CAMPBELL INDUSTRIAL PARK (CIP) GENERATING STATION PROJECT

2021 COMMUNITY BENEFITS PROGRAM

REEF FISHES MONITORING PROGRAM

Prepared For:

Hawaiian Electric Company, Inc.
P. O. Box 2750
Honolulu, Hawaiʻi 96840-0001

Project Period: 1 January 2021 through 31 December 2021

Prepared By:

Kuʻulei Rodgers Ph.D.
Sarah Severino M.S.
Keoki Stender
47-889 Kamehameha Highway
Kāneʻohe, Hawaiʻi 96744

Final Report- Report No. 2021-1
March 2022

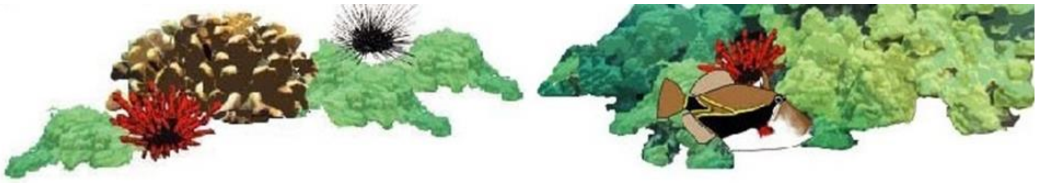


TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF FIELD PHOTOS

LIST OF APPENDICES (separate from report)

EXECUTIVE SUMMARY

Hawaiian Electric Company, Inc.'s (Hawaiian Electric's) Campbell Industrial Park (CIP) Generating Station quarterly ecological monitoring was initiated to monitor changes in biological communities with the startup of the generating facility at CIP, Barbers Point in West Oʻahu in 2010. Thirteen annual reports have been submitted between 2007 and 2020. The current 2021 report is the fourteenth in this series. The CIP Generating Station's wastewater is permitted to be discharged into two underground injection control (UIC) wells onsite; no effluent discharges to the ocean are permitted. The coral reef fish community monitoring continues as a commitment and benefit to the West Oʻahu community. Sixteen permanently marked monitoring stations extend from Barbers Point in the southeast to Nanakuli in the northwest, a distance of 7.9 kilometers (4.9 miles). These monitoring stations are located at depths between 5 meters (m) (16.4 feet) and 12 m (39.4 feet). In 2019, the number of monitoring stations was reduced from 16 to 14 based on comparability of biomass (mean standing crop) of fishes, abundance (mean number of individual fish), mean number of fish species, similarity of habitat, and spatial proximity. In 2020, the number of monitoring stations was further reduced to 12. The monitoring stations are located within four geographic groups (East, KoʻOlina, Kahe, and Nanakuli) within the nearshore and are analyzed to determine similarities based on historical data. The removal of four monitoring stations, East 2 and Kahe 7C, 7D, and 10C, are reflected in this report. Four monitoring events were conducted in 2021: June, July, September, and November, with an average reported from the pooled surveys.

Hawaiian Electric has collected data on fish and benthic communities in the nearshore vicinity of the Kahe Generating Station (KGS) since the mid-1970's. This long-term dataset documented severe changes following storms and hurricanes not related to the operation of KGS. Eight of the KGS monitoring stations (Kahe group) overlap with stations from this CIP Generating Station monitoring to provide a robust record of trends and patterns in fish community factors and their environmental and meteorological influences.

Fish community composition and biomass remained similar from the 2020 to 2021 surveys. In both 2020 and 2021, the brown surgeonfish, contribute most heavily to the abundance, with no single species dominating the biomass. The biomass along transects during both survey years is spread among several species. In 2021, biomass was dominated by the invasive *taʻape* (*Lutjanus kasmira*, bluestripe snapper), *naʻenaʻe* (*Acanthurus olivaceus*, orangeband surgeonfish), *humuhumuʻeleʻele* (*Melichthys niger*, black durgon), *mamo* (*Abudefduf vaigiensis*, Indo-Pacific sergeant), and *māikoiko* (*Acanthurus leucopareius*, whitebar surgeonfish). This varies slightly from the common contributors of biomass in 2020: (*A. nigrofuscus*, brown surgeonfish), *taʻape* (*L. kasmira*, bluestripe snapper), *naʻenaʻe* (*A. olivaceus*, orangeband surgeonfish), *maikoiko* (*Acanthurus leucopareius*, whitebar surgeonfish), *hīnālea lau wili* (*Thalassoma duperrey*, saddle wrasse), *mamo* (*A. vaigiensis*, Indo-Pacific sergeant) , and *kole* (*Ctenochaetus strigosus*, goldring surgeonfish). The total number of fish species recorded in 2021 (101 species) is similar to the number recorded in 2020 (118 species). Trophic regimes remain fairly constant throughout the

two years, with herbivores and invertebrate feeders making up the majority of both mean abundance and mean biomass.

Similar to the past two annual reports, the Ko‘Olina group exhibits a higher number of fish species, individuals and biomass as compared to the Kahe and Nanakuli group stations. In 2021, East group (Kalaeloa) exhibits higher number of fishes and biomass of fishes. Additionally, in 2021 there is no significant difference between Ko‘Olina, Kahe, East, and Nanakuli groups for abundance or biomass of fishes. As in previous years, the KGS discharge pipe (Pipe) station is significantly higher in fish biomass and abundance when compared to Kahe and Nanakuli groups and, also higher diversity of fishes as compared to the East, Kahe and Nanakuli groups. Although abundance and biomass are significantly higher at the Pipe than at other groups, a statistical difference is not found between Ko‘Olina and the Pipe. This is due to low diversity, abundance and biomass of fishes within the East, Kahe and Nanakuli groups, likely resulting from the poorly developed coral communities there and the high variability between fish surveys and years. The greater number of years surveyed, the lower the variability and increase in statistical power. This strengthens the confidence of results by providing additional data across years. Even with significantly higher fish biomass compared to most transects, Pipe transect has significantly higher fish biomass in 2021 as compared with the previous year. The total number of individual fishes and number of species at Pipe transect did not differ between the 2020 and 2021 surveys. Ko‘Olina group was the only grouping to experience a significant decline in the number of fishes between the last two surveys. East and Kahe groups experienced significant increases in biomass of fishes since the previous survey year. Nanakuli grouping (control), saw no significant changes in biomass, abudance, or diversity of fishes in 2021.

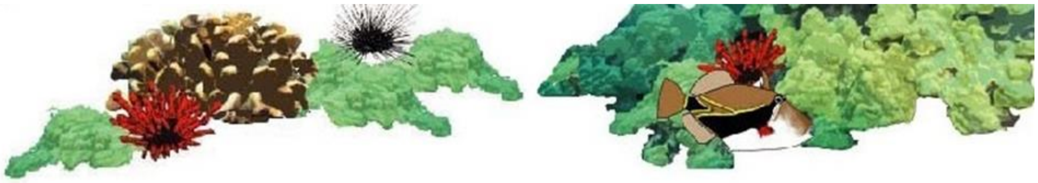
Fish populations are heavily influenced by spatial complexity. The topographic relief provided by the KGS Pipe provides protection from predators and habitat complexity that is known to be highly correlated with fish populations. In addition, numerous spinner dolphins, green turtles, and Hawaiian monk seals are observed throughout the surveys at the KGS Pipe. Periodic storms and hurricanes contribute to the lack of spatial relief through breakage and removal of coral colonies and shifting of sands. The poorly developed benthic communities at the Kahe stations are reflected in the lack of fishes as compared to more well-developed benthos as found at the Ko‘Olina and Pipe stations. The 2021 surveys found no significant change in fish community factors which can be attributed to the operation of KGS or CIP Generating Station facilities.

Key Points

- The dominant species in individual number observed in 2021 were similar to those reported in 2020: brown surgeonfish (*mā‘i'i'i*, *A. nigrofuscus*), blackfin chromis (*Chromis vanderbilti*) (small size, large schools), bluestripe snapper (*ta‘ape*, *L. kasmira*), and saddle wrasse (*hīnālea lauwili*, *T. duperrey*).
- Biomass is contributed mainly by the bluestripe snapper (*ta'ape, L. kasmira,* invasive), orangeband surgeonfish (*na'ena'e, A. olivaceus*), black durgon, *humuhumu‘ele‘ele* (*Melichthys niger*), and Indo-Pacific sergeant (*mamo, A. vaigiensis*).
- The number of species of fishes recorded in 2020 surveys (118 species) was fairly close to that of 2021 (101 species).

- No significant shift was found between years in trophic feeding guilds. Herbivores and invertebrate feeders consistently dominate. Herbivores experienced a shift in biomass from 60% dominance in 2020 to 49% dominance in 2021.
- Excluding the Pipe, which has the highest fish abundance and biomass, the East and Ko ‘Olina group have more developed fish communities than the other groups (Kahe, Nanakuli). This can be attributed to high spatial relief associated with well-developed fish communities.
- The 2021 surveys found no significant change in fish communities that can be attributed to the Hawaiian Electric’s KGS or CIP Generating Station facilities.

Field Photo 1. The endemic Saddle Wrasse, hinalea occurs solely in the Hawaiian Islands. One of the most common fishes throughout Hawai‘i, they feed opportunistically on invertebrates, fish eggs, and limu (seaweed). Spawning aggregations occur in the afternoon in spring and summer as the tide falls during a new moon. Males herd females then collectively dart rapidly upward, releasing their eggs and sperm before descending.



INTRODUCTION

Rationale and Historical Background for the Reef Fishes Monitoring Program

The Hawaiian Electric Company, Inc. (Hawaiian Electric) Campbell Industrial Park (CIP) Generating Station began service in 2010 with a 120-megawatt (MW) combustion turbine and two auxiliary 2 MW diesel engine generators. In contrast to the nearby Kahe Generating Station (KGS), the CIP Generating Station does not discharge effluent into the ocean. Instead, the CIP Generating Station is permitted to discharge effluent (approximately 600 gallons per minute [gpm]) from the production of electricity into two permitted injection wells onsite. This eliminates or greatly reduces any deleterious impacts to the adjacent nearshore marine environment. The development of this electric generating facility initiated an environmental monitoring program with a focus on determining any temporal or spatial changes in fish communities. The spatial extent of the quarterly surveys range from Kalaeloa (Barbers Point) in the southeast direction to Nanakuli in the northwest, a distance of 4.9 miles (7.9 kilometers (km)) (Figure 5). Eight of the monitoring stations along this coastline have been surveyed since 2008. The remaining stations were established in the 1970s for Hawaiian Electric’s KGS monitoring program. These stations range in depth from 16.4 feet (ft.) (5 meters (m)) to 39.4 ft. (12 m). Prior to construction of the CIP Generating Station, baseline surveys were conducted in 2007, followed by continued monitoring during the construction phase in 2009 (Brock 2019). Quarterly monitoring continued once the plant was fully operational in 2010 and has been consecutively monitored thereafter (Brock 2019). This statistical record of long-term fish monitoring has increased in value with the onset of acute events including storms, hurricanes, temperature anomalies, flooding, and other stochastic events. This has allowed an understanding of fish community impact and subsequent recovery along this coastline. Reassessments of previous monitoring stations in the Kahe area have increased the value of this database due to comparable surveys conducted by Hawaiian Electric in this region in the 1970s and 1980s, providing over five decades of information on fish community structure. Fish assemblage factors including biomass, abundance, trophic levels, and species composition accurately assess populations and determine change across sites and across time. Surveys continue as a benefit to the community of the West side of O‘ahu.

Accuracy in determining fish populations depend on the number and size of transects and whether transect locations are randomly selected, stratified random (e.g. following depth contours), or fixed (returning to the same location over time). Fixed transects may not be representative of the entire community of interest but allow for more accurate repeated measurements and over time increase in statistical power due to a larger sample size. It can be more characteristic and representative of what is actually occurring. Spatial and temporal variability of fishes can be extremely high due to mobility and large home ranges for some fishes. Many fish species are cryptic, rare or transient. There are also diurnal/nocturnal and seasonal sources of variability. To quantify absolute values for fish populations, an extremely large sample size is required, especially for heterogeneous habitats, that are diverse in substrate types, otherwise relative values, that compare across sites, should be used to determine differences between sites. Surveys repeated consistently over time on a regular basis can also be used to accurately quantify absolute values of what fishes are actually at a site. The statistical

power to detect differences increases with additional surveys due to an increase in the sample size. As the power increases, the chances of detecting a change if it exists increases. More samples (more surveys) allow for both large and small changes (effect sizes), regardless of the variability in the data, due to an increase in information.

Numerous methods have been developed for sampling fishes. Method selection depends on the focus of the research and the spatial and temporal scales involved. Comparability of methodology is imperative when making comparisons between and within sites across surveys. Calibration between methodologies and surveyors is vital to assurance of evaluations. This validates that a change detected is not from using dissimilar methods or different divers. Quantitative measurable methodology is vital to any long-term monitoring program.

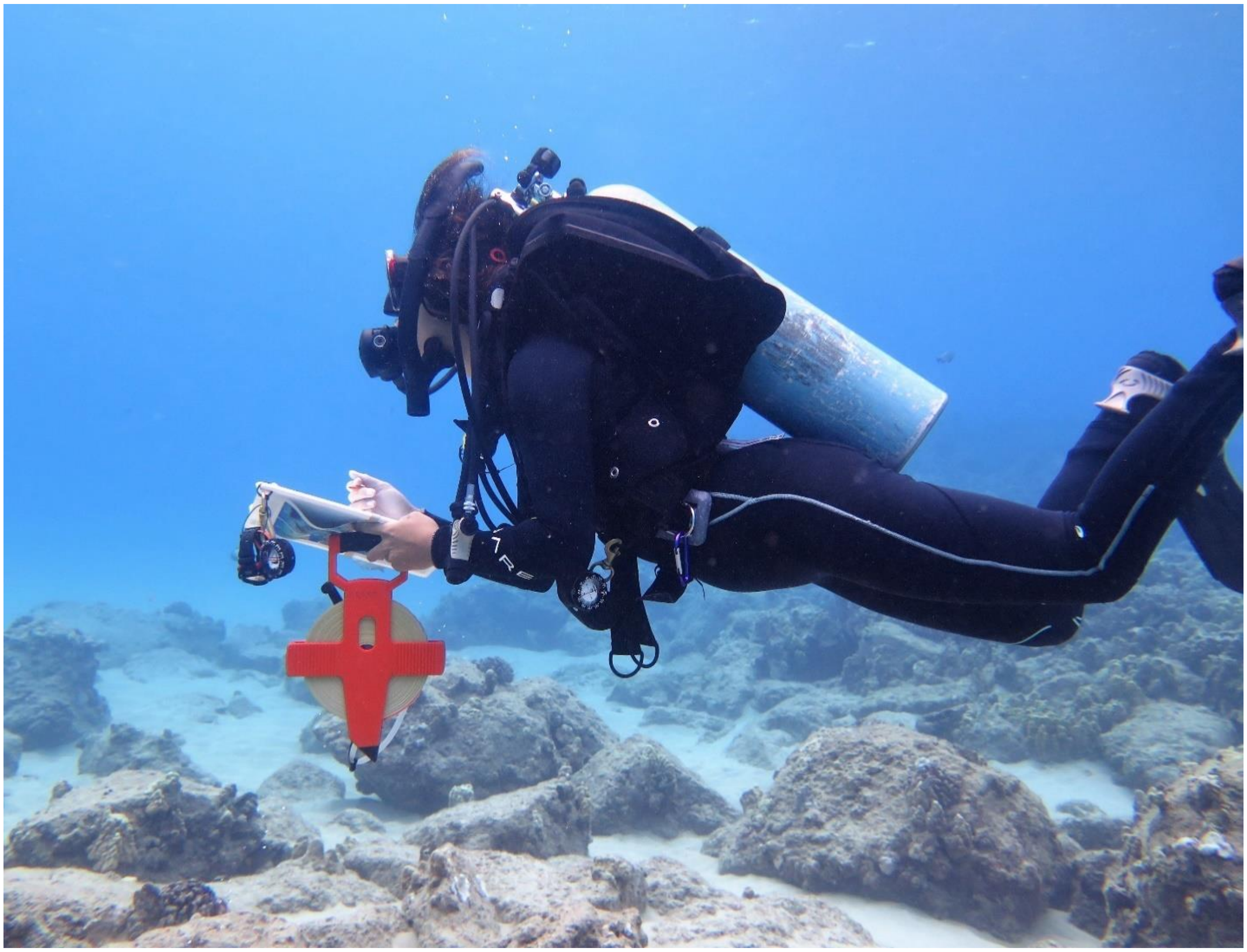
Qualitative (descriptive, non-numerical data) surveys by subject matter experts:

- Are subject to significant surveyor differences;
- Cannot be replicated by others or compared to other studies using quantitative methods;
- Can obtain only certain information (e.g. species presence) and doesn't measure all variables;
- Are good for large-scale rapid assessment of an area or general conditions;
- Are strongly biased; and
- Result in highly variable observations.

Quantitative (numerical data) surveys:

- Provide species abundance/biomass, most common species;
- Compare to other sites to determine change (seasonality or environmental changes);
- Provide a stable baseline;
- Can verify statistical differences; and
- Are archivable to review data or confirm species or repeat with new objective.

To avoid comparability issues with this dataset, the species abundance method (Brock (2019), adapted from the belt transect method (Brock 1954), has continued throughout this long-standing survey. This is commonly used among researchers and managers throughout the State. This includes a transect length of 164 x 13 ft. (50 m and width of 4 m) an area of 239 square yards (200 square meters [m^2]). This methodology records fish species and estimates length and number of individuals. From this data, fish community factors of abundance, biomass, trophic levels, endemism, diversity, evenness, and size class can be derived.



Field Picture 2. Diver recording fish species, number, and size at Kahe. (November 2021)

This species abundance method maximizes data and statistical comparability, allows for length to biomass conversions, and avoids limitations inherent in some other methods. This method includes two measures of abundance: numerical (number of fishes) and biomass (weight of fishes). These are both important population parameters that address different aspects of fish community structure. Unlike the belt transect method, species abundance estimates do not require additional survey time to allow for fish equilibrium to occur. The transect line is spooled out as the survey is conducted to avoid scaring away fishes.

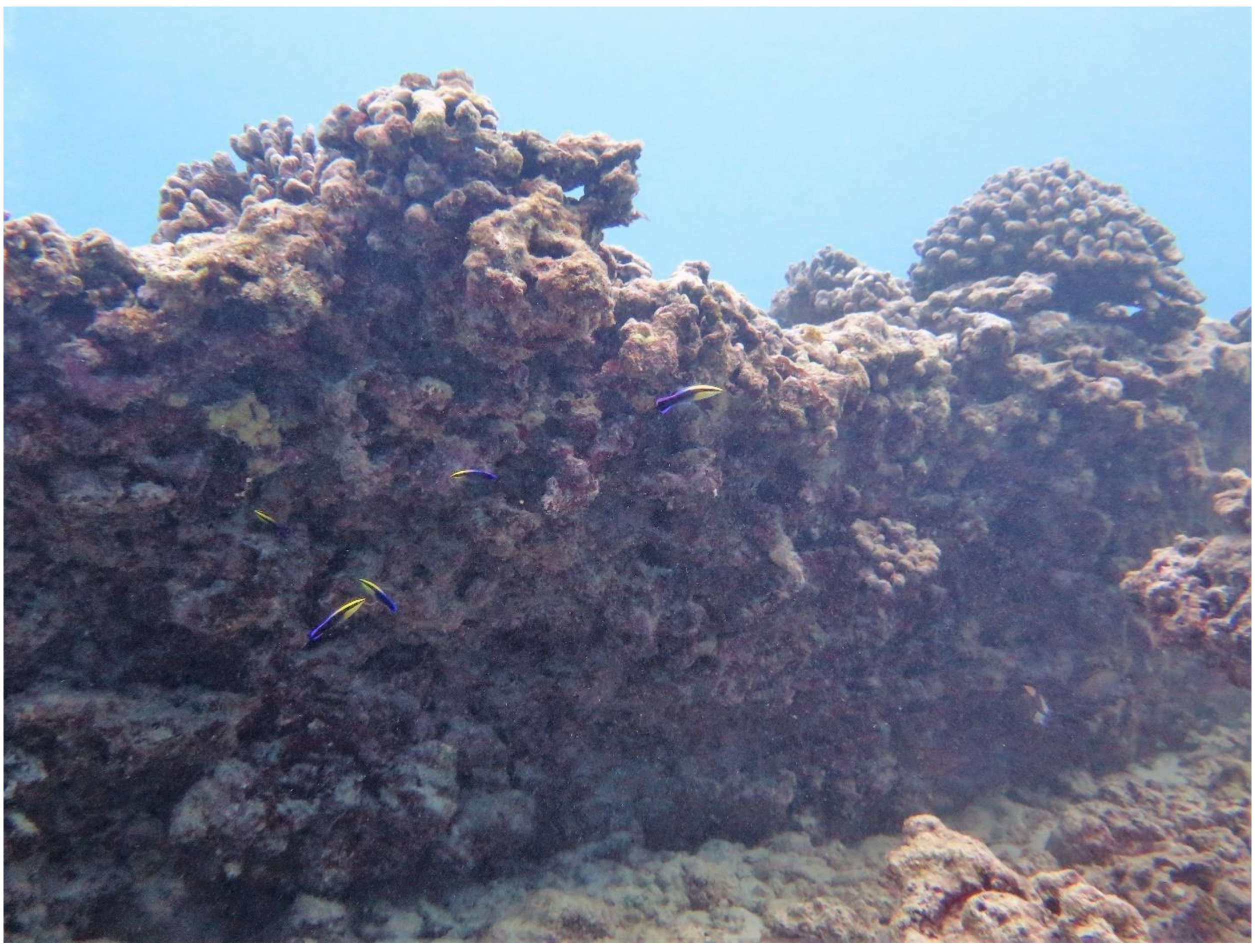
Field Picture 3. Diver conducting fish transects at Kalaeloa. Transect length of 164 ft. (50 m) by 13 ft. (4 m) covers an area of 239 yd^2 (200 m^2). Column extends to the surface (November 2021).

Size structure of fish populations can be an informative means of characterizing fish communities both spatially and temporally. Variations in recruitment processes such as production, transport, settlement, and mortality, can be revealed in missing or reduced size classes. Lack of recruitment can limit population size. Variations in size categories can explain variation in site attached fishes. The condition of different size assemblages can provide clues to causal mechanisms and links to environmental factors. Certain anthropogenic impacts can be detected, including the most influential impact of overfishing, by quantifying absence or highly reduced abundance of food fishes in the larger size classes. Absence or overabundance in certain size groups can predict future trophic structure and species composition. Size classes can directly influence competition, predation, and shifts in community structure.

Field Picture 4. Healthy populations of fishes include all size classes from juveniles to breeding adults (November 2021).

Trophic levels and endemism for fish species are also determined in these surveys. The trophic categories used by Brock (2019) were carnivores, herbivores, planktivores, omnivores, and corallivores. Trophic categories from 2019 forward are herbivores, invertebrate feeders, zooplanktivores, and piscivores. These categories are similar to the functional groups used by Brock (2019) but are now comparable on a Statewide spatial scale over a similar temporal scale. Fish assemblage organization including trophic structure is dependent more on local than regional conditions. Thus, these assemblages are more susceptible to local disturbances of fishing pressure, pollution, eutrophication or sedimentation, which can cause major shifts in trophic levels. Declines in apex predators (piscivores) are the most highly evident when comparing feeding guilds in the Main Hawaiian Islands (MHI) as compared with Papahānaumokuākea in the Northwestern Hawaiian Islands (NWHI). Large apex predators, primarily jacks and sharks, comprise over half of the total biomass in the NWHI (54%), while contributing only a small percentage (3%) in the MHI (Friedlander & DeMartini 2002).
Both terrestrial and marine endemism in the Hawaiian Islands is high compared to the rest of the world, due to geographic isolation that restricts gene flow and favors speciation where species

evolve over time. Of the 680 species of fishes in Hawai‘i, 20% are endemic, found exclusively in Hawai‘i. The overall marine environment has an average of 25% endemism with an endemism rate of 20% for algae, fishes and mollusks and 40% for crustaceans. There are no endemic echinoderms and very low endemism of pelagics due to their mobility. Endemism is restricted to the species and subspecies level with no endemic families and only three endemic genera. There are no single island endemics and corals are depauperate (lacking in number of species), missing many of the genus found elsewhere in the Pacific. There are few endemic species in a genus, only one or two. In contrast, a terrestrial genus has approximately 100 endemics.
Endemism is a biologically relevant attribute in examining fish assemblages. It relates to conservation of biodiversity, genetic connectivity and spatial patterns of recruitment. Historically, endemic comparisons have been based solely on presence/absence data due to lack of quantitative data. Yet, endemism evaluations are more statistically meaningful when incorporating numerical and biomass densities which allow for inclusion of spatial patterns (Friedlander & DeMartini 2004).



Field Picture 5. Found only in Hawai‘i, the endemic Hawaiian Cleaner Wrasses await fishes to remove parasites and dead tissue. Cleaning Stations are often found near ledges as pictured here. Research shows healthier fish populations where cleaning stations occur. (Kalaeloa, November 2021)

Field Picture 6. The Oval or Hawaiian Chromis is commonly found in aggregations where they feed on zooplankton. They are native to Hawai'i and found nowhere else in the world. Adults are bluish-grey in color while juveniles have bright yellow and blue dorsal stripes that gradually fade.

Field Picture 7. The Pebbled or Multiband Butterflyfish, kikākāpu endemic to the Hawaiian Islands are usually found in pairs. They feed on coral, worms, and small crustaceans.

Introduced species have become common on reefs in the MHI. Most snappers occurring in Hawai‘i have historically been highly prized food fishes. Pink snapper, *Pristipomoides filamentosus* (‘opakapaka), Crimson jobfish, *Etelis carbunculus* (ehu), Ruby snapper *Etelis coruscans* (onaga), and Long-tailed Red snapper inhabit depths of over 60 m. The Division of Aquatic Resources originally known as the Hawai‘i Fish and Game introduced three shallow water snappers from the South Pacific and Mexico in the mid-1950s and early 1960s in hopes of stimulating the commercial fisheries. These are among the 11 demersal species introduced within a 5-year period. *Lutjanus kasmira* (*ta‘ape*) the Blue-stripe snapper and *L. fulvus* (to’au) the Black-tail snapper have become widely established, while the third species, *L. gibbus*, the Humpback red snapper, is extremely rare. The more common of the non-native snappers, *L. kasmira*, (*ta‘ape*) was introduced from the Marquesas in 1958, while *L. fulvus* (*to‘au*) was imported two years earlier in 1956. Although only 3,200 *L. kasmira* (bluestripe snapper, *ta‘ape*) were released on the island of O‘ahu, they have increased their range to include the entire Hawaiian archipelago. The peacock grouper *Cephalopholis argus* (*roi*) introduced by the state for commercial purposes in 1956 from Moorea, French Polynesia, originally had more popularity as a food fish than the introduced snappers. Its attractiveness as a food fish rapidly declined as cases of ciguatera poisoning increased. This opportunistic feeder is perceived by many local fishermen as unsafe to consume and in direct competition with them because it preys upon native fish species. Contrary to popular belief, Dierking et al. (2005) found that the majority of *roi* (peacock grouper) are relatively safe to consume, with approximately 4% containing levels of toxin high enough to cause ciguatera poisoning. However, 20% of samples contained some level of ciguatoxin. Although a strong site specific correlation occurred with the highest percentage of toxic *roi* found on the island of Hawaiʻi, nearly all of the 28 locations tested on several islands contained fish that tested positive for ciguatoxins. Due to its carnivorous nature and presence of ciguatoxin, numerous efforts to cull this fish from the nearshore reefs have been initiated through community projects including "Kill Roi Day" on the island of Maui, "Roi Round-up" on the island of Hawaiʻi, and "Kauaʻi no ka Roi" on the island of Kauaʻi. None of these introduced species has been widely accepted as a food fish among the local population or become successful in the commercial fisheries and the ecological effects of these aliens have only recently been realized. Histological reports from Work et al. (2003) found that nearly half of the *L. kasmira* (*taʻape*) examined from Oʻahu were infected with an apicomplexan protozoan. Furthermore, 26% were infected with an epitheliocystic-like organism with potential transmission to endemic reef fishes. In addition, *L. kasmira* (*taʻape*) from Hilo were found to host the nematode *Spirocamallanus istiblenni* (Font and Rigby 2000). Species of goatfish *Mulloides flavolineatus* (*weke*), Yellowstripe goatfish and *Parupeneus porphyreus* (*kūmū*), Whitesaddle goatfish, popular food fishes, may be displaced by *L. kasmira* (*taʻape*), Bluestripe snapper which has also expanded its range into deeper water where *P. filamentosa* (*ʻopakapaka*), Pink snapper reside. Friedlander and Parrish (1998) looked at patterns of habitat use to determine predation and resource competition between *L. kasmira* (*taʻape*), bluestripe snapper and several native species within Hanalei Bay, Kauaʻi, but found no strong ecological relationships.

Field Picture 8. The Division of Aquatic Resources originally known as the Hawai‘i Fish and Game introduced three shallow water snappers from the South Pacific and Mexico in the mid-1950s and early 1960s in hopes of stimulating the commercial fisheries. *Ta‘ape* the Blue-stripe snapper (shown above) and L. fulvus (*to‘au*) the Black-tail snapper have become invasive and widely established, while the third species, the Humpback red snapper, is extremely rare. Since its introduction to O‘ahu from the Marquesas in 1958, this invasive species has increased their range to include the entire Hawaiian archipelago.

Diversity plays an important role in many ecological and conservation issues. Thus, it is included in this report. It can be a significant factor in assessing the efficacy of management efforts. Reductions in diversity can be indicative of fishing pressure since it can selectively remove specific species. Other anthropogenic impacts, such as eutrophication and sedimentation, can also result in phase shifts that impact fish diversity. Natural conditions can also determine diversity. Areas sheltered from high wave energy have previously been reported to maintain higher fish populations and exhibited greater species diversity in the Hawaiian Islands (Friedlander & Parrish 1998; Friedlander et al. 2003). This can be attributed to reduced habitat complexity in high-energy environments. Seasonal variability in wave impacts can structure the physiography of reefs, reducing habitat and spatial complexity for fishes through a dominance of encrusting morphologies of corals.

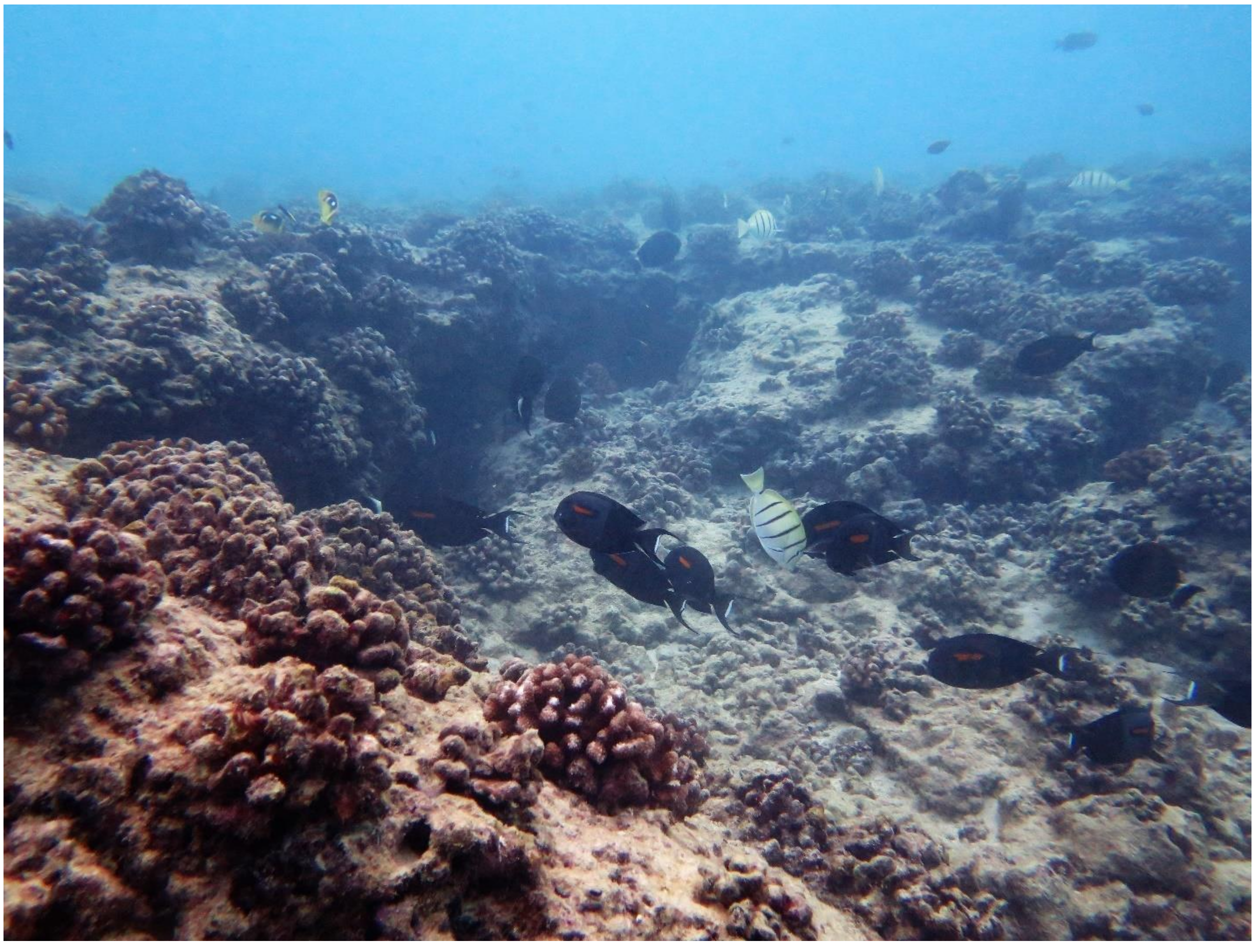
Field Picture 9. Diversity of fishes is important to the health of coral reefs. Mixed schools of fishes at this site in Kalaeloa include *manini*, *na'ena'e* and *to'au* (November 2021).

This annual report (Rodgers et al. 2021) includes a quantitative analyses of the fish populations along the Kalaeloa-Ko 'Olina-Kahe-Nanakuli nearshore corridor and a comparison with the prior twelve annual surveys conducted by Richard Brock (Brock 2018).

Natural Events and Human Impacts to Hawaiian Coral Reefs

Climate change has increased ocean temperatures and changed the ocean chemistry. This is due to the anthropogenic input of emissions into the atmosphere. The oceans absorb much of the carbon dioxide (CO_2) emitted. These global impacts are the ones most critical to address. But the impacts affecting the main Hawaiian Islands cannot be ignored. These problems that add to the decline of fisheries include invasive species, sedimentation, nutrification, pollution, fishing pressure and others.

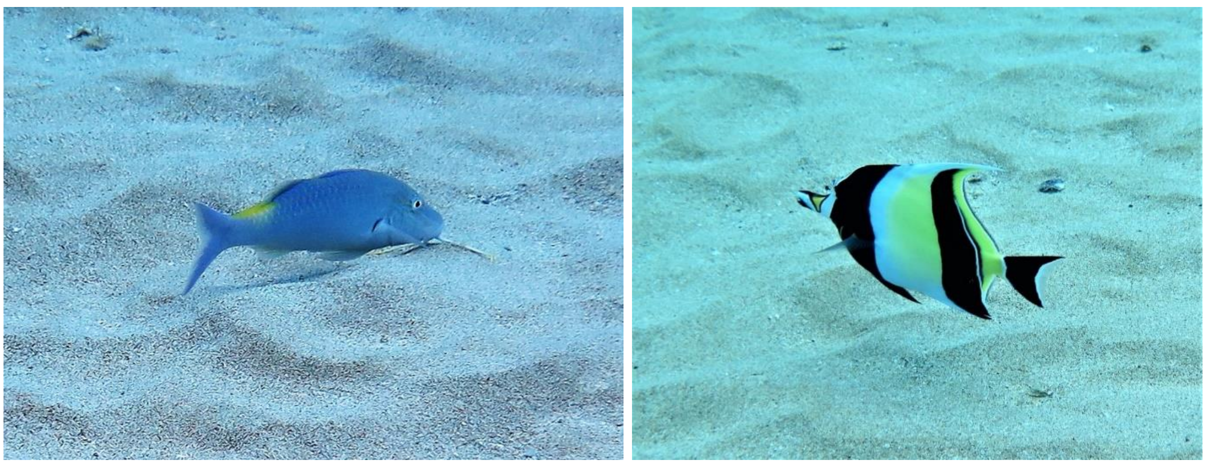
Both physical and biological processes control species distribution and abundance and other aspects of community structure. On a large scale, physical factors dominate, while at a local scale, biological interactions may control species composition. Physical processes include environmental stress/disturbance, climate, wave exposure, transport processes (dispersal), depth, temperature, salinity, light and oxygen levels. Biological processes include predator/prey relationships, competition, reproduction, recruitment, consumer/resource interactions and food availability.



Field Picture 10. Fish communities are controlled by physical and biological factors. The more complex the habitat, the greater the diversity and abundance of fishes as seen here at Kalaeloa. Size and structure of holes in the reef are related to the size and abundance of the fishes (November 2021).

<u>Fishing Pressure</u>

An expansion of commercial and recreational fisheries with more effective and efficient methods and increased economic pressure have led to worldwide overfishing. Nearly 70% of fish stocks are considered to be below sustainable levels. Both pelagic and coastal fish abundance have experienced extensive declines on a global scale. Fishing pressure has also caused severe depletion of fish stocks on a local scale. Recent research provides overwhelming evidence of the impact of overfishing in the MHI (Friedlander et al. 2017). It is based on the largest database of its kind including data from over 25,000 surveys and assembled and analyzed by the Fisheries Ecology Research Laboratory. Among the local pressures impacting Hawai‘i’s reefs, overfishing is clearly the primary forcing function of fish declines. The link between food fish populations and human population is strongly evident while fishes not targeted for food show no connection with populated areas. Reefs off highly populated regions have only a small fraction of food fishes than at remote reefs in the MHI such as at Ni'ihau, Kaho'olawe, and N. Moloka'i. Compared with Papahānaumokuākea in the NWHIs, the fish biomass is 10 times higher than off O'ahu. Total catch is considerably lower even with greater fishing effort. The shift is towards smaller, younger individuals and away from larger, piscivorous fishes. If fishes high on the trophic level are targeted, it is only sustainable under low fishing pressure. Many coastal fish populations have decreased to levels below the ability to replenish themselves (Friedlander and DeMartini, 2002). This report describes the fishing pressure at Kalaeloa, Ko 'Olina, Kahe, and the Kahe Pipeline by examining the ratio between food (resource) and non-food fishes non-resource).



Field Picture 11. Left: The Goatfish family are highly prized food fishes. They are commonly referred to as *weke, weke ula, moana kali, moano* or *moana kea.* They use long barbels or whiskers to force prey out of hiding. Goatfishes are often found over sand habitat and followed by *papio* (jacks), wrasses, or *puhi* (eels). Right: The non-food fish the Moorish Idol or *kihikihi* is common at most depths and found singularly or in schools feeding on encrusting invertebrates or sponges.

The dynamic nature of coral reefs and associated fish populations keep the marine environment in a constant state of flux. Changes in species abundance, size structure, and trophic levels occur frequently, causing community shifts. These processes can be a result of long-term impacts or stochastic events. The likelihood of recovery is higher from an acute event than from a chronic event. Chronic cases have only shown recovery of reefs after other anthropogenic or natural stressors ceased and where the physical or biological environments have not been altered (Connell, 1997; Erftemeijer et al., 2012; Philipp and Fabricius, 2003).

<u>Influential Factors Controlling Reef Communities</u>

Stratification of coral reef organisms is controlled principally by depth, topographical complexity, and wave regimes. Accretion, growth, and community structure of most coral reefs in the Hawaiian Islands are primarily under the control of wave forces (Grigg, 1998). The dominant wave regimes show quite different patterns of wave height, wave periodicity,

intensity and seasonality (Jokiel, 2006) and slight differences in exposure, and have a profound impact on reef coral development (Storlazzi et al., 2005). Large waves and strong currents in exposed areas flush contaminants from reefs. However, anthropogenic impacts can dominate in environments where wave forces are not the major controlling factor. To develop a measure of reef condition, Rodgers (2005) used 43 different factors in an attempt to understand what the most important factors were that influence coral reef communities. Parametric (multiple regression) and non-parametric statistical analyses (principal components analysis, and non-metric multidimensional scaling) were used to determine which environmental factors were most important in structuring coral and fish assemblages. Coral reefs involve multifaceted interactions and each factor alone is a weak predictor of any of the response variables; however, in combination these factors explained a large percent of the variability. Both natural factors such as spatial complexity, waves, and depth and anthropogenic factors such as human population, silt and organics explained most of the variability in fishes and coral (Figure 1).

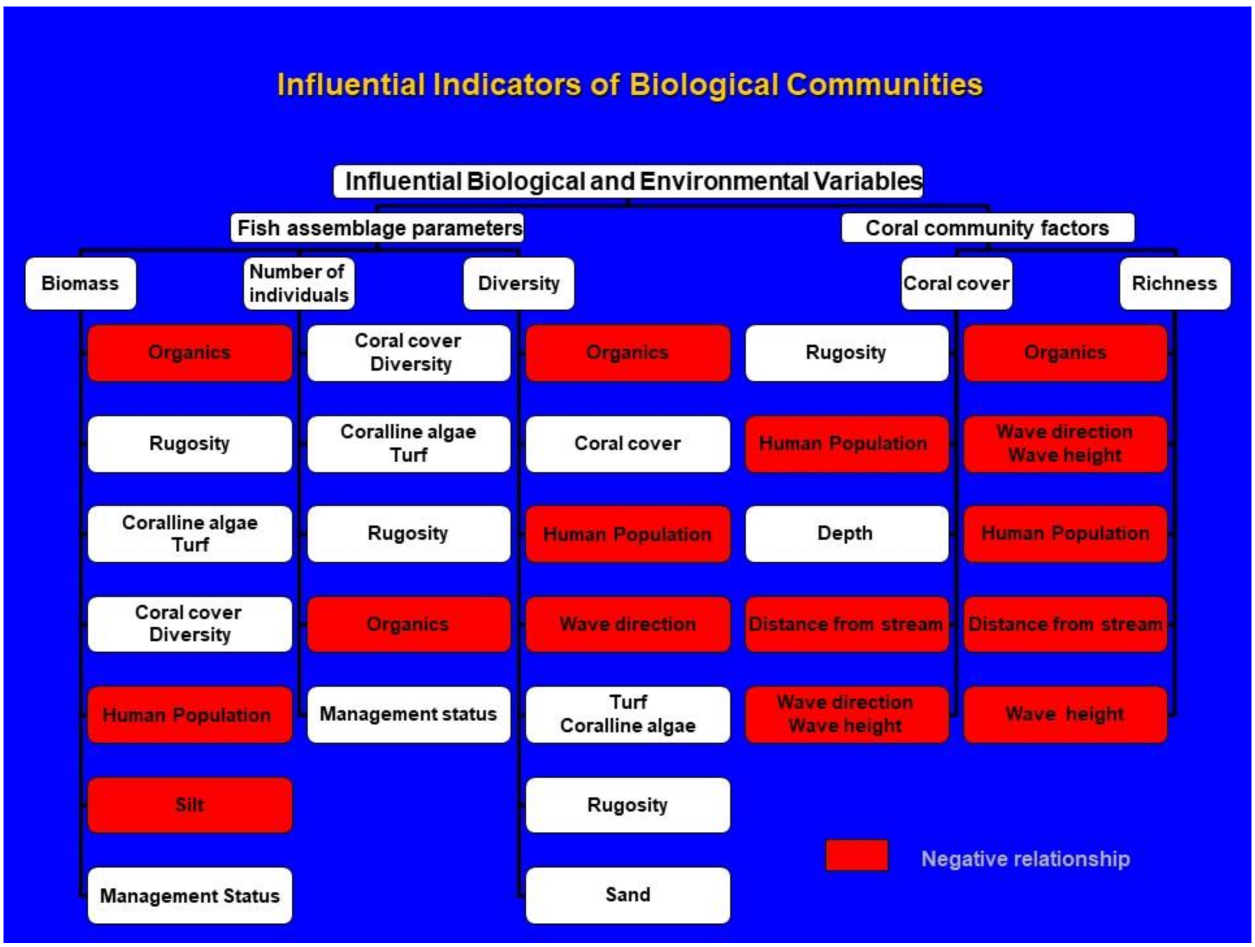
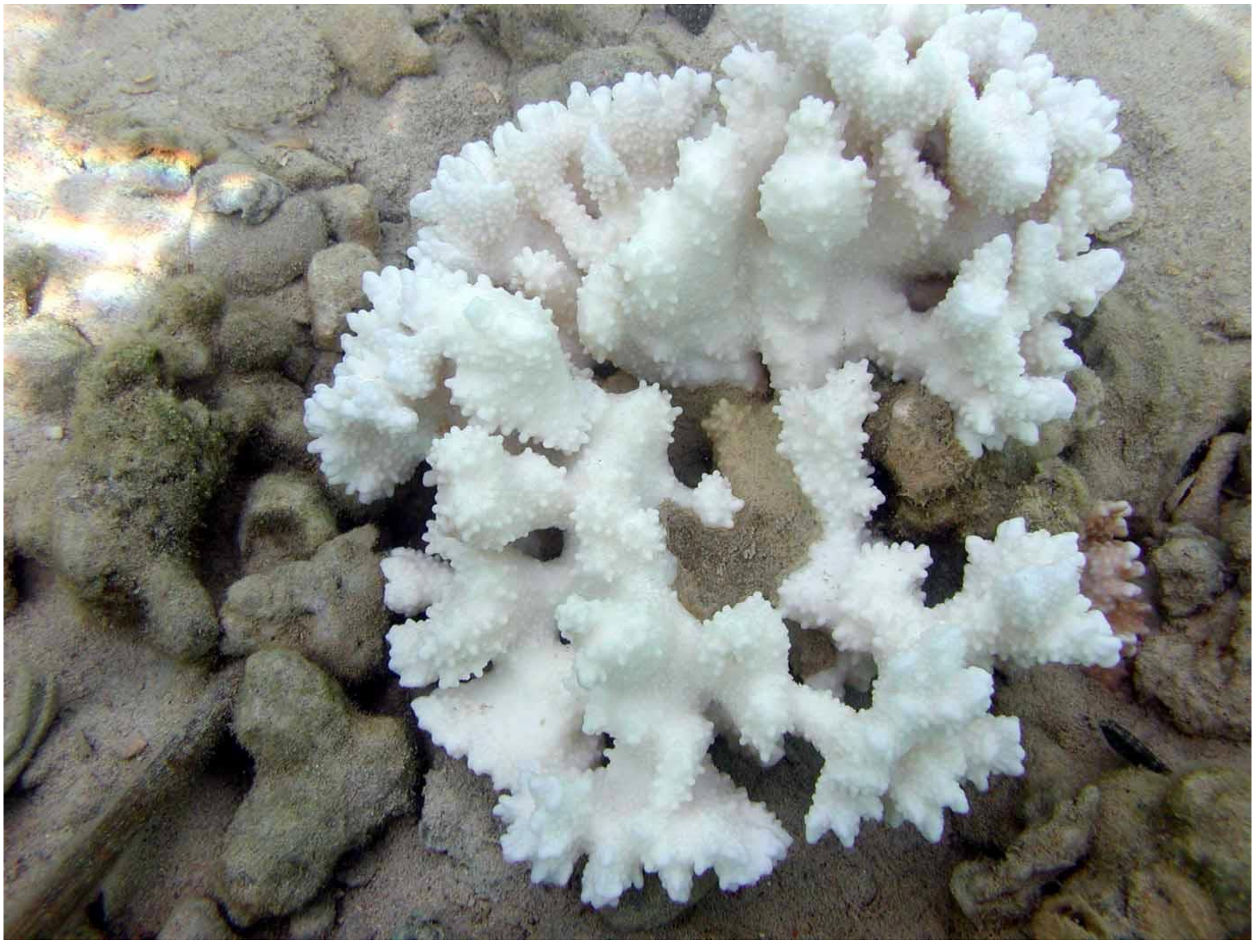


Figure 1. Primary forcing functions driving reef fish biomass, abundance and diversity and coral cover and richness in the main Hawaiian Islands. These top variables are most influential to fish and coral populations. Influential factors negatively correlated with fish or coral parameters are colored red. For example, the higher the organics or human population, the lower the fish and coral assemblages.

These influential factors can be less significant when stochastic events occur. Hurricanes have been documented as a major influence on coral reef communities (Heron et al., 2008). Hurricanes can have devastating effects (mechanical breakage, sedimentation, nutrification) but have also been documented to ameliorate coral bleaching (Manzello et al., 2007). Hurricanes absorb energy from the surface and reduce temperatures through evaporative cooling. They can cause upwelling by bringing deeper, cooler waters to shallower depths and a reduction in irradiance levels through cloud shading can decrease temperatures. However, in shallow waters, hurricanes can destroy corals through wave damage and cause mortality of recruits through sand scour. As the frequency and intensity of climate impacts accelerate, Hawai‘i is experiencing more severe and intense storms, hurricanes, and flood events. For example, bleaching events were unknown to science until 1983. The first widespread coral bleaching event in the MHIs occurred in 1996 where although bleaching was extensive, mortality was low because temperatures quickly returned to normal. Then in 2004 and 2006 the corals in Papahānaumokuākea in the NWHI experienced major bleaching. Hawai‘i then escaped the major bleaching that was occurring in many regions worldwide that devastated many reefs for the next decade due to our geographic location and a downturn of temperature since 1998. It wasn’t until 2014 and 2015 that Hawai‘i experienced another widespread bleaching event where severe mortality occurred. The coral mortality was 50% on the Kona coast and nearly 35% statewide (Kramer et al. 2016). It had been predicted that a bleaching event would impact the Hawaiian Islands once every 25-30 years (Mora et al. 2014). More recent predictive modeling based on the National Oceanic and Atmospheric Administration (NOAA) Coral Watch data is forecasting 6-year intervals between widespread bleaching events (Eakin et al. 2019). The International Panel on Climate Change, a group of renown scientists from over 40 countries recently announced their predictions based on tens of thousands of scientific papers. Their prediction states that if drastic changes are not made within 11 years, 99% of the world’s coral reefs will be gone within a generation. Many fishes rely on coral reefs to survive. Coral reefs provide protection from predators and food for many species including obligate corallivores. The recovery process following these bleaching, hurricane, and flood events have been well documented. Successional patterns of recovery have been documented globally and in the Hawaiian Islands (Blumenstock et al. 1961, Ball et al. 1967, Perkins and Enos 1968, Stoddard 1969, Maragos et al. 1973, Grigg and Maragos 1974, Ogg and Koslow 1978, Woodley et al. 1981, Walsh 1983, Harmelin-Vivien and Laboute 1986, Done et al. 1991, Dollar and Tribble 1993, Skirving et al. 2019). The CIP and the Kahe Marine Monitoring Projects have provided the opportunity to follow coral recovery subsequent to Hurricanes Iwa and Iniki (Noda 1983, Brock 2019).



Field Picture 12. Bleached coral shows the white skeleton through the transparent tissues. A number of environmental stressors initiate bleaching. Continued stress will lead to death.

Hawaiian Electric's Biological Communities Monitoring Program
The consistent and continued monitoring of benthic and fish communities provides a comprehensive record of spatial and temporal change during the construction of the Kahe Generating Station. Compliance with the National Pollutant Discharge Elimination System (NPDES) permit to allow thermally elevated seawater discharge for cooling purposes has been strictly adhered to throughout the period of construction and operation. Well-designed benthic and fish surveys within the zone of mixing, adjacent areas, and comparable reference sites allow for comparisons over space and time. The sample size, frequency of monitoring, and duration of surveys makes this program one of the longest and most valuable records in the Hawaiian Islands.

Fish populations are highly variable, requiring numerous transects to quantify absolute values of fish communities. A large sample size is necessary due to the high variability among fish assemblages. Many rare, cryptic or mobile species can be under reported and the power to accurately detect absolute fish abundances can be extremely low. Variation in numbers can be attributed to differences in visibility and natural fluctuations that are typically observed in temporally spaced censuses of highly mobile reef organisms. Although fish populations vary considerably both spatially and temporally, statistical power increases over a time series as additional data are acquired, as with the CIP monitoring dataset. With five decades of survey data, the power to detect differences increased considerably. Data, surveyor, and methodological compatibility were maintained to assure statistical significance and quality assurance and control. In long-term monitoring programs such as this program, methodological consistency is crucial. Coral and fish survey procedures and data assessment have and continue to maintain this consistency annually using uniform methodology. The variation of long-term monitoring of fish surveys was determined through statistical analyses of prior surveys with current surveys between observers (Stender/Tsang). In addition, a surveyor with similar expertise as the original surveyor was selected to continue fish community assessments. To interpret any environmental changes observed, it is vital to have qualified expertise in each area of the marine field. Low surveyor variation in this long-term monitoring record of nearly half a century is imperative to maintain since annual variability can often obscure trends and patterns.

Field Picture 13. Surveyor calibration is important to remain consistent in fish counts and size estimates.

<u>Historical Surveys to Date</u>

KGS began operation in 1963. The later expansion of the KGS to include six generating units required an environmental impact statement (EIS) compiled by Sterns-Roger, Inc. in 1973. The EIS included prior baseline conditions from reports submitted by Marine Advisors (1964), B.K. Dynamics (1971), and URS Research Co. (1973). During the station expansion and relocation of the shoreline outfall to the present location offshore, numerous NPDES marine monitoring reports described the Kahe physical and biological environment (Coles and McCain, 1973; Coles and Fukuda, 1975, 1983, 1984; Environmental Department, 1976; McCain, 1977; Coles, 1979, 1980; Coles et al., 1981, 1982, 1985, 1986; Fukuda and Oda, 1987; Hawaiian Electric Environmental Department 1988-2019: 31 reports). Surveys detected a decline of 20% in the coral communities in proximity to the KGS outfall from 1973 to 1977 (Coles 1979). Once full

KGS operations commenced, an increase in coral settlement and growth was reported in proximity to the outfall. This led to the assumption that the construction of the outfall and not the plant operations was responsible for the coral mortality. Fish censusing showed no change as a result of construction or plant operation except on peripheral reefs northeast of the KGS outfall where the abundance and number of species declined once the outfall was operating. The number of shoreline intertidal species increased where affected by the thermal outfall (Coles et al. 1985). Fish surveys conducted since the initial offshore outfall operation in 1976, show fish displacement near the outfall (Coles 1979). The fish population decrease from 1976-1978 was minimal relative to the change following the 1980 Kona storm. Coles et al. (1981) found much greater declines in coral cover, fish populations, and sand redistribution attributed to the 1980 storm than in the seven years previous.

With the addition of the KGS' Unit 6 in 1981, the water flow needed for cooling was increased by 33% above the flow rates for Units 1-5. The rate of flow was subsequently 846 million gallons per day (mgd). The benthic thermal impingement was twice the area, but mainly limited to sand areas offshore. Coral cover and fish populations both declined from previous surveys likely due to the loss of habitat from the 1980 storm (Coles et al. 1982.)

The CIP Generating Station began construction in 2009. Prior to construction, surveys had been conducted in 2007 and 2008 (Brock 2019). Twelve to fifteen stations were surveyed in 2007 and sixteen stations in 2008. The KGS discharge pipe station was added by the third survey and analyzed separately based on the unusual fauna. The high spatial complexity of the artificial structure provided habitat and protection for an extensive and well-developed fish community. During the construction phase in 2009, three fish surveys were completed at all sixteen stations. Operation of the new plant began in 2010. Unlike the KGS, the CIP Generating Station has no direct input into the ocean since it is located well inland. Details of quarterly surveying from 2010 through 2018 can be found in Brock (2019). Environmental and meteorological shifts have been apparent since 2014. The most widespread coral bleaching event occurred in the Hawaiian Archipelago in 2014 and 2015. Simultaneously in 2015, an unprecedented fifteen major storms were recorded. Loss of reef structure from coral mortality following severe bleaching events are strongly correlated to fish community factors (Friedlander et al. 1998). Loss of reef structure can have devastating impacts on fish assemblages.

The increase in ocean temperatures is directly related to the increase in carbon emissions. However, other large-scale weather patterns and global phenomena also affect ocean temperatures. The Pacific Decadal Oscillation (PDO) has been described as a long-lived El Niño-like pattern of Pacific climate variability characterized by widespread variations in Pacific Basin and North American climate. During the past century, two major PDO eras have persisted for 20 to 30 years. Cool PDO regimes prevailed from 1890–1924 and again from 1947–1976, while warm PDO regimes occurred from 1977 through the mid-1990s. A downturn of warm seawater temperature off Hawaiʻi in 1975 and 1998 was experienced as the PDO reversed. The PDO experienced a temporary reprieve of slight cooling due to a downturn of temperature since 1998 at the end of the last cycle of the PDO. Nevertheless, as the bleaching threshold was approached in 1996, there was a reversal of the warming trend that can be attributed to the PDO. Because of the uncertainty of how the PDO works, it is not possible to predict with certainty what will occur. A decline in warming of Hawaiian waters marked the beginning of a 20 to 30 year-long cool phase. This cooling phase which may be currently switching to a warming phase in Hawaiian waters, only served to moderate the local warming trend during the first part of the PDO cool cycle but will accelerate warming as the cycle reverses. Temperatures have been steadily increasing over the past several decades and models predict even more severe bleaching events that are projected to increase in frequency and intensity in the coming decade with concomitant decline in Hawaiian corals. Modeling for Hawaiʻi predicts a statewide bleaching event every six years. Thus far, widespread bleaching events have occurred in 1996, 2006, 2015/16, and 2019. The shorter El Nino/La Nina cycles may have an additive or synchronous effect on ocean temperatures as warm water from the western Pacific moves east. The warm water replaces the cold water, warming the air above it and increasing the amount of air rising in the Intertropical Convergence Zone, intensifying cloudiness and rainfall. These weather phenomena increase ocean temperatures and increase storm activity.

Historical Impacts (Storms, Hurricanes Iwa & Iniki)
The monitoring program at Kahe encompasses stochastic storm events (January 1980, November 1982, September 1992, November 2003) and two major hurricanes (Iwa 1982 and Iniki 1992). The major storm in 1980 had a large impact on the shallow benthic coral community due to wave energy of up to 6 m released at shallower depths. Coral cover declined by nearly 19% following this major storm event (Coles and Fukuda 1984). This was attributed to extensive sand scour and deposition resulting in a coral community compositional shift.

Hurricane Iwa, two years later in 1982, had the opposite effect where sand attenuation occurred revealing substrate previously buried by up to five feet of sand. This hurricane with maximum wave heights of 9 m (Noda 1983) destroyed offshore reefs deeper than 6 m, while sparing coral communities closer to shore (Coles et al. 1985). Subsequent surveys in 1983 validated the observations made shortly after the hurricane. Significant declines of coral, algae, and fishes occurred in regions where hurricane force waves were greatest (Coles et al. 1985). Coral cover offshore from the Kahe facility declined 5.4% in addition to the previous declines of 18.7% attributed to the 1980 storm.

The impact waves have on a reef depends on complex interactions between wave direction, topographical relief, and substrate bathymetry (Dollar and Tribble 1993; Storlazzi et al. 2002, 2005). A wave shadow is created in the lee of the islands, blocking waves that can ameliorate the influence of these waves on reefs (Storlazzi et al. 2005). For example, waves are lessened during north Pacific swells on the south shore of Molokaʻi due to island blockage although refraction does occur on the extreme ends of the coast. In contrast, the west side of Oʻahu, where Kahe is located, is vulnerable to waves and refraction from all directions because it does not fall under this wave shadow. Wave direction can be a strong influence on the level of impact occurring during a storm (Table 1).

Table 1. Waves influencing the main Hawaiian Islands (Jokiel 2008).

	Typical			Extreme				
	Height		Period	Height		Period	Direction	
Wave Type	**(m)**	**(ft)**	**(s)**	**(m)**	**(ft)**	**(s)**	**Mean**	**Range**
NE Trade wind waves	1.2-3.7	4-12	5-8	4.0-5.5	13-18	9-12	NE 45°	0-90°
North Pacific swell	2.4-4.6	8-15	10-17	4.9-7.6	16-25	18-25	NW 315°	282-45°
Southern swell	0.3-1.2	1-4	12-17	1.5-3.1	5-10	14-25	SSW 190°	236-147°
Kona storm waves	0.9-1.5	3-5	8-10	1.8-3.1	6-10	11-14	SW 210°	258-247°

m=meters, ft=feet, s=seconds

Northeast Trade wind waves: Typical trade winds weaken at night and gradually increase throughout the morning with wind speeds at the maximum in the afternoon. This is related to an increase in wind-driven waves. Offshore waves break and dissipate along the north and east shores of all islands. Islands act as a barrier to surface winds but increase in velocity as they funnel through breaks between islands producing sizable wave chop in channels with distinct boundaries. The November 2003 storm was an extremely destructive northeast wave event due to wave heights well above normal. Damage at Pilaʻa on the north coast of Kauaʻi resulted in a 43% reduction in coral cover with extensive fragmentation. Similar reductions were reported on the northeast facing shore of Oʻahu at Wawamalu near Sandy Beach (Jokiel and Brown 2004).

North Pacific Swells are generated in the North Pacific by winter storms. These can result in breaking inshore waves of over 15 m. This wave energy limits the coral development on north shores of islands where species of high skeletal strength and encrusting or lobate morphologies exist (Storlazzi et al. 2005, Rodgers et al. 2003).

Southern Swell is generated by winter storms in the Antarctic typically reaching the Hawaiian Islands a week following generation, during the Summer and early Fall. These storms weaken due to the spread of energy. This is the reason summer south swells do not typically reach the heights of winter north swells.

Kona Storm Waves can occur anytime of the year, but commonly develop from October through April. Waves are generated by southerly or southwesterly winds that precede cold north winds. Three-meter wave heights can be generated under extreme conditions. The Kona coast of the island of Hawaiʻi experienced 6 m waves that reduced coral cover from 46% to10% following a Kona storm in 1980 (Dollar and Tribble 1993).

Hurricane Waves are less frequent and highly unpredictable. To date hurricanes have followed trajectories that have led to direct reef impact on the islands of Kauaʻi and Oʻahu and less of an effect on the other islands (Schroeder 1998). Central Pacific hurricanes typically originate near Central America or southern Mexico. As they move towards Hawaiʻi over cooler water they lose energy or encounter atmospheric conditions unfavorable to further development. Hawaiʻi's hurricane season is from June through November. Hurricane Iniki (1992) generated powerful waves that fragmented and abraded corals on south Kaua‘i. Terrestrial objects swept onto the reefs added to the damage. However, re-colonization and recovery of corals occurred rapidly and within a decade, many reefs had returned to their prior condition. Hurricane Iniki also had an impact in Kona, Hawai‘i with declines in coral cover from 15% to 11% (Dollar and Tribble 1993) and Mamala Bay on O‘ahu (Brock 1996) with loss of rugosity and shelter for fishes. Storms and hurricanes have been documented to negatively impact fish communities in west O‘ahu (Brock CIP reports) and elsewhere in Hawai‘i (Walsh 1983). The Kahe dataset is important in separating these stochastic events from other environmental and anthropogenic factors.

METHODOLOGY

Survey Stations

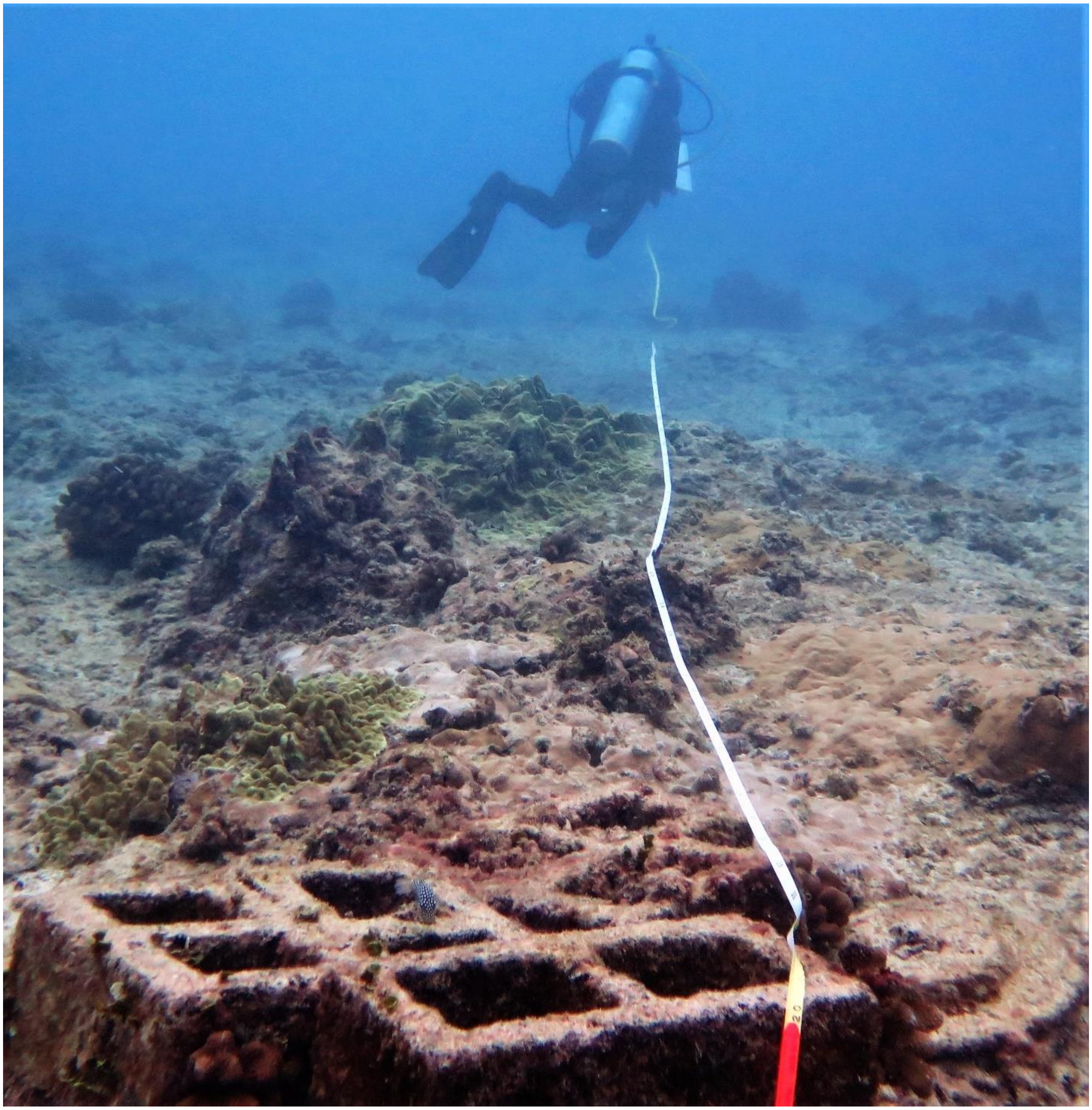
Eight stations were established in the 1970s prior to construction of the CIP Generating Station and an additional eight stations were added in 2008 prior to the preconstruction monitoring surveys. These stations were established to assess the fish communities in proximity to the CIP and Kahe Generating Stations at Kalaeloa and Kahe (Figure 5). Four stations are near the CIP Generating Station at 7-10 m depths and seven stations are adjacent to the Kahe Generating Station with one monitoring station along the KGS pipeline (5 m -12 m depths). Between these two sets, two stations are located northwest of the Ko ‘Olina and Barber’s Point Harbors between the 1st and 3rd Ko‘Olina lagoons at 7 m and 9 m depths. A reference site outside the KGS zone of mixing was established at Nanakuli (Coles et al. 1985). These two monitoring stations act as a control to assess any changes in fish structure at the other stations.

Sixteen survey stations located along the west coast of O‘ahu from Kalaeloa to Nanakuli have been surveyed quarterly since 2008 by a single surveyor (Figure 5). Subsequent to the departure of the original surveyor in 2019, survey stations were reduced to 14 with the removal of stations East 2 (2) and Kahe 7D (11) and to twelve stations in 2021 (7C and 10C). This was based on an analysis of historical data to determine proximity and site similarities. Elimination criteria included close proximity and similar habitat to other stations, similar fish composition and comparability. Mean standing crop (biomass), mean number of fishes (abundance), and mean fish species within site groups show within group similarity for each of the four sets of groups (Ko‘Olina, CIP, Nanakuli, and Kahe). These spatial similarities by location were the initial foundation for separation and removal of the stations.

Survey Methodology

Transect locations were originally stratified by location, proximity to the Kahe and CIP Generating Stations, and hard bottom habitat. The general station location is determined through a Global Positioning System (GPS) navigation to within several meters. A marker float is deployed to account for drift during anchoring of the vessel. On the substrate, exact start location has been marked with either a cinder block, a prominent geologic feature, or surface triangulations. The bearing direction of the transect was predetermined and followed throughout the entire program.

A modified visual transect (line/belt/strip) (Brock 1954) (species abundance methodology) is employed to quantify fish communities. The fish surveyor spools out the 164 ft (50 m) transect line while recording, species, size (total length [TL] in centimeters [cm]) and the number of individual fishes to 7 ft. (2 m) on each side of the transect line 13 ft. (4 m total width). This eliminates changes in fish behavior and allows fishes to equilibrate from previous activity in contrast to laying a transect prior to the survey. All transects are parallel to shore with the exception of the Kahe discharge pipe that runs perpendicular to the shoreline and is only 34 ft. (10.5 m) in length. The surveyor records on a slate, equipped with underwater writing paper, fish species, size in cm, and number of individuals with the use of self-contained underwater breathing apparatus (SCUBA). All fishes within the linear 239 yards^2 (200 m^2) transect from the benthos to the surface are recorded.



Field Picture 14. The start location at each station is marked for ease of relocation and comparison between years with either cinder blocks as shown here, a prominent geologic feature, surface triangulations and GPS points. The bearing direction of the transects from the start was predetermined by the original surveyor (R. Brock) and has been continued throughout the program. Blocks provide fish habitat and shelter (note small fish on block).

Biomass estimates are derived through total length estimated to the nearest cm in the field and converted to biomass estimates (tons/hectare) using length-weight fitting parameters. In estimating fish biomass from underwater length observations, most fitting parameters are obtained from the Hawaiʻi Cooperative Fishery Research Unit (HCFRU) consistent with previous analyses. Additionally, locally unavailable fitting parameters are obtained from Fishbase (www.fishbase.org) whose length-weight relationship is derived from over 1,000 references. Congeners of similar shape within certain genera are used in those rare cases lacking information. Conversions between recorded TL and other length types (e.g. fork length [FL]) contained in databases involve the use of linear regressions and ratios from Fishbase linking length types. The three commonly used measures of fishes are standard length (excludes the caudal fin), total length (from tip of snout to tail tip), and fork length (from tip of snout to deepest notch of the tailfin). A predictive linear regression of logM vs. logL is used in most cases to estimate the fitting parameters of the length-weight relationship. Visual length estimates are converted to weight using the formula $M = a \times L^b$ where M = mass in grams, L = standard length in millimeters (mm) and a and b are fitting parameters. Any anomalous values are detected by calculating a rough estimate for a given body type. The general trend for a 10 cm fish of the common fusiform shape should be approximately 10 g. Any gross deviations are replaced with values from the alternate source.

Trophic levels for fish species have historically been based on reports (Brock 2019). These trophic categories include: herbivores, planktivores, omnivores and carnivores. Herbivorous fishes diet consists primarily of algae, planktivores feed in the water column on detritus and zooplankton, omnivores are described as fishes feeding on a combination of algae and small benthic invertebrates and include corallivores that feed exclusively on corals, and carnivores that eat fish and invertebrates according to Brock (2019). Brock based these functional groups on Hiatt and Strasburg (1960), Hobson (1974), Brock et al. (1979) and Randall (2007). To update the trophic categories and for comparability with other sites throughout the State of Hawaiʻi, these categories have been adapted to reflect the trophic levels described in Friedlander et al. (2017). This data is a compilation of over 25 datasets containing greater than 25,000 surveys collected between 2000 and 2018. The Hawaiʻi Monitoring and Reporting Collaborative (HIMARC) is a consortium of managers and researchers throughout the Hawaiian Islands that collectively contribute monitoring and assessment data to the largest searchable database for fishes in Hawaiʻi. Trophic categories include herbivores, invertebrate feeders, zooplanktivores, and piscivores. These categories are similar to the functional groups used by Brock (2019).

Target fish species were selected to include popular food fishes to determine changes in fishing pressure. The genera selected were Acanthus, Aphareus, Cephalopholis, Caranx, Scarus, Chlorurus, Seriola, Sargocentron, Priacanthus, Kyphosus, Mullodicthys, Parupeneus and Decapterus.

Statistical Methods

Comparative analysis of mean number of fish species documented per transect, mean number of individual fish censused per transect, and mean estimated standing crop (g/m^2) were performed between 2020 and 2021 data to detect any significant differences which may have developed over the year, using an Independent-sample Mann-Whitney U test. The non-parametric Kruskal-Wallis ANOVA with pairwise comparisons was utilized to detect significant difference between all transects and groupings surveyed in 2021. Transects were grouped according to geographic locations (Table 2) into 5 total groups: East group (East 1, East 3, East 4), Koʻolina group (KO 1 and KO 2), Kahe group (1D, 5B, 7B, 7E), Nanakuli group (NANA 1 and NANA 2) and Pipe.

These groupings differ from Brock (2019) to make groupings more consistent with location of transect. The 2018 data from Brock's appendix was re-grouped and descriptive statistics were performed with new group assignments to compare to recent data. Each transect was surveyed four times throughout the year. The four timepoints for the surveys were not found to be statistically different, and therefore time points were pooled within transects and groups for analyses.

Table 2. Latitude and longitude of twelve permanently marked fish monitoring stations surveyed quarterly in this study in 2021.

Station No.	Station Area Name	Grouping	Latitude	Longitude	Remarks
1	East 1	East	21º18.237' N	158º07.024'W	offshore CIP
3	East 3	East	21º18.558'N	158º07.239'W	offshore CIP
4	East 4	East	21 º 18.406'N	158º07.285'W	offshore CIP
5	Ko'Olina 1	Ko'Olina	21º19.724'N	158º07.581'W	offshore Ko'Olina
6	Ko'Olina 2	Ko'Olina	21º19.904'N	158º07.693'W	offshore Ko'Olina
7	Station 1D	Kahe	21º20.763'N	158º07.773'W	Old Hawaiian Electric station
8	Station 5B	Kahe	21º21.145'N	158º07.819'W	Old Hawaiian Electric station
9	Station7B	Kahe	21º21.239'N	158º07.855'W	Old Hawaiian Electric station
12	Station 7E	Kahe	21º21.272'N	158º07.977'W	Old Hawaiian Electric station
14	Nanakuli Control 1	Nanakuli	21º22.329'N	158º08.440'W	Old Hawaiian Electric station
15	Nanakuli Control 2	Nanakuli	21º22.353'N	158º08.462'W	control station
16	Kahe Outfall	Pipe	21º21.193'N	158º07.869'W	north side of outfall

RESULTS AND DISCUSSION

The 2021 data are presented herein along with a comparative analysis to the 2020 data. The complete data set from the four 2021 surveys is given in Appendices A and B.

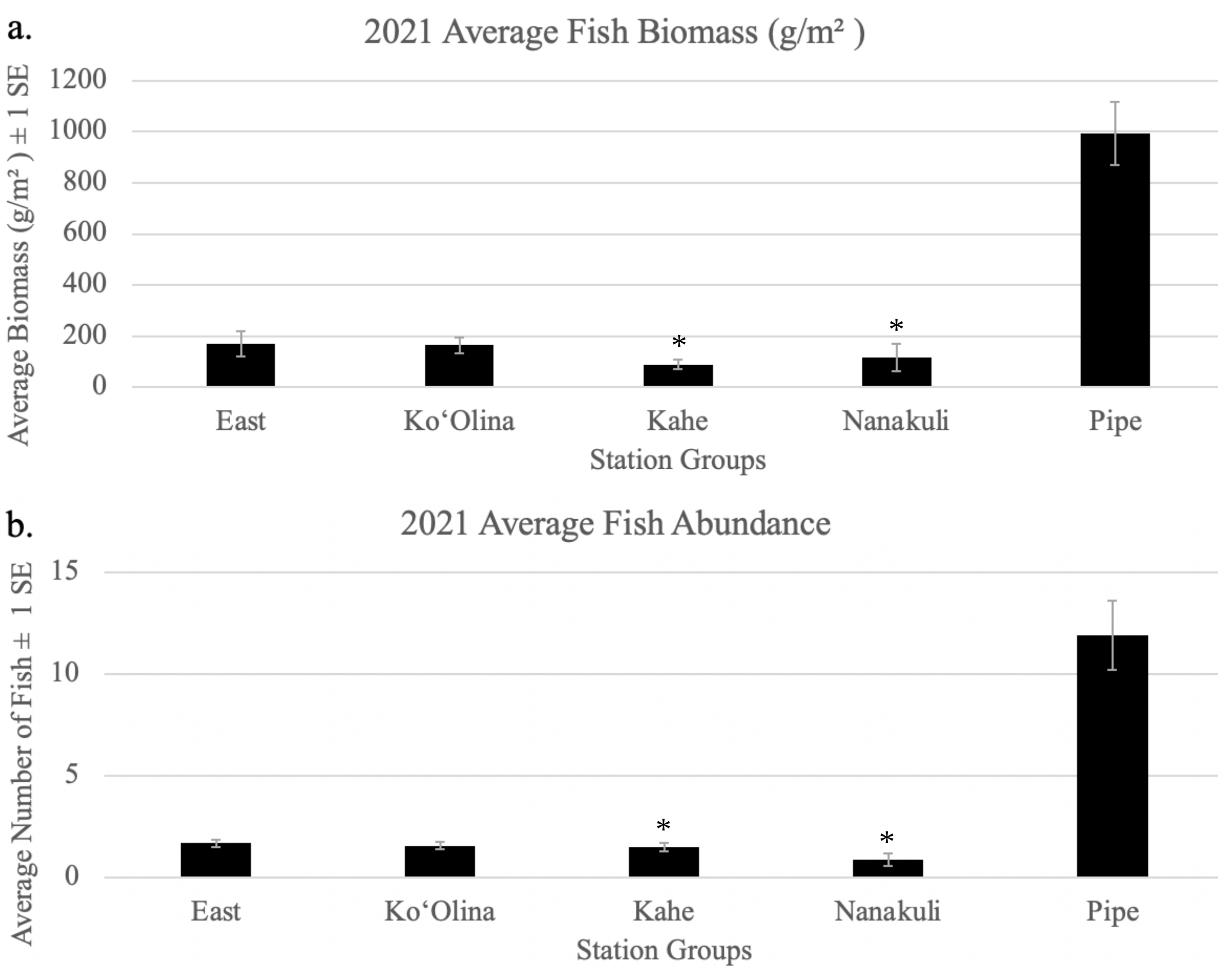
Transect surveys were performed on June 10, July 27, September 9, and November 22, 2021. The number of fish species, number of fish individuals, and biomass did not differ significantly between survey dates and therefore the four survey dates were pooled for analysis.

OVERALL

Utilizing data from all 55 surveys performed from 2007 to present (Appendix A, 2007-2018 performed by Brock, 2019-2021 by Rodgers), the number of fish species, the number of fish individuals and the biomass was compared between groups of transects: East (3 transects), Ko'Olina (2 transects), Kahe (4 transects), Nanakuli (2 transects), and Pipe (1 transect). The number of individuals and biomass of fishes differed significantly between groups Pipe and Nanakuli (p = 0.001 and p = 0.01 respectively) and Pipe and Kahe (p = 0.031 and p = 0.004 respectively), all other groups number of individual fishes and biomass of fishes were similar throughout time (Figures 2 & 3, Table 3). The greatest number of fish individuals and biomass was observed at Pipe, followed by East, Ko'Olina, Kahe, and Nanakuli. When comparing the number of fish species along transects throughout all survey years, Pipe differed significantly from East (p = 0.045), Kahe (p = 0.014), and Nanakuli (p = 0.002). Number of fish species present along transects was greatest at Pipe, followed by Ko'Olina, East, Kahe, and Nanakuli. In summary, Pipe transect had significanlty higher numbers of species, individual fishes and biomass when compared to Kahe and Nanakuli, and significantly higher number of species only when compared to East.

A total of 101 different fish species were recorded in 2021 surveys combining all 12 transects. The number of species present in 2020 surveys was 118. *Mā'i'i'i* (17.7% individuals, 5.1% biomass, *A. nigrofuscus*, brown surgeonfish,) is the dominant fish recorded along transects for number (abundance) in 2021. The biomass was dominated by several fishes, the three highest in biomass were *ta'ape* (8.4%, *L. kasmira*, bluestripe snapper), and *na'ena'e* (7.6%, *A. olivaceus*, orangeband surgeonfish), and *humuhumu'ele'ele* (7.3%, *Melicthys niger*, black durgon). In 2020, *mā'i'i'i* (19.5%, *A. nigrofuscus*, brown surgeonfish) was also the most abundant fish along transects. The biomass in 2020 was a composition of many fish species: *mā'i'i'i* (9.3%, *A. nigrofuscus*, brown surgeonfish), *ta'ape* (9.2%, *L. kasmira*, bluestripe snapper), and *na'ena'e* (8.8%, *A. olivaceus*, orangeband surgeonfish). Although the most dominant fish contributing to biomass differ between years, the two secondmost contributors remain the same, *ta'ape* and *na'ena'e*. In 2021 and 2020 the majority of individual fishes along transects were herbivores (2021: 34% abundance, 49% biomass; 2020: 45% abundance, 60% biomass) or invertebrate feeders (2021: 38% abundance, 30% biomass; 2020: 38% abundance, 30% biomass)(Figure 4). However, zooplanktivores (2021: 28% abundance, 20% biomass; 2020: 15% abundance, 8.7% biomass) and piscivores (2021: 0.9% abundance, 0.9% biomass; 2020: 0.8% abundance, 1.3% biomass) were also present. The abundance and biomass of zooplanktivores increased from 2020 to 2021, although not significantly. This could be in response to a slight increase in abundance and biomass of zooplanktivores like *mamo* (*A. vaigiensis*, Indo-Pacific sergeant) and blackfin

chromis (*C. vanderbilti*). To determine if there were any statistically significant differences among the mean number of fish species per transect, the mean number of individual fish per transect or the mean estimated biomass (g/m^2) per transect over time, transects were merged into geographic groups (East, Ko‘Olina, Pipe, Kahe, Nanakuli) and pooled over survey dates at each geographic location (four surveys). The twelve sites (Figure 5) were assigned to five geographic locations: (1) East: East 1, East 3, East 4, (2) Ko‘Olina : KO 1 and KO 2, (3) Kahe: 1D, 5B, 7B, 7E, (4) Nanakuli: NANA 1 and NANA 2, and (5) Pipe.



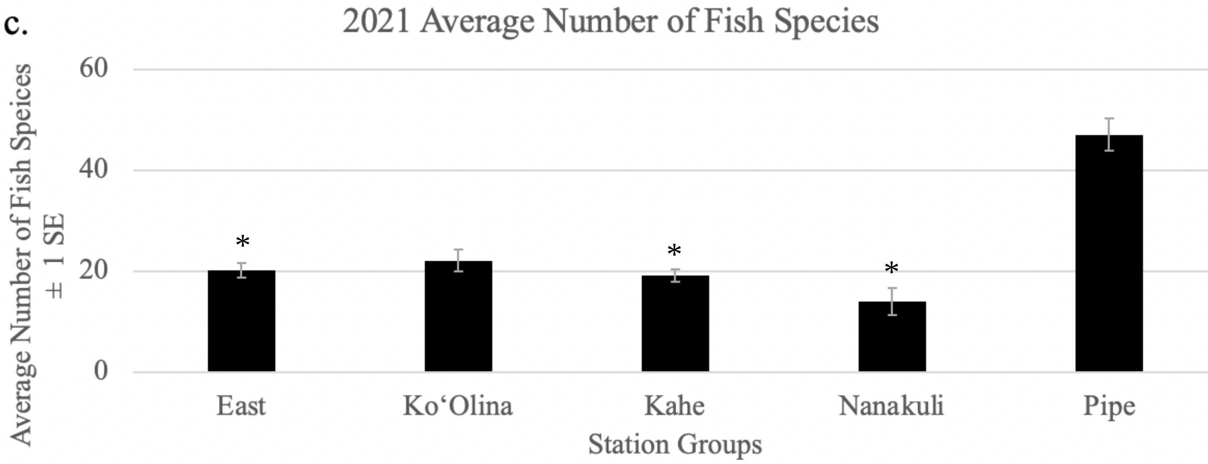


Figure 2. Average fish biomass (a), abundance (b) and number of species (c) per station grouping for 2021 surveys only. Standard error (SE) bars represent ± 1 SE. Asterisks (*) represent a significant difference from the Pipe transect.

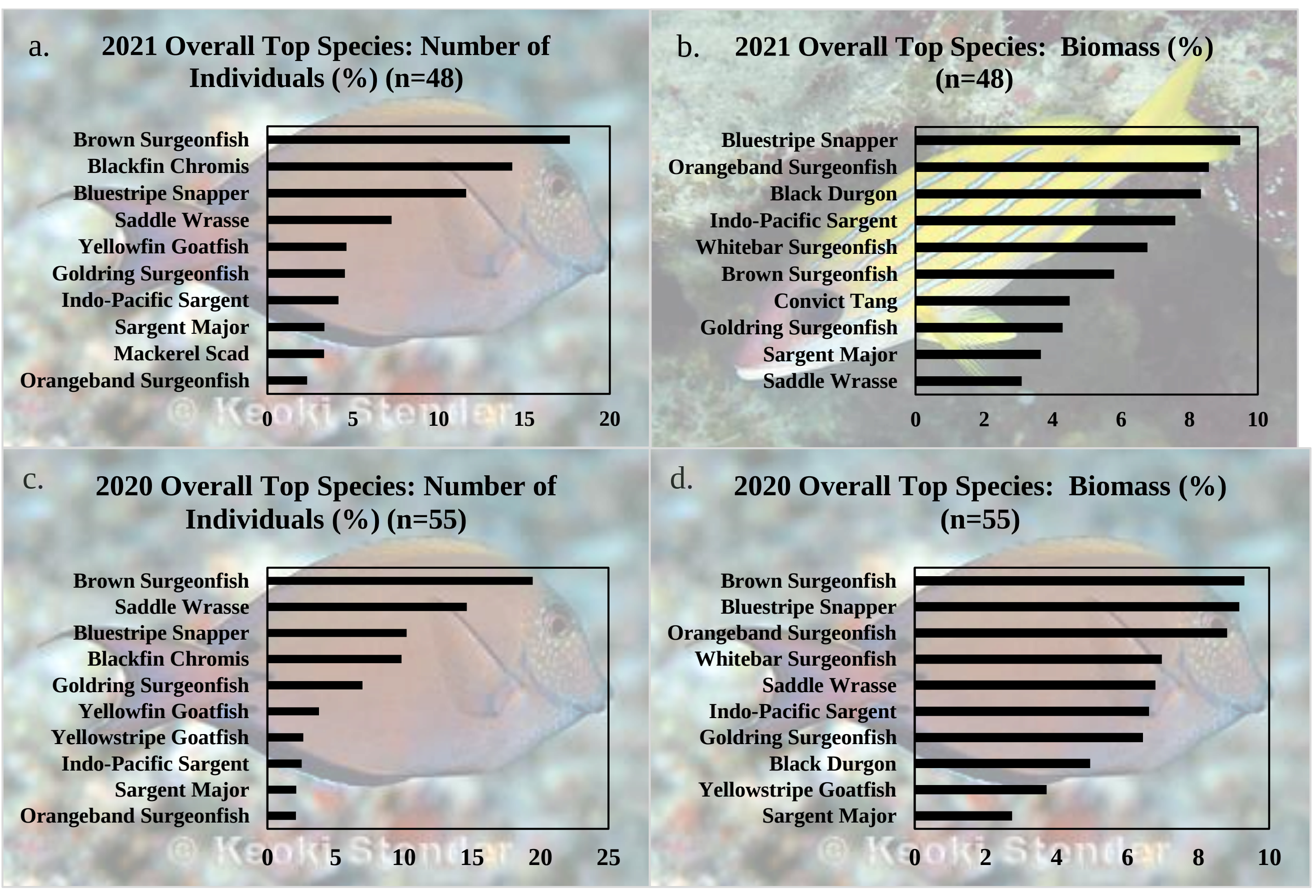


Figure 3. Top ten fish species contributing to number of individual fishes and biomass (%) for survey year 2021 (a, b) and 2020 (c, d).

Table 3. (A) Mean proportion of fish individuals and (B) biomass contributing to each trophic feeding level in 2020 and 2021. (C) Mean proportion of fish individuals and (D) biomass in each trophic level in Brock's 2019 report standardized to new trophic categories (see methods).

A. 2021 Trophic Levels: Number of Individuals (%)

Transect Group	Herbivores	Invertebrate Feeders	Piscivores	Zooplanktivores
East	40.2	20.0	0.9	38.9
Ko'Olina	65.1	30.7	0.8	3.4
Kahe	36.1	25.4	1.7	36.8
Nanakuli	66.7	18.6	1.6	13.2
Pipe	16.8	57.4	0.3	25.6
Total	33.9	37.5	0.9	27.7

B. 2021 Trophic Levels: Mean Biomass (%)

Transect Group	Herbivores	Invertebrate Feeders	Piscivores	Zooplanktivores
East	70.1	13.1	2.1	14.7
Ko'Olina	82.4	16.5	0.0	1.1
Kahe	49.3	25.8	2.0	22.8
Nanakuli	88.8	11.0	0.1	0.1
Pipe	18.0	50.1	0.4	31.4
Total	49.2	30.4	0.9	19.5

C. 2020 Trophic Levels: Number of Individuals (%)

Transect Group	Herbivores	Invertebrate Feeders	Piscivores	Zooplanktivores
East	46.7	29.6	1.3	22.4
Ko'Olina	66.3	31.3	0.5	1.9
Kahe	39.8	37.0	0.6	22.5
Nanakuli	61.1	28.0	1.2	9.7
Pipe	13.1	65.3	0.6	21.1
Total	45.4	38.2	0.8	15.5

D. 2020 Trophic Levels: Mean Biomass (%)

Transect Group	Herbivores	Invertebrate Feeders	Piscivores	Zooplanktivores
East	74.0	21.1	3.8	1.1
Ko'Olina	73.7	25.5	0.5	0.2
Kahe	50.7	33.9	0.8	14.6
Nanakuli	85.0	13.9	1.0	0.2
Pipe	16.2	55.7	0.6	27.5
Total	59.9	30.0	1.3	8.7

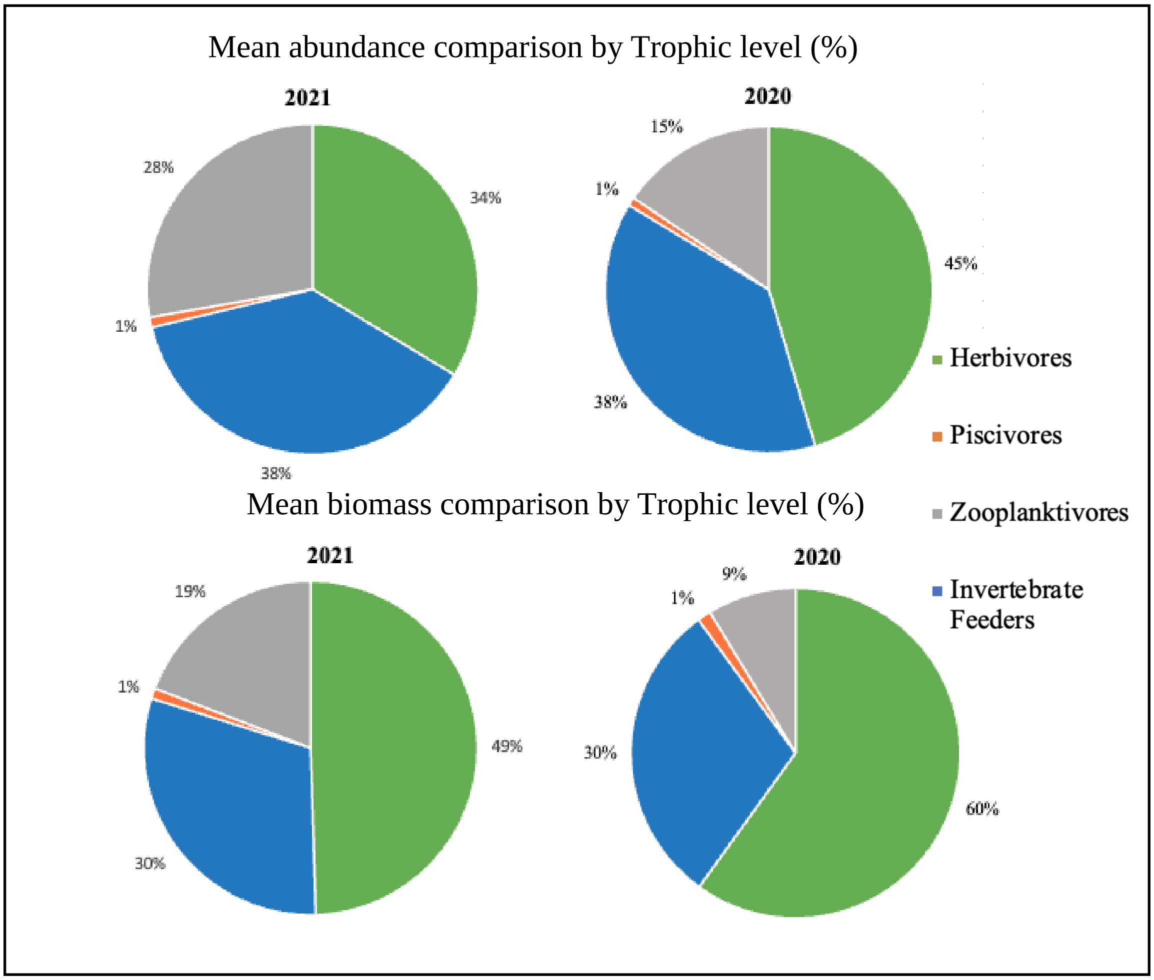


Figure 4. Mean abundance and biomass of each trophic level during 2021 and 2020 surveys.

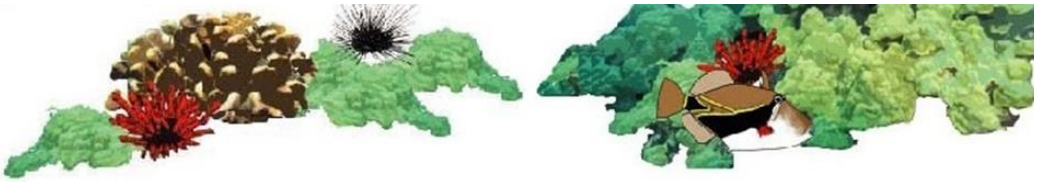
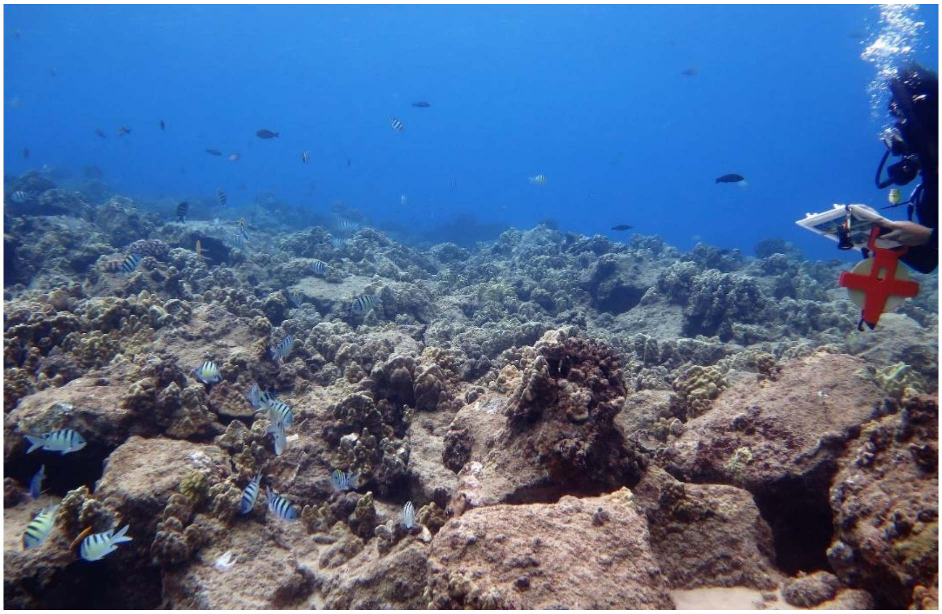
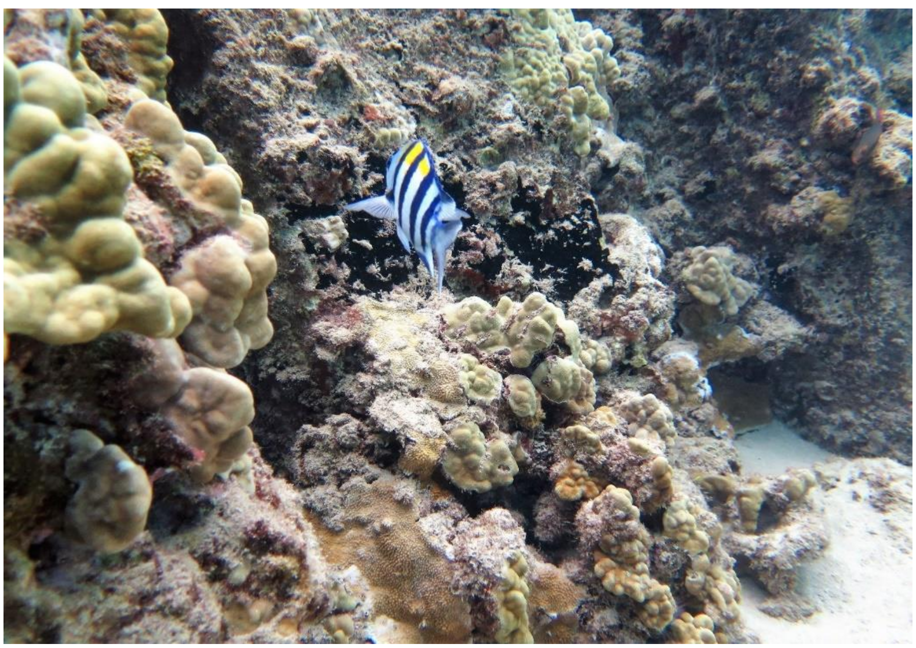


Figure 5. Map showing the southwest coastline of O‘ahu from Kalaeloa (Barbers Point) to Nanakuli Beach Park depicting locations of each of the twelve permanently marked stations monitored in this study.



Field Picture 15. Mamo (also known as maomao or mamao), the endemic Hawaiian Sergeant are found only in Hawai‘i. Large schools can be found on reef outcrops and ledges exposed to current. They can frequently be seen feeding in the water column on zooplankton. Breeding males appear deeper blue with yellow replacing some of the black bars (November 2021).



Field Picture 16. The common introduced Indo-Pacific Sergeant (*Abudefduf vaigiensis*) was first reported in waters surrounding Maui and O‘ahu in 1991. It has quickly spread throughout all the Hawaiian Islands. It is reported that juveniles first entered among marine debris. The bright yellow streak above, distinguish *A. vaigiensis* from the endemic Hawaiian Sergeant (mamo, or maomao). Hybrids of the two species are now quite common.

KALAELOA (Barber's Point, EAST)

In 2020 through 2021, transects East 1, East, 3 and East 4 were surveyed within the East transect grouping. In 2021, East 1 transect had the highest estimated standing crop of all East transects with 223.2 ± 80.3 g/m^2 (grams per square meter) (Figure 6). East 4 had the lowest biomass in 2021(85.6 ± 17.5 g/m^2). East 3 had intermediate biomass with 201.0 ± 128.1 g/m^2. East group had significantly greater mean biomass estimates (p = 0.037, 2021 = 169.9 ± 49.4 g/m^2, 2020 = 42.9 ± 5.4 g/m^2), and similar fish abundance (2021 = 1.7 ± 0.2 individuals/m^2, 2020 = 0.75 ± 0.12 individuals/m^2) and number of fish species (2021 = 20.2 ± 1.4, 2020 = 19.0 ± 2.1) present in the 2021 surveys when compared to the 2020 surveys. The biomass of fishes at East 1 and East 3 were significantly higher in 2021 when compared to 2020, there was no difference in fish abundance or number of fish speices. Consistent with 2020 surveys, fish abundance at all East transects was dominated by the Blackfin Chromis (*Chromis vanderbilti*), *manini* (*Acanthurus triostegus,* Convict tang), and *māʻiʻi* (*A. nigrofuscus,* Brown surgeonfish). Unlike the previous year, the biomass was dominated by *kala lōlō* (*Naso brevirostris*, Paletail Unicornfish) and *māikoiko* (*Acanthurus leucopareius*, whitebar surgeonfish). However, in both 2021 and 2020, the biomass at East transects were also dominated by *manini* and *na'ena'e* (*A. olivaceus*, orange band surgeonfish) (Figure 7).

Field Picture 17. Abundant manini and pualu at Kalealoa (East Stations).

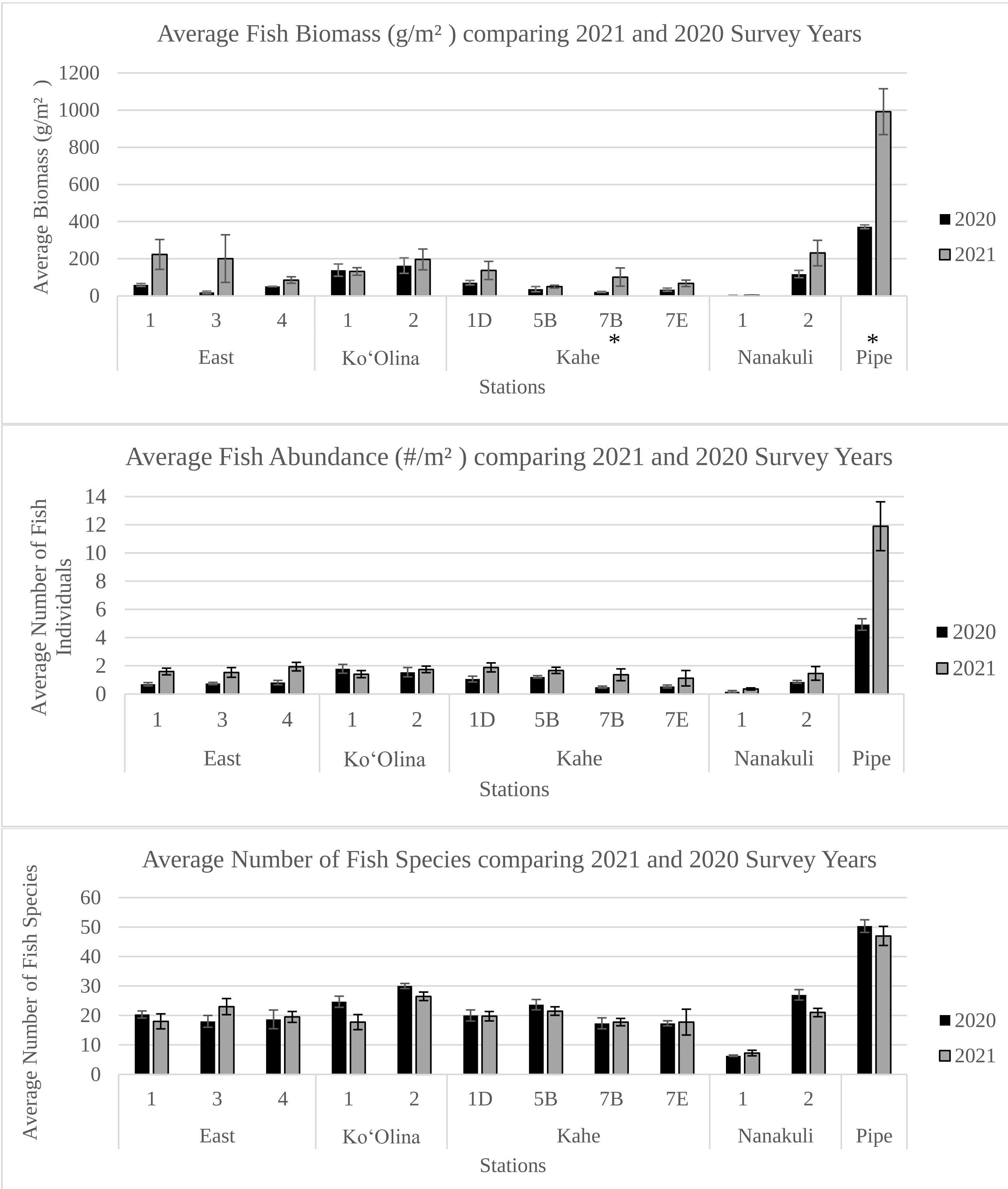


Figure 6. Average fish biomass (a), fish abundance (b) and number of fish species (c) per transect comparing survey years 2021 and 2020. Standard error (SE) bars represent ± 1 SE. An asterisk (*) after the station name indicates a significant difference between the two survey years.

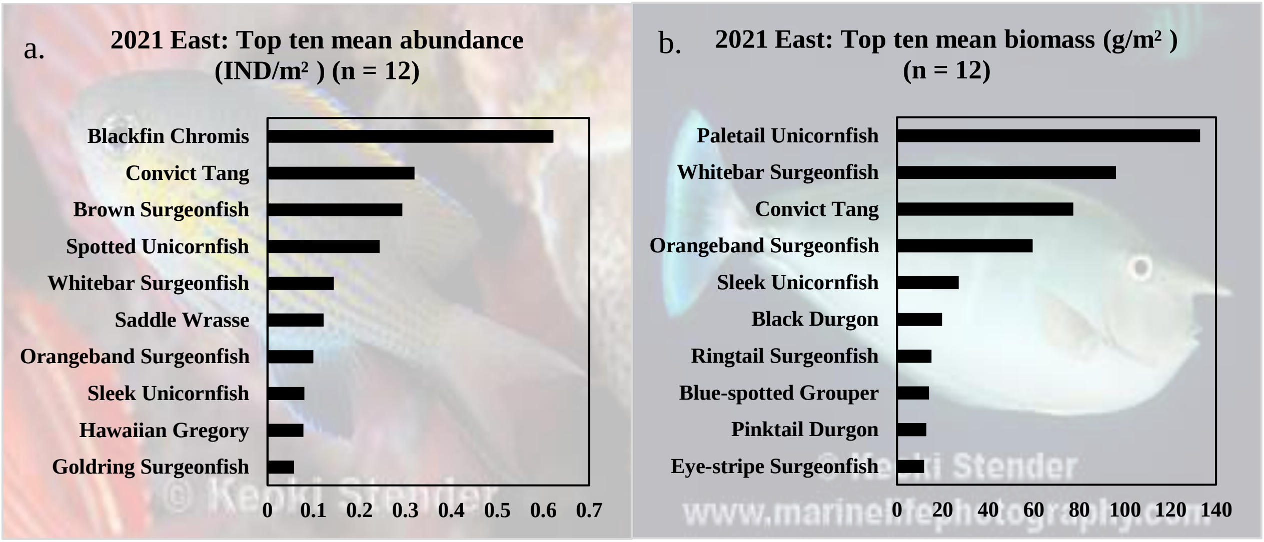


Figure 7. Top ten fishes contributing to mean abundance and biomass at East grouping in 2021. IND/m^2=individuals per square meter, g/m^2=grams per square meter.

Kalaeloa East 1: In 2020, East 1 transect had an average of 199.8 ± 29.7 fish individuals documented, encompassing a total of 30 species of fishes. The blackfin chromis (32.6% ± 6.8%, *C. vanderbilti*). *manini* (20.4% ± 0.1%, *Acanthurus triostegus*, convict tang), and *māʻi'i'i* (12.6% ± 1.3%, *A. nigrofuscus*, brown surgeonfish) were the most abundant fishes along this transect. The dominant fish species in biomass for all timepoints were *manini* (37.7% ± 7.2%, *A. triostegus*, convict tang) and *naʻenaʻe* (32.5% ± 4.5%, *A. olivaceus*, orangeband surgeonfish).

Field Picture 18. The ʻāweoweo and ʻuʻu as seen here are seasonally common in dark holes, emerging at night to feed. Bigeyes as adults are rarely seen for several years until schools of juveniles appear by summer and disappear gradually over time. The last mass recruitment of ʻāweoweo occurred in 2003 with the population center in Papahānaumokuākea (Northwestern Hawaiian Islands).

Kalaeloa East 3: The average number of fishes along transect East 3 was 191.5 ± 43.0 individuals of 41 fish species (Figure 6). Along East 3, *māʻi'i'i* (33.3% ± 5.1%, *A. nigrofuscus*, brown surgeonfish) was the most consistantly abundant fish for all survey timepoints (Appendix A). In June, the survey documented 318 fishes of 30 species. This was the greatest species diversity of all timepoints in the East group. Juneʻs survey also had the highest biomass of all timepoints; the three fishes responsible for the majority of the biomass (576.4 g/m^2) during Juneʻs survey were the *kala lōlō* (45.3%, *N. brevirostris*, paletail unicornfish), *māikoiko* (16.7%, *A. leucopareius*, whitebar surgeonfish), and the *naʻenaʻe* (12.7%, *A. olivaceus*, orangeband surgeonfish). In July, 142 individuals of 17 fish species were identified along transect East 3. The fishes contributing the most to biomass (47.5 g/m^2) were *humuhumuhiʻukole* (62.1%, *Melichthys vidua*, pinktail durgon), and *māʻiʻiʻi* (11.1%, *A. nigrofuscus*, brown surgeonfish). The census in September had the lowest biomass (28.0 g/m^2) of all four timepoints (172 individuals). During this survey, 21 fish species were observed; *humuhumulei* (38.5%, *Sufflamen bursa*, lei triggerfish) and *mā'i'i'i* (23.5%, *A. nigrofuscus*, brown surgeonfish) encompassed a large portion of the biomass. In November, 24 species of fishes were identified within 134 individuals. Biomass (152.1 g/m^2) in November was dominated by *na'ena'e* (33.9%, *A. olivaceus*, orangeband surgeonfish) and the invasive blue-spotted grouper (15.5%, *Cephalopholis argus*).

Field Picture 19. The Long-nose Butterflyfish, lauwiliwilinukunuku'oi'oi that feeds on tiny crustaceans is commonly found among Surgeonfishes (manini, pualu, palani, and na'ena'e) as pictured here (Kalealoa, November 2021).

Kalaeloa East 4: The number of fish species (19.5 ± 1.8), number of fish (243 ± 37.8) present along transects at each survey date, and biomass (85.6 ± 17.5 g/m^2) of East 4 remained consistent throughout the four timepoints in 2021. In June, 172 individuals of 21 species were recorded along East 4 transects. The biomass (42.1 g/m^2) was the lowest of all timepoints and was made up of 36.4% *humuhumuhi'ukole* (*M. vidua*, pinktail durgon), 22.8% *humuhumunukunukuapua'a* (*Rhinecanthus rectangulus*, reef triggerfish), and 18.5% *na'ena'e* (*A. olivaceus*, orangeband surgeonfish). The July census observed a biomass of 72.6 g/m^2

encompassing 21 species of fishes, with 246 individual fishes. The biomass continued to be dominated by *humuhumuhiʻukole* (38.1%, *M. vidua*, pinktail durgon) and *na'ena'e* (21.3%, *A. olivaceus*, orangeband surgeonfish). In September (113.8 g/m^2, 207 individuals, 14 species) the biomass was predominantly dominated by *humuhumuʻeleʻele* (64%, *Melichthys niger*, black durgon), with *humuhumumimi* (10.4%, *Sufflamen fraenatus*, brindled triggerfish) and *naʻenaʻe* (*A. olivaceus*, orangeband surgeonfish) also contributing to biomass. The large school of *humuhumuʻeleʻele* greatly impacted the biomass during this timepoint, although this timepoint had the second higest biomass, it had less individual fishes and the lowest species diversity of all timepoints. November's census had the greatest biomass, number of individuals, and number of species of all timpoints (114.0 g/m^2, 347 individuals, 22 species). The biomass was dominated by *na'ena'e* (31.7%, *A. olivaceus*, orangeband surgeonfish), the invasive blue-spotted grouper (13.1%, *C. argus*), *humuhumuʻeleʻele* (12.5%, *M. niger*, black durgon), and *humuhumuhi'ukole* (12.4%, *Melichthys vidua*, pinktail durgon).

Field Picture 20. The spatial complexity at Kalaeloa includes coral colonies, holes, crevices, overhangs, and caves that have been shown to harbor large fish populations.

KO ‘OLINA

The Ko‘Olina group includes transects KO 1 and KO 2. Average biomass and number of fish species for the Ko‘Olina group were similiar in 2021 (164.1 ± 30.2 g/m^2, 22.1 ± 2.1 species) when compared to 2020 (140 ± 25.0 g/m^2, 27.1 ± 1.6 species)(Figure 6). The number of fish individuals was significantly less in 2021, when compared to 2020 (p = 0.038, 2021: 218.5 ± 28.9 individuals, 2020: 365 ± 64.3 individuals). Overall, surveys in 2021 showed smaller numbers of larger fish of less diversity when compared to 2020. In Ko‘Olina group, the most abundant fishes were *mā‘i'i'i* (19%, *A. nigrofuscus*, brown surgeonfish) and *kole* (16%, *C. strigosus*, goldring surgeonfish) (Figure 8). *Humuhumu‘el‘ele* (19%, *M. niger*, black durgon), *kole* (14%, *C. strigosus*, goldring surgeonfish), and *na'ena'e* (13%, *A. olivaceus*, orangeband surgeonfish) were responsible for the majority of the biomass (Figure 8).

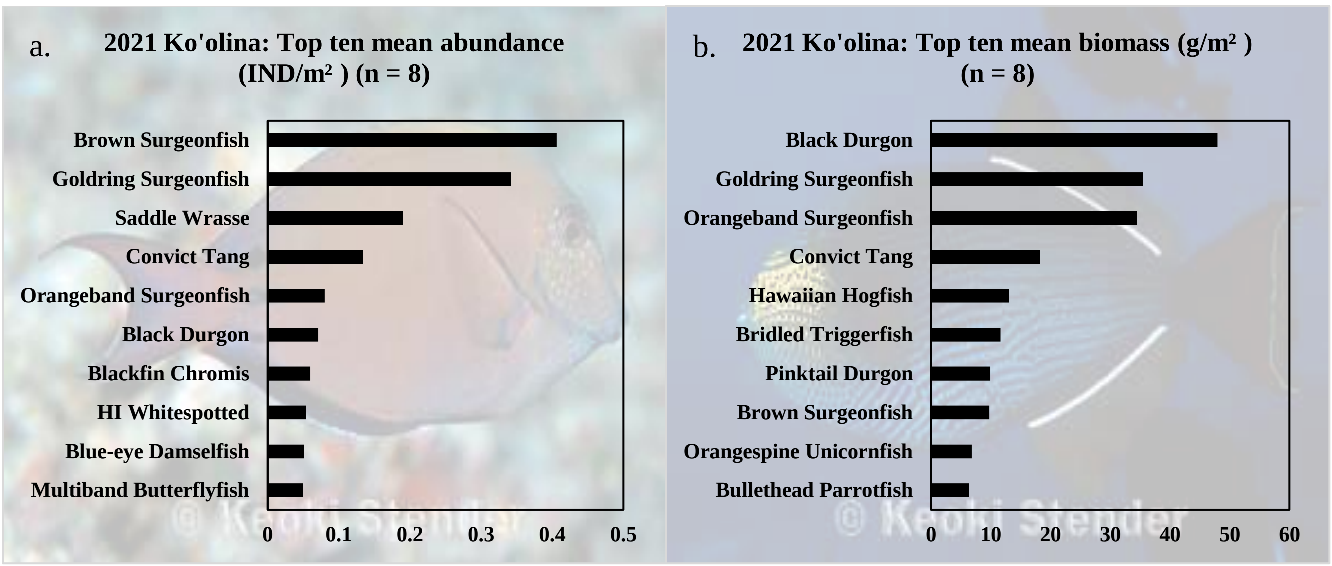


Figure 8. Top ten fish contributing to mean abundance and biomass at Ko‘Olina transect grouping in 2021.

Ko ‘Olina 1: In 2021, KO 1 transect varied in fish biomass over the four survey dates: June = 170.5 g/m2, July = 112.2 g/m2, September = 84.4 g/m2, and November = 160.0 g/m2. Despite this fluctuation, the fish species contributing the majority of the biomass remained similar. Collectively, humuhumu‘ele‘ele (June: 37.2%, July: 65.9%, September: 28.6%, November: 24.7%, M. niger, black durgon) and kole (June: 25.5%, July: 19.3%, September: 27.0%, November: 35.6%, C. strigosus, goldring surgeonfish) were two of the dominant biomass contributors. The September census also found mā‘i‘i‘i (20.1%, A. nigrofuscus, brown surgeonfish) and hīnālea lauwili (11.1%, Thalassoma duperrey, saddle wrasse) to contribute a large portion of the biomass. Species contribution to biomass showed the similar patterns for numbers of individuals along KO 1, however, the number of individuals varied between time points (June: 240 individuals (inds.), July: 122 inds., September: 221 inds., November: 123 inds.). The greatest number of species was recorded during the November survey (23) followed by June (21), September (15), and July (12).

Ko ‘Olina 2: KO 2 transect in June had the highest number of individual fishes (273 individuals) of all timepoints, and an intermediate biomass (139.5 g/m^2)(23 species)(Appendix A). The biomass was dominated by three species: *kole* (23.3%, *C. strigosus,* goldring surgeonfish), *humuhumu‘ele‘ele* (20.5%, *M. niger*, black durgon), and *humuhumuhi‘ukole* (11.7%, *M. vidua*, pinktail durgon). July’s survey had the highest biomass (361.1 g/m^2), with intermediate number of fishes (250 individuals) and intermediate number of species (26 species). The biomass was dominated by four species of fishes: *na’ena’e* (33.4%, *A. olivaceus*, orangeband surgeonfish), *manini* (18.6%, *A. Triostegus*, convict tang), *humuhumu‘el‘ele* (17.5%, *M. niger*, black durgon), and *kole* (10.6%, *C. strigosus*, goldring surgeonfish). In September and November, the biomass was dominated by *humuhumu‘ele‘ele* (Sept: 30.5%, Nov: 27.6%, *M. niger*, black durgon) and *kole* (Sept: 27.6%, Nov: 21.0%, *C. strigosus*, goldring surgeonfish) exclusively.
The biomass (Sept: 114.6 g/m^2, Nov: 170.4 g/m^2) and number of individuals per transect (Sept: 210 indv., Nov: 140 indv.) was intermediate to low, yet the species diversity was the highest of all timepoints (Sept: 30 species, Nov: 27 species). Similar to 2020, the species highest in abundance during 2021 KO 2 surveys were *mā‘i'i'i* (19%, *A. nigrofuscus*, brown surgeonfish), *kole* (16%, *C. strigosus*, goldring surgeonfish), and *hīnālea lauwili* (9%, *T. duperrey*, saddle wrasse).

Field Picture 21. The Hawaiian Whitespotted Toby is endemic to Hawai‘i and not found elsewhere in the world. Common at all depths, this pufferfish feeds mainly on small invertebrates and limu.

KAHE

The Kahe group encompasses four transects: 1D, 5B, 7B, and 7E. Based on comparability of biomass (mean standing crop) of fishes, abundance (mean number of individual fish), mean number of fish species, similarity of habitat, and spatial proximity, Kahe 7D transect was eliminated from surveys after 2018, and subsequently Kahe 7C and 10C were eliminated after the 2020 surveys, therefore they have been removed from group averages. At Kahe stations estimated biomass in 2020 was 41.3 ± 5.4 g/m^2, while in 2021 estimated biomass was 89.1 ± 18.2 g/m^2 (Figure 6). This was a significant increase in fish biomass in 2021 when compared to 2020 (p = 0.008). The average abundance of fishes in 2021 (1.5 ± 0.2) and 2020 (0.76 ± 0.09) were not significantly different from one another. The average number of species was similar for the two years (2021: 19.8 ± 1.6, 2020: 19 ± 2.0). In 2020, *mā'i'i'i* (*A. nigrofuscus*, brown surgeonfish) dominated in both abundance and biomass. This differed from 2021 surveys where blackfin chromis (*C. vanderbilti*) and *mā'i'i'i* dominated the abundance, and *opelu* (*Decapterus macarellus*, mackerel scad) and *humuhumu'el'ele* (*M. niger*, black durgon) dominated biomass (Figure 9).

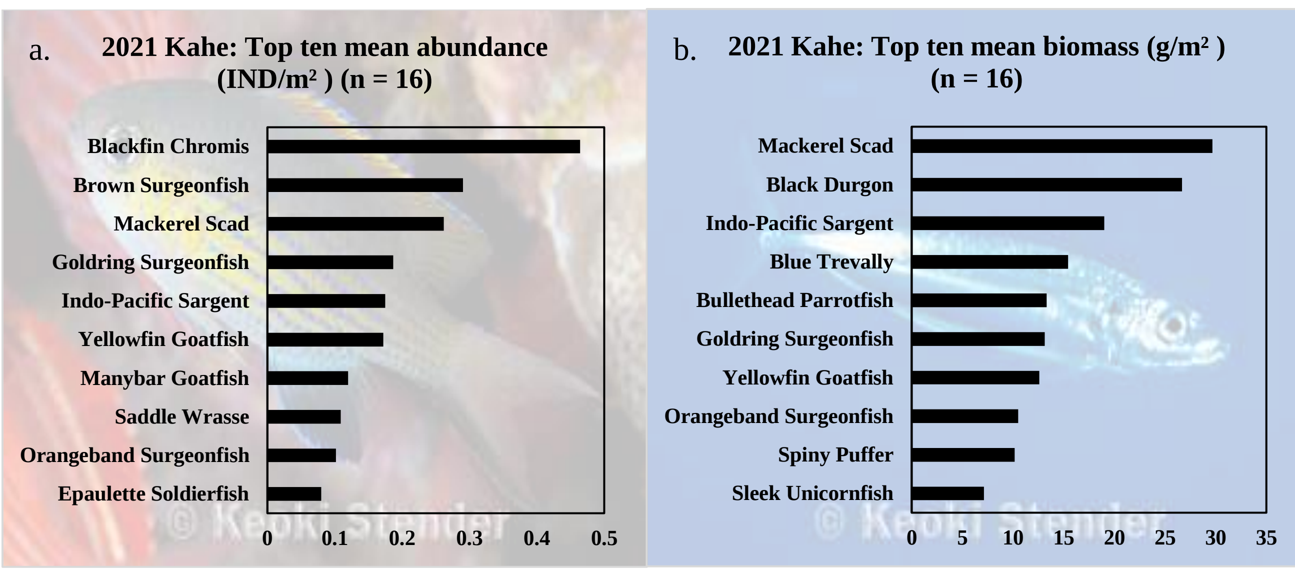


Figure 9. Top ten fish contributing to mean abundance and biomass at Kahe transect grouping in 2021 surveys.

Kahe 1D: Kahe station 1D had the highest average biomass, number of individuals in 2021 when compared to other Kahe transects (June: 141.2g/m^2, 338 individuals, 21 species, July.: 65 g/m^2, 155 individuals, 15 species, September: 68.3 g/m^2, 258 individuals, 22 species, November: 273.8 g/m^2, 193 individuals, 21 species. It was also highly variable in number of species and biomass between the four timepoints. In June, the biomass was dominated by four species: *humuhumu'ele'ele* (27.6%, *M. niger*, black durgon), *kole* (20.7%, *C. strigosus*, goldring surgeonfish), *weke'ula* (16.3%, *M. vanicolensis*, yellowfin goatfish), and *mā'i'i'i* (10.8%, *A. nigrofuscus*, brown surgeonfish). Similarly, in July, *kole* (38.2%, *C. strigosus*, goldring surgeonfish), *humuhumu'ele'ele* (24.6%, *M. niger*, black durgon), and *mā'i'i'i* (17.0%, *A. nigrofuscus*, brown surgeonfish) dominated the biomass. In September, *na'ena'e* (26.9%, *A.*

olivaceus, orangeband surgeonfish) was the most dominant fish species, followed by *māʻi'i'i* (21.6%, *A. nigrofuscus*, brown surgeonfish), *hīnālea lauwili* (13.4%, *T. duperrey*, saddle wrasse), and *kole* (10.8%, *C. strigosus*, goldring surgeonfish). In November, the biomass was dominated by four species: *humuhumuʻeleʻele* (30.6%, *M. niger*, black durgon), *uhu* (16.2%, *Chlorurus sordidus*, bullethead parrotfish), *kole* (15.5%, *C. strigosus*, goldring surgeonfish), and *na'ena'e* (12.0%, *A. olivaceus*, orangeband surgeonfish). The fishes that contributed most to fish abundance was, *māʻi'i'i* (*A. nigrofuscus*, brown surgeonfish), *kole* (*C. strigosus*, goldring surgeonfish), *hīnālea lauwili* (*T. duperrey*, saddle wrasse), and *na'ena'e* (*A. olivaceus*, orangeband surgeonfish).

Kahe 5B: 5B transect remained realitively stable throughout all four quarterly surveys: June: 69.4 g/m^2, 260 individuals, 21 species, July: 32.9 g/m^2, 131 individuals, 18 species, September: 45.3 g/m^2, 227 individuals, 25 species, November: 51.9 g/m^2, 221 individuals, 22 species. In June, a large school of *mamo* (*Abudefduf vaigiensis*, Indo-Pacific Sergeant) comprised 64.4% of the biomass. This was not seen in any other quarterly survey, and is the reason why June's survey was greatest in number of individuals and biomass when compared to all other timepoints. *Māʻiʻiʻi* (*A. nigrofuscus*, brown surgeonfish) was the top contributer to biomass in July (24.8%), September (25.5%), and November (26.0%,). In July, *munu* (20.3%, *Parupeneus bifasciatus*, doublebar goatfish), *na'ena'e* (10.9%, *A. olivaceus*, orangeband surgeonfish), *humuhumulei* (10.3%, *S. bursa*, lei triggerfish), and *hīnālea lauwili* (10.0%, *T. duperrey*, saddle wrasse) were also significant contributors to fish biomass. In September, other fishes contributing significantly to biomass include *hīnālea lauwili* (19.0%, *T. duperrey*, saddle wrasse) and *na'ena'e* (14.8%, *A. olivaceus*, orangeband surgeonfish). Similar to 2020, in 2021, the three most abundant fishes along all survey dates were blackfin chromis (*C. vanderbilti*), *māʻiʻiʻi* (*A. nigrofuscus*, brown surgeonfish), and *hīnālea lauwili* (*T. duperrey*, saddle wrasse). Chromis are small schooling fishes that can contribute strongly to abundance (number of individuals) but make very little contribution to biomass.

Kahe 7B: In 2021 surveys, 7B transect saw an increased trend in estimated biomass, individual fish counts, and number of species present for all four quarterly surveys: June: 36.2 g/m^2, 68 individuals, 14 species, July: 40.0 g/m^2, 97 individuals, 19 species, September: 245.0 g/m^2, 287 individuals, 19 species, November: 85.4 g/m^2, 230 individuals, 19 species. During the June survey, the biomass was dominated by five fish speicies: *naʻenaʻe* (27.0%, *A. olivaceus*, orangeband surgeonfish), *munu* (17.2%, *Parupeneus bifasciatus*, doublebar goatfish), *humuhumulei* (14.3%, *S. bursa*, lei triggerfish), *kala lolo* (11.4%, *Naso hexicanthus*, sleek unicornfish), and *hīnālea lauwili* (10.1%, *T. duperrey*, saddle wrasse). In July, the composition of key contributors to biomass consisted of *humuhumulei* (25.5%, *S. bursa*, lei triggerfish), *opelu* (15.2%, *D. macarellus*, mackerel scad), *manini* (14.7%, *A. triostegus*, convict tang), and *humuhumuhiʻukole* (10.5%, *M. vidua*, pinktail durgon). The biomass in September's survey was skewed by a large school of *opelu* (*D. macarellus*, mackerel scad) comprising 82.9% of total biomass along the transect. November's survey biomass was dominated by five speices of fishes: *umaumalei* (16.7%, *Naso lituratus*, orangespine unicornfish), *humuhumulei* (15.8%, *S. bursa*, lei triggerfish), *humuhumuhiʻukole* (13.8%, *M. vidua*, pinktail durgon), *hīnālea lauwili* (12.1%, *T. duperrey*, saddle wrasse), and *mamo* (10.2%, *A. vaigiensis*, Indo-Pacific Sergeant).

The two most abundant fish species within all quarterly surveys at 7B in years 2019, 2020, and 2021, excluding the large school of *opelu* (*D. macarellus*, mackerel scad), were the blackfin chromis (*C. vanderbilti*) and *māʻi'i'i* (*A. nigrofuscus*, brown surgeonfish).

Kahe 7E: Kahe 7E was highly variable in fish biomass and number of individuals throughout the four surveys, this trend was similar to 2020's surveys. July had the second highest biomass and total number of fishes (90.8 g/m^2, 107 individuals, 20 species) present along transects when compared to other survey dates and the biomass was dominated by four speices of fishes: *humuhumu'ele'ele* (19.9%, *M. niger*, black durgon), *omilu* (17.0%, *Caranx melampygus*, blue trevally, *manini* (13.1%, *A. triostegus*, convict tang) and *opelu* (11.9%, *D. macarellus*, mackerel scad). The biomass in July (20.4 g/m^2, 38 individuals, 5 species) was the lowest of all four surveys (September: 64.0 g/m^2, 68 individuals, 25 species; November: 96.1 g/m^2, 340 individuals, 21 species). In July, with only five fish species recorded, *humuhumuuhi'ukole* (*M. vidua*, pinktail durgon) made up 45.6% of the biomass, followed by *humuhumulei* (32.4%, *S. bursa*, lei triggerfish), and *umaumalei* (20.7%, *N. lituratus*, orangspine unicornfish). Both September and November's biomass was dominated by *na'ena'e* (September: 30.5%, November: 24.4%, *A. olivaceus*, orangeband surgeonfish) and *humuhumulei* (September: 10.6%, November: 18.5%, *S. bursa*, lei triggerfish). *Manini* (11.5%, *A. triostegus*, convict tang) was also a large contributor to biomass in September, while in November three additional species of fishes contributed significantly to biomass: *humuhumuhi'ukole* (10.6%, *M. vidua*, pinktail durgon), *'o'opu okala* (10.6%, *Diodon holocanthus*, spiny puffer), and *kala lolo* (10.5%, *N. hexacanthus*, sleek unicornfish). Overall, the Blackfin Chromis (*C. vanderbiliti*) was the most abundance species along 7E transect.

Field Picture 22. Survey divers record all fishes within a 16 ft. (5 m) by 164 ft. (50 m) swath that extend to the water column. Surveys are conducted four times throughout the year at the same place and approximately the same time of day. This provides a representative sampling of the abundance and biomass of fishes (November 2021).

NANAKULI (Control Stations)

Two fish transects are included in the Nanakuli group: NANA 1 and NANA 2. These survey sites are the control stations for all other stations for this project. No significant differences were found in biomass, abundance, or number of species between 2021 and 2020. The biomass at Nanakuli stations in 2021 (117.2 ± 53.4 g/m^2) and 2020 (52.0 ± 21.0 g/m^2) were within the range of variability. The average abundance of fishes (2021: 0.9 ± 0.3, 2020: 0.48 ± .14), and average number of species also remained similar (2021: 14.1 ± 2.7, 2020: 16.1 ± 3.8) (Figure 6). Similar to that of 2020 surveys, the most abundant fishes at Nanakuli group in 2021 were *mā'i'i'i* (*A. nigrofuscus*, brown surgeonfish) and *māikoiko (A. leucopareius*, whitebar surgeonfish)(Figure 10), while *māikoiko (A. leucopareius*, whitebar surgeonfish) alone dominated the biomass (Figure 10).

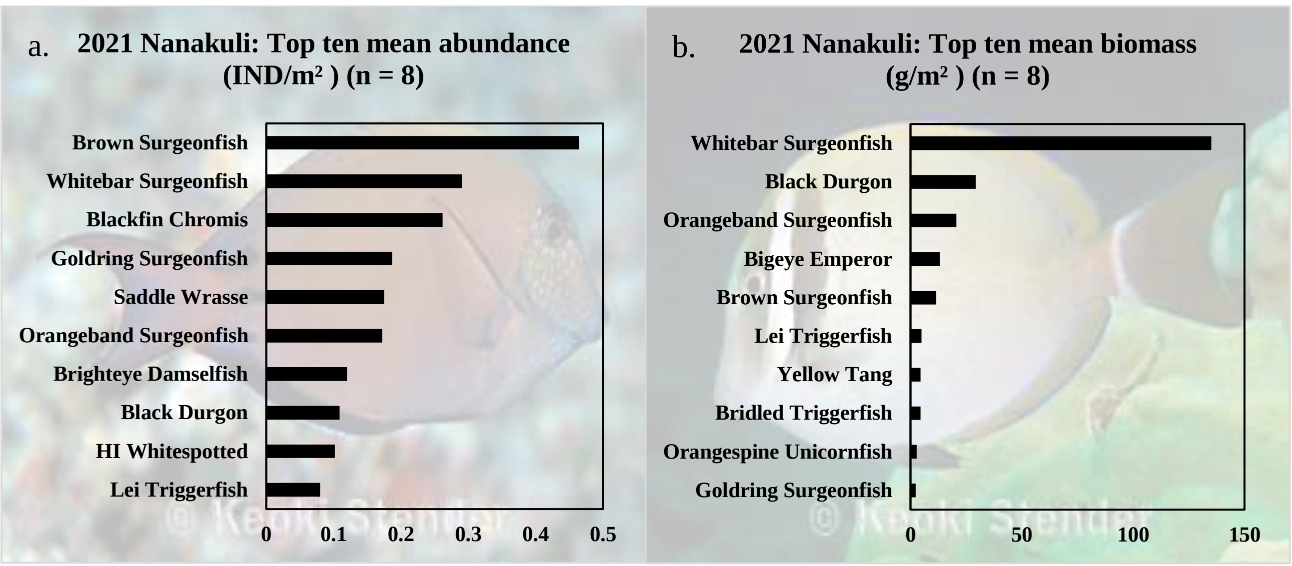


Figure 10. Top ten fishes contributing to mean abundance and biomass at Nanakuli transect grouping in 2021 surveys.

NANA 1: Biomass, abundance, and number of species was lowest at NANA 1 transect when compared to all other transects surveyed but was not signifiacntly lower than surveys in 2020. During the June survey at NANA 1 (0.3 g/m^2, 48 individuals, 6 species), several species dominated the biomass: brighteye damselfish (28.3%, *Plectroglyphidodon imparipennis*), *hīnālea lauwili* (26.9%, *T. duperrey*, saddlewrasse), and blackfin chromis (25.3%, *C. vanderbilti*). In July, biomass (3.8 g/m^2, 21 individuals, 7 species) was composed of *humuhumunukunukuapua'a* (45.1%, *Rhinecanthus rectangulus*, reef triggerfish), *āwela* (29.0%, *Thalassoma trilobatum*, Christmas wrasse) and *manini* (17.4%, *A. triostegus*, convict tang). Similarly, *humuhumunukunukuapua'a* (55.2%, *R. rectangulus*, reef triggerfish) and *hīnālea lauwili* (11.3%, *T. duperrey*, saddle wrasse) dominated the biomass in September surveys (2.3 g/m^2, 67 individuals, 6 species). November had the highest biomass (7.9 g/m^2, 44 individuals, 10 species) of all quarterly surveys, which was dominated by *munu* (33.3%, *P. bifasciatus*, doublebar goatfish), *humuhumunukunukuapua'a* (28.3%, *R. rectangulus*, reef triggerfish), and āwela (18.3%, *T. trilobatum*, Christmas wrasse). The blackfin chromis (*C. vanderbilti*), bright-

eye damselfish (*P. imparipennis*), and *hīnālea lauwili* (*T. duperrey*, saddlewrasse) were the most common fishes along transects for all timepoints.

NANA 2: Despite their geographic similarity, the Nana 2 transect is consistently greater in all fish community factors (June: 278.1 g/m^2, 116 individuals, 21 species, July: 153.4 g/m^2, 364 individuals, 23 species, September: 88.6 g/m^2, 111 individuals, 17 species, November: 399.8 g/m^2, 141 individuals, 23 species. NANA 2 transect did not differ in fish biomass, abundance or species diversity between survey years 2021 and 2020. The biomass on all quarterly surveys was dominated by *māikoiko* (June: 72.3%, July: 26.5%, September: 55.8%, November: 62.1%, *A. leucopareius*, whitebar surgeonfish). In June, *na'ena'e* (10.3%, *A. olivaceus*, orangeband surgeonfish) also significantly contributed to the biomass at NANA 2. In July, *māʻiʻiʻi* (50.0%, *A. nigrofuscus*, brown surgeonfish) contributed greatly to the biomass. In November, *humuhumuʻeleʻele* (15.5%, *M. niger*, black durgon) also contributed to the biomass. The most abundant fishes along all transects were *māʻi'i'i* (*A. nigrofuscus*, brown surgeongish) and *māikoiko* (*A. leucopareius*, whitebar surgeonfish).

Field Picture 23. ʻUlae, the Clearfin Lizardfish camouflages well and is common on sand. Mottled light brown with a pale blue lateral stripe and row of brown circles below with yellow centers. This is one of 15 species of lizardfishes known to inhabit the Hawaiian Islands. These piscivores swallow smaller fishes whole headfirst (November 2021).

PIPELINE

The KGS Pipe station is the only transect in this study that is located on an artificial surface. The fish biomass, number of fish individuals and number of species present along the Pipe is consistently greater than the East, Ko'Olina, Kahe, and Nanakuli groups (Figure 6). The fish biomass in 2020 (362.0 ± 10.4 g/m^2) was significantly lower than the biomass in 2021 (991.8 ± 123.5 g/m^2) (p = 0.029) (Figure 6). Fish abundance, although not statistically significant, was also greater in 2021 when compared to 2020, and the species diversity along Pipe transect was similar between survey years (2021: 11.9 ± 1.7 #/m^2, 47.0 ± 3.2 fish species; 2020: 5.3 ± 0.4 #/m^2, 51.3 ± 2.1 fish species). Throughout the four 2021 surveys, Pipe transect fluctuated in biomass, number of fish individuals and number of species present: June: 947.9 g/m^2, 2082 individuals, 54 species, July: 1345.8 g/m^2, 1537 individuals, 39 species, September: 898.2 g/m^2, 1148 individuals, 50 species, and November: 775.1 g/m^2, 1183 individuals, 45 species.

During the June survey, the invasive *ta'ape* (22.1%, *L. kasmira*, bluestripe snapper), *weke 'ula* (18.6%, *Mulloidichthys vanicolensis*, yellowfin goatfish), and *mamo* (18.0%, *A. vaigiensis*, Indo-Pacific sergeant) were responsible for the majority of the biomass. In July, the biomass was dominated by the *ta'ape* (37.4%, *L. kasmira*, bluestripe snapper), *mamo* (16.7%, *A. vaigiensis*, Indo-Pacific sergeant), and *uhu* (10.3%, *C. sordidus*, bullethead parrotfish). The September survey was dominated by *mamo* (27.6%, *A. vaigiensis*, Indo-Pacific sergeant), and *moano* (14.4%, *Parupeneus multifasciatus*, manybar goatfish). In November, *ta'ape* (25.7%, *L. kasmira*, bluestripe snapper) and *mamo* (25.1%, *A. vaigiensis*, Indo-Pacific sergeant) dominated the biomass. Combining all four survey timepoints, the most abundant fish species in number and biomass at Pipe transect was the *ta'ape* (*L. kasmira*, bluestripe snapper, invasive) (Figure 11). Large resident schools of *ta'ape*, *mamo*, and *weke 'ula* are consistently found throughout surveys.

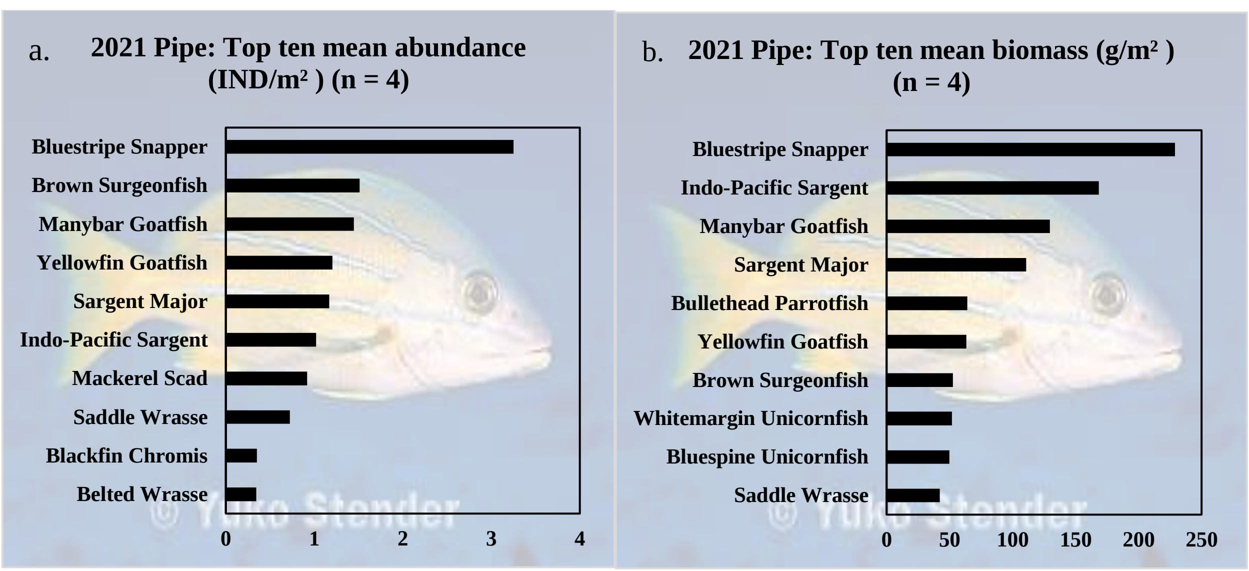
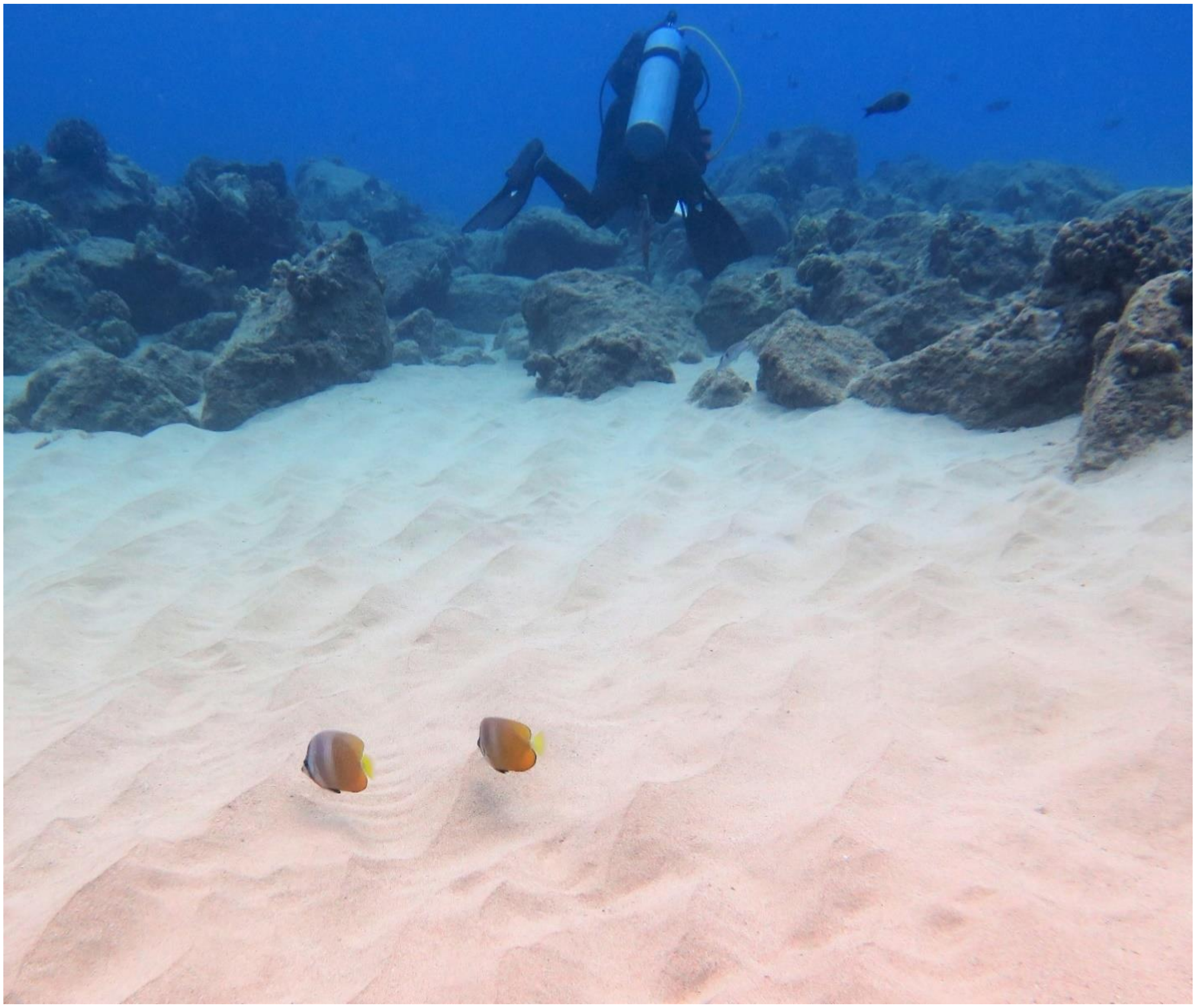


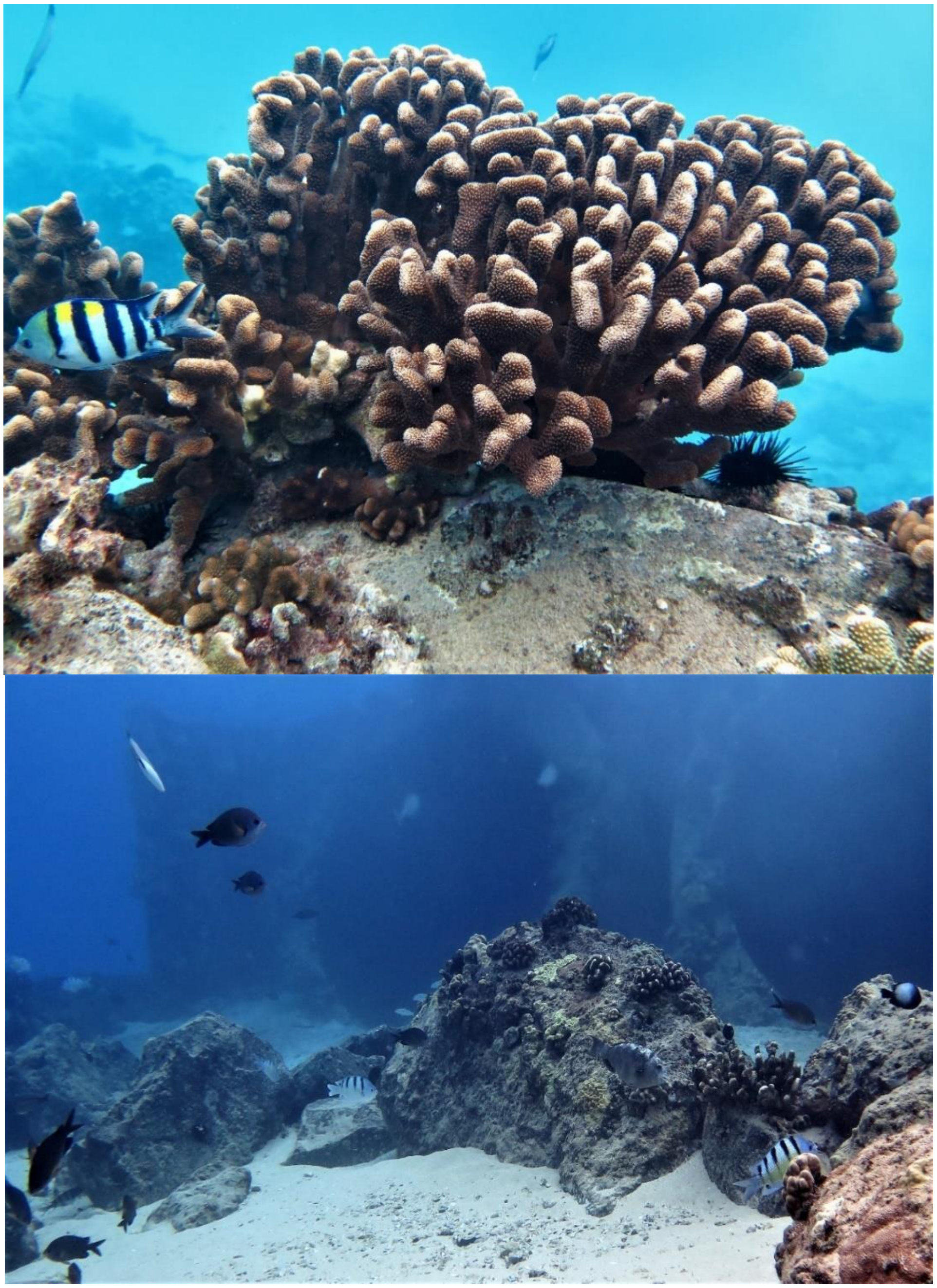
Figure 11. Top ten fishes contributing to mean abundance and biomass at the Pipe transect in 2021.



Field Picture 24. The Black-lip or Sunburst Butterflyfish, kikākāpu near the Kahe pipeline. This common solitary species occurs on clean reefs & ledges exposed to current. They have a diverse diet, feeding on coral, zooplankton, and algae (November 2021).

Field Picture 25. Forceps fishes, *lauwiliwilinukunuku'oi'oi*. Commonly travel in pairs. Feeds upon tube feet of sea cucumbers (*loli*) and sea urchins *('ina, wana*), worm tentacles, and other invertebrates. Can be observed swimming upside down along the ceiling of caves (Kahe, November 2021).

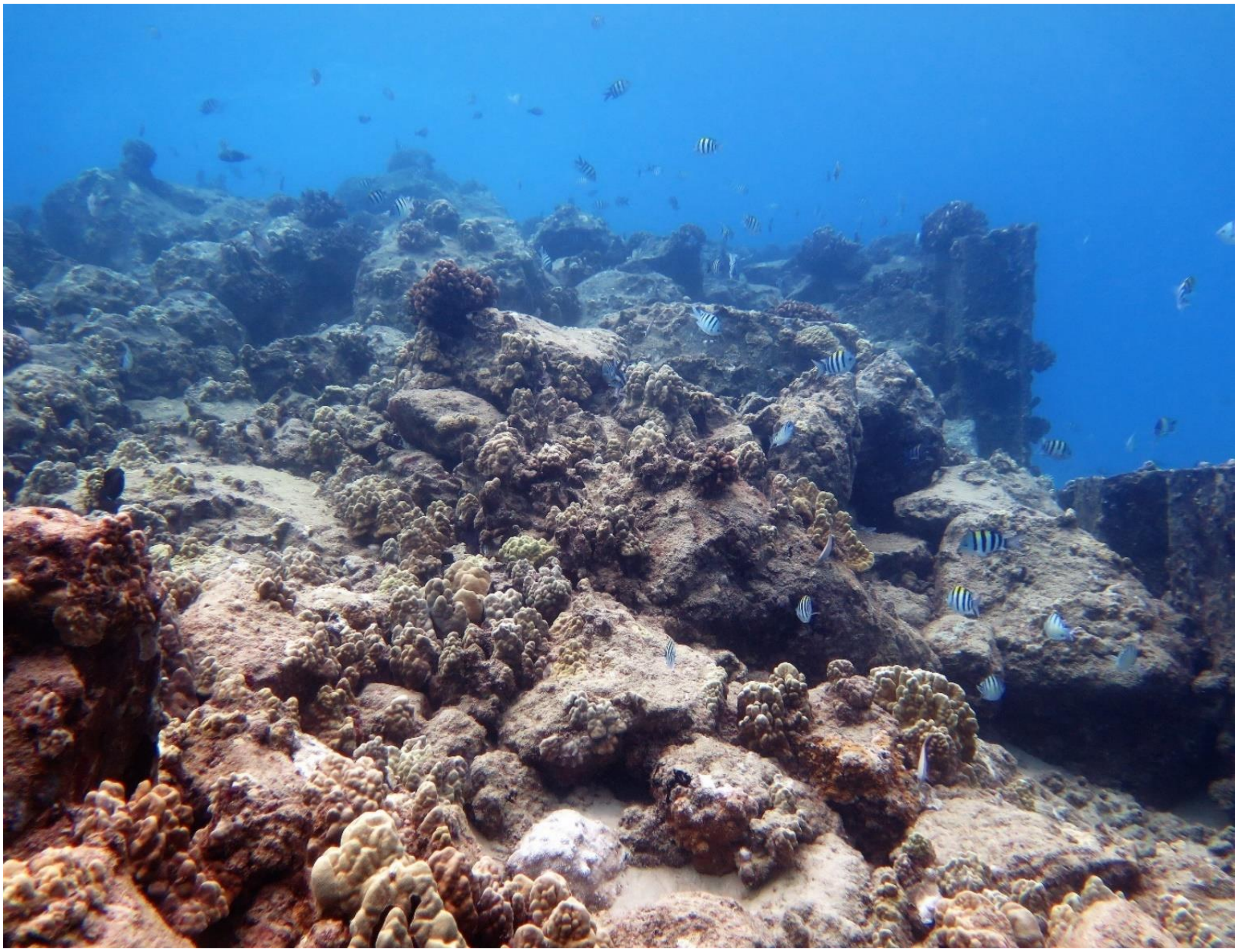
Field Picture 26. The rock piles along the Kahe Pipeline provide stability, spatial complexity, and topographic relief offering the added benefit of protection from predators and habitat complexity that is correlated with fish populations.



Field Picture 27. Top: *Pocillopora grandis* known the Antler coral is common along the West O‘ahu coast due to strong water circulation. These picturesque corals can reach a height and diameter of least 4 feet. The strong skeletal strength can withstand high water motion. The Antler coral provides food and shelter to numerous fishes and invertebrate species. This massive colony is found on top of the terminus of the two Kahe pipeline outflows despite warm water release (bottom background). The pipeline is abundant with corals due to the available substrate, good water circulation, and lack of sedimentation.

Field Picture 28. *Wana*, the Banded Urchin is a food resource for some fishes (puffers) and fishers who consider the gonads a delicacy. *Wana* are common on reefs and rubble outside of the surf zone. Closely spaced primary spines are black in adults, banded with white in juveniles. They hide thin venomous secondary spines that can be painful when encountered. *Loli*, the White-spotted Sea Cucumber, located on the left of the image below the *wana*, is also a food resource for fishes and fishers.

Field Picture 29. The structural formation at the Kahe Pipeline provides support for corals and maintains productive assemblages of various fishes (November 2021).



Field Picture 30. The structural relief and magnitude of cavities on the Kahe Pipe provides the shelter and food resources to support an unusually large and diverse number of fishes and coral species. (November 2021)

FOOD FISHES

Twenty-one common species of targeted fishes (Table 4) for hook line and spearfishing as resources of food for the community were assessed for their change in number of fishes and biomass of fishes from 2018 (Brock's survey) through the present 2021 survey.

Table 4. Fishes considered food fishes in analyses.

Scientific Name	Common Name	Hawaiian Name
Acanthurus blochii	Ringtail Surgeonfish	*pualu*
Acanthurus dussumieri	Eye-stripe Surgeonfish	*palani*
Acanthurus nigroris	Bluelined Surgeonfish	*maiko*
Acanthurus triostegus	Convict Tang	*manini*
Aprion virescens	Green Jobfish	*uku*
Calotomus carolinus	Stareye Parrotfish	
Caranx melampygus	Blue Trevally	*omilu*
Cephalopholis argus	Blue-spotted Grouper	
Kyphosus bigibbus	Brown Chub	*nenue*
Kyphosus cinerascens	Highfin Chub	*nenue*
Kyphosus species	Lowfin Chub	*nenue*
Lutjanus fulvus	Blacktail Snapper	*to'au*
Lutjanus kasmira	Bluestripe Snapper	*ta'ape*
Monotaxis grandoculis	Bigeye Emperor	*mu*
Mulloidichthys flavolineatus	Yellowstripe Goatfish	*weke*
Mulloidichthys vanicolensis	Yellowfin Goatfish	*weke 'ula*
Naso lituratus	Orangespine Unicornfish	*umaumalei*
Naso unicornis	Bluespine Unicornfish	*kala*
Parupeneus cyclostomus	Blue Goatfish	*moano kea*
Scarus psittacus	Palenose Parrotfish	*uhu*
Scarus rubroviolaceus	Redlip Parrotfish	*pālukaluka*

In 2018, the percent abundance and biomass of food fishes compared to species of fishes not usually targeted as food was highest at Pipe, followed by East and Ko'Olina, Nanakuli, and Kahe (Figure 12). Throughout the four survey years, the percentages of food fishes varied, with an overall trend of decreasing within East, Ko'Olina, Nanakuli, and Kahe, while increasing at Pipe. The increase in food fishes at Pipe, is likely the result of increases in the number of invasive *ta'ape* (*Lutjanus kasmira*, bluestriped snapper) along the transect in more recent years. Some spikes in certain species can be linked to seasonal and annual variability determined by high recruitment. Abundance and biomass of fishes is extremely variable, and therefore, this project will continue to monitor the percentage of food fishes at each transect in future years to determine if there is a pattern of fishing pressure at any particular site.

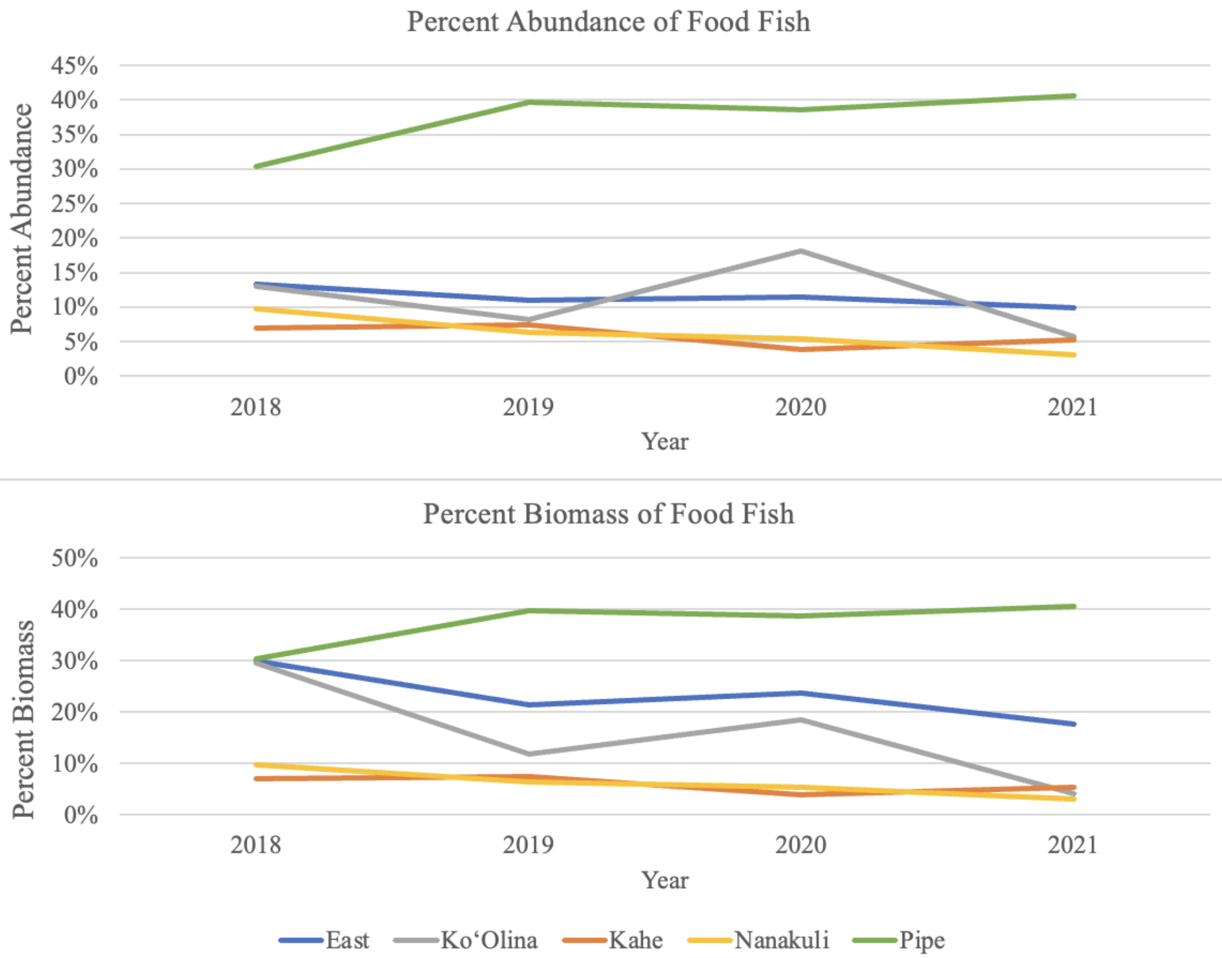
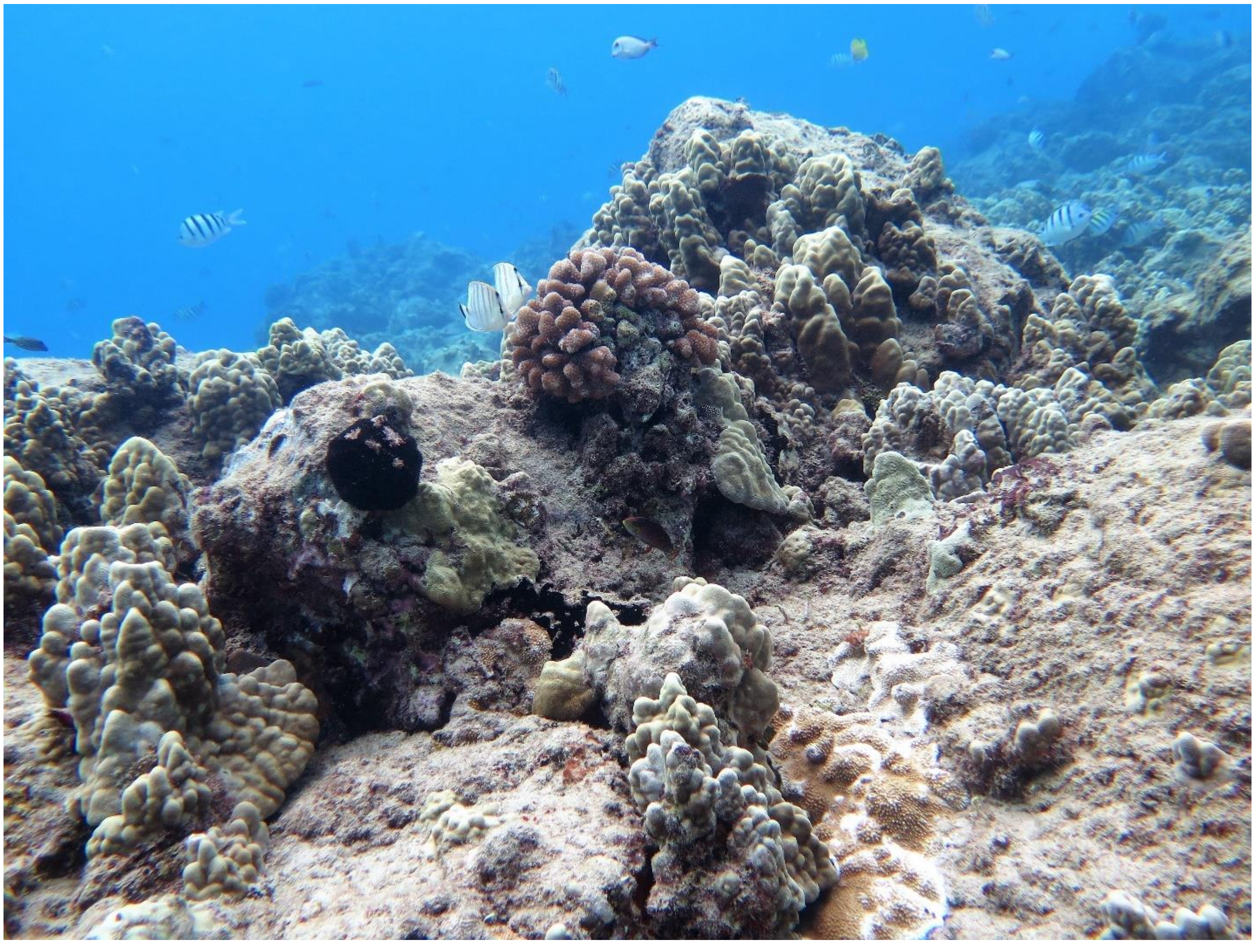


Figure 12. Percent abundance and biomass of food fishes from 2018 through 2021.

Field Picture 31. A popular food fish, *weke* or Yellowstripe are commonly found in schools on shallow sandy reefs. They use barbels to feel for invertebrates buried in the sand. Anglers can be found aggregating in circles along shorelines to catch the highly prized juveniles, during *'oama* season. These are used as bait for larger fishes or consumed whole (Kahe Pipe 2021).

SUMMARY

Fish communities remain similar from 2020 to 2021 surveys. The total number of fish species recorded in 2021 surveys (101 species) was similar to that of 2020 surveys (118 species). The dominant species observed in 2021 were similar to those reported in 2020: *mā'i'i'i* (*A. nigrofuscus,* brown surgeonfish), blackfin chromis (*C. vanderbilti*), invasive *ta'ape* (*L. kasmira,* bluestribe snapper), and *hīnālea lauwili* (*T. duperrey*, saddle wrasse). Biomass is contributed mainly by the invasive *ta'ape* (*L. kasmira*, bluestripe snapper), *na'ena'e* (*A. olivaceus,* orangeband surgeonfish), *humuhumu'ele'ele* (*M. niger*, black durgon), *mamo* (*A. vaigiensis,* Indo-Pacific sergeant), and *māikoiko* (*A. leucopareius*, whitebar surgeonfish). With some overlap, the biomass in 2020 surveys was contributed mainly by the *māi'i'i* (*A. nigrofuscus,* brown surgeonfish), *ta'ape* (*L. kasmira*, bluestripe snapper, invasive), *na'ena'e* (*A. olivaceu,s* orangeband surgeonfish), *māikoiko* (*A. leucopareius,* whitebar surgeonfish), *hīnālea lauwili* (*T. duperrey,* saddle wrasse), *kole,* (*C. strigosus,* goldring surgeonfish), and *mamo* (*A. vaigiensis,* Indo-Pacific sergeant). The only significant shifts in trophic feeding guilds between 2021 and 2020 surveys was at Pipe transect where zooplanktivorous fishes increase significantly in biomass in 2021 surveys ($p = 0.029$). No significant shifts in herbivorous fishes were detected, despite decreases in biomass from 60% (2020) dominance to 49% dominance (2021). Of the twelve transects, only Ko'Olina experienced a significant decline in fish individuals since 2020. Excluding Pipe, which has the highest fish abundance and biomass, East and Ko 'Olina groups have more developed fish communities than the other groups (Kahe and Nanakuli), although not statistically significant. At Ko'Olina, this can be attributed to high spatial relief associated with well-developed fish communities. East, Kahe, and Nanakuli naturally have flatter reef that make the environment less favorable to well-developed fish communities. The 2021 surveys found no significant changes in fish communities that can be attributed to the Hawaiian Electric's KGS or CIP Generating Station facilities.



Field Picture 32. A healthy environment for reef fishes includes coral diversity (Cauliflower coral in center, Rice coral in lower right, Lobe coral throughout image), invertebrates (Collector urchin center left, Black Sponge center), and limu (turf algae on substrate, coralline algae pink areas on substrate) that provide shelter and food (November 2021).

LITERATURE CITED

Ball, M., E. Shinn and K. Stockman. 1967. The geological effects of Hurricane Donna in south Florida. J. Geol. 75:583-597.

Blumenstock, D., F. Fosberg and C. Johnson. 1961. The re-survey of typhoon effects on Jaluit Atoll in the Marshall Islands. Nature 189:618-620.

Brock, V.E. 1954. A preliminary report on a method of estimating reef fish populations. J. Wildlife Mgmt. 18:297-308.

Brock, R.E., C. Lewis and R.C. Wass. 1979. Stability and structure of a fish community on a coral patch reef in Hawaii. Mar. Biol. *54*:281-292.

Brock, R.E. 1996. A study of the impact of Hurricane Iniki on coral communities at selected sites in Mamala Bay, O'ahu, Hawai'i. Project Report PR-96-09. Water Resources Research Center, University of Hawaii, Honolulu. vii+23p.

Brock, R. E. 2019. CIP Generation Project 2018 Community Benefits Program Reef Fish Monitoring Project Year 11 Results. Year 2018 Report. EA. LLC Rep. No. 2019-02. PRIL 2019. Hawaiian Electric Co. Inc., Honolulu.

Dollar SJ, Tribble GW 1993. Recurrent storm disturbance and recovery: a long-term study of coral communities in Hawaii. Coral Reefs 12:223–233.

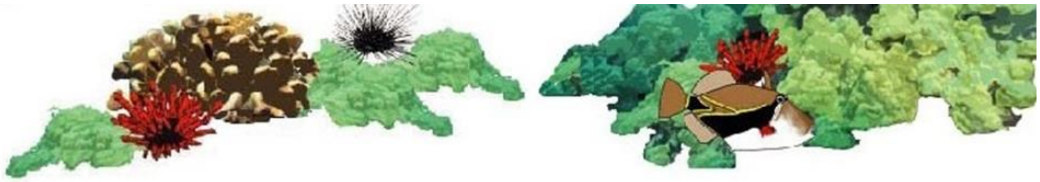
Done, T., P. Dayton, A. Dayton and R. Steger. 1991. Regional and local variability in recovery of shallow coral communities: Moorea, French Polynesia and central Great Barrier Reef. Coral Reefs 9:183-192.

Eakin CM, Sweatman HPA, Brainard RE. 2019. The 2014-2017 Global-scale Coral Bleaching Event: insights and impacts. Coral Reefs 38: 539-545.

Friedlander A.M. and Parrish, J.D. 1998. Habitat characteristics affecting fish assemblages on a Hawaiian coral reef. Journal of Experimental Marine Biology and Ecology 224:1-30.

Friedlander A. M. and DeMartini, E. E. 2002. Contrasts in density, size, and biomass of reef fishes between the Northwestern and the main Hawaiian Islands: the effects of fishing down apex predators. Marine Ecological Progress Series 230:253-264.

Friedlander A. M. and DeMartini, E. E. 2004. Spatial patterns of endemism in shallow water reef fish populations of the Northwestern Hawaiian Islands. Marine Ecological Progress Series 271:281-296.



Friedlander, A., Brown, E. K, Jokiel, P. L., Smith, W. R., and Rodgers, K.S. 2003. Effects of habitat, wave exposure, and marine protected area status on coral reef fish assemblages in the Hawaiian archipelago. Coral Reefs 22: 291-305.

Friedlander AM., Donovan MK, Stamoulis KS, Williams ID, Brown EK, Conklin EJ, DeMartini EE, Rodgers KS, Sparks RT, Walsh WJ. 2017. Human-induced gradients of reef fish declines in the Hawaiian Archipelago viewed through the lens of traditional management boundaries. Aquatic Conservation: Marine and Freshwater Ecosystems. DOI: 10.1002/aqc.2832.

Grigg, R.W. and J.E. Maragos. 1974. Recolonization of hermatypic corals on submerged lava flows in Hawaii. Ecology 55:387-395.

Grigg, R. W. 1998. Holocene coral reef accretion in Hawaii: a function of wave exposure and sea level history. Coral Reefs 17:263-272.

Harmelin-Vivien, M. and P. Laboute. 1986. Catastrophic impact of hurricanes on atoll outer reef slopes in the Tuamotu (French Polynesia). Coral Reefs 5:55-62.Heron S., Eakin CM, Morgan J., and Skirving WJ. 2008. Hurricanes and their Effects on Coral Reefs. https://www.researchgate.net/publication/266558093.

Hiatt, R.W. and D.W. Strasburg. 1960. Ecological relationships of the fish fauna on coral reefs of the Marshall Islands. Ecol. Monogr. *30*:65-127.

Hobson, E.S. 1974. Feeding relationships of teleostean fishes on coral reefs in Kona, Hawaii. Fish. Bull. *72*:915-1031.

Manzello DP, Brandt M, Smith TB, Lirman D, Hendee JC, Nemeth RS 2007. Hurricanes benefit bleached corals. Proceedings of the National Academy of Sciences 104:12035-12039.

Maragos, J., G. Baines and P. Beveridge. 1973. Tropical cyclone Bebe creates a new land formation on Funafuti Atoll. Science 181:1161-1164.

Mora C, Frazier AG, Tong EJ, Longman RJ, Kaiser LR, Dacks RS, Walton MM, Fernandez-Silva I, Stender YO, Anderson JM, Sanchez JJ, Ambrosino CM, Giuseffi LM, Giambelluca TW. 2014. Uncertainties in the timing of unprecedented climates. Nature 511:E5,E6.

Noda, E.K. 1983. Affects of Hurricane Iwa, November 23, 1982 offshore of Kahe Point, Oahu. Unpublished report prepared for Research Corp. of the University of Hawaii.

Ogg, J. and J. Koslow. 1978.The impact of typhoon Pamela 1976. on Guam’s coral reefs and beaches. Pacif. Sci. 32:1056-118.

Randall, J.E. 2007. Reef and shore fishes of the Hawaiian Islands. Sea Grant College Program, University of Hawai'i, Honolulu. xiv+546p.

Rodgers, K.S., C. Newtson, and E.F. Cox. 2003. Mechanical Fracturing of Dominant Hawaiian Corals in Relation to Trampling. Environmental Management vol 31 pp 377-384.

Rodgers, K. S. Evaluation of Nearshore Coral Reef Condition and Identification of Indicators in the Main Hawaiian Islands. 2005. PhD Dissertation. University of Hawai'i, Dept. of Geography. Honolulu, Hawai'i. Pp.203.

Schroeder TA 1998. Hurricanes. In: Juvik S Juvick JO (eds) Atlas of Hawai'i , 3rd edition, University of Hawaii Press, Honolulu , HI, pp 74–75.

Skirving WJ, Heron SF, Marsh BL, Liu G, Dela Cour JL, Geiger EF, and Eakin CM. 2019. The Relentless March of Mass Coral Bleaching: a global perspective of changing heat stress. Coral Reefs 38:547-557.

Stoddart, D. 1969. Post-hurricane changes on the British Honduras reefs and cays: re-survey of 1965. Atoll Res. Bull. 13:1-25.

Storlazzi CD, Field ME, Dykes JD, Jokiel PL, Brown E 2002. Wave control on reef morphology and coral distribution: Molokai , Hawaii. Proc 4th Int Symposium Waves, pp.784–793.

Storlazzi, C. D., M. E. Field, P. L. Jokiel, S. K. Rodgers, E. Brown and J. D. Dykes. 2005. A model for wave control on coral breakage and species distribution: Southern Molokai, Hawaii. Coral Reefs 24:43-55.

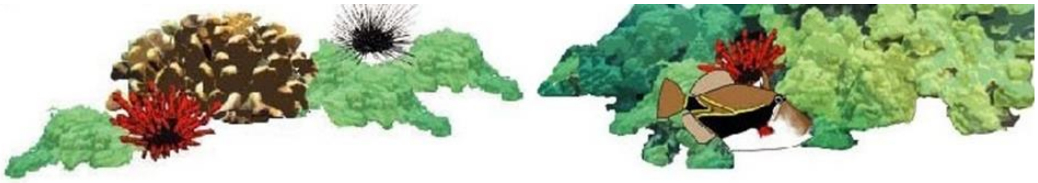
Walsh W.J. 1983. Stability of a coral reef fish community following a catastrophic storm. Coral Reefs. 2:49-63.

Woodley, J. et al. 1981. Hurricane Allen's impact on Jamaican coral reefs. Science 214:749-755.

APPENDICES

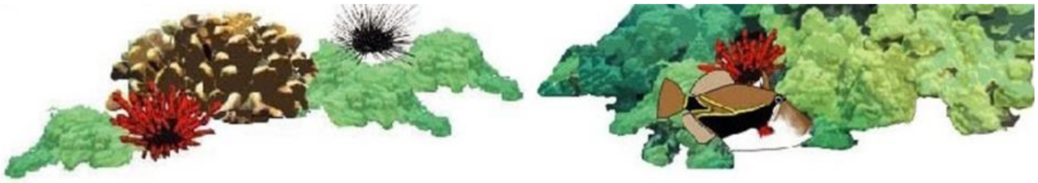
A. Summary of the fish censuses carried out at sixteen locations on forty-nine suveys over the 2007-2021 period (2007-2018 from Brock (2019).

Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
27-Dec-07	1	12	69	15
	2	19	155	143
	3	30	189	41
	4		Not sampled	
	5		Not sampled	
	6		Not sampled	
	7	28	306	92
	8	25	241	43
	9	23	259	290
	10	17	261	154
	11	13	23	104
	12	34	581	63
	13	31	580	594
	14	18	124	7
	15	23	164	94
	16		Not sampled	
4-Apr-08	1	10	129	8
	2	25	333	238
	3	18	146	21
	4	25	270	116
	5	34	307	146
	6	31	292	164
	7	21	365	158
	8	27	499	29
	9	17	75	74
	10	11	117	8
	11	6	21	4
	12	25	390	31
	13	16	401	62
	14	12	260	14
	15	17	214	129
	16		Not sampled	
30-May-08	1	12	77	9
	2	21	220	64
	3	22	136	37
	4	30	293	49
	5	30	250	84
	6	32	265	132
	7	24	292	94
	8	26	412	75
	9	21	152	95
	10	21	167	55
	11	12	81	21
	12	25	453	14
	13	24	263	24
	14	26	188	20



Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
30-May-08 cont.	15	13	80	34
	16	42	1205	358
19-Aug-08	1	19	155	13
	2	20	280	120
	3	23	231	40
	4	26	415	108
	5	24	227	69
	6	35	302	165
	7	24	213	65
	8	27	463	39
	9	23	235	34
	10	39	201	33
	11	32	126	41
	12	23	514	33
	13	21	385	63
	14	19	192	8
	15	15	104	16
	16	37	1023	396
25-Nov-08	1	6	20	2
	2	10	41	4
	3	21	100	12
	4	20	165	79
	5	31	289	91
	6	36	263	189
	7	31	394	60
	8	33	147	29
	9	25	374	171
	10	31	364	62
	11	9	52	18
	12	31	426	19
	13	32	931	155
	14	19	170	15
	15	24	234	171
	16	40	1017	225
19-Mar-09	1	14	93	13
	2	14	102	15
	3	22	126	21
	4	18	125	25
	5	27	302	113
	6	33	370	259
	7	32	349	91
	8	21	353	31
	9	17	111	74
	10	13	52	14
	11	5	7	4
	12	28	251	15
	13	30	458	84
	14	17	84	7

Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
19-Mar-09 cont.	15	23	148	115
	16	48	1438	577
11-May-09	1	11	108	12
	2	18	231	41
	3	26	224	65
	4	25	328	61
	5	31	383	224
	6	30	240	153
	7	26	263	51
	8	27	363	35
	9	15	88	20
	10	20	159	22
	11	4	9	12
	12	24	267	20
	13	28	459	147
	14	11	43	6
	15	17	194	174
	16	39	1333	425
21-Jul-09	1	17	141	18
	2	25	389	73
	3	31	301	80
	4	27	506	209
	5	39	582	267
	6	37	354	188
	7	33	589	155
	8	26	800	47
	9	27	204	70
	10	24	212	30
	11	10	40	12
	12	26	432	20
	13	24	405	145
	14	15	111	9
	15	21	258	140
	16	40	1605	431
29-Mar-10	1	17	162	30
	2	22	315	33
	3	27	197	45
	4	24	324	105
	5	31	312	129
	6	29	313	176
	7	26	336	67
	8	29	265	56
	9	19	83	18
	10	13	53	10
	11	10	28	14
	12	24	245	54
	13	34	312	69
	14	11	101	7



Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
29-Mar-10 cont.	15	24	149	77
	16	29	1192	561
14-May-10	1	18	94	15
	2	17	91	14
	3	23	160	63
	4	16	326	85
	5	35	511	242
	6	37	241	164
	7	23	395	113
	8	26	361	80
	9	28	179	159
	10	21	119	55
	11	9	43	21
	12	25	299	51
	13	31	369	57
	14	10	19	2
	15	26	201	139
	16	33	1767	390
12-Aug-10	1	22	198	157
	2	25	313	69
	3	25	225	28
	4	22	358	151
	5	36	426	163
	6	30	233	118
	7	26	271	100
	8	24	425	62
	9	28	104	40
	10	20	106	31
	11	13	58	19
	12	31	317	24
	13	32	359	60
	14	13	51	23
	15	26	248	207
	16	33	1584	603
29-Oct-10	1	14	104	96
	2	13	208	56
	3	27	183	49
	4	22	195	66
	5	38	315	98
	6	36	294	123
	7	31	743	245
	8	28	262	24
	9	22	467	730
	10	17	57	21
	11	13	38	15
	12	36	334	23
	13	35	478	192
	14	9	57	7

Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
29-Oct-10 cont.	15	28	169	31
	16	35	1039	554
25-Feb-11	1	9	42	5
	2	16	183	66
	3	17	119	18
	4	20	266	25
	5	31	307	99
	6	27	328	196
	7	18	235	93
	8	25	307	33
	9	13	61	10
	10	7	26	4
	11	8	15	12
	12	24	243	14
	13	27	427	119
	14	9	32	2
	15	14	69	23
	16	24	910	430
16-Jun-11	1	18	162	124
	2	17	123	66
	3	27	275	273
	4	25	340	80
	5	24	270	74
	6	33	281	207
	7	27	434	131
	8	27	464	37
	9	15	54	14
	10	16	103	13
	11	11	42	6
	12	28	769	50
	13	29	383	75
	14	12	88	5
	15	21	340	108
	16	40	1315	318
29-Jul-11	1	16	137	14
	2	21	183	52
	3	23	277	435
	4	26	299	52
	5	34	333	138
	6	36	375	234
	7	23	309	100
	8	33	802	38
	9	22	477	285
	10	11	58	5
	11	9	53	2
	12	32	297	22
	13	33	327	36
	14	12	67	5
	15	22	113	82
	16	38	864	436
23-Nov-11	1	15	179	161
	2	22	348	263

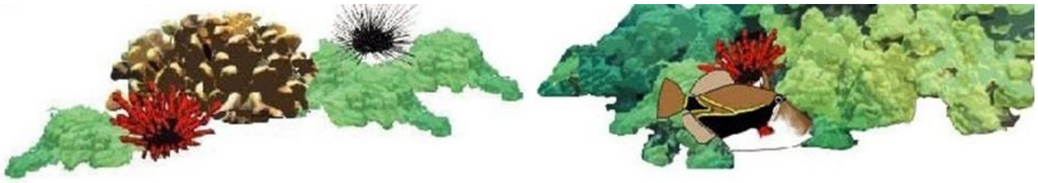
	3	38	320	379
	4	26	360	166
	5	29	320	122
	6	30	291	188
	7	26	244	68
	8	27	343	32
	9	23	102	29
	10	20	85	19
	11	13	26	50
	12	34	691	24
	13	35	1253	318
	14	12	44	7
	15	17	85	16
	16	28	1318	681
2-May-12	1	9	74	16
	2	13	130	27
	3	23	137	65
	4	26	251	128
	5	29	227	93
	6	35	276	147
	7	25	315	82
	8	31	371	130
	9	21	116	20
	10	15	78	16
	11	11	31	67
	12	28	262	50
	13	35	339	173
	14	14	89	9
	15	20	150	54
	16	26	568	143
23-May-12	1	15	105	52
	2	15	194	53
	3	23	176	75
	4	18	357	49
	5	28	211	57
	6	32	259	163
	7	19	247	48
	8	22	270	42
	9	17	59	20
	10	13	36	10
	11	9	23	30
	12	18	211	27
	13	28	211	71
	14	11	89	4
23-May-12	15	17	118	19
	16	23	846	214
23-Jul-12	1	23	274	189
	2	18	187	55
	3	21	114	39
	4	19	344	36
	5	30	185	46
	6	30	184	134
	7	24	249	50
	8	29	212	41

	9	25	81	26
	10	13	64	9
	11	9	20	82
	12	24	274	32
	13	34	439	92
	14	15	54	6
	15	19	102	88
	16	30	685	153
2-Nov-12	1	18	201	86
	2	17	224	52
	3	24	147	109
	4	22	285	51
	5	30	259	137
	6	31	249	139
	7	30	662	182
	8	24	348	93
	9	32	219	155
	10	19	60	21
	11	8	14	20
	12	33	530	29
	13	32	467	186
	14	16	68	6
	15	23	200	108
	16	33	1316	334
3-May-13	1	18	233	128
	2	18	165	118
	3	23	110	16
	4	23	302	62
	5	18	540	237
	6	30	257	104
	7	19	428	181
	8	24	286	225
	9	14	35	19
	10	10	17	6
	11	7	22	26
	12	20	186	37
	13	28	327	114
3-May-13	14	10	59	4
	15	20	183	124
	16	31	1155	347
14-Jun-13	1	18	214	103
	2	18	289	238
	3	14	181	89
	4	22	385	70
	5	21	342	181
	6	30	229	116
	7	28	370	97
	8	24	263	89
	9	12	106	8
	10	10	28	8
	11	6	7	8
	12	22	409	35
	13	23	468	145
	14	9	56	4

	15	16	167	81
	16	34	816	294
20-Sep-13	1	21	206	90
	2	18	129	55
	3	19	132	16
	4	22	240	24
	5	26	324	90
	6	31	259	126
	7	28	282	95
	8	27	184	65
	9	17	266	1619
	10	16	46	12
	11	15	38	9
	12	31	804	372
	13	41	432	121
	14	16	154	31
	15	32	259	131
	16	36	1554	413
18-Dec-13	1	22	231	115
	2	23	261	281
	3	26	167	64
	4	21	251	135
	5	20	165	39
	6	31	281	109
	7	21	337	102
	8	24	163	37
	9	23	79	13
	10	17	73	19
	11	16	76	31
	12	35	375	27
	13	37	336	107
18-Dec-13	14	14	64	10
	15	23	233	163
	16	36	1004	296
8-May-14	1	15	94	22
	2	20	120	25
	3	14	115	14
	4	19	155	71
	5	29	265	101
	6	31	211	150
	7	17	364	100
	8	27	287	153
	9	17	99	10
	10	13	32	8
	11	6	17	31
	12	27	190	27
	13	25	529	109
	14	7	16	1
	15	21	201	190
	16	37	1339	346
6-Jun-14	1	17	155	111
	2	14	151	64
	3	14	73	64
	4	21	220	95

	5	25	266	84	
	6	27	269	135	
	7	28	445	149	
	8	24	220	41	
	9	18	48	38	
	10	36	203	67	
	Sample Date	**Transect No.**	**No. Species**	**No. Individuals**	**Biomass (g/m^2)**
	12	25	187	40	
	13	33	471	235	
	14	8	11	11	
	15	22	152	102	
	16	33	983	253	
26-Sep-14	1	20	482	336	
	2	21	292	95	
	3	21	210	26	
	4	33	409	167	
	5	31	359	107	
	6	26	371	212	
	7	30	816	150	
	8	27	214	18	
	9	17	77	8	
	10	26	152	20	
	11	20	77	26	
	12	35	635	48	
	13	39	485	130	
26-Sep-14	14	14	148	12	
	15	28	284	148	
	16	36	1285	215	
27-Feb-15	1	18	264	153	
	2	23	360	182	
	3	32	343	128	
	4	28	439	175	
	5	25	336	121	
	6	26	260	104	
	7	31	1049	215	
	8	21	194	64	
	9	10	26	8	
	10	4	11	3	
	11	4	7	3	
	12	19	120	33	
	13	31	605	471	
	14	12	59	8	
	15	17	197	133	
	16	34	1595	386	
6-Apr-15	1	19	400	231	
	2	20	278	160	
	3	24	283	93	
	4	37	310	142	
	5	31	275	59	
	6	29	381	96	
	7	20	677	229	
	8	27	146	31	

	9	17	81	11
	10	19	47	16
	11	3	5	5
	12	22	137	16
	13	26	612	313
	14	15	85	15
	15	23	174	53
Sample Date	**Transect No.**	**No. Species**	**No. Individuals**	**Biomass (g/m^2)**
	16	43	1246	254
18-Jun-15	1	19	277	129
	2	16	249	92
	3	20	160	18
	4	19	386	248
	5	29	284	68
	6	28	190	72
	7	28	587	123
	8	25	183	39
	9	21	121	34
	10	11	43	21
	11	7	15	20
	12	25	179	68
	13	25	901	600
18-Jun-15	14	13	73	9
	15	21	235	95
	16	29	1435	506
21-Oct-15	1	Not sampled		
	2	Not sampled		
	3	Not sampled		
	4	Not sampled		
	5	37	1734	1196
	6	30	379	112
	7	24	348	159
	8	27	348	74
	9	19	106	26
	10	17	45	26
	11	8	22	16
	12	29	546	58
	13	26	457	161
	14	14	197	60
	15	31	316	280
	16	35	978	559
8-Apr-16	1	21	245	107
	2	25	262	291
	3	20	236	157
	4	24	370	145
	5	22	678	517
	6	22	158	45



Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
	7	21	398	87
	8	20	410	97
	9	18	127	132
	10	14	43	22
	11	6	10	6
	12	23	651	29
	13	27	406	146
	14	15	95	43
	15	21	185	151
	16	25	1039	281
15-Apr-16	1	21	155	171
	2	27	369	395
	3	26	209	256
	4	29	253	180
	5	25	1162	969
	6	20	188	48
	7	30	365	70
	8	26	344	62
15-Apr-16	9	12	53	10
	10	17	57	84
	11	4	6	16
	12	29	225	43
	13	34	661	400
	14	8	34	2
	15	21	123	80
	16	31	1722	719
5-Jul-16	1	27	370	379
	2	14	171	167
	3	16	123	32
	4	20	269	190
	5	24	921	385
	6	22	251	173
	7	19	334	71
	8	27	273	34
	9	18	120	11
	10	7	35	6
	11	2	3	7
	12	24	584	19
	13	29	354	90
	14	11	65	51
	15	29	292	319
	16	38	1543	802
18-Aug-16	1	23	302	334
	2	19	219	37
	3	21	178	102
	4	20	139	26
	5	22	486	210
	6	22	337	245
	7	26	289	81
	8	27	352	62
	9	18	233	79
	10	14	50	9

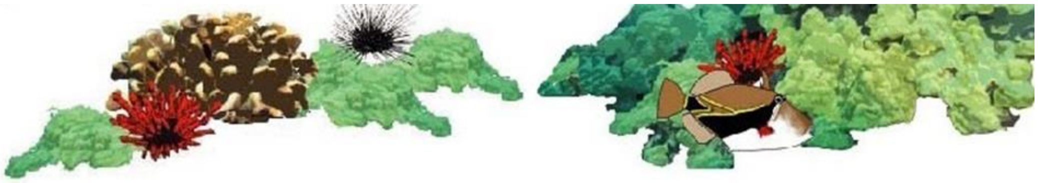
Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m²)
	11	2	3	4
	12	26	815	41
	13	26	363	138
	14	10	86	8
	15	23	164	160
	16	39	1552	797
15-Mar-17	1	23	215	134
	2	24	461	243
	3	26	225	118
	4	20	309	197
	5	19	424	137
	6	23	168	141
	7	21	525	159
	8	28	206	27
15-Mar-17	9	21	97	12
	10	11	43	19
	11	4	6	4
	12	28	235	24
	13	25	306	122
	14	13	86	6
	15	29	235	213
	16	29	1204	810
18-May-17	1	19	327	201
	2	22	385	108
	3	25	228	117
	4	19	298	69
	5	25	837	250
	6	19	242	198
	7	20	352	103
	8	22	424	120
	9	16	133	44
	10	15	71	18
	11	3	5	14
	12	13	125	12
	13	26	724	248
	14	12	57	6
	15	22	215	214
	16	39	985	1010
2-Jun-17	1	26	400	222
	2	20	225	145
	3	20	163	30
	4	20	421	150
	5	21	817	410
	6	24	201	50
	7	17	534	180
	8	18	189	32
	9	13	36	10
	10	16	39	19
	11	5	6	9
	12	24	284	29
	13	27	554	216
	14	5	31	6

	15	21	138	69
	16	32	1635	703
29-Aug-17	1	28	288	209
	2	21	166	78
	3	26	275	81
	4	20	902	196
Sample Date	**Transect No.**	**No. Species**	**No. Individuals**	**Biomass (g/m^2)**
	5	22	388	128
	6	30	206	112
	7	17	584	165
	8	29	242	33
29-Aug-17	9	17	72	14
	10	18	70	31
	11	6	8	22
	12	30	555	39
	13	27	1171	258
	14	12	89	2
	15	19	160	179
	16	33	1313	650
21-Dec-17	1	17	319	241
	2	21	536	183
	3	20	182	124
	4	23	357	90
	5	20	221	44
	6	34	314	233
	7	22	769	330
	8	24	233	22
	9	15	279	344
	10	12	56	26
	11	9	34	88
	12	26	374	22
	13	31	931	389
	14	11	47	4
	15	25	184	158
	16	29	1455	1042
11-May-18	1	17	250	134
	2	12	94	85
	3	22	192	20
	4	17	328	121
	5	19	272	97
	6	20	132	42
	7	24	485	184
	8	19	165	30
	9	8	51	14
	10	19	73	32
	11	3	5	19
	12	24	105	20
	13	20	229	49
	14	10	50	1
	15	25	105	208
	16	35	2008	1635
26-Jun-18	1	13	271	262
	2	13	105	93

	3	13	132	18
	4	15	239	66
	5	13	129	40
	6	21	209	115
	7	21	454	122
	8	16	191	31

Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m^2)
26-Jun-18 cont.	9	13	41	11
	10	16	89	29
	11	4	9	8
	12	22	199	17
	13	23	368	156
	14	14	68	3
	15	19	170	130
	16	33	1572	824
19-Nov-18	1	22	366	356
	2	22	320	209
	3	17	230	547
	4	16	369	65
	5	26	330	168
	6	29	324	218
	7	17	446	118
	8	15	338	22
	9	17	350	253
	10	9	120	78
	11	4	6	5
	12	16	659	11
	13	25	704	413
	14	12	86	23
	15	20	227	233
	16	30	1311	890
10-Jan-19	1	24	365	213
	2	17	278	262
	3	19	190	41
	4	20	233	178
	5	22	209	52
	6	23	134	44
	7	31	619	148
	8	21	177	23
	9	22	105	20
	10	9	68	60
	11	4	32	52
	12	26	559	15
	13	25	477	202
	14	8	36	4
	15	21	126	59

	16	22	1850	972
25-Jul-19	1	19	135	19
	3	23	167	32
	4	28	505	110
	5	27	302	104
	6	35	310	160
	7	27	324	102
	8	21	327	42
	9	12	36	10
	10	12	34	13
	12	15	37	21
	13	15	121	43
	14	14	64	6
	15	22	159	107
	16	45	1228	594
26-Aug-19	1	14	117	5
	3	24	182	118
	4	25	241	74
	5	34	479	198
	6	34	318	113
	7	24	364	152
	8	21	262	34
	9	16	108	19
	10	8	30	7
	12	16	112	40
	13	23	203	42
	14	11	54	2
	15	27	213	93
	16	55	1139	668
13-Sep-19	1	11	36	3
	3	17	137	31
	4	22	281	64
	5	28	580	271
	6	25	270	161
	7	29	593	271
	8	21	405	48
	9	20	83	16
	10	12	58	29
	12	18	91	94
	13	29	320	61
	14	7	40	2
	15	23	164	169
	16	55	1163	506
29-Nov-29	1	21	102	51
	3	27	161	31
	4	23	249	70
	5	22	353	117
	6	29	306	269
	7	24	237	88
	8	18	184	34
	9	21	108	20
	10	13	61	20
	12	15	79	39



13	25	326	113
14	3	4	1
15	24	226	204
16	55	1279	670

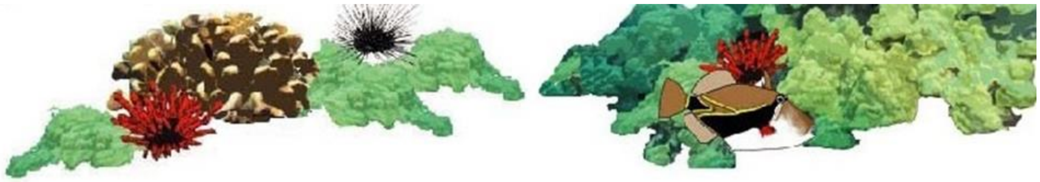
Appendix A. cont. (16/17)

Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m2)
23-Jul-20	1	18	166	48
	3	18	173	25
	4	15	213	48
	5	21	489	184
	6	32	494	277
	7	24	322	104
	8	23	259	32
	9	13	80	17
	10	16	86	26
	12	15	146	53
	13	21	261	66
	14	6	73	2
	15	23	209	130
	16	45	934	371
16-Sep-20	1	22	94	55
	3	18	105	13
	4	22	94	54
	5	29	395	180
	6	29	240	106
	7	15	129	55
	8	20	243	41
	9	21	138	29
	10	6	14	5
	12	19	89	17
	13	25	160	64
	14	6	19	3
	15	28	130	85
	16	52	987	379
5-Oct-20	1	21	158	74
	3	18	172	18
	4	19	181	51
	5	24	191	53
	6	29	197	107
	7	21	185	54
	8	28	229	37
	9	18	76	19
	10	12	34	17
	12	18	88	31
	13	28	197	71
	14	7	12	3
	15	30	180	139
	16	54	1039	366
20-Nov-20	1	-	-	-
	3	26	157	45
	4	30	235	50
	5	21	329	89
	6	32	277	122
	7	19	250	61
	8	26	182	92
	9	14	82	16
	10	7	13	7
	12	17	47	17

13	24	272	60
14	6	13	0
15	23	128	54
16	54	1299	332

Appendix A. cont. (17/17)

Sample Date	Transect No.	No. Species	No. Individuals	Biomass (g/m2)
10-Jun-21	1	20	246.00	221.5
	3	30	318.00	576.4
	4	21	172.00	42.1
	5	21	240.00	170.5
	6	23	273.00	139.5
	7	21	338.00	141.2
	8	21	260.00	69.4
	9	14	68.00	36.2
	12	20	107.00	90.8
	14	6	48.00	0.3
	15	21	116.00	278.1
	16	54	2082.00	947.9
27-Jul-21	1	18	214.00	430.5
	3	17	142.00	47.5
	4	21	246.00	72.6
	5	12	122.00	112.2
	6	26	250.00	361.1
	7	15	155.00	65.0
	8	18	131.00	32.9
	9	19	97.00	40.0
	12	5	38.00	20.4
	14	7	21.00	3.8
	15	23	364.00	156.4
	16	39	1537.00	1345.8
9-Sep-21	1	11	113.00	38.7
	3	21	172.00	28.0
	4	14	207.00	113.8
	5	15	221.00	84.4
	6	30	210.00	114.6
	7	22	258.00	68.3
	8	25	227.00	45.3
	9	19	287.00	245.0
	12	25	68.00	64.0
	14	6	67.00	2.3
	15	17	111.00	88.6
	16	50	1148.00	898.2
22-Nov-21	1	23	226.00	202.1
	3	24	134.00	152.1
	4	22	347.00	114.0
	5	23	123.00	160.0
	6	27	141.00	170.4
	7	21	193.00	273.8
	8	22	221.00	51.9
	9	19	230.00	85.4
	12	21	340.00	96.1
	14	10	44.00	7.9
	15	23	141.00	399.8
	16	45	1183.00	775.1



B. Results of fish censuses carried out each of the four 2021 surveys. Trophic categories include Herbivore (H), Corallivore (C), Detritivore (D), Mixed (MI), Piscivore (P), Sessile Invertebrate feeder (SI) and Zooplanktivore (Z). Endemism categories include Endemic (E), Indigenous (I) and Introduced (X).

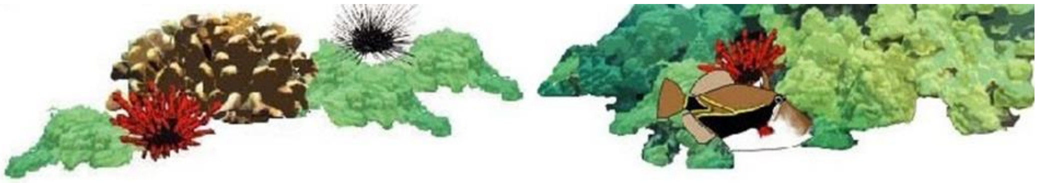
Date	Transect	Species	Number	Average Length (cm)	Biomass (g)	Trophic	Endemism
6/10/21	East 1	*Canthigaster jactator*	5	7	0.2087	H	E
6/10/21	East 1	*Canthigaster jactator*	4	4	0.0383	H	E
6/10/21	East 1	*Canthigaster jactator*	3	6	0.0835	H	E
6/10/21	East 1	*Thalassoma duperrey*	6	5	0.0136	MI	E
6/10/21	East 1	*Thalassoma duperrey*	5	7	0.0325	MI	E
6/10/21	East 1	*Thalassoma duperrey*	1	9	0.0142	MI	E
6/10/21	East 1	*Rhinecanthus rectangulus*	1	20	0.4365	MI	I
6/10/21	East 1	*Acanthurus triostegus*	23	20	3.8962	H	I
6/10/21	East 1	*Acanthurus triostegus*	12	23	3.2923	H	I
6/10/21	East 1	*Acanthurus triostegus*	8	17	0.7736	H	I
6/10/21	East 1	*Naso unicornis*	2	30	2.4443	H	I
6/10/21	East 1	*Naso unicornis*	1	32	1.4680	H	I
6/10/21	East 1	*Acanthurus blochii*	5	30	2.7000	H	I
6/10/21	East 1	*Acanthurus blochii*	1	35	0.8575	H	I
6/10/21	East 1	*Chromis vanderbilti*	30	2	0.0112	Z	I
6/10/21	East 1	*Chromis vanderbilti*	65	3	0.0816	Z	I
6/10/21	East 1	*Acanthurus olivaceus*	3	35	5.5314	H	I
6/10/21	East 1	*Acanthurus olivaceus*	10	30	11.5219	H	I
6/10/21	East 1	*Lutjanus fulvus*	2	27	0.7480	MI	X
6/10/21	East 1	*Lutjanus fulvus*	2	25	0.5938	MI	X
6/10/21	East 1	*Parupeneus bifasciatus*	1	25	0.3379	MI	I
6/10/21	East 1	*Parupeneus bifasciatus*	3	23	0.7756	MI	I
6/10/21	East 1	*Parupeneus bifasciatus*	1	18	0.1177	MI	I
6/10/21	East 1	*Chaetodon ornatissimus*	1	15	0.1958	C	I
6/10/21	East 1	*Forcipiger flavissimus*	2	15	0.1059	SI	I
6/10/21	East 1	*Acanthurus dussumieri*	1	28	0.4390	H	I
6/10/21	East 1	*Acanthurus dussumieri*	2	30	1.0800	H	I
6/10/21	East 1	*Plectroglyphidodon imparipennis*	2	5	0.0112	MI	I
6/10/21	East 1	*Plectroglyphidodon imparipennis*	1	3	0.0011	MI	I
6/10/21	East 1	*Plectroglyphidodon imparipennis*	1	1	0.0000	MI	I
6/10/21	East 1	*Acanthurus nigrofuscus*	15	12	1.7855	H	I
6/10/21	East 1	*Acanthurus nigrofuscus*	20	10	1.4159	H	I
6/10/21	East 1	*Chaetodon quadrimaculatus*	2	12	0.1492	C	I
6/10/21	East 1	*Melichthys niger*	1	27	1.5137	H	I
6/10/21	East 1	*Paracirrhites forsteri*	1	12	0.0548	P	I
6/10/21	East 1	*Naso lituratus*	1	28	0.6739	H	I
6/10/21	East 1	*Naso lituratus*	1	25	0.4743	H	I
6/10/21	East 1	*Stethojulis balteata*	1	8	0.0114	MI	E
6/10/21	East 4	*Chromis vanderbilti*	50	3	0.0628	Z	I
6/10/21	East 4	*Chromis vanderbilti*	10	2	0.0037	Z	I
6/10/21	East 4	*Chromis vanderbilti*	30	3	0.0377	Z	I
6/10/21	East 4	*Ctenochaetus strigosus*	1	3	0.0011	D	I
6/10/21	East 4	*Acanthurus nigrofuscus*	5	10	0.3540	H	I
6/10/21	East 4	*Acanthurus nigrofuscus*	6	7	0.1537	H	I
6/10/21	East 4	*Sufflamen fraenatus*	1	18	0.3230	MI	I
6/10/21	East 4	*Thalassoma duperrey*	6	9	0.0854	MI	E
6/10/21	East 4	*Thalassoma duperrey*	4	15	0.2803	MI	E
6/10/21	East 4	*Thalassoma duperrey*	1	15	0.0701	MI	E
6/10/21	East 4	*Thalassoma duperrey*	7	4	0.0079	MI	E
6/10/21	East 4	*Thalassoma duperrey*	5	7	0.0325	MI	E
6/10/21	East 4	*Canthigaster jactator*	4	6	0.1113	H	E
6/10/21	East 4	*Canthigaster jactator*	2	4	0.0192	H	E

6/10/21	East 4	*Canthigaster jactator*	1	5	0.0172	H	E
6/10/21	East 4	*Pseudocheilinus tetrataenia*	1	4	0.0013	MI	I
6/10/21	East 4	*Paracirrhites arcatus*	2	7	0.0034	MI	I
6/10/21	East 4	*Cirrhitops fasciatus*	1	7	0.0035	MI	I
6/10/21	East 4	*Macropharyngodon geoffroyi*	1	5	0.0069	MI	E
6/10/21	East 4	*Labroides phthirophagus*	1	5	0.0014	P	E
6/10/21	East 4	*Novaculichthys taeniourus*	1	20	0.1838	MI	I
6/10/21	East 4	*Stethojulis balteata*	4	7	0.0300	MI	E
6/10/21	East 4	*Stethojulis balteata*	2	9	0.0332	MI	E
6/10/21	East 4	*Parupeneus cyclostomus*	1	13	0.0390	P	I
6/10/21	East 4	*Melichthys vidua*	3	27	6.8045	H	I
6/10/21	East 4	*Paracirrhites forsteri*	1	8	0.0157	P	I
6/10/21	East 4	*Gomphosus varius*	1	6	0.0199	MI	I
6/10/21	East 4	*Parupeneus bifasciatus*	10	7	0.0568	MI	I
6/10/21	East 4	*Coris gaimard*	1	18	0.0742	MI	I
6/10/21	East 4	*Acanthurus olivaceus*	1	28	0.9335	H	I
6/10/21	East 4	*Acanthurus olivaceus*	1	30	1.1522	H	I
6/10/21	East 4	*Rhinecanthus rectangulus*	3	20	1.3096	MI	I
6/10/21	East 4	*Rhinecanthus rectangulus*	3	18	0.9689	MI	I
6/10/21	East 4	*Rhinecanthus rectangulus*	1	15	0.1917	MI	I
6/10/21	East 3	*Plectroglyphidodon imparipennis*	1	4	0.0028	MI	I
6/10/21	East 3	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
6/10/21	East 3	*Chaetodon multicinctus*	1	10	0.0501	C	E
6/10/21	East 3	*Chaetodon multicinctus*	4	9	0.1461	C	E
6/10/21	East 3	*Acanthurus nigrofuscus*	15	9	0.7865	H	I
6/10/21	East 3	*Acanthurus nigrofuscus*	50	10	3.5397	H	I
6/10/21	East 3	*Acanthurus nigrofuscus*	5	7	0.1281	H	I
6/10/21	East 3	*Acanthurus nigrofuscus*	30	12	3.5710	H	I
6/10/21	East 3	*Thalassoma duperrey*	4	10	0.0791	MI	E
6/10/21	East 3	*Thalassoma duperrey*	1	15	0.0701	MI	E
6/10/21	East 3	*Thalassoma duperrey*	6	9	0.0854	MI	E
6/10/21	East 3	*Thalassoma duperrey*	4	12	0.1397	MI	E
6/10/21	East 3	*Stethojulis balteata*	2	10	0.0463	MI	E
6/10/21	East 3	*Stethojulis balteata*	4	8	0.0457	MI	E
6/10/21	East 3	*Scarus psittacus*	1	12	0.0321	H	I
6/10/21	East 3	*Scarus psittacus*	2	10	0.0351	H	I
6/10/21	East 3	*Paracirrhites arcatus*	2	9	0.0090	MI	I
6/10/21	East 3	*Plectroglyphidodon johnstonianus*	3	4	0.0084	C	I
6/10/21	East 3	*Plectroglyphidodon johnstonianus*	3	6	0.0295	C	I
6/10/21	East 3	*Parupeneus bifasciatus*	1	9	0.0127	MI	I
6/10/21	East 3	*Canthigaster jactator*	2	6	0.0557	H	E
6/10/21	East 3	*Canthigaster jactator*	4	5	0.0689	H	E
6/10/21	East 3	*Canthigaster jactator*	2	3	0.0090	H	E
6/10/21	East 3	*Naso unicornis*	1	27	0.9061	H	I
6/10/21	East 3	*Ctenochaetus strigosus*	1	12	0.0838	D	I
6/10/21	East 3	*Ctenochaetus strigosus*	13	8	0.3075	D	I
6/10/21	East 3	*Ctenochaetus strigosus*	8	5	0.0437	D	I
6/10/21	East 3	*Melichthys niger*	2	28	3.3409	H	I
6/10/21	East 3	*Sufflamen bursa*	1	17	0.2743	MI	I
6/10/21	East 3	*Stegastes fasciolatus*	4	8	0.0958	H	I
6/10/21	East 3	*Stegastes fasciolatus*	4	9	0.1380	H	I
6/10/21	East 3	*Stegastes fasciolatus*	4	5	0.0223	H	I
6/10/21	East 3	*Coris venusta*	1	8	0.0067	MI	E
6/10/21	East 3	*Coris venusta*	1	12	0.0248	MI	E
6/10/21	East 3	*Melichthys vidua*	2	28	4.9826	H	I
6/10/21	East 3	*Naso brevirostris*	30	30	36.5418	Z	I
6/10/21	East 3	*Naso brevirostris*	30	27	27.0919	Z	I
6/10/21	East 3	*Bodianus bilunulatus*	1	35	1.4071	MI	I

6/10/21	East 3	*Acanthurus leucopareius*	13	27	14.6554	H	I
6/10/21	East 3	*Acanthurus leucopareius*	5	25	4.4471	H	I
6/10/21	East 3	*Acanthurus olivaceus*	9	30	10.3697	H	I
6/10/21	East 3	*Acanthurus olivaceus*	5	35	9.2189	H	I
6/10/21	East 3	*Sufflamen bursa*	2	18	0.6459	MI	I
6/10/21	East 3	*Naso hexacanthus*	10	25	7.2576	Z	I
6/10/21	East 3	*Chlorurus sordidus*	1	12	0.0280	H	I
6/10/21	East 3	*Naso lituratus*	4	27	2.4083	H	I
6/10/21	East 3	*Naso lituratus*	2	30	1.6693	H	I
6/10/21	East 3	*Gomphosus varius*	1	7	0.0292	MI	I
6/10/21	East 3	*Sufflamen fraenatus*	1	25	0.8264	MI	I
6/10/21	East 3	*Parupeneus bifasciatus*	1	12	0.0320	MI	I
6/10/21	East 3	*Halichoeres ornatissimus*	1	12	0.2842	MI	I
6/10/21	East 3	*Halichoeres ornatissimus*	1	8	0.1315	MI	I
6/10/21	East 3	*Zebrasoma flavescens*	1	20	0.9375	H	I
6/10/21	East 3	*Cephalopholis argus*	1	27	0.3309	P	X
6/10/21	East 3	*Coris venusta*	1	12	0.0248	MI	E
6/10/21	East 3	*Acanthurus blochii*	3	30	1.6200	H	I
6/10/21	East 3	*Acanthurus blochii*	5	35	4.2875	H	I
6/10/21	KO 1	*Thalassoma duperrey*	4	17	0.4141	MI	E
6/10/21	KO 1	*Thalassoma duperrey*	2	7	0.0130	MI	E
6/10/21	KO 1	*Thalassoma duperrey*	7	10	0.1384	MI	E
6/10/21	KO 1	*Thalassoma duperrey*	6	12	0.2096	MI	E
6/10/21	KO 1	*Thalassoma duperrey*	1	15	0.0701	MI	E
6/10/21	KO 1	*Thalassoma duperrey*	3	5	0.0068	MI	E
6/10/21	KO 1	*Ctenochaetus strigosus*	3	8	0.0710	D	I
6/10/21	KO 1	*Ctenochaetus strigosus*	15	10	0.7119	D	I
6/10/21	KO 1	*Ctenochaetus strigosus*	40	15	6.7262	D	I
6/10/21	KO 1	*Ctenochaetus strigosus*	2	17	0.4970	D	I
6/10/21	KO 1	*Ctenochaetus strigosus*	3	12	0.2515	D	I
6/10/21	KO 1	*Acanthurus nigrofuscus*	5	12	0.5952	H	I
6/10/21	KO 1	*Acanthurus nigrofuscus*	15	8	0.5622	H	I
6/10/21	KO 1	*Acanthurus nigrofuscus*	50	10	3.5397	H	I
6/10/21	KO 1	*Chaetodon quadrimaculatus*	1	5	0.0047	C	I
6/10/21	KO 1	*Plectroglyphidodon johnstonianus*	6	7	0.0950	C	I
6/10/21	KO 1	*Plectroglyphidodon johnstonianus*	2	5	0.0112	C	I
6/10/21	KO 1	*Plectroglyphidodon johnstonianus*	1	8	0.0240	C	I
6/10/21	KO 1	*Chromis vanderbilti*	14	3	0.0176	Z	I
6/10/21	KO 1	*Canthigaster jactator*	1	2	0.0015	H	E
6/10/21	KO 1	*Canthigaster jactator*	1	6	0.0278	H	E
6/10/21	KO 1	*Canthigaster jactator*	1	5	0.0172	H	E
6/10/21	KO 1	*Sufflamen bursa*	4	17	1.0970	MI	I
6/10/21	KO 1	*Sufflamen bursa*	1	20	0.4365	MI	I
6/10/21	KO 1	*Sufflamen bursa*	1	15	0.1917	MI	I
6/10/21	KO 1	*Gomphosus varius*	2	7	0.0585	MI	I
6/10/21	KO 1	*Acanthurus leucopareius*	1	22	0.5999	H	I
6/10/21	KO 1	*Acanthurus leucopareius*	2	25	1.7788	H	I
6/10/21	KO 1	*Melichthys niger*	10	27	15.1365	H	I
6/10/21	KO 1	*Melichthys niger*	3	30	6.0416	H	I
6/10/21	KO 1	*Monotaxis grandoculis*	5	18	0.6236	MI	I
6/10/21	KO 1	*Monotaxis grandoculis*	2	15	0.1384	MI	I
6/10/21	KO 1	*Chaetodon multicinctus*	7	12	0.6076	C	E
6/10/21	KO 1	*Chaetodon multicinctus*	2	10	0.1003	C	E
6/10/21	KO 1	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
6/10/21	KO 1	*Parupeneus bifasciatus*	2	18	0.2354	MI	I
6/10/21	KO 1	*Parupeneus bifasciatus*	1	9	0.0127	MI	I
6/10/21	KO 1	*Chlorurus sordidus*	1	20	0.1552	H	I

6/10/21	KO 1	*Zebrasoma flavescens*	1	5	0.0297	H	I
6/10/21	KO 1	*Zebrasoma flavescens*	1	7	0.0687	H	I
6/10/21	KO 1	*Zanclus cornutus*	1	13	0.1495	SI	I
6/10/21	KO 1	*Zanclus cornutus*	1	15	0.2255	SI	I
6/10/21	KO 1	*Stegastes fasciolatus*	1	8	0.0240	H	I
6/10/21	KO 1	*Stegastes fasciolatus*	1	9	0.0345	H	I
6/10/21	KO 1	*Paracirrhites arcatus*	2	12	0.0270	MI	I
6/10/21	KO 1	*Lutjanus fulvus*	1	20	0.1520	MI	X
6/10/21	KO 1	*Naso lituratus*	2	27	1.2041	H	I
6/10/21	KO 1	*Naso lituratus*	1	25	0.4743	H	I
6/10/21	KO 2	*Bodianus bilunulatus*	1	35	1.4071	MI	I
6/10/21	KO 2	*Bodianus bilunulatus*	1	30	0.8726	MI	I
6/10/21	KO 2	*Bodianus bilunulatus*	2	17	0.3000	MI	I
6/10/21	KO 2	*Sufflamen bursa*	3	17	0.8228	MI	I
6/10/21	KO 2	*Sufflamen bursa*	4	18	1.2919	MI	I
6/10/21	KO 2	*Ctenochaetus strigosus*	7	18	2.0790	D	I
6/10/21	KO 2	*Ctenochaetus strigosus*	16	15	2.6905	D	I
6/10/21	KO 2	*Ctenochaetus strigosus*	30	10	1.4237	D	I
6/10/21	KO 2	*Ctenochaetus strigosus*	1	3	0.0011	D	I
6/10/21	KO 2	*Acanthurus nigrofuscus*	35	10	2.4778	H	I
6/10/21	KO 2	*Acanthurus nigrofuscus*	50	8	1.8740	H	I
6/10/21	KO 2	*Zebrasoma flavescens*	2	15	0.9160	H	I
6/10/21	KO 2	*Zebrasoma flavescens*	2	8	0.1915	H	I
6/10/21	KO 2	*Zebrasoma flavescens*	2	5	0.0594	H	I
6/10/21	KO 2	*Thalassoma duperrey*	2	15	0.1401	MI	E
6/10/21	KO 2	*Thalassoma duperrey*	10	10	0.1977	MI	E
6/10/21	KO 2	*Thalassoma duperrey*	10	7	0.0650	MI	E
6/10/21	KO 2	*Thalassoma duperrey*	15	5	0.0341	MI	E
6/10/21	KO 2	*Abudefduf abdominalis*	3	17	1.8551	Z	E
6/10/21	KO 2	*Abudefduf abdominalis*	1	15	0.4460	Z	E
6/10/21	KO 2	*Acanthurus triostegus*	4	15	0.2512	H	I
6/10/21	KO 2	*Parupeneus bifasciatus*	3	12	0.0961	MI	I
6/10/21	KO 2	*Parupeneus bifasciatus*	2	15	0.1311	MI	I
6/10/21	KO 2	*Parupeneus bifasciatus*	4	10	0.0714	MI	I
6/10/21	KO 2	*Parupeneus bifasciatus*	3	5	0.0058	MI	I
6/10/21	KO 2	*Parupeneus bifasciatus*	3	7	0.0170	MI	I
6/10/21	KO 2	*Canthigaster jactator*	6	5	0.1034	H	E
6/10/21	KO 2	*Canthigaster jactator*	5	3	0.0225	H	E
6/10/21	KO 2	*Acanthurus olivaceus*	1	30	1.1522	H	I
6/10/21	KO 2	*Melichthys niger*	5	27	7.5683	H	I
6/10/21	KO 2	*Melichthys niger*	1	30	2.0139	H	I
6/10/21	KO 2	*Acanthurus nigricans*	2	15	0.4497	H	I
6/10/21	KO 2	*Acanthurus nigricans*	1	17	0.3212	H	I
6/10/21	KO 2	*Plectroglyphidodon imparipennis*	3	4	0.0084	MI	I
6/10/21	KO 2	*Plectroglyphidodon imparipennis*	2	3	0.0023	MI	I
6/10/21	KO 2	*Chaetodon multicinctus*	4	9	0.1461	C	E
6/10/21	KO 2	*Gomphosus varius*	3	8	0.1223	MI	I
6/10/21	KO 2	*Gomphosus varius*	2	10	0.1422	MI	I
6/10/21	KO 2	*Plectroglyphidodon johnstonianus*	6	8	0.1437	C	I
6/10/21	KO 2	*Plectroglyphidodon johnstonianus*	1	6	0.0098	C	I
6/10/21	KO 2	*Plectroglyphidodon johnstonianus*	6	7	0.0950	C	I
6/10/21	KO 2	*Melichthys vidua*	2	28	4.9826	H	I
6/10/21	KO 2	*Melichthys vidua*	1	27	2.2682	H	I
6/10/21	KO 2	*Paracirrhites arcatus*	1	8	0.0028	MI	I
6/10/21	KO 2	*Stethojulis balteata*	1	7	0.0075	MI	E
6/10/21	KO 2	*Stegastes fasciolatus*	1	7	0.0158	H	I
6/10/21	KO 2	*Cantherhines dumerilii*	1	28	0.4699	C	I

6/10/21	KO 2	*Zanclus cornutus*	1	15	0.2255	SI	I
6/10/21	KO 2	*Acanthurus olivaceus*	1	23	0.5124	H	I
6/10/21	KAHE 1D	*Coris venusta*	1	17	0.0757	MI	E
6/10/21	KAHE 1D	*Thalassoma duperrey*	9	15	0.6306	MI	E
6/10/21	KAHE 1D	*Thalassoma duperrey*	3	10	0.0593	MI	E
6/10/21	KAHE 1D	*Thalassoma duperrey*	3	12	0.1048	MI	E
6/10/21	KAHE 1D	*Thalassoma duperrey*	5	5	0.0114	MI	E
6/10/21	KAHE 1D	*Thalassoma duperrey*	10	17	1.0354	MI	E
6/10/21	KAHE 1D	*Ctenochaetus strigosus*	40	10	1.8983	D	I
6/10/21	KAHE 1D	*Ctenochaetus strigosus*	20	15	3.3631	D	I
6/10/21	KAHE 1D	*Ctenochaetus strigosus*	20	7	0.3119	D	I
6/10/21	KAHE 1D	*Myripristis kuntee*	3	12	0.2590	Z	I
6/10/21	KAHE 1D	*Myripristis kuntee*	4	15	0.6551	Z	I
6/10/21	KAHE 1D	*Myripristis kuntee*	3	17	0.7037	Z	I
6/10/21	KAHE 1D	*Melichthys niger*	7	27	10.5956	H	I
6/10/21	KAHE 1D	*Melichthys niger*	2	25	2.4574	H	I
6/10/21	KAHE 1D	*Acanthurus nigrofuscus*	70	8	2.6236	H	I
6/10/21	KAHE 1D	*Acanthurus nigrofuscus*	30	10	2.1238	H	I
6/10/21	KAHE 1D	*Acanthurus nigrofuscus*	30	8	1.1244	H	I
6/10/21	KAHE 1D	*Plectroglyphidodon imparipennis*	2	3	0.0023	MI	I
6/10/21	KAHE 1D	*Cantherhines sandwichiensis*	1	8	0.0633	H	E
6/10/21	KAHE 1D	*Sufflamen bursa*	3	17	0.8228	MI	I
6/10/21	KAHE 1D	*Sufflamen bursa*	3	15	0.5752	MI	I
6/10/21	KAHE 1D	*Canthigaster jactator*	5	5	0.0861	H	E
6/10/21	KAHE 1D	*Canthigaster jactator*	2	3	0.0090	H	E
6/10/21	KAHE 1D	*Chaetodon ornatissimus*	1	15	0.1958	C	I
6/10/21	KAHE 1D	*Chaetodon ornatissimus*	1	17	0.2876	C	I
6/10/21	KAHE 1D	*Stegastes fasciolatus*	2	17	0.4957	H	I
6/10/21	KAHE 1D	*Stegastes fasciolatus*	1	5	0.0056	H	I
6/10/21	KAHE 1D	*Parupeneus bifasciatus*	1	9	0.0127	MI	I
6/10/21	KAHE 1D	*Parupeneus bifasciatus*	1	12	0.0320	MI	I



6/10/21	KAHE 1D	*Aulostomus chinensis*	1	27	0.0121	P	I
6/10/21	KAHE 1D	*Aulostomus chinensis*	1	33	0.0243	P	I
6/10/21	KAHE 1D	*Mulloidichthys vanicolensis*	20	18	1.9545	MI	I
6/10/21	KAHE 1D	*Mulloidichthys vanicolensis*	20	15	1.0906	MI	I
6/10/21	KAHE 1D	*Thalassoma ballieui*	2	17	0.1964	MI	E
6/10/21	KAHE 1D	*Chlorurus sordidus*	1	25	0.3278	H	I
6/10/21	KAHE 1D	*Gomphosus varius*	1	12	0.1119	MI	I
6/10/21	KAHE 1D	*Gomphosus varius*	5	7	0.1462	MI	I
6/10/21	KAHE 1D	*Plectroglyphidodon johnstonianus*	2	7	0.0317	C	I
6/10/21	KAHE 1D	*Ostracion meleagris*	1	5	0.0042	SI	I
6/10/21	KAHE 1D	*Monotaxis grandoculis*	1	15	0.0692	MI	I
6/10/21	KAHE 5B	*Labroides phthirophagus*	3	12	0.0570	P	E
6/10/21	KAHE 5B	*Gomphosus varius*	1	12	0.1119	MI	I
6/10/21	KAHE 5B	*Gomphosus varius*	1	13	0.1366	MI	I
6/10/21	KAHE 5B	*Gomphosus varius*	1	15	0.1951	MI	I
6/10/21	KAHE 5B	*Plectroglyphidodon johnstonianus*	2	6	0.0196	C	I
6/10/21	KAHE 5B	*Plectroglyphidodon johnstonianus*	2	5	0.0112	C	I
6/10/21	KAHE 5B	*Acanthurus nigrofuscus*	20	8	0.7496	H	I
6/10/21	KAHE 5B	*Acanthurus nigrofuscus*	15	10	1.0619	H	I
6/10/21	KAHE 5B	*Acanthurus nigrofuscus*	5	7	0.1281	H	I
6/10/21	KAHE 5B	*Abudefduf vaigiensis*	55	12	13.7028	Z	I
6/10/21	KAHE 5B	*Thalassoma duperrey*	2	12	0.0699	MI	E
6/10/21	KAHE 5B	*Thalassoma duperrey*	1	10	0.0198	MI	E
6/10/21	KAHE 5B	*Thalassoma duperrey*	1	15	0.0701	MI	E
6/10/21	KAHE 5B	*Thalassoma duperrey*	1	17	0.1035	MI	E
6/10/21	KAHE 5B	*Thalassoma duperrey*	2	7	0.0130	MI	E
6/10/21	KAHE 5B	*Chromis vanderbilti*	102	3	0.1280	Z	I
6/10/21	KAHE 5B	*Coris venusta*	1	6	0.0027	MI	E
6/10/21	KAHE 5B	*Zanclus cornutus*	1	13	0.1495	SI	I
6/10/21	KAHE 5B	*Zanclus cornutus*	1	15	0.2255	SI	I
6/10/21	KAHE 5B	*Zanclus cornutus*	2	12	0.2377	SI	I
6/10/21	KAHE 5B	*Sufflamen bursa*	5	12	0.5064	MI	I
6/10/21	KAHE 5B	*Sufflamen bursa*	1	15	0.1917	MI	I
6/10/21	KAHE 5B	*Sufflamen bursa*	1	7	0.0217	MI	I
6/10/21	KAHE 5B	*Plectroglyphidodon imparipennis*	1	3	0.0011	MI	I
6/10/21	KAHE 5B	*Plectroglyphidodon imparipennis*	2	4	0.0056	MI	I
6/10/21	KAHE 5B	*Parupeneus bifasciatus*	5	12	0.1602	MI	I
6/10/21	KAHE 5B	*Parupeneus bifasciatus*	2	10	0.0357	MI	I
6/10/21	KAHE 5B	*Parupeneus bifasciatus*	1	7	0.0057	MI	I
6/10/21	KAHE 5B	*Parupeneus bifasciatus*	1	15	0.0656	MI	I
6/10/21	KAHE 5B	*Paracirrhites forsteri*	1	6	0.0065	P	I
6/10/21	KAHE 5B	*Canthigaster jactator*	1	4	0.0096	H	E
6/10/21	KAHE 5B	*Stethojulis balteata*	1	7	0.0075	MI	E
6/10/21	KAHE 5B	*Stethojulis balteata*	1	9	0.0166	MI	E
6/10/21	KAHE 5B	*Sufflamen fraenatus*	1	18	0.3230	MI	I
6/10/21	KAHE 5B	*Paracirrhites arcatus*	1	10	0.0067	MI	I
6/10/21	KAHE 5B	*Abudefduf abdominalis*	8	15	3.5684	Z	E

6/10/21	KAHE 5B	*Acanthurus olivaceus*	1	17	0.2038	H	I
6/10/21	KAHE 5B	*Calotomus carolinus*	1	14	0.0513	H	I
6/10/21	KAHE 5B	*Chaetodon multicinctus*	2	9	0.0730	C	E
6/10/21	KAHE 5B	*Chaetodon multicinctus*	2	7	0.0343	C	E
6/10/21	KAHE 5B	*Canthigaster jactator*	2	5	0.0345	H	E
6/10/21	NANA 1	*Chromis vanderbilti*	15	3	0.0188	Z	I
6/10/21	NANA 1	*Chromis vanderbilti*	13	2	0.0049	Z	I
6/10/21	NANA 1	*Thalassoma duperrey*	1	6	0.0040	MI	E
6/10/21	NANA 1	*Thalassoma duperrey*	7	4	0.0079	MI	E
6/10/21	NANA 1	*Thalassoma duperrey*	2	5	0.0045	MI	E
6/10/21	NANA 1	*Plectroglyphidodon imparipennis*	5	4	0.0140	MI	I
6/10/21	NANA 1	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
6/10/21	NANA 1	*Ostracion meleagris*	1	5	0.0042	SI	I
6/10/21	NANA 1	*Acanthurus triostegus*	1	4	0.0007	H	I
6/10/21	NANA 1	*Stethojulis balteata*	2	5	0.0052	MI	E
6/10/21	NANA 2	*Acanthurus nigrofuscus*	2	12	0.2381	H	I
6/10/21	NANA 2	*Acanthurus nigrofuscus*	1	10	0.0708	H	I
6/10/21	NANA 2	*Acanthurus nigrofuscus*	3	8	0.1124	H	I
6/10/21	NANA 2	*Sufflamen bursa*	3	18	0.9689	MI	I
6/10/21	NANA 2	*Sufflamen bursa*	2	20	0.8731	MI	I
6/10/21	NANA 2	*Canthigaster jactator*	2	5	0.0345	H	E
6/10/21	NANA 2	*Canthigaster jactator*	2	4	0.0192	H	E
6/10/21	NANA 2	*Rhinecanthus rectangulus*	1	18	0.3230	MI	I
6/10/21	NANA 2	*Monotaxis grandoculis*	1	25	0.3604	MI	I
6/10/21	NANA 2	*Stethojulis balteata*	1	10	0.0231	MI	E
6/10/21	NANA 2	*Stethojulis balteata*	1	7	0.0075	MI	E
6/10/21	NANA 2	*Gomphosus varius*	1	7	0.0292	MI	I
6/10/21	NANA 2	*Stegastes fasciolatus*	1	7	0.0158	H	I
6/10/21	NANA 2	*Acanthurus leucopareius*	45	25	40.0240	H	I
6/10/21	NANA 2	*Acanthurus olivaceus*	6	27	5.0132	H	I
6/10/21	NANA 2	*Acanthurus olivaceus*	4	25	2.6429	H	I
6/10/21	NANA 2	*Acanthurus triostegus*	2	17	0.1934	H	I
6/10/21	NANA 2	*Zebrasoma flavescens*	5	17	3.1274	H	I
6/10/21	NANA 2	*Naso lituratus*	1	22	0.3191	H	I
6/10/21	NANA 2	*Lutjanus fulvus*	1	22	0.2023	MI	X
6/10/21	NANA 2	*Chaetodon ornatissimus*	1	15	0.1958	C	I
6/10/21	NANA 2	*Ctenochaetus strigosus*	3	9	0.1025	D	I
6/10/21	NANA 2	*Ctenochaetus strigosus*	1	12	0.0838	D	I
6/10/21	NANA 2	*Melichthys niger*	1	25	1.2287	H	I
6/10/21	NANA 2	*Melichthys niger*	4	27	6.0546	H	I
6/10/21	NANA 2	*Chromis vanderbilti*	15	3	0.0188	Z	I
6/10/21	NANA 2	*Stethojulis balteata*	1	10	0.0231	MI	E
6/10/21	NANA 2	*Canthigaster amboinensis*	1	7	0.1932	H	I
6/10/21	NANA 2	*Thalassoma duperrey*	1	4	0.0011	MI	E
6/10/21	NANA 2	*Thalassoma duperrey*	1	7	0.0065	MI	E
6/10/21	NANA 2	*Thalassoma duperrey*	1	12	0.0349	MI	E
6/10/21	NANA 2	*Parupeneus bifasciatus*	1	13	0.0414	MI	I
6/10/21	KAHE 7B	*Dascyllus albisella*	1	15	0.1365	Z	E
6/10/21	KAHE 7B	*Dascyllus albisella*	2	10	0.0710	Z	E
6/10/21	KAHE 7B	*Dascyllus albisella*	1	5	0.0036	Z	E
6/10/21	KAHE 7B	*Paracirrhites forsteri*	1	7	0.0104	P	I
6/10/21	KAHE 7B	*Acanthurus olivaceus*	2	18	0.4852	H	I
6/10/21	KAHE 7B	*Acanthurus olivaceus*	2	20	0.6691	H	I
6/10/21	KAHE 7B	*Acanthurus olivaceus*	2	25	1.3214	H	I
6/10/21	KAHE 7B	*Acanthurus olivaceus*	2	12	0.1409	H	I
6/10/21	KAHE 7B	*Naso unicornis*	1	12	0.0906	H	I
6/10/21	KAHE 7B	*Naso lituratus*	1	9	0.0200	H	I
6/10/21	KAHE 7B	*Naso lituratus*	1	20	0.2375	H	I
6/10/21	KAHE 7B	*Sufflamen bursa*	2	17	0.5485	MI	I
6/10/21	KAHE 7B	*Sufflamen bursa*	2	12	0.2026	MI	I

6/10/21	KAHE 7B	*Sufflamen bursa*	3	15	0.5752	MI	I
6/10/21	KAHE 7B	*Acanthurus nigrofuscus*	10	9	0.5243	H	I
6/10/21	KAHE 7B	*Parupeneus cyclostomus*	1	20	0.1509	P	I
6/10/21	KAHE 7B	*Zanclus cornutus*	1	10	0.0704	SI	I
6/10/21	KAHE 7B	*Thalassoma duperrey*	1	22	0.2314	MI	E
6/10/21	KAHE 7B	*Thalassoma duperrey*	2	18	0.2475	MI	E
6/10/21	KAHE 7B	*Thalassoma duperrey*	3	7	0.0195	MI	E
6/10/21	KAHE 7B	*Thalassoma duperrey*	2	12	0.0699	MI	E
6/10/21	KAHE 7B	*Thalassoma duperrey*	1	6	0.0040	MI	E
6/10/21	KAHE 7B	*Thalassoma duperrey*	1	15	0.0701	MI	E
6/10/21	KAHE 7B	*Parupeneus bifasciatus*	1	17	0.0980	MI	I
6/10/21	KAHE 7B	*Parupeneus bifasciatus*	2	20	0.3302	MI	I
6/10/21	KAHE 7B	*Parupeneus bifasciatus*	2	18	0.2354	MI	I
6/10/21	KAHE 7B	*Parupeneus bifasciatus*	3	12	0.0961	MI	I
6/10/21	KAHE 7B	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
6/10/21	KAHE 7B	*Parupeneus pleurostigma*	5	12	0.3155	MI	I
6/10/21	KAHE 7B	*Canthigaster jactator*	1	6	0.0278	H	E
6/10/21	KAHE 7B	*Naso hexacanthus*	1	12	0.0903	Z	I
6/10/21	KAHE 7B	*Naso hexacanthus*	6	15	1.0207	Z	I
6/10/21	KAHE 7B	*Paracirrhites forsteri*	1	7	0.0104	P	I
6/10/21	KAHE 7E	*Sufflamen bursa*	1	20	0.4365	MI	I
6/10/21	KAHE 7E	*Sufflamen bursa*	3	15	0.5752	MI	I
6/10/21	KAHE 7E	*Sufflamen bursa*	1	12	0.1013	MI	I
6/10/21	KAHE 7E	*Sufflamen bursa*	1	18	0.3230	MI	I
6/10/21	KAHE 7E	*Thalassoma duperrey*	3	18	0.3712	MI	E
6/10/21	KAHE 7E	*Thalassoma duperrey*	2	12	0.0699	MI	E
6/10/21	KAHE 7E	*Thalassoma duperrey*	2	9	0.0285	MI	E
6/10/21	KAHE 7E	*Thalassoma duperrey*	1	15	0.0701	MI	E
6/10/21	KAHE 7E	*Parupeneus bifasciatus*	4	10	0.0714	MI	I
6/10/21	KAHE 7E	*Parupeneus bifasciatus*	1	6	0.0035	MI	I
6/10/21	KAHE 7E	*Parupeneus bifasciatus*	2	15	0.1311	MI	I
6/10/21	KAHE 7E	*Parupeneus bifasciatus*	10	7	0.0568	MI	I
6/10/21	KAHE 7E	*Parupeneus bifasciatus*	4	12	0.1281	MI	I
6/10/21	KAHE 7E	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
6/10/21	KAHE 7E	*Paracirrhites arcatus*	1	6	0.0009	MI	I
6/10/21	KAHE 7E	*Paracirrhites arcatus*	1	8	0.0028	MI	I
6/10/21	KAHE 7E	*Canthigaster jactator*	1	4	0.0096	H	E
6/10/21	KAHE 7E	*Acanthurus olivaceus*	1	20	0.3345	H	I
6/10/21	KAHE 7E	*Acanthurus olivaceus*	1	25	0.6607	H	I
6/10/21	KAHE 7E	*Acanthurus triostegus*	10	15	0.6279	H	I
6/10/21	KAHE 7E	*Acanthurus triostegus*	3	20	0.5082	H	I
6/10/21	KAHE 7E	*Naso lituratus*	1	15	0.0973	H	I
6/10/21	KAHE 7E	*Naso lituratus*	2	12	0.0975	H	I
6/10/21	KAHE 7E	*Chromis vanderbilti*	1	2	0.0004	Z	I
6/10/21	KAHE 7E	*Sufflamen fraenatus*	1	18	0.3230	MI	I
6/10/21	KAHE 7E	*Forcipiger flavissimus*	1	12	0.0261	SI	I
6/10/21	KAHE 7E	*Forcipiger flavissimus*	3	8	0.0217	SI	I
6/10/21	KAHE 7E	*Melichthys vidua*	1	27	2.2682	H	I
6/10/21	KAHE 7E	*Caranx melampygus*	1	30	0.6263	P	I
6/10/21	KAHE 7E	*Caranx melampygus*	4	27	1.8283	P	I
6/10/21	KAHE 7E	*Parupeneus cyclostomus*	3	25	0.9122	P	I
6/10/21	KAHE 7E	*Calotomus carolinus*	1	17	0.0972	H	I
6/10/21	KAHE 7E	*Melichthys niger*	4	27	6.0546	H	I
6/10/21	KAHE 7E	*Abudefduf abdominalis*	7	13	2.1492	Z	E
6/10/21	KAHE 7E	*Chaetodon multicinctus*	2	9	0.0730	C	E
6/10/21	KAHE 7E	*Gomphosus varius*	1	14	0.1643	MI	I
6/10/21	KAHE 7E	*Decapterus macarellus*	20	18	0.9790	Z	I
6/10/21	PIPE	*Acanthurus nigrofuscus*	145	12	17.2598	H	I
6/10/21	PIPE	*Acanthurus nigrofuscus*	50	14	9.2350	H	I
6/10/21	PIPE	*Acanthurus nigrofuscus*	50	8	1.8740	H	I

6/10/21	PIPE	*Plectroglyphidodon johnstonianus*	5	6	0.0491	C	I
6/10/21	PIPE	*Plectroglyphidodon johnstonianus*	6	5	0.0335	C	I
6/10/21	PIPE	*Stegastes fasciolatus*	6	8	0.1437	H	I
6/10/21	PIPE	*Stegastes fasciolatus*	1	7	0.0158	H	I
6/10/21	PIPE	*Thalassoma duperrey*	4	20	0.6876	MI	E
6/10/21	PIPE	*Thalassoma duperrey*	9	8	0.0887	MI	E
6/10/21	PIPE	*Thalassoma duperrey*	17	12	0.5937	MI	E
6/10/21	PIPE	*Thalassoma duperrey*	10	15	0.7006	MI	E
6/10/21	PIPE	*Thalassoma duperrey*	3	7	0.0195	MI	E
6/10/21	PIPE	*Thalassoma duperrey*	7	17	0.7248	MI	E
6/10/21	PIPE	*Thalassoma duperrey*	3	10	0.0593	MI	E
6/10/21	PIPE	*Paracirrhites forsteri*	1	15	0.1090	P	I
6/10/21	PIPE	*Paracirrhites forsteri*	2	17	0.3205	P	I
6/10/21	PIPE	*Paracirrhites forsteri*	1	12	0.0548	P	I
6/10/21	PIPE	*Zanclus cornutus*	13	15	2.9312	SI	I
6/10/21	PIPE	*Zanclus cornutus*	5	12	0.5942	SI	I
6/10/21	PIPE	*Pervagor aspricaudus*	3	6	0.0405	H	I
6/10/21	PIPE	*Pervagor aspricaudus*	3	12	0.2799	H	I
6/10/21	PIPE	*Pervagor aspricaudus*	2	8	0.0602	H	I
6/10/21	PIPE	*Pervagor aspricaudus*	1	5	0.0081	H	I
6/10/21	PIPE	*Pervagor aspricaudus*	1	9	0.0418	H	I
6/10/21	PIPE	*Chromis vanderbilti*	70	3	0.0879	Z	I
6/10/21	PIPE	*Chromis vanderbilti*	10	2	0.0037	Z	I
6/10/21	PIPE	*Sufflamen bursa*	3	15	0.5752	MI	I
6/10/21	PIPE	*Sufflamen bursa*	2	12	0.2026	MI	I
6/10/21	PIPE	*Sufflamen bursa*	2	18	0.6459	MI	I
6/10/21	PIPE	*Parupeneus bifasciatus*	6	12	0.1922	MI	I
6/10/21	PIPE	*Parupeneus bifasciatus*	4	18	0.4708	MI	I
6/10/21	PIPE	*Parupeneus bifasciatus*	4	20	0.6603	MI	I
6/10/21	PIPE	*Parupeneus bifasciatus*	2	15	0.1311	MI	I
6/10/21	PIPE	*Parupeneus bifasciatus*	3	9	0.0382	MI	I
6/10/21	PIPE	*Naso lituratus*	1	7	0.0092	H	I
6/10/21	PIPE	*Naso lituratus*	1	12	0.0487	H	I
6/10/21	PIPE	*Rhinecanthus rectangulus*	1	12	0.1013	MI	I
6/10/21	PIPE	*Cantherhines sandwichiensis*	1	14	0.2697	H	E
6/10/21	PIPE	*Dascyllus albisella*	17	12	1.1061	Z	E
6/10/21	PIPE	*Mulloidichthys flavolineatus*	20	20	4.7184	MI	I
6/10/21	PIPE	*Gomphosus varius*	1	18	0.3072	MI	I
6/10/21	PIPE	*Gomphosus varius*	3	7	0.0877	MI	I
6/10/21	PIPE	*Gomphosus varius*	1	15	0.1951	MI	I
6/10/21	PIPE	*Gomphosus varius*	1	10	0.0711	MI	I
6/10/21	PIPE	*Stegastes fasciolatus*	4	8	0.0958	H	I
6/10/21	PIPE	*Thalassoma trilobatum*	7	25	3.5751	MI	I
6/10/21	PIPE	*Thalassoma trilobatum*	2	22	0.6988	MI	I
6/10/21	PIPE	*Thalassoma trilobatum*	4	20	1.0530	MI	I
6/10/21	PIPE	*Thalassoma trilobatum*	1	28	0.7151	MI	I
6/10/21	PIPE	*Abudefduf vaigiensis*	21	13	6.4476	Z	I
6/10/21	PIPE	*Abudefduf vaigiensis*	75	15	33.4536	Z	I
6/10/21	PIPE	*Abudefduf vaigiensis*	50	12	12.4571	Z	I
6/10/21	PIPE	*Canthigaster jactator*	3	6	0.0835	H	E
6/10/21	PIPE	*Canthigaster jactator*	3	4	0.0287	H	E
6/10/21	PIPE	*Canthigaster jactator*	2	5	0.0345	H	E
6/10/21	PIPE	*Stethojulis balteata*	11	12	0.4526	MI	E
6/10/21	PIPE	*Stethojulis balteata*	47	10	1.0870	MI	E
6/10/21	PIPE	*Stethojulis balteata*	20	8	0.2285	MI	E
6/10/21	PIPE	*Stethojulis balteata*	1	15	0.0833	MI	E
6/10/21	PIPE	*Monotaxis grandoculis*	1	17	0.1037	MI	I
6/10/21	PIPE	*Monotaxis grandoculis*	1	23	0.2753	MI	I

6/10/21	PIPE	*Sargocentron xantherythrum*	1	13	0.0484	MI	
6/10/21	PIPE	*Zebrasoma flavescens*	1	8	0.0957	H	I
6/10/21	PIPE	*Chromis ovalis*	3	12	0.2377	Z	E
6/10/21	PIPE	*Chromis ovalis*	2	14	0.2512	Z	E
6/10/21	PIPE	*Ctenochaetus strigosus*	1	7	0.0156	D	I
6/10/21	PIPE	*Ctenochaetus strigosus*	2	15	0.3363	D	I
6/10/21	PIPE	*Ctenochaetus strigosus*	3	12	0.2515	D	I
6/10/21	PIPE	*Chaetodon lunula*	1	13	0.0747	SI	I
6/10/21	PIPE	*Melichthys vidua*	1	13	0.3441	H	I
6/10/21	PIPE	*Parupeneus cyclostomus*	1	23	0.2340	P	I
6/10/21	PIPE	*Exallias brevis*	1	15	0.0318	C	I
6/10/21	PIPE	*Mulloidichthys vanicolensis*	420	15	22.9018	MI	I
6/10/21	PIPE	*Mulloidichthys vanicolensis*	30	10	0.4469	MI	I
6/10/21	PIPE	*Chaetodon multicinctus*	2	13	0.2209	C	E
6/10/21	PIPE	*Chaetodon multicinctus*	2	7	0.0343	C	E
6/10/21	PIPE	*Chaetodon multicinctus*	2	10	0.1003	C	E
6/10/21	PIPE	*Chaetodon kleinii*	4	12	0.4049	Z	I
6/10/21	PIPE	*Halichoeres ornatissimus*	1	14	0.3809	MI	I
6/10/21	PIPE	*Chaetodon ornatissimus*	2	6	0.0235	C	I
6/10/21	PIPE	*Lutjanus kasmira*	350	15	9.9537	MI	X
6/10/21	PIPE	*Lutjanus kasmira*	250	12	3.2055	MI	X
6/10/21	PIPE	*Sufflamen fraenatus*	1	25	0.8264	MI	I
6/10/21	PIPE	*Sufflamen fraenatus*	1	20	0.4365	MI	I
6/10/21	PIPE	*Abudefduf abdominalis*	40	15	17.8419	Z	E
6/10/21	PIPE	*Abudefduf abdominalis*	25	13	7.6757	Z	E
6/10/21	PIPE	*Abudefduf abdominalis*	50	12	12.4571	Z	E
6/10/21	PIPE	*Melichthys niger*	1	28	1.6704	H	I
6/10/21	PIPE	*Melichthys niger*	1	17	0.4321	H	I
6/10/21	PIPE	*Chlorurus sordidus*	1	25	0.3278	H	I
6/10/21	PIPE	*Chlorurus sordidus*	1	27	0.4242	H	I
6/10/21	PIPE	*Chlorurus sordidus*	1	10	0.0152	H	I
6/10/21	PIPE	*Cantherhines dumerilii*	1	25	0.3247	C	I
6/10/21	PIPE	*Coris gaimard*	1	18	0.0742	MI	I
6/10/21	PIPE	*Coris gaimard*	1	17	0.0615	MI	I
6/10/21	PIPE	*Naso hexacanthus*	1	17	0.2427	Z	I
6/10/21	PIPE	*Decapterus macarellus*	70	15	1.9329	Z	I
6/10/21	PIPE	*Forcipiger flavissimus*	2	12	0.0522	SI	I
6/10/21	PIPE	*Forcipiger flavissimus*	2	10	0.0293	SI	I
6/10/21	PIPE	*Chromis agilis*	6	6	0.0598	Z	I
6/10/21	PIPE	*Chromis hanui*	1	5	0.0058	Z	E
6/10/21	PIPE	*Chaetodon unimaculatus*	2	12	0.1492	C	I
6/10/21	PIPE	*Ostracion meleagris*	1	6	0.0075	SI	I
6/10/21	PIPE	*Ostracion meleagris*	1	4	0.0021	SI	I
6/10/21	PIPE	*Naso unicornis*	3	35	5.6803	H	I
6/10/21	PIPE	*Naso unicornis*	2	30	2.4443	H	I
6/10/21	PIPE	*Acanthurus guttatus*	15	18	4.8505	H	I
6/10/21	PIPE	*Acanthurus guttatus*	5	20	2.2366	H	I
6/10/21	PIPE	*Chaetodon quadrimaculatus*	2	12	0.1492	C	I
6/10/21	PIPE	*Labroides phthirophagus*	1	6	0.0024	P	E
6/10/21	PIPE	*Myripristis kuntee*	4	17	0.9382	Z	I
6/10/21	PIPE	*Acanthurus olivaceus*	2	22	0.8948	H	I
6/10/21	PIPE	*Myripristis kuntee*	3	15	0.4913	Z	I
7/27/21	East 1	*Plectroglyphidodon imparipennis*	2	5	0.0112	MI	I
7/27/21	East 1	*Plectroglyphidodon imparipennis*	1	2	0.0003	MI	I
7/27/21	East 1	*Rhinecanthus rectangulus*	6	20	2.6192	MI	I
7/27/21	East 1	*Rhinecanthus rectangulus*	5	22	2.8667	MI	I
7/27/21	East 1	*Rhinecanthus rectangulus*	1	18	0.3230	MI	I
7/27/21	East 1	*Acanthurus triostegus*	50	20	8.4701	H	I
7/27/21	East 1	*Acanthurus triostegus*	20	25	7.3162	H	I
7/27/21	East 1	*Acanthurus blochii*	5	30	2.7000	H	I

7/27/21	East 1	*Acanthurus blochii*	5	35	4.2875	H	I
7/27/21	East 1	*Acanthurus dussumieri*	3	30	1.6200	H	I
7/27/21	East 1	*Acanthurus dussumieri*	2	35	1.7150	H	I
7/27/21	East 1	*Acanthurus dussumieri*	1	55	3.3275	H	I
7/27/21	East 1	*Chromis vanderbilti*	31	2	0.0116	Z	I
7/27/21	East 1	*Acanthurus olivaceus*	8	35	14.7503	H	I
7/27/21	East 1	*Acanthurus olivaceus*	20	30	23.0437	H	I
7/27/21	East 1	*Bodianus bilunulatus*	1	45	3.0668	MI	I
7/27/21	East 1	*Lutjanus fulvus*	2	30	1.0260	MI	X
7/27/21	East 1	*Naso brevirostris*	1	30	1.2181	Z	I
7/27/21	East 1	*Acanthurus nigrofuscus*	10	12	1.1903	H	I
7/27/21	East 1	*Acanthurus nigrofuscus*	20	10	1.4159	H	I
7/27/21	East 1	*Naso unicornis*	1	35	1.8934	H	I
7/27/21	East 1	*Forcipiger flavissimus*	2	13	0.0673	SI	I
7/27/21	East 1	*Labroides phthirophagus*	1	7	0.0038	P	E
7/27/21	East 1	*Melichthys niger*	2	25	2.4574	H	I
7/27/21	East 1	*Chaetodon quadrimaculatus*	1	14	0.1214	C	I
7/27/21	East 1	*Thalassoma duperrey*	4	8	0.0394	MI	E
7/27/21	East 1	*Thalassoma duperrey*	3	10	0.0593	MI	E
7/27/21	East 1	*Thalassoma duperrey*	3	5	0.0068	MI	E
7/27/21	East 1	*Thalassoma duperrey*	1	15	0.0701	MI	E
7/27/21	East 1	*Stethojulis balteata*	2	7	0.0150	MI	E
7/27/21	East 3	*Plectroglyphidodon johnstonianus*	5	5	0.0279	C	I
7/27/21	East 3	*Plectroglyphidodon johnstonianus*	3	7	0.0475	C	I
7/27/21	East 3	*Acanthurus nigrofuscus*	16	9	0.8389	H	I
7/27/21	East 3	*Acanthurus nigrofuscus*	7	12	0.8332	H	I
7/27/21	East 3	*Acanthurus nigrofuscus*	5	10	0.3540	H	I
7/27/21	East 3	*Thalassoma duperrey*	5	6	0.0201	MI	E
7/27/21	East 3	*Thalassoma duperrey*	3	10	0.0593	MI	E
7/27/21	East 3	*Canthigaster jactator*	5	5	0.0861	H	E
7/27/21	East 3	*Canthigaster jactator*	1	3	0.0045	H	E
7/27/21	East 3	*Chaetodon multicinctus*	2	5	0.0124	C	E
7/27/21	East 3	*Chaetodon multicinctus*	4	10	0.2006	C	E
7/27/21	East 3	*Melichthys vidua*	3	25	5.5791	H	I
7/27/21	East 3	*Melichthys vidua*	2	27	4.5363	H	I
7/27/21	East 3	*Melichthys vidua*	1	30	2.9767	H	I
7/27/21	East 3	*Ctenochaetus strigosus*	10	10	0.4746	D	I
7/27/21	East 3	*Ctenochaetus strigosus*	2	8	0.0473	D	I
7/27/21	East 3	*Chaetodon ornatissimus*	2	18	0.6854	C	I
7/27/21	East 3	*Chaetodon ornatissimus*	1	15	0.1958	C	I
7/27/21	East 3	*Ostracion meleagris*	1	8	0.0186	SI	I
7/27/21	East 3	*Chromis vanderbilti*	50	3	0.0628	Z	I
7/27/21	East 3	*Stegastes fasciolatus*	4	10	0.1914	H	I
7/27/21	East 3	*Sufflamen bursa*	1	17	0.2743	MI	I
7/27/21	East 3	*Parupeneus bifasciatus*	1	12	0.0320	MI	I
7/27/21	East 3	*Gomphosus varius*	2	10	0.1422	MI	I
7/27/21	East 3	*Coris venusta*	1	12	0.0248	MI	E
7/27/21	East 3	*Stethojulis balteata*	3	8	0.0343	MI	E
7/27/21	East 3	*Paracirrhites arcatus*	2	8	0.0057	MI	I
7/27/21	East 4	*Canthigaster jactator*	6	7	0.2504	H	E
7/27/21	East 4	*Canthigaster jactator*	2	5	0.0345	H	E
7/27/21	East 4	*Acanthurus blochii*	1	27	0.3937	H	I
7/27/21	East 4	*Melichthys vidua*	5	25	9.2985	H	I
7/27/21	East 4	*Melichthys vidua*	1	30	2.9767	H	I
7/27/21	East 4	*Gomphosus varius*	1	15	0.1951	MI	I
7/27/21	East 4	*Gomphosus varius*	2	10	0.1422	MI	I
7/27/21	East 4	*Chromis vanderbilti*	105	2	0.0392	Z	I
7/27/21	East 4	*Chromis vanderbilti*	45	3	0.0565	Z	I

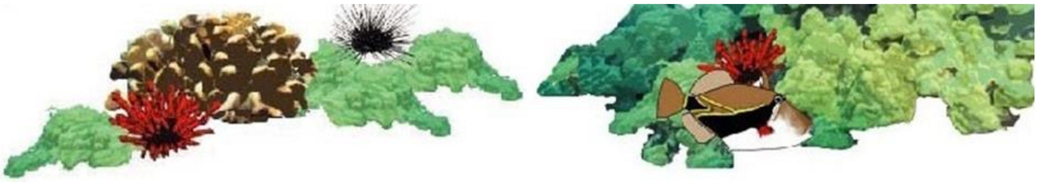
7/27/21	East 4	*Thalassoma duperrey*	5	7	0.0325	MI	E
7/27/21	East 4	*Thalassoma duperrey*	10	10	0.1977	MI	E
7/27/21	East 4	*Thalassoma duperrey*	4	5	0.0091	MI	E
7/27/21	East 4	*Thalassoma duperrey*	1	15	0.0701	MI	E
7/27/21	East 4	*Ctenochaetus strigosus*	1	5	0.0055	D	I
7/27/21	East 4	*Macropharyngodon geoffroyi*	4	5	0.0277	MI	E
7/27/21	East 4	*Acanthurus nigrofuscus*	30	10	2.1238	H	I
7/27/21	East 4	*Acanthurus olivaceus*	1	30	1.1522	H	I
7/27/21	East 4	*Zebrasoma flavescens*	1	20	0.9375	H	I
7/27/21	East 4	*Chaetodon lunula*	2	17	0.3341	SI	I
7/27/21	East 4	*Chaetodon lunula*	1	5	0.0043	SI	I
7/27/21	East 4	*Canthigaster coronata*	1	8	0.0593	SI	I
7/27/21	East 4	*Stethojulis balteata*	2	8	0.0229	MI	E
7/27/21	East 4	*Stethojulis balteata*	1	10	0.0231	MI	E
7/27/21	East 4	*Parupeneus bifasciatus*	1	7	0.0057	MI	I
7/27/21	East 4	*Chaetodon quadrimaculatus*	1	5	0.0047	C	I
7/27/21	East 4	*Naso lituratus*	1	27	0.6021	H	I
7/27/21	East 4	*Rhinecanthus rectangulus*	2	20	0.8731	MI	I
7/27/21	East 4	*Rhinecanthus rectangulus*	1	23	0.6511	MI	I
7/27/21	East 4	*Paracirrhites arcatus*	3	6	0.0028	MI	I
7/27/21	East 4	*Paracirrhites forsteri*	1	9	0.0226	P	I
7/27/21	East 4	*Paracirrhites forsteri*	1	12	0.0548	P	I
7/27/21	East 4	*Sufflamen fraenatus*	1	30	1.3920	MI	I
7/27/21	East 4	*Acanthurus olivaceus*	1	30	1.1522	H	I
7/27/21	East 4	*Acanthurus olivaceus*	1	35	1.8438	H	I
7/27/21	KO 1	*Lutjanus fulvus*	2	25	0.5938	MI	X
7/27/21	KO 1	*Chaetodon multicinctus*	4	12	0.3472	C	E
7/27/21	KO 1	*Ctenochaetus strigosus*	1	5	0.0055	D	I
7/27/21	KO 1	*Ctenochaetus strigosus*	25	12	2.0955	D	I
7/27/21	KO 1	*Ctenochaetus strigosus*	12	15	2.0178	D	I
7/27/21	KO 1	*Acanthurus nigrofuscus*	10	10	0.7079	H	I
7/27/21	KO 1	*Acanthurus nigrofuscus*	10	12	1.1903	H	I
7/27/21	KO 1	*Acanthurus nigrofuscus*	10	7	0.2562	H	I
7/27/21	KO 1	*Thalassoma duperrey*	5	10	0.0989	MI	E
7/27/21	KO 1	*Thalassoma duperrey*	2	12	0.0699	MI	E
7/27/21	KO 1	*Thalassoma duperrey*	1	15	0.0701	MI	E
7/27/21	KO 1	*Thalassoma duperrey*	1	5	0.0023	MI	E
7/27/21	KO 1	*Melichthys niger*	7	30	14.0970	H	I
7/27/21	KO 1	*Melichthys niger*	7	27	10.5956	H	I
7/27/21	KO 1	*Chaetodon unimaculatus*	2	15	0.3019	C	I
7/27/21	KO 1	*Plectroglyphidodon johnstonianus*	2	8	0.0479	C	I
7/27/21	KO 1	*Plectroglyphidodon johnstonianus*	1	5	0.0056	C	I
7/27/21	KO 1	*Gomphosus varius*	4	12	0.4477	MI	I
7/27/21	KO 1	*Gomphosus varius*	1	7	0.0292	MI	I
7/27/21	KO 1	*Gomphosus varius*	2	5	0.0253	MI	I
7/27/21	KO 1	*Chromis vanderbilti*	10	2	0.0037	Z	I
7/27/21	KO 1	*Sufflamen bursa*	1	15	0.1917	MI	I
7/27/21	KO 1	*Sufflamen bursa*	1	20	0.4365	MI	I
7/27/21	KO 1	*Paracirrhites arcatus*	1	8	0.0028	MI	I
7/27/21	KO 2	*Acanthurus nigrofuscus*	45	10	3.1858	H	I
7/27/21	KO 2	*Acanthurus nigrofuscus*	10	12	1.1903	H	I
7/27/21	KO 2	*Acanthurus olivaceus*	18	27	15.0395	H	I
7/27/21	KO 2	*Acanthurus olivaceus*	15	30	17.2828	H	I
7/27/21	KO 2	*Zebrasoma flavescens*	2	15	0.9160	H	I
7/27/21	KO 2	*Zebrasoma flavescens*	4	5	0.1188	H	I
7/27/21	KO 2	*Zebrasoma flavescens*	2	10	0.3338	H	I
7/27/21	KO 2	*Ctenochaetus strigosus*	10	20	4.1259	D	I
7/27/21	KO 2	*Ctenochaetus strigosus*	20	15	3.3631	D	I

7/27/21	KO 2	*Abudefduf abdominalis*	4	18	2.8715	Z	E
7/27/21	KO 2	*Chaetodon unimaculatus*	2	18	0.5371	C	I
7/27/21	KO 2	*Chaetodon unimaculatus*	2	15	0.3019	C	I
7/27/21	KO 2	*Acanthurus nigricans*	1	17	0.3212	H	I
7/27/21	KO 2	*Thalassoma duperrey*	5	8	0.0493	MI	E
7/27/21	KO 2	*Thalassoma duperrey*	2	10	0.0395	MI	E
7/27/21	KO 2	*Thalassoma duperrey*	1	12	0.0349	MI	E
7/27/21	KO 2	*Plectroglyphidodon imparipennis*	5	5	0.0279	MI	I
7/27/21	KO 2	*Melichthys vidua*	1	27	2.2682	H	I
7/27/21	KO 2	*Melichthys vidua*	2	30	5.9533	H	I
7/27/21	KO 2	*Melichthys niger*	10	27	15.1365	H	I
7/27/21	KO 2	*Melichthys niger*	3	30	6.0416	H	I
7/27/21	KO 2	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
7/27/21	KO 2	*Plectroglyphidodon johnstonianus*	4	6	0.0393	C	I
7/27/21	KO 2	*Sufflamen bursa*	1	15	0.1917	MI	I
7/27/21	KO 2	*Paracirrhites arcatus*	2	7	0.0034	MI	I
7/27/21	KO 2	*Gomphosus varius*	1	8	0.0408	MI	I
7/27/21	KO 2	*Gomphosus varius*	2	10	0.1422	MI	I
7/27/21	KO 2	*Gomphosus varius*	1	15	0.1951	MI	I
7/27/21	KO 2	*Sufflamen fraenatus*	1	27	1.0299	MI	I
7/27/21	KO 2	*Sufflamen fraenatus*	1	30	1.3920	MI	I
7/27/21	KO 2	*Canthigaster jactator*	1	6	0.0278	H	E
7/27/21	KO 2	*Canthigaster jactator*	1	4	0.0096	H	E
7/27/21	KO 2	*Stethojulis balteata*	1	10	0.0231	MI	E
7/27/21	KO 2	*Acanthurus triostegus*	30	15	1.8836	H	I
7/27/21	KO 2	*Acanthurus triostegus*	20	20	3.3880	H	I
7/27/21	KO 2	*Acanthurus triostegus*	10	18	1.1777	H	I
7/27/21	KO 2	*Chlorurus sordidus*	1	30	0.6038	H	I
7/27/21	KO 2	*Forcipiger flavissimus*	1	15	0.0529	SI	I
7/27/21	KO 2	*Chaetodon ornatissimus*	2	18	0.6854	C	I
7/27/21	KO 2	*Chaetodon multicinctus*	2	9	0.0730	C	E
7/27/21	KO 2	*Labroides phthirophagus*	2	6	0.0048	P	E
7/27/21	KO 2	*Sargocentron spiniferum*	1	27	2.5766	MI	I
7/27/21	KAHE 1D	*Acanthurus nigrofuscus*	30	12	3.5710	H	I
7/27/21	KAHE 1D	*Acanthurus nigrofuscus*	10	10	0.7079	H	I
7/27/21	KAHE 1D	*Thalassoma duperrey*	1	20	0.1719	MI	E
7/27/21	KAHE 1D	*Thalassoma duperrey*	3	15	0.2102	MI	E
7/27/21	KAHE 1D	*Thalassoma duperrey*	4	10	0.0791	MI	E
7/27/21	KAHE 1D	*Thalassoma duperrey*	3	8	0.0296	MI	E
7/27/21	KAHE 1D	*Thalassoma duperrey*	2	18	0.2475	MI	E
7/27/21	KAHE 1D	*Thalassoma duperrey*	4	12	0.1397	MI	E
7/27/21	KAHE 1D	*Ctenochaetus strigosus*	25	12	2.0955	D	I
7/27/21	KAHE 1D	*Ctenochaetus strigosus*	20	10	0.9491	D	I
7/27/21	KAHE 1D	*Ctenochaetus strigosus*	10	15	1.6815	D	I
7/27/21	KAHE 1D	*Abudefduf vaigiensis*	2	12	0.4983	Z	I
7/27/21	KAHE 1D	*Acanthurus triostegus*	1	10	0.0155	H	I

7/27/21	KAHE 1D	*Acanthurus triostegus*	4	8	0.0287	H	I
7/27/21	KAHE 1D	*Canthigaster jactator*	6	5	0.1034	H	E
7/27/21	KAHE 1D	*Gomphosus varius*	3	8	0.1223	MI	I
7/27/21	KAHE 1D	*Stethojulis balteata*	3	10	0.0694	MI	E
7/27/21	KAHE 1D	*Stethojulis balteata*	2	8	0.0229	MI	E
7/27/21	KAHE 1D	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
7/27/21	KAHE 1D	*Sufflamen bursa*	1	20	0.4365	MI	I
7/27/21	KAHE 1D	*Sufflamen bursa*	2	8	0.0635	MI	I
7/27/21	KAHE 1D	*Stegastes fasciolatus*	1	8	0.0240	H	I
7/27/21	KAHE 1D	*Melichthys niger*	2	27	3.0273	H	I
7/27/21	KAHE 1D	*Melichthys niger*	1	30	2.0139	H	I
7/27/21	KAHE 1D	*Melichthys niger*	1	15	0.3078	H	I
7/27/21	KAHE 1D	*Acanthurus olivaceus*	2	15	0.2782	H	I
7/27/21	KAHE 1D	*Acanthurus olivaceus*	3	8	0.0614	H	I
7/27/21	KAHE 1D	*Acanthurus olivaceus*	3	10	0.1212	H	I
7/27/21	KAHE 1D	*Myripristis berndti*	2	12	0.1726	Z	I
7/27/21	KAHE 1D	*Gomphosus varius*	1	7	0.0292	MI	I
7/27/21	KAHE 1D	*Stegastes fasciolatus*	1	7	0.0158	H	I
7/27/21	KAHE 1D	*Rhinecanthus rectangulus*	1	13	0.1273	MI	I
7/27/21	PIPE	*Stethojulis balteata*	1	12	0.0411	MI	E
7/27/21	PIPE	*Stethojulis balteata*	1	10	0.0231	MI	E
7/27/21	PIPE	*Stethojulis balteata*	10	13	0.5299	MI	E
7/27/21	PIPE	*Stethojulis balteata*	60	15	4.9971	MI	E
7/27/21	PIPE	*Stethojulis balteata*	10	18	1.4818	MI	E
7/27/21	PIPE	*Stegastes fasciolatus*	3	7	0.0475	H	I
7/27/21	PIPE	*Stegastes fasciolatus*	4	10	0.1914	H	I
7/27/21	PIPE	*Thalassoma duperrey*	45	15	3.1529	MI	E
7/27/21	PIPE	*Thalassoma duperrey*	15	12	0.5239	MI	E
7/27/21	PIPE	*Thalassoma duperrey*	2	5	0.0045	MI	E
7/27/21	PIPE	*Thalassoma duperrey*	3	20	0.5157	MI	E
7/27/21	PIPE	*Thalassoma duperrey*	10	18	1.2375	MI	E
7/27/21	PIPE	*Thalassoma duperrey*	9	23	2.3929	MI	E
7/27/21	PIPE	*Zanclus cornutus*	5	13	0.7477	SI	I
7/27/21	PIPE	*Zanclus cornutus*	1	15	0.2255	SI	I
7/27/21	PIPE	*Dascyllus albisella*	4	8	0.0677	Z	E
7/27/21	PIPE	*Dascyllus albisella*	4	10	0.1421	Z	E
7/27/21	PIPE	*Chlorurus sordidus*	4	23	0.9916	H	I
7/27/21	PIPE	*Chlorurus sordidus*	20	25	6.5560	H	I
7/27/21	PIPE	*Chlorurus sordidus*	7	20	1.0866	H	I
7/27/21	PIPE	*Chlorurus sordidus*	2	27	0.8484	H	I
7/27/21	PIPE	*Chlorurus sordidus*	4	30	2.4150	H	I

7/27/21	PIPE	*Acanthurus nigrofuscus*	3	8	0.1124	H	I
7/27/21	PIPE	*Acanthurus nigrofuscus*	27	12	3.2139	H	I
7/27/21	PIPE	*Acanthurus nigrofuscus*	205	10	14.5129	H	I
7/27/21	PIPE	*Acanthurus nigrofuscus*	50	15	11.2417	H	I
7/27/21	PIPE	*Lutjanus kasmira*	80	12	1.0257	MI	X
7/27/21	PIPE	*Lutjanus kasmira*	200	10	1.3375	MI	X
7/27/21	PIPE	*Lutjanus kasmira*	20	15	0.5688	MI	X
7/27/21	PIPE	*Lutjanus kasmira*	360	20	28.5925	MI	X
7/27/21	PIPE	*Sufflamen fraenatus*	1	23	0.6511	MI	I
7/27/21	PIPE	*Melichthys niger*	10	25	12.2870	H	I
7/27/21	PIPE	*Melichthys niger*	1	27	1.5137	H	I
7/27/21	PIPE	*Gomphosus varius*	1	10	0.0711	MI	I
7/27/21	PIPE	*Gomphosus varius*	2	13	0.2732	MI	I
7/27/21	PIPE	*Gomphosus varius*	4	15	0.7803	MI	I
7/27/21	PIPE	*Gomphosus varius*	1	18	0.3072	MI	I
7/27/21	PIPE	*Naso lituratus*	1	25	0.4743	H	I
7/27/21	PIPE	*Melichthys vidua*	1	22	1.3372	H	I
7/27/21	PIPE	*Aulostomus chinensis*	1	22	0.0060	P	I
7/27/21	PIPE	*Aulostomus chinensis*	1	45	0.0707	P	I
7/27/21	PIPE	*Chaetodon multicinctus*	1	10	0.0501	C	E
7/27/21	PIPE	*Chaetodon multicinctus*	3	12	0.2604	C	E
7/27/21	PIPE	*Sufflamen bursa*	2	15	0.3835	MI	I
7/27/21	PIPE	*Canthigaster jactator*	6	5	0.1034	H	E
7/27/21	PIPE	*Canthigaster jactator*	3	3	0.0135	H	E
7/27/21	PIPE	*Canthigaster jactator*	4	6	0.1113	H	E
7/27/21	PIPE	*Parupeneus bifasciatus*	1	22	0.2242	MI	I
7/27/21	PIPE	*Parupeneus bifasciatus*	1	18	0.1177	MI	I
7/27/21	PIPE	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
7/27/21	PIPE	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
7/27/21	PIPE	*Selar crumenophthalmus*	3	22	1.4295	Z	I
7/27/21	PIPE	*Cantherhines sandwichiensis*	1	18	0.5171	H	E
7/27/21	PIPE	*Abudefduf vaigiensis*	155	15	69.1375	Z	I
7/27/21	PIPE	*Chromis agilis*	2	6	0.0199	Z	I
7/27/21	PIPE	*Chromis vanderbilti*	15	2	0.0056	Z	I
7/27/21	PIPE	*Chromis vanderbilti*	30	3	0.0377	Z	I
7/27/21	PIPE	*Chaetodon ornatissimus*	1	7	0.0189	C	I
7/27/21	PIPE	*Chaetodon ornatissimus*	1	9	0.0408	C	I
7/27/21	PIPE	*Monotaxis grandoculis*	29	25	10.4505	MI	I
7/27/21	PIPE	*Monotaxis grandoculis*	5	20	0.8764	MI	I
7/27/21	PIPE	*Monotaxis grandoculis*	1	15	0.0692	MI	I
7/27/21	PIPE	*Mulloidichthys vanicolensis*	30	20	4.1072	MI	I
7/27/21	PIPE	*Pervagor aspricaudus*	4	8	0.1204	H	I
7/27/21	PIPE	*Forcipiger flavissimus*	3	12	0.0783	SI	I
7/27/21	PIPE	*Chromis hanui*	1	6	0.0100	Z	E
7/27/21	PIPE	*Novaculichthys taeniourus*	1	4	0.0011	MI	I
7/27/21	PIPE	*Plectroglyphidodon johnstonianus*	1	7	0.0158	C	I
7/27/21	PIPE	*Myripristis berndti*	6	18	1.6582	Z	I
7/27/21	PIPE	*Ctenochaetus strigosus*	3	15	0.5045	D	I
7/27/21	PIPE	*Chaetodon multicinctus*	1	8	0.0256	C	E
7/27/21	PIPE	*Chromis ovalis*	7	10	0.3215	Z	E
7/27/21	PIPE	*Chaetodon fremblii*	1	9	0.0487	SI	E
7/27/21	PIPE	*Chaetodon fremblii*	1	12	0.1103	SI	E
7/27/21	PIPE	*Gomphosus varius*	1	12	0.1119	MI	I
7/27/21	PIPE	*Gomphosus varius*	3	10	0.2132	MI	I
7/27/21	PIPE	*Naso unicornis*	3	50	15.6419	H	I
7/27/21	PIPE	*Naso unicornis*	3	30	3.6664	H	I
7/27/21	PIPE	*Naso unicornis*	2	40	5.5332	H	I
7/27/21	PIPE	*Thalassoma purpureum*	1	25	0.2939	MI	I
7/27/21	PIPE	*Chaetodon miliaris*	3	12	0.3037	Z	E

7/27/21	PIPE	*Scomberoides lysan*	1	25	0.1422	P	I
7/27/21	PIPE	*Chaetodon fremblii*	2	13	0.2769	SI	E
7/27/21	KAHE 5B	*Thalassoma duperrey*	1	22	0.2314	MI	E
7/27/21	KAHE 5B	*Thalassoma duperrey*	2	15	0.1401	MI	E
7/27/21	KAHE 5B	*Thalassoma duperrey*	4	10	0.0791	MI	E
7/27/21	KAHE 5B	*Thalassoma duperrey*	2	5	0.0045	MI	E
7/27/21	KAHE 5B	*Thalassoma duperrey*	1	18	0.1237	MI	E
7/27/21	KAHE 5B	*Acanthurus nigrofuscus*	25	10	1.7699	H	I
7/27/21	KAHE 5B	*Acanthurus nigrofuscus*	5	8	0.1874	H	I
7/27/21	KAHE 5B	*Acanthurus nigrofuscus*	10	12	1.1903	H	I
7/27/21	KAHE 5B	*Chromis vanderbilti*	35	3	0.0439	Z	I
7/27/21	KAHE 5B	*Ctenochaetus strigosus*	1	10	0.0475	D	I
7/27/21	KAHE 5B	*Canthigaster jactator*	4	5	0.0689	H	E
7/27/21	KAHE 5B	*Labroides phthirophagus*	1	4	0.0007	P	E
7/27/21	KAHE 5B	*Paracirrhites forsteri*	1	12	0.0548	P	I
7/27/21	KAHE 5B	*Sufflamen bursa*	2	20	0.8731	MI	I
7/27/21	KAHE 5B	*Zanclus cornutus*	2	15	0.4510	SI	I
7/27/21	KAHE 5B	*Parupeneus bifasciatus*	4	12	0.1281	MI	I
7/27/21	KAHE 5B	*Parupeneus bifasciatus*	2	18	0.2354	MI	I
7/27/21	KAHE 5B	*Parupeneus bifasciatus*	4	18	0.4708	MI	I
7/27/21	KAHE 5B	*Chaetodon multicinctus*	1	10	0.0501	C	E
7/27/21	KAHE 5B	*Plectroglyphidodon imparipennis*	2	5	0.0112	MI	I
7/27/21	KAHE 5B	*Chaetodon quadrimaculatus*	1	7	0.0136	C	I
7/27/21	KAHE 5B	*Plectroglyphidodon johnstonianus*	1	5	0.0056	C	I
7/27/21	KAHE 5B	*Gomphosus varius*	1	15	0.1951	MI	I
7/27/21	KAHE 5B	*Gomphosus varius*	2	20	0.7986	MI	I
7/27/21	KAHE 5B	*Gomphosus varius*	1	12	0.1119	MI	I
7/27/21	KAHE 5B	*Gomphosus varius*	3	18	0.9215	MI	I
7/27/21	KAHE 5B	*Acanthurus olivaceus*	2	17	0.4076	H	I
7/27/21	KAHE 5B	*Acanthurus olivaceus*	2	12	0.1409	H	I
7/27/21	KAHE 5B	*Acanthurus olivaceus*	3	15	0.4174	H	I
7/27/21	KAHE 5B	*Chaetodon multicinctus*	1	7	0.0171	C	E
7/27/21	KAHE 5B	*Rhinecanthus rectangulus*	1	20	0.4365	MI	I
7/27/21	KAHE 5B	*Plectroglyphidodon imparipennis*	3	4	0.0084	MI	I
7/27/21	KAHE 5B	*Acanthurus blochii*	1	6	0.0043	H	I
7/27/21	KAHE 7B	*Sufflamen bursa*	1	20	0.4365	MI	I
7/27/21	KAHE 7B	*Sufflamen bursa*	5	18	1.6148	MI	I
7/27/21	KAHE 7B	*Sufflamen bursa*	3	15	0.5752	MI	I
7/27/21	KAHE 7B	*Dascyllus albisella*	1	9	0.0250	Z	E
7/27/21	KAHE 7B	*Zanclus cornutus*	1	10	0.0704	SI	I
7/27/21	KAHE 7B	*Zanclus cornutus*	3	15	0.6764	SI	I
7/27/21	KAHE 7B	*Chaetodon multicinctus*	1	6	0.0108	C	E
7/27/21	KAHE 7B	*Thalassoma duperrey*	1	15	0.0701	MI	E
7/27/21	KAHE 7B	*Thalassoma duperrey*	3	18	0.3712	MI	E
7/27/21	KAHE 7B	*Parupeneus bifasciatus*	1	6	0.0035	MI	I
7/27/21	KAHE 7B	*Parupeneus bifasciatus*	1	15	0.0656	MI	I
7/27/21	KAHE 7B	*Acanthurus nigrofuscus*	5	9	0.2622	H	I
7/27/21	KAHE 7B	*Acanthurus nigrofuscus*	2	12	0.2381	H	I
7/27/21	KAHE 7B	*Stethojulis balteata*	1	14	0.0670	MI	E
7/27/21	KAHE 7B	*Naso lituratus*	1	15	0.0973	H	I
7/27/21	KAHE 7B	*Acanthurus olivaceus*	1	10	0.0404	H	I
7/27/21	KAHE 7B	*Acanthurus olivaceus*	1	17	0.2038	H	I
7/27/21	KAHE 7B	*Acanthurus olivaceus*	1	15	0.1391	H	I
7/27/21	KAHE 7B	*Forcipiger flavissimus*	1	10	0.0146	SI	I
7/27/21	KAHE 7B	*Chaetodon fremblii*	1	8	0.0349	SI	E
7/27/21	KAHE 7B	*Paracirrhites arcatus*	2	7	0.0034	MI	I
7/27/21	KAHE 7B	*Decapterus macarellus*	6	22	0.5515	Z	I
7/27/21	KAHE 7B	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
7/27/21	KAHE 7B	*Acanthurus olivaceus*	1	15	0.1391	H	I



7/27/21	KAHE 7B	*Acanthurus triostegus*	9	15	0.5651	H	I
7/27/21	KAHE 7B	*Naso lituratus*	1	22	0.3191	H	I
7/27/21	KAHE 7B	*Melichthys vidua*	1	25	1.8597	H	I
7/27/21	KAHE 7B	*Mulloidichthys flavolineatus*	1	22	0.3107	MI	I
7/27/21	KAHE 7B	*Chromis vanderbilti*	40	2	0.0149	Z	I
7/27/21	KAHE 7E	*Canthigaster jactator*	6	4	0.0575	H	E
7/27/21	KAHE 7E	*Canthigaster jactator*	2	6	0.0557	H	E
7/27/21	KAHE 7E	*Sufflamen bursa*	1	12	0.1013	MI	I
7/27/21	KAHE 7E	*Sufflamen bursa*	3	18	0.9689	MI	I
7/27/21	KAHE 7E	*Sufflamen bursa*	1	20	0.4365	MI	I
7/27/21	KAHE 7E	*Sufflamen bursa*	1	15	0.1917	MI	I
7/27/21	KAHE 7E	*Naso lituratus*	1	18	0.1713	H	I
7/27/21	KAHE 7E	*Naso lituratus*	1	27	0.6021	H	I
7/27/21	KAHE 7E	*Melichthys vidua*	1	25	1.8597	H	I
7/27/21	KAHE 7E	*Melichthys vidua*	1	27	2.2682	H	I
7/27/21	KAHE 7E	*Chromis vanderbilti*	20	2	0.0075	Z	I
7/27/21	NANA 1	*Stethojulis balteata*	1	5	0.0026	MI	E
7/27/21	NANA 1	*Plectroglyphidodon imparipennis*	6	5	0.0335	MI	I
7/27/21	NANA 1	*Plectroglyphidodon imparipennis*	2	3	0.0023	MI	I
7/27/21	NANA 1	*Rhinecanthus rectangulus*	1	20	0.4365	MI	I
7/27/21	NANA 1	*Thalassoma duperrey*	4	6	0.0161	MI	E
7/27/21	NANA 1	*Thalassoma duperrey*	2	4	0.0023	MI	E
7/27/21	NANA 1	*Paracirrhites arcatus*	1	5	0.0005	MI	I
7/27/21	NANA 1	*Acanthurus triostegus*	1	15	0.0628	H	I
7/27/21	NANA 1	*Thalassoma trilobatum*	1	20	0.2632	MI	I
7/27/21	NANA 1	*Chromis vanderbilti*	2	2	0.0007	Z	I
7/27/21	NANA 2	*Acanthurus nigrofuscus*	90	10	6.3715	H	I
7/27/21	NANA 2	*Acanthurus nigrofuscus*	200	12	23.8066	H	I
7/27/21	NANA 2	*Gomphosus varius*	1	12	0.1119	MI	I
7/27/21	NANA 2	*Canthigaster jactator*	1	5	0.0172	H	E
7/27/21	NANA 2	*Parupeneus bifasciatus*	1	7	0.0057	MI	I
7/27/21	NANA 2	*Parupeneus bifasciatus*	2	15	0.1311	MI	I
7/27/21	NANA 2	*Parupeneus bifasciatus*	1	18	0.1177	MI	I
7/27/21	NANA 2	*Stethojulis balteata*	3	7	0.0225	MI	E
7/27/21	NANA 2	*Halichoeres ornatissimus*	2	8	0.2630	MI	I
7/27/21	NANA 2	*Thalassoma duperrey*	4	5	0.0091	MI	E
7/27/21	NANA 2	*Thalassoma duperrey*	5	15	0.3503	MI	E
7/27/21	NANA 2	*Thalassoma duperrey*	1	17	0.1035	MI	E
7/27/21	NANA 2	*Thalassoma duperrey*	2	22	0.4629	MI	E
7/27/21	NANA 2	*Plectroglyphidodon johnstonianus*	2	6	0.0196	C	I
7/27/21	NANA 2	*Ctenochaetus strigosus*	3	6	0.0289	D	I
7/27/21	NANA 2	*Ctenochaetus strigosus*	3	12	0.2515	D	I
7/27/21	NANA 2	*Ctenochaetus strigosus*	3	10	0.1424	D	I
7/27/21	NANA 2	*Acanthurus leucopareius*	10	22	5.9995	H	I
7/27/21	NANA 2	*Acanthurus leucopareius*	5	20	2.2366	H	I
7/27/21	NANA 2	*Stegastes fasciolatus*	4	7	0.0633	H	I
7/27/21	NANA 2	*Acanthurus olivaceus*	1	27	0.8355	H	I
7/27/21	NANA 2	*Paracirrhites forsteri*	1	15	0.1090	P	I
7/27/21	NANA 2	*Paracirrhites forsteri*	1	10	0.0313	P	I
7/27/21	NANA 2	*Gomphosus varius*	1	8	0.0408	MI	I
7/27/21	NANA 2	*Chaetodon quadrimaculatus*	1	12	0.0746	C	I
7/27/21	NANA 2	*Zebrasoma flavescens*	3	20	2.8124	H	I
7/27/21	NANA 2	*Acanthurus triostegus*	2	15	0.1256	H	I
7/27/21	NANA 2	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
7/27/21	NANA 2	*Chaetodon multicinctus*	1	5	0.0062	C	E
7/27/21	NANA 2	*Chaetodon quadrimaculatus*	1	13	0.0960	C	I
7/27/21	NANA 2	*Sufflamen bursa*	1	17	0.2743	MI	I
7/27/21	NANA 2	*Sufflamen bursa*	1	20	0.4365	MI	I
7/27/21	NANA 2	*Chaetodon lunula*	2	15	0.2295	SI	I

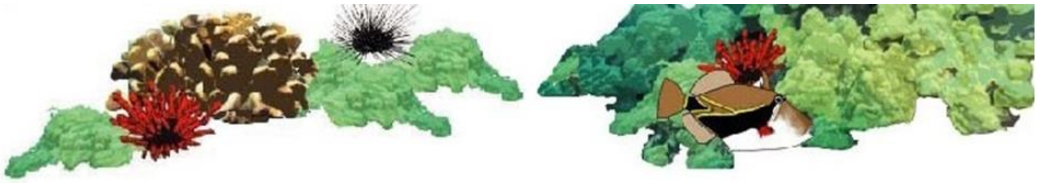
7/27/21	NANA 2	*Melichthys niger*	1	27	1.5137	H	I
7/27/21	NANA 2	*Lutjanus fulvus*	1	20	0.1520	MI	X
7/27/21	NANA 2	*Sufflamen fraenatus*	1	28	1.1427	MI	I
7/27/21	NANA 2	*Chaetodon ornatissimus*	1	15	0.1958	C	I
9/9/21	EAST1	*Plectroglyphidodon johnstonianus*	1	4	0.0028	C	I
9/9/21	EAST1	*Plectroglyphidodon imparipennis*	4	3	0.0046	MI	I
9/9/21	EAST1	*Plectroglyphidodon imparipennis*	3	4	0.0084	MI	I
9/9/21	EAST1	*Thalassoma duperrey*	5	8	0.0493	MI	E
9/9/21	EAST1	*Thalassoma duperrey*	2	7	0.0130	MI	E
9/9/21	EAST1	*Thalassoma duperrey*	5	6	0.0201	MI	E
9/9/21	EAST1	*Thalassoma duperrey*	2	10	0.0395	MI	E
9/9/21	EAST1	*Thalassoma duperrey*	2	5	0.0045	MI	E
9/9/21	EAST1	*Thalassoma duperrey*	1	16	0.0857	MI	E
9/9/21	EAST1	*Paracirrhites arcatus*	2	6	0.0019	MI	I
9/9/21	EAST1	*Paracirrhites arcatus*	2	4	0.0004	MI	I
9/9/21	EAST1	*Canthigaster jactator*	2	5	0.0345	H	E
9/9/21	EAST1	*Canthigaster jactator*	1	6	0.0278	H	E
9/9/21	EAST1	*Canthigaster jactator*	1	7	0.0417	H	E
9/9/21	EAST1	*Plagiotremus goslinei*	1	8	0.0009	P	E
9/9/21	EAST1	*Acanthurus triostegus*	20	16	1.5689	H	I
9/9/21	EAST1	*Acanthurus triostegus*	4	18	0.4711	H	I
9/9/21	EAST1	*Acanthurus nigrofuscus*	14	12	1.6665	H	I
9/9/21	EAST1	*Acanthurus nigrofuscus*	1	8	0.0375	H	I
9/9/21	EAST1	*Naso lituratus*	4	24	1.6716	H	I
9/9/21	EAST1	*Chromis vanderbilti*	35	4	0.1038	Z	I
9/9/21	EAST1	*Rhinecanthus rectangulus*	1	21	0.5019	MI	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	19	7	0.4867	H	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	1	3	0.0023	H	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	1	4	0.0052	H	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	13	10	0.9203	H	I
9/9/21	EAST3	*Chromis vanderbilti*	2	5	0.0116	Z	I
9/9/21	EAST3	*Chaetodon multicinctus*	2	7	0.0343	C	E
9/9/21	EAST3	*Chaetodon multicinctus*	1	6	0.0108	C	E
9/9/21	EAST3	*Thalassoma duperrey*	7	10	0.1384	MI	E
9/9/21	EAST3	*Thalassoma duperrey*	6	12	0.2096	MI	E
9/9/21	EAST3	*Thalassoma duperrey*	5	8	0.0493	MI	E
9/9/21	EAST3	*Thalassoma duperrey*	2	5	0.0045	MI	E
9/9/21	EAST3	*Thalassoma duperrey*	1	15	0.0701	MI	E
9/9/21	EAST3	*Sufflamen bursa*	6	20	2.6192	MI	I
9/9/21	EAST3	*Sufflamen bursa*	1	14	0.1574	MI	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	26	7	0.6660	H	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	1	6	0.0165	H	I
9/9/21	EAST3	*Acanthurus nigrofuscus*	12	8	0.4498	H	I
9/9/21	EAST3	*Parupeneus multifasciatus*	2	10	0.0395	MI	I
9/9/21	EAST3	*Parupeneus multifasciatus*	1	12	0.0349	MI	I
9/9/21	EAST3	*Parupeneus pleurostigma*	1	10	0.0373	MI	I
9/9/21	EAST3	*Paracirrhites arcatus*	1	8	0.0028	MI	I
9/9/21	EAST3	*Paracirrhites arcatus*	1	10	0.0067	MI	I
9/9/21	EAST3	*Synodus binotatus*	1	12	0.0170	P	I
9/9/21	EAST3	*Plectroglyphidodon johnstonianus*	3	5	0.0167	C	I
9/9/21	EAST3	*Plectroglyphidodon johnstonianus*	2	8	0.0479	C	I
9/9/21	EAST3	*Plectroglyphidodon johnstonianus*	5	6	0.0491	C	I
9/9/21	EAST3	*Canthigaster jactator*	4	4	0.0383	H	E
9/9/21	EAST3	*Canthigaster jactator*	2	5	0.0345	H	E
9/9/21	EAST3	*Canthigaster jactator*	2	3	0.0090	H	E
9/9/21	EAST3	*Stegastes fasciolatus*	6	7	0.0950	H	I

9/9/21	EAST3	*Stegastes fasciolatus*	4	8	0.0958	H	I
9/9/21	EAST3	*Stegastes fasciolatus*	7	6	0.0687	H	I
9/9/21	EAST3	*Parupeneus cyclostomus*	2	8	0.0170	P	I
9/9/21	EAST3	*Stethojulis balteata*	1	8	0.0114	MI	E
9/9/21	EAST3	*Stethojulis balteata*	1	6	0.0046	MI	E
9/9/21	EAST3	*Ctenochaetus strigosus*	4	8	0.0946	D	I
9/9/21	EAST3	*Ctenochaetus strigosus*	3	6	0.0289	D	I
9/9/21	EAST3	*Ctenochaetus strigosus*	1	10	0.0475	D	I
9/9/21	EAST3	*Macropharyngodon geoffroyi*	2	6	0.0235	MI	E
9/9/21	EAST3	*Macropharyngodon geoffroyi*	1	8	0.0270	MI	E
9/9/21	EAST3	*Gomphosus varius*	1	8	0.0408	MI	I
9/9/21	EAST3	*Gomphosus varius*	2	7	0.0585	MI	I
9/9/21	EAST3	*Gomphosus varius*	1	15	0.1951	MI	I
9/9/21	EAST3	*Halichoeres ornatissimus*	1	8	0.1315	MI	I
9/9/21	EAST3	*Halichoeres ornatissimus*	1	10	0.2010	MI	I
9/9/21	EAST3	*Parupeneus bifasciatus*	1	7	0.0057	MI	I
9/9/21	EAST3	*Sufflamen fraenatus*	1	23	0.6511	MI	I
9/9/21	EAST3	*Pseudocheilinus octotaenia*	1	10	0.0231	MI	I
9/9/21	EAST4	*Chromis vanderbilti*	61	5	0.3527	Z	I
9/9/21	EAST4	*Chromis vanderbilti*	1	2	0.0004	Z	I
9/9/21	EAST4	*Acanthurus nigrofuscus*	6	8	0.2249	H	I
9/9/21	EAST4	*Acanthurus nigrofuscus*	17	7	0.4355	H	I
9/9/21	EAST4	*Acanthurus nigrofuscus*	2	5	0.0196	H	I
9/9/21	EAST4	*Thalassoma duperrey*	6	12	0.2096	MI	E
9/9/21	EAST4	*Thalassoma duperrey*	6	14	0.3390	MI	E
9/9/21	EAST4	*Thalassoma duperrey*	10	8	0.0986	MI	E
9/9/21	EAST4	*Thalassoma duperrey*	1	6	0.0040	MI	E
9/9/21	EAST4	*Thalassoma duperrey*	3	15	0.2102	MI	E
9/9/21	EAST4	*Sufflamen fraenatus*	1	24	0.7353	MI	I
9/9/21	EAST4	*Stethojulis balteata*	14	6	0.0644	MI	E
9/9/21	EAST4	*Stethojulis balteata*	2	8	0.0229	MI	E
9/9/21	EAST4	*Scarus psittacus*	3	8	0.0252	H	I
9/9/21	EAST4	*Cirrhitops fasciatus*	1	8	0.0056	MI	I
9/9/21	EAST4	*Pseudocheilinus octotaenia*	1	8	0.0114	MI	I
9/9/21	EAST4	*Novaculichthys taeniourus*	1	10	0.0201	MI	I
9/9/21	EAST4	*Chromis vanderbilti*	34	4	0.1009	Z	I
9/9/21	EAST4	*Acanthurus olivaceus*	2	30	2.3044	H	I
9/9/21	EAST4	*Acanthurus olivaceus*	1	26	0.7447	H	I
9/9/21	EAST4	*Melichthys vidua*	2	22	2.6745	H	I
9/9/21	EAST4	*Melichthys niger*	28	22	24.3306	H	I
9/9/21	EAST4	*Sufflamen fraenatus*	1	30	1.3920	MI	I
9/9/21	EAST4	*Sufflamen fraenatus*	1	26	0.9245	MI	I
9/9/21	EAST4	*Plectroglyphidodon imparipennis*	1	4	0.0028	MI	I
9/9/21	EAST4	*Naso unicornis*	1	24	0.6485	H	I
9/9/21	KO1	*Ctenochaetus strigosus*	13	13	1.3988	D	I
9/9/21	KO1	*Ctenochaetus strigosus*	2	15	0.3363	D	I
9/9/21	KO1	*Ctenochaetus strigosus*	1	4	0.0027	D	I
9/9/21	KO1	*Ctenochaetus strigosus*	2	10	0.0949	D	I
9/9/21	KO1	*Acanthurus nigrofuscus*	14	12	1.6665	H	I
9/9/21	KO1	*Acanthurus nigrofuscus*	12	10	0.8495	H	I
9/9/21	KO1	*Acanthurus nigrofuscus*	6	8	0.2249	H	I
9/9/21	KO1	*Acanthurus nigrofuscus*	32	12	3.8090	H	I
9/9/21	KO1	*Thalassoma duperrey*	11	10	0.2175	MI	E
9/9/21	KO1	*Thalassoma duperrey*	8	12	0.2794	MI	E
9/9/21	KO1	*Thalassoma duperrey*	10	14	0.5650	MI	E
9/9/21	KO1	*Thalassoma duperrey*	4	15	0.2803	MI	E
9/9/21	KO1	*Chaetodon multicinctus*	12	10	0.6017	C	E
9/9/21	KO1	*Thalassoma duperrey*	10	7	0.0650	MI	E
9/9/21	KO1	*Thalassoma duperrey*	5	6	0.0201	MI	E
9/9/21	KO1	*Thalassoma duperrey*	8	8	0.0789	MI	E

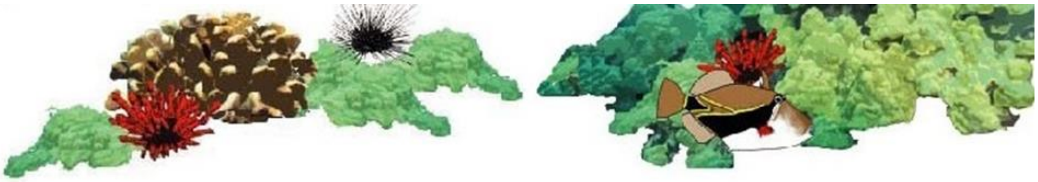
9/9/21	KO1	*Thalassoma duperrey*	7	10	0.1384	MI	E
9/9/21	KO1	*Ctenochaetus strigosus*	13	12	1.0897	D	I
9/9/21	KO1	*Ctenochaetus strigosus*	1	10	0.0475	D	I
9/9/21	KO1	*Ctenochaetus strigosus*	10	14	1.3559	D	I
9/9/21	KO1	*Sufflamen bursa*	2	18	0.6459	MI	I
9/9/21	KO1	*Parupeneus bifasciatus*	1	16	0.0807	MI	I
9/9/21	KO1	*Plectroglyphidodon johnstonianus*	4	7	0.0633	C	I
9/9/21	KO1	*Plectroglyphidodon johnstonianus*	3	5	0.0167	C	I
9/9/21	KO1	*Gomphosus varius*	4	10	0.2843	MI	I
9/9/21	KO1	*Gomphosus varius*	4	8	0.1631	MI	I
9/9/21	KO1	*Canthigaster jactator*	7	4	0.0671	H	E
9/9/21	KO1	*Canthigaster jactator*	3	5	0.0517	H	E
9/9/21	KO1	*Melichthys niger*	4	30	8.0554	H	I
9/9/21	KO1	*Paracirrhites arcatus*	1	7	0.0017	MI	I
9/9/21	KO1	*Chaetodon ornatissimus*	1	18	0.3427	C	I
9/9/21	KO1	*Stethojulis balteata*	1	8	0.0114	MI	E
9/9/21	KO1	*Chaetodon unimaculatus*	2	13	0.1921	C	I
9/9/21	KO1	*Parupeneus multifasciatus*	1	16	0.0857	MI	I
9/9/21	KO1	*Gomphosus varius*	2	12	0.2238	MI	I
9/9/21	KO2	*Naso lituratus*	1	30	0.8346	H	I
9/9/21	KO2	*Acanthurus nigrofuscus*	15	12	1.7855	H	I
9/9/21	KO2	*Acanthurus nigrofuscus*	26	10	1.8407	H	I
9/9/21	KO2	*Thalassoma duperrey*	3	14	0.1695	MI	E
9/9/21	KO2	*Thalassoma duperrey*	10	10	0.1977	MI	E
9/9/21	KO2	*Thalassoma duperrey*	11	8	0.1084	MI	E
9/9/21	KO2	*Thalassoma duperrey*	3	6	0.0121	MI	E
9/9/21	KO2	*Ctenochaetus strigosus*	10	16	2.0566	D	I
9/9/21	KO2	*Ctenochaetus strigosus*	13	14	1.7626	D	I
9/9/21	KO2	*Ctenochaetus strigosus*	10	10	0.4746	D	I
9/9/21	KO2	*Ctenochaetus strigosus*	5	8	0.1183	D	I
9/9/21	KO2	*Ctenochaetus strigosus*	19	12	1.5926	D	I
9/9/21	KO2	*Ctenochaetus strigosus*	1	6	0.0096	D	I
9/9/21	KO2	*Parupeneus multifasciatus*	1	13	0.0448	MI	I
9/9/21	KO2	*Chaetodon multicinctus*	6	10	0.3008	C	E
9/9/21	KO2	*Acanthurus leucopareius*	1	16	0.2250	H	I
9/9/21	KO2	*Scarus psittacus*	1	12	0.0321	H	I
9/9/21	KO2	*Centropyge potteri*	1	8	0.0830	H	E
9/9/21	KO2	*Chaetodon lunula*	1	15	0.1148	SI	I
9/9/21	KO2	*Paracirrhites arcatus*	2	10	0.0134	MI	I
9/9/21	KO2	*Thalassoma duperrey*	1	15	0.0701	MI	E
9/9/21	KO2	*Parupeneus multifasciatus*	2	10	0.0395	MI	I
9/9/21	KO2	*Synodus binotatus*	1	15	0.0344	P	I
9/9/21	KO2	*Canthigaster jactator*	12	5	0.2067	H	E
9/9/21	KO2	*Canthigaster jactator*	7	4	0.0671	H	E
9/9/21	KO2	*Chromis vanderbilti*	5	9	0.1676	Z	I
9/9/21	KO2	*Plectroglyphidodon johnstonianus*	2	6	0.0196	C	I
9/9/21	KO2	*Plectroglyphidodon johnstonianus*	4	8	0.0958	C	I
9/9/21	KO2	*Plectroglyphidodon imparipennis*	4	4	0.0112	MI	I
9/9/21	KO2	*Melichthys niger*	7	28	11.6930	H	I
9/9/21	KO2	*Acanthurus triostegus*	1	15	0.0628	H	I
9/9/21	KO2	*Acanthurus triostegus*	1	7	0.0045	H	I
9/9/21	KO2	*Abudefduf abdominalis*	2	13	0.6141	Z	E
9/9/21	KO2	*Sufflamen bursa*	2	18	0.6459	MI	I
9/9/21	KO2	*Melichthys vidua*	1	26	2.0577	H	I
9/9/21	KO2	*Chaetodon ornatissimus*	2	16	0.4774	C	I
9/9/21	KO2	*Zanclus cornutus*	1	17	0.3229	SI	I

9/9/21	KO2	*Acanthurus olivaceus*	4	22	1.7896	H	I
9/9/21	KO2	*Labroides phthirophagus*	1	8	0.0056	P	E
9/9/21	KO2	*Chlorurus sordidus*	1	22	0.2136	H	I
9/9/21	KO2	*Chlorurus sordidus*	1	18	0.1091	H	I
9/9/21	KO2	*Gomphosus varius*	2	10	0.1422	MI	I
9/9/21	KO2	*Stethojulis balteata*	1	8	0.0114	MI	E
9/9/21	KO2	*Stethojulis balteata*	2	6	0.0092	MI	E
9/9/21	KO2	*Chaetodon quadrimaculatus*	2	12	0.1492	C	I
9/9/21	KO2	*Ostracion meleagris*	1	5	0.0042	SI	I
9/9/21	1D	*Thalassoma duperrey*	9	15	0.6306	MI	E
9/9/21	1D	*Thalassoma duperrey*	6	13	0.2690	MI	E
9/9/21	1D	*Thalassoma duperrey*	15	10	0.2966	MI	E
9/9/21	1D	*Thalassoma duperrey*	5	8	0.0493	MI	E
9/9/21	1D	*Acanthurus nigrofuscus*	42	12	4.9994	H	I
9/9/21	1D	*Acanthurus nigrofuscus*	10	10	0.7079	H	I
9/9/21	1D	*Chromis vanderbilti*	4	4	0.0119	Z	I
9/9/21	1D	*Chromis vanderbilti*	2	3	0.0025	Z	I
9/9/21	1D	*Ctenochaetus strigosus*	15	12	1.2573	D	I
9/9/21	1D	*Ctenochaetus strigosus*	3	10	0.1424	D	I
9/9/21	1D	*Pervagor aspricaudus*	1	10	0.0561	H	I
9/9/21	1D	*Thalassoma duperrey*	7	6	0.0281	MI	E
9/9/21	1D	*Thalassoma duperrey*	2	20	0.3438	MI	E
9/9/21	1D	*Parupeneus multifasciatus*	15	13	0.6725	MI	I
9/9/21	1D	*Parupeneus multifasciatus*	1	16	0.0857	MI	I
9/9/21	1D	*Rhinecanthus rectangulus*	2	18	0.6459	MI	I
9/9/21	1D	*Naso lituratus*	1	15	0.0973	H	I
9/9/21	1D	*Gomphosus varius*	3	10	0.2132	MI	I
9/9/21	1D	*Gomphosus varius*	1	13	0.1366	MI	I
9/9/21	1D	*Plectroglyphidodon johnstonianus*	4	7	0.0633	C	I
9/9/21	1D	*Plectroglyphidodon johnstonianus*	2	8	0.0479	C	I
9/9/21	1D	*Plectroglyphidodon imparipennis*	9	6	0.0884	MI	I
9/9/21	1D	*Parupeneus multifasciatus*	3	14	0.1695	MI	I
9/9/21	1D	*Stethojulis balteata*	3	10	0.0694	MI	E
9/9/21	1D	*Stethojulis balteata*	2	8	0.0229	MI	E
9/9/21	1D	*Stethojulis balteata*	2	12	0.0823	MI	E
9/9/21	1D	*Canthigaster jactator*	3	5	0.0517	H	E
9/9/21	1D	*Canthigaster jactator*	1	4	0.0096	H	E
9/9/21	1D	*Cirripectes vanderbilti*	1	10	0.0207	H	E
9/9/21	1D	*Sufflamen bursa*	1	16	0.2306	MI	I
9/9/21	1D	*Decapterus macarellus*	7	15	0.1933	Z	I
9/9/21	1D	*Paracirrhites forsteri*	2	13	0.1403	P	I
9/9/21	1D	*Stegastes fasciolatus*	1	8	0.0240	H	I
9/9/21	1D	*Melichthys niger*	1	20	0.6712	H	I
9/9/21	1D	*Forcipiger flavissimus*	1	16	0.0650	SI	I
9/9/21	1D	*Chaetodon quadrimaculatus*	1	12	0.0746	C	I
9/9/21	1D	*Acanthurus olivaceus*	70	12	4.9306	H	I
9/9/21	5B	*Labroides phthirophagus*	2	8	0.0113	P	E
9/9/21	5B	*Acanthurus nigrofuscus*	30	12	3.5710	H	I
9/9/21	5B	*Acanthurus nigrofuscus*	5	8	0.1874	H	I
9/9/21	5B	*Acanthurus nigrofuscus*	10	10	0.7079	H	I
9/9/21	5B	*Thalassoma duperrey*	3	17	0.3106	MI	E
9/9/21	5B	*Thalassoma duperrey*	4	20	0.6876	MI	E
9/9/21	5B	*Thalassoma duperrey*	6	6	0.0241	MI	E
9/9/21	5B	*Thalassoma duperrey*	6	12	0.2096	MI	E
9/9/21	5B	*Thalassoma duperrey*	8	10	0.1582	MI	E
9/9/21	5B	*Thalassoma duperrey*	6	8	0.0591	MI	E
9/9/21	5B	*Chromis vanderbilti*	30	5	0.1734	Z	I
9/9/21	5B	*Chromis vanderbilti*	25	4	0.0742	Z	I

9/9/21	5B	*Gomphosus varius*	2	18	0.6143	MI	I
9/9/21	5B	*Gomphosus varius*	3	5	0.0380	MI	I
9/9/21	5B	*Zanclus cornutus*	1	15	0.2255	SI	I
9/9/21	5B	*Canthigaster amboinensis*	5	8	1.2975	H	I
9/9/21	5B	*Canthigaster amboinensis*	1	6	0.1374	H	I
9/9/21	5B	*Canthigaster amboinensis*	1	10	0.4249	H	I
9/9/21	5B	*Acanthurus olivaceus*	2	20	0.6691	H	I
9/9/21	5B	*Acanthurus olivaceus*	5	15	0.6956	H	I
9/9/21	5B	*Acanthurus olivaceus*	1	12	0.0704	H	I
9/9/21	5B	*Stegastes fasciolatus*	1	8	0.0240	H	I
9/9/21	5B	*Sufflamen bursa*	1	18	0.3230	MI	I
9/9/21	5B	*Sufflamen bursa*	1	19	0.3770	MI	I
9/9/21	5B	*Naso unicornis*	2	10	0.1079	H	I
9/9/21	5B	*Parupeneus multifasciatus*	4	12	0.1397	MI	I
9/9/21	5B	*Parupeneus multifasciatus*	1	14	0.0565	MI	I
9/9/21	5B	*Parupeneus multifasciatus*	2	16	0.1714	MI	I
9/9/21	5B	*Parupeneus multifasciatus*	3	15	0.2102	MI	I
9/9/21	5B	*Parupeneus multifasciatus*	2	10	0.0395	MI	I
9/9/21	5B	*Cantherhines dumerilii*	1	15	0.0614	C	I
9/9/21	5B	*Chaetodon multicinctus*	1	8	0.0256	C	E
9/9/21	5B	*Rhinecanthus rectangulus*	1	18	0.3230	MI	I
9/9/21	5B	*Chaetodon unimaculatus*	2	12	0.1492	C	I
9/9/21	5B	*Acanthurus olivaceus*	1	14	0.1127	H	I
9/9/21	5B	*Acanthurus olivaceus*	1	18	0.2426	H	I
9/9/21	5B	*Thalassoma duperrey*	1	15	0.0701	MI	E
9/9/21	5B	*Stethojulis balteata*	1	8	0.0114	MI	E
9/9/21	5B	*Canthigaster jactator*	4	5	0.0689	H	E
9/9/21	5B	*Canthigaster jactator*	1	7	0.0417	H	E
9/9/21	5B	*Halichoeres ornatissimus*	1	12	0.2842	MI	I
9/9/21	5B	*Halichoeres ornatissimus*	1	6	0.0761	MI	I
9/9/21	5B	*Halichoeres ornatissimus*	1	15	0.4342	MI	I
9/9/21	5B	*Acanthurus olivaceus*	1	5	0.0049	H	I
9/9/21	5B	*Gomphosus varius*	3	5	0.0380	MI	I
9/9/21	5B	*Paracirrhites arcatus*	3	7	0.0051	MI	I
9/9/21	5B	*Paracirrhites arcatus*	2	8	0.0057	MI	I
9/9/21	5B	*Plectroglyphidodon imparipennis*	5	6	0.0491	MI	I
9/9/21	5B	*Plectroglyphidodon imparipennis*	5	5	0.0279	MI	I
9/9/21	5B	*Chaetodon multicinctus*	1	4	0.0032	C	E
9/9/21	5B	*Paracirrhites forsteri*	1	16	0.1329	P	I
9/9/21	5B	*Acanthurus blochii*	3	8	0.0307	H	I
9/9/21	5B	*Plectroglyphidodon johnstonianus*	6	8	0.1437	C	I
9/9/21	5B	*Plectroglyphidodon johnstonianus*	2	6	0.0196	C	I
9/9/21	5B	*Chaetodon multicinctus*	2	9	0.0730	C	E
9/9/21	5B	*Pervagor aspricaudus*	2	10	0.1122	H	I
9/9/21	5B	*Stethojulis balteata*	1	14	0.0670	MI	E
9/9/21	7B	*Decapterus macarellus*	200	22	18.3834	Z	I
9/9/21	7B	*Mulloidichthys vanicolensis*	3	18	0.2932	MI	I
9/9/21	7B	*Parupeneus multifasciatus*	9	16	0.7712	MI	I
9/9/21	7B	*Parupeneus multifasciatus*	1	10	0.0198	MI	I
9/9/21	7B	*Parupeneus multifasciatus*	6	14	0.3390	MI	I
9/9/21	7B	*Parupeneus multifasciatus*	1	18	0.1237	MI	I
9/9/21	7B	*Naso lituratus*	1	18	0.1713	H	I
9/9/21	7B	*Acanthurus olivaceus*	1	16	0.1694	H	I
9/9/21	7B	*Chromis vanderbilti*	11	4	0.0326	Z	I
9/9/21	7B	*Chromis vanderbilti*	8	3	0.0100	Z	I
9/9/21	7B	*Acanthurus nigrofuscus*	11	12	1.3094	H	I
9/9/21	7B	*Dascyllus albisella*	5	9	0.1252	Z	E
9/9/21	7B	*Thalassoma duperrey*	1	14	0.0565	MI	E

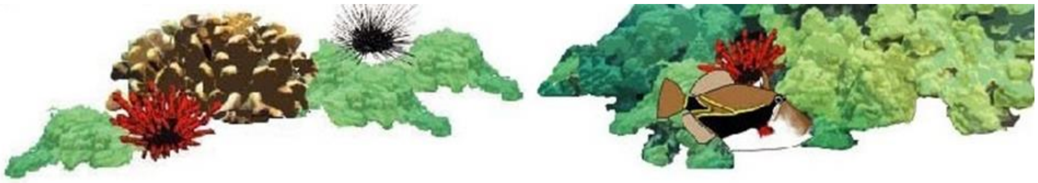


9/9/21	7B	*Thalassoma duperrey*	1	10	0.0198	MI	E
9/9/21	7B	*Thalassoma duperrey*	2	8	0.0197	MI	E
9/9/21	7B	*Thalassoma duperrey*	2	6	0.0080	MI	E
9/9/21	7B	*Thalassoma duperrey*	2	16	0.1714	MI	E
9/9/21	7B	*Thalassoma duperrey*	1	20	0.1719	MI	E
9/9/21	7B	*Sufflamen fraenatus*	1	20	0.4365	MI	I
9/9/21	7B	*Stethojulis balteata*	1	14	0.0670	MI	E
9/9/21	7B	*Melichthys vidua*	2	22	2.6745	H	I
9/9/21	7B	*Canthigaster jactator*	1	4	0.0096	H	E
9/9/21	7B	*Paracirrhites arcatus*	1	5	0.0005	MI	I
9/9/21	7B	*Zanclus cornutus*	1	16	0.2714	SI	I
9/9/21	7B	*Sufflamen bursa*	5	18	1.6148	MI	I
9/9/21	7B	*Acanthurus olivaceus*	3	17	0.6114	H	I
9/9/21	7B	*Acanthurus olivaceus*	1	22	0.4474	H	I
9/9/21	7B	*Acanthurus blochii*	1	24	0.2765	H	I
9/9/21	7B	*Parupeneus pleurostigma*	3	17	0.5180	MI	I
9/9/21	7B	*Acanthurus triostegus*	1	16	0.0784	H	I
9/9/21	NANA1	*Plectroglyphidodon imparipennis*	6	4	0.0168	MI	I
9/9/21	NANA1	*Thalassoma duperrey*	4	8	0.0394	MI	E
9/9/21	NANA1	*Thalassoma duperrey*	2	6	0.0080	MI	E
9/9/21	NANA1	*Chromis vanderbilti*	40	4	0.1187	Z	I
9/9/21	NANA1	*Chromis vanderbilti*	10	3	0.0126	Z	I
9/9/21	NANA1	*Stethojulis balteata*	2	6	0.0092	MI	E
9/9/21	NANA1	*Stethojulis balteata*	1	7	0.0075	MI	E
9/9/21	NANA1	*Parupeneus bifasciatus*	1	8	0.0087	MI	I
9/9/21	NANA1	*Rhinecanthus rectangulus*	1	18	0.3230	MI	I
9/9/21	NANA2	*Thalassoma duperrey*	3	18	0.3712	MI	E
9/9/21	NANA2	*Thalassoma duperrey*	3	12	0.1048	MI	E
9/9/21	NANA2	*Thalassoma duperrey*	5	10	0.0989	MI	E
9/9/21	NANA2	*Thalassoma duperrey*	4	8	0.0394	MI	E
9/9/21	NANA2	*Thalassoma duperrey*	2	16	0.1714	MI	E
9/9/21	NANA2	*Acanthurus nigrofuscus*	10	12	1.1903	H	I
9/9/21	NANA2	*Acanthurus nigrofuscus*	7	10	0.4956	H	I
9/9/21	NANA2	*Acanthurus nigrofuscus*	1	14	0.1847	H	I
9/9/21	NANA2	*Canthigaster jactator*	5	4	0.0479	H	E
9/9/21	NANA2	*Canthigaster jactator*	2	5	0.0345	H	E
9/9/21	NANA2	*Halichoeres ornatissimus*	2	12	0.5683	MI	I
9/9/21	NANA2	*Halichoeres ornatissimus*	1	10	0.2010	MI	I
9/9/21	NANA2	*Acanthurus leucopareius*	22	20	9.8412	H	I
9/9/21	NANA2	*Acanthurus triostegus*	5	18	0.5889	H	I
9/9/21	NANA2	*Naso lituratus*	2	22	0.6382	H	I
9/9/21	NANA2	*Chaetodon ornatissimus*	1	18	0.3427	C	I
9/9/21	NANA2	*Acanthurus blochii*	1	30	0.5400	H	I
9/9/21	NANA2	*Zebrasoma flavescens*	3	18	2.1634	H	I
9/9/21	NANA2	*Ctenochaetus strigosus*	11	8	0.2602	D	I
9/9/21	NANA2	*Ctenochaetus strigosus*	1	6	0.0096	D	I
9/9/21	NANA2	*Ctenochaetus strigosus*	4	12	0.3353	D	I
9/9/21	NANA2	*Sufflamen bursa*	5	18	1.6148	MI	I
9/9/21	NANA2	*Chromis hanui*	1	6	0.0100	Z	E
9/9/21	NANA2	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
9/9/21	NANA2	*Parupeneus bifasciatus*	2	12	0.0641	MI	I
9/9/21	NANA2	*Stethojulis balteata*	3	8	0.0343	MI	E
9/9/21	NANA2	*Stegastes fasciolatus*	3	8	0.0719	H	I
9/9/21	NANA2	*Thalassoma purpureum*	1	19	0.1211	MI	I
9/9/21	7E	*Coris gaimard*	1	28	0.3173	MI	I
9/9/21	7E	*Acanthurus olivaceus*	3	24	1.7501	H	I
9/9/21	7E	*Acanthurus olivaceus*	3	28	2.8006	H	I
9/9/21	7E	*Naso lituratus*	1	21	0.2763	H	I
9/9/21	7E	*Scarus psittacus*	1	18	0.1229	H	I
9/9/21	7E	*Acanthurus blochii*	3	22	0.6389	H	I

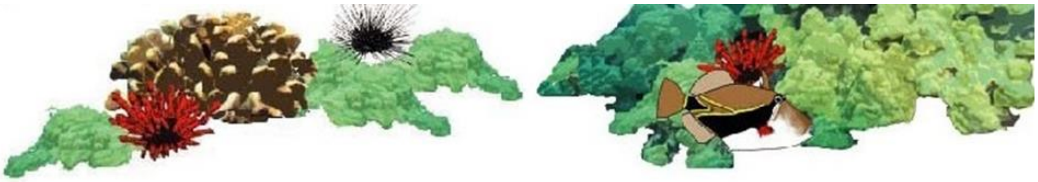


9/9/21	7E	*Acanthurus triostegus*	6	18	0.7066	H	I
9/9/21	7E	*Gomphosus varius*	1	18	0.3072	MI	I
9/9/21	7E	*Thalassoma duperrey*	1	12	0.0349	MI	E
9/9/21	7E	*Thalassoma duperrey*	1	20	0.1719	MI	E
9/9/21	7E	*Aphareus furca*	1	35	0.5579	P	I
9/9/21	7E	*Lutjanus fulvus*	2	20	0.3040	MI	X
9/9/21	7E	*Paracirrhites arcatus*	2	8	0.0057	MI	I
9/9/21	7E	*Sufflamen bursa*	4	20	1.7462	MI	I
9/9/21	7E	*Canthigaster jactator*	3	5	0.0517	H	E
9/9/21	7E	*Zanclus cornutus*	2	16	0.5427	SI	I
9/9/21	7E	*Oxycheilinus bimaculatus*	3	6	0.0034	MI	I
9/9/21	7E	*Plagiotremus goslinei*	1	7	0.0006	P	E
9/9/21	7E	*Sufflamen fraenatus*	1	24	0.7353	MI	I
9/9/21	7E	*Parupeneus multifasciatus*	1	8	0.0099	MI	I
9/9/21	7E	*Parupeneus multifasciatus*	4	14	0.2260	MI	I
9/9/21	7E	*Parupeneus multifasciatus*	1	10	0.0198	MI	I
9/9/21	7E	*Parupeneus multifasciatus*	5	12	0.1746	MI	I
9/9/21	7E	*Parupeneus multifasciatus*	1	20	0.1719	MI	I
9/9/21	7E	*Parupeneus pleurostigma*	1	15	0.1203	MI	I
9/9/21	7E	*Melichthys vidua*	1	22	1.3372	H	I
9/9/21	7E	*Forcipiger flavissimus*	2	12	0.0522	SI	I
9/9/21	7E	*Acanthurus olivaceus*	2	20	0.6691	H	I
9/9/21	7E	*Gomphosus varius*	2	20	0.7986	MI	I
9/9/21	7E	*Chaetodon multicinctus*	2	10	0.1003	C	E
9/9/21	7E	*Chaetodon miliaris*	1	12	0.1012	Z	E
9/9/21	7E	*Parupeneus cyclostomus*	1	20	0.1509	P	I
9/9/21	7E	*Chaetodon kleinii*	2	12	0.2025	Z	I
9/9/21	7E	*Chaetodon multicinctus*	2	10	0.1003	C	E
9/9/21	PIPE	*Thalassoma duperrey*	78	18	9.6524	MI	E
9/9/21	PIPE	*Thalassoma duperrey*	25	10	0.4943	MI	E
9/9/21	PIPE	*Thalassoma duperrey*	17	8	0.1676	MI	E
9/9/21	PIPE	*Thalassoma duperrey*	7	12	0.2445	MI	E
9/9/21	PIPE	*Thalassoma duperrey*	30	15	2.1019	MI	E
9/9/21	PIPE	*Thalassoma duperrey*	1	20	0.1719	MI	E
9/9/21	PIPE	*Parupeneus multifasciatus*	8	18	0.9900	MI	I
9/9/21	PIPE	*Parupeneus multifasciatus*	11	16	0.9426	MI	I
9/9/21	PIPE	*Parupeneus multifasciatus*	12	14	0.6779	MI	I
9/9/21	PIPE	*Mulloidichthys vanicolensis*	4	20	0.5476	MI	I
9/9/21	PIPE	*Mulloidichthys vanicolensis*	14	14	0.6122	MI	I
9/9/21	PIPE	*Abudefduf vaigiensis*	141	15	62.8928	Z	I
9/9/21	PIPE	*Abudefduf vaigiensis*	53	12	13.2045	Z	I
9/9/21	PIPE	*Acanthurus nigrofuscus*	16	10	1.1327	H	I
9/9/21	PIPE	*Acanthurus nigrofuscus*	140	12	16.6646	H	I
9/9/21	PIPE	*Stethojulis balteata*	2	12	0.0823	MI	E
9/9/21	PIPE	*Myripristis kuntee*	9	14	1.2091	Z	I
9/9/21	PIPE	*Chromis ovalis*	5	13	0.5032	Z	E
9/9/21	PIPE	*Thalassoma purpureum*	1	20	0.1429	MI	I
9/9/21	PIPE	*Thalassoma purpureum*	12	18	1.2204	MI	I
9/9/21	PIPE	*Thalassoma purpureum*	10	14	0.4516	MI	I
9/9/21	PIPE	*Dascyllus albisella*	16	10	0.5683	Z	E
9/9/21	PIPE	*Acanthurus guttatus*	4	18	1.2935	H	I
9/9/21	PIPE	*Abudefduf abdominalis*	103	15	45.9430	Z	E
9/9/21	PIPE	*Lutjanus kasmira*	15	1200	0.1923	MI	X
9/9/21	PIPE	*Acanthurus olivaceus*	1	20	0.3345	H	I
9/9/21	PIPE	*Chaetodon quadrimaculatus*	2	12	0.1492	C	I
9/9/21	PIPE	*Caranx melampygus*	1	35	0.9931	P	I
9/9/21	PIPE	*Mulloidichthys vanicolensis*	20	14	0.8745	MI	I
9/9/21	PIPE	*Gomphosus varius*	2	10	0.1422	MI	I
9/9/21	PIPE	*Chromis hanui*	1	6	0.0100	Z	E
9/9/21	PIPE	*Naso annulatus*	5	40	13.7868	Z	I

9/9/21	PIPE	*Naso annulatus*	1	45	3.8527	Z	I
9/9/21	PIPE	*Cantherhines dumerilii*	1	15	0.0614	C	I
9/9/21	PIPE	*Mulloidichthys flavolineatus*	65	22	20.1976	MI	I
9/9/21	PIPE	*Acanthurus olivaceus*	1	22	0.4474	H	I
9/9/21	PIPE	*Parupeneus multifasciatus*	150	18	18.5623	MI	I
9/9/21	PIPE	*Canthigaster jactator*	7	5	0.1206	H	E
9/9/21	PIPE	*Canthigaster jactator*	5	4	0.0479	H	E
9/9/21	PIPE	*Chaetodon auriga*	1	20	0.3094	SI	I
9/9/21	PIPE	*Gomphosus varius*	5	12	0.5596	MI	I
9/9/21	PIPE	*Gomphosus varius*	4	18	1.2286	MI	I
9/9/21	PIPE	*Cantherhines dumerilii*	1	14	0.0490	C	I
9/9/21	PIPE	*Canthigaster amboinensis*	1	10	0.4249	H	I
9/9/21	PIPE	*Chromis vanderbilti*	10	4	0.0297	Z	I
9/9/21	PIPE	*Forcipiger flavissimus*	4	14	0.1702	SI	I
9/9/21	PIPE	*Halichoeres ornatissimus*	3	12	0.8525	MI	I
9/9/21	PIPE	*Pervagor aspricaudus*	7	10	0.3928	H	I
9/9/21	PIPE	*Ctenochaetus strigosus*	1	8	0.0237	D	I
9/9/21	PIPE	*Aulostomus chinensis*	1	32	0.0218	P	I
9/9/21	PIPE	*Naso lituratus*	1	22	0.3191	H	I
9/9/21	PIPE	*Monotaxis grandoculis*	11	25	3.9640	MI	I
9/9/21	PIPE	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
9/9/21	PIPE	*Parupeneus bifasciatus*	3	18	0.3531	MI	I
9/9/21	PIPE	*Chaetodon multicinctus*	3	10	0.1504	C	E
9/9/21	PIPE	*Zanclus cornutus*	6	16	1.6282	SI	I
9/9/21	PIPE	*Zanclus cornutus*	6	15	1.3529	SI	I
9/9/21	PIPE	*Paracirrhites forsteri*	1	14	0.0881	P	I
9/9/21	PIPE	*Sufflamen bursa*	5	18	1.6148	MI	I
9/9/21	PIPE	*Coris gaimard*	2	22	0.2871	MI	I
9/9/21	PIPE	*Coris gaimard*	1	20	0.1049	MI	I
9/9/21	PIPE	*Stegastes fasciolatus*	4	8	0.0958	H	I
9/9/21	PIPE	*Cantherhines dumerilii*	1	12	0.0297	C	I
9/9/21	PIPE	*Stegastes fasciolatus*	4	12	0.3367	H	I
9/9/21	PIPE	*Parupeneus bifasciatus*	2	15	0.1311	MI	I
9/9/21	PIPE	*Parupeneus bifasciatus*	2	20	0.3302	MI	I
9/9/21	PIPE	*Parupeneus pleurostigma*	7	15	0.8419	MI	I
9/9/21	PIPE	*Parupeneus pleurostigma*	1	18	0.2037	MI	I
9/9/21	PIPE	*Aphareus furca*	1	25	0.2061	P	I
9/9/21	PIPE	*Stethojulis balteata*	3	12	0.1234	MI	E
9/9/21	PIPE	*Stethojulis balteata*	3	10	0.0694	MI	E
9/9/21	PIPE	*Paracirrhites arcatus*	2	10	0.0134	MI	I
9/9/21	PIPE	*Naso hexacanthus*	26	20	10.0125	Z	I
9/9/21	PIPE	*Melichthys niger*	1	22	0.8690	H	I
9/9/21	PIPE	*Aulostomus chinensis*	1	40	0.0471	P	I
9/9/21	PIPE	*Parupeneus pleurostigma*	5	14	0.4926	MI	I
9/9/21	PIPE	*Chaetodon auriga*	2	16	0.3085	SI	I
9/9/21	PIPE	*Synodus dermatogenys*	1	18	0.0564	P	I
9/9/21	PIPE	*Chaetodon fremblii*	1	13	0.1385	SI	E
9/9/21	PIPE	*Forcipiger flavissimus*	1	14	0.0425	SI	I
9/9/21	PIPE	*Chaetodon miliaris*	2	13	0.2552	Z	E
9/9/21	PIPE	*Acanthurus leucopareius*	1	20	0.4473	H	I
9/9/21	PIPE	*Chaetodon ornatissimus*	1	16	0.2387	C	I
9/9/21	PIPE	*Melichthys niger*	1	24	1.1000	H	I
9/9/21	PIPE	*Chaetodon kleinii*	1	12	0.1012	Z	I
11/22/21	KO 2	*Acanthurus nigrofuscus*	5	7	0.1281	H	I
11/22/21	KO 2	*Acanthurus nigrofuscus*	36	10	2.5486	H	I
11/22/21	KO 2	*Ctenochaetus strigosus*	1	22	0.5555	D	I
11/22/21	KO 2	*Ctenochaetus strigosus*	15	20	6.1888	D	I
11/22/21	KO 2	*Ctenochaetus strigosus*	3	7	0.0468	D	I
11/22/21	KO 2	*Melichthys niger*	1	27	1.5137	H	I
11/22/21	KO 2	*Melichthys niger*	7	30	14.0970	H	I

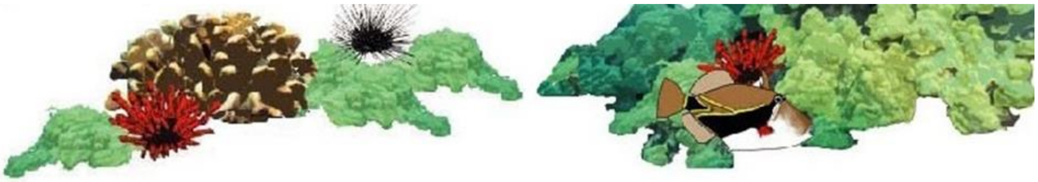


11/22/21	KO 2	*Melichthys niger*	1	35	3.0581	H	I
11/22/21	KO 2	*Sufflamen bursa*	2	18	0.6459	MI	I
11/22/21	KO 2	*Chaetodon unimaculatus*	1	15	0.1510	C	I
11/22/21	KO 2	*Chaetodon unimaculatus*	1	18	0.2686	C	I
11/22/21	KO 2	*Acanthurus triostegus*	1	22	0.2354	H	I
11/22/21	KO 2	*Zebrasoma flavescens*	3	7	0.2060	H	I
11/22/21	KO 2	*Chaetodon ornatissimus*	2	22	1.2691	C	I
11/22/21	KO 2	*Chaetodon ephippium*	2	17	0.3658	MI	I
11/22/21	KO 2	*Gomphosus varius*	1	20	0.3993	MI	I
11/22/21	KO 2	*Gomphosus varius*	1	6	0.0199	MI	I
11/22/21	KO 2	*Acanthurus blochii*	1	25	0.3125	H	I
11/22/21	KO 2	*Chaetodon multicinctus*	2	10	0.1003	C	E
11/22/21	KO 2	*Paracirrhites forsteri*	1	13	0.0701	P	I
11/22/21	KO 2	*Thalassoma duperrey*	8	10	0.1582	MI	E
11/22/21	KO 2	*Thalassoma duperrey*	2	8	0.0197	MI	E
11/22/21	KO 2	*Thalassoma duperrey*	1	15	0.0701	MI	E
11/22/21	KO 2	*Canthigaster jactator*	1	5	0.0172	H	E
11/22/21	KO 2	*Canthigaster jactator*	1	6	0.0278	H	E
11/22/21	KO 2	*Calotomus carolinus*	1	5	0.0017	H	I
11/22/21	KO 2	*Calotomus carolinus*	1	6	0.0032	H	I
11/22/21	KO 2	*Plectroglyphidodon johnstonianus*	3	6	0.0295	C	I
11/22/21	KO 2	*Plectroglyphidodon johnstonianus*	2	7	0.0317	C	I
11/22/21	KO 2	*Sufflamen fraenatus*	1	35	2.1633	MI	I
11/22/21	KO 2	*Sufflamen fraenatus*	1	30	1.3920	MI	I
11/22/21	KO 2	*Paracirrhites arcatus*	1	7	0.0017	MI	I
11/22/21	KO 2	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
11/22/21	KO 2	*Plectroglyphidodon imparipennis*	1	6	0.0098	MI	I
11/22/21	KO 2	*Stethojulis balteata*	1	13	0.0530	MI	E
11/22/21	KO 2	*Stethojulis balteata*	1	6	0.0046	MI	E
11/22/21	KO 2	*Zebrasoma flavescens*	3	7	0.2060	H	I
11/22/21	KO 2	*Zebrasoma flavescens*	3	10	0.5006	H	I
11/22/21	KO 2	*Forcipiger flavissimus*	2	15	0.1059	SI	I
11/22/21	KO 2	*Chlorurus sordidus*	1	25	0.3278	H	I
11/22/21	KO 2	*Chlorurus sordidus*	1	27	0.4242	H	I
11/22/21	KO 2	*Chaetodon unimaculatus*	3	15	0.4529	C	I
11/22/21	KO 2	*Chaetodon multicinctus*	6	12	0.5208	C	E
11/22/21	KO 2	*Sargocentron spiniferum*	1	38	5.9724	MI	I
11/22/21	KO 2	*Sufflamen bursa*	1	18	0.3230	MI	I
11/22/21	KO 2	*Abudefduf abdominalis*	3	18	2.1536	Z	E
11/22/21	KO 2	*Acanthurus olivaceus*	1	30	1.1522	H	I
11/22/21	KO 2	*Chaetodon quadrimaculatus*	2	17	0.4484	C	I
11/22/21	KAHE 1D	*Acanthurus nigrofuscus*	25	10	1.7699	H	I
11/22/21	KAHE 1D	*Acanthurus nigrofuscus*	20	12	2.3807	H	I
11/22/21	KAHE 1D	*Thalassoma duperrey*	5	18	0.6187	MI	E
11/22/21	KAHE 1D	*Thalassoma duperrey*	1	20	0.1719	MI	E
11/22/21	KAHE 1D	*Thalassoma duperrey*	4	12	0.1397	MI	E
11/22/21	KAHE 1D	*Thalassoma duperrey*	3	15	0.2102	MI	E
11/22/21	KAHE 1D	*Thalassoma duperrey*	4	10	0.0791	MI	E
11/22/21	KAHE 1D	*Gomphosus varius*	1	17	0.2664	MI	I



11/22/21	KAHE 1D	*Gomphosus varius*	1	10	0.0711	MI	I
11/22/21	KAHE 1D	*Sufflamen bursa*	4	18	1.2919	MI	I
11/22/21	KAHE 1D	*Sufflamen bursa*	1	15	0.1917	MI	I
11/22/21	KAHE 1D	*Sufflamen bursa*	1	20	0.4365	MI	I
11/22/21	KAHE 1D	*Abudefduf vaigiensis*	7	12	1.7440	Z	I
11/22/21	KAHE 1D	*Monotaxis grandoculis*	3	27	1.3862	MI	I
11/22/21	KAHE 1D	*Chaetodon quadrimaculatus*	3	12	0.2237	C	I
11/22/21	KAHE 1D	*Cantherhines sandwichiensis*	1	18	0.5171	H	E
11/22/21	KAHE 1D	*Ctenochaetus strigosus*	4	20	1.6504	D	I
11/22/21	KAHE 1D	*Ctenochaetus strigosus*	16	18	4.7520	D	I
11/22/21	KAHE 1D	*Ctenochaetus strigosus*	10	15	1.6815	D	I
11/22/21	KAHE 1D	*Chlorurus sordidus*	1	40	1.5827	H	I
11/22/21	KAHE 1D	*Chlorurus sordidus*	1	30	0.6038	H	I
11/22/21	KAHE 1D	*Chlorurus sordidus*	1	27	0.4242	H	I
11/22/21	KAHE 1D	*Chlorurus sordidus*	1	25	0.3278	H	I
11/22/21	KAHE 1D	*Chlorurus sordidus*	8	18	0.8725	H	I
11/22/21	KAHE 1D	*Stethojulis balteata*	1	17	0.1237	MI	E
11/22/21	KAHE 1D	*Melichthys niger*	2	40	8.7830	H	I
11/22/21	KAHE 1D	*Melichthys niger*	5	30	10.0693	H	I
11/22/21	KAHE 1D	*Melichthys niger*	3	35	9.1744	H	I
11/22/21	KAHE 1D	*Naso lituratus*	1	27	0.6021	H	I
11/22/21	KAHE 1D	*Acanthurus olivaceus*	7	17	1.4265	H	I
11/22/21	KAHE 1D	*Acanthurus olivaceus*	4	20	1.3381	H	I
11/22/21	KAHE 1D	*Acanthurus olivaceus*	5	10	0.2020	H	I
11/22/21	KAHE 1D	*Acanthurus olivaceus*	2	27	1.6711	H	I
11/22/21	KAHE 1D	*Acanthurus olivaceus*	5	15	0.6956	H	I
11/22/21	KAHE 1D	*Acanthurus olivaceus*	3	30	3.4566	H	I
11/22/21	KAHE 1D	*Acanthurus triostegus*	5	20	0.8470	H	I
11/22/21	KAHE 1D	*Acanthurus triostegus*	2	17	0.1934	H	I
11/22/21	KAHE 1D	*Acanthurus triostegus*	5	15	0.3139	H	I

11/22/21	KAHE 1D	*Acanthurus triostegus*	5	12	0.1454	H	I
11/22/21	KAHE 1D	*Myripristis berndti*	3	18	0.8291	Z	I
11/22/21	KAHE 1D	*Zanclus cornutus*	1	10	0.0704	SI	I
11/22/21	KAHE 1D	*Plectroglyphidodon imparipennis*	3	5	0.0167	MI	I
11/22/21	KAHE 1D	*Stegastes fasciolatus*	1	9	0.0345	H	I
11/22/21	KAHE 1D	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
11/22/21	KAHE 1D	*Canthigaster jactator*	2	6	0.0557	H	E
11/22/21	KAHE 1D	*Chaetodon quadrimaculatus*	1	13	0.0960	C	I
11/22/21	PIPE	*Acanthurus nigrofuscus*	50	10	3.5397	H	I
11/22/21	PIPE	*Acanthurus nigrofuscus*	20	12	2.3807	H	I
11/22/21	PIPE	*Thalassoma duperrey*	9	20	1.5472	MI	E
11/22/21	PIPE	*Thalassoma duperrey*	16	12	0.5588	MI	E
11/22/21	PIPE	*Thalassoma duperrey*	8	22	1.8516	MI	E
11/22/21	PIPE	*Thalassoma duperrey*	30	15	2.1019	MI	E
11/22/21	PIPE	*Thalassoma duperrey*	3	10	0.0593	MI	E
11/22/21	PIPE	*Aulostomus chinensis*	1	55	0.1414	P	I
11/22/21	PIPE	*Parupeneus pleurostigma*	3	17	0.5180	MI	I
11/22/21	PIPE	*Melichthys vidua*	1	30	2.9767	H	I
11/22/21	PIPE	*Chaetodon ornatissimus*	2	20	0.9472	C	I
11/22/21	PIPE	*Chaetodon ornatissimus*	1	15	0.1958	C	I
11/22/21	PIPE	*Chromis ovalis*	1	9	0.0335	Z	E
11/22/21	PIPE	*Chromis ovalis*	4	15	0.6175	Z	E
11/22/21	PIPE	*Chromis ovalis*	5	17	1.1223	Z	E
11/22/21	PIPE	*Chromis ovalis*	2	12	0.1584	Z	E
11/22/21	PIPE	*Chlorurus sordidus*	4	30	2.4150	H	I
11/22/21	PIPE	*Chlorurus sordidus*	3	20	0.4657	H	I
11/22/21	PIPE	*Chlorurus sordidus*	1	18	0.1091	H	I
11/22/21	PIPE	*Chlorurus sordidus*	1	33	0.8309	H	I
11/22/21	PIPE	*Dascyllus albisella*	6	10	0.2131	Z	E
11/22/21	PIPE	*Dascyllus albisella*	5	12	0.3253	Z	E
11/22/21	PIPE	*Sufflamen bursa*	1	20	0.4365	MI	I
11/22/21	PIPE	*Sufflamen bursa*	4	18	1.2919	MI	I
11/22/21	PIPE	*Plectroglyphidodon johnstonianus*	1	6	0.0098	C	I
11/22/21	PIPE	*Canthigaster jactator*	5	6	0.1391	H	E
11/22/21	PIPE	*Canthigaster jactator*	1	8	0.0593	H	E
11/22/21	PIPE	*Canthigaster jactator*	2	5	0.0345	H	E
11/22/21	PIPE	*Zanclus cornutus*	2	15	0.4510	SI	I
11/22/21	PIPE	*Forcipiger flavissimus*	2	17	0.1575	SI	I
11/22/21	PIPE	*Forcipiger flavissimus*	1	15	0.0529	SI	I
11/22/21	PIPE	*Forcipiger flavissimus*	5	12	0.1305	SI	I
11/22/21	PIPE	*Forcipiger flavissimus*	2	10	0.0293	SI	I
11/22/21	PIPE	*Chromis vanderbilti*	25	3	0.0314	Z	I
11/22/21	PIPE	*Gomphosus varius*	1	22	0.5062	MI	I
11/22/21	PIPE	*Gomphosus varius*	4	10	0.2843	MI	I
11/22/21	PIPE	*Gomphosus varius*	3	20	1.1979	MI	I
11/22/21	PIPE	*Gomphosus varius*	4	12	0.4477	MI	I
11/22/21	PIPE	*Gomphosus varius*	1	5	0.0127	MI	I
11/22/21	PIPE	*Naso hexacanthus*	1	17	0.2427	Z	I
11/22/21	PIPE	*Mulloidichthys flavolineatus*	17	20	4.0106	MI	I
11/22/21	PIPE	*Mulloidichthys flavolineatus*	5	25	2.2480	MI	I
11/22/21	PIPE	*Chaetodon multicinctus*	4	10	0.2006	C	E



11/22/21	PIPE	*Chaetodon multicinctus*	2	7	0.0343	C	E
11/22/21	PIPE	*Chaetodon multicinctus*	2	17	0.4953	C	E
11/22/21	PIPE	*Stegastes fasciolatus*	3	12	0.2526	H	I
11/22/21	PIPE	*Stegastes fasciolatus*	1	10	0.0478	H	I
11/22/21	PIPE	*Abudefduf abdominalis*	100	17	61.8380	Z	E
11/22/21	PIPE	*Abudefduf abdominalis*	5	20	4.7254	Z	E
11/22/21	PIPE	*Abudefduf abdominalis*	115	15	51.2955	Z	E
11/22/21	PIPE	*Stethojulis balteata*	2	17	0.2474	MI	E
11/22/21	PIPE	*Pervagor aspricaudus*	3	9	0.1255	H	I
11/22/21	PIPE	*Pervagor aspricaudus*	1	8	0.0301	H	I
11/22/21	PIPE	*Parupeneus bifasciatus*	1	22	0.2242	MI	I
11/22/21	PIPE	*Parupeneus bifasciatus*	1	12	0.0320	MI	I
11/22/21	PIPE	*Parupeneus bifasciatus*	3	20	0.4952	MI	I
11/22/21	PIPE	*Parupeneus bifasciatus*	1	15	0.0656	MI	I
11/22/21	PIPE	*Abudefduf vaigiensis*	15	17	9.2757	Z	I
11/22/21	PIPE	*Chaetodon auriga*	1	17	0.1864	SI	I
11/22/21	PIPE	*Myripristis berndti*	4	17	0.9382	Z	I
11/22/21	PIPE	*Ctenochaetus strigosus*	2	17	0.4970	D	I
11/22/21	PIPE	*Ctenochaetus strigosus*	1	15	0.1682	D	I
11/22/21	PIPE	*Thalassoma purpureum*	1	13	0.0355	MI	I
11/22/21	PIPE	*Stegastes fasciolatus*	3	9	0.1035	H	I
11/22/21	PIPE	*Mulloidichthys vanicolensis*	15	10	0.2235	MI	I
11/22/21	PIPE	*Ostracion meleagris*	1	7	0.0122	SI	I
11/22/21	PIPE	*Chromis vanderbilti*	15	3	0.0188	Z	I
11/22/21	PIPE	*Canthigaster jactator*	1	5	0.0172	H	E
11/22/21	PIPE	*Chaetodon fremblii*	2	12	0.2206	SI	E
11/22/21	PIPE	*Coris venusta*	1	10	0.0138	MI	E
11/22/21	PIPE	*Parupeneus bifasciatus*	2	20	0.3302	MI	I
11/22/21	PIPE	*Parupeneus bifasciatus*	1	23	0.2585	MI	I
11/22/21	PIPE	*Naso unicornis*	1	30	1.2221	H	I
11/22/21	PIPE	*Naso unicornis*	1	35	1.8934	H	I
11/22/21	PIPE	*Naso unicornis*	1	40	2.7666	H	I
11/22/21	PIPE	*Acanthurus olivaceus*	1	27	0.8355	H	I
11/22/21	PIPE	*Sufflamen bursa*	1	15	0.1917	MI	I
11/22/21	PIPE	*Zanclus cornutus*	1	9	0.0520	SI	I
11/22/21	PIPE	*Chaetodon fremblii*	1	15	0.2079	SI	E
11/22/21	PIPE	*Chaetodon fremblii*	1	12	0.1103	SI	E
11/22/21	PIPE	*Chaetodon fremblii*	2	10	0.1314	SI	E
11/22/21	PIPE	*Calotomus carolinus*	1	30	0.6299	H	I
11/22/21	PIPE	*Melichthys niger*	2	27	3.0273	H	I
11/22/21	PIPE	*Sufflamen fraenatus*	1	27	1.0299	MI	I
11/22/21	PIPE	*Lutjanus kasmira*	300	15	8.5318	MI	X
11/22/21	PIPE	*Lutjanus kasmira*	50	20	3.9712	MI	X
11/22/21	PIPE	*Naso unicornis*	1	27	0.9061	H	I
11/22/21	PIPE	*Naso unicornis*	1	30	1.2221	H	I
11/22/21	PIPE	*Naso unicornis*	1	35	1.8934	H	I
11/22/21	PIPE	*Decapterus macarellus*	160	15	4.4181	Z	I
11/22/21	PIPE	*Chaetodon quadrimaculatus*	1	15	0.1510	C	I
11/22/21	PIPE	*Monotaxis grandoculis*	1	10	0.0187	MI	I
11/22/21	PIPE	*Monotaxis grandoculis*	2	27	0.9241	MI	I
11/22/21	PIPE	*Mulloidichthys vanicolensis*	70	15	3.8170	MI	I
11/22/21	PIPE	*Naso brevirostris*	2	20	0.7702	Z	I
11/22/21	PIPE	*Zanclus cornutus*	2	15	0.4510	SI	I
11/22/21	PIPE	*Thalassoma purpureum*	1	25	0.2939	MI	I
11/22/21	PIPE	*Chaetodon miliaris*	3	17	0.8310	Z	E
11/22/21	PIPE	*Melichthys niger*	1	27	1.5137	H	I
11/22/21	PIPE	*Macropharyngodon geoffroyi*	1	6	0.0117	MI	E
11/22/21	East 1	*Diodon holocanthus*	1	25	2.2731	MI	I
11/22/21	East 1	*Acanthurus triostegus*	2	15	0.1256	H	I
11/22/21	East 1	*Acanthurus triostegus*	13	20	2.2022	H	I

11/22/21	East 1	*Acanthurus triostegus*	3	18	0.3533	H	I
11/22/21	East 1	*Acanthurus triostegus*	5	22	1.1768	H	I
11/22/21	East 1	*Rhinecanthus rectangulus*	3	20	1.3096	MI	I
11/22/21	East 1	*Rhinecanthus rectangulus*	2	22	1.1467	MI	I
11/22/21	East 1	*Rhinecanthus rectangulus*	1	25	0.8264	MI	I
11/22/21	East 1	*Acanthurus olivaceus*	1	25	0.6607	H	I
11/22/21	East 1	*Acanthurus olivaceus*	6	30	6.9131	H	I
11/22/21	East 1	*Acanthurus olivaceus*	20	27	16.7106	H	I
11/22/21	East 1	*Acanthurus blochii*	4	27	1.5746	H	I
11/22/21	East 1	*Acanthurus blochii*	4	35	3.4300	H	I
11/22/21	East 1	*Coris gaimard*	1	22	0.1435	MI	I
11/22/21	East 1	*Plectroglyphidodon imparipennis*	2	5	0.0112	MI	I
11/22/21	East 1	*Plectroglyphidodon imparipennis*	4	3	0.0046	MI	I
11/22/21	East 1	*Paracirrhites arcatus*	1	7	0.0017	MI	I
11/22/21	East 1	*Plectroglyphidodon johnstonianus*	4	5	0.0223	C	I
11/22/21	East 1	*Thalassoma duperrey*	1	5	0.0023	MI	E
11/22/21	East 1	*Acanthurus nigrofuscus*	15	12	1.7855	H	I
11/22/21	East 1	*Acanthurus nigrofuscus*	5	7	0.1281	H	I
11/22/21	East 1	*Chaetodon quadrimaculatus*	2	12	0.1492	C	I
11/22/21	East 1	*Lutjanus fulvus*	2	25	0.5938	MI	X
11/22/21	East 1	*Lutjanus fulvus*	2	20	0.3040	MI	X
11/22/21	East 1	*Bodianus bilunulatus*	1	35	1.4071	MI	I
11/22/21	East 1	*Forcipiger flavissimus*	2	15	0.1059	SI	I
11/22/21	East 1	*Forcipiger flavissimus*	1	10	0.0146	SI	I
11/22/21	East 1	*Chaetodon miliaris*	2	15	0.3859	Z	E
11/22/21	East 1	*Labroides phthirophagus*	2	5	0.0028	P	E
11/22/21	East 1	*Acanthurus dussumieri*	1	27	0.3937	H	I
11/22/21	East 1	*Acanthurus dussumieri*	1	30	0.5400	H	I
11/22/21	East 1	*Chromis vanderbilti*	25	3	0.0314	Z	I
11/22/21	East 1	*Chromis vanderbilti*	80	2	0.0299	Z	I
11/22/21	East 1	*Melichthys vidua*	1	25	1.8597	H	I
11/22/21	East 1	*Thalassoma duperrey*	1	8	0.0099	MI	E
11/22/21	East 1	*Thalassoma duperrey*	2	5	0.0045	MI	E
11/22/21	East 1	*Naso lituratus*	1	27	0.6021	H	I
11/22/21	East 1	*Canthigaster jactator*	1	6	0.0278	H	E
11/22/21	East 1	*Parupeneus bifasciatus*	1	5	0.0019	MI	I
11/22/21	East 3	*Thalassoma duperrey*	3	15	0.2102	MI	E
11/22/21	East 3	*Thalassoma duperrey*	2	10	0.0395	MI	E
11/22/21	East 3	*Thalassoma duperrey*	3	8	0.0296	MI	E
11/22/21	East 3	*Acanthurus nigrofuscus*	38	10	2.6902	H	I
11/22/21	East 3	*Acanthurus nigrofuscus*	15	7	0.3843	H	I
11/22/21	East 3	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
11/22/21	East 3	*Parupeneus bifasciatus*	1	18	0.1177	MI	I
11/22/21	East 3	*Parupeneus bifasciatus*	1	12	0.0320	MI	I
11/22/21	East 3	*Calotomus carolinus*	2	10	0.0339	H	I
11/22/21	East 3	*Sufflamen bursa*	1	20	0.4365	MI	I
11/22/21	East 3	*Sufflamen bursa*	1	25	0.8264	MI	I
11/22/21	East 3	*Sufflamen bursa*	2	18	0.6459	MI	I
11/22/21	East 3	*Ctenochaetus strigosus*	1	6	0.0096	D	I
11/22/21	East 3	*Ctenochaetus strigosus*	10	10	0.4746	D	I
11/22/21	East 3	*Ctenochaetus strigosus*	1	12	0.0838	D	I
11/22/21	East 3	*Melichthys vidua*	1	25	1.8597	H	I
11/22/21	East 3	*Melichthys vidua*	1	27	2.2682	H	I
11/22/21	East 3	*Melichthys vidua*	1	30	2.9767	H	I
11/22/21	East 3	*Chlorurus sordidus*	1	18	0.1091	H	I
11/22/21	East 3	*Chlorurus sordidus*	1	15	0.0592	H	I
11/22/21	East 3	*Coris venusta*	1	12	0.0248	MI	E
11/22/21	East 3	*Zebrasoma flavescens*	1	5	0.0297	H	I
11/22/21	East 3	*Parupeneus bifasciatus*	2	9	0.0254	MI	I

11/22/21	East 3	*Stegastes fasciolatus*	6	8	0.1437	H	I
11/22/21	East 3	*Coris gaimard*	1	13	0.0254	MI	I
11/22/21	East 3	*Stethojulis balteata*	1	15	0.0833	MI	E
11/22/21	East 3	*Stethojulis balteata*	3	9	0.0497	MI	E
11/22/21	East 3	*Stethojulis balteata*	1	12	0.0411	MI	E
11/22/21	East 3	*Sufflamen fraenatus*	2	35	4.3266	MI	I
11/22/21	East 3	*Plectroglyphidodon johnstonianus*	3	7	0.0475	C	I
11/22/21	East 3	*Plectroglyphidodon johnstonianus*	3	8	0.0719	C	I
11/22/21	East 3	*Paracirrhites arcatus*	1	8	0.0028	MI	I
11/22/21	East 3	*Paracirrhites arcatus*	1	9	0.0045	MI	I
11/22/21	East 3	*Chaetodon multicinctus*	4	10	0.2006	C	E
11/22/21	East 3	*Chaetodon ornatissimus*	1	18	0.3427	C	I
11/22/21	East 3	*Chaetodon ornatissimus*	1	20	0.4736	C	I
11/22/21	East 3	*Canthigaster jactator*	1	6	0.0278	H	E
11/22/21	East 3	*Parupeneus multifasciatus*	1	9	0.0142	MI	I
11/22/21	East 3	*Chromis vanderbilti*	1	3	0.0013	Z	I
11/22/21	East 3	*Cephalopholis argus*	1	35	0.7236	P	X
11/22/21	East 3	*Cephalopholis argus*	1	50	2.1209	P	X
11/22/21	East 3	*Acanthurus olivaceus*	5	35	9.2189	H	I
11/22/21	East 3	*Acanthurus olivaceus*	4	30	4.6087	H	I
11/22/21	East 3	*Bodianus bilunulatus*	1	40	2.1287	MI	I
11/22/21	East 4	*Acanthurus nigrofuscus*	20	10	1.4159	H	I
11/22/21	East 4	*Chromis vanderbilti*	260	3	0.3263	Z	I
11/22/21	East 4	*Thalassoma duperrey*	1	15	0.0701	MI	E
11/22/21	East 4	*Thalassoma duperrey*	8	10	0.1582	MI	E
11/22/21	East 4	*Thalassoma duperrey*	2	12	0.0699	MI	E
11/22/21	East 4	*Thalassoma duperrey*	7	8	0.0690	MI	E
11/22/21	East 4	*Macropharyngodon geoffroyi*	1	7	0.0184	MI	E
11/22/21	East 4	*Macropharyngodon geoffroyi*	2	6	0.0235	MI	E
11/22/21	East 4	*Melichthys niger*	1	25	1.2287	H	I
11/22/21	East 4	*Melichthys niger*	1	30	2.0139	H	I
11/22/21	East 4	*Melichthys niger*	1	27	1.5137	H	I
11/22/21	East 4	*Gomphosus varius*	1	18	0.3072	MI	I
11/22/21	East 4	*Gomphosus varius*	1	9	0.0547	MI	I
11/22/21	East 4	*Paracirrhites arcatus*	6	8	0.0171	MI	I
11/22/21	East 4	*Melichthys vidua*	1	25	1.8597	H	I
11/22/21	East 4	*Melichthys vidua*	1	35	4.4305	H	I
11/22/21	East 4	*Acanthurus olivaceus*	2	40	5.5413	H	I
11/22/21	East 4	*Acanthurus olivaceus*	2	30	2.3044	H	I
11/22/21	East 4	*Acanthurus olivaceus*	1	35	1.8438	H	I
11/22/21	East 4	*Aulostomus chinensis*	1	45	0.0707	P	I
11/22/21	East 4	*Canthigaster jactator*	6	6	0.1670	H	E
11/22/21	East 4	*Canthigaster jactator*	2	7	0.0835	H	E
11/22/21	East 4	*Canthigaster amboinensis*	1	10	0.4249	H	I
11/22/21	East 4	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
11/22/21	East 4	*Parupeneus bifasciatus*	1	15	0.0656	MI	I
11/22/21	East 4	*Thalassoma trilobatum*	2	9	0.0491	MI	I
11/22/21	East 4	*Cephalopholis argus*	1	40	1.0823	P	X
11/22/21	East 4	*Cephalopholis argus*	1	35	0.7236	P	X
11/22/21	East 4	*Naso lituratus*	1	30	0.8346	H	I
11/22/21	East 4	*Naso lituratus*	1	25	0.4743	H	I
11/22/21	East 4	*Labroides phthirophagus*	1	5	0.0014	P	E
11/22/21	East 4	*Coris gaimard*	1	17	0.0615	MI	I
11/22/21	East 4	*Coris gaimard*	1	25	0.2186	MI	I
11/22/21	East 4	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
11/22/21	East 4	*Sufflamen fraenatus*	1	30	1.3920	MI	I
11/22/21	East 4	*Rhinecanthus rectangulus*	2	20	0.8731	MI	I
11/22/21	East 4	*Rhinecanthus rectangulus*	2	22	1.1467	MI	I

11/22/21	East 4	*Stethojulis balteata*	1	7	0.0075	MI	E
11/22/21	KO 1	*Acanthurus nigrofuscus*	5	12	0.5952	H	I
11/22/21	KO 1	*Acanthurus nigrofuscus*	15	10	1.0619	H	I
11/22/21	KO 1	*Ctenochaetus strigosus*	19	20	7.8392	D	I
11/22/21	KO 1	*Ctenochaetus strigosus*	9	15	1.5134	D	I
11/22/21	KO 1	*Ctenochaetus strigosus*	4	18	1.1880	D	I
11/22/21	KO 1	*Ctenochaetus strigosus*	6	10	0.2847	D	I
11/22/21	KO 1	*Plectroglyphidodon johnstonianus*	2	6	0.0196	C	I
11/22/21	KO 1	*Thalassoma duperrey*	2	10	0.0395	MI	E
11/22/21	KO 1	*Thalassoma duperrey*	6	8	0.0591	MI	E
11/22/21	KO 1	*Thalassoma duperrey*	2	12	0.0699	MI	E
11/22/21	KO 1	*Thalassoma duperrey*	1	15	0.0701	MI	E
11/22/21	KO 1	*Chaetodon lunula*	1	18	0.1983	SI	I
11/22/21	KO 1	*Chaetodon lunula*	1	15	0.1148	SI	I
11/22/21	KO 1	*Canthigaster jactator*	1	5	0.0172	H	E
11/22/21	KO 1	*Canthigaster jactator*	1	7	0.0417	H	E
11/22/21	KO 1	*Melichthys vidua*	1	30	2.9767	H	I
11/22/21	KO 1	*Chaetodon multicinctus*	3	12	0.2604	C	E
11/22/21	KO 1	*Chaetodon multicinctus*	2	10	0.1003	C	E
11/22/21	KO 1	*Chaetodon quadrimaculatus*	3	15	0.4529	C	I
11/22/21	KO 1	*Chromis vanderbilti*	6	3	0.0075	Z	I
11/22/21	KO 1	*Stethojulis balteata*	1	12	0.0411	MI	E
11/22/21	KO 1	*Stethojulis balteata*	1	10	0.0231	MI	E
11/22/21	KO 1	*Gomphosus varius*	2	18	0.6143	MI	I
11/22/21	KO 1	*Gomphosus varius*	1	9	0.0547	MI	I
11/22/21	KO 1	*Zanclus cornutus*	2	15	0.4510	SI	I
11/22/21	KO 1	*Melichthys niger*	2	30	4.0277	H	I
11/22/21	KO 1	*Melichthys niger*	3	35	9.1744	H	I
11/22/21	KO 1	*Chaetodon ornatissimus*	1	22	0.6346	C	I
11/22/21	KO 1	*Chaetodon ornatissimus*	2	23	1.4547	C	I
11/22/21	KO 1	*Chlorurus sordidus*	1	27	0.4242	H	I
11/22/21	KO 1	*Chlorurus sordidus*	1	30	0.6038	H	I
11/22/21	KO 1	*Chaetodon lunulatus*	1	17	0.2373	C	I
11/22/21	KO 1	*Chaetodon lunulatus*	1	15	0.1624	C	I
11/22/21	KO 1	*Acanthurus leucopareius*	1	25	0.8894	H	I
11/22/21	KO 1	*Lutjanus kasmira*	1	27	0.2319	MI	X
11/22/21	KO 1	*Forcipiger flavissimus*	1	17	0.0787	SI	I
11/22/21	KO 1	*Forcipiger flavissimus*	2	15	0.1059	SI	I
11/22/21	KO 1	*Sufflamen bursa*	1	20	0.4365	MI	I
11/22/21	KO 1	*Sufflamen bursa*	1	18	0.3230	MI	I
11/22/21	KO 1	*Plectroglyphidodon johnstonianus*	2	8	0.0479	C	I
11/22/21	KO 1	*Acanthurus achilles*	1	17	0.3739	H	I
11/22/21	KO 1	*Monotaxis grandoculis*	4	17	0.4148	MI	I
11/22/21	KAHE 5B	*Gomphosus varius*	1	15	0.1951	MI	I
11/22/21	KAHE 5B	*Gomphosus varius*	3	22	1.5187	MI	I
11/22/21	KAHE 5B	*Gomphosus varius*	1	18	0.3072	MI	I
11/22/21	KAHE 5B	*Gomphosus varius*	3	12	0.3357	MI	I
11/22/21	KAHE 5B	*Chaetodon multicinctus*	1	12	0.0868	C	E
11/22/21	KAHE 5B	*Canthigaster jactator*	1	6	0.0278	H	E
11/22/21	KAHE 5B	*Canthigaster jactator*	2	5	0.0345	H	E
11/22/21	KAHE 5B	*Acanthurus nigrofuscus*	40	10	2.8318	H	I
11/22/21	KAHE 5B	*Acanthurus nigrofuscus*	20	12	2.3807	H	I
11/22/21	KAHE 5B	*Labroides phthirophagus*	2	5	0.0028	P	E
11/22/21	KAHE 5B	*Parupeneus bifasciatus*	1	6	0.0035	MI	I
11/22/21	KAHE 5B	*Parupeneus bifasciatus*	2	10	0.0357	MI	I
11/22/21	KAHE 5B	*Parupeneus bifasciatus*	1	15	0.0656	MI	I
11/22/21	KAHE 5B	*Parupeneus bifasciatus*	1	17	0.0980	MI	I
11/22/21	KAHE 5B	*Parupeneus bifasciatus*	1	22	0.2242	MI	I

11/22/21	KAHE 5B	*Mulloidichthys flavolineatus*	4	20	0.9437	MI	I
11/22/21	KAHE 5B	*Thalassoma duperrey*	4	9	0.0569	MI	E
11/22/21	KAHE 5B	*Thalassoma duperrey*	1	18	0.1237	MI	E
11/22/21	KAHE 5B	*Thalassoma duperrey*	1	22	0.2314	MI	E
11/22/21	KAHE 5B	*Thalassoma duperrey*	1	12	0.0349	MI	E
11/22/21	KAHE 5B	*Myripristis berndti*	2	17	0.4691	Z	I
11/22/21	KAHE 5B	*Chromis vanderbilti*	106	3	0.1330	Z	I
11/22/21	KAHE 5B	*Sufflamen bursa*	1	15	0.1917	MI	I
11/22/21	KAHE 5B	*Sufflamen bursa*	3	18	0.9689	MI	I
11/22/21	KAHE 5B	*Paracirrhites arcatus*	1	8	0.0028	MI	I
11/22/21	KAHE 5B	*Zanclus cornutus*	4	15	0.9019	SI	I
11/22/21	KAHE 5B	*Decapterus macarellus*	1	23	0.1057	Z	I
11/22/21	KAHE 5B	*Calotomus carolinus*	1	18	0.1173	H	I
11/22/21	KAHE 5B	*Plectroglyphidodon johnstonianus*	1	6	0.0098	C	I
11/22/21	KAHE 5B	*Plectroglyphidodon johnstonianus*	2	8	0.0479	C	I
11/22/21	KAHE 5B	*Chlorurus sordidus*	1	22	0.2136	H	I
11/22/21	KAHE 5B	*Acanthurus olivaceus*	1	12	0.0704	H	I
11/22/21	KAHE 5B	*Rhinecanthus rectangulus*	2	18	0.6459	MI	I
11/22/21	KAHE 5B	*Novaculichthys taeniourus*	1	12	0.0360	MI	I
11/22/21	KAHE 5B	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
11/22/21	KAHE 5B	*Melichthys vidua*	1	25	1.8597	H	I
11/22/21	KAHE 5B	*Acanthurus olivaceus*	1	25	0.6607	H	I
11/22/21	KAHE 7B	*Acanthurus nigrofuscus*	15	10	1.0619	H	I
11/22/21	KAHE 7B	*Acanthurus nigrofuscus*	10	12	1.1903	H	I
11/22/21	KAHE 7B	*Zanclus cornutus*	1	9	0.0520	SI	I
11/22/21	KAHE 7B	*Zanclus cornutus*	2	15	0.4510	SI	I
11/22/21	KAHE 7B	*Zanclus cornutus*	2	12	0.2377	SI	I
11/22/21	KAHE 7B	*Coris gaimard*	1	24	0.1911	MI	I
11/22/21	KAHE 7B	*Dascyllus albisella*	1	10	0.0355	Z	E
11/22/21	KAHE 7B	*Thalassoma duperrey*	4	23	1.0635	MI	E
11/22/21	KAHE 7B	*Thalassoma duperrey*	4	20	0.6876	MI	E
11/22/21	KAHE 7B	*Thalassoma duperrey*	1	15	0.0701	MI	E
11/22/21	KAHE 7B	*Melichthys vidua*	1	27	2.2682	H	I
11/22/21	KAHE 7B	*Sufflamen bursa*	7	17	1.9198	MI	I
11/22/21	KAHE 7B	*Sufflamen bursa*	3	15	0.5752	MI	I
11/22/21	KAHE 7B	*Sufflamen bursa*	1	12	0.1013	MI	I
11/22/21	KAHE 7B	*Sufflamen bursa*	2	20	0.8731	MI	I
11/22/21	KAHE 7B	*Parupeneus bifasciatus*	1	20	0.1651	MI	I
11/22/21	KAHE 7B	*Chaetodon multicinctus*	1	7	0.0171	C	E
11/22/21	KAHE 7B	*Chaetodon multicinctus*	4	12	0.3472	C	E
11/22/21	KAHE 7B	*Paracirrhites arcatus*	3	7	0.0051	MI	I
11/22/21	KAHE 7B	*Parupeneus bifasciatus*	3	15	0.1967	MI	I
11/22/21	KAHE 7B	*Parupeneus bifasciatus*	2	20	0.3302	MI	I
11/22/21	KAHE 7B	*Abudefduf vaigiensis*	6	15	2.6763	Z	I
11/22/21	KAHE 7B	*Chromis vanderbilti*	5	2	0.0019	Z	I
11/22/21	KAHE 7B	*Chromis vanderbilti*	130	3	0.1632	Z	I
11/22/21	KAHE 7B	*Mulloidichthys flavolineatus*	1	25	0.4496	MI	I
11/22/21	KAHE 7B	*Canthigaster jactator*	2	15	0.6196	H	E
11/22/21	KAHE 7B	*Cantherhines sandwichiensis*	1	17	0.4459	H	E
11/22/21	KAHE 7B	*Acanthurus triostegus*	5	12	0.1454	H	I
11/22/21	KAHE 7B	*Naso lituratus*	2	27	1.2041	H	I
11/22/21	KAHE 7B	*Naso lituratus*	3	25	1.4228	H	I
11/22/21	KAHE 7B	*Naso unicornis*	2	15	0.3414	H	I
11/22/21	KAHE 7B	*Parupeneus bifasciatus*	1	17	0.0980	MI	I
11/22/21	KAHE 7B	*Melichthys vidua*	1	30	2.9767	H	I
11/22/21	KAHE 7B	*Plectroglyphidodon imparipennis*	1	5	0.0056	MI	I
11/22/21	KAHE 7B	*Naso unicornis*	1	15	0.1707	H	I
11/22/21	NANA 1	*Parupeneus bifasciatus*	2	10	0.0357	MI	I

11/22/21	NANA 1	*Parupeneus bifasciatus*	1	6	0.0035	MI	I
11/22/21	NANA 1	*Parupeneus bifasciatus*	1	22	0.2242	MI	I
11/22/21	NANA 1	*Parupeneus bifasciatus*	1	15	0.0656	MI	I
11/22/21	NANA 1	*Thalassoma duperrey*	3	10	0.0593	MI	E
11/22/21	NANA 1	*Thalassoma duperrey*	1	7	0.0065	MI	E
11/22/21	NANA 1	*Thalassoma duperrey*	1	5	0.0023	MI	E
11/22/21	NANA 1	*Canthigaster jactator*	3	7	0.1252	H	E
11/22/21	NANA 1	*Canthigaster jactator*	1	6	0.0278	H	E
11/22/21	NANA 1	*Plectroglyphidodon imparipennis*	4	5	0.0223	MI	I
11/22/21	NANA 1	*Ostracion meleagris*	1	5	0.0042	SI	I
11/22/21	NANA 1	*Rhinecanthus rectangulus*	1	22	0.5733	MI	I
11/22/21	NANA 1	*Thalassoma trilobatum*	1	22	0.3494	MI	I
11/22/21	NANA 1	*Chaetodon quadrimaculatus*	1	12	0.0746	C	I
11/22/21	NANA 1	*Chromis vanderbilti*	10	2	0.0037	Z	I
11/22/21	NANA 1	*Chromis vanderbilti*	10	3	0.0126	Z	I
11/22/21	NANA 1	*Acanthurus nigrofuscus*	2	8	0.0750	H	I
11/22/21	NANA 2	*Stethojulis balteata*	3	10	0.0694	MI	E
11/22/21	NANA 2	*Acanthurus triostegus*	1	5	0.0014	H	I
11/22/21	NANA 2	*Thalassoma duperrey*	6	10	0.1186	MI	E
11/22/21	NANA 2	*Thalassoma duperrey*	1	20	0.1719	MI	E
11/22/21	NANA 2	*Thalassoma duperrey*	2	15	0.1401	MI	E
11/22/21	NANA 2	*Acanthurus nigrofuscus*	15	10	1.0619	H	I
11/22/21	NANA 2	*Acanthurus nigrofuscus*	15	12	1.7855	H	I
11/22/21	NANA 2	*Rhinecanthus rectangulus*	1	22	0.5733	MI	I
11/22/21	NANA 2	*Parupeneus bifasciatus*	1	23	0.2585	MI	I
11/22/21	NANA 2	*Parupeneus bifasciatus*	1	10	0.0178	MI	I
11/22/21	NANA 2	*Parupeneus bifasciatus*	1	18	0.1177	MI	I
11/22/21	NANA 2	*Acanthurus leucopareius*	30	27	33.8201	H	I
11/22/21	NANA 2	*Acanthurus leucopareius*	10	30	15.5950	H	I
11/22/21	NANA 2	*Thalassoma trilobatum*	1	13	0.0732	MI	I
11/22/21	NANA 2	*Zebrasoma flavescens*	2	17	1.2510	H	I
11/22/21	NANA 2	*Naso lituratus*	1	27	0.6021	H	I
11/22/21	NANA 2	*Acanthurus olivaceus*	7	30	8.0653	H	I
11/22/21	NANA 2	*Monotaxis grandoculis*	5	27	2.3103	MI	I
11/22/21	NANA 2	*Monotaxis grandoculis*	1	30	0.6494	MI	I
11/22/21	NANA 2	*Chaetodon ornatissimus*	2	17	0.5751	C	I
11/22/21	NANA 2	*Forcipiger flavissimus*	1	15	0.0529	SI	I
11/22/21	NANA 2	*Sufflamen bursa*	3	18	0.9689	MI	I
11/22/21	NANA 2	*Ctenochaetus strigosus*	6	10	0.2847	D	I
11/22/21	NANA 2	*Ctenochaetus strigosus*	4	12	0.3353	D	I
11/22/21	NANA 2	*Chromis vanderbilti*	3	3	0.0038	Z	I
11/22/21	NANA 2	*Melichthys niger*	8	30	16.1109	H	I
11/22/21	NANA 2	*Melichthys niger*	3	27	4.5410	H	I
11/22/21	NANA 2	*Chaetodon lunula*	1	17	0.1670	SI	I
11/22/21	NANA 2	*Lutjanus fulvus*	2	25	0.5938	MI	X
11/22/21	NANA 2	*Canthigaster jactator*	2	6	0.0557	H	E
11/22/21	NANA 2	*Gomphosus varius*	1	7	0.0292	MI	I
11/22/21	NANA 2	*Stegastes fasciolatus*	1	9	0.0345	H	I
11/22/21	KAHE 7E	*Sufflamen bursa*	6	20	2.6192	MI	I
11/22/21	KAHE 7E	*Sufflamen bursa*	6	18	1.9378	MI	I
11/22/21	KAHE 7E	*Thalassoma duperrey*	1	18	0.1237	MI	E
11/22/21	KAHE 7E	*Thalassoma duperrey*	1	12	0.0349	MI	E
11/22/21	KAHE 7E	*Acanthurus nigrofuscus*	15	10	1.0619	H	I
11/22/21	KAHE 7E	*Acanthurus nigrofuscus*	4	6	0.0660	H	I
11/22/21	KAHE 7E	*Paracirrhites arcatus*	1	9	0.0045	MI	I
11/22/21	KAHE 7E	*Paracirrhites arcatus*	2	7	0.0034	MI	I
11/22/21	KAHE 7E	*Acanthurus olivaceus*	2	27	1.6711	H	I
11/22/21	KAHE 7E	*Acanthurus olivaceus*	4	30	4.6087	H	I
11/22/21	KAHE 7E	*Naso unicornis*	1	30	1.2221	H	I
11/22/21	KAHE 7E	*Naso lituratus*	1	25	0.4743	H	I

11/22/21	KAHE 7E	*Parupeneus bifasciatus*	2	8	0.0174	MI	I
11/22/21	KAHE 7E	*Parupeneus bifasciatus*	2	12	0.0641	MI	I
11/22/21	KAHE 7E	*Parupeneus bifasciatus*	3	15	0.1967	MI	I
11/22/21	KAHE 7E	*Parupeneus bifasciatus*	13	6	0.0450	MI	I
11/22/21	KAHE 7E	*Naso hexacanthus*	3	27	2.7092	Z	I
11/22/21	KAHE 7E	*Canthigaster jactator*	3	6	0.0835	H	E
11/22/21	KAHE 7E	*Canthigaster jactator*	6	5	0.1034	H	E
11/22/21	KAHE 7E	*Melichthys vidua*	1	27	2.2682	H	I
11/22/21	KAHE 7E	*Zanclus cornutus*	4	15	0.9019	SI	I
11/22/21	KAHE 7E	*Chromis vanderbilti*	10	2	0.0037	Z	I
11/22/21	KAHE 7E	*Pseudojuloides cerasinus*	3	5	0.0068	MI	I
11/22/21	KAHE 7E	*Plectroglyphidodon johnstonianus*	2	6	0.0196	C	I
11/22/21	KAHE 7E	*Thalassoma duperrey*	1	18	0.1237	MI	E
11/22/21	KAHE 7E	*Thalassoma duperrey*	2	12	0.0699	MI	E
11/22/21	KAHE 7E	*Chaetodon multicinctus*	2	6	0.0216	C	E
11/22/21	KAHE 7E	*Melichthys vidua*	1	27	2.2682	H	I
11/22/21	KAHE 7E	*Chromis vanderbilti*	100	2	0.0373	Z	I
11/22/21	KAHE 7E	*Chromis vanderbilti*	130	3	0.1632	Z	I
11/22/21	KAHE 7E	*Zebrasoma flavescens*	2	12	0.5255	H	I
11/22/21	KAHE 7E	*Zebrasoma flavescens*	2	5	0.0594	H	I
11/22/21	KAHE 7E	*Stethojulis balteata*	1	15	0.0833	MI	E
11/22/21	KAHE 7E	*Diodon holocanthus*	1	30	3.7256	MI	I
11/22/21	KAHE 7E	*Coris gaimard*	1	25	0.2186	MI	I
11/22/21	KAHE 7E	*Novaculichthys taeniourus*	1	20	0.1838	MI	I