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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

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IN PEARL HARBOR, HONOLULU HARBOR, AND
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O'AHU, HAWAI'I**

I

Final Report prepared for the Department of Defense Legacy Program

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*Bernice Pauahi Bishop Museum
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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taxonomic level, and results were added to the lists determined by the previous study and other published and unpublished marine biological surveys conducted in Pearl Harbor, published taxonomic descriptions of organisms collected from the harbor and Pearl Harbor specimens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 18th 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 19th 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 20th 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

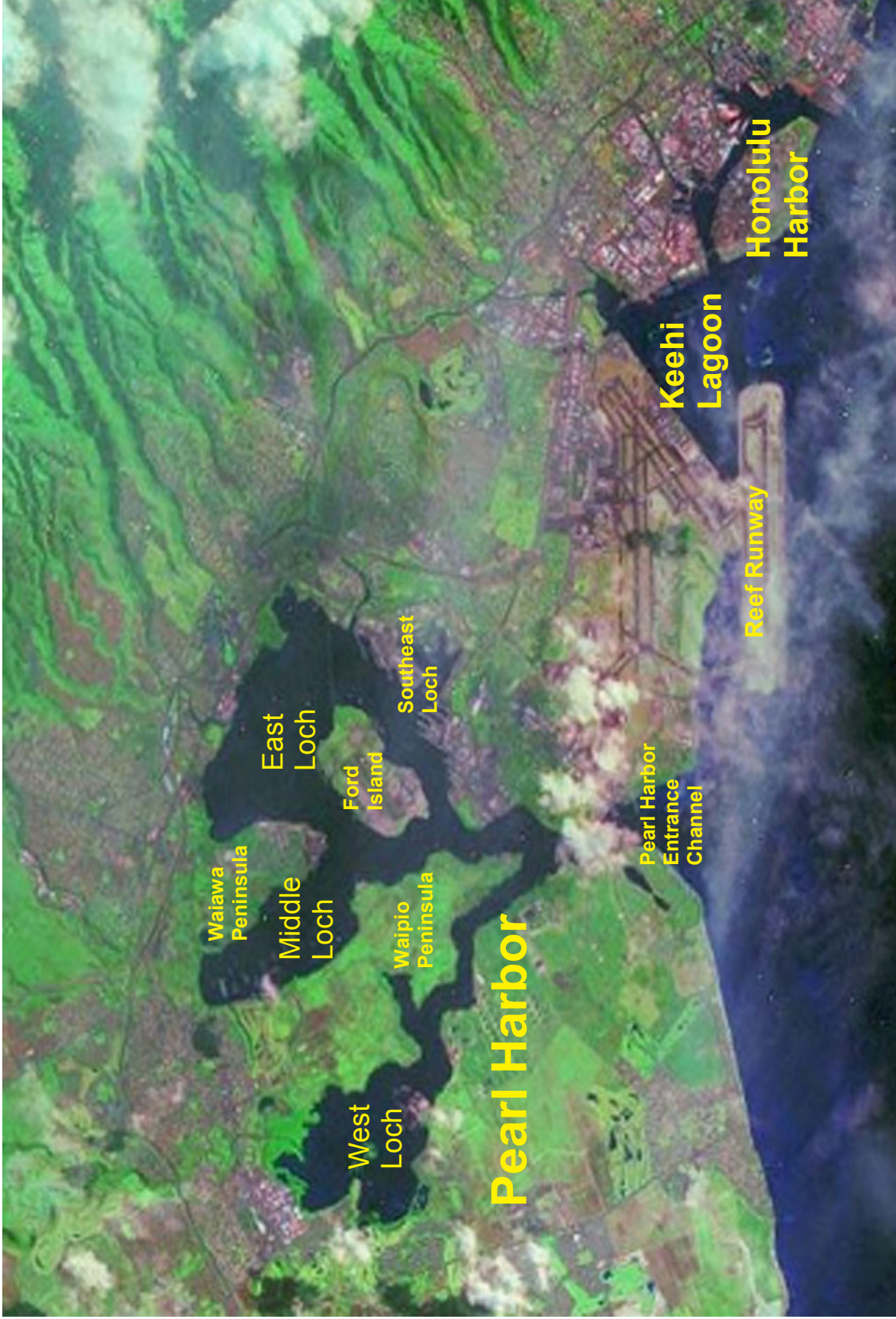


Figure 1. Aerial perspective of Pearl Harbor, Honolulu Harbor and Ke'e-hi Lagoon. Source: <http://terrainmap.com>.

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 20th 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 m³/day and City and County of Honolulu sewage discharges averaged 34,000 m³/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

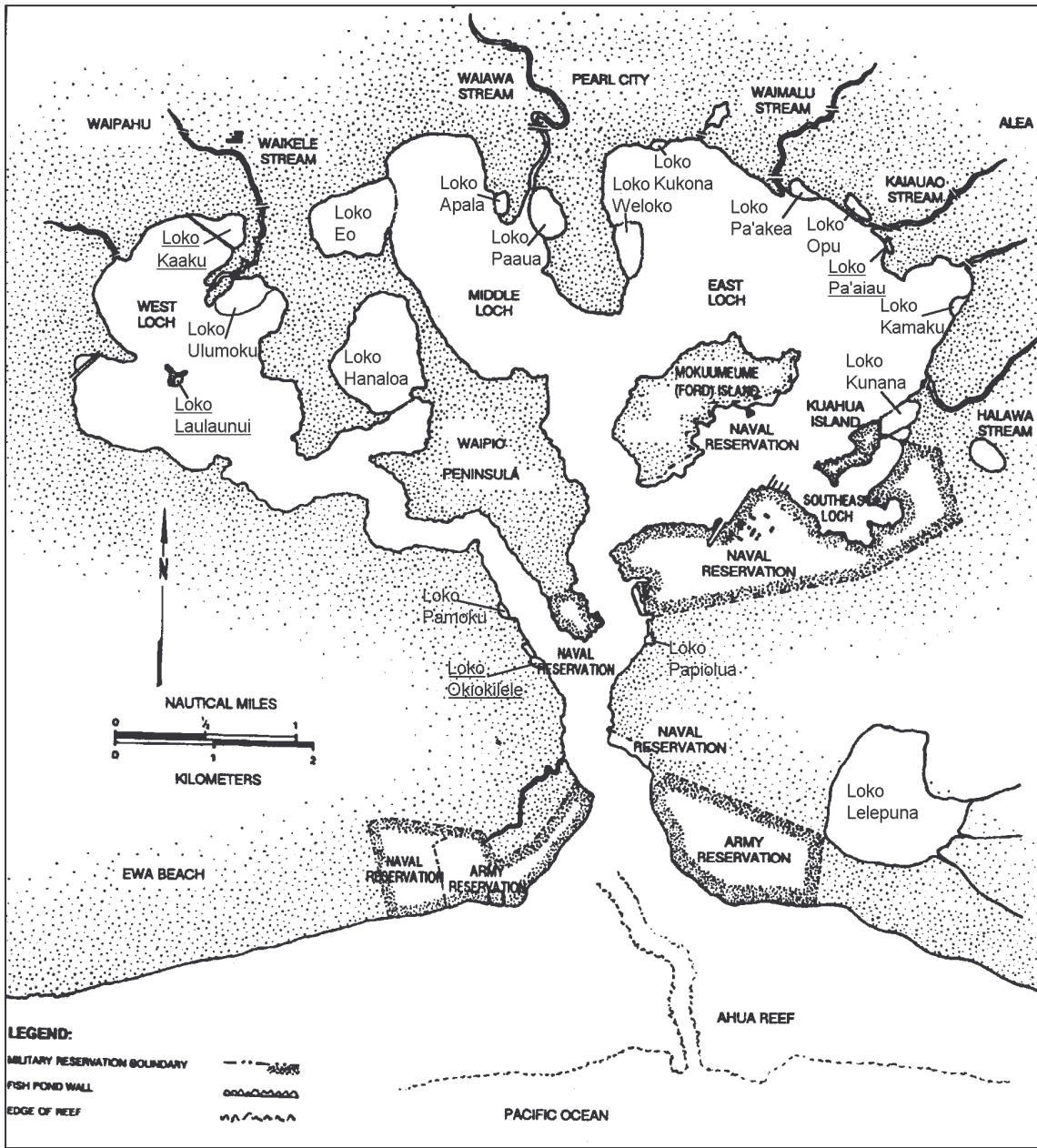


Figure 2. Pearl Harbor in ca. 1920, showing many of the fish ponds that still remained after the initial development of the naval base. Of these only the four underlined still existed in 1972 (adapted from Grovhoug, 1992 and based on an undated O’ahu Fisheries chart).

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 20th 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.

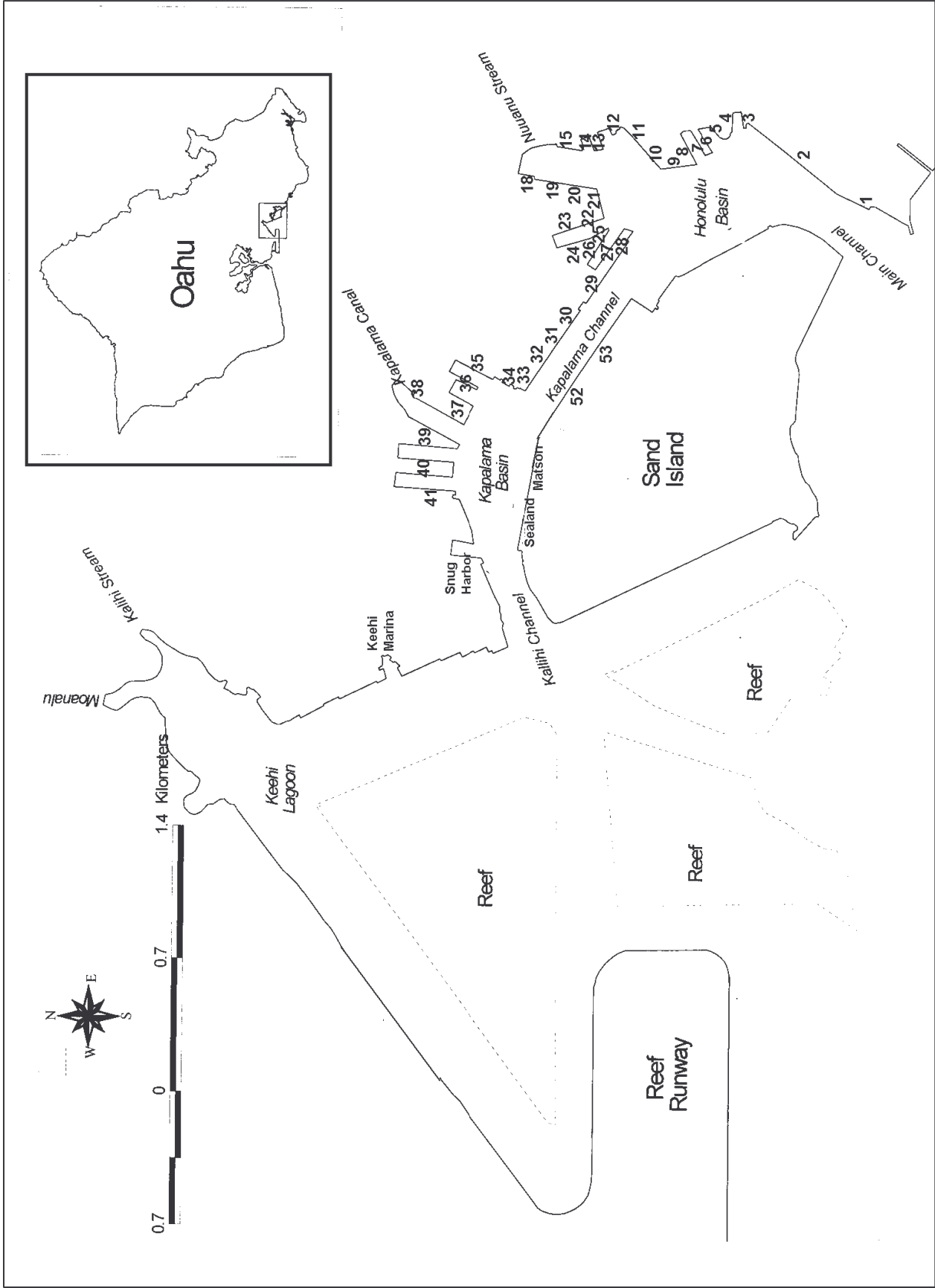


Figure 3. Map of Honolulu Harbor and Ke'ehi Lagoon showing Pier locations.

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 19th 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).

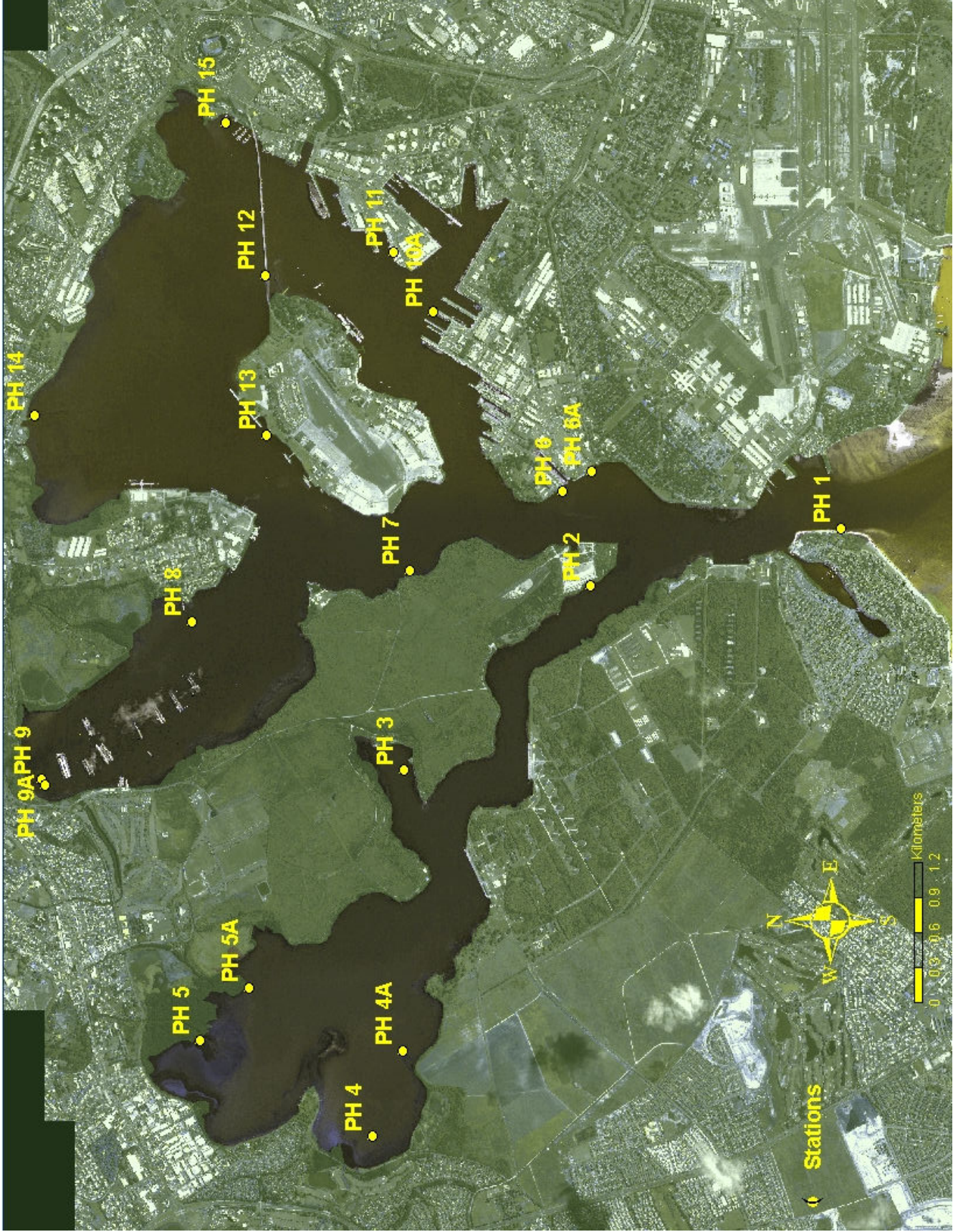


Figure 4. Pearl Harbor 1996 and 2008 sampling stations.

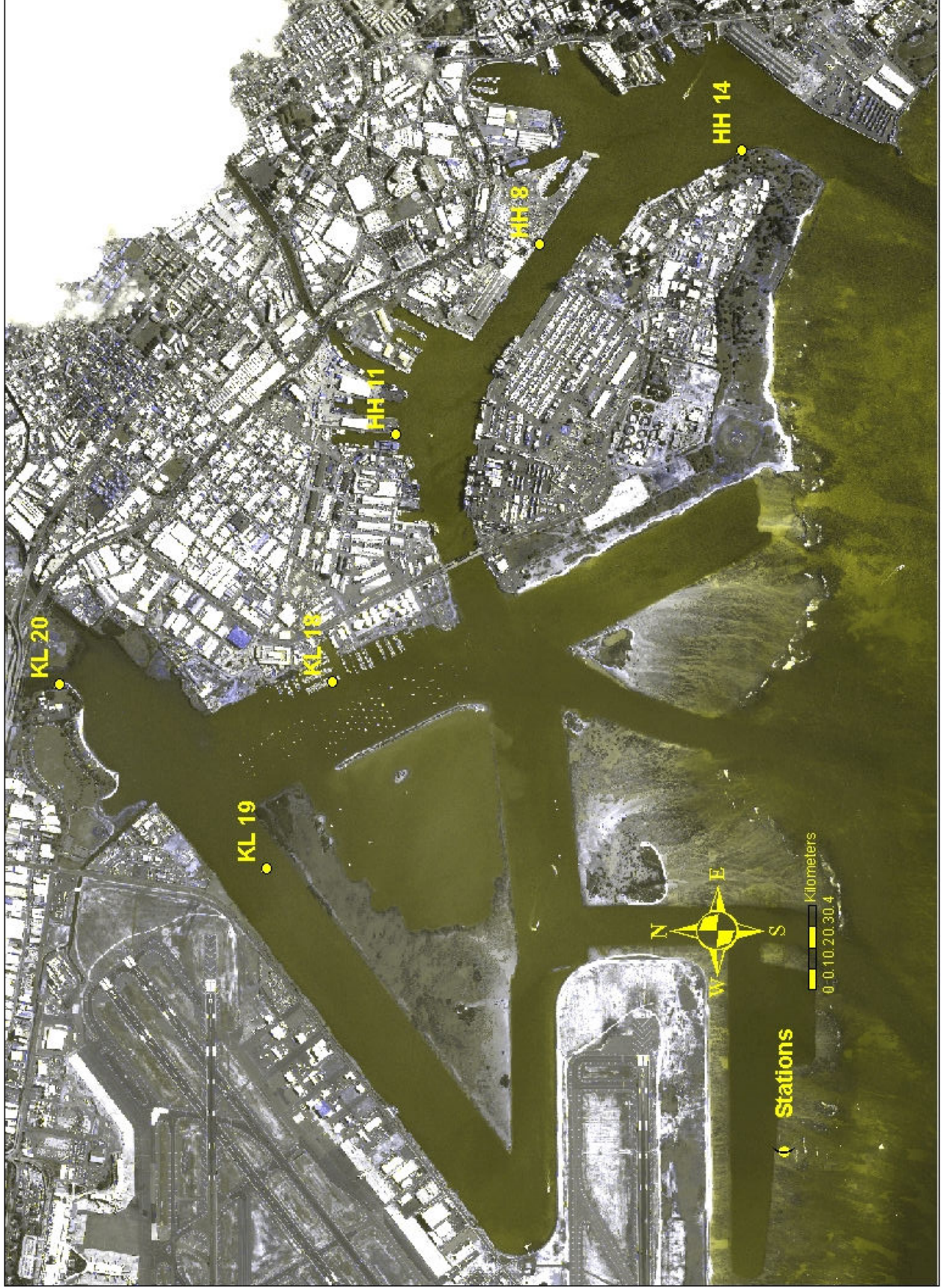


Figure 5. Honolulu Harbor and Ke'ehi Lagoon stations sampled in 1997 and 2008.

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	607274.70466011
	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.

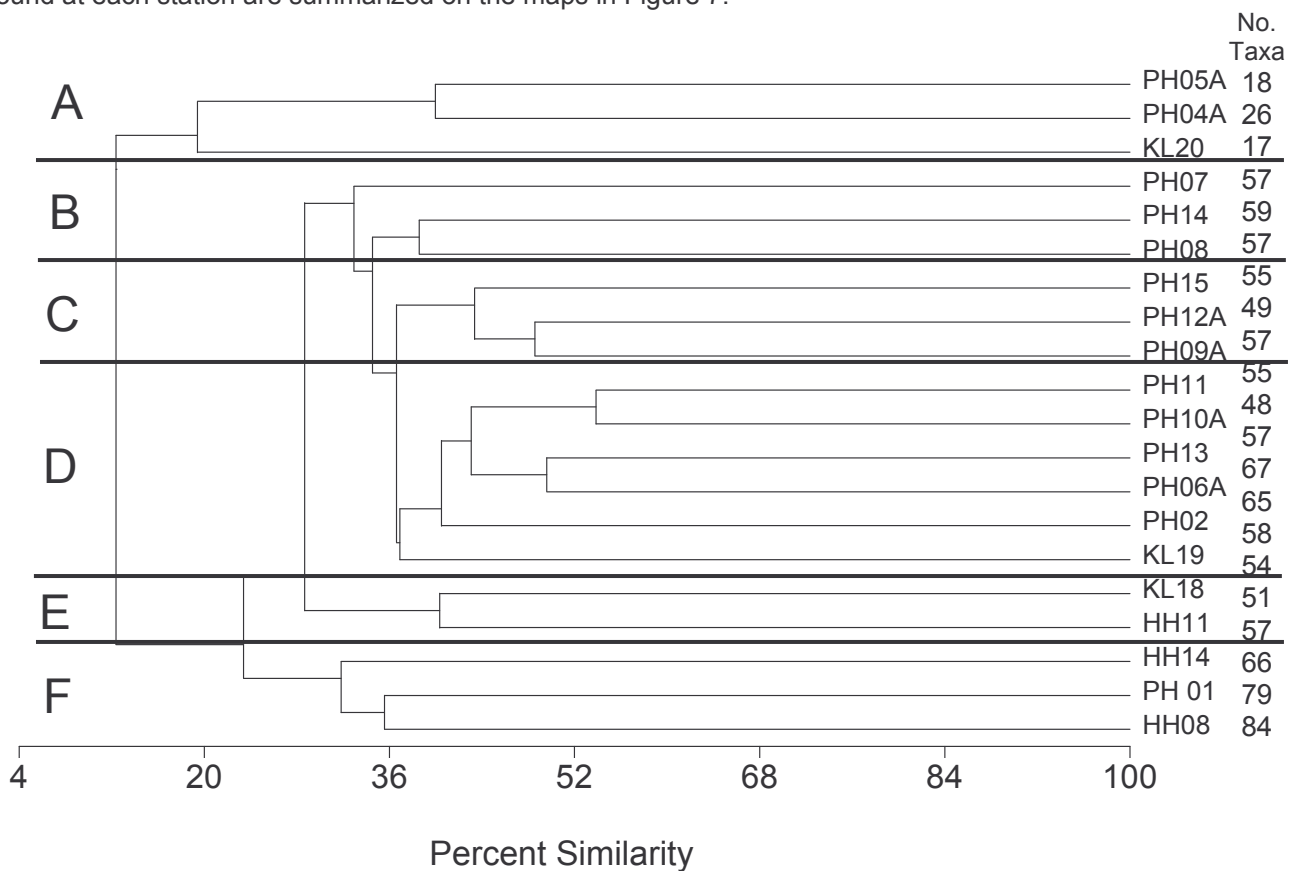


Figure 6. Dendrograph of Sorenson similarities and numbers of taxa for all sites sampled in Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon.

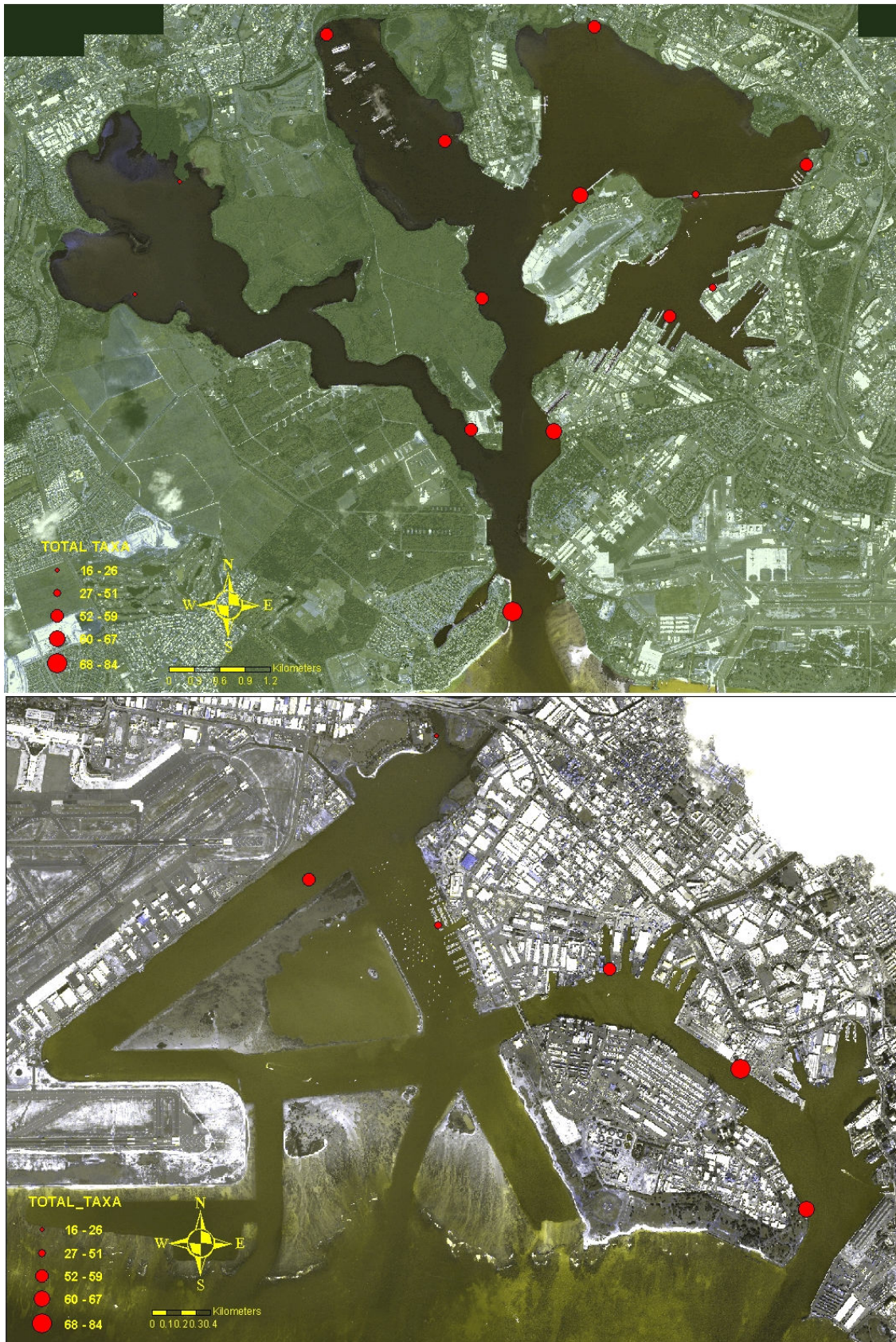


Figure 7. Distributions of numbers of taxa identified at Pearl and Honolulu Harbors and Ke'ehi Lagoon.

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 20th 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.

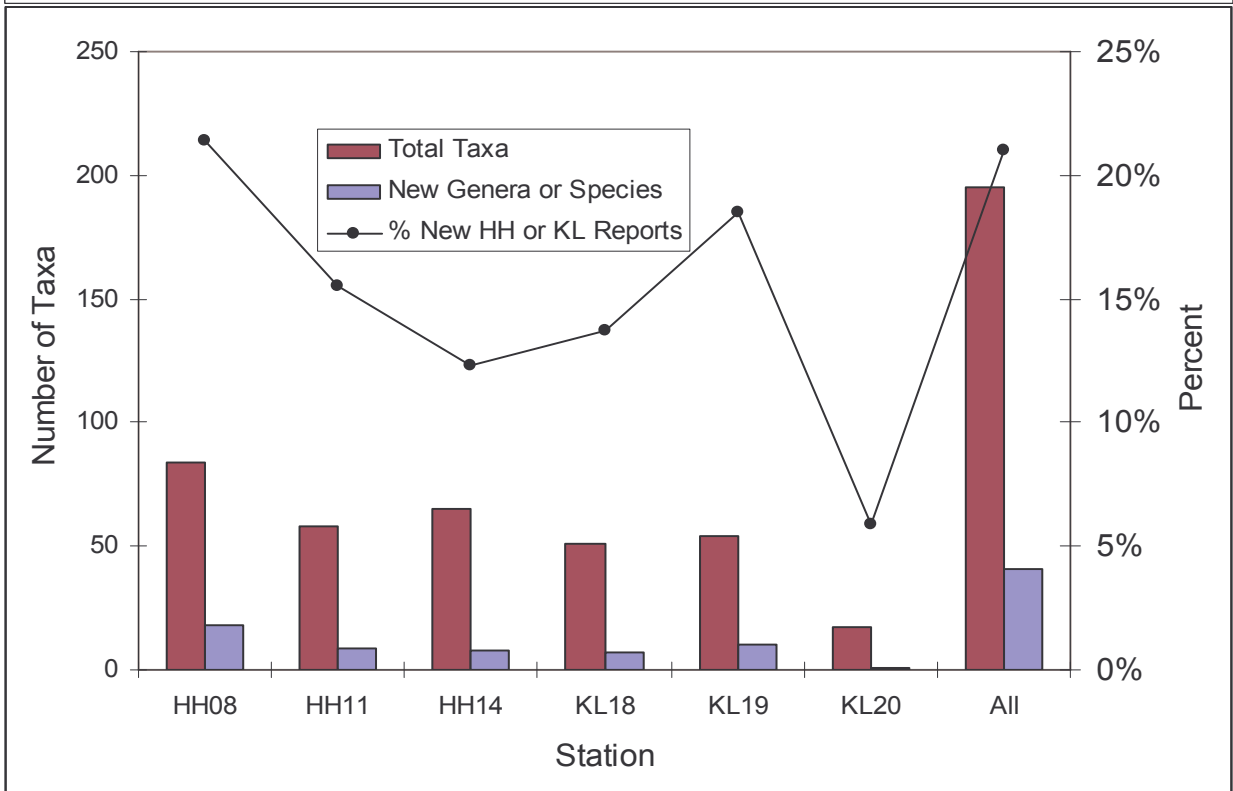
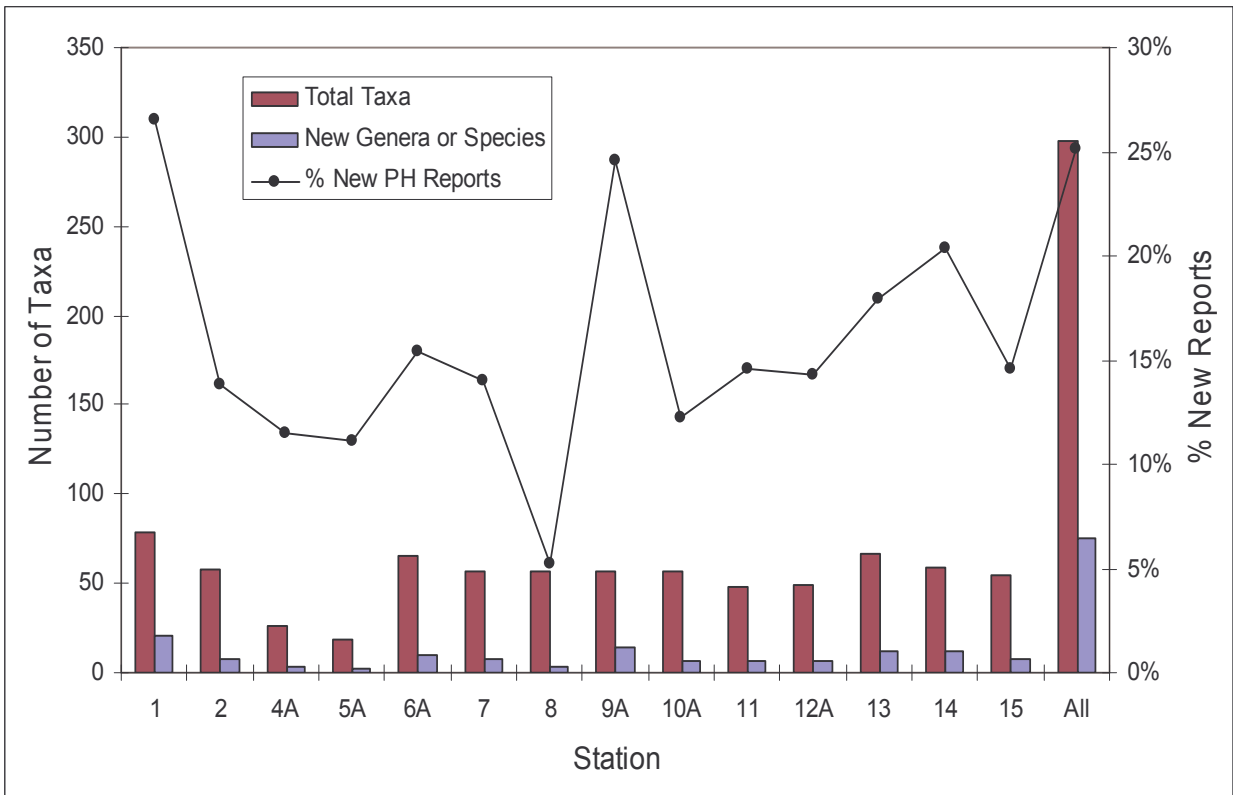


Figure 8. Total taxa and numbers of new genera or species found in Pearl and Honolulu Harbors and Ke'ehi Lagoon.

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

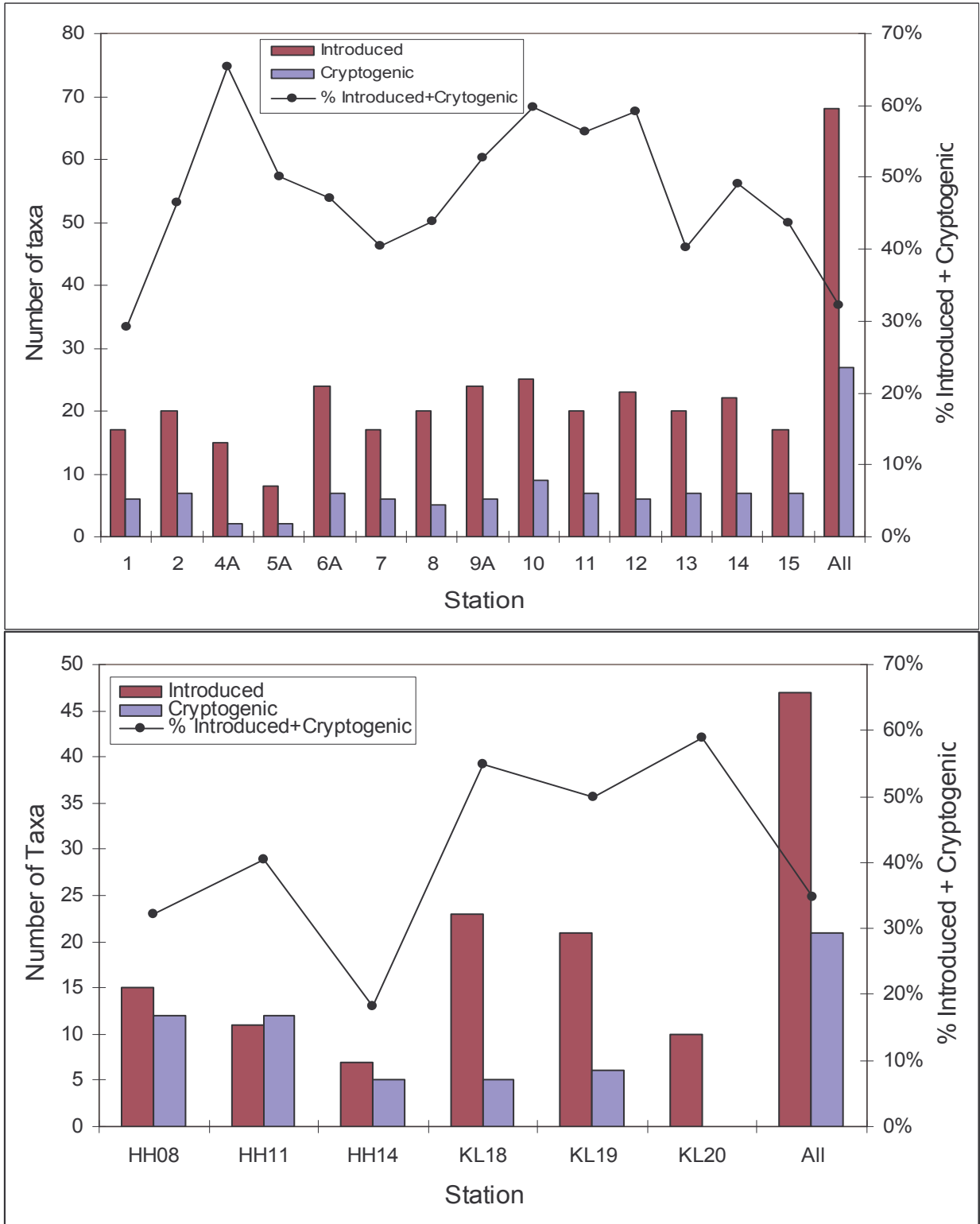


Figure 9. Numbers of introduced or cryptogenic genera or species and percent of total taxa observed or collected in Pearl and Honolulu Harbors and Ke'ehi Lagoon.

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			Origin														
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>Liocochla 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				x
Honolulu Harbor-Ke'ehi Lagoon																	
Phylum			Origin														
PORIFERA	<i>Scientific name</i>	Author Date	Origin		HH08	HH11	KL18	KL19									
		de Laubenfels, 1935															
PORIFERA	<i>Monanchora dianchora</i>	Ridley, 1884	Cryptogenic	x	x			x									
PORIFERA	<i>Iotrochota baculifera</i>	(Bowerbank, 1875)	Cryptogenic		x												
PORIFERA	<i>Iotrochota purpurea</i>	Hooper, 1991	Cryptogenic	x	x												
PORIFERA	<i>Raspailia (Clathrodendron) darwinensis</i>	(M. Sars, 1850)	Cryptogenic	x													
PORIFERA	<i>Scopalina sp.</i>	(Pictet, 1893)	Cryptogenic	x													
CNIDARIA	<i>Glytia cf. gracilis</i>	Savigny, 1818	Cryptogenic														
CNIDARIA	<i>Halopteris plagiocampa</i>	(Pace, 1903),	Cryptogenic	x													
ANNELIDA	<i>Oenone fulgida</i>	(Giard, 1872)	Cryptogenic														
MOLLUSCA	<i>Zafra cf. hervieri</i>	(Sluiter, 1885)	Cryptogenic														
CHORDATA	<i>Diplosoma cf. spongiforme</i>		Cryptogenic														
CHORDATA	<i>Polycarpa cryptocarpa</i>		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

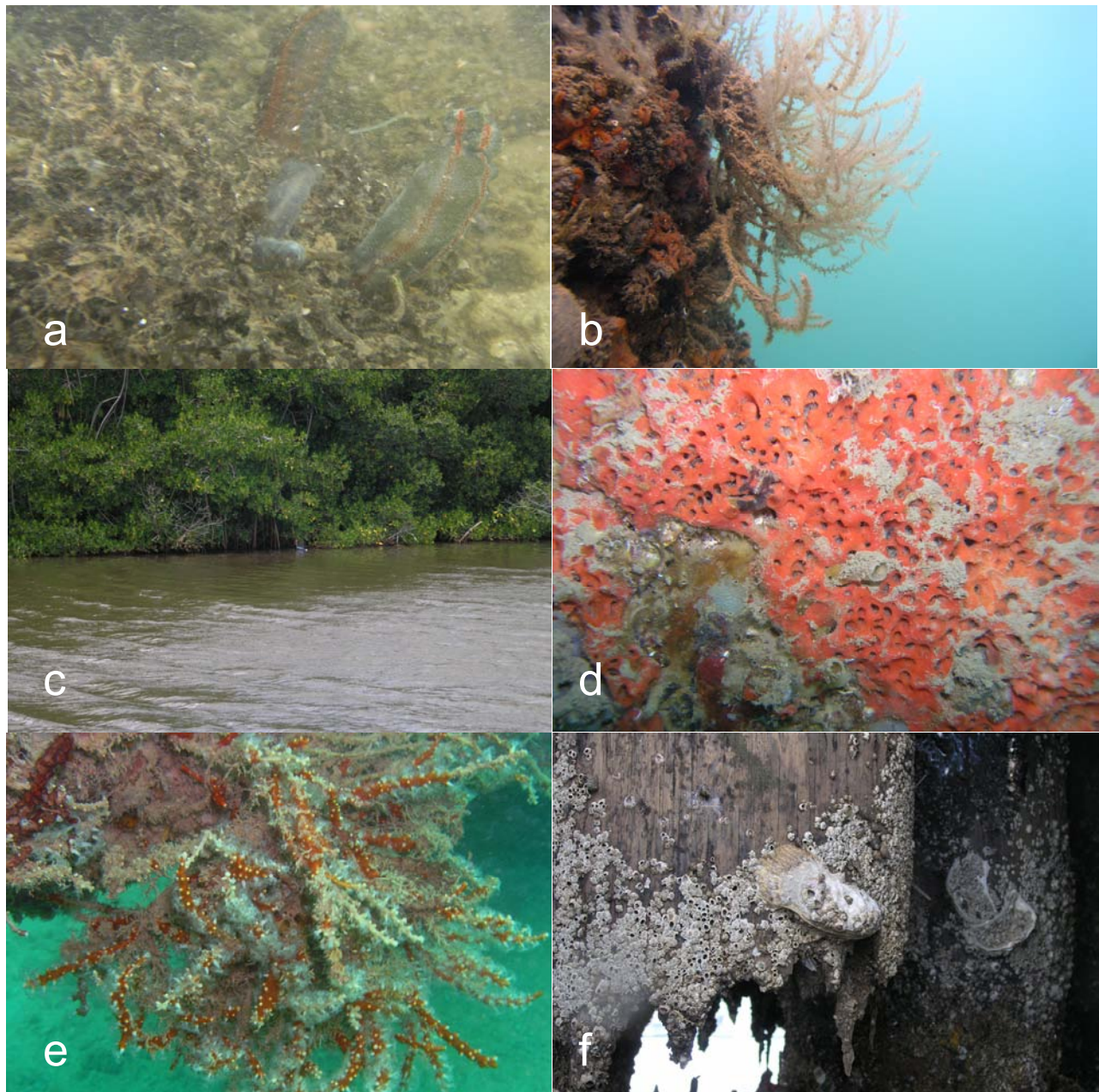


Figure 10. Invasive species in Pearl Harbor. **a**: Dense mat of *Gracilaria salicornia* with sea cucumber *Opheodesoma spectabilis* at PH Sta. 12; **b**: *Acanthophora spicifera* at PH Sta. 9A; **c**: *Rhizophora mangle* at PH Sta. 5A; **d**: *Mycale grandis* at PH Sta. 11; **e**: *Carijoa* cf. *riisei*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

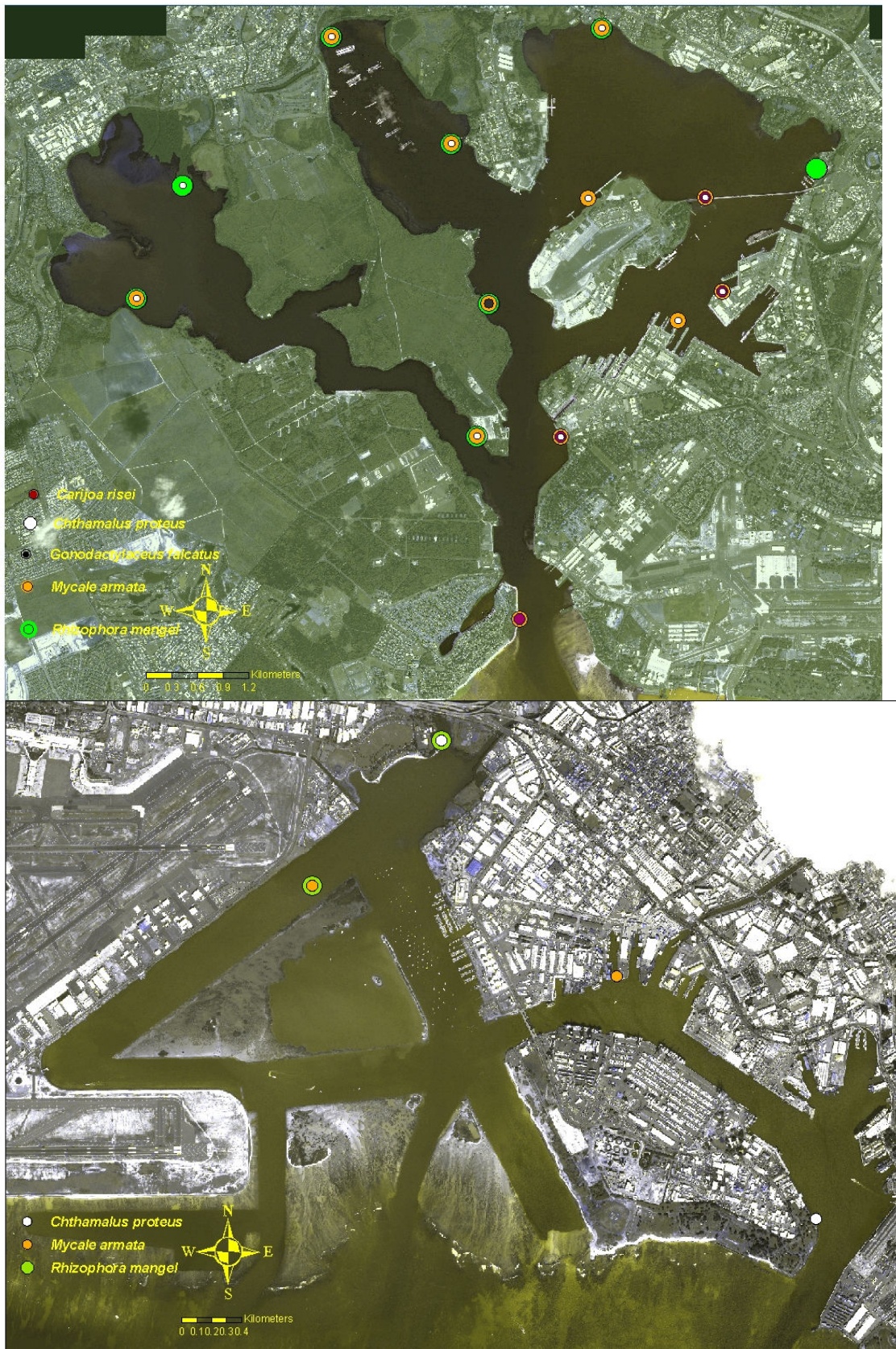


Figure 11. Locations of invasive introduced species in Pearl Harbor, Honolulu Harbor and Ke'ehi Lagoon.

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
<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

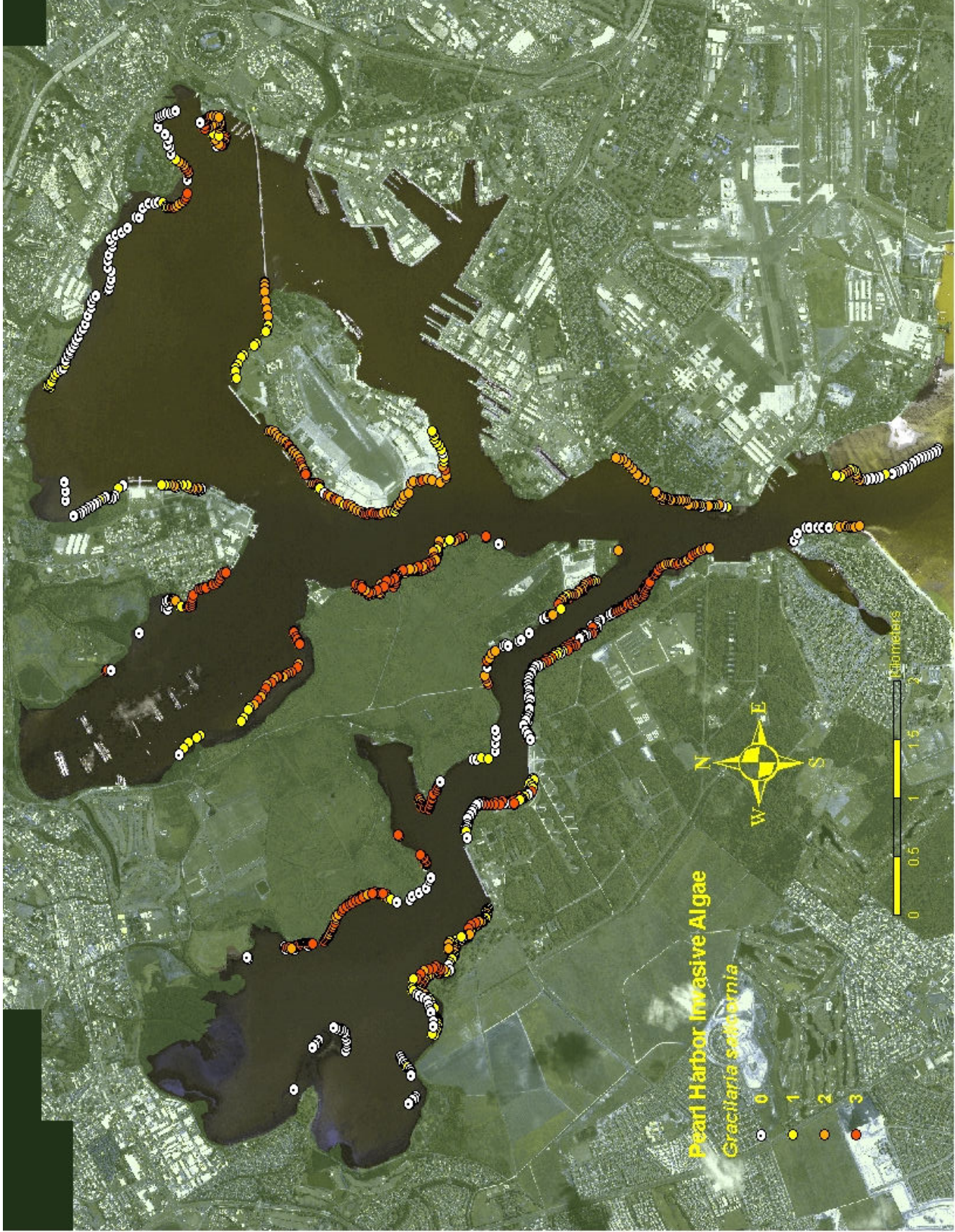


Figure 12. Distribution of *Gracilaria salicornia* in Pearl Harbor determined from snorkeling surveys, 2007-2008.

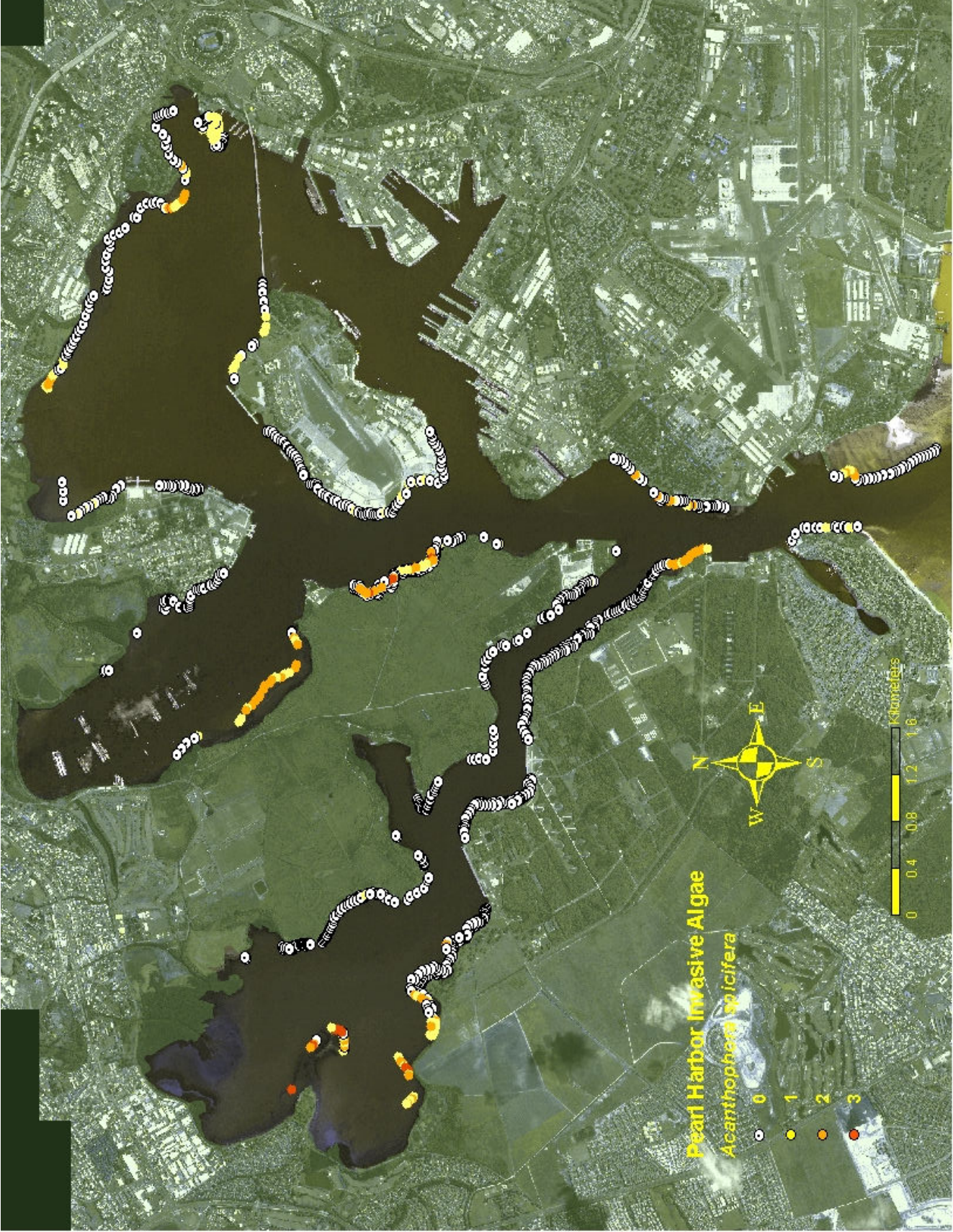


Figure 13. Distribution of *Acanthophora spicifera* in Pearl Harbor determined from snorkeling surveys, 2007-2008.

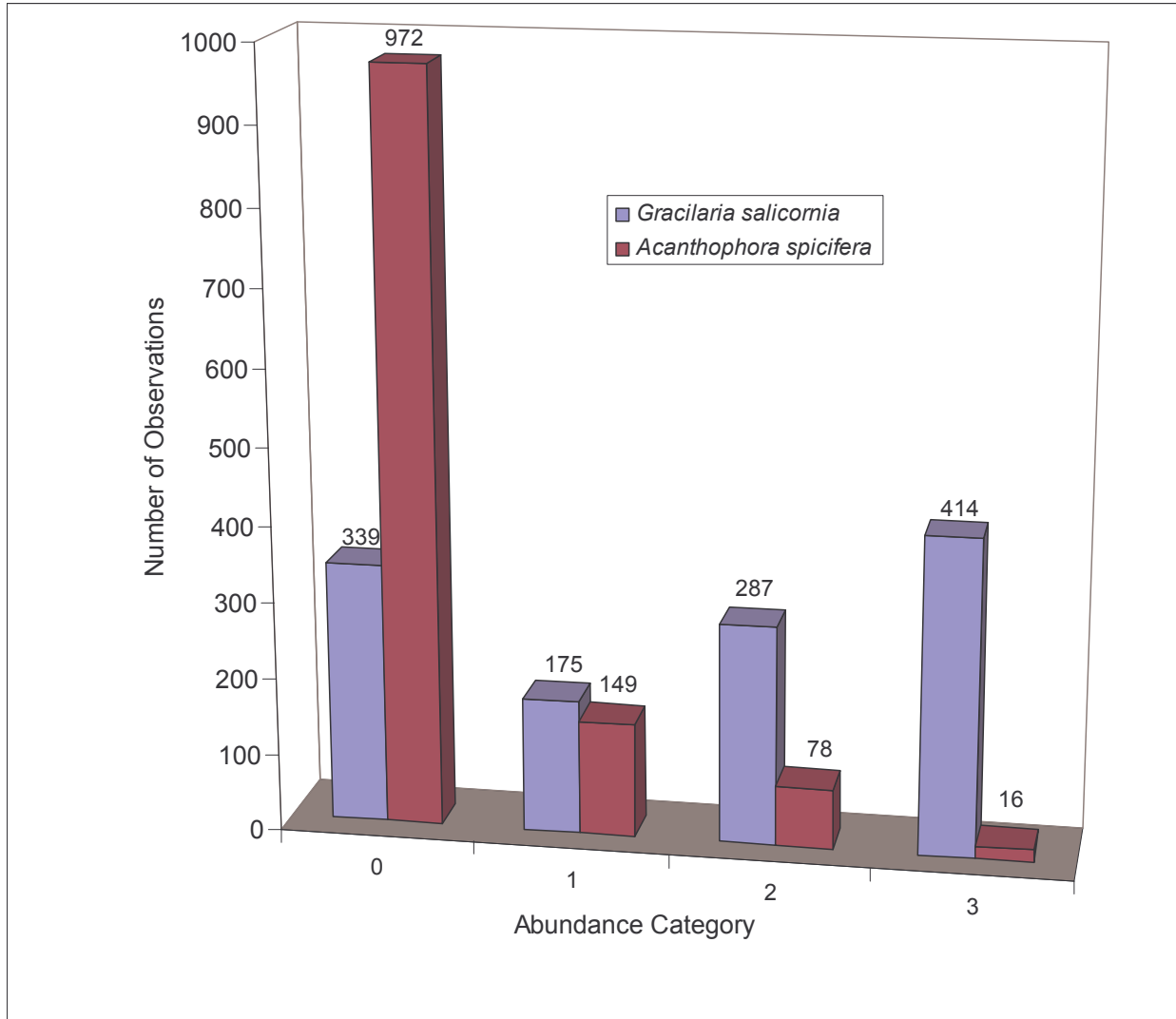


Figure 14. Frequencies of occurrence of *Gracilaria salicornia* and *Acanthophora spicifera* in the four abundance categories for the 1215 observations made in Pearl Harbor.

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.

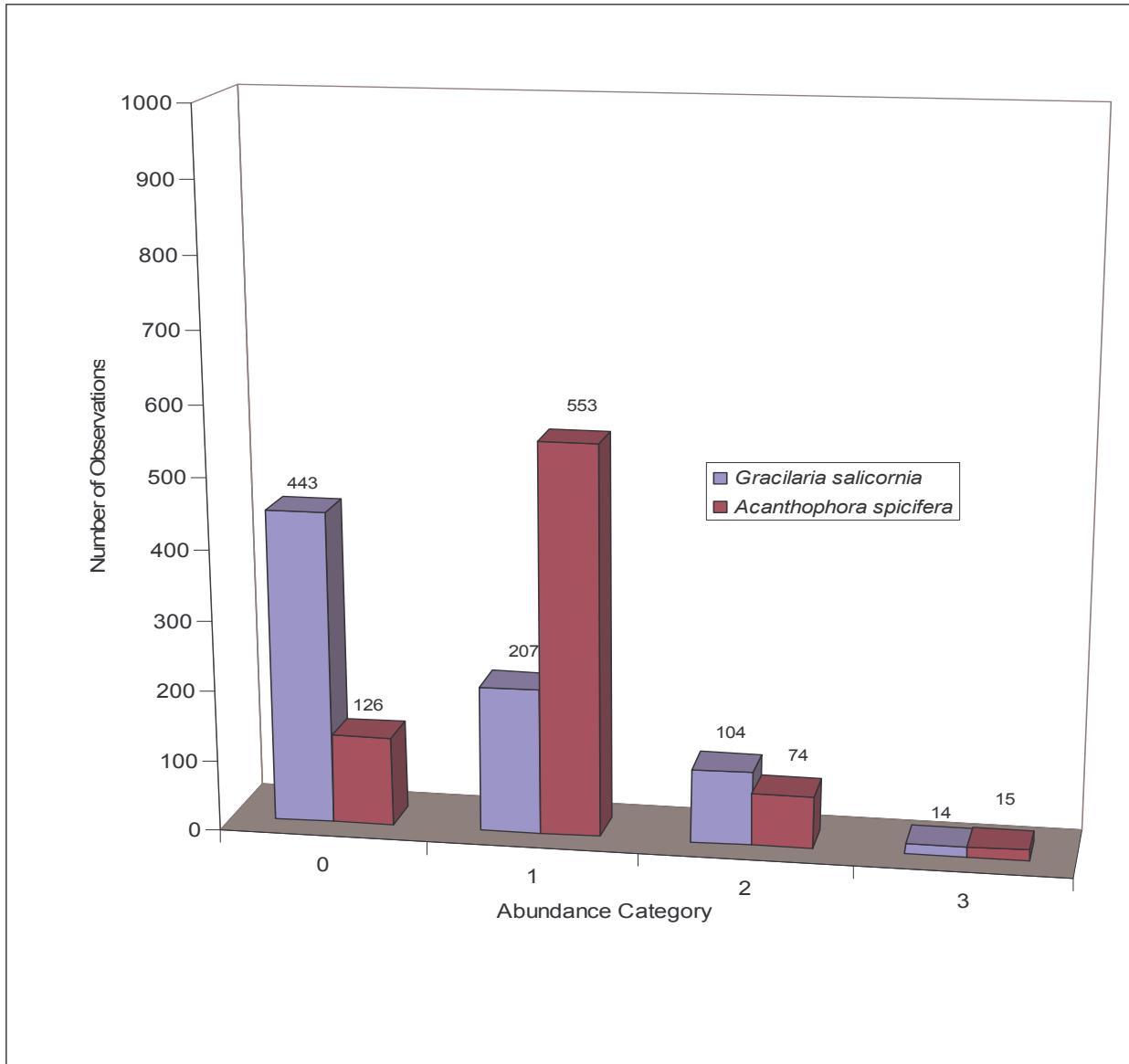


Figure 17. Frequencies of occurrence of *Gracilaria salicornia* and *Acanthophora spicifera* in the four abundance categories for the 768 observations made in Ke'ehi Lagoon.

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.

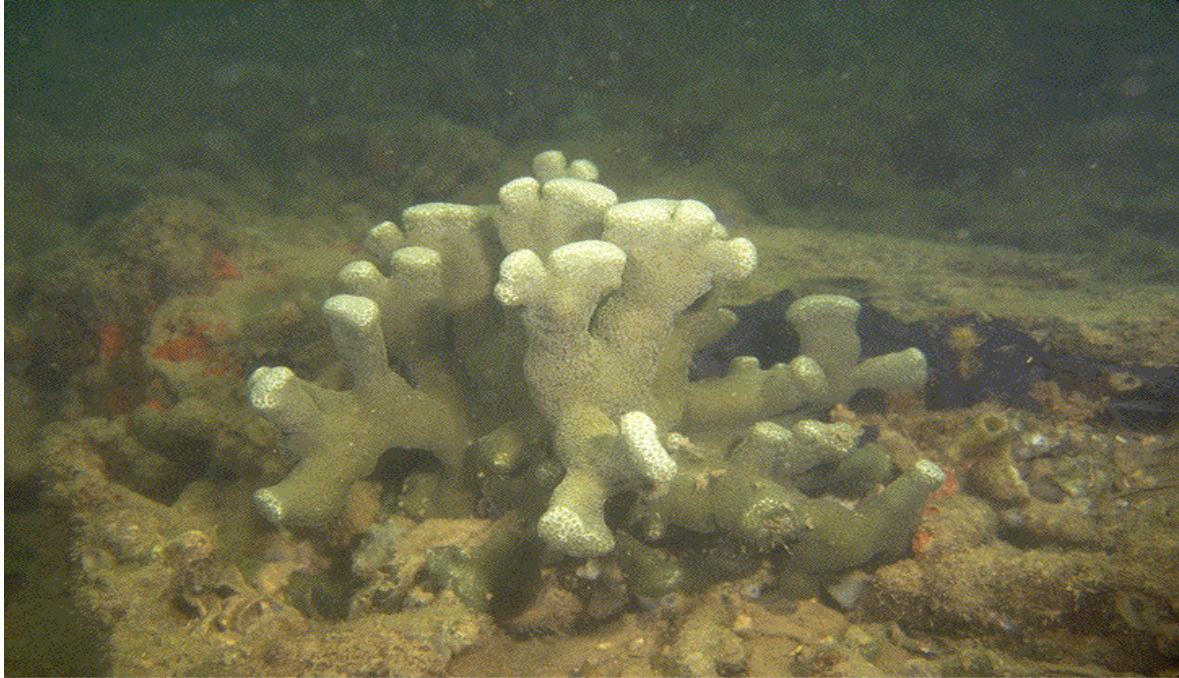


Figure 18. *Porites compressa* coral at Station 2, West Loch Channel at 4 m depth, April 1996.

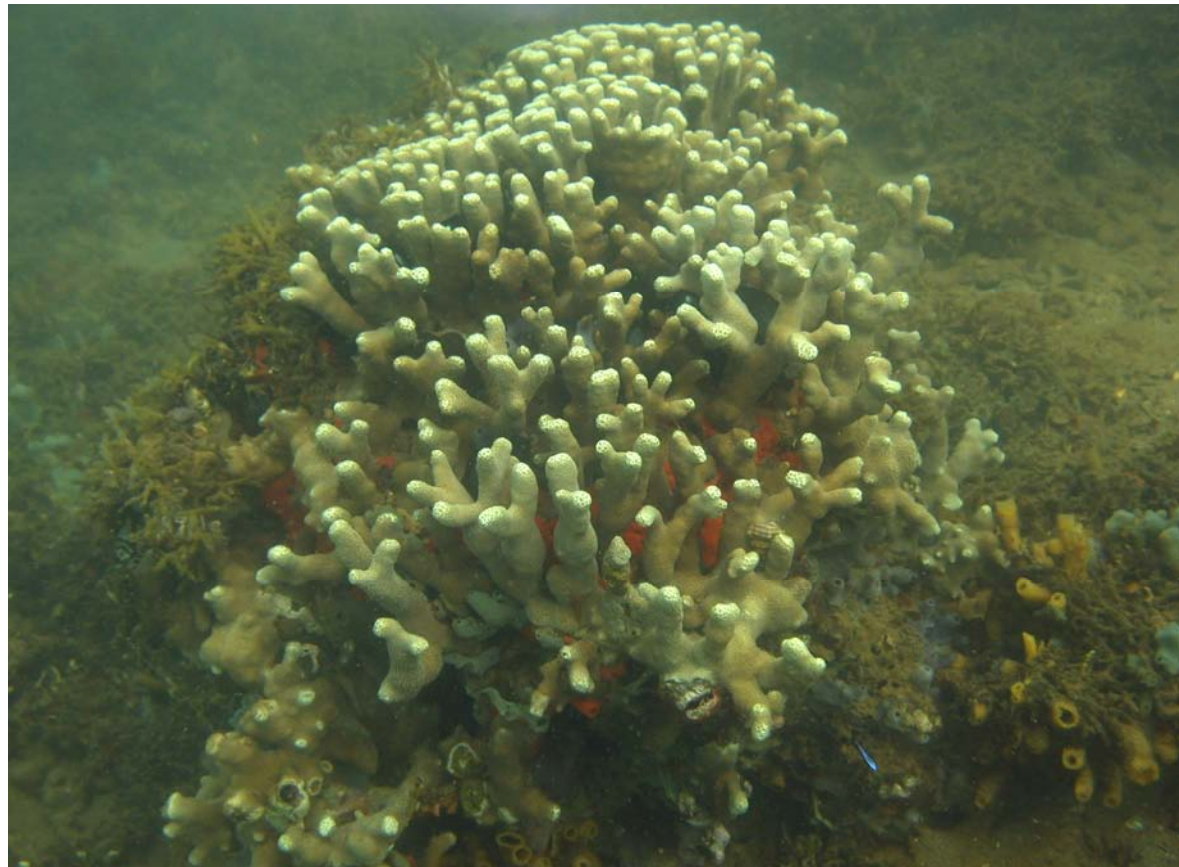


Figure 19. Same *Porites compressa* colony at Station 2, January 2008.



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

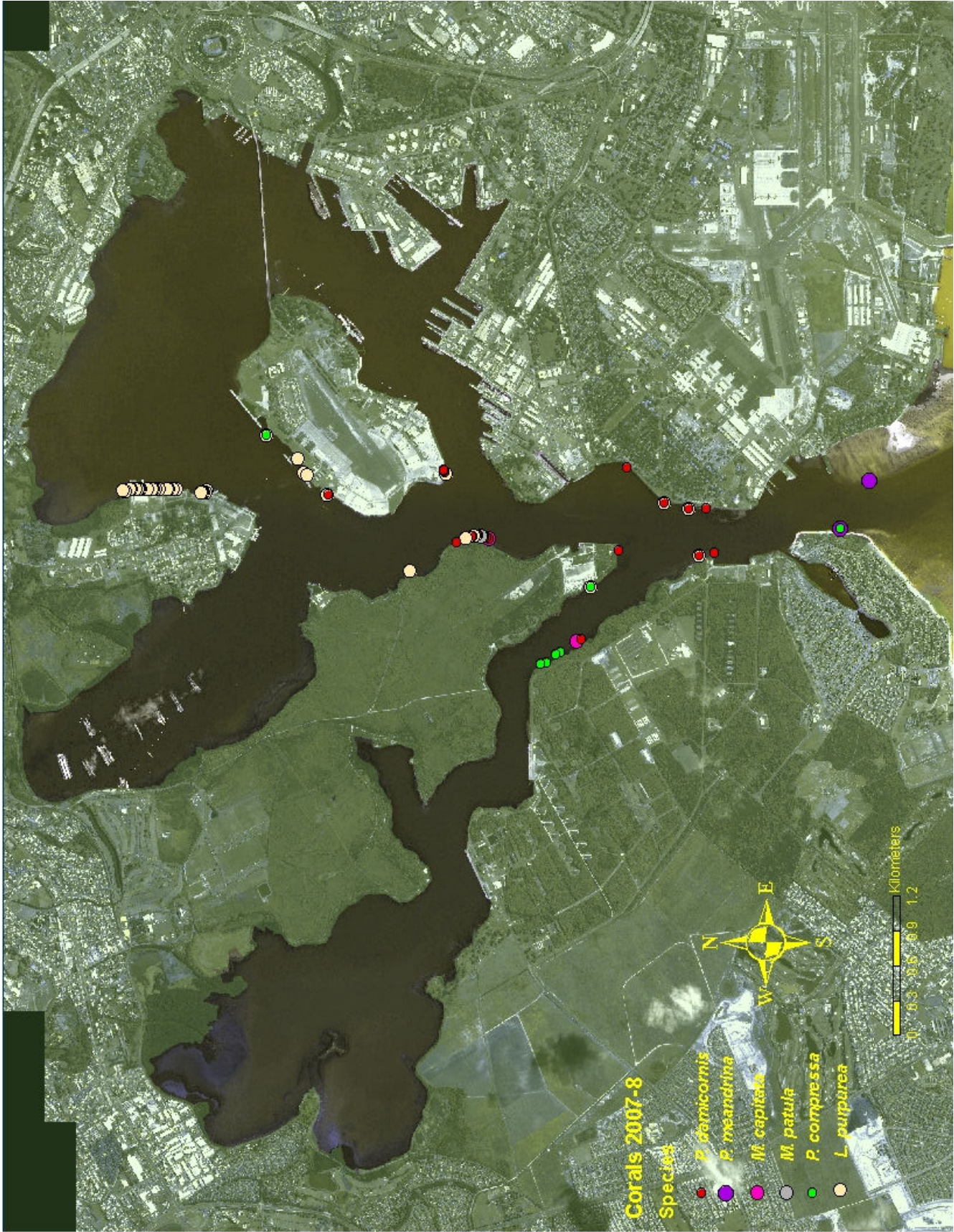


Figure 21. Pearl Harbor corals at collection stations from snorkel surveys in 2007-2008.



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

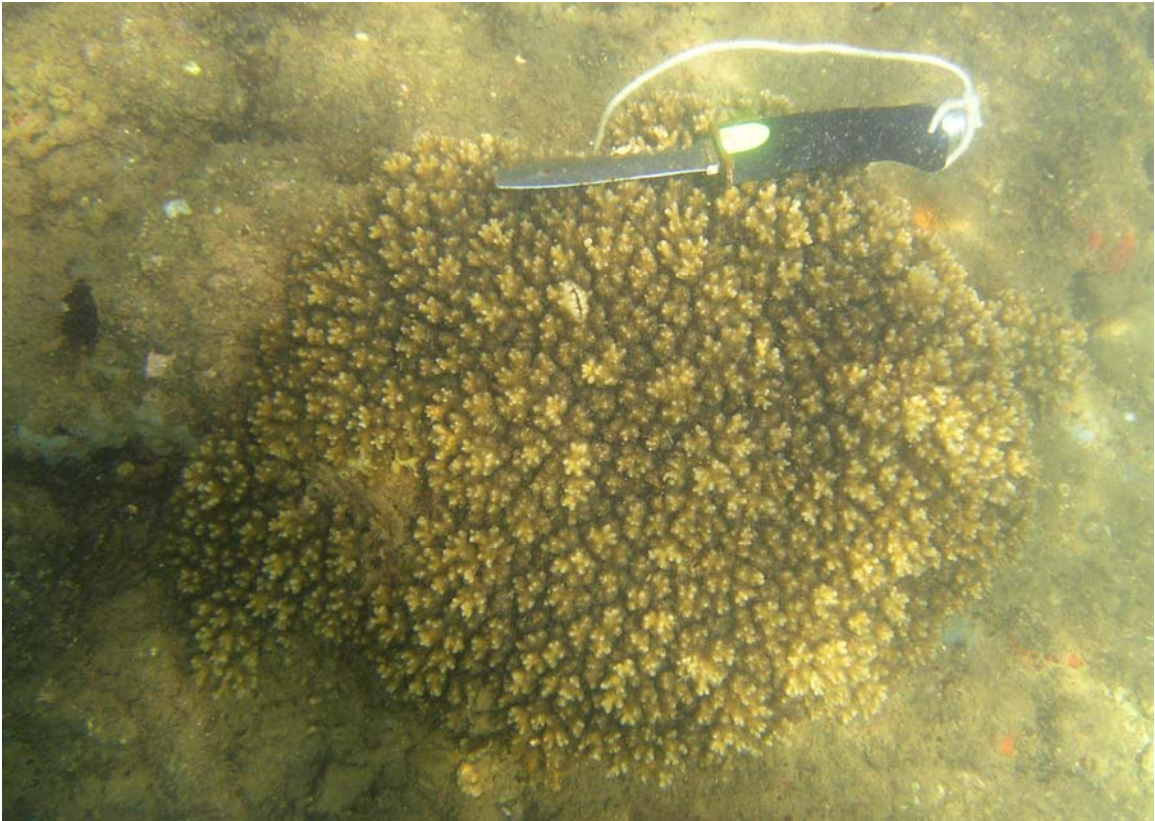


Figure 23. *Pocillopora damicornis* colony ca 0.5 m diameter near West Loch entrance, November 27, 2007.

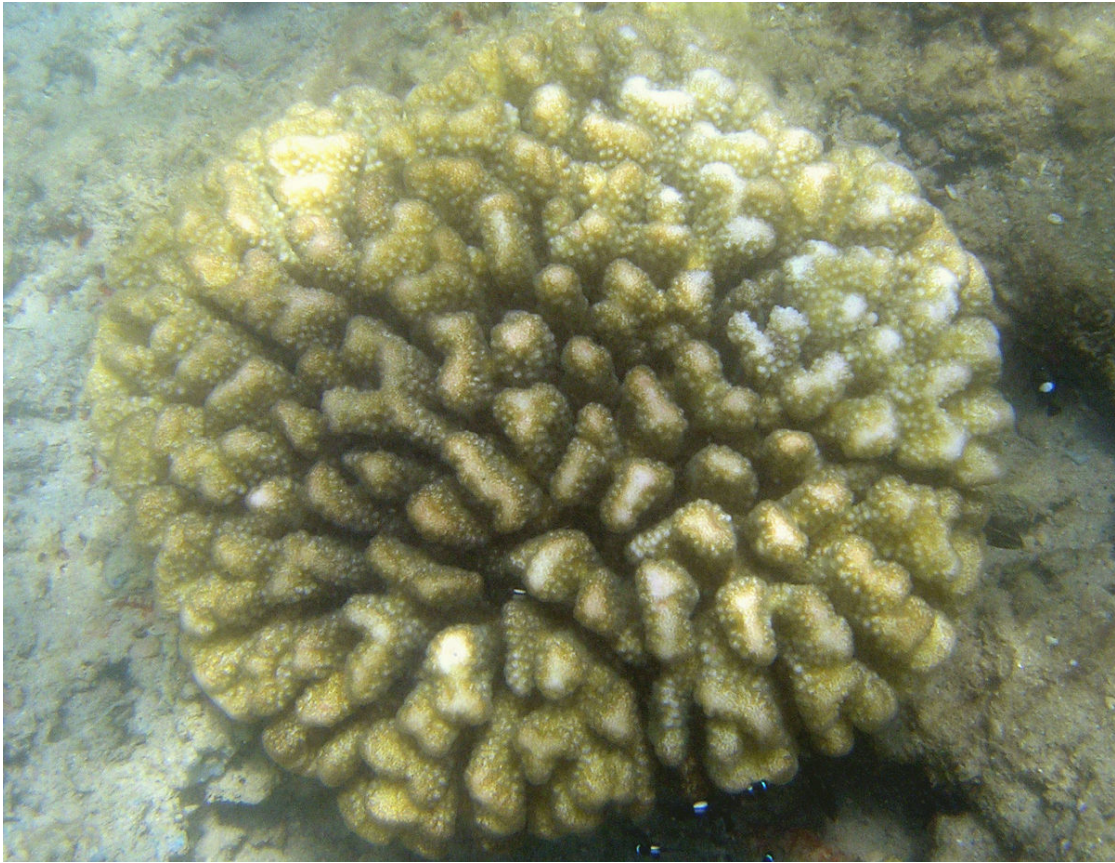


Figure 24. *Pocillopora meandrina* colony ca 0.5 m diameter near harbor entrance June 12, 2008.



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



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

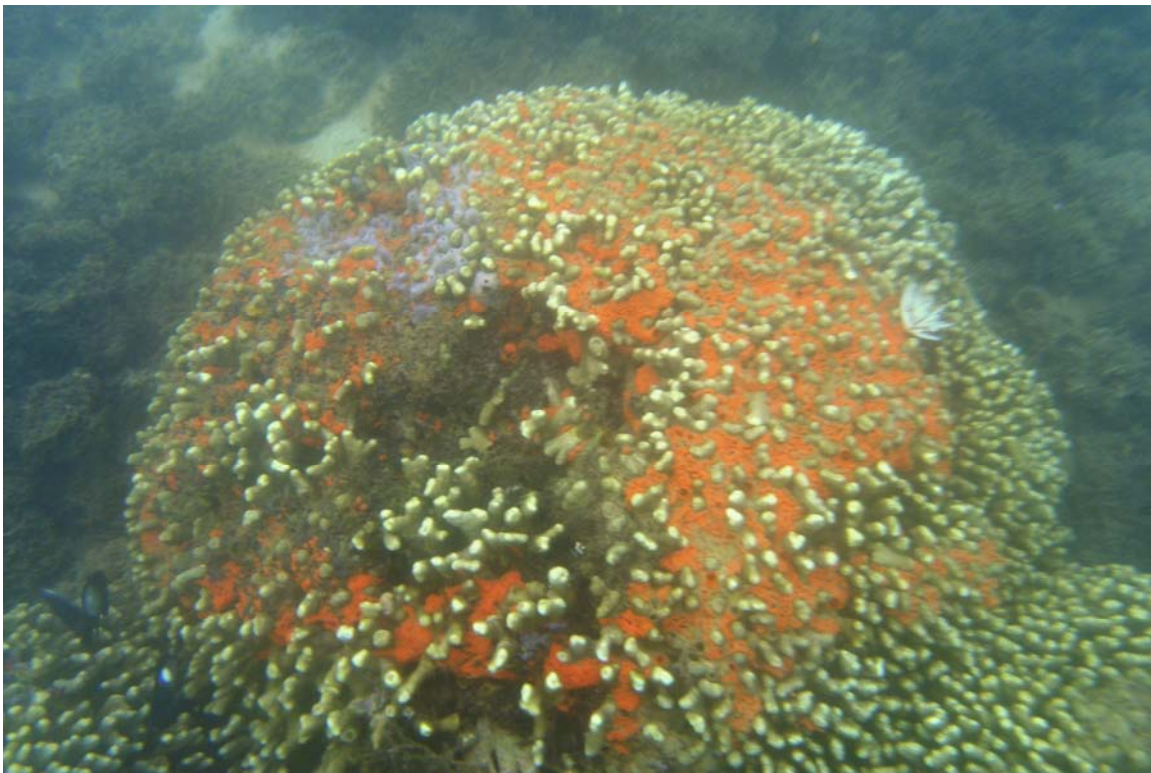


Figure 27. *Porites* Reef 2 in West Loch November 27, 2007 with heavy growth of *Mycale grandis* sponge.



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‘ohe 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‘ohe 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‘ohe 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‘ohe 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			
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		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	X
PORIFERA	<i>Tedania (Tedania) ignis</i>	(Duchassaing & Michelotti, 1864)	C		X				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>Phyllococidae 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									
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>Phascolosoma 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			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 unicomis</i>	Schmarda, 1861															
POLYCHAETA	<i>Nereididae unid. sp.</i>			x	x			x	x	x							x
POLYCHAETA	<i>Perinereis curvata</i>	Holly, 1935															
POLYCHAETA	<i>Phyllococidae unid. sp.</i>								x								
POLYCHAETA	<i>Pileolaria militaris</i>	Ciapparede, 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								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
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					
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
MOLLUSCA	<i>Ostreidae unid. spp.</i>				x												
MOLLUSCA	<i>Petaloconchus keenae</i>	Hadfield and Kay, 1972															x
MOLLUSCA	<i>Pinctada margaritifera</i>	(Linnaeus, 1758)															x
MOLLUSCA	<i>Pinctada sp.</i>																
MOLLUSCA	<i>Pusillina marmorata</i>	Ponder, 1985		x													
MOLLUSCA	<i>Rissoina cerithiiformis</i>	Tryon, 1887		x													
MOLLUSCA	<i>Rochefortina 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>																
CRUSTACEA	<i>Apseudes sp. 1</i>																
CRUSTACEA	<i>Amphipoda unid. sp.</i>																
CRUSTACEA	<i>Balanus amphitrite</i>	Darwin 1854	I							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 sp.</i>		I		X										X		
CRUSTACEA	<i>Caprellidae unid. sp.</i>															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 lunallio</i>	Barnard, 1970							X		X			X			X
CRUSTACEA	<i>Colomastix pusilla</i>	Grube, 1864									X						
CRUSTACEA	<i>Corophium baconi</i>	Shoemaker, 1934	I								X			X			
CRUSTACEA	<i>Corophium sp.</i>		I														X
CRUSTACEA	<i>Crab Larvae unid. Sp.</i>				X					X							
CRUSTACEA	<i>Elasmopus sp.</i>										X					X	
CRUSTACEA	<i>Erichthonius brasiliensis</i>	(Dana, 1853)	I								X					X	
CRUSTACEA	<i>Erichthonius sp.</i>						X				X						
CRUSTACEA	<i>Gonodactylaceus falcatus</i>	(Forsk., 1775)	I						X								
CRUSTACEA	<i>Grandierella sp</i>											X					
CRUSTACEA	<i>Hyastenus tenuicornis</i>	(Pocock , 1895)															
CRUSTACEA	<i>Lembos sp.</i>																
CRUSTACEA	<i>Leptochelia dubia</i>	Krøyer, 1842	C						X					X			X
CRUSTACEA	<i>Leucothoe hyhelia</i>	Barnard, 1965							X		X			X		X	X
CRUSTACEA	<i>Leucothoe sp.1</i>																
CRUSTACEA	<i>Lysianassa ewa</i>	Barnard, 1970									X						
CRUSTACEA	<i>Maera pacifica</i>	Schellenberg, 1938									X			X		X	
CRUSTACEA	<i>Maera sp.</i>								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 sp.</i>															X	
CRUSTACEA	<i>Pachynidae unid. sp.</i>																X
CRUSTACEA	<i>Panopeus lacustris</i>	Desbonne, 1867	I								X						
CRUSTACEA	<i>Panopeus pacificus</i>	Edmondson, 1931	I			X											
CRUSTACEA	<i>Parasterope sp</i>									X							
CRUSTACEA	<i>Paravargula sp.</i>										X			X			X
CRUSTACEA	<i>Parthenope sp.</i>													X			
CRUSTACEA	<i>Photis hawaiiensis</i>	Barnard, 1955	C								X			X		X	
CRUSTACEA	<i>Phymodius nitidus</i>	(Dana, 1852)							X		X						
CRUSTACEA	<i>Phymodius sp.</i>																X
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			x			
CRUSTACEA	<i>Thalaimita integra</i>	Dana, 1852			x												
CRUSTACEA	<i>Thalaimita sp.</i>												x		x	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			
BRYOZOA	<i>Bugula neritina</i>	(Linnaeus, 1758)	I	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		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>			x	x												
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>Polyleptana 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>Polycilium 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>																
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>	Tokioka, 1953	I					x				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	x					x	x	
Osteichthyes	<i>Acanthurus ?dussumieri</i>	Valenciennes 1835											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)															
Osteichthyes	<i>Acanthurus triostegus</i>	(Linnaeus, 1758)		x					x	x							
Osteichthyes	<i>Arothron hispidus</i>	(Linnaeus, 1758)			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>Bierna 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	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								x
POLYCHAETA	<i>Branchiommma nigromaculata</i>	Cryptogenic						x						x		x
POLYCHAETA	<i>Chaetopterus sp.</i>	Cryptogenic				x			x		x			x		x
POLYCHAETA	<i>Serpula vermicularis</i>	Cryptogenic			x											
POLYCHAETA	<i>Simplicaria pseudomilitaris</i>	Cryptogenic		x												
POLYCHAETA	<i>Spinther japonicus</i>	Cryptogenic		x												
MOLLUSCA	<i>Chama cf. fibula</i>	Cryptogenic	x											x		
MOLLUSCA	<i>Chama fibula</i>	Cryptogenic									x					
MOLLUSCA	<i>Lioconcha faszigata</i>	Cryptogenic												x		
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	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	x
PORIFERA	<i>Mycale (Zygomycale) parishii</i>	Introduced				x										
PORIFERA	<i>Suberites aurantiacus</i>	Introduced			x			x		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										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>Erichonius 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					
ASCIDACEA	<i>Polyandrocarpa sagamiensis</i>	Introduced					x				x					
ASCIDACEA	<i>Polyandrocarpa zooritensis</i>	Introduced								x						
ASCIDACEA	<i>Styela canopus</i>	Introduced														
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>Ciocalypa 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>Protopalylthoa 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>Anatanais 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>	(Fabricus, 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 (Thymiosyca) 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

Taxa	Scientific name	HH08	HH11	HH14	KL18	KL19	KL20
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 *Derbesua 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.)

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

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

- Genus: *Pellina***
Pellina eusiphonia Ridley, 1884
 1993 Ref - Brock, 1994
 1994 Ref - Brock, 1995
- Genus: *Toxadocia***
Toxadocia violacea de Laubenfels, 1950
 1993 Ref - Brock, 1994
 1994 Ref - Brock, 1995
- Family: AMPHILECTIDAE**
Genus: *Biemna*
Biemna fistulosa Topsent, 1897 Cryptogenic. Common name(s): Tubular Biemna.
 1996 Legacy Project (Coles et al., 1997)
 2007 This Project
 2008 This Project
- Family: Coelosphaeridae**
Genus: *Lissodendoryx*
Lissodendoryx (Lissodendoryx) similis New record for Hawaii. Cryptogenic.
 2008 This Project
- Family: Hymedesmiidae**
Genus: *Hamigera*
***Hamigera* sp.** Indigenous. Common name(s): Red Boring Sponge.
 2007 This Project
- Family: MICROCIONIDAE**
Genus: *Clathria*
***Clathria* sp.** Indigenous. Common name(s): Vermilion Clathria.
 2008 This Project
- Clathria (Microcionia) n. sp.*** Known only from Hawaii.
 1996 Legacy Project (Coles et al., 1997)
- Clathria (Microcionia) maunaloa*** de Laubenfels, 1951
 1993 Ref - Brock, 1994 Recorded as Microcionia maunaloa.
 1994 Ref - Brock, 1995 Recorded as Microcionia maunaloa.
 2007 Ref - Brock, 2007 Recorded as Microcionia maunaloa.
- Family: MYCALIDAE**
Genus: *Mycale*
***Mycale* sp.** Cryptogenic.
 1973 Ref - McCain, 1974
 1973 Ref - McCain, 1975
- Mycale (Carmia) cecilia*** (de Laubenfels, 1936) 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
- Mycale (Carmia) contarenii*** sensu de Laubenfels, 1951
 1996 Legacy Project (Coles et al., 1997)
- Mycale (Carmia) maunakea*** de Laubenfels, 1936 Known only from Hawaii.
 1996 Legacy Project (Coles et al., 1997)
- Mycale (Mycale) grandis*** Gray, 1867 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.
Family: PENNARIIDAE		
Genus: <i>Pennaria</i>		
<i>Pennaria disticha</i> (Goldfuss, 1820) Introduced. Common name(s): Christmas Tree		
Hydroid.		
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	
Family: PLUMULARIIDAE		
Unidentified Plumulariidae		
1948	Spec - BPBM-D 290	Drydock #4.
Genus: <i>Plumularia</i>		
<i>Plumularia goodei?</i> Nutting, 1900		
1972	Ref - Long, 1974	Off Pearl Harbor.
Family: TUBULARIIDAE		
Genus: <i>Tubularia</i>		
<i>Tubularia</i> sp.		
1978	Ref - Grovhoug, 1979	
Class: SCYPHOZOA		
Unidentified Scyphozoa		
1929	Spec - BPBM-D 240	
1982	Spec - BPBM-D 751	Off Pearl Harbor.
Order: SEMAEOSTOMEAE		
Family: ULMARIDAE		
Genus: <i>Aurelia</i>		
<i>Aurelia labiata?</i> Chamisso & Eysenhardt, 1820		
1973	Ref - Evans et al., 1974	Recorded as <i>Balanus labiata</i> .
Order: RHIZOSTOMEAE		
Family: CASSIOPEIDAE		
Genus: <i>Cassiopea</i>		
<i>Cassiopea medusa</i> Light, 1914 Introduced.		
1941	Ref - Doty, 1961	
Family: MASTIGIIDAE		
Genus: <i>Phyllorhiza</i>		
<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	
Class: ANTHOZOA		
Unidentified Anthozoa		
1937	Spec - BPBM-D 227	
1948	Spec - BPBM-D 291	Drydock #4.

Legacy Project - Species Report (Cont.)

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

Chaetopterus variopedatus 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	
<i>Hydroides elegans</i> (Haswell, 1883) Introduced.		
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	
<i>Hydroides sanctaerucis</i> Morch, 1863		
1972	Ref - Long, 1974	Off Pearl Harbor.
<i>Hydroides uncinata</i> Phillipe, 1844		
1972	Ref - Long, 1974	
Genus: <i>Neodexiospira</i>		
<i>Neodexiospira foraminosa</i> (Moore & Bush, 1904) Introduced.		
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: TEREPELLIDAE

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: RHYNCHOBDELLIDA

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

Unknown Spec - BPBM-MO 225792 (Pease, 1861) Hawaiian name(s): `opihi.
Opposite Ford Island on Railroad Wharf on Peninsula.
Catalogue XVI.

1973 Ref - Evans et al., 1974

1996 Legacy Project (Coles et al., 1997)

Diodora octogona

2008 This Project

(Reeve, 1850) Indigenous. Common name(s): Sea Frost.

Diodora octogona

1996 Legacy Project (Coles et al., 1997)

Reeve, 1850

Diodora ruppelli

1962 Ref - Kay, 1979

1996 Legacy Project (Coles et al., 1997)

2008 This Project

(Sowerby, 1834) Introduced.

Family: NERITIDAE

Genus: *Nerita*

Nerita sp.

1932 Spec - BPBM-MO 199261

Catalogue XIV.

Nerita picea

name(s): pipipi kai;

Recluz, 1841 Indigenous. Common name(s): Black Nerite; Hawaiian

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

1912 Spec - BPBM-MO 64294

Gray Known only from Hawaii.

Catalogue V.

Theodoxus kanaka

1912 Spec - BPBM-MO 64313

Pilsbry

Catalogue V.

Theodoxus neglectus

1932 Spec - BPBM-MO 198799

Pease, 1861

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*

Cellana sp.

1934 Spec - BPBM-MO 205577

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

Dredge. Catalogue XIV.

Legacy Project - Species Report (Cont.)

1950	Spec - BPBM-MO 55		
1973	Ref - Evans et al., 1974		
Family: PHASIANELLIDAE			
Genus: <i>Tricolia</i>			
	<i>Tricolia variabilis</i>	(Pease, 1861)	Hawaiian name(s): pupu kanaloa.
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
Family: PHENACOLEPADIDAE			
Genus: <i>Phenacolepas</i>			
	<i>Phenacolepas sp.</i>		
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
Family: SCISSURELLIDAE			
Genus: <i>Scissurella</i>			
	<i>Scissurella sp.</i>		
1973	Ref - Evans et al., 1974		
Family: SKENEIDAE			
Genus: <i>Lophocaclias</i>			
	<i>Lophocaclias minutissimus</i>	(Pilsbry, 1921)	
1973	Ref - Evans et al., 1974		Off Pearl Harbor. Recorded as <i>Cyclostremiscus minutissimus</i>
(Pilsbry, 1921).			
Family: STOMATELLIDAE			
Genus: <i>Syncera</i>			
	<i>Syncera giffardi</i>	Dall	
Unknown	Spec - BPBM-MO 65725		Pearl City. Catalogue V.
Family: TROCHIDAE			
Genus: <i>Danilia</i>			
	<i>Danilia eucheliformis</i>	(Nomura & Hatai, 1940)	
1961	Spec - BPBM-MO 217634		Off Fort Kamehameha. Catalogue XV.
Genus: <i>Euchelus</i>			
	<i>Euchelus gemmatus</i>	Gould, 1845	
1973	Ref - Evans et al., 1974		
Genus: <i>Tholotia</i>			
	<i>Tholotia subangulata</i>	(Pease, 1861)	
1917	Ref - Pilsbry, 1917		Recorded as <i>Alcyna lineata</i> Pease, 1861. MCZ 31724.
Genus: <i>Trochus</i>			
	<i>Trochus sp.</i>		
1934	Spec - BPBM-MO 205576		Dredge. Catalogue XIV.
	<i>Trochus histrio</i>	Reeve	
1973	Ref - Evans et al., 1974		
	<i>Trochus intextus</i>	Kiener, 1850	Hawaiian name(s): pupu o Ha`upu; ha`upu; haupu; `okole
Unknown	Spec - BPBM-MO 200688		Haupu. 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 puhi.
 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*

<i>Crucibulum spinosum</i>		(Sowerby, 1824)	Indigenous.
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*

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

Family: CASSIDIDAE

Genus: *Casmaria*

<i>Casmaria vibex</i>			
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*

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

Genus: *Phalium*

<i>Phalium (Semicassis) umbilicatum</i>		(Pease, 1861)	
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*

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

<i>Bittium manti</i>		Dall	
Unknown	Spec - BPBM-MO 65642		Catalogue V.

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

<i>Bittium zebrum</i>		(Kiener, 1841)	
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)		
Genus: <i>Cerithiopsis</i>			
<i>Cerithiopsis sp. A</i>			
1973	Ref - Evans et al., 1974		Recorded as <i>Cerithiopsis sp. A</i> .
1996	Legacy Project (Coles et al., 1997)		
<i>Cerithiopsis sp. B</i>			
1973	Ref - Evans et al., 1974		Recorded as <i>Cerithiopsis sp. B</i> .
<i>Cerithiopsis acaria sp.</i>			
Unknown	Spec - BPBM-MO 65649		Catalogue V.
<i>Cerithiopsis acaria sp.?</i>			
1934	Spec - BPBM-MO 205561		Dredge. Catalogue XIV.
Genus: <i>Cerithium</i>			
<i>Cerithium articulatus</i>			
1961	Spec - BPBM-MO 217761		Off Fort Kamehameha?. Catalogue XV.
<i>Cerithium diminutirum</i> Phil.			
Unknown	Spec - BPBM-MO 63339		Ford Island. Catalogue V.
<i>Cerithium locticum</i> Pease			
Unknown	Spec - BPBM-MO 63176		Catalogue V.
Unknown	Spec - BPBM-MO 63229		Ford Island. Catalogue V.
<i>Cerithium matukense</i> Watson, 1886			
1961	Spec - BPBM-MO 217694		Off Pearl Harbor. Catalogue XV.
1982	Spec - BPBM-MO 207403		Catalogue XIV.
<i>Cerithium nesioticum</i> Pilsbry & Vanatta, 1905 Hawaiian name(s): pupu maka`aha; maka`aha.			
1973	Ref - Evans et al., 1974		
<i>Cerithium zebrum</i> Kiener, 1841 Indigenous.			
2008	This Project		
Genus: <i>Finella</i>			
<i>Finella pupoides</i> A. Adams, 1860			
Unknown	Spec - BPBM-MO 229372		Catalogue XVI.
1996	Legacy Project (Coles et al., 1997)		
Genus: <i>Rhinoclavis</i>			
<i>Rhinoclavis fasciata</i> Bruguiere			
1961	Spec - BPBM-MO 217848		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 217849		Off Fort Kamehameha?. Catalogue XV.
Family: CERITHIOPSIDAE			
Unidentified <i>Cerithiopsidae</i>			
Unknown	Spec - BPBM-MO 230301		Catalogue XVI.
Family: CYMATIIDAE			
Genus: <i>Cymatium</i>			
<i>Cymatium sp.</i> Indigenous.			
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		
<i>Cymatium aquatile</i> Reeve, 1844			
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.
<i>Cymatium gemmatum</i> Reeve, 1844			
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)	
<i>Cymatium intermedium</i> Pease, 1869		
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)	
<i>Cymatium muricinum</i> Röding, 1798		
Unknown	Spec - BPBM-MO 240859	Hawaiian name(s): pupu `ole kiwi; naunau; `anaunau. 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.
<i>Cymatium nicobaricum</i> (Röding, 1798)		
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)	
<i>Cymatium pileare</i> Linnaeus, 1758		
1932	Spec - BPBM-MO 198718	Pearl Harbor entrance Channel, off Fort Kamehameha.
Catalogue XIV.		
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.
<i>Cymatium rubeculum</i> (Linnaeus, 1758)		
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	
Genus: <i>Distorsio</i>		
<i>Distorsio</i> sp.		
1934	Spec - BPBM-MO 205565	Dredge. Catalogue XIV.
Genus: <i>Gyrineum</i>		
<i>Gyrineum pusillum</i> Broderip		
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.
Genus: <i>Triton</i>		
<i>Triton tuberosus</i> Lamarck		
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.
<i>Cypraea alisonae</i>		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.
<i>Cypraea arabica</i>		(Linnaeus, 1758)
1976	Ref - Burgess, 1995	Off Pearl Harbor.
<i>Cypraea caputserpentis</i>		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.
<i>Cypraea carneola</i>		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.
<i>Cypraea childreni</i>		Gray, 1825
1996	Legacy Project (Coles et al., 1997)	
<i>Cypraea chinensis</i>		Gmelin, 1791
1932	Spec - BPBM-MO 198042	Pearl Harbor channel, Watertown. Catalogue XIV.
<i>Cypraea clandestina</i>		Linnaeus, 1767 Introduced.
1950	Ref - Burgess, 1959	Off Pearl Harbor.
<i>Cypraea cribaria</i>		Linnaeus, 1758 Introduced.
1950	Ref - Burgess, 1959	Off Pearl Harbor.
<i>Cypraea cylindrica</i>		Born Introduced.
1950	Ref - Burgess, 1959	Off Pearl Harbor.
<i>Cypraea depressa</i>		Grey, 1825 Introduced.
1991	Ref - Burgess, 1995	Off Pearl Harbor.
<i>Cypraea fimbriata</i>		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.
<i>Cypraea gaskoini</i>		Reeve, 1846
Unknown	Spec - BPBM-MO 247840	Pearl City. Catalogue XVII.
<i>Cypraea gaspardi</i>		Biraghi & Nicolay, 1993 Introduced.
1993	Ref - Burgess, 1995	Off Pearl Harbor.

Legacy Project - Species Report (Cont.)

<i>Cypraea helvola</i>	Linnaeus, 1758	Indigenous.	Hawaiian name(s): 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.
<i>Cypraea hirundo</i>	Linnaeus, 1758	Introduced.	
1993	Ref - Burgess, 1995		Off Pearl Harbor.
<i>Cypraea isabella</i>	Linnaeus, 1758	Indigenous.	Common name(s): Isabella Cowry; Hawaiian
name(s):			puleho; puleho holei; puleho kani`o; puleholeho; puleho palaoa; puleho
`ula; puleholeho;			leho kupe`e lima; momi ke`oke`o.
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.
<i>Cypraea labrolineata</i>	Gaskoin, 1849	Indigenous.	
1993	Ref - Burgess, 1995		Off Pearl Harbor.
<i>Cypraea maculifera</i>	Shilder, 1932	Hawaiian name(s): kuoho; leho; leho kolea.	
1957	Spec - BPBM-MO 246540		Fort Kaahamaha (Fort Kamehameha). Catalogue XVII.
<i>Cypraea moneta</i>	Linnaeus, 1758	Hawaiian name(s): leho palaoa; leho puna; leho `uala;	
`uwala; pupu			leholeho.
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.
<i>Cypraea poraria</i>	Linnaeus, 1758	Introduced.	
1950	Ref - Burgess, 1959		Off Pearl Harbor.
<i>Cypraea reticulata</i>	Martyn		
1916	Spec - BPBM-MO 67		Reef Waikiki of entrance to Pearl Harbor.
1932	Spec - BPBM-MO 196358		Reef off Fort Kamehameha. Catalogue XIV.
<i>Cypraea scurra</i>	Gmelin, 1791		
1932	Spec - BPBM-MO 198044		Keahi Point. Catalogue XIV.
<i>Cypraea semiplota</i>	Mighels, 1845	Hawaiian name(s): 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.
<i>Cypraea shilderorum</i>			
1932	Spec - BPBM-MO 197146		Pearl Harbor Channel; Watertown. Catalogue XIV.
<i>Cypraea staphylaea</i>	Linnaeus, 1758		
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.
<i>Cypraea sulcidentata</i>	Gray, 1824		
1932	Spec - BPBM-MO 197173		Fort Kamehameha, reef off. Catalogue XIV.
<i>Cypraea talpa</i>	Linnaeus, 1758		
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.)

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

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	<i>Hipponix foliaceus</i>		Quoy & Gaimard, 1835	
	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>		Gould, 1846	
	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>		(Deshayes, 1832)	
	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)		
	Family: LITTORINIDAE			
	Genus: <i>Littoraria</i>			Common name(s): Periwinkle; Hawaiian name(s): pupu kolea.
	<i>Littoraria coccinea</i>		(Gmelin, 1791)	
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>		(Wood, 1828)	Indigenous.
	1996	Legacy Project (Coles et al., 1997)		
	<i>Littoraria scabra</i>		(Linnaeus, 1758)	Indigenous. Common name(s): Feather Duster Worm;
Hawaiian				name(s): kukae kolea; pupu kolea; kolealea; pipipi kolea.
	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		
	Family: MODULIDAE			
	Genus: <i>Modulus</i>			
	<i>Modulus sp.</i>			
	1934	Spec - BPBM-MO 205575		Dredge. Catalogue XIV.
	<i>Modulus tectum</i>		Gmelin	Hawaiian name(s): pupu.
	1932	Spec - BPBM-MO 199280		Reef off Fort Kamehameha. Catalogue XIV.
	Family: NATICIDAE			
	Genus: <i>Natica</i>			
	<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		
<i>Natica gualteriana</i>		Recluz, 1844	Hawaiian name(s): pupu kui; kio noho one.
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		
<i>Natica tessellata</i>			
1961	Spec - BPBM-MO 218143		Off Fort Kamehameha. Catalogue XV.
Genus: <i>Polinices</i>			
<i>Polinices</i> sp.			
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.
Family: RISSOELLIDAE			
Genus: <i>Rissoella</i>			
<i>Rissoella</i> sp.			
1973	Ref - Evans et al., 1974		
Family: RISSOIDAE			
Genus: <i>Cithna</i>			
<i>Cithna</i> sp.			
1973	Ref - Evans et al., 1974		Off Pearl Harbor.
Genus: <i>Merelina</i>			
<i>Merelina</i> sp.			
1973	Ref - Evans et al., 1974		
Genus: <i>Parashiela</i>			
<i>Parashiela beetsi</i>			
1973	Ref - Evans et al., 1974	Ladd, 1966	Off Pearl Harbor.
Genus: <i>Pusillina</i>			
<i>Pusillina marmorata</i>			
2008	This Project	Ponder, 1985	Indigenous.
Genus: <i>Rissoina</i>			
<i>Rissoina ambigua</i>			
1973	Ref - Evans et al., 1974	(Gould, 1849)	
<i>Rissoina cerithiiformis</i>			
2008	This Project	Tryon, 1887	Indigenous.
<i>Rissoina miltozona</i>			
1973	Ref - Evans et al., 1974	Tomlin, 1915	
1996	Legacy Project (Coles et al., 1997)		
<i>Rissoina rhyssa</i>			
Unknown	Spec - BPBM-MO 228923	Dall	Catalogue XVI.
Unknown	Spec - BPBM-MO 65714		Catalogue V.
<i>Rissoina turricula</i>			
1973	Ref - Evans et al., 1974	Pease, 1861	
1996	Legacy Project (Coles et al., 1997)		
Genus: <i>Schwartziella</i>			
<i>Schwartziella gracilis</i>			
1973	Ref - Evans et al., 1974	(Pease, 1861)	Recorded as <i>Rissoina gracilis</i> .
Genus: <i>Zebina</i>			
<i>Zebina tridentata</i>			
Unknown	Spec - BPBM-MO 63855	(Michaud, 1830)	Catalogue V.

Legacy Project - Species Report (Cont.)

1973	Ref - Evans et al., 1974	Off Pearl Harbor.
1996	Legacy Project (Coles et al., 1997)	
Family: STROMBIDAE		
Genus: <i>Strombus</i>		
<i>Strombus dentatus</i> (Linnaeus, 1758)		
1961	Spec - BPBM-MO 217932	Off Fort Kamehameha. Catalogue XV.
<i>Strombus helii</i> Kiener, 1843		
1961	Spec - BPBM-MO 217953	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 217954	Off Fort Kamehameha. Catalogue XV.
<i>Strombus maculatus</i> Sowerby, 1842 Hawaiian name(s): mamaiki; pupu mamaiki; pu leholeho.		
1932	Spec - BPBM-MO 199101	Reef off Fort Kamehameha. Catalogue XIV.
Family: TONNIDAE		
Genus: <i>Tonna</i> Hawaiian name(s): pu`oni`oni`o.		
<i>Tonna perdit</i> Linnaeus, 1758 Hawaiian name(s): puleho.		
1936	Spec - BPBM-MO 240897	Reef off Fort Kamehameha. Catalogue XVII.
Family: TRIPHORIDAE		
Genus: <i>Triforis</i>		
<i>Triforis flammulata</i> Pease		
Unknown	Spec - BPBM-MO 62886	Ford Island. Catalogue V.
Genus: <i>Triphora</i>		
<i>Triphora</i> {<i>Triphoridae</i>}		
1932	Spec - BPBM-MO 198048	Pearl Harbor entrance channel. Catalogue XIV.
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Viriola</i>		
<i>Viriola incisa</i> Pease, 1861		
1936	Spec - BPBM-MO 230149	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
Family: VERMETIDAE		
Unidentified Vermetidae		
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	
Genus: <i>Dendropoma</i>		
<i>Dendropoma</i> sp.		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
<i>Dendropoma platypus</i> Morch, 1861		
1973	Ref - Evans et al., 1974	
1987	Ref - Brewer & Assoc., 1987	
<i>Dendropoma psarocephala</i> Hadfield & Kay, 1972		
1975	Ref - Grovhoug, 1976	
<i>Dendropoma psarocephala?</i> Hadfield & Kay, 1972		
1973	Ref - Evans et al., 1974	
Genus: <i>Eualetes</i>		
<i>Eualetes tulipa</i> (Chenu, 1843) Introduced. Common name(s): Noble Vermitid.		
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	
Genus: <i>Petalococonchus</i>		
<i>Petalococonchus keenae</i>		
	Hadfield and Kay, 1972	Indigenous. Common name(s): Periwinkle.
2007	This Project	
2008	This Project	
Genus: <i>Serpulorbis</i>		
<i>Serpulorbis variabilis</i>		
	Hadfield and Kay, 1972	Indigenous.
2007	This Project	
2008	This Project	
Genus: <i>Vermetus</i>		
<i>Vermetus</i> sp.		
Unknown	Spec - BPBM-MO 63578	Catalogue V.
1973	Ref - Evans et al., 1974	
Family: VITRINELLIDAE		
Genus: <i>Cyclostremiscus</i>		
<i>Cyclostremiscus</i> sp. A		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. A.
<i>Cyclostremiscus</i> sp. B		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. B.
<i>Cyclostremiscus</i> sp. C		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. C.
<i>Cyclostremiscus</i> sp. D		
1973	Ref - Evans et al., 1974	Off Pearl Harbor. Recorded as <i>Cyclostremiscus</i> sp. D.
<i>Cyclostremiscus emeryi</i>		
	Ladd, 1966	
1973	Ref - Evans et al., 1974	Off Pearl Harbor.
Family: XENOPHORIDAE		
Genus: <i>Xenophora</i>		
<i>Xenophora pallida</i>		
1961	Spec - BPBM-MO 217922	Off Fort Kamehameha. Catalogue XV.
Order: NEOGASTROPODA		
Family: BUCCINIDAE		
Genus: <i>Cantharus</i>		
<i>Cantharus farinosus</i>		
	(Gould, 1850)	
1973	Ref - Evans et al., 1974	
Genus: <i>Colubraria</i>		
<i>Colubraria obscura</i>		
	Reeve, 1844	
Unknown	Spec - BPBM-MO 240920	Channel. Catalogue XVII.
Genus: <i>Engina</i>		
<i>Engina</i> sp.		
1973	Ref - Evans et al., 1974	
Genus: <i>Prodotia</i>		
<i>Prodotia ignea</i>		
	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.
Family: COLUMBELLIDAE			
Genus: <i>Anachis</i>			
<i>Anachis miser</i>	1973	Ref - Evans et al., 1974	(Sowerby, 1844) Recorded as <i>A. zebra</i> .
Genus: <i>Columbella</i>			
<i>Columbella varians</i>	1932	Spec - BPBM-MO 199827	Sowerby Hawaiian name(s): pupu Ni`ihau. Fort Kamehameha, reef off. Catalogue XIV.
Genus: <i>Euplica</i>			
<i>Euplica varians</i>	1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Mitrella</i>			
<i>Mitrella margarita</i>	1961	Spec - BPBM-MO 221163	Reeve, 1859 Off Fort Kamehameha?. Catalogue XV.
Genus: <i>Seminella</i>			
<i>Seminella sp.</i>	1996	Legacy Project (Coles et al., 1997)	
Family: CONIDAE			
Genus: <i>Conus</i>			
pupu poniuniu.		Common name(s): Cone shell; Hawaiian name(s): pupu`ala;	
<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	Lamarck, 1810 Off Fort Kamehameha. Catalogue XV.
	1961	Spec - BPBM-MO 220119	Off Fort Kamehameha. Catalogue XV.
<i>Conus catus</i>	1932	Spec - BPBM-MO 198911	Hwass, 1792 Reef off Fort Kamehameha. Catalogue XIV.
	1936	Spec - BPBM-MO 238941	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	Linnaeus, 1758 Indigenous. Common name(s): Soldier Cone. Fort Kamehameha, near outer edge of the reef. Catalogue XIV.
	1932	Spec - BPBM-MO 199135	Reef off Fort Kamehameha. Catalogue XIV.
	1936	Spec - BPBM-MO 2	Off Fort Kamehameha, on the reef.
	1936	Spec - BPBM-MO 239251	Off Fort Kamehameha, on the reef. Catalogue XVI.

Legacy Project - Species Report (Cont.)

	<i>Conus nussatella</i>	Linnaeus, 1758	
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.
	<i>Conus pennaccus</i>		
	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.
	<i>Conus quercinus</i>	Lightfoot, 1786	
	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.
	<i>Conus rattus</i>	Hwass, 1792	
	1932	Spec - BPBM-MO 199084	Fort Kamehameha. Catalogue XIV.
	<i>Conus sponsalis</i>	Hass in Brugière, 1792	
	1932	Spec - BPBM-MO 199201	Reef off Fort Kamehameha. Catalogue XIV.
	<i>Conus textile</i>	Linnaeus, 1758	
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.
	<i>Conus vexillum</i>	Gmelin, 1791	
	1932	Spec - BPBM-MO 199346	Reef off Fort Kamehameha. Catalogue XIV.
	1932	Spec - BPBM-MO 199347	Fort Kamehameha. Catalogue XIV.
	<i>Conus vitulinus</i>	Hwass, 1792	
	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.
	Family: CORALLIOPHILIDAE		
	Genus: <i>Quoyula</i>		
	<i>Quoyula madreporarum</i>	Sowerby, 1834	
	1932	Spec - BPBM-MO 198765	Reef off Fort Kamehameha. Catalogue XIV.
	Family: FASCIOLARIIDAE		
	Genus: <i>Fusinus</i>		
	<i>Fusinus sp.</i>		
	1934	Spec - BPBM-MO 205567	Dredge. Catalogue XIV.
	1961	Spec - BPBM-MO 218747	Off Fort Kamehameha, Station 2. Catalogue XV.
	<i>Fusinus sandvicensis</i>	Saverly	
	1934	Spec - BPBM-MO 215733	West Lock, Dredging. Catalogue XV.
	1940	Spec - BPBM-MO 249147	Dredging. Catalogue XVII.
	Genus: <i>Fusolatirus</i>		
	<i>Fusolatirus kuroseanus?</i>		
	1961	Spec - BPBM-MO 222218	Off Fort Kamehameha. Catalogue XV.
	Genus: <i>Peristernia</i>		
	<i>Peristernia chlorostoma</i>	(Sowerby, 1825)	Hawaiian name(s): kolealea.
	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.)

- Genus: *Neocancilla***
Neocancilla waikikiensis Pilsbry, 1921
 1961 Spec - BPBM-MO 219594 Off Fort Kamehameha. Catalogue XV.
- Genus: *Scabricola***
Scabricola newcombii Pease, 1869
 1961 Spec - BPBM-MO 219413 Off Fort Kamehameha. Catalogue XV.
- Genus: *Subcancilla***
Subcancilla flammea (Quoy & Gaimard, 1833)
 1982 Spec - BPBM-MO 242714 Entrance to west. Catalogue XVII.
- Genus: *Vexillum***
Vexillum (Pusia) lautum (Reeve, 1845)
 1932 Spec - BPBM-MO 199456 Fort Kamehameha, reef off. Catalogue XIV.
- Vexillum alveolus* Reeve, 1845
 1938 Spec - BPBM-MO 12 Fossil near Yacht Club.
- Vexillum bellum* Pease, 1860
 1962 Spec - BPBM-MO 219200 Off Fort Kamehameha. Catalogue XV.
- Vexillum filistriatum* (Sowerby, 1874)
 1982 Spec - BPBM-MO 243097 Entrance to west. Catalogue XVII.
- Vexillum pacificum* Reeve
 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.
- Family: MURICIDAE**
- Genus: *Aspella***
Aspella producta (Pease, 1861)
 1932 Spec - BPBM-MO 200760 Fort Kamehameha, reef off. Catalogue XIV.
 1973 Ref - Evans et al., 1974
- Genus: *Chicoreus***
Chicoreus insularum (Pilsbry, 1921)
 1961 Spec - BPBM-MO 218423 Off Fort Kamehameha. Catalogue XV.
- Genus: *Drupella***
Drupella elata Blainville, 1832
 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.
- Genus: *Morula***
Morula sp.
 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.
- Morula dermosa*
 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)
- Morula foliacea* Conrad
 1932 Spec - BPBM-MO 198180 Reef off Fort Kamehameha. Catalogue XIV.
 1936 Spec - BPBM-MO 234727 Reefs at Fort Kamehameha. Catalogue XVI.
- Morula granulata* Duclos, 1832 **Hawaiian name(s): pupu maka'awa; maka'awa.**
 Unknown Spec - BPBM-MO 204188 Fort Kamehameha. Catalogue XIV. May be *M. uva*.

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.
<i>Morula mitosa?</i>		
	Dall	
1927	Spec - BPBM-MO 73	Naval Station.
<i>Morula spinosa</i>		
	H. and A. Adams, 1853	
1932	Spec - BPBM-MO 198280	Fort Kamehameha. Catalogue XIV.
<i>Morula uva</i>		
	Röding, 1798	
1949	Spec - BPBM-MO 234787	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
<i>Morula vexilla</i>		
	(Kuroda, 1953)	
1961	Spec - BPBM-MO 222217	Off Fort Kamehameha. Catalogue XV.
Genus: <i>Murex</i>		
<i>Murex sandwichensis</i>		
	Pease	
1932	Spec - BPBM-MO 198399	Fort Kamehameha, reef off. Catalogue XIV.
Genus: <i>Vitularia</i>		
<i>Vitularia miliaris</i>		
	Gmelin, 1791	Cryptogenic.
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> .
Family: NASSARIIDAE		
Genus: <i>Nassarius</i>		
<i>Nassarius crematus</i>		
	(Hinds, 1844)	
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.
Family: NEPTUNEIDAE		
Genus: <i>Caducifer</i>		
<i>Caducifer decapitata</i>		
	Reeve	
1936	Spec - BPBM-MO 235879	E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
Genus: <i>Clathurella</i>		
<i>Clathurella fuscomaculata</i>		
	Pease, 1860	
1932	Spec - BPBM-MO 200762	Fort Kamehameha, reef off. Catalogue XIV.
Family: PYRAMIDELLIDAE		
Genus: <i>Evalea</i>		
<i>Evalea peasei</i>		
	Dautzenberg & Bouge, 1933	Hawaiian name(s): pupu po`ai.
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia eclectic</i> Pilsbry.
Genus: <i>Herviera</i>		
<i>Herviera patricia</i>		
	Pilsbry, 1918	
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia patricia</i> Pilsbry.
Genus: <i>Hinemoa</i>		
<i>Hinemoa indica</i>		
	(Melvill, 1896)	Introduced.
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia indica</i> Melvill.
1996	Legacy Project (Coles et al., 1997)	
2008	This Project	
Genus: <i>Miralda</i>		
<i>Miralda paulbartschi</i>		
	Pilsbry, 1918	
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia paulbartschi</i> Pilsbry.

Legacy Project - Species Report (Cont.)

<i>Miralda scopulorum</i>	Watson, 1886	
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia scopulorum</i> Watson.
Genus: <i>Odostomia</i>		
<i>Odostomia</i> sp.		
1943	Spec - BPBM-MO 11	From Railroad Wharf, Peninsula.
1973	Ref - Evans et al., 1974	
<i>Odostomia stearnsiella</i>	Pilsbry, 1918	
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Pyramidella</i>		
<i>Pyramidella</i> sp.		
1996	Legacy Project (Coles et al., 1997)	
<i>Pyramidella dolabrata</i>	Linnaeus, 1758	
1961	Spec - BPBM-MO 220403	Off Fort Kamehameha. Catalogue XV.
<i>Pyramidella miralis hawaiiensis</i>	Dall	
1932	Spec - BPBM-MO 200124	Fort Kamehameha, reef. Catalogue XIV.
<i>Pyramidella nitida</i>	A. Adams	
Unknown	Spec - BPBM-MO 64185	Ford Island. Catalogue V.
<i>Pyramidella oahuuanus</i>	Pilsbry	
1932	Spec - BPBM-MO 200126	Fort Kamehameha, reef. Catalogue XIV.
<i>Pyramidella sulcata</i>	A. Adams, 1859	Hawaiian name(s): pupu `ole.
1915	Spec - BPBM-MO 64201	Catalogue V.
1961	Spec - BPBM-MO 220435	Off Fort Kamehameha. Catalogue XV.
Genus: <i>Pyrgulina</i>		
<i>Pyrgulina oodes</i>		
	(Watson, 1886)	Cryptogenic.
1973	Ref - Evans et al., 1974	Recorded as <i>Odostomia oodes</i> Watson.
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Turbonilla</i>		
<i>Turbonilla</i> sp.		
1973	Ref - Evans et al., 1974	
Family: TEREBRIDAE		
Unidentified Terebridae		
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.
Genus: <i>Hastula</i>		
<i>Hastula matheroniana</i>		
	Deshayes, 1859	
1961	Spec - BPBM-MO 219838	Off Fort Kamehameha. Catalogue XV.
<i>Hastula nitida</i>		
	Hinds, 1844	
1961	Spec - BPBM-MO 220973	Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 221008	Off Fort Kamehameha. Catalogue XV.
<i>Hastula penicillata</i>		
	Hinds, 1844	
1961	Spec - BPBM-MO 220950	Off Fort Kamehameha. Catalogue XV.
Genus: <i>Terebra</i>		
<i>Duplicaria gouldi</i>		
	Deshayes	Hawaiian name(s): loloa; `oi `oi.
1915	Spec - BPBM-MO 54	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>		Weaver, 1960	
1932	Spec - BPBM-MO 199574		Catalogue XIV.
<i>Terebra amoena</i>		Deshayes, 1859	
1961	Spec - BPBM-MO 222344		Off Fort Kamehameha. Catalogue XV.
<i>Terebra cerithina</i>		Lamarck, 1822	
1961	Spec - BPBM-MO 220041		Off Fort Kamehameha. Catalogue XV.
<i>Terebra cerithina?</i>		Lamarck, 1822	
1991	Spec - BPBM-MO 246085		Fort Kamehameha south end housing area. Catalogue XVII.
<i>Terebra columellaris</i>		Hinds, 1844	
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>		Hinds, 1844	
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>		Pease	
1915	Spec - BPBM-MO 9		Dredged off entrance to Pearl Harbor, Map 34, loc. 1.
<i>Terebra maculata</i>		Linnaeus, 1758	Hawaiian name(s): pupu `ole.
1961	Spec - BPBM-MO 219863		Off Fort Kamehameha. Catalogue XV.
1961	Spec - BPBM-MO 219864		Off Fort Kamehameha. Catalogue XV.
<i>Terebra pertusa</i>		Born	
1917	Spec - BPBM-MO 29		Off Pearl Harbor.
<i>Terebra plumbea</i>		Quoy	
1915	Spec - BPBM-MO 7		Dredged off entrance to Pearl Harbor, Map 35, loc. 1.
Family: THAIDIDAE			
Genus: <i>Muricodrupa</i>			
<i>Muricodrupa funiculus</i>		Wood	
Unknown	Spec - BPBM-MO 234516		Catalogue XVI.
Genus: <i>Nassa</i>			
<i>Nassa sp.</i>			
1934	Spec - BPBM-MO 205582		Dredge. Catalogue XIV.
<i>Nassa sarta</i>			
1932	Spec - BPBM-MO 198407		Fort Kamehameha, reef off. Catalogue XIV.
Genus: <i>Pinaxia</i>			
<i>Pinaxia versicolor</i>		Gray, 1839	
1936	Spec - BPBM-MO 234832		E shore of entrance; reef at Fort Kamehameha. Catalogue XVI.
Genus: <i>Vexilla</i>			
<i>Vexilla sp.</i>			
1932	Spec - BPBM-MO 198326		Fort Kamehameha, reef off. Catalogue XIV.
Family: TURRIDAE			
Unidentified Turridae			
1973	Ref - Evans et al., 1974		
Genus: <i>Anacithara</i>			
<i>Anacithara perfecta</i>		Kay, 1979	
Unknown	Spec - BPBM-MO 9817		Honouliuli, West Loch. Catalogue I.
Genus: <i>Carinapex</i>			
<i>Carinapex sp.</i>			
1973	Ref - Evans et al., 1974		

Legacy Project - Species Report (Cont.)

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

Umbraculum sp.

1996 Legacy Project (Coles et al., 1997)

Umbraculum 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 bronni

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, l.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>		Reeve	
1932	Spec - BPBM-MO 200513		Fort Kamehameha. Catalogue XIV.
<i>Isognomon californicum</i>		(Conrad, 1837)	Indigenous.
2008	This Project		
<i>Isognomon incisum</i>		Conrad	
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>		(Gmelin, 1791)	Indigenous.
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<i>Isognomon perna</i>		(Linnaeus, 1767)	Indigenous. Hawaiian name(s): nahawele.
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		
Family: LIMIDAE			
Genus: <i>Lima</i>			
<i>Lima aperta</i>		Sowerby	
1932	Spec - BPBM-MO 200194		Fort Kamehameha; along edge of channel. Catalogue XIV.
Questionable ID.			
Family: MALLEIDAE			
Genus: <i>Malleus</i>			
<i>Malleus daemonicus?</i>		Reeve, 1858	
1950	Spec - BPBM-MO 250727		Ship bottom. Catalogue XVII.
<i>Malleus regula</i>		(Forsskål, 1775)	
1943	Ref - Hutchins, 1949		Recorded as <i>Malleus nuttalli</i> .
Family: MYTILIDAE			
Unidentified Mytilidae			
1950	Spec - BPBM-MO 250729		Ship bottom (with BPBM 250728). Catalogue XVII.
Genus: <i>Brachidontes</i>			
<i>Brachidontes crebristriatus</i>		(Conrad, 1837)	Indigenous. Hawaiian name(s): `owa`owaka;
nahawelepahikaua;			
nahawele li`ili`i; kio nahawele.			
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)		
Genus: <i>Lithophaga</i>			
<i>Lithophaga fasciola</i>		Dall, Bartsch & Rehder, 1938	
1996	Legacy Project (Coles et al., 1997)		
Genus: <i>Musculus</i>			
<i>Musculus oahuensis</i>		Dall, Bartsch & Rehder, 1938	
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	
Genus: <i>Lopha</i>		
<i>Lopha cristigalli</i> (Linnaeus, 1758) Introduced.		
1951	Ref - Paulay, 1996	USNM 699998.
Genus: <i>Nanostrea</i>		
<i>Nanostrea exigua</i> Harry, 1985		
1985	Ref - Harry, 1985	
1996	Ref - Paulay, 1996	USNM 337556.
Genus: <i>Ostrea</i>		
<i>Ostrea</i> sp.		
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)	
<i>Ostrea cf. hanleyana</i> Sowerby, 1871 Indigenous.		
2008	This Project	
<i>Ostrea lima</i> Sowerby, 1871 Indigenous.		
1972	Ref - Long, 1974	Recorded as <i>O. kavaia</i> Dall et al., 1938.
<i>Ostrea margaritae</i> Pisbry, 1918		
Unknown	Spec - BPBM-MO 65691	Catalogue V.
Genus: <i>Saccostrea</i>		
<i>Saccostrea cucullata</i> (Born, 1778)		
1996	Legacy Project (Coles et al., 1997)	
Family: PECTINIDAE		
Genus: <i>Anguipecten</i>		
<i>Anguipecten lamberti</i> Sowerby, 1874		
1961	Spec - BPBM-MO 218856	Off Fort Kamehameha. Catalogue XV. Questionable ID.
Genus: <i>Chlamys</i>		
<i>Chlamys</i> sp.		
1934	Spec - BPBM-MO 205571	Dredge. Catalogue XIV.
1934	Spec - BPBM-MO 205572	Dredge. Catalogue XIV.
<i>Chlamys irregularis</i> (Sowerby, 1842) Indigenous.		
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.
Genus: <i>Pecten</i>		
<i>Pecten n. sp. p-4</i>		
Unknown	Spec - BPBM-MO 60291	Ford Island. Catalogue V. Questionable ID.
<i>Pecten n. sp. p-5</i>		
Unknown	Spec - BPBM-MO 60292	Catalogue V. Questionable ID.
Family: PINNIDAE		
Genus: <i>Pinna</i>		
<i>Pinna sp.</i>		
1973	Ref - Evans et al., 1974	
<i>Pinna muricata</i>		
1972	Ref - Long, 1974	Linnaeus, 1758 Off Pearl Harbor.
Family: PTERIIDAE		
Genus: <i>Pinctada</i>		
<i>Pinctada sp.</i>		
Unknown	Spec - BPBM-MO 45	Indigenous.
2007	This Project	
<i>Pinctada cumingi</i>		
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.		
<i>Pinctada margaritifera</i>		
(Linnaeus, 1758) Indigenous. Common name(s): mother-of-pearl shell;		
Hawaiian name(s): pa; pa hau.		
1915	Ref - Bryan, 1915	Recorded as <i>Avicula margaritifera</i> .
1926	Spec - BPBM-MO 208454	Shore, rocks east of Mokuapu. Catalogue XIV.
1936	Spec - BPBM-MO 24	Reef at Fort Kamehameha.
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	
<i>Pinctada radiata</i>		
(Leach, 1814) Indigenous. Hawaiian name(s): unahi pipi; pipi.		
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)	
Genus: <i>Pteria</i>		
<i>Pteria loveni</i>		
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	Ship bottom. Catalogue XVII.
1950	Spec - BPBM-MO 53	Bottom of YOC-41 in Dry Dock #2..
1973	Ref - Evans et al., 1974	

Spondylus sp.?

1950	Spec - BPBM-MO 49	
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Spondylus linguaefelis

1972	Ref - Long, 1974	Sowerby, 1847 Off Pearl Harbor. Recorded as <i>Spondylus gloriosus</i> .
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Spondylus linguaefelis?

1961	Spec - BPBM-MO 221073	Sowerby, 1847 Off Fort Kamehameha. Catalogue XV.
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Spondylus sparsispinosus

1918	Spec - BPBM-MO 28	
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Spondylus tenebrosus

2007	Ref - Brock, 2007	Reeve, 1856
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Spondylus violacescens

Unknown	Spec - BPBM-MO 60310	Reeve, 1856 Hawaiian name(s): `okupe; pupu momi. Catalogue V.
1932	Spec - BPBM-MO 200223	Fort Kamehameha; along edge of channel. Catalogue XIV.
1973	Ref - Evans et al., 1974	Recorded as <i>Spondylus hawaiiensis</i> Dall et al., 1938.
1993	Ref - Brock, 1994	Recorded as <i>Spondylus tenebrosus</i> .
1994	Ref - Brock, 1995	Recorded as <i>Spondylus tenebrosus</i> .

Order: VENEROIDA

Family: CARDIIDAE

Genus: *Trachycardium*

Trachycardium orbita

1920	Ref - Dall et al., 1938	Sowerby, 1833 Hawaiian name(s): `olepe kupa; pupu kupa. Recorded as <i>T. hawaiiensis</i> . USNM 346229.
1932	Spec - BPBM-MO 200248	Pearl Harbor Channel; Watertown. Catalogue XIV.

Family: CHAMIDAE

Genus: *Chama*

Chama sp.

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

Chama brassica

1951	Ref - Paulay, 1996	Reeve, 1847 Introduced. USNM 700006.
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Chama cf. fibula

2008	This Project	Reeve, 1846 Cryptogenic.
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Chama elatensis

1996	Legacy Project (Coles et al., 1997)	Delsaerd, 1986 Introduced.
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Chama fibula

1920	Ref - Dall et al., 1938	Reeve, 1846 Cryptogenic. Recorded as <i>C. hendersoni</i> . USNM 341296.
1920	Ref - Dall et al., 1938	Recorded as <i>C. hendersoni</i> . USNM 484174.
1935	Spec - BPBM-MO 35	Near Yacht Club.
1979	Ref - Kay, 1979	
1996	Legacy Project (Coles et al., 1997)	
2008	This Project	

Chama iostoma

Unknown	Spec - BPBM-MO 60395	Conrad, 1837 Indigenous. Catalogue V.
1920	Ref - Dall et al., 1938	USNM 484173.
1923	Spec - BPBM-MO 36	Near entrance.
2007	This Project	

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: <i>Semele</i>		
<i>Semele australis</i>	Sowerby, 1832	
Unknown	Spec - BPBM-MO 209617	Catalogue XIV.
Family: TELLINIDAE		
Unidentified Tellinidae		
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Macoma</i>		
<i>Macoma dispar</i>	(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 <i>Scissulina dispar</i> . USNM 341298.
1935	Spec - BPBM-MO 3	In a road cut near Yacht Club.
1938	Ref - Dall et al., 1938	Recorded as <i>Scissulina dispar</i> . USNM 337353.
1938	Ref - Dall et al., 1938	Recorded as <i>Scissulina dispar</i> . USNM 33754.
<i>Macoma obliquilineata</i>	(Conrad, 1837)	
1920	Ref - Dall et al., 1938	Recorded as <i>Jactellina obliquilineata</i> . USNM 331294.
Genus: <i>Pharoanella</i>		
<i>Pharoanella variabilis</i>		
Unknown	Spec - BPBM-MO 64344	Catalogue V. Questionable ID.
Genus: <i>Tellina</i>		
<i>Tellina sp.</i>		
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)	
<i>Tellina sp. A</i>		
1996	Legacy Project (Coles et al., 1997)	
<i>Tellina sp.?</i>		
1934	Spec - BPBM-MO 205579	Dredge. Catalogue XIV.
<i>Tellina (Arcopagia) robusta</i>	(Hanley, 1844)	
1920	Ref - Dall et al., 1938	Recorded as <i>Pinquitellina robusta</i> . USNM 341229.
1938	Ref - Dall et al., 1938	Recorded as <i>Pinquitellina robusta</i> . USNM 337359.
1973	Ref - Evans et al., 1974	Recorded as <i>Angulus nucella</i> Dall et al., 1938.
<i>Tellina palatam</i>	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 <i>Quidnipagus palatum</i> . USNM 335579.
1915	Spec - BPBM-MO 60524	Catalogue V.
1920	Ref - Dall et al., 1938	Recorded as <i>Quidnipagus palatum</i> . 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 <i>Quidnipagus palatum</i> . BPBM.
Family: TRAPEZIIDAE		
Genus: <i>Trapezium</i>		
<i>Trapezium sp.</i>		
1934	Spec - BPBM-MO 205590	Dredge. Catalogue XIV.
Family: VENERIDAE		
Genus: <i>Lioconcha</i>		
<i>Lioconcha fasigata</i>		
Hawaiian Oyster.	Sowerby, 1851	New record for Hawaii. Cryptogenic. Common name(s):
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 makaloa.

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.)

Genus: <i>Teredo</i>		Hawaiian name(s): wawahi wa`a.
<i>Teredo</i> sp.		Indigenous.
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	
<i>Teredo bartschi</i>		Clapp, 1923 Introduced.
	1935 Ref - Edmondson, 1940	
	1935 Ref - Edmondson, 1942	
	1976 Ref - Cooke et al., 1980	
	1996 Legacy Project (Coles et al., 1997)	
<i>Teredo clappi</i>		Bartsch, 1923 Introduced.
	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	
<i>Teredo diegensis</i>		Bartsch, 1916
	1924 Ref - Edmondson, 1940	
	1924 Ref - Edmondson, 1942	
	1973 Ref - McCain, 1974	
	1973 Ref - McCain, 1975	
<i>Teredo furcifera</i>		van Martens, 1894 Introduced.
	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	
<i>Teredo oahuensis</i>		Edmondson, 1942
	1973 Ref - McCain, 1974	
	1973 Ref - McCain, 1975	
Class: SCAPHOPODA		
Order: DENTALIDA		
Family: DENTALIIDAE		
Genus: <i>Dentalium</i>		
<i>Dentalium</i> sp.		
	1961 Spec - BPBM-MO 220733	Off Fort Kamehameha. Catalogue XV.
Class: CEPHALOPODA		
Order: OCTOPODA		
Family: OCTOPODIDAE		
Genus: <i>Polypus</i>		
<i>Polypus</i> sp.		
	1973 Ref - Evans et al., 1974	Off Pearl Harbor.
Phylum: ARTHROPODA		
Unidentified Arthropoda		
	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	
Class: PYCNOGONIDA		
Unidentified Pycnogonida		
	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.)

	<i>Balanus amphitrite?</i>	Darwin	Introduced. Common name(s): Acorn Barnacle.
	1975 Spec - BPBM-B 568		Identified by T.L. Smalley.
	1977 Spec - BPBM-B 615		Pearl Harbor?. Identified by T.L. Smalley.
	<i>Balanus crenatus</i>	Bruguieres, 1789	
	1972 Ref - Long, 1974		Off Pearl Harbor.
	<i>Balanus eburneus</i>	Gould, 1841	Introduced. Common name(s): Reticulated Barnacle.
	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		
	<i>Balanus reticulatus</i>	Utinomi, 1960	Introduced. Common name(s): Reticulated Barnacle.
	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		
	<i>Balanus tintinnabulum</i>	(Linnaeus, 1758)	
	1943 Ref - Hutchins, 1949		Off Pearl Harbor.
	1972 Ref - Long, 1974		Off Pearl Harbor.
	<i>Balanus trigonus</i>	Darwin, 1854	
	1943 Ref - Hutchins, 1949		
	1948 Spec - BPBM-B 345		
	1948 Spec - BPBM-B 350		
	1972 Ref - Long, 1974		
	1973 Ref - Evans et al., 1974		
	Genus: <i>Chelonibia</i>		
	<i>Chelonibia</i> sp.		
	1973 Ref - Evans et al., 1974		
	Family: CHTHAMALIDAE		
	Genus: <i>Chthamalus</i>		
	<i>Chthamalus</i> sp.	Introduced.	
	1993 Ref - Brock, 1994		Recorded as <i>Chthamalus hembeli</i> .
	1994 Ref - Brock, 1995		Recorded as <i>Chthamalus hembeli</i> .
	<i>Chthamalus proteus</i>	Darbo & Southward, 1980	Introduced. Common name(s): Proteus Rock
Barnacle.	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.)

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

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

Genus: <i>Pachygrapsus</i>			
<i>Pachygrapsus sp.</i>		Indigenous.	
2008	This Project		
Genus: <i>Plagusia</i>			
<i>Plagusia depressa tuberculata</i>		Lamarck, 1818	
1947	Spec - BPBM-S 5306		
1973	Ref - Evans et al., 1974		Off Pearl Harbor. Recorded as <i>Plagusia depressa tuberculata</i>
(Lameroux).			
Family: HAPALOCARCINIDAE			
Genus: <i>Hapalocarcinus</i>			
<i>Hapalocarcinus marsupialis</i>		Stimpson, 1859	
1996	Legacy Project (Coles et al., 1997)		
Family: HIPPOLYTIDAE			
Genus: <i>Hippolysmata</i>			
<i>Hippolysmata sp.</i>			
1948	Spec - BPBM-S 6079		
<i>Hippolysmata vittata</i>			
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		
Genus: <i>Leptodius</i>			
<i>Leptodius exaratus</i>		Milne Edwards	
1906	Ref - Rathbun , 1906		
<i>Leptodius sanguineus</i>		(H. Milne Edwards, 1834)	
1973	Ref - Evans et al., 1974		
Genus: <i>Lysmata</i>			
<i>Lysmata acicula</i>		(Rathbun)	
1948	Spec - BPBM-S 5329		
1973	Ref - Evans et al., 1974		
Genus: <i>Saron</i>			
<i>Saron marmoratus</i>		(Olivier, 1811)	Hawaiian name(s): `opae.
1993	Ref - Brock, 1994		
1994	Ref - Brock, 1995		
Genus: <i>Spirontocaris</i>			
<i>Spirontocaris marmoratus</i>			
1950	Spec - BPBM-S 5634		
Family: HOMOLIDAE			
Genus: <i>Homola</i>			
<i>Homola ikedai</i>		Sakai, 1879	
1976	Spec - BPBM-S 10637		Entrance to Pearl Harbor; 2.5 miles off Buoy 1.
Genus: <i>Paromola</i>			
<i>Paromola japonica</i>		Parisi, 1915	
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.			
Family: LEUCOSIIDAE			
Genus: <i>Randallia</i>			
<i>Randallia distincta</i>		Rathbun	
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

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

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

Legacy Project - Species Report (Cont.)

Genus: <i>Libystes</i>		
<i>Libystes nitidus</i>		A. Milne Edwards, 1868
1973	Ref - Evans et al., 1974	
Genus: <i>Podophthalmus</i>		
<i>Podophthalmus vigil</i>		(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 <i>Podophthalmus vigil</i> (Fabricus).
2006	Ref - Smith et al., 2006	
Genus: <i>Portunus</i>		Hawaiian name(s): `ala`eke.
<i>Portunus longispinosus</i>		(Dana, 1852)
1973	Ref - Evans et al., 1974	Recorded as <i>Portunus longispinosus</i> Rathbun.
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
<i>Portunus sanguinolentus</i>		(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: <i>Scylla</i>		
<i>Scylla serrata</i>		(Forsskål, 1775) Introduced. Common name(s): Serrate Swimming Crab;
Samoaan Crab;		Mangrove Crab; Red Crab.
1973	Ref - Evans et al., 1974	Recorded as <i>Scylla serrata</i> de Man.
1987	Ref - Brewer & Assoc., 1987	
1993	Ref - Brock, 1994	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Thalamita</i>		
<i>Thalamita admete</i>		(Herbst, 1803)
1973	Ref - Evans et al., 1974	
<i>Thalamita crenata</i>		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	
<i>Thalamita crenata?</i>		Latreille, 1900
1950	Spec - BPBM-S 5621	
<i>Thalamita dakini</i>		Montgomery, 1931 Indigenous.
2008	This Project	
<i>Thalamita edwardsi</i>		
1950	Spec - BPBM-S 5619	
2007	Ref - Brock, 2007	
<i>Thalamita edwardsi?</i>		
1948	Spec - BPBM-S 5335	
<i>Thalamita integra</i>		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 laevis (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>	De Haan, 1833	
1996	Legacy Project (Coles et al., 1997)	
<i>Pilumnus oahuensis</i>	Edmondson, 1931	Introduced. Common name(s): Pilumnid Crab.
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>	Rathbun, 1906	Indigenous.
2008	This Project	

Genus: *Platypodia*

<i>Platypodia eydouxii</i>	(A. Milne Edwards, 1865)	
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 eydouxii</i> .
1996	Legacy Project (Coles et al., 1997)	

<i>Platypodia semigranosa</i>	
1950	Spec - BPBM-S 5638

Unidentified *Platypodia*

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

<i>Trapezia guttata</i>	Rüppell, 1830	
1973	Ref - Evans et al., 1974	Off Pearl Harbor.

<i>Trapezia intermedia</i>	(Miers)
1996	Legacy Project (Coles et al., 1997)

<i>Trapezia wardi</i>	Serène, 1970
1996	Legacy Project (Coles et al., 1997)

Genus: *Xanthias*

<i>Xanthias sp.</i>	
1973	Ref - Evans et al., 1974

Order: STOMATOPODA

Family: GONODACTYLIDAE

Genus: *Gonodactylaceus*

<i>Gonodactylaceus falcatus</i>	(Forsskål, 1775)	Introduced. Common name(s): Snapping Shrimp.
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 (Lamouroux, 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.)

Genus: <i>Holoporella</i>		
<i>Holoporella</i> sp.		
1975	Ref - Grovhoug, 1976	
1978	Ref - Grovhoug, 1979	
Family: CELLEPORIDAE		
Genus: <i>Cellepora</i>		
<i>Cellepora vagans</i> (Busk, 1855)		
1972	Ref - Long, 1974	Recorded as Celleporaria vagans.
Family: CRIBRILINIDAE		
Genus: <i>Cribrilaria</i>		
<i>Cribrilaria radiata</i> (Moll, 1803)		
1972	Ref - Long, 1974	Off Pearl Harbor.
Family: MICROPORELLIDAE		
Genus: <i>Microporella</i>		
<i>Microporella ciliata</i> (Pallas, 1766)		
1972	Ref - Long, 1974	
Family: MUCRONELLIDAE		
Genus: <i>Parasmittina</i>		
<i>Parasmittina</i> sp.		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
<i>Parasmittina spathulata</i> (Smitt, 1873)		
1972	Ref - Long, 1974	Off Pearl Harbor.
Family: RETEPORIDAE		
Genus: <i>Reteporellina</i>		
<i>Reteporellina denticulata</i> (Busk, 1884)		
1972	Ref - Long, 1974	Off Pearl Harbor.
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Rhynchozoon</i>		
<i>Rhynchozoon</i> sp.		
1972	Ref - Long, 1974	Off Pearl Harbor.
Family: SAVIGNYELLIDAE		
Genus: <i>Savignyella</i>		
<i>Savignyella lafontii</i> (Audouin, 1826)		
1972	Ref - Long, 1974	
1996	Legacy Project (Coles et al., 1997)	
Family: SCHIZOPORELLIDAE		
Genus: <i>Schizoporella</i>		
<i>Schizoporella cf. errata</i> (Waters, 1878) Introduced. Common name(s): Erratic Bryozoan.		
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	
<i>Schizoporella unicornis</i> (Johnston, 1847) Introduced.		
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>	Fisher, 1925	
		Unknown Spec - BPBM-W 626		
		Order: FORCIPULATIDA		
		Family: ASTERIIDAE		
		Genus: <i>Distolasterias</i>		
		<i>Distolasterias euplecta</i>	Fisher, 1906	
1982.	1982	Spec - BPBM-W 3028		Off Pearl Harbor; dredge spoil site. Identified by D.M. Devaney,
		Order: OPHIURIDA		
		Family: AMPHIURIDAE		
		Genus: <i>Amphipholis</i>		
		<i>Amphipholis squamata</i>	(Delle Chiaje, 1829)	
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.
		Genus: <i>Ophionereis</i>		
		<i>Ophionereis porrecta</i>	Lyman	
	1967	Spec - BPBM-W 2579		Ewa End.
		Family: OPHIACTIDAE		
		Genus: <i>Histampica</i>		
		<i>Histampica cythera</i>	(A. H. Clark, 1949)	
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,
		Genus: <i>Ophiactis</i>		
		<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>	Clark, 1911	
	1949	Ref - Clark, 1949		USNM 6927.
		<i>Ophiactis modesta</i>	Brock, 1888	
	1938	Spec - BPBM-W 1031		
	1942	Ref - Ely, 1942		
		<i>Ophiactis savignyi</i>	(Müller & Troschel, 1842)	Cryptogenic. Common name(s): Sponge Brittle
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		
<i>Didemnum perlucidum</i>		Monniot, 1983	Introduced.
2007	This Project		
Genus: <i>Diplosoma</i>			
<i>Diplosoma cf. spongiforme</i>		(Giard, 1872)	New record for Hawaii. Introduced.
2008	This Project		
<i>Diplosoma listerianum</i>		(Milne-Edwards, 1841)	Introduced.
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		
Genus: <i>Trididemnum</i>			
<i>Trididemnum savignyi</i>		(Herdman, 1886)	
1975	Ref - Grovhoug, 1976		
Family: POLYCLINIDAE			
Unidentified Polyclinidae			
1947	Spec - BPBM-Y 168		
1948	Spec - BPBM-Y 173		
1948	Spec - BPBM-Y 175		
Genus: <i>Polyclinum</i>			
<i>Polyclinum sp.</i>			Indigenous.
1975	Ref - Grovhoug, 1976		
<i>Polyclinum constellatum</i>		Savigny, 1816	
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		
<i>Polyclinum vasculosum</i>		Pizon, 1908	
1920	Ref - Tokioka, 1967		USNM 11755.
1972	Ref - Long, 1974		
Order: PHLEBOBRANCHIA			
Family: ASCIDIIDAE			
Genus: <i>Ascidia</i>			
<i>Ascidia n. sp.</i>			Known only from Hawaii.
1996	Legacy Project (Coles et al., 1997)		
<i>Ascidia sp.</i>			Indigenous.
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		
<i>Ascidia sp. B</i>			Introduced.
1996	Legacy Project (Coles et al., 1997)		
2008	This Project		
<i>Ascidia interrupta</i>			
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> ..
		<i>Ascidia melanostoma</i>	(Sluiter, 1885)
	1972	Ref - Long, 1974	
	1996	Legacy Project (Coles et al., 1997)	
		<i>Ascidia sp. A</i>	Introduced.
	2007	This Project	
		<i>Ascidia sydneiensis</i>	(Stimpson, 1855) Introduced. Common name(s): Yellow-green Sea
Squirt.			
	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	
		Genus: <i>Phallusia</i>	
		<i>Phallusia nigra</i>	(Savigny, 1816) Introduced. Common name(s): Black Sea Squirt.
	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	
		Family: CIONIDAE	
		Genus: <i>Ciona</i>	
		<i>Ciona intestinalis</i>	(Linnaeus, 1767) Introduced.
	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	
		Family: PEROPHORIDAE	
		Genus: <i>Perophora</i>	
		<i>Perophora sp.</i>	
	1975	Ref - Grovhoug, 1976	
		<i>Perophora annectens</i>	
	1996	Legacy Project (Coles et al., 1997)	
		Order: STOLIDOBRANCHIA	
		Family: PYURIDAE	
		Genus: <i>Herdmania</i>	
		<i>Herdmania sp.</i>	Indigenous.
	2008	This Project	
		<i>Herdmania mauritiana</i>	(Drasche, 1884) Introduced.
	2008	This Project	
		<i>Herdmania pallida</i>	(Savigny, 1816) Introduced.
	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	
		Genus: <i>Microsomus</i>	
		<i>Microsomus exasperatus</i>	Introduced.
	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*

Fundulus grandis

		Baird & Girard, 1853	Introduced.
1905	Ref - Brock, 1960		
1905	Ref - Maciolek, 1984		
1907	Ref - Van Dine, 1907		
1987	Ref - Randall, 1987		

Family: HEMIRAMPHIDAE

Genus: *Hemiramphus*

Hemiramphus depauperatus

		Lay & Bennett, 1839	
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*

Gambusia affinis

		(Baird & Girard, 1853)	Introduced.
1905	Ref - Brock, 1960		
1905	Ref - Maciolek, 1984		
1907	Ref - Van Dine, 1907		
1987	Ref - Randall, 1987		

Genus: *Poecilia*

Poecilia latipinna

		(LeSueur)	Introduced.
1905	Ref - Brock, 1960		Recorded as <i>Mollienesia latipinna</i> .
1905	Ref - Maciolek, 1984		Recorded as <i>Mollienesia latipinna</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*

Myripristis amaena

		(Castelnau, 1873)	
2006	Ref - Smith et al., 2006		Recorded as <i>Myripristis amaenus</i> .

Myripristis berndti

		Jordan & Evermann, 1903	
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*

Neoniphon sammara

		(Forsskål, 1775)	
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*

Sargocentron diadema

		(Lacepede, 1802)	Hawaiian name(s): 'ala 'ihi kalaloa.
1996	Spec - BPBM-I 37326		NE side of West Loch channel.

Sargocentron punctatissimum

		(Cuvier in Cuvier and Valenciennes, 1829)	
2006	Ref - Smith et al., 2006		Recorded as <i>Adioryx lacteoguttatus</i> .
2006	Ref - Smith et al., 2006		

Order: GASTEROSTEIFORMES

Family: AULOSTOMIDAE

Genus: *Aulostomus*

Aulostomus chinensis

		(Linnaeus, 1766)	
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 coniorta (Jenkins, 1903)
1973 Ref - Evans et al., 1974 Recorded as *Scorpaena coniorta* (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.)

<i>Acanthurus nigrofuscus</i>	(Forsskål, 1775)	
1996	Legacy Project (Coles et al., 1997)	
<i>Acanthurus olivaceus</i>	(Bloch & Schneider, 1801)	
1973	Ref - Evans et al., 1974	
<i>Acanthurus triostegus</i>	(Linnaeus, 1758)	Indigenous. Common name(s): Convict Tang; Hawaiian name(s): palani.
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	
<i>Acanthurus xanthopterus</i>	Cuvier & Valenciennes, 1835	
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	
Genus: <i>Ctenochaetus</i>		
<i>Ctenochaetus strigosus</i>	(Bennett, 1828)	
1973	Ref - Evans et al., 1974	
1996	Legacy Project (Coles et al., 1997)	
2006	Ref - Smith et al., 2006	
Genus: <i>Naso</i>		
<i>Naso brevirostris</i>	(Valenciennes, 1835)	
1978	Ref - Grovhoug, 1979	
1986	Ref - Lenihan, 1990	
1996	Legacy Project (Coles et al., 1997)	
<i>Naso lituratus</i>	(Forster and Schneider, 1801)	
2006	Ref - Smith et al., 2006	
<i>Naso unicornis</i>	(Forsskål, 1775)	Indigenous. Common name(s): Bluespine Unicornfish; Hawaiian name(s): kala.
1973	Ref - Evans et al., 1974	
1986	Ref - Lenihan, 1990	
1994	Ref - Brock, 1995	
1996	Legacy Project (Coles et al., 1997)	
2007	This Project	
Genus: <i>Zanclus</i>		
<i>Zanclus cornutus</i>	(Linnaeus, 1758)	Indigenous. Common name(s): Moorish Idol; Hawaiian name(s): kīhikihi.
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> .
<i>Sarotherodon melanotheron</i>		
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> .
Family: GOBIIDAE		
Unidentified Gobiidae		
1996	Legacy Project (Coles et al., 1997)	
Genus: <i>Asterropteryx</i>		
<i>Asterropteryx semipunctatus</i>		
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);
1996	Spec - BPBM-I 37316	along shoreline.
2006	Ref - Smith et al., 2006	W side of Middle Loch channel.
2007	Ref - Brock, 2007	
Genus: <i>Bathygobius</i>		
<i>Bathygobius cocosensis</i>		
1973	Ref - Evans et al., 1974	(Bleeker, 1854) Hawaiian name(s): 'o'opu 'ohune.
1986	Ref - Lenihan, 1990	Recorded as <i>fuscus</i> (Ruppell).
1993	Ref - Brock, 1994	Recorded as <i>B. fuscus</i> (Ruppell).
1994	Ref - Brock, 1995	Recorded as <i>B. fuscus</i> .
1996	Spec - BPBM-I 37313	Recorded as <i>B. fuscus</i> .
1996	Spec - BPBM-I 37317	Rainbow Bay Marina; docks and shoreline.
Company (HECO)		Sheet piling in thermal discharge from Hawaiian Electric
1996	Spec - BPBM-I 37319	Waiau Plant.
Floating Drydock.		Middle Loch; on wooden pilings near U.S.S. "Machinist"
1996	Spec - BPBM-I 37321	Middle Loch; on hull of U.S.S. "Machinist" Floating Drydock.
<i>Bathygobius cotticeps</i>		
1987	Ref - AECOS, 1987	Steindachner, 1880
<i>Bathygobius fuscus</i>		
2006	Ref - Smith et al., 2006	(Rüppell, 1830)
Genus: <i>Ctenogobius</i>		
<i>Ctenogobius tongarevae</i>		
1973	Ref - Evans et al., 1974	(Fowler, 1927)
1978	Ref - Grovhoug, 1979	
Genus: <i>Eviota</i>		
<i>Eviota epiphanes</i>		
1996	Spec - BPBM-I 37314	Jenkins, 1903
		N side of entrance channel.
Genus: <i>Gnatholepis</i>		
<i>Gnatholepis anjerensis</i>		
1973	Ref - Evans et al., 1974	Bleeker, 1850
1978	Ref - Grovhoug, 1979	
Genus: <i>Mugilogobius</i>		
<i>Mugilogobius cavifrons</i>		
1991	Spec - BPBM-I 34997	(Weber, 1909)
		Drainage area E of Blaisdell Park.
<i>Mugilogobius parvus</i>		
1987	Ref - Randall et al., 1993	(Oshima, 1919) Introduced.
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
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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