INVENTORY OF INTERTIDAL AND SHALLOW SUBTIDAL MARINE INVERTEBRATES AT KALAUPAPA NATIONAL HISTORIC PARK MOLOKA'I, HAWAI'I

Hawaii Biological Survey

Final Report

January 2006

COVER PHOTOS
Tide pool area at Ka Laemau on northwestern tip of Kalaupapa Peninsula.
Inset, the intertidal anemone *Cladactella manni* (Verrill, 1899).
(Cover Design: D. Preston, Photos by: S. Godwin)

FINAL REPORT
INVENTORY OF INTERTIDAL AND SHALLOW SUBTIDAL MARINE INVERTEBRATES AT KALAUPAPA NATIONAL HISTORIC PARK

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EXECUTIVE SUMMARY

In September 2004 a project designated as KALA-00013 under National Park Service (NPS) permit KALA-2004-SCI-0004 was begun as a collaborative effort with the Pacific Cooperative Studies Unit, University of Hawai'i Manoa, The National Park Service (NPS), Pacific Islands Coral Reef Program, and the Bishop Museum in Honolulu, Hawaii which focused on the intertidal and supralittoral habitats of Kalaupapa National Historic Park (KALA). The principal goal of this project was to collect both qualitative and quantitative site-specific information focusing on a species inventory of marine invertebrates associated with intertidal and supralittoral coastal habitats of KALA. The intent of the inventory work and methods entail acquisition of species inventory data that will contribute to the subsequent development of an integrated and comprehensive long-term marine monitoring program. Additionally, an archived and catalogued collection of 507 lots of marine invertebrates containing roughly 1548 specimens was created with organisms from this project. This collection was deposited with KALA as an addition to existing cultural and natural history material.

A total of 12 sites were surveyed, with both quantitative monitoring and species inventory methodologies. The species inventory yielded 306 species, with 284 native, 14 endemic, 9 introduced, and 3 cryptogenic species. In addition, there were 2 new records for the Hawaiian Archipelago, and 3 new species records. Two of the new species records have been previously recorded for the Hawaiian Archipelago but one was a newly described species. An archive of both *in situ* and laboratory images of common species was created and deposited with NPS staff at KALA.

Introduction

The intertidal zone in Hawai‘i is created by horizontal faces of ancient lava flows at various stages of erosion. These flows have formed benches that are at or just above mean tide level, which are the basis of the variety of habitats associated with shorelines in the Main Hawaiian Islands. These habitats include sea cliffs, sea-level basalt shorelines, calcareous solution and water-leveled benches (Kay, 1979). The supra-littoral beach zone associated with these habitats is also quite varied, and is represented by single or combined substrates. These substrates are boulder/cobble, calcareous and basaltic rubble, and various sand types. The variety of intertidal and supralitorral habitat contains cryptic species assemblages that have attracted little attention historically by researchers in Hawai‘i but have always been of great cultural importance.

The land under control of the Kalaupapa National Historic Park (KALA) comprises 1093 hectares of shallow nearshore marine habitat with associated shorelines that have all of the previously mentioned intertidal and supralittoral habitat and substrates. The geographic isolation and access restrictions to this area have allowed it to remain basically unaltered. It is therefore an excellent site to expand the knowledge of species assemblages and vertical partitioning of habitat by marine invertebrate organisms in the Hawaiian intertidal and supralittoral zones.

In September 2004, a project designated as KALA-00013 under National Park Service (NPS) permit KALA-2004-SCI-0004 was begun as a collaborative effort with the Pacific Cooperative Studies Unit, University of Hawai’i Manoa, The National Park Service (NPS) Pacific Islands Coral Reef Program, and the Bishop Museum in Honolulu, Hawai‘i which focused on the intertidal and supralittoral habitats of KALA. The principal goal of this project was to collect both qualitative and quantitative site-specific information focusing on a species inventory of marine invertebrates associated with intertidal and supralittoral coastal habitats of KALA. The intent of the inventory work and methods entail acquisition of species inventory data that will contribute to the subsequent development of an integrated and comprehensive long-term marine monitoring program.

Proposed Project Components and Deliverables

The proposed products of these efforts were: *****(1) a 90% presence-absence species inventory, including a species list with relative abundance data, in an agreed upon digital format denoting native, endemic, alien/invasive, and cryptogenic taxa, that will be used by KALA staff to populate spatial (GIS) or relational databases. (2) digital photographs with sufficient resolution to identify macroinvertebrates, done in conjunction with KALA staff during field work. (3) training of KALA staff during field work. (4) a final PCSU/CESU and BPBM jointly published report that briefly summarizes findings. Also, (5) a comprehensive set of voucher specimens accessioned and catalogued using NPS collections management policy and regulations and deposited with the museum curator at KALA.

*** This is a guideline based on National Park Service initiatives and was deemed unrealistic for the reasons of inadequate taxonomic resolution for many organisms and too short of a time period for the project.**

Deliverables Produced

Final Report including:

? Site data that includes habitat descriptions such as habitat and substrate types and GPS position

? Complete inventory data including; species, taxonomic authorship (authority of taxon name), status (i.e.; alien, native…), relative abundance, and distribution presented for each site surveyed. To include (with caveats):

Phylum Porifera Due to complications with the taxonomy of this group most identifications will be tentative or not to species.

Phylum Cnidaria

Phylum Nemertea

Phylum Annelida

Phylum Sipuncula

Phylum Mollusca

Phylum Arthropoda (not to include subphylum Uniramia or class Arachnida)

Phylum Ectoprocta

Phylum Echinodermata

Phylum Chordata (Ascidiacea only): Due to the complications with the taxonomy of the Family Didemnidae in this phylum, some of the members of this group can only be tentatively identified.

Additional products:

? Digital photo catalog on CD

? Archived and catalogued collection of 507 lots of specimens of marine invertebrates, with database

Methodology

Field Component

A total of 12 sites were chosen and surveyed during the course of the project. These sites encompassed the representative range of all nearshore marine habitat types present to a maximum depth of 1.5 meters, and took into consideration any criteria set forth by the National Park Service (NPS) during an initial site trip.

STANDARD SITE SURVEYS

Surveys were based on two basic activities, species inventory and quantitative survey, which took place either as joint exercises or individually. Table 1.1 provides the metadata for each site, which includes the activity conducted. The specifics of these activities are:

Species Inventory:

1) Transect Inventory – Species are recorded along a 2 meter belt transect that was used for quantitative enumeration. This serves as a point to record and collect species but also to define species distribution and habitat type.

2) Roving Collections – The collection of the representative fauna strictly for species inventory. This activity ranged throughout the site from a water depth of 1 meter to the extent of the supralittoral zone. This was accomplished by shore wading, roving swims, and searching the supralittoral zone to collect qualitative data or samples for common, rare, or cryptic organisms and to survey any additional habitats present at the site, (e.g.; sand, pavement, undersides of cobbles, small boulders and rubble).

Quantitative Survey:

1) Transect Survey – A transect line is stretched from the low tide mark to the extent of the supralittoral zone. A 0.125m^2 quadrat is placed at pre-set intervals and all organisms are enumerated.

SURVEY SCENARIO

An initial site visit was conducted for the purpose of reviewing the habitat types around the coastline of Kalaupapa Peninsula, and what requirements for access existed. A decision was made to follow the existing plan for sites used for prior intertidal research (Bird *pers. comm.*; Minton & Carnevale, 2004). The only deviation from these previous plans was to designate sites specifically for collection of organisms.

Field activities were planned around the greatest low tide periods that occurred in the hours between 6:00 AM and noon with ranges between 0.1 and -0.3 feet. This allowed field activities during the morning hours and sample processing and data entry in the afternoon. Occasionally sites were visited during evening low tides to collect particular organisms more active during this period.

Quantitative surveys were the first activity conducted at a site and were then followed by field collections. Transect tapes were laid out perpendicular to the shoreline from the low tide mark to the beginning of the vegetation zone, or out to a maximum of 60 meters (whichever was applicable). Two individuals conducted quadrat counts, while another recorded GPS coordinates, photographed the site, and conducted the transect inventory. Once quantitative surveys were complete the roving collection of errant and sessile marine invertebrates took place. In some cases, sites were chosen to conduct roving collections exclusively (See Table 1.1). In conjunction with the roving collections and transect inventory, *in situ* photos of organisms were taken. Specialized collections of rubble, dead coral, and algae for symbiotic organisms or substrate-specific inhabitants were done during the roving collection step. These samples were processed in the following ways:

1) Rubble is placed in a dilute formalin bath to dislodge small mobile invertebrates, which are removed by a 0.5 mm sieve. Large pieces of rubble are broken apart with chisels and examined for the purpose of collecting any sessile fauna.

2) Algae and other substrate are washed with either dilute formalin or under running fresh water to collect epibionts, which are collected on a 0.5 mm sieve.

All collected organisms were sorted by higher taxonomic and morphotype level in an on-site field lab at KALA. Specimens were preserved with methods appropriate to the specific taxonomic group. Porifera, molluscs, crustaceans, and echinoderms were preserved in 75% ethanol or frozen, and soft-bodied organisms (cnidaria, sea slugs, and urochordates) preserved in 10% formalin. Individual specimens and the samples mentioned above are temporarily stored in clear plastic samples bags for transport back to Bishop Museum. These specimens are then transferred to glass storage containers for short term storage during the taxonomy phase.

Laboratory Analysis and Voucher Collections

All collected material was brought back to the Bishop Museum for further analysis. The analysis at Bishop Museum involved the use of recent taxonomic literature to make identifications. Problematic groups were sent on loan to recognized experts for positive identification. The loan process was monitored by both the Bishop Museum registrar and Invertebrate Zoology collections manager until the specimens were returned.

All organisms identified during the above process were first entered into a phylogentically ordered inventory list. The list contains current genus and species, taxonomic authority, and status (i.e.; native, endemic, non-native, new record….etc). Additionally, a site inventory for each species was produced.

NATURAL HISTORY COLLECTIONS FOR KALA

In collaboration with the NPS museum curator at KALA, an archival process was set in place during the course of species identifications. A NPS accession number for all material collected under the permit was assigned and a string of catalogue numbers was provided for individual specimens. Once identification of a specimen was confirmed, it was assigned a catalogue number, and a label (with all pertinent information) is printed on archival paper with a standard laser printer. The specimen and label was sealed in a glass container and suspended in 75% ethanol. This material and an accompanying collections inventory were then deposited with the KALA museum curator.

Results

A total of 12 sites were surveyed during the course of the project and Table 1.1 shows the breakdown of activities, as well as site designations, geographic names, and UTM coordinates (NAD 83, UTM Zone 4N). A map of the Kalaupapa Peninsula depicting the locations of each site is shown in Figure 1.1 and descriptions of the sites are in the following section. The results of the quantitative survey will be presented first and will be followed by the results of the species inventory.

Site Descriptions

The following section has field descriptions with specific highlights. Data presented in following sections will cover more specific topics such as species distributions and relative abundance, which are not covered in the site descriptions.

Site	Locality	UTM-N	UTM-E	Comments
4	Piko'one	2343829.42	708988.26	Quantitative Survey
5	Puwah	2344305.11	709237.90	Quantitative Survey
6	Kahili	2346757.45	710096.55	Quantitative Survey, Species Inventory
7	Ka Laemau	2347143.39	710176.33	Quantitative Survey, Species Inventory
16	Mormon Pond	2342852.37	713419.70	Quantitative Survey
20	Church Pasture	2343090.14	713344.71	Quantitative Survey, Species Inventory
21	Carpenters Beach	2344725.96	709198.16	Quantitative Survey
22	Dock	2344473.76	709216.56	Species Inventory
23	Papaloa Beach	2344859.0	709362.0	Quantitative Survey
24	Lighthouse	2346614.0	711613.0	Quantitative Survey
25	Old Lady Cave	2345055.0	712539.0	Quantitative Survey, Species Inventory
26	Ka Laemilo Point	2345785.6	709347.2	Species Inventory

Table 1.1. Site designations, UTM coordinates, and activities.

KALA-04, Piko‘one

A narrow basaltic bench with sparse tide pools and a narrow band of boulders fronting a steep hillside. At low tide, the exposed area between the vegetation zone and the low tide mark was 30 meters. The boulder habitat was roughly 12 meters wide and a zone defined by the presence of *Littoraria pintado* began 5.6 meters from the vegetation zone within the boulder habitat. This site is washed heavily by waves at high tide and is reported to be inundated by sand during certain periods of the year. The common species at this site: *Littoraria pintado*, *Nodilittorina hawaiensis,* and *Nerita picea* were located from low intertidal to low supralittoral zones. The upper supralittoral zone was devoid of species except for crabs of the genus *Pachygrapsus*.

KALA-05, Puwah

A finger of basalt extending roughly 40 meters from a 10 meter wide boulder shoreline. A steep sloping relief characterizes the southern side of the finger, while the northern side is bordered by a shallow bench that is exposed at low tide. This shallow bench was characterized by extensive tide pools and contained numerous corals, mollusks, and echinoderms. The quantitative survey of this site took place from the seaward tip along the spine of the finger to the extent of the boulder habitat. This basalt finger is inundated during high tide and receives harsh pounding from waves during the winter months. Typical low intertidal species, such as opihi and the urchins *Colobocentrotus* and *Echinometra* were present on the seaward and southern edge. The gastropods *Littoraria pintado*, *Nodilittorina hawaiensis, Nerita picea* and *Peasiella tantilla* were common on upper exposed areas, while *Morula uva, Drupa ricina* and *Serpulorbis variabilis* were common on lower wave-washed areas.

Figure 1.1. Kalaupapa Peninsula and location of project survey sites. Map pr oduced by: M. McShane

KALA-06, Kahili

An extensive intertidal area characterized by boulders, shallow sand/cobble areas, and basalt pavement in conjunction with a broad sand beach. At low tide an extensive area is covered by water less than 0.5 meters deep which has unconsolidated rubble, sand, and basalt pavement. This zone was characterized by numerous holothuroid and echinoid echinoderms, and the gastropod *Hipponix imbricatus* was extremely abundant. Also at low tide, a zone running for roughly 30 meters from the sand beach that contained shallow sand pits and tide pools is exposed. The site is also protected from extreme wave action through most of the year by a subtidal boulder field on the extreme seaward edge. The quantitative transect at this site began at the edge of the sand beach and ran for 40 meters seaward. Extensive species inventory sampling was conducted at this site, and a new species of holothuroid from the genus *Stichopus* was obtained during this activity (see description and photo, p. 24).

KALA-07, Ka Leamau

Ka Leamau Point is at the extreme seaward edge of an extensive lava flow north of KALA-06. The point is characterized by a high wall that drops sharply to a moderate relief basalt bench that runs roughly 100 meters east to a boulder field that spans 200-300 meters and terminates at a sand beach. A transect was run across an extensive tide pool area for the quantitative survey and therefore, is not directly comparable to other sites. The common species that were captured by quantitative enumeration were *Nodilittorina hawaiensis* and *Nerita picea*. A new species of holothuroid from the genus *Holothuria* was recorded from this site (see description and photo, p. 23).

KALA-16, Mormon Pond

This site was composed entirely of boulder habitat roughly 10 meters in width at low tide. The site is battered by strong wave action during the winter months and is quite representative of the southern-most end of the east side of the peninsula. The zone from the low tide mark to 5 meters was characterized by opihi (*Cellana exarata*), *Nerita picea*, and *Littoraria pintado*, while the zone up to 10 meters had the majority of species. The gastropods *Littoraria pintado*, *Nodilittorina hawaiensis* and *Melampus castaneus*, and shore crabs of the genus *Pachygrapsus* and *Cyclograpsus* were recorded in this zone.

KALA-20, Church Pasture

A broad expanse of basalt bench existed at this site, which contained numerous tide pools. The basaltic bench in this area was up to 100 meters in width at some spots. A location was chosen to survey that was 60 meters from low tide mark to the vegetation zone. The first 10 meters of the transect was dominated by the gastropod *Serpulorbis variabilis* and the hermit crab *Calcinus seurati.* The remaining 50 meters contained the gastropod *Littoraria pintado* up to the vegetation zone. Three shore crab species were recorded in the high intertidal and supralittoral zones. These were *Pachygrapsus* and *Geograpsus* in the high intertidal and *Sesarma* and *Cyclograpsus* in the supralittoral zone. The isopod *Ligia* was noted in both these zones as well. Vegetation zone was dominated by ironwood trees and the pine needle litter associated with this species.

KALA-21, Carpenter's Beach

Low basalt bench with sand and cobble beach and high volume of pine needles from ironwood trees. The site chosen to survey was 35 meters in width from the low tide mark to the vegetation zone and contained poorly developed tide pools. The low intertidal had the gastropods *Cellana exarata, Cellana sandwicensis, Serpulorbis variabilis,* and *Nerita picea,* and the cnidarians *Palythoa caesia* and *Aiptasia pulchella*. Individuals of the gastropod *Littoraria pintado* began appearing 10 meters from the low tide mark and were found up to the vegetation zone. Three shore crab species were recorded: *Grapsus tenuicrustatus* was present in the low and middle intertidal zone, while *Pachygrapus* and *Cyclograpsus* were found in the supralittoral zone.

KALA-22, Dock

This site was a combination of man-made sea wall, large rip-rap boulders, and associated shallow subtidal sand habitat that was surveyed for species inventory only. Numerous opihi were present in the boulder habitat from high intertidal (*Cellana exarata*) to below the low tide mark (*Cellana sandwicensis* and *Cellana talcosa*). The gastropods *Thais intermedia* and *Purpura aperta* were numerous and the cephalopod *Octopus cyanea* was recorded. The holothuroids *Stichopus horrens* and *Holothuria atra* were present, as were the echinoid echinoderms *Diadema paucispinum, Eucidaris metularia, Tripneustes gratilla,* and *Echinometra*. The crabs *Grapsus tenuicrustatus* and *Percnon planissimum* were common throughout the boulder habitat.

KALA-23, Papaloa Beach

A drowned reef substrate is located intertidally and represents a unique habitat. A transect 15 meters long was laid from the low tide mark to the edge of this unique substrate. The vegetation zone was located 10 meters beyond this edge and the substrate was all sand within this zone. The only species abundant throughout the drowned reef substrate was the gastropod *Peasiella tantilla*. The gastropods *Littoraria pintado, Nodilittorina hawaiensis, Nerita picea*, and *Ittibitium* sp. were present in high numbers but were patchy in distribution.

KALA-24, Lighthouse

Extensive basalt shore area southeast of the lighthouse. The distance from the low tide mark to the vegetation zone was well over 200 meters, so the transect was run from the low tide mark out to 50 meters. Moderate relief basalt tide pool habitat extended 40 meters beyond the low tide mark. The majority of species recorded were located in the low intertidal, with the gastropod *Nerita picea* being the most abundant. The only species found commonly through a majority of the site was the gastropod *Littoraria pintado*.

KALA-25, Old Lady's Cave

Low relief basalt bench with a sharp drop-off to the ocean that was located at the base of a cliff. Large boulders bordered the site at the base of the cliff and the transect was run from the edge of the bench to this area. The tide pool system at this site harbored a diverse group of echinoid echinoderms and bivalve and gastropod mollusks.

KALA-26, Ka Laemilo Point

This site encompassed an extensive intertidal and shallow subtidal area on the south side of Ka Laemilo Point. This area was used exclusively for species inventory activities that focused on the collection of specimens. The consolidated and unconsolidated boulder and cobble provided

habitat for a variety of organisms and new species of amphipod was identified from the site (see description and photo, pp 24 & 25).

Species Distribution

The following section will graphically show species distribution patterns for some sites quantitatively enumerated during the project. The data is presented by individual site and does not include KALA-22 or KALA-26 since only species inventories were carried out at these sites. Distributions (presence/absence) are charted in 5 meter intervals beginning at the low tide mark (LTM) and the habitat type is recorded at each interval. A set of organisms that were common across most sites were chosen for charting and for use in the later species abundance section. The codes for these species are as follows:

Aip. pulch. = *Aiptasia pulchella*, Cnidaria: Actinaria
Zoanth. = Cnidaria**,** Zoanthidae
Ner. pic. = *Nerita picea*, Mollusca: Gastropoda
Lit. pint. = *Littoraria pintado*, Mollusca: Gastropoda
Nod. haw. = *Nodilittorina hawaiensis*, Mollusca: Gastropoda
Peas. tant. = *Peasiella tantilla*, Mollusca: Gastropoda
Ittibit = *Ittibittium* sp., Mollusca: Gastropoda
Melamp. = *Melampus castaneus*, Mollusca: Gastropoda
Isog. = *Isognomon* sp., Mollusca: Bivalvia
Cell. exart. = *Cellana exarata*, Mollusca: Gastropoda
Cell. sand. = *Cellana sandwicensis*, Mollusca: Gastropoda
Calc. seurat. *= Calcinus seurati*, Arthropoda: Crustacea
Pachy. = *Pachygrapsus sp.*, Arthropoda: Crustacea
Cyclo. = *Cyclograpsus sp.*, Arthropoda: Crustacea
Grap. *= Grapsus tenuicrustatus*, Arthropoda: Crustacea
Sesarm. = *Sesarma sp.* Arthropoda: Crustacea
Nes. intext. = *Nesochthamalus intertextus* Arthropoda: Crustacea (Barnacle)
Colobo. = *Colobocentrotus atratus*, Echinodermata: Echinoidea
Echino. = *Echinometra sp.*, Echinodermata: Echinoidea
Zoanth = Zoanthid, Cnidaria: Zoanthidea

Codes for habitat types are defined, as follows:

ba = basalt
bo = boulder
co = cobble
s = sand
ca = carbonate
tp = tide pool
v = vegetation

Site 4 - Piko'one		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba/tp																
5-10	ba/tp																
10-15	ba/bo																
15-20	bo																
20-25	bo																
25-30	bo/v																

Site 5 - Puwah		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba/tp																
5-10	ba/tp																
10-15	ba/tp																
15-20	ba/tp																
20-25	ba																
25-30	ba																
30-35	ba/bo																
35-40	bo/co																
40-45	bo																
45-50	bo/v																

Site 6 - Kahili		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	bo/co/s																
5-10	bo/co/s																
10-15	bo/co/s																
15-20	ba/bo/s																
20-25	ba/bo/s																
25-30	ba/bo/s																
30-35	ba/bo/s																
35-40	ba/s																
40-45	ba/s																

Table 1.2. Species distributions for KALA-04, KALA-05, and KALA-06

Site 7 - Ka Laemau		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba/tp																
5-10	ba/tp																
10-15	ba/tp																
15-20	ba/tp																
20-25	ba/tp																
25-30	ba/tp																

Site 16 - Mormon Pond		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	bo																
5-10	bo																

Site 20 - Church Pasture		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba/tp																
5-10	ba/tp																
10-15	ba/tp																
15-20	ba/tp																
20-25	ba/tp																
25-30	ba/tp																
30-35	ba/tp																
35-40	ba/tp																
40-45	ba																
45-50	ba																
50-55	ba/bo																
55-60	ba/bo/v																

Site 21 - Carpenter's Bch		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba																
5-10	ba																
10-15	ba																
15-20	ba																
20-25	ba																
25-30	ba																
30-35	ba/v																

Table 1.3. Species distributions for KALA-07, KALA-16, KALA-20, and KALA-21

Site 23 - Papaloa Beach		Species															
Interval (m) Beginning at LTM	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ca																
5-10	ca/s																
10-15	ca/s																

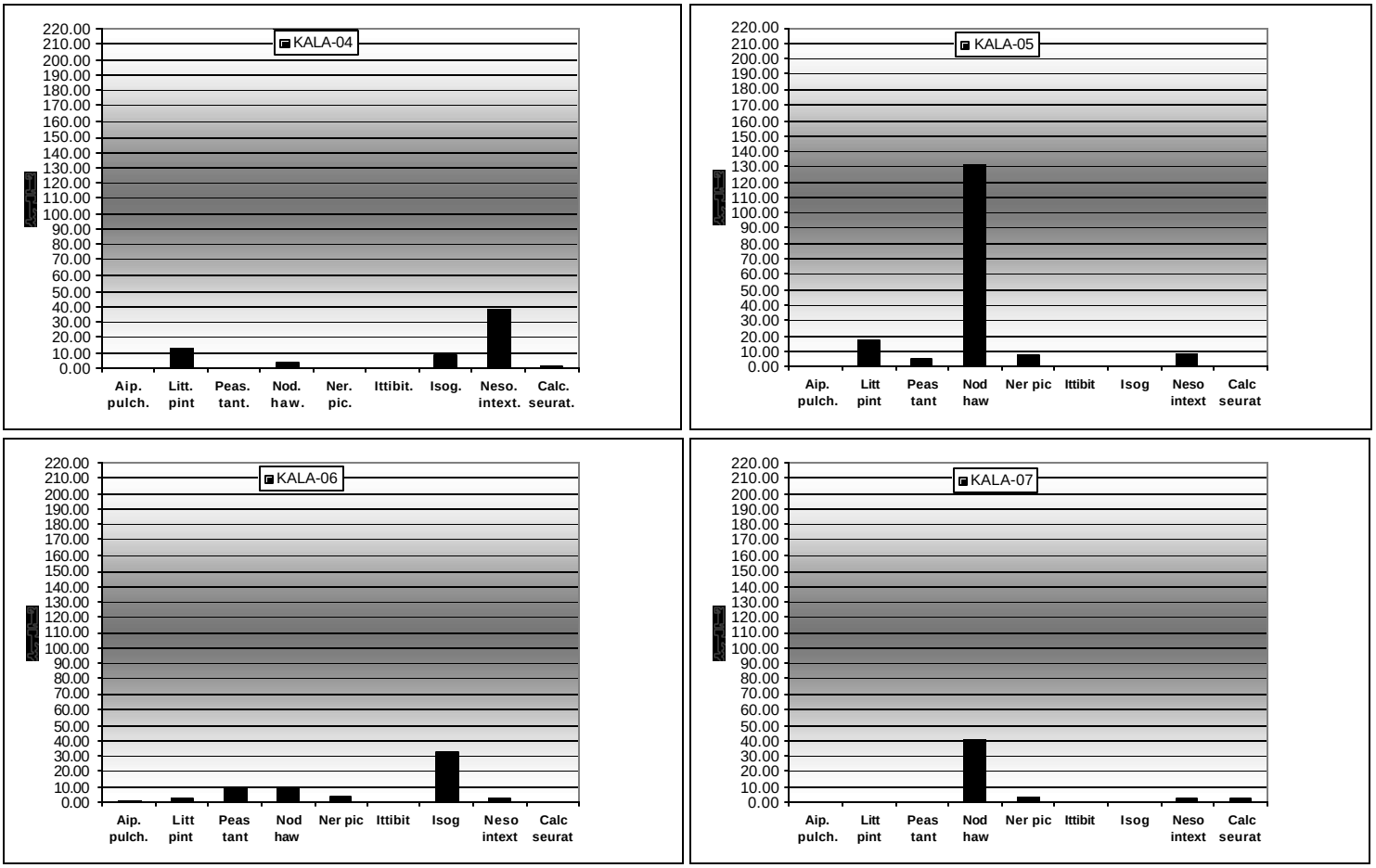
Site 24 - Lighthouse		Species															
Interval (m)	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba/tp																
5-10	ba/tp																
10-15	ba/tp																
15-20	ba/tp																
20-25	ba/tp																
25-30	ba/tp																
30-35	ba/tp																
35-40	ba/tp																
40-45	ba																
45-50	ba																

Site 25 - Old Lady's Cave		Species															
Interval (m)	Habitat	Ner. pic.	Lit. pint.	Nod. haw.	Peas. tant.	Melamp.	Cell. exart	Cell. sand.	Calc. serat.	Pachy.	Cyclo.	Grap.	Sesarm.	Nes. intext.	Colobo.	Echino.	Zoanth.
0-5	ba/tp																
5-10	ba/tp																
10-15	ba/tp																
15-20	ba/tp																
20-25	ba/tp																
25-30	ba/tp																
30-35	ba/tp																
35-40	ba/tp																
40-45	ba/tp																
45-50	ba/bo																

Table 1.4. Species distributions for KALA-23, KALA-24, and KALA-25

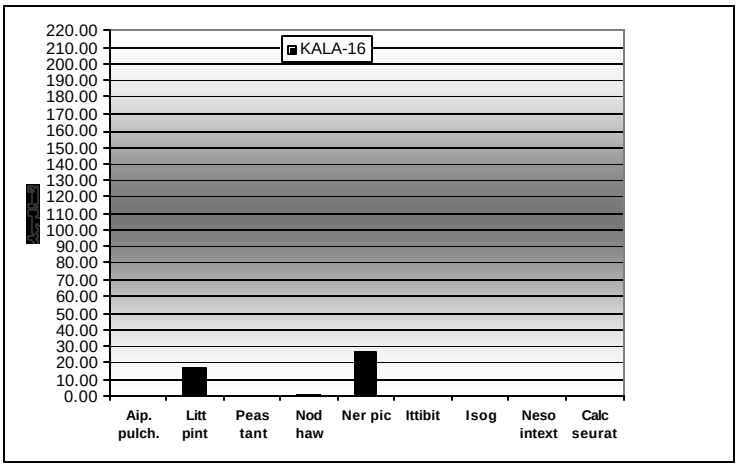
Species Abundance

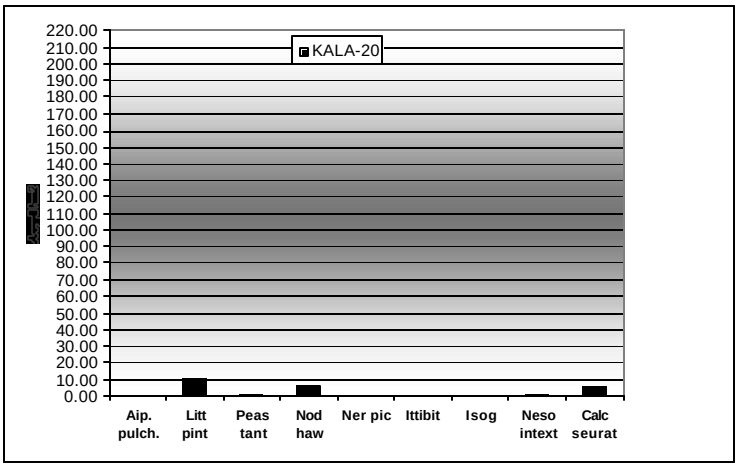
The relative abundance of organisms enumerated during quantitative surveys will be reported in this section. As with any transect/quadrat methodology, the full suite of organisms present at any site is not fully represented. The species picked up by the transect enumeration should be considered a subset of representative fauna associated with intertidal habitats of the Kalaupapa Peninsula. The list of species reported in this section represents sessile and mobile fauna enumerated at two or more quantitative survey sites. Obviously, very active mobile fauna such as grapsid shore crabs are not included due to the inability to include them in quadrats.

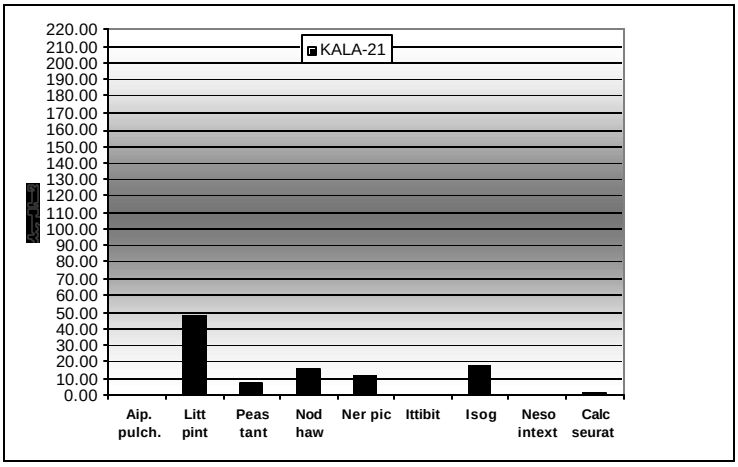


	KALA-04	KALA-05	KALA-06	KALA-07
Aip. pulch.	0.00	0.00	0.40	0.00
Litt. pint	13.13	17.81	2.20	0.00
Peas. tant.	0.00	5.42	9.80	0.00
Nod. haw.	4.10	131.61	9.00	40.73
Ner. pic.	0.21	8.00	4.00	2.91
Ittibit.	0.00	0.00	0.00	0.00
Isog.	8.62	0.00	32.60	0.00
Neso. intext.	38.56	8.26	2.20	2.18
Calc. seurat.	1.23	0.52	0.00	2.18

Table 1.5. Relative abundance of taxa (Avg#/m^2) for KALA-04, KALA-05, KALA-06 and KALA-07

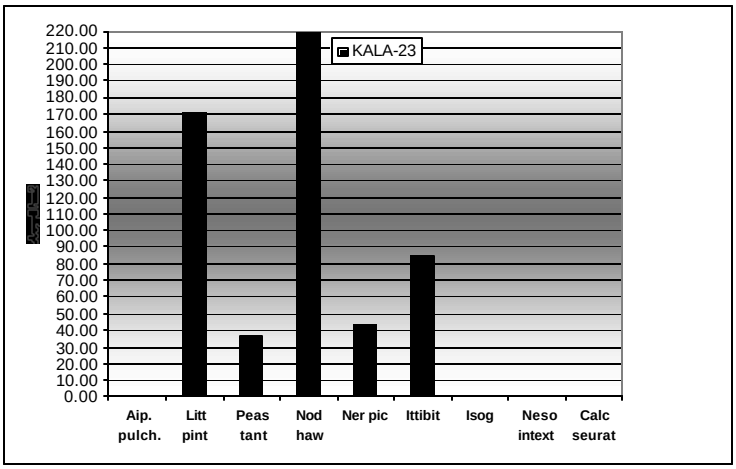


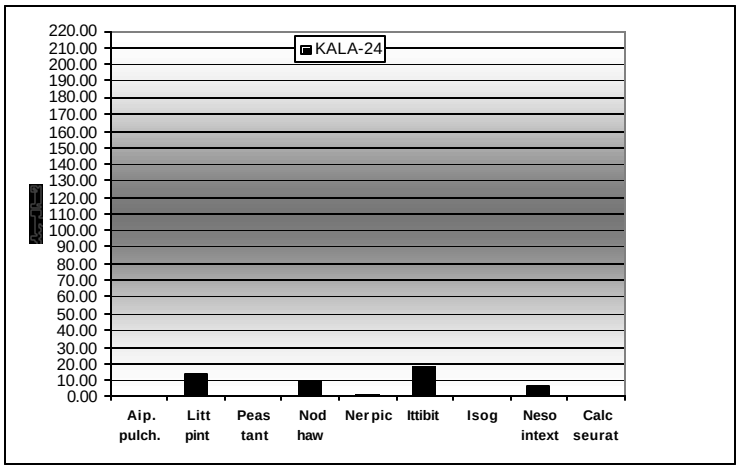


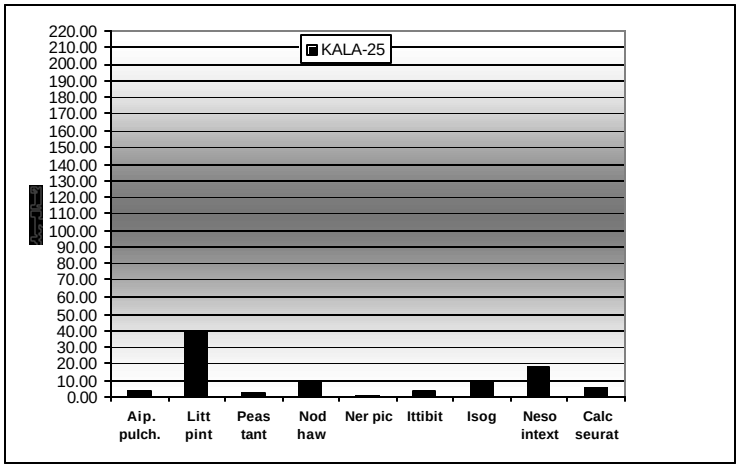


	KALA-16	KALA-20	KALA-21
Aip. pulch.	0.00	0.00	0.00
Litt. pint	17.00	10.56	48.00
Peas. tant.	0.00	0.64	8.00
Nod. haw.	1.00	6.08	16.00
Ner. pic.	27.00	0.00	11.29
Ittibit.	0.00	0.00	0.00
Isog.	0.00	0.00	17.88
Neso. intext.	0.00	0.96	0.00
Calc. seurat.	0.00	5.44	1.88

Table 1.6. Relative abundance of taxa (Avg#/m^2) for KALA-16, KALA-20, and KALA-21







	KALA-23	KALA-24	KALA-25
Aip. pulch.	0.00	0.00	3.52
Litt. pint	170.77	13.76	39.36
Peas. tant.	36.42	0.64	2.24
Nod. haw.	219.52	9.92	10.24
Ner. pic.	43.53	1.28	0.64
Ittibit.	85.11	18.56	3.52
Isog.	0.00	0.64	8.96
Neso. intext.	0.00	7.04	18.56
Calc. seurat.	0.00	0.32	5.44

Table 1.7. Relative abundance of taxa (Avg#/m^2) for KALA-23, KALA-24, and KALA-25

Species Inventory

A total of six sites were sampled for the species inventory activities during the project (see Table 1.1). The collections made were processed at KALA and transported to Bishop Museum for taxonomic identification. Table 1.8 breaks down the components of the species identified and their status in Hawai‘i.

Taxon	Species #	Native	Endemic	Introduced	Crytogenic	New HI Record	New Species	Unidentified Species
Phylum Cnidaria	15	15	0	1	0	0	0	0
Phylum Nemertea	2	2	0	0	0	1	0	0
Phylum Annelida								
Class Polychaeta	31	29	1	2	0	0	0	0
Phylum Arthropoda								
Order Thoracica	3	3	0	0	0	0	0	0
Order Stomatopoda	2	1	0	1	0	0	0	0
InfraOrder Anomura	12	12	0	0	0	0	0	0
Infraorder Brachyura	47	47	3	0	0	0	0	0
InfraOrder Stenopidea	1	1	0	0	0	0	0	0
InfraOrder Caridea	5	5	0	0	0	0	0	0
SuperOrder Peracarida								
Order Amphipoda	26	25	0	1	0	0	1	0
Order Isopoda	11	4	0	0	0	0	0	6
Order Tanaidacea	8	7	0	0	1	0	0	0
Phylum Echinodermata								
Class Asteroidea	3	3	0	0	0	0	0	0
Class Ophiuroidea	6	6	0	0	0	0	0	0
Class Holothuroidea	16	16	2(?)	0	0	1	2	0
Class Echinoidea	13	13	0	0	0	0	0	0
Phylum Mollusca								
Class Gastropoda	73	72	6	0	1	0	0	0
Class Bivalvia	10	10	1	0	0	0	0	0
Class Polyplacophora	3	3	3	0	0	0	0	0
Class Cephalopoda	1	1	0	0	0	0	0	0
Phylum Sipuncula	3	3	0	0	0	0	0	0
Phylum Echiura	1	1	0	0	0	0	0	0
Phylum Hemichordata	1	1	0	0	0	0	0	0
Phylum Ectoprocta	1	1	0	0	0	0	0	0
Phylum Chordata	1	1	0	0	0	0	0	0
SubPhylum Urochordata	11	2	0	4	1	0	0	4
Grand Total	306	284	14	9	3	2	3	10

Table 1.8. Compiled data for species inventory

A phylogenetically ordered list of all species recorded can be found in Appendix A. This list includes the scientific name with taxonomic authority, the NPS catalogue number, a log of photos, species status, and comments. This is followed by site records for each species, which can be seen in Appendix B. The most numerous species were the arthropods, with the brachyurans having the most records and the highest level of endemism in the phylum. Pericarid crustaceans were the second most numerous after brachyurans, and were followed by anomurans. Molluscs followed arthropods in abundance but had far greater endemism. The echinoderms were the most conspicuous faunal group and were impressive in their diversity and abundance in the intertidal habitats of KALA. Of the three new species recorded, two were holothuroids, and

these will be described further below. A photo archive composed of *in situ* and laboratory photos of various taxa was provided to KALA staff in CD format.

NEW SPECIES RECORDS

Echinodermata: Class Holothuroidea (Sea Cucumbers)

Two sea cucumbers determined to be new species were recorded during the course of the project. Both these species have been recorded in Hawai‘i previously but still remain undescribed. It is possible that these two species are endemic to the Hawaiian Archipelago and this has been noted in Table 1.8. Images and brief descriptions are, as follows:

Holothuria (Stauropora) n. sp.

Figure 1.2. *Holothuria* **n. sp in tide pool habitat at Ka Laemau (KALA-07). Photo: C. Zabin**

Holothuria is one of the most common genus of sea cucumber within tropical coastal habitats of the Pacific. This new species has been recorded at a few shallow reef locations in the Main Hawaiian Islands and Northwestern Hawaiian Islands (Godwin, 2005) but has never been recorded in an intertidal habitat. It was recorded in a tide pool having direct open ocean connection at high tide, so it was not completely isolated from shallow reef habitats. Taxonomic efforts on this species by Gustav Paulay at the University of Florida Museum of Natural History, and the principal investigator (Godwin) have placed it in the subgenus Stauropora but it has not been given a species designation. This step will take place within a monograph that will reanalyze the genus *Holothuria*, in preparation at this time (Paulay, *pers. comm.*).

Stichopus n. sp.

The genus *Stichopus* is well represented in most tropical coastal areas of the Pacific, with the exception of the Hawaiian Archipelago. This new species has only been recorded in shallow reef habitats in the Main Hawaiian Islands. The most common species of this genus in Hawai‘i, *Stichopus horrens*, is quite different from this species. Presently, this species is being included in a reanalysis of the genus *Stichopus* at the University of Florida Museum of Natural History (Starmer, *in prep.*). This specimen was recorded in a low intertidal habitat at Kahili (KALA-06).

Figure 1.3. *Stichopus* **n. sp. from Kahili (KALA-06) and** *Stichopus horrens* **from Pearl and Hermes Atoll, Northwestern Hawaiian Islands. Photos: S. Godwin**

Arthropoda: Subphylum Crustacea: Order Amphipoda

Pseudambasia kalaupapa n. sp. (Longenecker & Bolick, 2006)

This represents a new species for the Hawaiian Archipelago and has been formally described by staff at the Bishop Museum (Longenecker & Bolick, *in prep.*). *Pseudambasia* belongs to the family Lysianassidae, which has been inadequately collected in Hawai‘i. This species was collected from rubble samples obtained in the intertidal zone at Ka Laemilo Point. The species keys to *Parambasia* in Barnard & Karaman (1991). However, because the type material was lost, and no new material has been reported, Lowry & Stoddart (1995) consider *Parambasia* a dubious genus. All but the type species, *Parambasia forbesi* Walker & Scott, 1903, are now placed in *Pseudambasia*. This is the first report of *Pseudambasia* from Hawaiian waters. Type specimens are deposited at the Bishop Museum and paratypes have been deposited with accession KALA-00157 under the catalogue number 14506 at KALA. The name maintains the tradition, established by J.L. Barnard, of assigning names derived from the Hawaiian language to amphipod species discovered in Hawai‘i. It is intended to honor the residents, past and present, of Kalaupapa Peninsula.

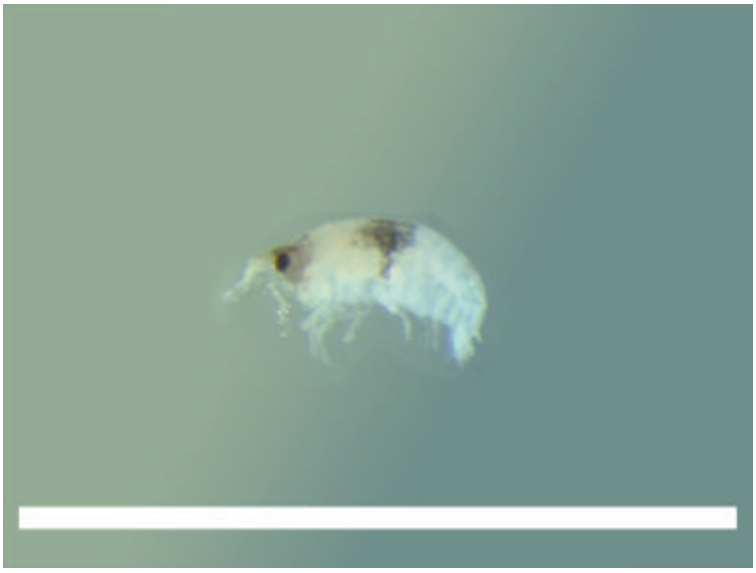


Figure 1.4. *Pseudambasia kalaupapa* **(Longenecker & Bolick, 2006) , paratype (NPS Cat. #-14506), collected at Ka Laemilo Point (KALA-26). Scale bar = 0.5mm. Photo: K. Longenecker**

INTRODUCED AND CRYTPTOGENIC SPECIES

Introduced and cryptogenic (undetermined origin) species made up 4.5% of the total species compliment from the inventory component. All of the species documented have been previously recorded in Hawai‘i, and do not represent new records. Also, none of the species appear to be exhibiting invasive behavior within the area of KALA. A brief synopsis of each species is included below:

Cnidaria: Class Hydrozoa

Pennaria disticha, Introduced

Reported from warm water seas worldwide and is distributed throughout the Main Hawaiian Islands and Northwestern Hawaiian Islands. Documented only on pilings and sea wall associated with the dock (KALA-22).

Annelida: Class Polychaeta

Chaetopterus variopedatus, Brachiomma nigromaculata, Introduced

These tube worms have been documented to develop into large colonies in sheltered harbors and embayments on artificial substrates. Both species are typically found on the underside of rocks close to shore in areas such as Kahili (KALA-06), and Ka Laemilo Point (KALA-26).

Arthropoda: Order Stomatopoda

Gonodactylaceus falcatus, Introduced

Lives in shallow coastal areas associated with coral heads and rubble. Has been documented to aggressively displace the native stomatopod *Pseudosquilla ciliata* (Kinzie, 1968). Native range

includes all the Indo-Pacific, except Hawai‘i, and was collected from coral rubble at Ka Laemilo Point (KALA-26).

Arthropoda: Super Order Pericarida

Monocorophium acherusicum, Introduced

This native to the North Atlantic can be found in shallow near-shore areas and harbors throughout the Main Hawaiian Islands and was collected at Ka Laemilo Point (KALA-26)

Leptochelia dubia, Cryptogenic

Periodically found in high densities around Oahu and Maui in shallow near-shore areas. This represents the first record of this species for the island of Molokai. During this project it was collected at Puwah (KALA-05), Carpenter's Beach (KALA-21), the dock (KALA-22), and Ka Laemilo Point (KALA-26).

Mollusca: Class Gastropoda

Hipponix australis, Cryptogenic

Found throughout the Hawaiian Archipelago attached to other gastropods in the shallow near-shore areas.

Chordata: Subphylum Urochordata, Class Ascidiacea

Diplosoma listerianum, Ascidia archaia, Ascidia syndneiensis, and *Botryllus* sp., Introduced
Polycarpa aurita, Cryptogenic

These are tunicate species found throughout the Main Hawaiian Islands in sheltered near-shore areas, harbors, and embayments.

NATURAL HISTORY COLLECTIONS FOR KALA

An archived and catalogued collection of 507 lots with roughly 1548 specimens of marine invertebrates obtained from this project were deposited with KALA as an addition to existing cultural and natural history material. This lot of specimens was deposited with KALA under the accession KALA-00157 and a collections database was provided to the KALA museum curator. The entire collection has been archived as wet and dry specimens in long-term storage containers.

DISCUSSION

The sites surveyed during the course of this project displayed species assemblages commonly associated with the littoral zones of the Main Hawaiian Islands. In-depth analysis of similarities between sites shows that there are essentially two main groupings when based on relative abundance of species common to all sites. Figure 1.5 shows the results of a cluster analysis based

on this parameter, which shows two distinct groupings. All of the sites within the top cluster, with the exception of KALA-06, were extensive basaltic lave flows with high wave energy, that were fringed by boulders. The site KALA-06 differed in that it was a combination of basaltic substrate with boulders spread throughout. This site was also partially protected from wave energy by a boulder field on the seaward edge. Both site KALA-06 and KALA-07 are positioned on the extreme edge of the top cluster, which denotes them as unique. The factors responsible for this are the unique habitat and species present. The extensive basaltic habitat present at KALA-07 included extensive tidepools, which were protected from direct wave energy and allowed a more diverse biological community to persist. The bottom grouping is not as tightly clustered than the top and two of the sites (KALA-23 & KALA-16) are positioned at the extreme edge. Both these had high abundances of rare species, which is the reason for their position at the extreme of the cluster.

More distinct pairing of sites is exhibited if a similarity analysis is performed on the full compliment of species recorded across all sites, which is illustrated in Figure 1.6. This analysis clearly shows pairings of similar habitats and species compliments. Additionally, the two most unique sites (KALA-16 & KALA-23) are more clearly illustrated in this analysis.

The data from the quantitative survey and species inventory shows the importance of viewing the Kalaupapa Peninsula from a broad perspective. The habitats and species compliments within the littoral zone are not uniform and should be managed within an ecosystem viewpoint. Research focusing on monitoring and species inventories should continue to be supported by the NPS, if management of unique areas such as the Kalaupapa Peninsula is to be successful.

The Kalaupapa Peninsula is an isolated environment that has less anthropogenic impact than similar locations on other Main Hawaiian Islands. This lower degree of impact has allowed much of the intertidal/supralittoral habitat to remain relatively intact. The variety of intertidal and supralitorral habitats contain cryptic species assemblages that have attracted little attention historically by researchers in Hawai‘i but have always been of great cultural importance.

The results of this project should be considered to be a baseline effort, which should be continued in later years. Projects such as this can never produce fully comprehensive results within such short time periods. This is especially true for species inventory activities, which should be allotted multiple years for sampling and post-processing. This project produced information about better known taxonomic groups but continued efforts would be needed to provide information concerning lesser known, and under-sampled species associated with intertidal communities (i.e.; epibenthic and infaunal organisms). Efforts were made to duplicate sites selected for previous intertidal and sub-tidal efforts at KALA. This hopefully will provide opportunities to develop full-scale monitoring programs that take into account the full spectrum of habitats that exist from the supralittoral zone to the subtidal zone. This biotic component integrated with oceanographic and terrestrial monitoring efforts would provide an ecosystem approach that is much needed in protected areas such as KALA.

Continued protection and management of isolated areas like the Kalaupapa Peninsula is highly justified from the perspective of this and other surveys of biotic resources. Not only are culturally important species such as opihi abundant but species with less high profile distinction are proliferating in the intertidal habitats of KALA. The presence of new records and new species from this narrowly defined and brief survey project shows the importance of such

activities from the standpoint of biodiversity. The intertidal habitats of Hawai‘i are generally overlooked when monitoring and survey activities are attempted at both federal and state levels. Further efforts to encourage research and monitoring activities at KALA should be pursued that are based on times frames longer than this project.

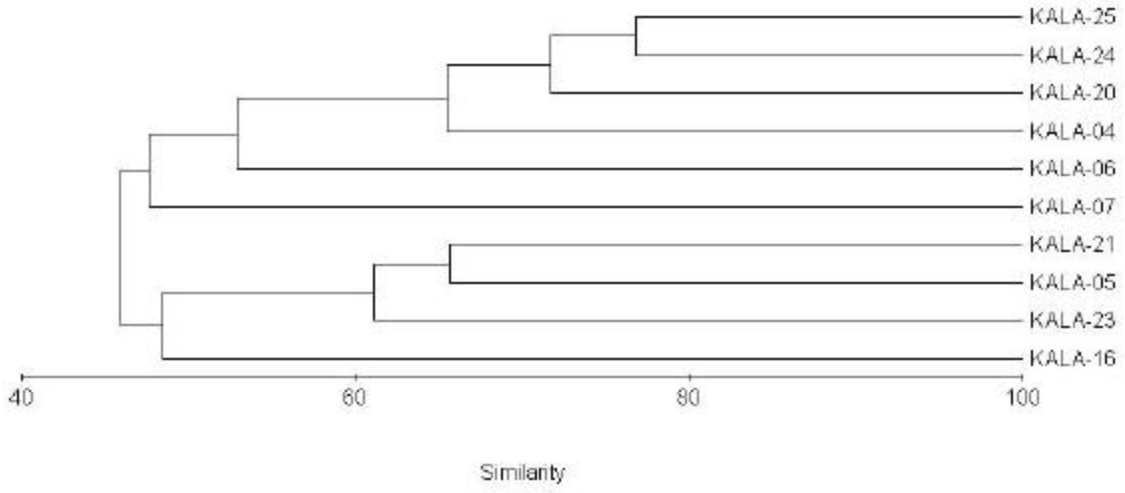


Figure 1.5. Dendrogram of hierarchical clustering using the group-average linking of Bray-Curtis similarities calculated on square root transformed abundance data for species common to all sites

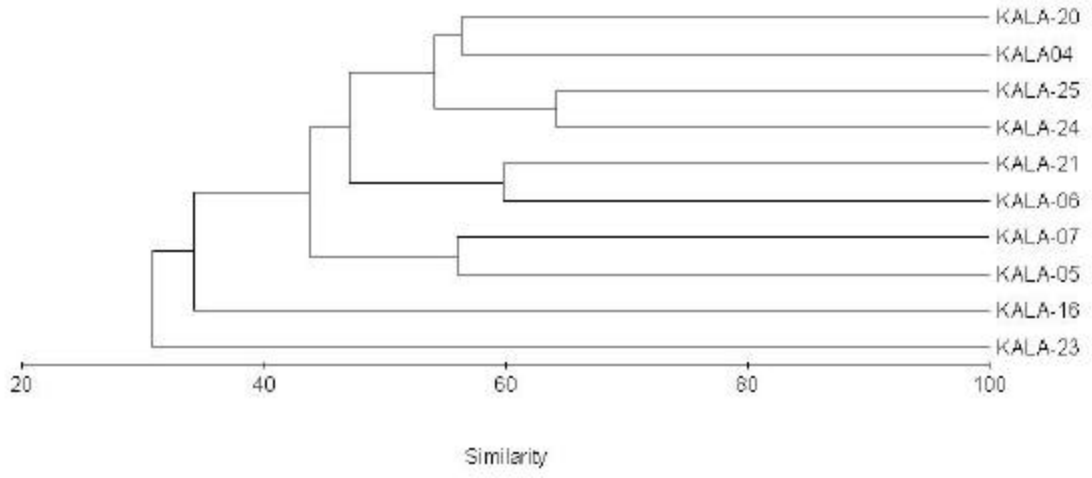


Figure 1.6 Dendrogram of hierarchical clustering using the group-average linking of Bray-Curtis similarities calculated on square root transformed abundance data for the full species compliment recorded across all sites

LITERTURE CITED

Barnard, J.L. & Karaman, G.S. (1991).The families and genera of marine gammaridean Amphipoda (except marine gammaroids). *Records of the Australian Museum,* Supplement 13 (2), 419–866.

Godwin, S. 2005**.** Preliminary species inventory for marine invertebrates associated with the coral reef communities of the Northwestern Hawaiian Islands**.** Report submitted to the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve.

Kay, E.A. 1979. *Reef and Shore Fauna of Hawai'i Section 3: Hawai'i Marine Shells*. Bishop Museum Press. Honolulu, Hawai'i. 652 pp

Kinzie, R.A. III. 1968. The ecology of replacement of *Pseudosquilla ciliata* (Fabricius) by *Gondactylus falcatus* (Forskål) (Crustacea: Stomatopoda) recently introduced into the Hawaiian Islands. *Pacific Science* 22(4): 465-475

Lowry, J.K., & Stoddart, H.E. (1995).The Amphipoda (Crustacea) of Madang Lagoon: Lysianassidae, Opisidae, Uristidae, Wandinidae and Stegocephalidae. *Records of the Australian Museum,* Supplement 22, 97–174

Minton, D & M. Carnevale. 2005. A preliminary survey of the marine and intertidal invertebrates of Kalaupapa National Historic Park (Molokai, Hawai'i)

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Maria Carnevale, Dwayne Minton, Larry Basch, Eric Brown and Randall Watanuki - **National Park Service**

The following individuals were responsible for the taxonomic efforts during the course of the project:

Phylum Cnidaria:

Scott Godwin – Bishop Museum

Phylum Nemertea:

Jon Norenburg – Smithsonian Institution, Scott Godwin – Bishop Museum

Phylum Sipuncula:

Scott Godwin – Bishop Museum

Phylum Echiura:

Scott Godwin – Bishop Museum

Phylum Annelida

Holly Bolick – Bishop Museum, Leslie Harris – Los Angeles County Museum

Phylum Mollusca:

Ranya Henson & Scott Godwin – Bishop Museum, Regie Kawamoto – University of Hawai'i

Phylum Arthropoda:

Scott Godwin, Ken Longenecker & Holly Bolick – Bishop Museum

Phylum Echinodermata:

Scott Godwin – Bishop Museum

Phylum Ectoprocta:

Chela Zabin – University of Hawai'i

Phyla Hemichordata & Chordata (Urochordata):

Scott Godwin – Bishop Museum

APPENDIX A

Formal species inventory, catalogue numbers, photo log and status

Taxon	Catalog #	Photo	Status	Comment
Phylum Cnidaria				
Class Hydrozoa				
Order Hydroida				
Family Halocordylidae				
Pennaria disticha (Goldfuss, 1820)	14001	X	I	Field Photo (S. Godwin)
Class Anthozoa				
SubClass Hexacorallia				
Order Actinaria				
Family Actiniidae				
Anthopleura nigrescens (Verrill, 1928)	14004		N	
Cladactella manni (Verrill, 1899)	No Specimen	X	N	Field Photo (S. Godwin)
Family Aiptasiidae				
Aiptasia pulchella Carlgren, 1943	No Speciemen	X	N	Field Photo (S. Godwin)
Order Scleractinia				
Family Acroporidae				
Montipora capitata (Dana, 1846)	No Specimen	X	N	Field Photo (S. Godwin)
Family Faviidae				
Leptastrea bewickensis Veron, Pichon & Wijsman, 1977	14005	X	N	Field Photo (S. Godwin)
Cyphastrea agassizi Vaughan, 1907	No Specimen	X	N	Field Photo (L. Basch)
Family Pocilloporidae				
Pocillopora damicornis (Linnaeus, 1758)	14006	X	N	Field Photo (L. Basch)
Pocillopora meandrina Dana, 1846	14007	X	N	Field Photo (S. Godwin)
Family Poritidae				
Porites lobata Dana, 1846	14008	X	N	Field Photo (S. Godwin)
Order Zoanthidea				
Family Zoanthidae				
Palythoa caesia Dana, 1848	14003	X	N	Field Photo (S. Godwin)
Zoanthus cf. pacificus Walsh & Bowers, 1971	14009	X	N	Field Photo (S. Godwin)
Zoanthus sp. 1	No Specimen	X	U	Field Photo (S. Godwin)
Zoanthus sp. 2	No Specimen	X	U	Field Photo (S. Godwin)
Isaurus tuberculatus Verrill,	14002		N	
Phylum Nemertea				
Class Anopa				
Order Heteronemertea				
Family Baseodiscidae				
Baseodiscus cingulatus (Coe, 1906)	14011		N	
Baseodiscus delineatus (Delle Chiaje, 1825)	14482	X	N	**New Record**, Field Photo (S. Godwin)
Phylum Sipuncula				
Class Phascolosomatidea				
Order Aspidosiphoniformes				
Family Aspidosiphonidae				
Aspidosiphon elegans (Chamisso & Eysenhardt, 1821)	14483, 14484, 14485	X	N	Field Photo (S. Godwin)
Order Phascolosomatiformes				
Family Phascolosomatidae				
Phascolosoma nigrescens Keferstein, 1865	14486, 14487	X	N	Field Photo (S. Godwin)
Phascolosoma stephensoni (Stephen, 1942)	14488	X	N	Field Photo (S. Godwin)
Phylum Echiura				
Order Echiuroidea				
Family Echiuridae				
Anelassorhynchus porcellus Fisher, 1948	14450	X	N	Field Photo (S. Godwin)
Phylum Annelida				
Class Polychaeta				
Family Polynoidae				
Hololepidella nigropunctata (Horst, 1915)	14220, 14221		N	
Iphione muricata (Horst, 1915)	14222, 14223, 14224, 14225		N	
Family Amphinomidae				
Eurythoe complanata (Pallas, 1766)	14012, 14196, 14197	X	N	Field Photo (S. Godwin)
Phericardia striata (Kinberg, 1857)	14198		N	
Family Phyllodocidae				
Phyllodoce madeirensis (Langerhans, 1880)	14219		N	
Family Syllidae				
Brania rhopalophora (Ehlers, 1897)	14232, 14233		N	
Trypanosyllis sp	14234, 14235		N	
Trypanosyllis cf. variegata (Grube, 1860)	14236		N	
Typosyllis sp.	14237, 14238, 14239		N	
Family Nereididae			N	
Perineresis curvata Holly, 1935	14217, 14218		N	

Taxon	Catalog #	Photo	Status	Comment
Family Eunicidae				
Eunice afra Peters, 1854	14208		N	
Eunice antennata (Savigny, 1820)	14209, 14210		N	
Eunice cariboea (Grube, 1856)	14211		N	
Eunice vittata (delle Chiaje, 1828)	14212		N	
Lysidice ninetta Audouin & Milne Edwards, 1833	14213		N	
Nematoneresis unicornis Holly, Schmarda, 1861	14214, 14215		N	
Family Lumbrineridae				
Lumbrineresis dentata Hartmann-Schroder,1965	14216		N	
Family Dorvilleidae				
Apophryotrocha sp	14205		N	
Dorvillea moniloceras (Moore, 1909)	14206		N	
Dorvillea sp	14207		N	
Family Cirratulidae				
Cirriformia sp	14203		N	
Dodecaceria laddi Hartman, 1954	14204		N	
Family Chaetopteridae				
Phyllochaetopterus verrilli Treadwell, 1943	14199, 14200		N	
Chaetopterus variopedatus (Renier, 1804)	14201, 14202		I	
Family Terebellidae				
Nicolea gracilibranchis (Grube, 1878)	14240		N	
Polycirrus sp	14241		N	
Family Sabellidae				
Branchiomma nigromaculata (Baird, 1865)	14226, 14227		I	
Family Serpulidae				
Potamethus sp	14228			
Pseudovermilia occidentalis McIntosh, 1885	14229		N	
Spirobranchus giganteus (Grube, 1862)	14230	X	N	Field Photo (S. Godwin)
Vermiliopsis torquata Treadwell, 1943	14231		E	
Phylum Mollusca				
Class Gastropoda				
SubClass Prosobranchia				
Order Archaeogastropoda				
SuperFamily Fissurelloidea				
Family Fissurellidae (Diodorinae)				
Diodora granifera (Pease, 1861)	No Specimen		N	Lost in transit to KALA
SuperFamily Patelloidea				
Family Patellidae				
Cellana exarata (Reeve, 1854)	14018, 14019	X	E	Field Photo (S. Godwin)
Cellana sandwicensis (Pease, 1861)	14020	X	E	Field Photo (L. Basch)
Cellana talcosa (Gould, 1846)	14021	X	E	Field Photo (L. Basch)
SuperFamily Trochoidea				
Family Trochidae (Trochinae)				
Trochus intextus Kiener, 1850	14022, 14023, 14056		N	
Family Turbinidae (Colloninae)				
Leptothyra verruca (Gould, 1845)	14024		N	
Family Turbinidae (Turbininae)				
Turbo sandwicensis Pease, 1861	14025, 14026, 14027	X	E	Field Photo (L. Basch)
SuperFamily Neritoidea				
Family Neritidae (Neritinae)				
Nerita picea (Recluz, 1841)	14057, 14470		N	
Nerita polita Linnaeus, 1758	14469		N	
Theodoxus neglectus (Pease, 1861)	No Specimen		E	
Order Neotaenioglossa				
SuperFamily Cerithoidea				
Family Cerithiidae				
Ittibittium zebrum (Keiner, 1841)	14456		N	
Cerithium atromarginatum Dautzenberg & Bouge, 1933	14030		N	
Cerithium nesioticum Pilsbry & Vanatta, 1905	14054, 14066		N	
Cerithium rostratum Sowerby, 1855	14498		N	
Family Modulidae				
Modulus tectum (Gmelin, 1791)	14065, 14463			
Family Planaxidae				
Planaxis labiosa A. Adams, 1853	14471			

Taxon	Catalog #	Photo	Status	Comment
SuperFamily Littorinoidea				
Family Littorinidae				
Littoraria pintado (Wood, 1828)	14058	X	N	Field Photo (S. Godwin)
Nodilittorina hawaiensis Rosewater & Kadolsky, 1981	14059		E	
Peasiella tantilla (Gould, 1849)	14060	X	N	Field Photo (S. Godwin)
SuperFamily Truncatelloidea				
Family Rissoidae (Rissoininae)				
Rissoina ambigua (Gould, 1849)	14028		N	
SuperFamily Vanikoroidea				
Family Hipponicidae				
Hipponix australis Lamarck, 1819	14052, 14068, 14069	X	C	Field Photo (S. Godwin)
Hipponix imbricatus Gould, 1846	14067, 14462	X	N	Field Photo (S. Godwin)
SuperFamily Vermetoidea				
Family Vermetidae				
Dendropoma gregaria Hadfield & Kay, 1972	14062		N	
Petalochonchus keenae Hadfield & Kay, 1972	14063		N	
Serpulorbis variabilis Hadfield & Kay, 1972	14029	X	N	Field Photo (S. Godwin)
SuperFamily Cypraeoidea				
Family Cypraeidae				
Cypraea caputserpentis Linnaeus, 1758	14072	X	N	Field Photo (L. Basch)
Cypraea isabella Linnaeus, 1758	14070, 14071, 14032		N	
Cypraea mauritiana Linnaeus, 1758	15506	X	N	Field Photo (L. Basch)
SuperFamily Lamellaroidea				
Family Triviidae				
Trivia hordacea Kiener, 1845	14459		N	
SuperFamily Naticoidea				
Family Naticidae				
Natica gualiteriana Recluz, 1844	14033, 14073, 14074, 14468		N	
SuperFamily Tonnoidea				
Family Bursidae				
Bursa rosa (Perry, 1811)	14077		N	
Family Ranellidae (Cymatiinae)				
Cymatium nicobaricum (Rodong, 1798)	14075, 14472	X	N	Field Photo (S. Godwin)
Family Ranellidae (Ranellinae)				
Gyrineum pusillum (Broderip, 1832)	14076		N	
Order Neogastropoda				
SuperFamily Muricoidea				
Family Buccinidae				
Engina albocincta Pease, 1860	14455		N	
Prodotia ignea (Gmelin, 1791)	14039		N	
Prodotia iostomus (Gray in Griffiths & Pidgeon, 1834)	14122		N	
Family Columbellidae				
Euplica varians (Sowerby, 1832)	14457		N	
Family Fasciolariidae				
Peristernia chlorostoma (Sowerby, 1825)	14123, 14460		N	
Family Nassariidae				
Nassarius papillosus (Linnaeus, 1758)	14040		N	
FamilyThaididae				
Drupa (Drupa) morum Roding & Sowerby, 1829	14465	X	N	Field Photo (S. Godwin)
Drupa (Drupa) ricina (Linnaeus, 1758)	14034, 14051, 14078, 14079		N	
Drupella elata Blainville, 1832	14080		N	
Drupella ochrostoma (Blainville, 1832)	14500		N	
Maculotriton bracteatus (Hinds, 1844)	14035		N	
Morula foliacea (Conrad, 1837)	14115		N	
Morula granulata (Duclos, 1832)	14036, 14116, 14117, 14118, 14499		N	
Morula uva (Roding, 1798)	14119, 14120, 14464		N	
Purpura aperta (Blainville, 1832)	14037, 14476		N	
Thais intermedia (Kiener, 1836)	14038, 14121, 14475		N	
SuperFamily Volutoidea				
Family Costellaridae				
Vexillum (Pusia) cancellarioidea (Anton, 1839)	14125, 14041		N	
Vexillum (Pusia) lautum (Reeve, 1845)	14126		N	
Family Mitridae				
Mitra (Strigatella) fastigium (Reeve, 1845)	14124		N	

Taxon	Catalog #	Photo	Status	Comment
SuperFamily Conoidea				
Family Conidae				
Conus abbreviatus Reeve, 1843	14044	X	N	Field Photo (S. Godwin)
Conus ebraeus Linnaeus, 1758	14042, 14055, 14129	X	N	Field Photo (S. Godwin)
Conus catus Hwass in Bruguiere, 1792	14128		N	
Conus lividus Hwass in Bruguiere, 1792	14130, 14127	X	N	Field Photo (L. Basch)
Conus pennaceus Born, 1780	14043, 14131		N	
Conus rattus Hwass in Bruguiere, 1792	14132, 14458	X	N	Field Photo (S. Godwin)
Conus sponsalis Hwass in Bruguiere, 1792	14053, 14133, 14134		N	
Conus textile Linnaeus, 1758	No Specimen	X	N	Field Photo (S. Godwin)
Family Terebridae				
Hastula strigilata (Linnaeus, 1758)	14474		N	
Order Heterostropha				
SuperFamily Architectonicoidea				
Family Architectonicidae				
Heliacus variegatus (Gmelin, 1791)	14061		N	
Order Cephalaspidea				
SuperFamily Atyoidea				
Family Smaragdinellidae				
Smaragdinella calyculata (Broderip & Sowerby, 1829)	14140	X	N	Field Photo (S. Godwin)
SuperFamily Acteonoidea				
Family Aplustridae				
Hydatina amplustra (Linnaeus, 1758)	14046, 14135		N	
Hydatina physis (Linnaeus, 1758)	14136		N	
Order Anaspidea				
SuperFamily Aplysioidea				
Family Aplysiidae (Aplysiinae)				
Aplysia dactylomela Rang,1828	14045	X	N	Field Photo (L. Basch)
Family Aplysiidae (Dolabellinae)				
Dolabella auricularia (Lightfoot, 1786)	No Specimen	X	N	Field Photo (L. Basch)
Family Aplysiidae (Dolabriferinae)				
Dolabrifera dolabrifera (Rang, 1828)	14137	X	N	Field Photo (S. Godwin)
Family Aplysiidae (Notarchiinae)				
Stylocheilus longicaudatus (Quoy & Gaimard, 1824)	14138		N	
Order Notaspidea				
SuperFamily Pleurobranchoidea				
Family Pleurobranchidae				
Berthellina citrina (Ruppell & Leuckart, 1831)	14139	X	N	Field Photo (S. Godwin)
Family Umbraculidae				
Umbraculum sinicum (Gmelin, 1791)	14047	X	N	Field Photo (L. Basch)
Order Nudibranchia				
SuperFamily Doridoidea				
Family Doridiidae (Kentrodoridinae)			N	
Asteronotus cespitosus (van Hasselt, 1824)	14048			
Family Hexabranchidae				
Hexabranchus sanguineus (Ruppell & Leuckart, 1831)	No Specimen	X	N	Field Photo (S. Godwin & L. Basch)
SubClass Pulmonata				
Order Basommatophora				
SuperFamily Melampoidea				
Family Melampidae				
Melampus castaneus (Muhlfeld, 1816)	14049		N	
Family Siphonariidae				
Williamia radiata (Pease, 1861)	14473		N	
Class Bivalvia				
SuperFamily Mytiloidea				
Family Mytilidae				
Septifer bryanae (Pilsbry, 1921)	14466, 14467		N	
SuperFamily Arcoidea				
Family Arcidae (Arcinae)				
Barbatia (Acar) divaricata (Sowerby, 1833)	14453		N	
SuperFamily Pterioidea				
Family Isognomidae				
Isognomon californicum (Conrad, 1837)	14141, 14497	X	N	Field Photo (S. Godwin & L. Basch)
Isognomon incisum (Conrad, 1837)	14142, 14143		N	
Isognomon legumen (Gmelin,1791)	No Specimen		N	
Isognomon perna (Linnaeus, 1767)	14194	X	N	Field Photo (S. Godwin)

Taxon	Catalog #	Photo	Status	Comment
SuperFamily Ostreoidea				
Family Ostreidae				
Dendostrea sandvicensis (Sowerby, 1871)	No Specimen		E	
Ostrea hanleyana Dall, Bartsch & Rehder, 1938	14454		N	
SuperFamily Veneroidea				
Family Veneridae				
Gouldia cookei (Dall, Bartsch & Rehder, 1938)	14013		N	
Periglypta reticulata (Linnaeus, 1758)	14050		N	
Class Polyplacophora				
Family Chitonidae				
Rhyssoplax linsleyi Burghardt, 1973	14015, 14017, 14480, 14481	X	E	Field Photo (S. Godwin)
Acanthochiton viridis (Pease, 1872)	No Specimen	X	E	Field Photo (L. Basch)
Family Ischnochitonidae				
Ischnochiton petaloides (Gould, 1846)	14014, 14016		E	
Class Cephalopoda				
Order Octopoda				
Family Octopodidae				
Octopus cyanea Gray, 1849	No Specimen	X	N	Field Photo Only (S. Godwin)
Phylum Arthropoda				
SubPhylum Crustacea				
Class Maxillopoda				
SubClass Cirripedia				
Order Thoracica				
Family Chthamalidae				
Euraphia hembeli (Conrad, 1834)	No Specimen		N	
Nesochthamalus intertextus (Darwin, 1854)	14114	X	N	Field Photo (S. Godwin)
Family Balanidae				
Tetraclita wireni pacifica Pilsbry, 1928	No Specimen		N	
Class Malacostraca				
Order Stomatopoda				
Family Gonodactylidae				
Gonodactylaceus falcatus (Forskal, 1775)	14349	X	I	Field Photo (S. Godwin)
Family Protosquillidae				
Echinosquilla guerini (White, 1861)	14371	X	N	Field Photo (S. Godwin)
SubClass Eumalacostraca				
SuperOrder Eucarida				
Order Decapoda				
SubOrder Pleocyemata				
InfraOrder Stenopididea				
Family Stenopidae				
Stenopus hispidus (Olivier, 1811)	No Specimen	X	N	Field Photo (S. Godwin)
SuperOrder Pleocyemata				
InfraOrder Caridea				
SuperFamily Palaemonoidea				
Family Gnathophyllidae				
Gnathophyllum americanum Guerin-Meneville, 1856	14348		N	
Family Palaemonidae				
Palaemon debilis (Dana, 1852)	14081		N	
SuperFamily Alpheiodea				
Family Alpheidae				
Alpheus lottini Guerin, 1829	14342		N	
Alpheus lobidens De Haan, 1850	14341		N	
Family Hippolytidae				
Saron marmoratus (Olivier, 1811)	14361	X	N	Field Photo (S. Godwin)
SuperOrder Peracarida				
Order Amphipoda				
SubOrder Gammaridea				
Family Amphilochidae				
Amphilocus menehune Barnard, 1970	14242, 14243, 14244, 14245, 14246		N	
Family Ampithoidae				
Ampithoe ramondi Audouin, 1826	14249, 14250, 14251		N	
Ampithoe waialua Barnard, 1970	No Specimen		N	Specimen lost in transit to KALA
Paragrubia vorax Chevreux, 1901	14252, 14253		N	

Taxon	Catalog #	Photo	Status	Comment
Family Anamixidae				
Anamixis moana Thomas, 1997	14254, 14256, 14257		N	
Family Aoridae				
Lembos leapakahi Barnard, 1970	14258, 14259, 14260, 14262		N	
Lembos waipio Barnard, 1970	14261		N	
Aloiloi nenue Barnard, 1970	No Specimen		N	Specimen lost in transit KALA
Family Corophiidae				
Monocorophium acherusicum (Costa, 1857)	14264		I	Formerly Corphium acherusicum
Family Gammaridae				
Ceradocus hawaiiensis Barnard, 1955	14265, 14266		N	
Elasmopus piikoi Barnard, 1970	14267		N	
Elasmopus hooheno Barnard, 1970	14268, 14269, 14270		N	
Elasmopus molokai Barnard, 1970	14271		N	
Maera pacifica Schellenberg, 1938	14272, 14275, 14276, 14281, 14282		N	
Maera insignis (Chevreux, 1901)	14273, 14274		N	
Maera quadrimana (Dana, 1853)	14277, 14278, 14279, 14280		N	
Family Isaeidae				
Gammaropsis kaumaka Barnard, 1970	14283, 14284, 14285, 14288		N	
Gammaropsis atlantica Stebbing, 1888	14286, 14287,		N	
Photis kapapa Barnard, 1970	14289		N	
Chevalia aviculae Walker, 1904	14290		N	
Family Ischyroceridae				
Ischyrocerus oahu Barnard, 1970	14292, 14293		N	
Family Leucothoidae				
Leucothoe tridens Stebbing, 1888	14294, 14295, 14296, 14298, 14299		N	
Family Liljeborgiidae				
Liljeborgia heeia	14300		N	
Family Lysianassidae				
Arugella ewa (Barnard, 1970)	14301, 14302		N	Formerly Lysianassa ewa
Pseudambasia kalaupapa Longenecker & Bolick, 2006	14506	X	N	**New Species, Paratype,** Photo (K. Longenecker)
Family Podoceridae				
Podocerus talegus lawai (Barnard, 1970)	14303, 14304		N	
Order Isopoda				
Unidentified sp 1	14339		U	
Unidentified sp 2	14340		U	
SubOrder Anthuridea				
Family Santiidae				
Species 1	14306, 14307, 14308		U	
Family Anthuridae				
Mesanthura hieroglyphica Miller & Menzies, 1952	14309		N	
SubOrder Flabellifera				
Family Cirolanidae				
Species 1	14310, 14311		U	
Family Sphaeromatidae				
Species 1	14333, 14334, 14335, 14336, 14337		U	
Family Stenetriidae				
Stenetrium medipacificum Miller, 1941	14338			
Family Jaeropsidae				
Jaeropsis hawaiiensis Miller, 1941	14313, 14314, 14315, 14316, 14317		N	
Family Munnidae				
Species 1	14324, 14325, 14326, 14327, 14328		U	
Family Paranthuridae				
Paranthura ostergaardi Miller and Menzies, 1952	14329, 14330, 14331, 14332		N	
Family Janiridae				
Bagatus algicola	14318, 14319, 14320, 14321, 14322, 14323		N	Formerly Janira algicola
SubOrder Valvifera				
Family Idoteidae				
Colidotea edmondsoni Miller, 1940	14312		N	

Taxon	Catalog #	Photo	Status	Comment
Order Tanaidacea				
SubOrder Tanaidomorpha				
Family Tanaidae				
Anatanais insularis Miller, 1940	14433, 14334, 14335, 14336		N	
Apseudomorpha oahuensis Miller, 1940	14437, 14438, 14439, 14440		N	
Parapsuedes neglectus Miller, 1940	14441		N	
Tanais vanis Miller, 1940	14442, 14443, 14444, 14445, 14446		N	
Apseudes tropicalis Miller, 1940	14417, 14418, 14419, 14420		I	
Hodometrica prolixa Miller, 1940	14421, 14422,		N	
Synapseudes minutus Miller, 1940	14423, 14424, 14425, 14426		N	
Family Pseudozuxidae				
Leptochelia dubia Kroyer, 1842	14427, 14428, 14429, 14430, 14431, 14432		C	
SubOrder Reptantia				
InfraOrder Anomura				
SuperFamily Coenobitoidea				
Family Diogenidae				
Calcinus seurati Forest, 1951	14095, 14096, 14097		N	
Calcinus laevimanus (Randall, 1839)	14098, 14099, 14100, 14101	X	N	Field Photo (S. Godwin)
Calcinus elegans Milne Edwards, 1836	14082, 14083, 14084, 14085, 14086, 14087, 14088	X	N	Field Photo (S. Godwin)
Calcinus latens (Randall, 1839)	14089, 14090, 14091		N	
Calcinus guamensis Wooster, 1982	14092, 14093, 14094		N	
Ciliopagurus strigatus (Herbst, 1804)	14102, 14103	X	N	Field Photo (S. Godwin)
Clibanarius zebra Dana, 1852	14343		N	
SuperFamily Paguroidea				
Family Paguridae				
Pagurixus festinus McLaughlin & Haig, 1984	14104, 14105, 14106, 14107		N	
Pylopaguropsis keijii, McLaughlin & Haig, 1989	14108		N	
SuperFamily Galatheoidea				
Family Porcellanidae				
Pachycheles pisoides (Heller, 1865)	14109, 14110	X	N	Field Photo (S. Godwin)
Petrolisthes coccineus (Owen, 1839)	14369	X	N	Field Photo (S. Godwin)
Family Galatheidae				
Galathea spinosorostrus Dana, 1852	14347		N	
Infraorder Brachyura				
Superfamily Homoloidea				
Family Dromiidae				
Cryptodromiopsis tridens Borradaille,1906	14344		N	
Family Dynomeniidae				
Dynomene hispida Guerin-Meneville, 1832	14345, 14346		N	
SuperFamily Raniniodea				
Family Majidae				
Perinea tumida Dana, 1852	14364, 14365, 14366, 14367	X	N	Field Photo (S. Godwin)
Family Calappidae				
Calappa gallus (Herbst, 1803)	14111		N	
Family Leucosiidae				
Nucia speciosa Dana, 1852	14362	X	N	Field Photo (S. Godwin)
SuperFamily Grapsidoidea				
Family Grapsidae				
Cyclograpsus granulatus Dana, 1851	14353	X	N	Field Photo (S. Godwin)
Cyclograpsus henshawi Rathbun, 1902	14356	X	N	Field Photo (S. Godwin)
Grapsus tenuicrustatus	No Specimen	X	N	Field Photo (S. Godwin)
Geograpsus crinipes (Dana, 1852)	14355	X	N	Field Photo (S. Godwin)
Metopograpsus thukuhar (Owen, 1803)	No Specimen			
Metopograpsus messor (Forskal, 1775)	14351		N	
Pachygrapsus minutus A. Milne Edwards, 1873	14350, 14358	X	N	Field Photo (S. Godwin)
Pachygrapsus plicatus (A. Milne Edwards, 1873)	14360	X	N	Field Photo (S. Godwin)
Pachygrapsus planifrons de Man, 1888	14354	X	N	Field Photo (S. Godwin)

Taxon	Catalog #	Photo	Status	Comment
Percnon planissimum (Herbst, 1904)	14352, 14359	X	N	Field Photo (S. Godwin)
Sesarma obtusifrons (Dana, 1851)	14357	X	N	Field Photo (S. Godwin)
SuperFamily Ocypodoidea				
Family Ocypodidae				
Ocypode ceratophthalmia (Pallas, 1772)	14112		N	
SuperFamily Portunoidea				
Family Portunidae				
Thalamita dakini Montgomery, 1931	14370		N	
Charybdis erythrodactyla	No Specimen	X	N	Field Photo (S. Godwin)
SuperFamily Xanthoidea				
Family Goneplacidae				
Pseudozius caystrus (Adams & White, 1848)	14385	X	N	Field Photo (S. Godwin)
Family Trapeziidae				
Trapezia intermedia Miers, 1886	14372	X	N	Field Photo (S. Godwin)
Domecia hispida Edyoux & Souleyet, 1842	14373	X	N	Field Photo (S. Godwin)
Family Xanthidae				
Chlorodiella cytherea Dana, 1852	14378, 14379	X	N	Field Photo (S. Godwin)
Chlorodiella laevissima (Dana,1852)	14377, 14383, 14409	X	N	Field Photo (S. Godwin)
Leptodius sanguineus (H. Milne Edwards, 1834)	14376, 14386	X	N	Field Photo (S. Godwin)
Leptodius gracilis (Dana, 1852)	14401	X	N	Field Photo (S. Godwin)
Leptodius waialuanus Rathbun, 1906	14404	X	E	Field Photo (S. Godwin)
Liocarpilodes biunguis (Rathbun, 1906)	14388, 14393	X	N	Field Photo (S. Godwin)
Liocarpilodes integerrimus Dana, 1852	14389, 14412	X	N	Field Photo (S. Godwin)
Liomera bella (Dana, 1852)	14394, 14408, 14411	X	N	Field Photo (S. Godwin)
Liomera rugata (H. Milne Edwards, 1834)	14402	X	N	Field Photo (S. Godwin)
Lophozozymus pulchellus A. Milne Edwards, 1867	14397		N	
Lophozozymus dodone (Herbst, 1801)	14410		N	
Lophozozymus sp. (juvenile)	14396	X	U	Field Photo (S. Godwin)
Lybia edmondsoni Takeda & Miyake, 1970	14416	X	E	Field Photo (S. Godwin)
Jacforus cavatus (Rathbun, 1907)	14381	X	N	Field Photo (S. Godwin)
Paraxanthias notatus (Dana, 1852)	14391, 14405	X	N	Field Photo (S. Godwin)
Phymodius nitidus (Dana, 1852)	14403	X	N	Field Photo (S. Godwin)
Pilodius areolatus (H. Milne Edwards, 1834)	14395, 14399	X	N	Field Photo (S. Godwin)
Platypodia eydouxii (A. Milne Edwards, 1865)	14375	X	N	Field Photo (S. Godwin)
Platypodia hawaiiensis (Rathbun, 1906)	14387, 14400	X	E	Field Photo (S. Godwin)
Polydectus cupulifer Latreille, 1825	14392, 14406	X	N	Field Photo (S. Godwin)
Pseudoliomera remota (rathbun, 1907)	14382	X	N	Field Photo (S. Godwin)
Pseudoliomera variolosa (Borradaile, 1902)	14415	X	N	Field Photo (S. Godwin)
Tweedieia laysani (Rathbun, 1906)	14390, 14414	X	N	Field Photo (S. Godwin)
Xanthias canaliculatus Rathbun, 1906	14384, 14407	X	N	Field Photo (S. Godwin)
Medaeops neglectus (Balss, 1922)	14398	X	N	Field Photo (S. Godwin)
Phylum Echinodermata				
Sub Phylum Eleutherozoa				
Class Asteroidea				
Order Valvatida				
Family Asteropseidae				
Asteropsis carinifera (Lamarck, 1816)	14144, 14145	X	N	Field Photo (S. Godwin)
Family Ophidiasteridae				
Ophidiaster hemprichi Fisher, 1906	14146		N	
Family Oreasteridae				
Culcita novaeguineae Muller & Troschel, 1842 (Juvenile)	14447		N	
Class Ophiuroidea				
Order Ophiurida				
Family Ophiocomidae				
Ophiocoma brevipes Peters, 1851	14149, 14150, 14151		N	
Ophiocoma dentata Muller & Troschel, 1842	14147, 14148	X	N	Field Photo (S. Godwin)
Ophiocoma erinaceus Muller & Troschel, 1842	14152, 14153	X	N	Field Photo (S. Godwin)
Ophiocoma pica Muller & Troschel, 1842	14154		N	
Family Ophiodermatidae				
Ophiopeza clarki Ely, 1942	14449		N	
Family Ophionereididae				
Ophioneresis porrecta Lyman, 1860	14184		N	

Taxon	Catalog #	Photo	Status	Comment
Class Holothuroidea				
Order Aspidochirotida				
Family Holothuriidae				
Actinopyga mauritiana (Quoy & Gaimard, 1833)	14164, 14188	X	N	Field Photo (S. Godwin)
Holothuria (Cystipus) inhabilis Selenka, 1867	14175, 14176		N	Field Photo (S. Godwin)
Holothuria atra (Halodeima) atra Jaeger, 1833	14165, 14190, 14191	X	N	Field Photo (S. Godwin)
Holothuria (Lessonthuria) pardalis Selenka, 1867	14169	X	N	Field Photo (S. Godwin)
Holothuria (Stauropora)) n. sp.	No Specimen	X	E (?)	**New sp.**, Field Photo (S. Godwin)
Holothura (Microthele) whitmaei Bell, 1887	No Specimen	X	N	Field Photo (S. Godwin)
Holothuria (Platyperona) difficilis Semper, 1868	14168, 14192	X	N	Field Photo (S. Godwin)
Holothuria (Mertensiothuria) pervicax Selenka, 1867	14170, 14171, 14172, 14173	X	N	Field Photo (S. Godwin)
Holothura (Thymiosycia) arenicola Semper, 1868	14166, 14167, 14189	X	N	Field Photo (S. Godwin)
Holothuria (Thymiosycia) hilla Lesson, 1830	14174	X	N	Field Photo (S. Godwin)
Holothuria (Thymiosycia) impatiens (Forskal, 1775)	14177, 14178	X	N	Field Photo (S. Godwin)
Holothuria (Cystipus) cf. rigida Selenka, 1867	14179		N	**New Record**, Field Photo (S. Godwin)
Family Stichopodidae				
Stichopus horrens Selenka, 1867	14180, 14181, 14182	X	N	Field Photo (S. Godwin)
Stichopus n sp	14448	X	E (?)	**New sp**, Field Photo (S. Godwin)
Order Apodida				
Family Synaptidae				
Euapta godeffroyi (Semper, 1868)	14193	X	N	Field Photo (S. Godwin)
Polyplectana kefersteinii (Selenka, 1867)	14183	X	N	Field Photo (S. Godwin)
Class Echinoidea				
Order Cidaroida				
Family Cidaridae				
Eucidaris metularia Lamarck, 1816	14155, 14156	X	N	Field Photo (S. Godwin)
Order Diadematoida				
Family Diadematidae				
Diadema paucispinum Agassiz, 1863	No specimen	X	N	Field Photo (S. Godwin)
Echinothrix calamaris (Pallas, 1774)	14186	X	N	Field Photo (S. Godwin)
Echinothrix diadema (Linnaeus, 1758)	No Specimen	X	N	Field Photo (S. Godwin)
Order Temnopleuroida				
Family Toxopneustidae				
Tripneustes gratilla (Linnaeus, 1758)	14161, 14162, 14503	X	N	Field Photo (S. Godwin)
Pseudobolentia indiana (Michelin, 1862)	14160		N	
Order Echinoida				
Family Echinometridae				
Colobocentrotus atratus (Linnaeus, 1758)	14502	X	N	Field Photo (S. Godwin)
Echinometra mathaei (Blainville, 1825)	14157	X	N	Field Photo (S. Godwin)
Echinometra oblongata (Blainville, 1825)	14187, 14504, 14505	X	N	Field Photo (S. Godwin)
Echinostrephus aciculatus Agassiz, 1863	No Specimen	X	N	Field Photo (S. Godwin)
Heterocentrotus mammilatus (Linnaeus, 1758)	14159	X	N	Field Photo (S. Godwin)
Family Echinoneidae				
Echinoneus cyclostomus Leske, 1778	14158, 14163	X	N	Field Photo (L. Basch)
Family Brissidae				
Brissus latecarinatus (Leske, 1778)	14185	X	N	Field Photo (S. Godwin)
Phylum Ectoprocta				
Class Stenolaemata				
Order Cyclostomata				
SubOrder Articulata				
Family Crisiidae				
Crisina radians (Lamarck, 1816)	No Specimen	X	N	
Phylum Hemichordata				
Class Enteropneusta				
Family Ptychoderidae				
Ptychodera flava Eschscholtz, 1825	14451, 14452	X	N	Field Photo (S. Godwin)

Taxon	Catalog #	Photo	Status	Comment
Phylum Chordata				
SubPhylum Urochordata				
Class Ascidiacea				
Order Enterogona				
SubOrder Aplousobranchia				
Family Didemnidae				
Didemnum edmondsoni Eldredge, 1967	14491		**N**	
Didemnum sp 1 (White)	14492	**X**	**U**	Field Photo (L. Basch))
Didemnum sp 2 (White)	No Specimen	**X**	**U**	Field Photo (L. Basch))
Didemnum sp 3 (Orange)	No Specimen	**X**	**U**	Field Photo (L. Basch))
Diplosoma listerianum (Milne Edwards, 1841)	14493		**I**	
SubOrder Phlebobranchia				
Family Ascidiidae				
Ascidia archaia Sluiter, 1890	14490		**I**	
Ascidia sydneiensis Stimpson, 1855	14489, 14496	**X**	**I**	Field Photo (S. Godwin)
Family Perophoridae				
Perophora annectens Ritter, 1893	14494	**X**	**N**	Field Photo (L. Basch))
Order Pleurogona				
SubOrder Stolidobranchia				
Family Styelidae				
Botryllus sp.	No Specimen	**X**	**I**	Field Photo (S. Godwin)
Polycarpa aurita (Sluiter, 1890)	14495		**C**	
Unknown Species (red)	No Specimen	**X**	**U**	Field Photo (S. Godwin)

APPENDIX B
Species records by site

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Phylum Cnidaria												
Class Hydrozoa												
Order Hydroida												
Family Halocordylidae												
Pennaria disticha (Goldfuss, 1820)								X				
Class Anthozoa												
SubClass Hexacorallia												
Order Actinaria												
Family Actiniidae												
Anthopleura nigrescens (Verrill, 1928)			X									X
Cladactella manni (Verrill, 1899)		X										
Family Aiptasiidae												
Aiptasia pulchella Carlgren, 1943		X	X	X			X			X	X	X
Order Scleractinia												
Family Acroporidae												
Montipora capitata (Dana, 1846)			X					X				X
Family Faviidae												
Leptastrea bewickensis Veron, Pichon & Wijsman, 1977		X										
Cyphastrea agassizi Vaughan, 1907			X									
Family Pocilloporidae												
Pocillopora damicornis (Linnaeus, 1758)		X	X	X				X				X
Pocillopora meandrina Dana, 1846		X	X	X			X	X				X
Family Poritidae												
Porites lobata Dana, 1846		X	X	X				X				X
Order Zoanthidea												
Family Zoanthidae												
Palythoa caesia Dana, 1848		X	X	X			X	X		X		X
Zoanthus cf. pacificus Walsh & Bowers, 1971			X									X
Zoanthus sp. 1			X									
Zoanthus sp. 2			X									
Isaurus tuberculatus Verrill,		X										
Phylum Nemertea												
Class Anlopa												
Order Heteronemertea												
Family Baseodiscidae												
Baseodiscus cingulatus (Coe, 1906)			X									
Baseodiscus delineatus (Delle Chiaje, 1825)												X
Phylum Sipuncula												
Class Phascolosomatidea												
Order Aspidosiphoniformes												
Family Aspidosiphonidae												
Aspidosiphon elegans (Chamisso & Eysenhardt, 1821)								X				X
Order Phascolosomatiformes												
Family Phascolosomatidae												
Phascolosoma nigrescens Keferstein, 1865			X									X
Phascolosoma stephensoni (Stephen, 1942)								X				
Phylum Echiura												
Order Echiuroidea												
Family Echiuridae												
Anelassorhynchus porcellus Fisher, 1948			X									
Phylum Annelida												
Class Polychaeta												
Family Polynoidae												
Hololepidella nigropunctata (Horst, 1915)								X				X
Iphione muricata (Horst, 1915)			X					X				X
Family Amphinomidae												
Eurythoe complanata (Pallas, 1766)		X	X									X
Phericardia striata (Kinberg, 1857)								X				
Family Phyllodocidae												
Phyllodoce madeirensis (Langerhans, 1880)								X				
Family Syllidae												
Brania rhopalophora (Ehlers, 1897)								X				X
Trypanosyllis sp								X				X
Trypanosyllis cf. variegata (Grube, 1860)		X										
Typosyllis sp.		X	X									
Family Nereididae												
Perineresis curvata Holly, 1935			X									X
Family Eunicidae												
Eunice afra Peters, 1854												X
Eunice antennata (Savigny, 1820)								X				X
Eunice cariboea (Grube, 1856)			X									
Eunice vittata (delle Chiaje, 1828)								X				
Lysidice ninetta Audouin & Milne Edwards, 1833			X									
Nematoneresis unicornis Holly, Schmarda, 1861			X									X

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Family Lumbrineridae												
Lumbrineresis dentata Hartmann-Schroder,1965			X									
Family Dorvilleidae												
Apophryotrocha sp			X									
Dorvillea moniloceras (Moore, 1909)												X
Dorvillea sp								X				
Family Cirratulidae												
Cirriformia sp												X
Dodecaceria laddi Hartman, 1954		X										
Family Chaetopteridae												
Phyllochaetopterus verrilli Treadwell, 1943							X	X				
Chaetopterus variopedatus (Renier, 1804)			X									
Family Terebellidae												
Nicolea gracilibranchis (Grube, 1878)							X					
Polycirrus sp			X									
Family Sabellidae												
Branchiomma nigromaculata (Baird, 1865)		X										X
Family Serpulidae												
Potamethus sp												X
Pseudovermilia occidentalis McIntosh, 1885												X
Spirobranchus giganteus (Grube, 1862)								X				
Vermiliopsis torquata Treadwell, 1943								X				
Phylum Mollusca												
Class Gastropoda												
SubClass Prosobranchia												
Order Archaeogastropoda												
SuperFamily Fissurelloidea												
Family Fissurellidae (Diodorinae)												
Diodora granifera (Pease, 1861)							X					
SuperFamily Patelloidea												
Family Patellidae												
Cellana exarata (Reeve, 1854)	X	X		X				X			X	
Cellana sandwicensis (Pease, 1861)		X						X			X	
Cellana talcosa (Gould, 1846)		X						X				
SuperFamily Trochoidea												
Family Trochidae (Trochinae)												
Trochus intextus Kiener, 1850		X	X	X							X	X
Family Turbinidae (Colloninae)												
Leptothyra verruca (Gould, 1845)												X
Family Turbinidae (Turbininae)												
Turbo sandwicensis Pease, 1861			X									X
SuperFamily Neritoidea												
Family Neritidae (Neritinae)												
Nerita picea (Recluz, 1841)	X	X	X	X	X	X	X	X	X	X	X	X
Nerita polita Linnaeus, 1758			X									
Theodoxus neglectus (Pease, 1861)	X	X		X								
Order Neotaenioglossa												
SuperFamily Cerithoidea												
Family Cerithiidae												
Ittibittium zebrum (Keiner, 1841)									X	X	X	X
Cerithium atromarginatum Dautzenberg & Bouge, 1933												X
Cerithium nesioticum Pilsbry & Vanatta, 1905		X	X					X				X
Cerithium rostratum Sowerby, 1855			X									
Family Modulidae												
Modulus tectum (Gmelin, 1791)		X	X									
Family Planaxidae												
Planaxis labiosa A. Adams, 1853	X											
SuperFamily Littorinoidea												
Family Littorinidae												
Littoraria pintado (Wood, 1828)	X	X	X	X	X	X	X	X	X	X	X	X
Nodilittorina hawaiensis Rosewater & Kadolsky, 1981	X	X	X	X	X	X	X		X	X	X	X
Peasiella tantilla (Gould, 1849)		X	X			X	X		X	X	X	X
SuperFamily Truncatelloidea												
Family Rissoidae (Rissoininae)												
Rissoina ambigua (Gould, 1849)												X
SuperFamily Vanikoroidea												
Family Hipponicidae												
Hipponix australis Lamarck, 1819		X	X				X					X
Hipponix imbricatus Gould, 1846		X	X	X								X

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
SuperFamily Vermetoidea												
Family Vermetidae												
Dendropoma gregaria Hadfield & Kay, 1972		X	X									X
Petalochonchus keenae Hadfield & Kay, 1972				X								X
Serpulorbis variabilis Hadfield & Kay, 1972	X	X	X	X	X	X	X	X	X	X	X	X
SuperFamily Cypraeoidea												
Family Cypraeidae												
Cypraea caputserpentis Linnaeus, 1758		X	X								X	X
Cypraea isabella Linnaeus, 1758			X								X	X
Cypraea mauritiana Linnaeus, 1758		X		X								
SuperFamily Lamellaroidea												
Family Triviidae												
Trivia hordacea Kiener, 1845							X					
SuperFamily Naticoidea												
Family Naticidae												
Natica gualiteriana Recluz, 1844		X	X									X
SuperFamily Tonnoidea												
Family Bursidae												
Bursa rosa (Perry, 1811)												X
Family Ranellidae (Cymatiinae)												
Cymatium nicobaricum (Rodong, 1798)			X	X								
Family Ranellidae (Ranellinae)												
Gyrineum pusillum (Broderip, 1832)			X									
Order Neogastropoda												
SuperFamily Muricoidea												
Family Buccinidae												
Engina albocincta Pease, 1860							X					
Prodotia ignea (Gmelin, 1791)												X
Prodotia iostomus (Gray in Griffiths & Pidgeon, 1834)			X									
Family Columbellidae												
Euplica varians (Sowerby, 1832)							X					
Family Fasciolariidae												
Peristernia chlorostoma (Sowerby, 1825)		X	X									
Family Nassariidae												
Nassarius papillosus (Linnaeus, 1758)								X				
FamilyThaididae												
Drupa (Drupa) morum Roding & Sowerby, 1829		X		X			X					
Drupa (Drupa) ricina (Linnaeus, 1758)		X	X	X			X	X			X	X
Drupella elata Blainville, 1832			X									
Drupella ochrostoma (Blainville, 1832)			X									
Maculotriton bracteatus (Hinds, 1844)												X
Morula foliacea (Conrad, 1837)			X									
Morula granulata (Duclos, 1832)		X	X									X
Morula uva (Roding, 1798)		X	X	X								X
Purpura aperta (Blainville, 1832)		X		X			X	X				
Thais intermedia (Kiener, 1836)		X		X				X				
SuperFamily Volutoidea												
Family Costellaridae												
Vexillum (Pusia) cancellarioidea (Anton, 1839)		X										X
Vexillum (Pusia) lautum (Reeve, 1845)			X									
Family Mitridae												
Mitra (Strigatella) fastigium (Reeve, 1845)		X										
SuperFamily Conoidea												
Family Conidae												
Conus abbreviatus Reeve, 1843		X	X	X								X
Conus ebraeus Linnaeus, 1758			X									X
Conus catus Hwass in Bruguiere, 1792												X
Conus lividus Hwass in Bruguiere, 1792			X									X
Conus pennaceus Born, 1780			X									X
Conus rattus Hwass in Bruguiere, 1792			X					X				X
Conus sponsalis Hwass in Bruguiere, 1792		X	X	X								
Conus textile Linnaeus, 1758								X				
Family Terebridae												
Hastula strigilata (Linnaeus, 1758)		X										
Order Heterostropha												
SuperFamily Architectonicoidea												
Family Architectonicidae												
Heliacus variegatus (Gmelin, 1791)			X									
Order Cephalaspidea												
SuperFamily Atyoidea												
Family Smaragdinellidae												
Smaragdinella calyculata (Broderip & Sowerby, 1829)		X										
SuperFamily Acteonoidea												
Family Aplustridae												
Hydatina amplustra (Linnaeus, 1758)			X									X
Hydatina physis (Linnaeus, 1758)			X									

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Order Anaspidea												
SuperFamily Aplysioidea												
Family Aplysiidae (Aplysiinae)												
Aplysia dactylomela Rang,1828		X										
Family Aplysiidae (Dolabellinae)												
Dolabella auricularia (Lightfoot, 1786)		X										
Family Aplysiidae (Dolabriferinae)												
Dolabrifera dolabrifera (Rang, 1828)			X									
Family Aplysiidae (Notarchiinae)												
Stylocheilus longicaudatus (Quoy & Gaimard, 1824)		X										
Order Notaspidea												
SuperFamily Pleurobranchoidea												
Family Pleurobranchidae												
Berthellina citrina (Ruppell & Leuckart, 1831)			X									
Family Umbraculidae												
Umbraculum sinicum (Gmelin, 1791)			X									
Order Nudibranchia												
SuperFamily Doridoidea												
Family Dorididae (Kentrodoridinae)												
Asteronotus cespitosus (van Hasselt, 1824)			X									
Family Hexabranchidae												
Hexabranchus sanguineus (Ruppell & Leuckart, 1831)								X				
SubClass Pulmonata												
Order Basommatophora												
SuperFamily Melampoidea												
Family Melampidae												
Melampus castaneus (Muhlfeld, 1816)					X	X						
Family Siphonariidae												
Williamia radiata (Pease, 1861)							X					
Class Bivalvia												
SuperFamily Mytiloidea												
Family Mytilidae												
Septifer bryanae (Pilsbry, 1921)		X	X	X								X
SuperFamily Arcoidea												
Family Arcidae (Arcinae)												
Barbatia (Acar) divaricata (Sowerby, 1833)												X
SuperFamily Pterioidea												
Family Isognomidae												
Isognomon californicum (Conrad, 1837)		X	X	X								
Isognomon incisum (Conrad, 1837)	X		X								X	
Isognomon legumen (Gmelin,1791)							X					
Isognomon perna (Linnaeus, 1767)		X	X	X			X	X			X	X
SuperFamily Ostreoidea												
Family Ostreidae												
Dendostrea sandvicensis (Sowerby, 1871)								X				
Ostrea hanleyana Dall, Bartsch & Rehder, 1938		X	X									
SuperFamily Veneroidea												
Family Veneridae												
Gouldia cookei (Dall, Bartsch & Rehder, 1938)			X									
Periglypta reticulata (Linnaeus, 1758)												X
Class Polyplacophora												
Family Chitonidae												
Rhyssoplax linsleyi Burghardt, 1973			X								X	X
Acanthochiton viridis (Pease, 1872)				X							X	
Family Ischnochitonidae												
Ischnochiton petaloides (Gould, 1846)			X									X
Class Cephalopoda												
Order Octopoda												
Family Octopodidae												
Octopus cyanea Gray, 1849								X				
Phylum Arthropoda												
SubPhylum Crustacea												
Class Maxillopoda												
SubClass Cirripedia												
Order Thoracica												
Family Chthamalidae												
Euraphia hembeli (Conrad, 1834)												
Nesochthamalus intertextus (Darwin, 1854)	X	X	X	X			X	X			X	
Family Balanidae												
Tetraclita wireni pacifica Pilsbry, 1928									X			

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Class Malacostraca												
Order Stomatopoda												
Family Gonodactylidae												
Gonodactylaceus falcatus (Forskal, 1775)												X
Family Protosquillidae												
Echinosquilla querini (White, 1861)							X					
SubClass Eumalacostraca												
SuperOrder Eucarida												
Order Decapoda												
SubOrder Pleocyemata												
InfraOrder Stenopididea												
Family Stenopidae												
Stenopus hispidus (Olivier, 1811)			X									
SuperOrder Pleocyemata												
InfraOrder Caridea												
SuperFamily Palaemonoidea												
Family Gnathophyllidae												
Gnathophyllum americanum Guerin-Meneville, 1856												X
Family Palaemonidae												
Palaemon debilis (Dana, 1852)			X									
SuperFamily Alpheiodea												
Family Alpheidae												
Alpheus lottini Guerin, 1829												X
Alpheus lobidens De Haan, 1850												X
Family Hippolytidae												
Saron marmoratus (Olivier, 1811)			X									X
SuperOrder Peracarida												
Order Amphipoda												
SubOrder Gammaridea												
Family Amphilochidae												
Amphilocus menehune Barnard, 1970		X					X	X				X
Family Ampithoidae												
Ampithoe ramondi Audouin, 1826		X					X	X				X
Ampithoe waialua Barnard, 1970							X					
Paragrubia vorax Chevreux, 1901		X										X
Family Anamixidae												
Anamixis moana Thomas, 1997		X					X	X				
Family Aoridae												
Lembos leapakahi Barnard, 1970		X					X	X				X
Lembos waipio Barnard, 1970							X					X
Aloiloi nenue Barnard, 1970								X				
Family Corophiidae												
Monocorophium acherusicum (Costa, 1857)												X
Family Gammaridae												
Ceradocus hawaiiensis Barnard, 1955												X
Elasmopus piikoi Barnard, 1970												X
Elasmopus hooheno Barnard, 1970		X					X	X				
Elasmopus molokai Barnard, 1970								X				
Maera pacifica Schellenberg, 1938							X	X				X
Maera insignis (Chevreux, 1901)								X				X
Maera quadrimana (Dana, 1853)								X				X
Family Isaeidae												
Gammaropsis kaumaka Barnard, 1970		X					X	X				X
Gammaropsis atlantica Stebbing, 1888							X	X				
Photis kapapa Barnard, 1970							X					
Chevalia aviculae Walker, 1904								X				
Family Ischyroceridae												
Ischyrocerus oahu Barnard, 1970							X	X				X
Family Leucothoidae												
Leucothoe tridens Stebbing, 1888		X					X	X				X
Family Liljeborgiidae												
Liljeborgia heeia												X
Family Lysianassidae												
Arugella ewa (Barnard, 1970)												X
Pseudambasia kalaupapa Longenecker & Bolick, 2006												X
Family Podoceridae												
Podocerus talegus lawai (Barnard, 1970)							X	X				

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Order Isopoda												
Unidentified sp 1		X										
Unidentified sp 2								X				
SubOrder Anthuridea												
Family Santiidae												
Species 1		X					X	X				
Family Anthuridae												
Mesanthura hieroglyphica Miller & Menzies, 1952												X
SubOrder Flabellifera												
Family Cirolanidae												
Species 1							X					X
Family Sphaeromatidae												
Species 1		X					X	X				X
Family Stenetriidae												
Stenetrium medipacificum Miller, 1941								X				
Family Jaeropsidae												
Jaeropsis hawaiiensis Miller, 1941		X					X	X				X
Family Munnidae												
Species 1		X					X	X				X
Family Paranthuridae												
Paranthura ostergaardi Miller and Menzies, 1952							X	X				X
Family Janiridae												
Bagatus algicola		X					X	X				X
SubOrder Valvifera												
Family Idoteidae												
Colidotea edmondsoni Miller, 1940								X				
Order Tanaidacea												
SubOrder Tanaidomorpha												
Family Tanaidae												
Anatanais insularis Miller, 1940		X					X	X				X
Apseudomorpha oahuensis Miller, 1940		X					X	X				
Parapsuedes neglectus Miller, 1940												X
Tanais vanis Miller, 1940		X					X	X				X
Apseudes tropicalis Miller, 1940							X	X				X
Hodometrica prolixa Miller, 1940							X	X				
Synapseudes minutus Miller, 1940							X	X				X
Family Pseudozuxidae												
Leptochelia dubia Kroyer, 1842		X					X	X				X
SubOrder Reptantia												
InfraOrder Anomura												
SuperFamily Coenobitoidea												
Family Diogenidae												
Calcinus seurati Forest, 1951	X	X	X	X						X	X	X
Calcinus laevimanus (Randall, 1839)		X	X	X								
Calcinus elegans Milne Edwards, 1836							X				X	X
Calcinus latens (Randall, 1839)			X					X				X
Calcinus guamensis Wooster, 1982							X	X				X
Ciliopagurus strigatus (Herbst, 1804)							X	X				
Clibanarius zebra Dana, 1852			X									
SuperFamily Paguroidea												
Family Paguridae												
Pagurixus festinus McLaughlin & Haig, 1984							X					X
Pylopaguropsis keijii, McLaughlin & Haig, 1989								X				
SuperFamily Galatheoidea												
Family Porcellanidae												
Pachycheles pisoides (Heller, 1865)							X	X				X
Petrolisthes coccineus (Owen, 1839)			X									
Family Galatheidae												
Galathea spinosorostrus Dana, 1852							X					
Infraorder Brachyura												
Superfamily Homoloidea												
Family Dromiidae												
Cryptodromiopsis tridens Borradaille,1906												X
Family Dynomeniidae												
Dynomene hispida Guerin-Meneville, 1832												X
SuperFamily Raniniodea												
Family Majidae												
Perinea tumida Dana, 1852			X				X	X				X
Family Calappidae												
Calappa gallus (Herbst, 1803)								X				
Family Leucosiidae												
Nucia speciosa Dana, 1852												X

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
SuperFamily Grapsidoidea												
Family Grapsidae												
Cyclograpsus granulatus Dana, 1851							X					
Cyclograpsus henshawi Rathbun, 1902						X						
Grapsus tenuicrustatus	X	X		X		X	X	X		X	X	
Geograpsus crinipes (Dana, 1852)						X						
Metopograpsus thukuhar (Owen, 1803)				X								
Metopograpsus messor (Forskal, 1775)			X	X								
Pachygrapsus minutus A. Milne Edwards, 1873			X		X							X
Pachygrapsus plicatus (A. Milne Edwards, 1873)			X									
Pachygrapsus planifrons de Man, 1888							X					
Percnon planissimum (Herbst, 1904)			X				X					
Sesarma obtusifrons (Dana, 1851)						X						
SuperFamily Ocypodoidea												
Family Ocypodidae												
Ocypode ceratophthalmia (Pallas, 1772)			X									X
SuperFamily Portunoidea												
Family Portunidae												
Thalamita dakini Montgomery, 1931												X
Charybdis erythrodactyla		X										
SuperFamily Xanthoidea												
Family Goneplacidae												
Pseudozius caystrus (Adams & White, 1848)							X					
Family Trapeziidae												
Trapezia intermedia Miers, 1886		X										X
Domecia hispida Edyoux & Souleyet, 1842												X
Family Xanthidae												
Chlorodiella cytherea Dana, 1852							X	X				
Chlorodiella laevissima (Dana,1852)							X	X				X
Leptodius sanguineus (H. Milne Edwards, 1834)							X				X	
Leptodius gracilis (Dana, 1852)												X
Leptodius waialuanus Rathbun, 1906												X
Liocarpilodes biunguis (Rathbun, 1906)			X				X					X
Liocarpilodes integerrimus Dana, 1852							X	X				X
Liomera bella (Dana, 1852)			X									X
Liomera rugata (H. Milne Edwards, 1834)												X
Lophozozymus pulchellus A. Milne Edwards, 1867			X									
Lophozozymus dodone (Herbst, 1801)												X
Lophozozymus sp. (juvenile)			X									
Lybia edmondsoni Takeda & Miyake, 1970												X
Jacforus cavatus (Rathbun, 1907)								X				
Paraxanthias notatus (Dana, 1852)							X					X
Phymodius nitidus (Dana, 1852)												X
Pilodius areolatus (H. Milne Edwards, 1834)			X									X
Platypodia eydouxii (A. Milne Edwards, 1865)												X
Platypodia hawaiiensis (Rathbun, 1906)							X					X
Polydectus cupulifer Latreille, 1825			X									X
Pseudoliomera remota (rathbun, 1907)								X				
Pseudoliomera variolosa (Borradaile, 1902)												X
Tweedieia laysani (Rathbun, 1906)							X					X
Xanthias canaliculatus Rathbun, 1906								X				X
Medaeops neglectus (Balss, 1922)												X

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Phylum Echinodermata												
Sub Phylum Eleutherozoa												
Class Asteroidea												
Order Valvatida												
Family Asteropseidae												
Asteropsis carinifera (Lamarck, 1816)												X
Family Ophidiasteridae												
Ophidiaster hemprichi Fisher, 1906								X				
Family Oreasteridae												
Culcita novaeguineae Muller & Troschel, 1842 (Juvenile)							X					
Class Ophiuroidea												
Order Ophiurida												
Family Ophiocomidae												
Ophiocoma brevipes Peters, 1851							X	X				
Ophiocoma dentata Muller & Troschel, 1842			X				X	X				
Ophiocoma erinaceus Muller & Troschel, 1842			X	X				X				X
Ophiocoma pica Muller & Troschel, 1842								X				
Family Ophiodermatidae												
Ophiopeza clarki Ely, 1942												X
Family Ophionereididae												
Ophioneresis porrecta Lyman, 1860								X				
Class Holothuroidea												
Order Aspidochirotida												
Family Holothuriidae												
Actinopyga mauritiana (Quoy & Gaimard, 1833)		X	X	X								X
Holothuria (Cystipus) inhabilis Selenka, 1867			X									X
Holothuria atra (Halodeima) atra Jaeger, 1833		X	X	X				X				X
Holothuria (Lessonthuria) pardalis Selenka, 1867			X									X
Holothuria (Stauropora)) n. sp.				X								
Holothura (Microthele) whitmaei Bell, 1887		X	X									X
Holothuria (Platyperona) difficilis Semper, 1868			X									X
Holothuria (Mertensiothuria) pervicax Selenka, 1867			X									X
Holothura (Thymiosycia) arenicola Semper, 1868			X									X
Holothuria (Thymiosycia) hilla Lesson, 1830			X									X
Holothuria (Thymiosycia) impatiens (Forskal, 1775)			X				X					X
Holothuria (Cystipus) cf. rigida Selenka, 1867												X
Family Stichopodidae												
Stichopus horrens Selenka, 1867			X					X				
Stichopus n sp			X									
Order Apodida												
Family Synaptidae												
Euapta godeffroyi (Semper, 1868)			X									
Polyplectana kefersteinii (Selenka, 1867)												X
Class Echinoidea												
Order Cidaroida												
Family Cidaridae												
Eucidaris metularia Lamarck, 1816			X					X			X	X
Order Diadematoida												
Family Diadematidae												
Diadema paucispinum Agassiz, 1863			X					X				X
Echinothrix calamaris (Pallas, 1774)											X	
Echinothrix diadema (Linnaeus, 1758)				X							X	
Order Temnopleuroida												
Family Toxopneustidae												
Tripneustes gratilla (Linnaeus, 1758)		X	X	X				X			X	X
Pseudobolentia indiana (Michelin, 1862)			X									
Order Echinoida												
Family Echinometridae												
Colobocentrotus atratus (Linnaeus, 1758)	X	X		X	X	X				X	X	X
Echinometra mathaei (Blainville, 1825)		X	X	X			X	X		X	X	X
Echinometra oblongata (Blainville, 1825)		X	X	X							X	X
Echinostrephus aciculatus Agassiz, 1863			X	X				X				X
Heterocentrotus mammilatus (Linnaeus, 1758)		X	X	X								X
Family Echinoneidae												
Echinoneus cyclostomus Leske, 1778			X									X
Family Brissidae												
Brissus latecarinatus (Leske, 1778)			X									

	Site											
Taxon	**4**	**5**	**6**	**7**	**16**	**20**	**21**	**22**	**23**	**24**	**25**	**26**
Phylum Ectoprocta												
Class Stenolaemata												
Order Cyclostomata												
SubOrder Articulata												
Family Crisiidae												
Crisina radians (Lamarck, 1816)								X				
Phylum Hemichordata												
Class Enteropneusta												
Family Ptychoderidae												
Ptychodera flava Eschscholtz, 1825		X						X				
Phylum Chordata												
SubPhylum Urochordata												
Class Ascidiacea												
Order Enterogona												
SubOrder Aplousobranchia												
Family Didemnidae												
Didemnum edmondsoni Eldredge, 1967			X									
Didemnum sp 1 (White)			X					X				
Didemnum sp 2 (White)								X				
Didemnum sp 3 (Orange)								X				X
Diplosoma listerianum (Milne Edwards, 1841)												X
SubOrder Phlebobranchia												
Family Ascidiidae												
Ascidia archaia Sluiter, 1890			X									
Ascidia sydneiensis Stimpson, 1855		X						X				X
Family Perophoridae												
Perophora annectens Ritter, 1893			X									X
Order Pleurogona												
SubOrder Stolidobranchia												
Family Styelidae												
Botryllus sp.			X					X				X
Polycarpa aurita (Sluiter, 1890)								X				
Unknown Species (red)								X				

APPENDIX C
Taxonomic source materials

Phylum Cnidaria:

Devaney, D.M. & L.G. Eldredge. 1977. *Reef and Shore Fauna of Hawai'i. Section 1: Protozoa through Ctenophora.* B.P Bishop Museum Special Publication 64(1). B. P.Bishop Museum Press. Honolulu, Hawai'i 278 pp

Fenner, D. 2005. *Coral of Hawai'i. A field guide to the hard,black, and soft corals of Hawai'i and the Northwest Hawaiian Islands, including Midway*. Mutual Publishing, LLC. Honolulu, Hawai'i

Uchida, H & I. Soyama. 2001. *Sea Anemones in Japanese Waters*. Hankyu Publishing, Japan. 160pp

Phylum Nemertea:

Coe, W.R. 1947. Nemerteans of the Hawaiian and Marshall Islands. *Bishop Museum Occasional Papers* 19(3):101-106

Devaney, D.M. & L.G. Eldredge. 1987. *Reef and Shore Fauna of Hawai'i. Section 2: Platyhelminthes through Phoronida, Section 3: Sipuncula through Annelida.* B.P Bishop Museum Special Publication 64(2 & 3). B. P.Bishop Museum Press. Honolulu, Hawai'i 461 pp

Gibson, R. 1979. Nemerteans of the Great Barrier Reef. 2. Anopla Heteronemertea (Baseodiscidae). *Zoological Journal of the Linnean Society* 66(2):137-160

Phylum Sipuncula:

Devaney, D.M. & L.G. Eldredge. 1987. *Reef and Shore Fauna of Hawai'i. Section 2: Platyhelminthes through Phoronida, Section 3: Sipuncula through Annelida.* B.P Bishop Museum Special Publication 64(2 & 3). B. P.Bishop Museum Press. Honolulu, Hawai'i 461 pp

Phylum Echiura:

Devaney, D.M. & L.G. Eldredge. 1987. *Reef and Shore Fauna of Hawai'i. Section 2: Platyhelminthes through Phoronida, Section 3: Sipuncula through Annelida.* B.P Bishop Museum Special Publication 64(2 & 3). B. P.Bishop Museum Press. Honolulu, Hawai'i 461 pp

Phylum Annelida

Day, J.H. 1967. *A monograph on the polychaeta of Southern Africa, Part I. Errantia*. British Museum of Natural History No. 656, 477 pp

Devaney, D.M. & L.G. Eldredge. 1987. *Reef and Shore Fauna of Hawai'i. Section 2: Platyhelminthes through Phoronida, Section 3: Sipuncula through Annelida.* B.P Bishop Museum Special Publication 64(2 & 3). B. P.Bishop Museum Press. Honolulu, Hawai'i 461 pp

Fauchald, K. 1970. Polychaetous annelids of the families from Western Mexico Eunicidae, Lumbrineridae, Iphitimidae, Arabellidae, Lysaretidae and Dorvilleidae. *Allan Hancock Monographs in Marine Biology No. 5*, 335 pp

Fauchald, K. 1977. *The Polychaete Worms, definitions and keys to the orders, families and genera.* Natural History Museum of Los Angeles County, Sciences Series 28

Fauchald, K. 1992. A review of the genus *Eunice* (Polychaete: Eunicidae) based upon type material. *Smithsonian Contributions to Zoology*, No. 523, 422 pp

Hartman, O. 1966. Polychaetous annelids of the Hawaiian Islands. *Bishop Museum Occasional Papers* 23(11):163-252

Phylum Mollusca:

Kay, E.A. 1979. *Hawai'i Marine Shells, Reef and Shore Fauna of Hawai'i. Section 4: Mollusca*. Bishop Museum Press. Honolulu, Hawai'i 654 pp

Kay, E.A. & O. Schoenberg-Dole. 1991. *Shells of Hawai'i*. University of Hawai'i Press, 89 pp

Phylum Arthropoda:

Thoracica (Barnacles)

Henry, D.P. 1957. Some littoral barnacles from the Tuamotu, Marshall and Caroline Islands. *Proceedings of the U.S. National Museum* 107(3381):25-38

Hiro, F. 1939. Studies on the Cirripedian Fauna of Japan IV. Cirripeds of Formosa (Taiwan), with some geographical and ecological remarks on the littoral forms. *Memiors of the College of Science, Kyoto Imperial University, Series B* 15(2):245-284

Newman, W.A & A. Ross. 1976. Revision of the balanomorph barnacles; including a catalog of the species. *Memoirs of the San Diego Society of Natural History* 9:1-108

Pilsbry, H.A. 1928. Littoral barnacles of the Hawaiian Islands and Japan. *The Academy of Natural Sciences of Philadelphia* 79:305-317

Southward, A. J., R. S. Burton, S. L. Coles, P. R. Dando, R. DeFelice, J. Hoover, P. E. Parnell, T.Yamaguchi, and W. A. Newman. 1998. Invasion of Hawaiian shores by an Atlantic barnacle. *Marine Ecology Progress Series* 165:119-126.

Stomatopoda (Mantis Shrimp)

Ahyong S. (2001). Revision of the Australian stomatopod crustacea. Records of theAustralian Museum, Supplement 26. Sydney. 326 pp.

Kinzie, R.A. III. 1968. The ecology of replacement of *Pseudosquilla ciliata* (Fabricius) by *Gondactylus falcatus* (Forskål) (Crustacea: Stomatopoda) recently introduced into the Hawaiian Islands. *Pacific Science* 22(4): 465-475

Manning, R.B. 1978. Notes on some species of the *falcatus* group of *Gonodactylus* (Crustacea: Stomatopoda: Gonodactylidae)

Townsley, S. J. 1953. Adult and larval stomatopod crustaceans occurring in Hawaiian waters. *Pacific Science* 7(4):399-437

Decapoda (Shrimp & Crab)

Shrimp

Banner, A.H & D.M. Banner. 1974. Contributions to the knowledge of the alpheid shrimp of the Pacific Ocean part XVII. Additional notes on the Hawaiian alpheids: new species, subspecies, and some nomenclature changes. *Pacific Science* 28(4):423-437

Holthuis, L.B. 1955. The recent genera of the caridean and stenopodidean shrimps (Class Crustacea, Order Decapoda, Supersection Natantia) with keys for their determination. *Zoologische Verhandelingen No. 26* 157 pp

Kawamoto, T & J. Okuno. 2003. *Shrimps and Crabs of Kume Island, Okinanwa*. Hankyu Press, Japan 176 pp

Titgen, R.H. 1989. Gnathophyllid shrimp of the Hawaiian Islands, with the description of a new species of *Gnathophyllum* (Decapoda: Gnathophyllidae). *Crustaceana* 52(2):200-210

Brachyuran Crabs

Castro, P., P.K.L. Ng, & S.T. Ahyong. 2004. Phylogeny and systematics of the Trapeziidae Miers, 1886 (Crustacea: Brachyura), with the description of a new family. *Zootaxa* 643, 70pp

Dai, A. & S. Yang. 1991. *Crabs of the China Seas*. China Ocean Press, Beijing & Springer-Verlag, Berlin 682 pp

Davie, P. J. F., 1997. - Crustacea Decapoda : Deep water Xanthoidea from the South-Western Pacific and the Western Indian Ocean. In: A. Crosnier (ed.), Résultats des campagnes *MUSORSTOM, volume 18. Mémoires du Muséum national d'Histoire naturelle, Paris (A*), 176: 337-387

Edmondson, C.H. 1922. Hawai‘i Dromiidae. *Bishop Museum Occasional Papers* 8(2):3-10

Edmondson, C. H. 1954. Hawai‘i Portunidae. *Bishop Museum Occasional Papers* 21(12):217-274

Edmondson, C.H. 1959. Hawai‘i Grapsidae. *Bishop Museum Occasional Papers* 22(10): 153-202

Edmondson, C.H. 1962. Xanthidae of Hawai‘i. *Bishop Museum Occasional Papers* 22(13):216-309

Eldredge, L.G. 1977. Note on *Crytodromiopsis tridens* (Brachyura, Dromiidae). *Pacific Science* 31(3):249-251

Kawamoto, T & J. Okuno. 2003. *Shrimps and Crabs of Kume Island, Okinanwa*. Hankyu Press, Japan 176 pp

McLay, C.L. 2001. Dynomenidae and Dromiidae (Decapoda, Brachyura) from Guam, Philippine Islands, Tonga and Samoa. *Zoosystema* 23(4):807-856

McLay, C.L. & P.A. Ryan. 1990. The terrestrial crabs *Sesarma* (*Sesarmops*) *impressum* and *Geograpsus crinipes* (Brachyura, Grapsidae, Sesarminae) recorded from the Fiji Islands.

Ng, P.K.L. & P.F. Clark. 2003. Three new genera of Indo-West Pacific Xanthidae (Crustacea: Decapoda: Brachyura: Xanthoidea). *Zoosystema* 25(1):131-147

Poupin, J., P.J.F. Davie & J. Cexus. 2005. A revision of the genus *Pachygrapsus* Randall, 1840 (Crustacea: Decapoda:Brachyura, Grapsidae), with special reference to the Southwest Pacific species. *Zootaxa* 1015 66 pp

Sakai, T. 1939. *Studies on the Crabs of Japan, IV*. Brachygnatha, Brachyrhyncha. Yokendo Limited, Tokyo. Pp 365-471

Serène, R. 1984. Crustacés decapods brachyoures de l’Océan Indien Occidental et de la Mer Rouge. Xanthoidea:Xanthidae et Trapezidae. Addendum: Crosnier, A., Carpiliidae et Menippidae. *Faune Tropical* 24:1-349

Titgen, R.H. 1987. Hawai‘i Xanthidae (Decapoda: Brachyura) I. Specimens at the California Academy of Sciences. *Bishop Museum Occasional Papers* 27:106-114

Anomura (Hermit Crabs, Porcelain Crabs & Squat Lobsters)

Asakura, A. 2000. A review of Japanese species of *Pylopaguropsis* Alcock, 1905 (Decapoda: Anomura: Paguridae). *Crustacean Research* 29:70-108

Asakura, A. 1992. New record of the intertidal hermit crab, *Calcinus guamensis* Wooster, 1982 from Japan, with comments on Japanese *Calcinus. Journal of the Natural History Museum and Institute, Chiba* 2(1):37-40

Baba, K. 1977. Biological results of the Snellius Expedition XXVII. The Galatheid crustacean of the Snellius expedition. *Zoologische Mededelingen* 50(15):243-259

Dai, A. & S. Yang. 1991. *Crabs of the China Seas*. China Ocean Press, Beijing & Springer-Verlag, Berlin 682 pp

Haig, J. & P.A. McLaughlin. 1983. New *Calcinus* species species (Decapoda: Anomura: Diogenidae) from Hawai‘i, with a key to the local species. *Micronesica* 19(1-2):107-121

Kawamoto, T & J. Okuno. 2003. *Shrimps and Crabs of Kume Island, Okinanwa*. Hankyu Press, Japan 176 pp

McLaughlin, P.A. & J. Haig. 1989. On the status of *Pylopaguropsis zebra* (Henderson), *P. magnimanus* (Henderson), and *Galapagurus teevanus* Boone, with descriptions of seven new species of *Pylopaguropsis* (Crustacea: Anomura: Paguridae). *Micronesica* 22(2):123-171

McLaughlin, P.A.& J. Haig. 1984. A review of *Pagurixus* (Decapoda, Anomura, Paguridae) and descriptions of new species. *Crustaceana* 47(2):121-148

McLaughlin, P.A. 1974. The hermit crabs (Crustacea: Decapoda, Paguridea) of Northwestern North America. *Zoologische Verhandelingen No. 130* 17pp

Morgan, G.J. 1991. A review of the hermit crab genus *Calcinus* Dana (Crustacea: Decapoda: Diogenidae) from Australia, with descriptions of two new species. *Invertebrate Taxonomy* 5:869-913

Poupin, J. & R. Lemaitre. 2003. Hermit crabs of the genus *Calcinus* Dana, 1851 (Decapoda: Anomura: Diogenidae) from the Austral Islands, French Polynesia, with description of a new species. *Zootaxa* 391:1-20

Tudge, C.C. 1995. *Hermit crabs of the Great Barrier Reef and coastal Queensland*. Backhuys Publishers, Netherlands 40 pp

Wooster, D.S. 1984. The genus *Calcinus* (Paguridea, Diogenidae) from the Mariana Islands including three new species. *Micronesica* 18:121-162

Pericarids(Amphipods, Isopods, Tanaids)

Amphipoda

Barnard, J.L. (1970) Sublittoral Gammaridea (Amphipoda) of the Hawaiian Islands. *Smithsonian Contributions to Zoology*, 34, 1–286.

Barnard, J.L. (1971) Keys to the Hawaiian marine Gammaridea, 0–30 meters. *Smithsonian Contributions to Zoology*, 58, 1–135.

Lysianassidae (Amphipoda)

Barnard, J.L. & Karaman, G.S. (1991) The families and genera of marine gammaridean Amphipoda (except marine gammaroids). *Records of the Australian Museum*, Supplement 13 (2), 419–866.

Pseudambasia (Amphipoda: Lysianassidae)

Ledoyer, M. (1984) Les gammariens (Crustacea, Amphipoda) des herbiers de phanerogames marines de Nouvelle Caledonie (region de Noumea). *Memoires du Museum National d'Histoire Naturelle*, Series A, Zoology, 129, 1–113.

Ledoyer, M. (1986) Crustaces amphipods gammariens. Familles des haustoriidae a Vitjazianidae. *Faune de Madagascar*, 59(2), 599–1112.

Lowry, J.K., & Stoddart, H.E. (1995) The Amphipoda (Crustacea) of Madang Lagoon: Lysianassidae, Opisidae, Uristidae, Wandinidae and Stegocephalidae. *Records of the Australian Museum*, Supplement 22, 97–174.

Myers, A.A. (1985) Shallow-water, coral reef and mangrove Amphipoda (Gammaridea) of Fiji. *Records of the Australian Museum*, Supplement 5, 1–143.

Stephensen, K. (1927) Papers from Dr. Th. Mortensen's Pacific Expedition 1914–16. XL. Crustacea from the Auckland and Campbell Islands. *Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening i Kjobenhavn*, 83, 289–390.

Walker, A.O., & A. Scott (1903) Crustacea: Malacostraca. II. Decapod and sessile-eyed crustaceans from Abd-el-Kuri: Macrura and Edriophthalma. *In:* H.O Forbes (Ed.), *The Natural History of Sokotra and Abd-el-Kuri.* Liverpool Museums, Liverpool, 216–232, plates 14A,B.

Isopoda

Miller, M.A. (1941) The isopod Crustacea of the Hawaiian Islands, II. Asellota. *Occasional Papers of Bernice P. Bishop Museum* 16(13): 315-320.

Miller, M.A. (1967) Another asellote, *Hawaianira peleae* new genus and species, from the Hawaiian Islands (Crustacea: Isopoda). *Proceedings of the Biological Society of Washington* 80: 187-194.

Miller, M.A., & R.J. Menzies (1952) The isopod Crustacea of the Hawaiian Islands, III. superfamily Flabellifera, family Anthuridae. *Occasional Papers of Bernice P. Bishop Museum* 21(1): 1-15.

Santiidae (Isopoda)

Keable, S.J., G.C.B. Poore, & G.D.F. Wilson (2002) Australian Isopoda: Families. Version: 2 October 2002. http://crustacea.net.

Sphaeromatidae (Isopoda)

Harrison, K., & J.P. Ellis (1991) The genera of the Sphaeromatidae (Crustacea: Isopoda): a key and distribution list. *Invertebrate Taxonomy* 5: 915-952.

Bagatus algicola (Isopoda)

Pires, A.M.S. (1982) Taxonomic revision of Bagatus (Isopoda, Asellota) with a discussion of ontogenetic polymorphism in males. *Journal of Natural History* 16:227-259.

Tanaidacea [and *Colidotea edmondsoni* (Isopoda: Idotheidae)]

Miller, M.A. (1940) The isopod Crustacea of the Hawaiian Islands (Chelifera and Valvifera). *Occasional Papers of Bernice P. Bishop Museum* 15(26): 295-321.

Phylum Echinodermata:

Clark, A.H. 1949. Ophiuroidea of the Hawaiian Islands. *B.P. Bishop Museum Bulletin* 195, 133 pp

Clark, A.M. & F.W.E. Rowe. 1971. *Monograph of Shallow-Water Indo-West Pacific Echinoderms.* London: British Museum of Natural History, 300pp

Devaney, D.M. 1970. Studies on Ophiocomid brittlestars. I. A new genus (Clarkoma) of Ophiocominae with a reevaluation of the genus Ophiocoma. *Smithsonian Contributions to Zoology* 51

Ely, C.A. 1942. Shallow-water asteroidean and ophiuroidea of Hawai‘i. *B.P. Bishop Museum Bulletin* 176, 74 pp

Fisher, W.K. 1907. The holothurians of the Hawaiian Islands. *Proceedings of the U.S. National Museum* 32:637-744

Rowe, F.W.E. 1969. A review of the family Holothuriidae (Holothurioidea: Aspidochirotida). *Bulletin of the British Museum of Natural History* 18(4), 170 pp

Rowe, F.W.E. & J.E. Doty. 1977. The shallow-water holothurians of Guam. *Micronescica* 13(2): 217-250

Phylum Ectoprocta:

Devaney, D.M. & L.G. Eldredge. 1987. *Reef and Shore Fauna of Hawai‘i. Section 2: Platyhelminthes through Phoronida, Section 3: Sipuncula through Annelida.* B.P Bishop Museum Special Publication 64(2 & 3). B. P.Bishop Museum Press. Honolulu, Hawai‘i 461 pp

Phyla Hemichordata & Chordata (Urochordata):

Abbott, D.P., A.T. Newberry, and K.M. Morris. 1997. *Reef and Shore Fauna of Hawai‘i. Section 6B: Ascidians (Urochordata)*. Bishop Museum Special Publication 64 (6B). 64 pp

Cameron, C.B. 2005. A phylogeny of the hemichordates based on morphological characters. *Canadian Journal of Zooolgy* 83:196-215

Devaney, D.M. & L.G. Eldredge. 1987. *Reef and Shore Fauna of Hawai‘i. Section 2: Platyhelminthes through Phoronida, Section 3: Sipuncula through Annelida.* B.P Bishop Museum Special Publication 64(2 & 3). B. P.Bishop Museum Press. Honolulu, Hawai‘i 461 pp

Eldredge, L.G. 1967. A taxonomic review of the Indo-Pacific didemnid ascidians and descriptions of twenty-three Central Pacific species. *Micronesica* 2:161-261