug, 1976	
<b><i>Perophora annectens</i></b>		
1996	Legacy Project (Coles et al., 1997)	
<b>Order: STOLIDOBRANCHIA</b>		
<b>Family: PYURIDAE</b>		
<b>Genus: <i>Herdmania</i></b>		
<b><i>Herdmania sp.</i> Indigenous.</b>		
2008	This Project	
<b><i>Herdmania mauritiana</i> (Drasche, 1884) Introduced.</b>		
2008	This Project	
<b><i>Herdmania pallida</i> (Savigny, 1816) Introduced.</b>		
1972	Ref - Long, 1974	Recorded as <i>Herdmania momus</i> .
1973	Ref - Evans et al., 1974	Recorded as <i>Herdmania momus</i> .
1993	Ref - Brock, 1994	Recorded as <i>Herdmania momus</i> .
1994	Ref - Brock, 1995	Recorded as <i>Herdmania momus</i> .
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
2008	This Project	
<b>Genus: <i>Microsomus</i></b>		
<b><i>Microsomus exasperatus</i> Introduced.</b>		
1996	Legacy Project (Coles et al., 1997)	
2008	This Project	

## Legacy Project - Species Report (Cont.)

### Family: STYELIDAE

#### Genus: *Botrylloides*

##### *Botrylloides* sp. Indigenous.

1996 Legacy Project (Coles et al., 1997)  
2008 This Project

##### *Botrylloides* sp. (grey) sp.

1973 Ref - McCain, 1974 Recorded as *Botrylloides* sp. (grey).  
1973 Ref - McCain, 1975 Recorded as *Botrylloides* sp. (grey).

##### *Botrylloides* sp. (red) sp.

1973 Ref - McCain, 1974 Recorded as *Botrylloides* sp. (red).  
1973 Ref - McCain, 1975 Recorded as *Botrylloides* sp. (red).

##### *Botrylloides nigrum*

1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
2007 Ref - Brock, 2007

#### Genus: *Botryllus*

##### *Botryllus* sp. Indigenous.

1975 Ref - Grovhoug, 1976 Recorded as *Botrylloides*.  
1978 Ref - Grovhoug, 1979 Recorded as *Botrylloides*.  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Cnemidocarpa*

##### *Cnemidocarpa irene* (Hartmeyer, 1906) Introduced.

2008 This Project

#### Genus: *Polyandrocarpa*

##### *Polyandrocarpa* sp. A

1996 Legacy Project (Coles et al., 1997)

##### *Polyandrocarpa* sp. B sp.

1996 Legacy Project (Coles et al., 1997)

##### *Polyandrocarpa sagamiensis*

2008 This Project Tokioka, 1953 Introduced.

##### *Polyandrocarpa zooritensis*

2008 This Project Van Name, 1931 Introduced.

#### Genus: *Polycarpa*

##### *Polycarpa* sp.

2008 This Project Indigenous.

##### *Polycarpa aurita*

2008 This Project (Sluiter, 1890) Indigenous.

##### *Polycarpa cryptocarpa*

2008 This Project (Sluiter, 1885) New record for Hawaii. Cryptogenic.

#### Genus: *Styela*

##### *Styela* sp.

1973 Ref - Evans et al., 1974

##### *Styela areoleata*

1975 Ref - Grovhoug, 1976 Heller, 1878

##### *Styela canopus*

2007 This Project Savigny, 1816 Introduced.  
2008 This Project

##### *Styela partita*

Unknown Spec - BPBM-Y 228 (Stimson, 1852) Scraped from bottom of U.S.S. Dobin. Identified by D.P.

Abbott.

1975 Ref - Grovhoug, 1976  
1976 Spec - BPBM-Y 239 Identified by P. Ching.

## Legacy Project - Species Report (Cont.)

- Styela partita?* (Stimson, 1852)  
1929 Spec - BPBM-Y 102
- Genus: *Symplegma*  
*Symplegma sp.* Tokioka, 1949 Indigenous.  
1929 Spec - BPBM-Y 110  
1996 Legacy Project (Coles et al., 1997)  
2008 This Project
- Symplegma oceania* Tokioka, 1961 Introduced.  
1975 Ref - Grovhoug, 1976 Recorded as *Symplegma connectans*.  
1978 Ref - Grovhoug, 1979 Recorded as *Symplegma connectans*.  
1996 Legacy Project (Coles et al., 1997)
- Symplegma reptans* Introduced.  
1996 Legacy Project (Coles et al., 1997)
- Class: THALIACEA  
Order: DOLIOLIDA  
Family: DOLIOLIDAE  
Genus: *Dolioum*  
*Dolioum sp.*  
1973 Ref - Evans et al., 1974
- Class: APPENDICULARIA  
Order: COPELATA  
Family: OIKOPLEURIDAE  
Genus: *Oikopleura*  
*Oikopleura sp.*  
1973 Ref - Evans et al., 1974
- Class: CHONDRICHTHYES  
Order: LAMNIFORMES  
Family: CARCHARHINIDAE  
Genus: *Carcharhinus*  
*Carcharhinus limbatus* (Valenciennes, 1841)  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979
- Genus: *Glyphis*  
*Glyphis granifera* Pease  
Unknown Spec - BPBM-MO 64518 Ford Island. Catalogue V.
- Family: SPHYRNIDAE  
Genus: *Sphyrna*  
*Sphyrna lewini* (Griffith & Smith, 1834)  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979  
1987 Ref - Brewer & Assoc., 1987
- Order: RAJIFORMES  
Family: MYLIOBATIDAE  
Genus: *Aetobatus*  
*Aetobatus nana* (Loman)  
1948 Spec - BPBM-S 7208 Identified by Koichiro Nakamura, 1985.  
1948 Spec - BPBM-S 8788 Drydock.
- Aetobatus narinari* (Euphrasen, 1790)  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979  
1987 Ref - Brewer & Assoc., 1987



## Legacy Project - Species Report (Cont.)

Class: ACTINOPTERYGII

Order: ELOPIFORMES

Family: ALBULIDAE

Genus: *Albula*

*Albula vulpes* (Linnaeus, 1758)

1973 Ref - Evans et al., 1974

Family: ELOPIDAE

Genus: *Elops*

*Elops hawaiiensis* Regan, 1909

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

2006 Ref - Smith et al., 2006 Recorded as *Elops hawaiiensis*.

Order: ANGUILLIFORMES

Family: CONGRIDAE

Genus: *Conger*

*Conger cinereus marginatus* Valenciennes, 1841

1973 Ref - Evans et al., 1974 Recorded as *C. marginatus*.

1978 Ref - Grovhoug, 1979 Recorded as *C. cinereus*.

Family: MURAENIDAE

Genus: *Gymnothorax*

*Gymnothorax* sp.

1979 Ref - AECOS, 1979 Off Pearl Harbor.

1986 Ref - Lenihan, 1990

1996 Legacy Project (Coles et al., 1997)

*Gymnothorax flavimarginatus* (Rüppell, 1828)

1973 Ref - Evans et al., 1974

*Gymnothorax petelli* (Bleeker, 1856)

1973 Ref - Evans et al., 1974

*Gymnothorax undulatus* (Lacépède, 1803)

1973 Ref - Evans et al., 1974

1973 Ref - McCain, 1974

1973 Ref - McCain, 1975

1978 Ref - Grovhoug, 1979

1987 Ref - Brewer & Assoc., 1987

1994 Ref - Brock, 1995

Order: CLUPEIFORMES

Family: Clupeidae

Genus: *Herklotsichthys*

*Herklotsichthys quadrimaculatus* (Rüppell, 1837)

2006 Ref - Smith et al., 2006

Family: ENGRAULIDAE

Genus: *Encrasicholina*

*Encrasicholina purpurea* Fowler, 1900

1961 Ref - Au, 1965 Recorded as *Stolephorus purpureus*.

1964 Spec - BPBM-I 25806

1973 Ref - Evans et al., 1974 Recorded as *Stolephorus purpureus* Fowler.

1978 Ref - Grovhoug, 1979 Recorded as *Stolephorus purpureus* Fowler.

1986 Ref - Somerton et al., 1993 Recorded as *Encrasicholina purpureus*.

1987 Ref - AECOS, 1987 Recorded as *Stolephorus purpureus* Fowler.

1993 Ref - Brock, 1994 Recorded as *Stolephorus purpureus*.

1994 Ref - Brock, 1995 Recorded as *Stolephorus purpureus*.

## Legacy Project - Species Report (Cont.)

### Order: MYCTOPHIFORMES

#### Family: SYNODONTIDAE

##### Genus: *Saurida*

##### *Saurida gracilis* (Quoy & Gaimard, 1824)

1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979  
1993 Ref - Brock, 1994  
2006 Ref - Smith et al., 2006

##### *Saurida nebulosa* Valenciennes, 1849

1992 Spec - BPBM-I 35396

##### Genus: *Synodus*

##### *Synodus sp.*

1996 Legacy Project (Coles et al., 1997)

##### *Synodus variegatus* (Lacépede, 1803)

1973 Ref - Evans et al., 1974

### Order: GONORYNCHIFORMES

#### Family: CHANIDAE

##### Genus: *Chanos*

##### *Chanos chanos* (Forsskål, 1775)

1973 Ref - Evans et al., 1974 Recorded as Chanos.  
1978 Ref - Grovhoug, 1979 Recorded as Chanos.  
1987 Ref - Brewer & Assoc., 1987 Recorded as Chanos.  
1993 Ref - Brock, 1994 Recorded as Chanos.  
1994 Ref - Brock, 1995 Recorded as Chanos.  
2006 Ref - Smith et al., 2006

### Order: LOPHIIFORMES

#### Family: ANTENNARIIDAE

##### Genus: *Antennarius*

##### *Antennarius commersoni*

1932 Spec - BPBM-I 3491 Near coral dock.

##### *Antennarius pictus* (Shaw & Nodder, 1974)

1923 Spec - BPBM-I 5144  
1973 Ref - Evans et al., 1974 Recorded as chironectes Lacepede.

##### Genus: *Antennatus*

##### *Antennatus tuberosus*

1962 Spec - BPBM-I 25788

### Order: GADIFORMES

#### Family: CARAPODIDAE

##### Genus: *Carapus*

##### *Carapus margaritiferae* (Rendahl, 1921)

1973 Ref - Evans et al., 1974

### Order: ATHERINIFORMES

#### Family: ATHERINIDAE

##### Genus: *Atherinomorus*

##### *Atherinomorus insularum* (Jordan and Evermann, 1903)

2006 Ref - Smith et al., 2006 Recorded as Pranesus insularum.

#### Family: BELONIDAE

##### Genus: *Tylosurus*

##### *Tylosurus crocodilus* (Peron & LeSueur, 1821)

1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979

## Legacy Project - Species Report (Cont.)

### Family: CYPRINODONTIDAE

#### Genus: *Fundulus*

<i>Fundulus grandis</i>		<b>Baird &amp; Girard, 1853</b>	Introduced.
1905	Ref - Brock, 1960		
1905	Ref - Maciolek, 1984		
1907	Ref - Van Dine, 1907		
1987	Ref - Randall, 1987		

### Family: HEMIRAMPHIDAE

#### Genus: *Hemiramphus*

<i>Hemiramphus depauperatus</i>		<b>Lay &amp; Bennett, 1839</b>	
1973	Ref - Evans et al., 1974		
1978	Ref - Grovhoug, 1979		
1987	Ref - Brewer & Assoc., 1987		

### Family: POECILIIDAE

#### Unidentified Poeciliidae

1996	Legacy Project (Coles et al., 1997)		
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#### Genus: *Gambusia*

<i>Gambusia affinis</i>		<b>(Baird &amp; Girard, 1853)</b>	Introduced.
1905	Ref - Brock, 1960		
1905	Ref - Maciolek, 1984		
1907	Ref - Van Dine, 1907		
1987	Ref - Randall, 1987		

#### Genus: *Poecilia*

<i>Poecilia latipinna</i>		<b>(LeSueur)</b>	Introduced.
1905	Ref - Brock, 1960		Recorded as <i>Mollienesia latipina</i> .
1905	Ref - Maciolek, 1984		Recorded as <i>Mollienesia latipina</i> .
1907	Ref - Van Dine, 1907		Recorded as <i>Poecilia latipinna</i> .
1973	Ref - Evans et al., 1974		
1987	Ref - Randall, 1987		Recorded as <i>Poecilia latipinna</i> .

### Order: POLYMIXIIFORMES

#### Family: HOLOCENTRIDAE

#### Genus: *Myripristis*

<i>Myripristis amaena</i>		<b>(Castelnau, 1873)</b>	
2006	Ref - Smith et al., 2006		Recorded as <i>Myripristis amaenus</i> .
<i>Myripristis berndti</i>		<b>Jordan &amp; Evermann, 1903</b>	
1973	Ref - Evans et al., 1974		Recorded as <i>murdjan</i> (Forsskal).
1978	Ref - Grovhoug, 1979		Recorded as <i>murdjan</i> (Forsskal).
1996	Legacy Project (Coles et al., 1997)		

#### Genus: *Neoniphon*

<i>Neoniphon sammara</i>		<b>(Forsskål, 1775)</b>	
1973	Ref - Evans et al., 1974		Recorded as <i>Flammeo sammara</i> (Forsskal).
1978	Ref - Grovhoug, 1979		Recorded as <i>Flammeo sammara</i> (Forsskal).

#### Genus: *Sargocentron*

<i>Sargocentron diadema</i>		<b>(Lacepede, 1802)</b>	Hawaiian name(s): 'ala 'ihi kalaloo. NE side of West Loch channel.
1996	Spec - BPBM-I 37326		
<i>Sargocentron punctatissimum</i>		<b>(Cuvier in Cuvier and Valenciennes, 1829)</b>	
2006	Ref - Smith et al., 2006		Recorded as <i>Adioryx lacteoguttatus</i> .
2006	Ref - Smith et al., 2006		

### Order: GASTEROSTEIFORMES

#### Family: AULOSTOMIDAE

#### Genus: *Aulostomus*

<i>Aulostomus chinensis</i>		<b>(Linnaeus, 1766)</b>	
1973	Ref - Evans et al., 1974		

## Legacy Project - Species Report (Cont.)

1996 Legacy Project (Coles et al., 1997)

### Family: SYNGNATHIDAE

#### Genus: *Doryrhamphus*

*Doryrhamphus exisis* (Kaup, 1856)  
1996 Legacy Project (Coles et al., 1997)

#### Genus: *Hippocampus*

*Hippocampus kuda* (Bleeker, 1852)  
1924 Spec - BPBM-I 3787  
2007 Ref - Brock, 2007

#### Genus: *Micrognathus*

*Micrognathus edmondsoni?* (Pietschmann, 1930)  
1973 Ref - Evans et al., 1974

### Order: SCORPAENIFORMES

#### Family: SCORPAENIDAE

#### Genus: *Brachirus*

*Brachirus barberi* (Eschmeyer & Randall)  
1973 Ref - Evans et al., 1974

#### Genus: *Scorpaenopsis*

*Scorpaenopsis diabolus* (Cuvier, 1829)  
1973 Ref - Evans et al., 1974 Recorded as *S. diabolus* (Eschmeyer & Anderson).

*Scorpaenopsis gibbosa* (Bloch & Snyder, 1801)  
1979 Ref - AECOS, 1979 Off Pearl Harbor. Recorded as *S. gibbosus*.

#### Genus: *Sebastapistes*

*Sebastapistes coniota* (Jenkins, 1903)  
1973 Ref - Evans et al., 1974 Recorded as *Scorpaena coniota* (Jenkins).

### Order: PERCIFORMES

#### Family: ACANTHURIDAE

#### Genus: *Acanthurus*

*Acanthurus blochi* (Cuvier, 1829) Indigenous. Common name(s): Ringtail Surgeonfish;  
Hawaiian name(s): pualu.  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006 Recorded as *Acanthurus blochii*.  
2008 This Project

*Acanthurus dussumieri* Cuvier & Valenciennes, 1835 Indigenous. Common name(s): Eyestripe Surgeonfish;  
Hawaiian name(s): palani.

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979  
1986 Ref - Lenihan, 1990  
2006 Ref - Smith et al., 2006  
2008 This Project

*Acanthurus guttatus* (Bloch & Schneider, 1801)  
1996 Legacy Project (Coles et al., 1997)

*Acanthurus leucopareius* (Jenkins, 1903) Indigenous. Common name(s): Whitebar Surgeonfish;  
Hawaiian name(s): māikoko.  
2008 This Project

*Acanthurus mata* (Cuvier, 1829)  
1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979  
1986 Ref - Lenihan, 1990

## Legacy Project - Species Report (Cont.)

<b><i>Acanthurus nigrofuscus</i></b>	<b>(Forsskål, 1775)</b>	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Acanthurus olivaceus</i></b>	<b>(Bloch &amp; Schneider, 1801)</b>	
1973	Ref - Evans et al., 1974	
<b><i>Acanthurus triostegus</i></b>	<b>(Linnaeus, 1758)</b>	<b>Indigenous. Common name(s): Convict Tang; Hawaiian name(s): palani.</b>
1973	Ref - Evans et al., 1974	
1973	Ref - McCain, 1974	
1973	Ref - McCain, 1975	
1979	Ref - AECOS, 1979	Off Pearl Harbor. Recorded as <i>A. triostegus sandvicensis</i> .
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	
2007	This Project	
2008	This Project	
<b><i>Acanthurus xanthopterus</i></b>	<b>Cuvier &amp; Valenciennes, 1835</b>	
1973	Ref - Evans et al., 1974	
1973	Ref - McCain, 1974	
1973	Ref - McCain, 1975	
1978	Ref - Grovhoug, 1979	
1986	Ref - Lenihan, 1990	
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	
<b>Genus: <i>Ctenochaetus</i></b>		
<b><i>Ctenochaetus strigosus</i></b>	<b>(Bennett, 1828)</b>	
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	
<b>Genus: <i>Naso</i></b>		
<b><i>Naso brevirostris</i></b>	<b>(Valenciennes, 1835)</b>	
1978	Ref - Grovhoug, 1979	
1986	Ref - Lenihan, 1990	
1996	Legacy Project (Coles et al., 1997)	
<b><i>Naso lituratus</i></b>	<b>(Forster and Schneider, 1801)</b>	
2006	Ref - Smith et al., 2006	
<b><i>Naso unicornis</i></b>	<b>(Forsskål, 1775)</b>	<b>Indigenous. Common name(s): Bluespine Unicornfish; Hawaiian name(s): kala.</b>
1973	Ref - Evans et al., 1974	
1986	Ref - Lenihan, 1990	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
<b>Genus: <i>Zanclus</i></b>		
<b><i>Zanclus cornutus</i></b>	<b>(Linnaeus, 1758)</b>	<b>Indigenous. Common name(s): Moorish Idol; Hawaiian name(s): kīhikihi.</b>
1973	Ref - Evans et al., 1974	Recorded as <i>canescens</i> (Linnaeus).
1978	Ref - Grovhoug, 1979	
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	

## Legacy Project - Species Report (Cont.)

**Genus: *Zebrasoma***  
***Zebrasoma flavescens*** (Bennett, 1828) Indigenous. Common name(s): Yellow Tang; Hawaiian name(s): lau-i-pala.

1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006  
 2007 This Project

***Zebrasoma veliferum*** (Bloch, 1797)

1973 Ref - Evans et al., 1974  
 1986 Ref - Lenihan, 1990  
 2006 Ref - Smith et al., 2006

### Family: APOGONIDAE

**Genus: *Apogon***

***Apogon sp.***

1986 Ref - Lenihan, 1990

***Apogon kallopterus*** (Bleeker, 1856)

1973 Ref - Evans et al., 1974 Recorded as snyderi, Jordan and Evermann.  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006

***Apogon snyderi*** (Jordan & Evermann, 1903)

1978 Ref - Grovhoug, 1979

**Genus: *Foa***

***Foa brachygramma*** (Jenkins, 1903) Hawaiian name(s): 'upapalu.

1973 Ref - Evans et al., 1974 Recorded as brachygrammus (Jenkins).  
 1978 Ref - Grovhoug, 1979  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Spec - BPBM-I 37322 West Loch; Oyster Reef.  
 2006 Ref - Smith et al., 2006

### Family: BLENNIIDAE

**Unidentified Blenniidae**

1987 Ref - Brewer & Assoc., 1987  
 2008 This Project

**Genus: *Cirripectus***

***Cirripectus vanderbilti*** (Fowler, 1938)

1996 Legacy Project (Coles et al., 1997)

**Genus: *Entomacrodus***

***Entomacrodus marmoratus*** (Bennett, 1928)

1973 Ref - Evans et al., 1974

**Genus: *Exallias***

***Exallias sp.***

1994 Ref - Brock, 1995

***Exallias brevis*** (Kner, 1868)

1973 Ref - Evans et al., 1974

**Genus: *Omobranchus***

***Omobranchus elongatus*** (Peters, 1855)

1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979  
 1996 Spec - BPBM-I 37320 NE side of West Loch channel.

## Legacy Project - Species Report (Cont.)

### Family: CARANGIDAE

#### Genus: *Carangoides*

*Carangoides gymnostethoides* **Bleeker, 1852**  
1973 Ref - Evans et al., 1974

#### Genus: *Caranx*

*Caranx sp.*  
1996 Legacy Project (Coles et al., 1997)

#### *Caranx ignobilis* **(Forsskål, 1775)**

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
2006 Ref - Smith et al., 2006

#### *Caranx mate* **Cuvier & Valenciennes, 1833**

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979

#### *Caranx melampygus* **Cuvier & Valenciennes, 1833**

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979  
1986 Ref - Lenihan, 1990  
1987 Ref - Brewer & Assoc., 1987  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995  
1996 Legacy Project (Coles et al., 1997)

#### *Caranx sexfasciatus* **Quoy & Gaimard, 1825**

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979

#### Genus: *Decapterus*

*Decapterus macarellus* **(Cuvier, 1833)**  
2006 Ref - Smith et al., 2006

#### Genus: *Gnathanodon*

*Gnathanodon speciosus* **(Forsskål, 1775)** **Indigenous. Common name(s): Golden Trevally;**  
**Hawaiian name(s): ulua** **pa'opa'o.**

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006  
2008 This Project

#### Genus: *Scomberoides*

#### *Scomberoides laysan* **(Forsskål, 1775)**

1993 Ref - Brock, 1994 Recorded as *Scrombroides laysan*.  
1994 Ref - Brock, 1995 Recorded as *Scrombroides laysan*.

#### *Scomberoides sanct-petri* **(Cuvier, 1831)**

1973 Ref - Evans et al., 1974

## Legacy Project - Species Report (Cont.)

### Family: CHAETODONTIDAE

#### Genus: *Chaetodon*

***Chaetodon auriga*** Forsskål, 1775 Indigenous. Common name(s): Threadfin Butterflyfish.

1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979  
 1986 Ref - Lenihan, 1990  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006  
 2007 This Project  
 2008 This Project

***Chaetodon ephippium*** Cuvier, 1831

1978 Ref - Grovhoug, 1979  
 1986 Ref - Lenihan, 1990  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006

***Chaetodon lineolatus*** Cuvier, 1831

1993 Ref - Brock, 1994

***Chaetodon lunula*** (Lacépede, 1802)

1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979  
 1986 Ref - Lenihan, 1990  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006

***Chaetodon lunulatus*** Quoy and Gaimard, 1825

2006 Ref - Smith et al., 2006

***Chaetodon miliaris*** Quoy & Gaimard, 1824

1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979  
 1996 Legacy Project (Coles et al., 1997)

#### Genus: *Forcipiger*

***Forcipiger flavissimus*** Jordan & McGregor, 1898

1996 Legacy Project (Coles et al., 1997)

#### Genus: *Heniochus*

***Heniochus diphreutes*** Jordan, 1903

1973 Ref - Evans et al., 1974 Recorded as acuminatus (Linnaeus).

### Family: Cheilodactylidae

#### Genus: *Goniistius*

***Goniistius vittatus*** (Garrett, 1864)

2006 Ref - Smith et al., 2006 Recorded as Cheilodactylus vittatus.

### Family: CICHLIDAE

#### Genus: *Oreochromis*

***Oreochromis mossambicus*** (Peters, 1852) Introduced.

1973 Ref - Evans et al., 1974 Recorded as Tilapia mossambica (Peters).  
 1973 Ref - McCain, 1974 Recorded as Tilapia mossambica.  
 1973 Ref - McCain, 1975 Recorded as Tilapia mossambica.  
 1987 Ref - AECOS, 1987 Recorded as Sarotherodon mossambica (Peters).  
 1994 Ref - Brock, 1995 Recorded as Tilapia mossambica (Peters).  
 1996 Legacy Project (Coles et al., 1997)

#### Genus: *Sarotherodon*

***Sarotherodon melanopleura*** (Rüppell, 1852)

1993 Ref - Brock, 1994 Recorded as Tilapia melanopleura.



## Legacy Project - Species Report (Cont.)

1994	Ref - Brock, 1995	Recorded as <i>Tilapia melanopleura</i> .
<b><i>Sarotherodon melanotheron</i></b>		
	<b>Ruppell, 1852</b>	
1987	Ref - Randall, 1987	Recorded as <i>Tilapia melanotheron</i> .
1996	Spec - BPBM-I 37324	Middle Loch; under hull of U.S.S. "Machinist" Floating Drydock.
2006	Ref - Smith et al., 2006	Recorded as <i>Tilapia melanotheron</i> .
2007	Ref - Brock, 2007	Recorded as <i>Tilapia melanotheron</i> .
<b>Family: GOBIIDAE</b>		
<b>Unidentified Gobiidae</b>		
1996	Legacy Project (Coles et al., 1997)	
<b>Genus: <i>Asterropteryx</i></b>		
<b><i>Asterropteryx semipunctatus</i></b>		
	<b>Rüppell, 1821</b>	
1973	Ref - Evans et al., 1974	
1978	Ref - Grovhoug, 1979	
1986	Ref - Lenihan, 1990	
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Spec - BPBM-I 37315	Middle Loch; W side of Waiawa Peninsula; near pier (Pan Am Clipper Dock); along shoreline. W side of Middle Loch channel.
1996	Spec - BPBM-I 37316	
2006	Ref - Smith et al., 2006	
2007	Ref - Brock, 2007	
<b>Genus: <i>Bathygobius</i></b>		
<b><i>Bathygobius cocosensis</i></b>		
	<b>(Bleeker, 1854)</b>	<b>Hawaiian name(s): 'o'opu 'ohune.</b>
1973	Ref - Evans et al., 1974	Recorded as <i>fuscus</i> (Ruppell).
1986	Ref - Lenihan, 1990	Recorded as <i>B. fuscus</i> (Ruppell).
1993	Ref - Brock, 1994	Recorded as <i>B. fuscus</i> .
1994	Ref - Brock, 1995	Recorded as <i>B. fuscus</i> .
1996	Spec - BPBM-I 37313	Rainbow Bay Marina; docks and shoreline.
1996	Spec - BPBM-I 37317	Sheet piling in thermal discharge from Hawaiian Electric Company (HECO); Waiau Plant.
1996	Spec - BPBM-I 37319	Middle Loch; on wooden pilings near U.S.S. "Machinist" Floating Drydock.
1996	Spec - BPBM-I 37321	Middle Loch; on hull of U.S.S. "Machinist" Floating Drydock.
<b><i>Bathygobius cotticeps</i></b>		
1987	Ref - AECOS, 1987	<b>Steindachner, 1880</b>
<b><i>Bathygobius fuscus</i></b>		
2006	Ref - Smith et al., 2006	<b>(Rüppell, 1830)</b>
<b>Genus: <i>Ctenogobius</i></b>		
<b><i>Ctenogobius tongarevae</i></b>		
	<b>(Fowler, 1927)</b>	
1973	Ref - Evans et al., 1974	
1978	Ref - Grovhoug, 1979	
<b>Genus: <i>Eviota</i></b>		
<b><i>Eviota epiphanes</i></b>		
1996	Spec - BPBM-I 37314	<b>Jenkins, 1903</b> N side of entrance channel.
<b>Genus: <i>Gnatholepis</i></b>		
<b><i>Gnatholepis anjerensis</i></b>		
1973	Ref - Evans et al., 1974	<b>Bleeker, 1850</b>
1978	Ref - Grovhoug, 1979	
<b>Genus: <i>Mugilogobius</i></b>		
<b><i>Mugilogobius cavifrons</i></b>		
1991	Spec - BPBM-I 34997	<b>(Weber, 1909)</b> Drainage area E of Blaisdell Park.
<b><i>Mugilogobius parvus</i></b>		
	<b>(Oshima, 1919)</b>	<b>Introduced.</b>
1987	Ref - Randall et al., 1993	
1994	Ref - Eldredge, 1994	

## Legacy Project - Species Report (Cont.)

### Genus: *Opua*

*Opua nephodes* Jordan, 1925  
 1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979

### Genus: *Oxyurichthys*

*Oxyurichthys lonchotus* (Jenkins, 1903)  
 1973 Ref - Evans et al., 1974

### Genus: *Psilogobius*

*Psilogobius mainlandi* Baldwin, 1972  
 1986 Ref - Lenihan, 1990  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995

### Family: KUHLIIDAE

#### Genus: *Kuhlia*

*Kuhlia sandvicensis* (Steindachner, 1876) Indigenous. Common name(s): Hawaiian Flagtail;  
 Hawaiian name(s): āholehole.

1973 Ref - Evans et al., 1974  
 1973 Ref - McCain, 1974  
 1973 Ref - McCain, 1975  
 1978 Ref - Grovhoug, 1979  
 1986 Ref - Lenihan, 1990  
 1987 Ref - Brewer & Assoc., 1987  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)  
 2008 This Project

### Family: KYPHOSIDAE

#### Genus: *Kyphosus*

*Kyphosus bigibbus* (Lacépède, 1802)  
 1973 Ref - Evans et al., 1974 Recorded as cinerascens (Forsskal).

#### Genus: *Microcanthus*

*Microcanthus strigatus* Cuvier & Valenciennes, 1831  
 1973 Ref - Evans et al., 1974  
 1996 Legacy Project (Coles et al., 1997)

### Family: LABRIDAE

#### Genus: *Anampses*

*Anampses cuvieri?* Quoy & Gaimard, 1824  
 1979 Ref - AECOS, 1979 Off Pearl Harbor.

#### Genus: *Cheilinus*

*Cheilinus bimaculatus* Valenciennes, 1840  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995

#### Genus: *Cheilio*

*Cheilio inermis* (Forsskål, 1775)  
 1973 Ref - Evans et al., 1974  
 1986 Ref - Lenihan, 1990

#### Genus: *Coris*

*Coris flavovita* Bennett, 1929  
 1996 Legacy Project (Coles et al., 1997)

#### Genus: *Gomphosus*

*Gomphosus varius* Lacépède, 1801  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006

## Legacy Project - Species Report (Cont.)

- Genus: *Labroides***  
***Labroides phthirophagus***                      **Randall, 1958**    **Indigenous. Common name(s): Cleaner Wrasse.**  
 1973    Ref - Evans et al., 1974  
 1996    Legacy Project (Coles et al., 1997)  
 2008    This Project
- Genus: *Oxycheilinus***  
***Oxycheilinus unifasciatus***                      **(Streets, 1877)**  
 2006    Ref - Smith et al., 2006
- Genus: *Stethojulis***  
***Stethojulis balteata***                      **(Quoy & Gaimard, 1824)**    **Indigenous. Common name(s): Belted Wrasse;**  
**Hawaiian**                      **name(s): ōmaka.**  
 1973    Ref - Evans et al., 1974                      Recorded as balteatus (Quoy and Gaimard).  
 1978    Ref - Grovhoug, 1979  
 1996    Legacy Project (Coles et al., 1997)  
 2007    This Project
- Genus: *Thalassoma***  
***Thalassoma duperrey***                      **(Quoy & Gaimard, 1824)**    **Indigenous. Common name(s): Saddle Wrasse;**  
**Hawaiian**                      **name(s): hīnālea lau-wili.**  
 1996    Legacy Project (Coles et al., 1997)  
 2006    Ref - Smith et al., 2006  
 2008    This Project
- Thalassoma umbrostigma***                      **(Rüppell, 1838)**  
 1979    Ref - AECOS, 1979                      Off Pearl Harbor.
- Family: LUTJANIDAE**  
**Genus: *Lutjanus***  
***Lutjanus fulvus***                      **(Bloch & Schneider)**    **Introduced. Common name(s): Blacktail Snapper;**  
**Hawaiian**                      **name(s): to'au.**  
 1973    Ref - Evans et al., 1974  
 1973    Ref - McCain, 1974  
 1973    Ref - McCain, 1975  
 1993    Ref - Brock, 1994  
 1994    Ref - Brock, 1995  
 1996    Spec - BPBM-I 37323                      West Loch; Oyster Reef.  
 1996    Legacy Project (Coles et al., 1997)  
 2006    Ref - Smith et al., 2006  
 2007    This Project  
 2008    This Project
- Family: MUGILIDAE**  
**Genus: *Chelon***  
***Valamugil engli***                      **(Bleeker, 1858)**  
 1993    Ref - Brock, 1994                      Recorded as Chelon engli.  
 1994    Ref - Brock, 1995                      Recorded as Chelon engli.
- Genus: *Moolgarda***  
***Moolgarda engeli***                      **(Bleeker, 1858)**  
 2006    Ref - Smith et al., 2006                      Recorded as Vulamugil engeli.
- Genus: *Mugil***  
***Mugil cephalus***                      **Linnaeus, 1758**  
 1973    Ref - Evans et al., 1974  
 1973    Ref - McCain, 1974  
 1973    Ref - McCain, 1975  
 1978    Ref - Grovhoug, 1979  
 1986    Ref - Lenihan, 1990  
 1993    Ref - Brock, 1994  
 1994    Ref - Brock, 1995

## Legacy Project - Species Report (Cont.)

1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006

### Family: MULLIDAE

#### Genus: *Mulloidichthys*

*Mulloidichthys auriflamma* Forsskål, 1775  
1973 Ref - Evans et al., 1974

*Mulloidichthys flavolineatus* (Lacépède, 1801)  
1973 Ref - Evans et al., 1974 Recorded as samoensis (Gunther).  
1978 Ref - Grovhoug, 1979 Recorded as samoensis (Gunther).  
1986 Ref - Lenihan, 1990 Recorded as M. samoensis (Gunther).  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006

*Mulloidichthys vanicolensis* Valenciennes, 1831 Indigenous. Common name(s): Yellowfin Goatfish;  
Hawaiian name(s): weke 'ula.

1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006

#### Genus: *Parupeneus*

*Parupeneus bifasciatus* (Lacepède, 1802)  
2006 Ref - Smith et al., 2006

*Parupeneus cyclostomus* (Lacepède, 1801)  
2006 Ref - Smith et al., 2006

*Parupeneus multifasciatus* (Quoy and Gaimard, 1825) Indigenous. Common name(s): Manybar  
Goatfish; Hawaiian name(s): moana.

2007 This Project

*Parupeneus mutifasciatus* Quoy & Gaimard, 1824  
1996 Legacy Project (Coles et al., 1997)

*Parupeneus pleurostigma* (Bennett, 1830)  
1973 Ref - Evans et al., 1974  
1978 Ref - Grovhoug, 1979

*Parupeneus porphyreus* Jenkins, 1903  
1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979  
1996 Legacy Project (Coles et al., 1997)  
2006 Ref - Smith et al., 2006

#### Genus: *Upeneus*

*Upeneus arge* Jordan & Evermann, 1903

1973 Ref - Evans et al., 1974  
1973 Ref - McCain, 1974  
1973 Ref - McCain, 1975  
1978 Ref - Grovhoug, 1979  
1986 Ref - Lenihan, 1990  
1993 Ref - Brock, 1994  
1994 Ref - Brock, 1995

*Upeneus taeniopterus* (Cuvier, 1829) Hawaiian name(s): weke pahulu; weke pueo.  
1996 Spec - BPBM-I 37325 NE side of West Loch channel.

*Upeneus vittatus* (Forsskål, 1775)  
1992 Spec - BPBM-I 35395  
1993 Spec - BPBM-I 37064

## Legacy Project - Species Report (Cont.)

### Family: POLYNEMIDAE

#### Genus: *Polydactylus*

##### *Polydactylus sexfilis*

(Cuvier & Valenciennes, 1831)

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

### Family: POMACANTHIDAE

#### Genus: *Pomacanthus*

##### *Pomacanthus imperator*

(Bloch, 1787)

2006 Ref - Smith et al., 2006

### Family: POMACENTRIDAE

#### Genus: *Abudefduf*

##### *Abudefduf abdominalis*

(Quoy & Gaimard, 1824) Indigenous. Common name(s): Hawaiian

Sergeant; Hawaiian

name(s): mamo.

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

1986 Ref - Lenihan, 1990

1994 Ref - Brock, 1995

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2007 This Project

2008 This Project

##### *Abudefduf sordidus*

(Forsskål, 1775)

1973 Ref - Evans et al., 1974

1986 Ref - Lenihan, 1990

2006 Ref - Smith et al., 2006

#### Genus: *Dascyllus*

##### *Dascyllus albisella*

Gill, 1862 Indigenous. Common name(s): Hawaiian Dascyllus; Hawaiian

name(s): mamo.

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

1996 Legacy Project (Coles et al., 1997)

2006 Ref - Smith et al., 2006

2007 Ref - Brock, 2007

2007 This Project

2008 This Project

### Family: PRIACANTHIDAE

#### Genus: *Heteropriacanthus*

##### *Heteropriacanthus cruentatus*

(Lacepede, 1801)

1973 Ref - Evans et al., 1974

Recorded as Priacanthus cruentatus (Lacepede).

1986 Ref - Lenihan, 1990

Recorded as Priacanthus cruentatus (Lacepede).

2006 Ref - Smith et al., 2006

### Family: SCARIDAE

#### Genus: *Calotomus*

##### *Calotomus carolinus*

(Valenciennes in Cuvier and Valenciennes, 1840)

2006 Ref - Smith et al., 2006

##### *Calotomus spinidens*

(Quoy & Gaimard, 1824)

1973 Ref - Evans et al., 1974

1978 Ref - Grovhoug, 1979

#### Genus: *Chlorurus*

##### *Chlorurus psittacus*

(Forsskål, 1775)

1996 Spec - BPBM-I 37327

NE of Ford Island.

2006 Ref - Smith et al., 2006

Recorded as Scarus psittacus.

##### *Chlorurus sordidus*

(Forsskål, 1775) Hawaiian name(s): uhu.

1973 Ref - Evans et al., 1974

Recorded as Scarus sordidus Forsskal.

## Legacy Project - Species Report (Cont.)

1993	Ref - Brock, 1994	Recorded as <i>Scarus sordidus</i> .
1994	Ref - Brock, 1995	Recorded as <i>Scarus sordidus</i> .
2006	Ref - Smith et al., 2006	Recorded as <i>Scarus sordidus</i> .
2007	Ref - Brock, 2007	Recorded as <i>Scarus sordidus</i> .

**Genus: *Scarus***

***Scarus sp.***

1973	Ref - Evans et al., 1974
1986	Ref - Lenihan, 1990
1996	Legacy Project (Coles et al., 1997)
2008	This Project

**Indigenous. Common name(s): Parrotfish.**  
juvenile.

***Scarus rubroviolaceus***

2006	Ref - Smith et al., 2006
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**Bleeker, 1849**

**Family: SPHYRAENIDAE**

**Genus: *Sphyraena***

***Sphyraena barracuda***

1973	Ref - Evans et al., 1974
1973	Ref - McCain, 1974
1973	Ref - McCain, 1975
1978	Ref - Grovhoug, 1979
1987	Ref - AECOS, 1987
1993	Ref - Brock, 1994
1994	Ref - Brock, 1995
1996	Legacy Project (Coles et al., 1997)
2006	Ref - Smith et al., 2006

**(Walbaum, 1792)**

**Order: PLEURONECTIFORMES**

**Family: BOTHIDAE**

**Genus: *Bothus***

***Bothus pantherinus***

1973	Ref - Evans et al., 1974
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**(Rüppell, 1830)**

**Order: TETRAODONTIFORMES**

**Family: DIODONTIDAE**

**Genus: *Diodon***

***Diodon holocanthus***

1973	Ref - Evans et al., 1974
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**Linnaeus, 1758**

***Diodon hystrix***

1973	Ref - Evans et al., 1974
1978	Ref - Grovhoug, 1979
1979	Ref - AECOS, 1979
1996	Legacy Project (Coles et al., 1997)
2006	Ref - Smith et al., 2006
2008	This Project

**Linnaeus, 1758**

**Indigenous. Common name(s): Spiny Balloonfish.**

Off Pearl Harbor. Recorded as *D. hystrix*.

**Family: MONACANTHIDAE**

**Genus: *Pervagor***

***Pervagor spilosoma***

1973	Ref - Evans et al., 1974
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**(Lay & Bennett, 1839)**

**Family: OSTRACIIDAE**

**Genus: *Lactoria***

***Lactoria fornasini***

1996	Legacy Project (Coles et al., 1997)
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**(Bianconi, 1846)**

**Genus: *Ostracion***

***Ostracion meleagris***

**Boxfish; Hawaiian**

2008	This Project
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**(Shaw and Nodder, 1796) Indigenous. Common name(s): Spotted  
name(s): moa.**

## Legacy Project - Species Report (Cont.)

*Ostracion meleagris camurum* (Jenkins, 1901)  
 1973 Ref - Evans et al., 1974  
 1978 Ref - Grovhoug, 1979  
 1996 Legacy Project (Coles et al., 1997)

**Family: TETRAODONTIDAE**

**Genus: *Arothron***

***Arothron* sp.**

**Hawaiian name(s): makimaki.**

1949 Spec - BPBM-I 25886  
 1996 Spec - BPBM-I 37318  
 Company (HECO) Sheet piling in thermal discharge from Hawaiian Electric  
 Waiau Plant.

***Arothron hispidus***

**(Linnaeus, 1758) Indigenous. Common name(s): Stripebelly Puffer;**

**Hawaiian name(s):**

**‘o‘opu-hue.**

1973 Ref - Evans et al., 1974  
 1973 Ref - McCain, 1974  
 1973 Ref - McCain, 1975  
 1978 Ref - Grovhoug, 1979  
 1986 Ref - Lenihan, 1990  
 1993 Ref - Brock, 1994  
 1994 Ref - Brock, 1995  
 1996 Legacy Project (Coles et al., 1997)  
 2006 Ref - Smith et al., 2006  
 2007 Ref - Brock, 2007  
 2007 This Project  
 2008 This Project

**Genus: *Canthigaster***

***Canthigaster coronata***

**(Vallant & Sauvage, 1875)**

1973 Ref - Evans et al., 1974 Canthigaster coronatus ( Randall, P.C.).

***Canthigaster jactator***

**(Jenkins, 1901) Indigenous. Common name(s): Whitespotted Toby.**

1973 Ref - Evans et al., 1974  
 2008 This Project

**Class: REPTILIA**

**Family: Chelonidae**

**Genus: *Chelonia***

***Chelonia mydas***

**(Linnaeus, 1758)**

2007 Ref - Brock, 2007