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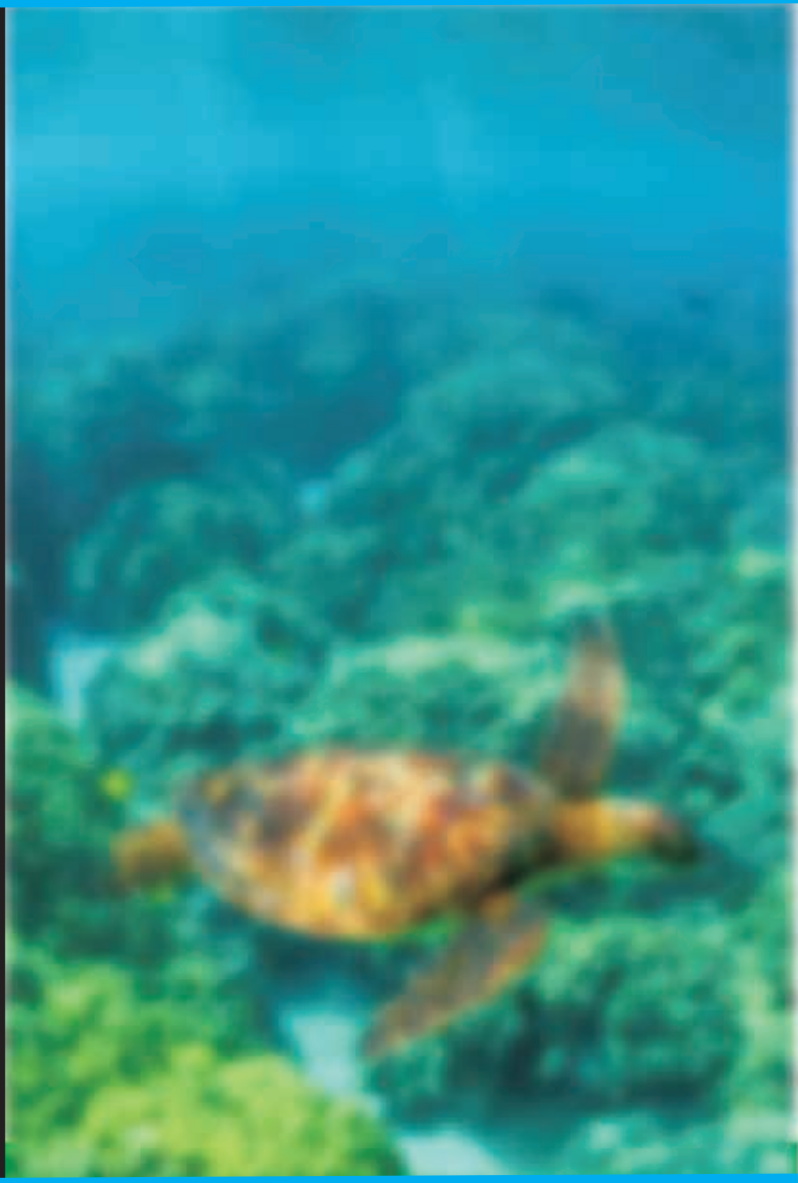
Identifying and Preserving the Resilience of West Maui Coral Reefs



CORAL REEFS

Prepared by: WHALE Environmental Services LLC www.whalees.com

August 14th, 2015

Ms. Emma Anders
Mr. Ray Uchimura
DLNR – Division of Aquatic Resources

Re: Submittal Report
Identifying and Preserving the Resiliency of the West Maui Coral Reefs in select project areas.

Dear Ms. Anders:

WHALE Environmental Services LLC has enclosed within the draft report for the West Maui Coral Reef Assessment of Resiliency study under contract number C42751 issued by the Department of Land and Natural Resources, State of Hawaii. Its contents may be found on the next pages.

Sincerely;
WHALE Environmental Services LLC

Mark Howland

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Mark Howland, Project Manager
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EPA award winners for Environmental Technology Innovation
for stormwater mitigation design and erosion control

August 2015

Identifying and Preserving the Resiliency of the West Maui Coral Reefs in select areas of West Maui from Maalaea Harbor to Honolua Bay.

Prepared for the Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) and NOAA.

Acknowledgments

This work was a labor-intensive study of 60 reefs along the West Maui Coastline to produce a resiliency analysis. WHALE Environmental Services LLC led the effort. The investigators and contributors to this effort would like to thank DAR for the financial support for the project as sourced from NOAA grants.

In particular, we strongly thank Ms. Darla White of DAR and Mr. Bernardo Vargas-Angel of NOAA. Without their guidance, support, data provision and corrective actions; this report would not have been made possible. We particularly thank them for taking the time to outline, explain and demonstrate the new updated methods to evaluate resiliency in reefs. In addition, our thanks also go out to Mr. John Burns of Plan B Consultancy who graciously provided NOAA certified divers so that we could complete the data acquisition.

Mark Howland, WHALE Environmental Services LLC

Executive Summary

Identifying and Preserving the Resiliency of the West Maui Coral Reefs in select areas of West Maui from Maalaea Harbor to Honolua Bay.

Coral reefs are increasingly being threatened by climate change, man-made stresses and other factors that challenge the ability of the reefs to be resilient and resist or recover from the disturbances of those activities. It is forecast that the growth in climate change, and the proliferation of human impacts will further require key understanding of resilience variable in a reef ecosystem. Many people have worked to develop a framework for understanding reef resiliency. While older methods focused on overall reef health (previously submitted by WHALE Environmental Services LLC); current and modern methods for appraising reef resiliency have been led by the framework developed by McClanahan et al in 2012.

This framework allows the reviewer to assess and compare reef resiliency across sites. By identifying high resiliency, management decisions can be made to support and maintain coral reefs. The McClanahan et al framework suggested that eleven (11) variables could be appraised to evaluate the resilience potentials among groups of reefs. This framework was apply to a specific geo-region on Maui, the West Maui Coastline from Maalaea harbor to Honolua Bay. The eleven (11) variables suggested for employments in a resiliency potential analysis are: coral diversity, bleaching resistance, recruitment, herbivore biomass, macroalgae cover, temperature variability, nutrient input/sedimentation, fishing access or pressure, coral disease, and anthropogenic physical impacts.

This report covers sixty (60) reefs in a specific West Maui georegion. In the past, broader island based reviews in select locations has been done; it is believed this is the first application of a resiliency potential analysis to a specific georegion. Since the inauguration of this project, WHALE Environmental Services LLC has worked also on two (2) other resiliency appraisals on the Islands of Hawaii and Oahu. The resilience scores are calculated from the average of eight (8) variables included in the analysis (minus coral disease – not sufficiently distinct by Simpson's Index of Diversity due to infrequent, sporadic observance, and anthropogenic physical impacts – which as analyzed separately as stress scores). The relative High, Medium and Low categories for scores were used to

describe the scores for the independent variables and the resultant ranking. This report presents the methodology used, the results of the data analysis which includes maps and rankings; and as well presents suggestions for resource management.

Twelve (12) reefs were found to have high relative resilience, thirty six (36) have medium, and twelve (12) have low. An analysis of the principal components driving resiliency were coral diversity, bleaching resistance and sedimentation. It was seen that the sites with higher scores had less sedimentation entry, greater coral diversity, and stronger bleaching resistance. The reverse was true for the sites with low resiliency scores. It was also apparent that the sites with low scores are in areas such as harbors, resorts, or public beaches where high human activity is noted.

Scoring for the independent variables and the final resilience scores are all relatives to the sites surveyed only. There are many other site studies which partially evaluated one or more variables by not all, or partially reviewed a section of a reef where this project had total coverage. That information was reviewed for data review, and possibly can be used by others to be incorporated into future projects.

Introduction and Objectives

Resilience has become a key word in coral reef management around the world. Resilience is a reef's capacity to ***resist*** and ***recover*** from disturbance. (Holling 1973, Nyström and Folke 2001). There are several types of disturbance which can affect the overall health of a reef:

- Climate change – warmer sea temperatures in overall rises worldwide or location-specific temperature rises can induce more frequent and more severe bleaching events within a coral reef ecosystem.
- Climate change and rising carbon dioxide increase an ocean's acidification which in turn impact a reef by weakening its skeletons and reduces prime conditions for new growth and recruitment.
- Climate change is also affecting weather patterns creating more storms, rising sea levels, rainfall frequency/intensity/patterns, and can damage reef structures.
- Climate change can also influence reefs from on-shore areas. Increased rainfall can lead to increased freshwater runoff in areas where stormwater discharges lead to off-shore reef areas.
- Man-made created stress to reefs appears in many forms and is often more the cause for reef impacts.
    - Development along coastlines add runoff, shore break changes, silt and erosion, pollution – all having impacts on nearby reefs
    - Activities such as golfing, fishing, boating and more all have impacts to reefs. Pesticides and nutrients, prop damage, and over-fishing are just a few activities which affect reefs and makes resilience more of a challenge.

- Mismanagement of resources can lead to nutrient overloads in reef waters. Septic discharges - accidental or deliberate - can increase nutrient levels in reef waters which promote algae blooms which out-compete coral as competitors for space and light. Poor quality runoff waters promote algae growth. Uncontrolled silt and sediment can overwhelm the reef structure, even in some cases carrying debris which physically damages reefs.

- The man-made induced changes of carrying nutrients to reef environments can be further exasperated and complicated by human activities. Overfishing removes the herbivorous fish that help retard algal growth. Physical impacts to reefs can be seen in many forms – sediment loading, propeller damage from fishing and tourist boats, prop wash effects, abandoned fishing nets, litter and other effects.

Coral reefs have always been affected by natural disturbances and even man-made disturbances for many centuries. They are dynamic vibrant systems which historically possess resilience. Today however, increasing levels of stress from a rising population and the projected effects of climate change challenges that resilience.

These factors create an overwhelming need to understand coral reef resilience in a specific georegion. The purpose of this study was to focus on a particular set of reefs within one georegion that could be analyzed for:

- Overall health
- Stressor Introduction
- Resiliency ability

The objective of the proposed work is to assess factors that allow a reef to gain resiliency such as coral cover, fish abundance, substrate availability - all associated with coral reefs and the aquatic resources, and to identify “stressors”.

Our goal is to answer three questions: *1. How much resilience does a reef possess? 2. Does the reef have a critical threshold indicated by present field survey or past documentation? 3. What external stressors are affecting the reef?*

Building on earlier work done by WHALE Environmental Services LLC, we focused our strengths for reef analysis, reef conditions and observed degradation using a SWOT analysis: Strengths, Weaknesses, Opportunities and Threats. This was our objective to identify resilience reef areas or non-resilience areas for DLNR.

The NOAA Pacific Islands Fisheries Science Center – Coral Reef Ecosystem Division (CRED) leads the challenge to manage coral reefs in the Pacific Region. They have conducted random and variable studies linked to watersheds to develop "geo-regions" in the State of Hawaii. This has allowed a broad understanding of coral reef issues linked to watershed subdivisions in the islands. This particular study concerns one such georegion – the West Maui coastline from Ukumehame/Maalaea to Honolua.

Additionally, we will discuss the tools for mitigation to reef impact that can be utilized. Policy makers will need to develop strategies that cannot be addressed on a local level – changing carbon and other greenhouse gas emissions into the atmosphere, or addressing changing the rate of global climate change. At a local level, stakeholders can work to reduce the stress coral reefs face with local actions. Whether it is to identify a need for creation or expansion of protected areas, to develop new regulations that may regulate over-fishing, to develop stormwater mitigation efforts and increase erosion control, or to develop complete watershed management plans that manage resources from mauka (mountain) to makai (sea) as the Hawaiians did with the ahupuaʻa system.

In an economic climate which makes allocating resources difficult, understanding the resilience needs of individual reefs or smaller aligned groups of reefs facing similar threats allows stakeholders to prioritize their actions. In this manner, coordinated action can lead to greater reef restoration in priority areas – protecting already resilient reefs, reversing the damage trend of affected reefs, or insuring marginally affected reefs do not lose further resilience abilities.

Methods

Many parties have been working with reef resilience characteristics over the years. WHALE Environmental Services LLC's early years involved understanding reef health indicators as advocated by scientists at the Woods Hole Oceanographic Institute. The vast range of work was to permit underwater fiber optic cables, conduct environmental assessments for ocean turbines and desalination plants, and to review shoreline runoff impacts to offshore environments; activities and studies which have kept us abreast of coral reef impacts and research development over the years.

Recently, however, there has been a stronger emphasis on understanding resilience. In 2012, McClanahan and Associates developed a new way to evaluate "Resilience Indicators". They presented a resilience assessment method based on up to eleven (11) key indicators that experts in the field agreed to have the largest importance and strongest empirical evidence (McClanahan TR).

These eleven (11) key indicators are considered to provide an evidence-weighted framework, which characterized resilience and distinguished priority sites. Resilience includes more complexity than a few key factors – it is vital to understand how the factors interrelate with key resilience components of resistance (the ability of a reef to resist or survive a disturbance) and recovery (the rate by which a reef returns to its original condition). Of sixty (60) commonly accepted reef indicators, only eleven (11) passed McClanahan's peer and expert reviewed consensus level. They are neither negatively nor positively correlated with resilience and thus can be used independently.

Resistant factors considered to be important include the presence of stress-resistant coral species (thus less susceptible to temperature rise), the presence of like-wise stress-resistant symbionts, and a large variability on yearly temperatures which encourages tolerance.

Recovery factors considered to be important are factors like active recruitment (new growth) for replenishment, suitable substrate for growth, and a low cover of macroalgae; which attracts silt, smothers coral and can dominate the space.

Our methodology includes the measurement or estimation of 'resilience factors' (Nyström 2008) and our assessments are designed as detailed snapshots of resilience. We recognized that we may be looking from multiple perspectives - an engineered recovery method – the return of the ecosystem (Holling 1996), or an ecological resilience model – the ability to withstand impact and regain stability (Walker 2004). Recognizing the difficulty of assessing all academia indicators at every site and knowing there is overlap, we felt that the assessments needed to focus on McClanahan's "key" resilience factors, which have been judged the best to be able to evaluate indicators of resilience.

To measure these factors, each reef evaluation used the following indictors to provide measurements to provide a "ranking sheet" for each reef. Upon commencement of the project, we anticipated that approximately 40-50 reefs would be evaluated. In the end, including reviewing DAR sites, sixty (60) reef locations were evaluated with transects at each study point.

Site Selection

WHALE Environmental Services LLC began by employing its GIS Analyst to identify reef locations with ArcMap which will gave us some general location indicators and used that data to design a data acquisition map for sampling. The chosen locations were discussed with NOAA CRED and HDLNR DAR for coverage sufficiency. The data acquisition design included points where WHALE felt reefs needed to be evaluated either due to an isolated condition or to provide sufficient depth of review on larger reefs. Upon water entry for sampling, locations were ground-truth surveyed and recorded.

The data acquisition design contains twelve (12) DAR sampling points and forty-eight (48) WHALE sampling points. Each data acquisition point had transects taken for sampling coverage, and mostly were taken at consistent three (3) meter and ten (10) meter isobar depths. In a few cases, reefs were at varying depths and are so noted on the reporting forms. In the Appendix, Reef Charts with reef nomenclature, latitude/longitude, depth and other information is provided. For the DAR sites, inclusion of historical data and current gathered data is provided.

The Appendix also contains six (6) study zone schematics which graphically demonstrate the location and name of each study point. A Master Chart with exact GPS coordinate locations is also provided in the Appendix.

Data Collection

For data collection, our intent was to insure the data was compatible with existing data in Hawaii gathered by NOAA, DAR and others. With the assistance of Darla White of DAR and Bernardo Angel-Vargas of NOAA, we reached out to many providers of historical data to set up our data collection designed. Consistent with McClanahan, the indicators evaluated for use for this assessment were:

(1) Coral Diversity
(2) Recruitment
(3) Bleaching Resistance
(4) Temperature Variability
(5) Herbivore Biomass
(6) Macroalgae Cover
(7) Nutrient Input
(8) Sedimentation
(9) Fishing Access
(10) Coral Disease
(11) Anthropogenic physical impacts

Baseline information was gathered from the past DAR Maui and Lanai 2006-2010 Monitoring Report (Russell Sparks) and from data provided by NOAA CRED (Ivor Williams). We are of the belief that this is the first geo-region specific reef assessment conducted in the field in the Hawaiian Islands.

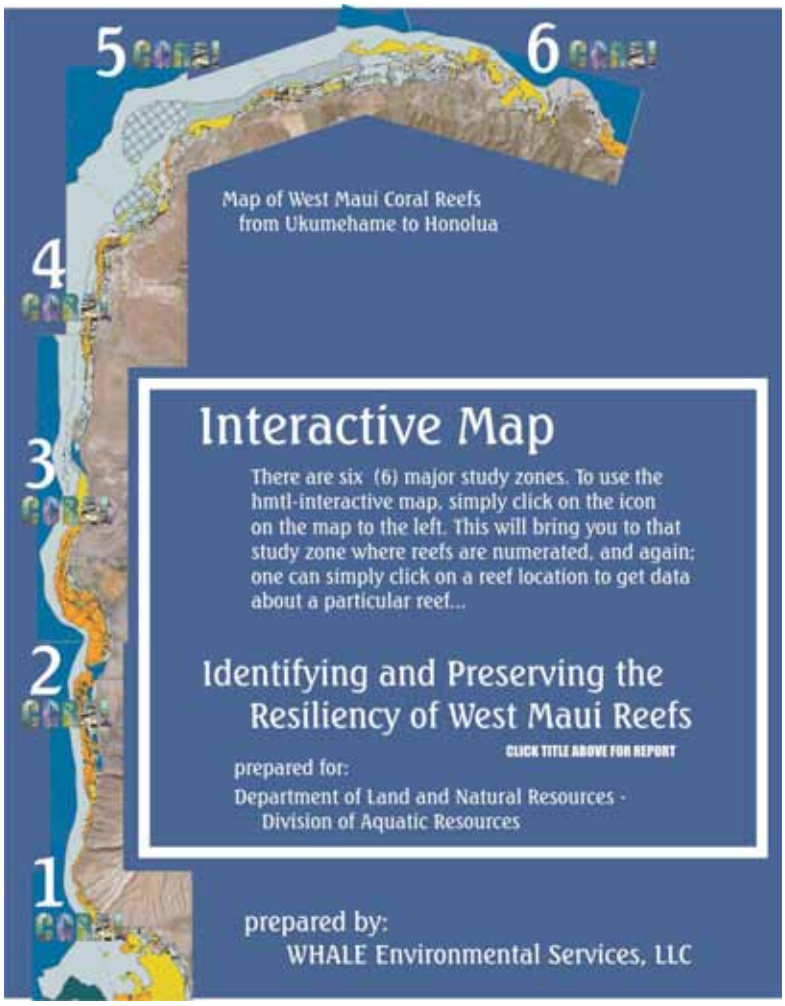
Our goal was four-fold:

- Assess and quantify the coral community make-up, note key resilience factors and document stress at each study site.
- Strive to achieve an evaluation of the resilience potential at each study site, evaluate results, conduct reef resilience calculations and present findings that are used in conjunction with assessments of stressors.
- Present information in a fashion that allows stakeholders to make informed decisions on maintaining, increasing, or recovering resilience in West Maui's reef environments. Maintain communication between stakeholders.

- The data collection is conducted in such a manner that it acknowledges where data has already been collected in datasets, and where the gaps are. Data Collection is included to bring the assessment down to the geo-region level to insure that no gaps remain from previously recorded datasets and provide a complete view of the reef resiliency of the geo-region.

Data is presented in metric format and stored in various formats for ease of integration into existing databases (ArcMap, EXCEL, Word, Adobe pdf are examples).

As described above, eleven (11) indicators were evaluated for use. These eleven (11) indicators are those developed by McClanahan et all in 2012 (McClanahan TR). Data was collected from May to September 2014, with a return collection for indicator data in February/March/April 2015. A second return collection of indicator data was conducted in June/July 2015. A composite map of zones evaluated may be found below with six (6) major zones in the georegion. Each Zone (1-6) is broken out into data acquisition location maps.



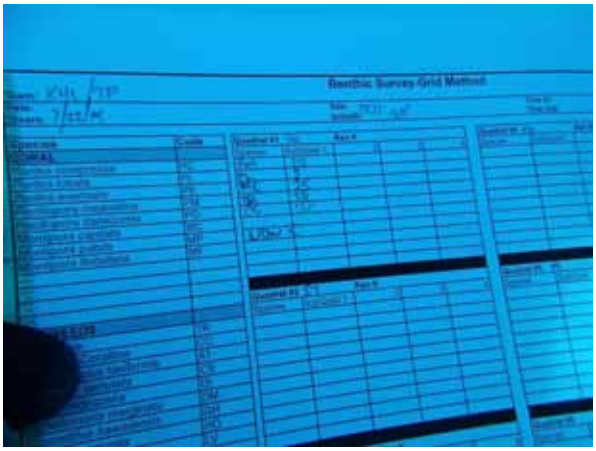
This map to the right shows the six study zones found in the study area between Maalaea Harbor and Honolua Bay. Furthermore, as seen on the next pages, each study zone has reef locations marked for each reef assessed within the individual study zone for easier graphic presentation. There are six sets of zone maps and reef numbering matching the reef resiliency assessments charts found later in this report.

A more detailed composite map with actual GPS located data acquisition points can be found in the appendix.

Our survey methods are detailed below and indicated whether the factor was field-assessed, desktop assessment, or a combination of both.

Transects

For the field-assessed factors, a data collection of the indicators in the reef environment was reviewed using two (2) twenty-five (25) meter (approximate) transects at each site; and each transect was eight (8) meters (approximate) wide. A transect line with marked metric measures on it was employed to set up observation points dependent on the field-indicator being evaluated. Marked rulers and printed datasheet on waterproof paper and China pens were also employed.



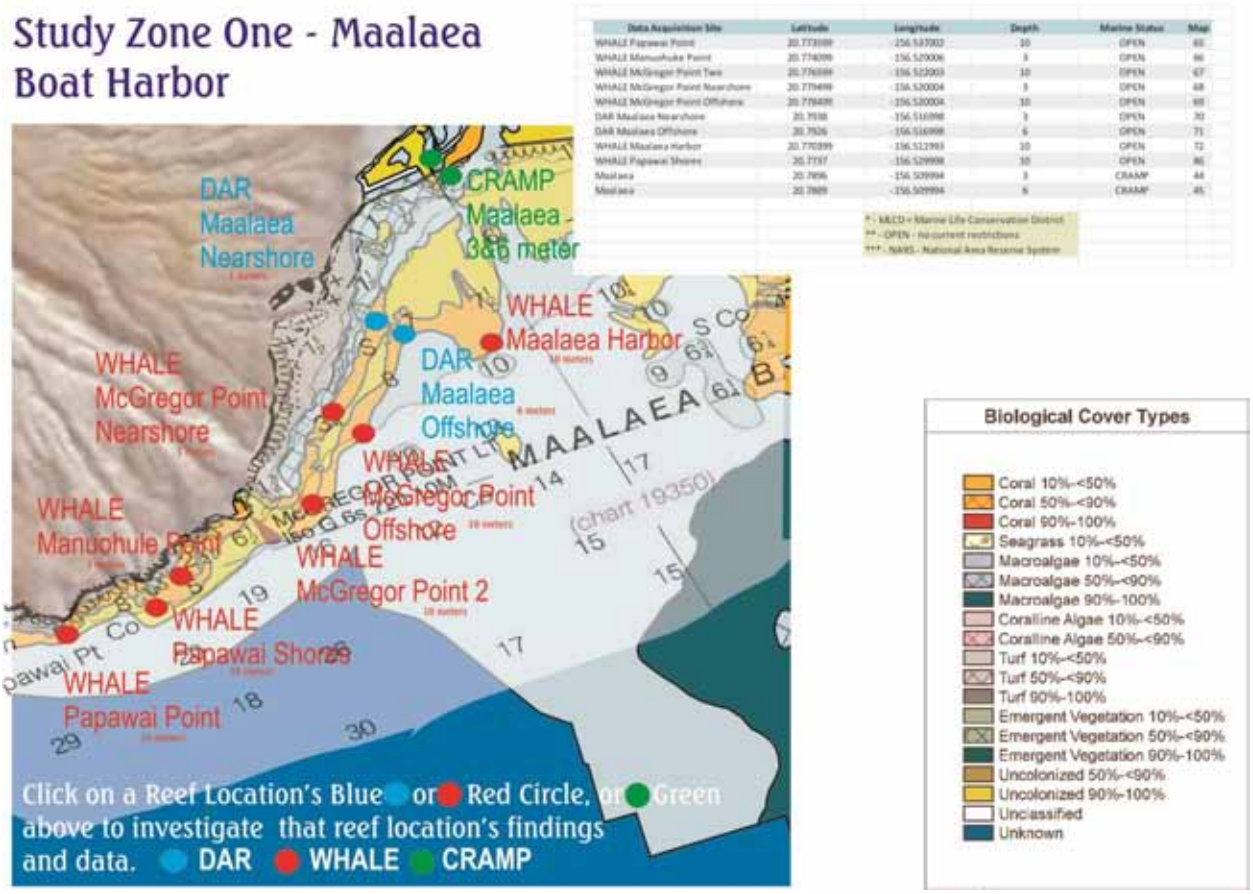
For each set of two (2) transects at a site, transects are treated equally, collecting data in the same manner and frequency of sampling for each type of indicator. Transects are no closer than ten (10) meters apart. For each site, where a reef extended over varying depths, to remain consistent with DAR sampling, dual sets of transects were conducted at varying depths – most commonly at the three (3) meter and ten (10) meter depth. There are a few variations where reef coverage did not exist at those depths. Depth indicators are included in the attached reef charts and on the zone maps below.

Our "sites" consist of fifty (50) meters by fifty (50) meter plots in which transects characterize the plot. Plots were decided upon by design to mostly be in the center point of a reef colony. For larger reef colonies, additional plots are established to characterize that reef successfully. Dual set of transects are not side by side within a plot, but at varying angles to each other to obtain consistency of sampling and to get better coverage of the heterogeneity of the coral community. However, no transect lies within 10 meters of another. Transects are always within the defined plot to maintain consistency.

For purposes of this study, since some reefs have a formal name, a common name, no name, etc… for consistency, we used a numbering system. On the reef ranking chart, the corresponding local shore name is also used.

The following zone charts represent locations of data acquisition. They are images used for interactive mapping on WHALE Environmental Services LLC's web site at http://www.whalees.com/Coral/WestMaui.htm for the West Maui Coral Reef Assessment. That online site, which will be updated in September of 2015, allows a user to click on a reef location and gain information about that particular reef and some of the findings of the resilience study.

- Zone One – Maalaea Boat Harbor to Papawai Point
- Zone Two – Papawai Point to Olowalu
- Zone Three – Olowalu to Kamehameha Park, Lahaina
- Zone Four – Lahaina to Kaanapali
- Zone Five – Kaanapali to Napili
- Zone Six – Napili to Lipoa Point

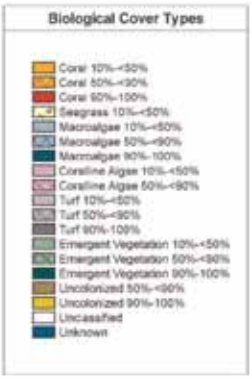


Study Zone Two Papalaua to Olowalu

Click on a Reef Location's Blue or Red Circle, or Green or Yellow, or Violet above to investigate that reef location's findings and data. DAR WHALE CRAMP FISH HAFA

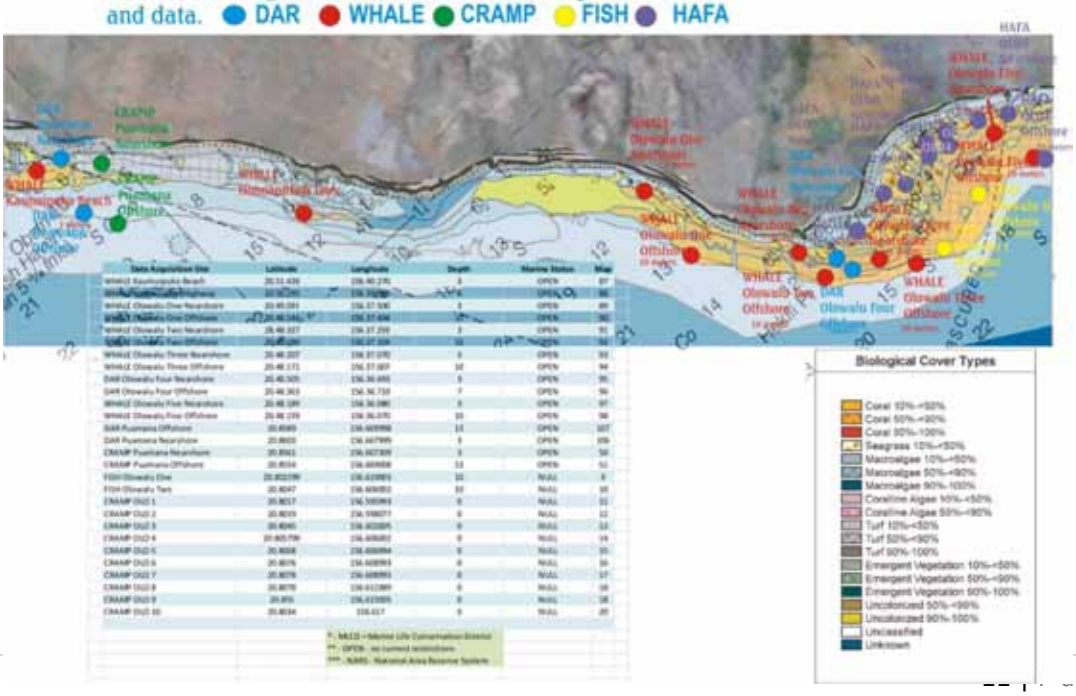
Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Six Nearshore	20.8075	-156.613998	3	OPEN	73
WHALE Olowalu Six Offshore	20.8059	-156.613998	10	OPEN	74
WHALE Olowalu Seven Nearshore	20.8087	-156.610992	3	OPEN	79
WHALE Seven Five Offshore	20.807199	-156.608993	10	OPEN	76
WHALE Olowalu Beach	20.8062	-156.604995	10	OPEN	77
WHALE Kailili Beach	20.8019	-156.597	3	OPEN	78
WHALE Papalaua Nearshore One	20.7914	-156.572998	3	OPEN	79
WHALE Papalaua Offshore One	20.7908	-156.574005	10	OPEN	80
WHALE Papalaua Nearshore Two	20.788799	-156.563003	3	OPEN	81
WHALE Papalaua Offshore Two	20.788299	-156.563003	10	OPEN	82
WHALE Ukumehane State Beach	20.787799	-156.561004	3	OPEN	83
WHALE Makumana Gulch	20.7826	-156550003	3	OPEN	84
WHALE Manawainui Gulch	20.7763	-156.541	10	OPEN	85
WHALE Papawai Shores 2	20.7737	-156.529998	10	OPEN	86
HAFA OLO 1	20.8017	-156.595993	n/a	NULL	11
HAFA OLO 2	20.8019	-156.598007	n/a	NULL	12

* - MLCD = Marine Life Conservation District
** - OPEN - no current restrictions
*** - NARS - National Area Reserve System

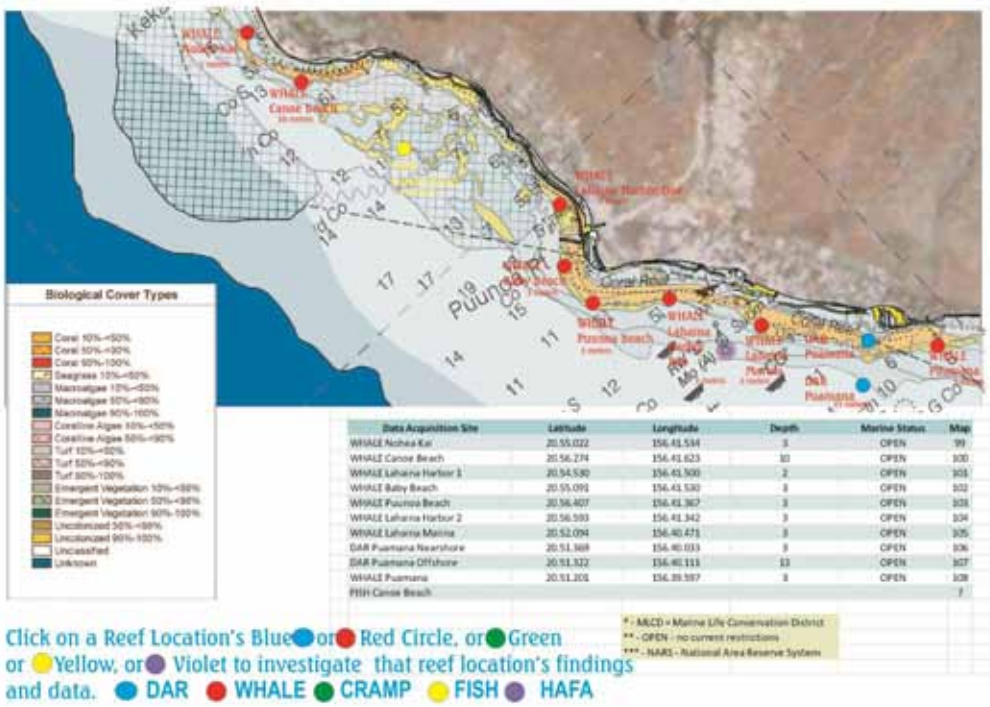


Study Zone Three Olowalu to Kamehameha Park, Lahaina

Click on a Reef Location's Blue or Red Circle, or Green or Yellow, or Violet above to investigate that reef location's findings and data. DAR WHALE CRAMP FISH HAFA



Study Zone Four Lahaina to Kaanapali



Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Nohea Kai	20.55.022	156.41.534	3	OPEN	99
WHALE Canoe Beach	20.56.274	156.41.623	10	OPEN	100
WHALE Lahaina Harbor 1	20.54.530	156.41.500	2	OPEN	101
WHALE Baby Beach	20.55.091	156.41.530	3	OPEN	102
WHALE Puunoa Beach	20.56.407	156.41.367	3	OPEN	103
WHALE Lahaina Harbor 2	20.56.593	156.41.342	3	OPEN	104
WHALE Lahaina Marina	20.52.094	156.40.471	3	OPEN	105
DAR Puamana Nearshore	20.51.369	156.40.033	3	OPEN	106
DAR Puamana Offshore	20.51.322	156.40.113	13	OPEN	107
WHALE Puamana	20.51.201	156.39.597	3	OPEN	108
FISH Canoe Beach					7

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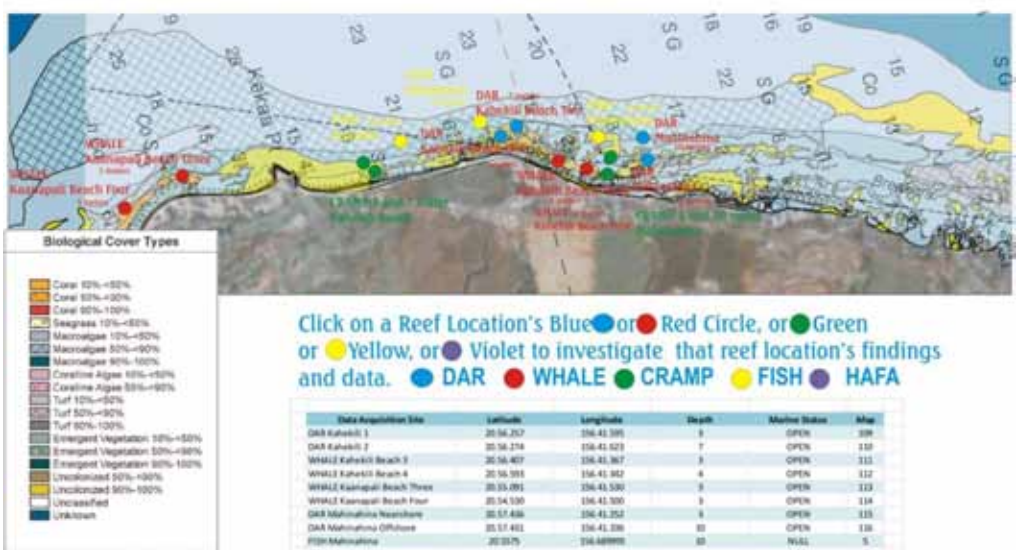
Study Zone Five Kaanapali to Napili



Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Kahekili 1	20.56.257	156.41.595	3	OPEN	109
DAR Kahekili 2	20.56.274	156.41.623	7	OPEN	110
WHALE Kahekili Beach 3	20.56.407	156.41.367	3	OPEN	111
WHALE Kahekili Beach 4	20.56.593	156.41.342	4	OPEN	112
WHALE Kaanapali Beach Three	20.55.091	156.41.530	3	OPEN	113
WHALE Kaanapali Beach Four	20.54.530	156.41.500	3	OPEN	114
DAR Mahinahina Nearshore	20.57.436	156.41.352	3	OPEN	115
DAR Mahinahina Offshore	20.57.401	156.41.336	10	OPEN	116
FISH Mahinahina	20.3575	156.689999	10	NULL	5
FISH Honokowai	20.9496	156.694	10	NULL	6
FISH Kahekili	20.909999	156.692993	10	NULL	8
CRAMP Kahekili	20.937599	156.692993	3	OPEN	42
CRAMP Kahekili	20.9379	156.694	7	OPEN	43
CRAMP Mahinahina	20.9571	156.688008	3	OPEN	46
CRAMP Mahinahina	20.9571	156.688999	10	OPEN	47

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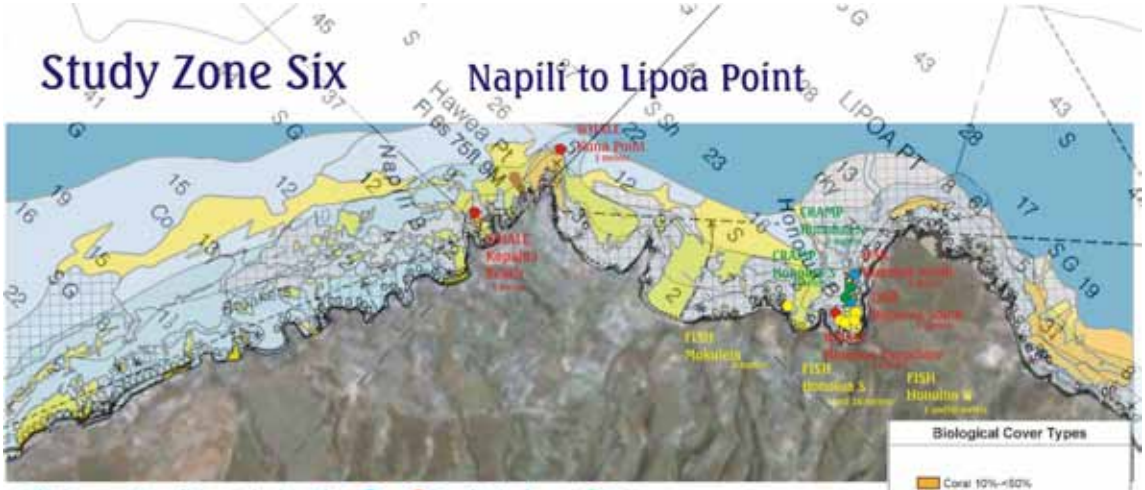

Click on a Reef Location's Blue or Red Circle, or Green or Yellow, or Violet to investigate that reef location's findings and data. DAR WHALE CRAMP FISH HAFA

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Honolua North	21.00.923	156.38.343	3	MLCD	117
DAR Honolua South	21.00.831	156.38.380	3	MLCD	118
WHALE Honolua NearShore	21.00.532	156.38.254	3	MLCD	119
WHALE Kona Point	21.00.458	156.38.441	3	MLCD	120
WHALE Kapalua Beach	21.00.036	156.40.092	3	OPEN	121
CRAMP Honolua N	21.015399	156.639007	3	MLCD	40
CRAMP Honolua S	21.013799	156.639999	3	MLCD	41
FISH Honolua N	21.015699	156.639007	3	MLCD	0
FISH Honolua N	21.0153	156.639999	10	MLCD	1
FISH Honolua N	21.013999	156.639999	3	MLCD	2
FISH Honolua S	21.014	156.63999	10	MLCD	3
FISH Mokuleia	21.0129	156.543997	0	MLCD	4

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Data Fieldwork: Variables Assessed

For an understanding of data acquisition consistent with NOAA/DAR protocols, WHALE Environmental Services LLC would also like to offer our thanks for consultation with DAR, the National Oceanic and Atmospheric Administration's Coral Reef Ecosystem Division (CRED), the West Maui watershed coordinator, the West Maui Ridge to Reef Initiative Working group, the Maui Nui Marine Resource Council (MNMRC), and Maui DAR personnel as well as others. In particular, Ms. Darla White of DAR, and Mr. Bernardo Vargas-Angel of NOAA provided valuable guidance and direction. As well, they referenced and directed us to other agencies such as USGS where other data acquisition materials could be found.

Field Assessment included:

- Coral Diversity
- Recruitment

- Bleaching Resistance
- Herbivore BioMass
- Macroalgae Cover
- Coral Disease
- Anthropogenic Physical Impacts

For each of the sites selected, we used two survey teams – one, a ground based team of two (2) biologists for confirming desktop-arrived stressor factors; and the second consisting of a pair of SCUBA divers for the coral reef assessments –one diver to conduct transects surveys required and the second diver for safety factors and photodocumentation.

Our certified and trained underwater divers with the aid of a transect line with printed metric measures conducted an assessment along 8x25 meters transects to record species and factors. The divers took underwater measurements with standard similarly marked rulers and/or PVC tools and also used waterproof printed datasheets to note key indicators. Still photos were also taken the coral assessments; and for the fish SPC inspections, observations were also recorded on video by SCUBA divers and later counted and identified while reviewed on a computer monitor display.

Fieldwork: variables measured

Though transects are all the same size (length and width) and within the defined plot selected for study; varying observation points are done within transects dependent on the data acquisition type being gathered. Observation stations are noted below on each indicator.

Since the first arrival of divers to a site startles fish species, the Stationary Point Counts (SPC) are done first, with following passes along transects for diversity, coral species, disease, and substrate evaluations conducted afterwards.

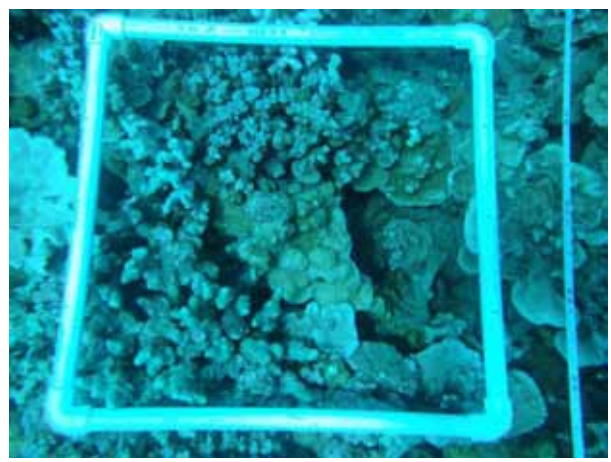
Coral Diversity

Percent Cover: Images (photos) were taken with image analysis of ten photos (10) per transect and 100 points per image using photo-quad analysis. A PVC framed camera holder was used to maintain consistent distance about the reef to elevate the camera equally for all the photos. Using PhotoQuad, percent cover was extracted from the images.

Substrate: Notes of some of the substrate types that were recorded are below. These are samples of types of observation taken along transects to list the type of substrate found with the intent that the sum of all substrate types is 100%:

- CCA (crustose coralline algae)
- Macroalgae
- Sand
- Turf Algae
- Coral Cover

Species Diversity: During the dive series, the lead diver with the aid of a China pen and/or measuring instruments takes notes on the type and abundance of various coral species types observed at ten (10) approximately 2.5 m^2 squares conducted in a linear fashion within the transect. For convenience of measurement, the diver uses the metric measured transect line to establish one side of the observation square. Images from the percent cover series of photos in each transect were also reviewed to detect/confirm/verify coral species.



To calculate species diversity, we used the Simpson's Index of Diversity. This compares total number of a particular coral type versus total number of all species. The index, on a basis of 0 to 1, calculates the chance that two randomly observed individuals are *not* of the same species. A score closer to 1 indicates greater diversity.

Simpson's Index of Diversity

$$D = \frac{\Sigma\, n(n-1)}{N(N-1)}$$

Reef Recruitment Ability: During the dive series, along the transect and in the observation quadrants, the diver took notes of whether there were any signs of new growth and the extent of proliferation development. At these squares, recruits were considered to be coral species with a geometric mean of less than approximately 4 centimeters. Recruitment growth was evaluated also in the quadrant photos with Photoquad. The density of recruits in a desktop analysis is calculated for each site and is used as the recruitment measure: sum total of recruits across all quadrants and converted to m^2 for recruits/m^2.

Bleaching Resistance: During the dive series, the divers recorded species types in the species diversity quadrants. Outside of the field evaluation, in a desktop analysis; a ranking of bleaching susceptibility was applied for these species from data previously collected for Hawaiian and Northern Hawaiian Islands.

Herbivore Biomass:

The fish community is monitored at the same survey sites as the benthic community located along the West Maui Coastline. Fish communities were assessed using a visual census to estimate the abundance and biomass of fish present . Data collected includes a listing of all species present, the numbers of individual species and the estimated length (cm) of each for estimates of standing crop using linear regression techniques (cm later converted to mm for formula use in desktop analysis). The census was conducted with two (2) 7.5m Stationary Point Counts (SPC) in the 8 X 25 meter transect line. All fish within the transect area from the aquatic floor to the water's surface are recorded by video by the SCUBA divers and later re-counted and re-identified/confirmed when reviewing on a computer monitor display.

In the beginning of a dive series, the lead diver placed the transect line in place. Along the transect line, the diver pauses for five (5) minutes and conducted a fish survey radius count (SPC). This is done in the initial part of the survey to avoid later disturbance and resulting fish avoidance during the checkpoint surveys. Two SPCs are done on each transect. The diver conducts the survey in a 7.5m cylinder turning in place 360 degrees.

Visual length estimates were converted to weight using the standard conversion formula of **M = a * Lb**; where M = mass in grams, L = standard length in mm and a and b are fitting parameters. "a" and "b" fitting parameters were obtained from Fishbase (Froese and Pauley 2000 – fishbase.org) and from NOAA's CRED Division for the fish species identified. Diversity was calculated, using Shannon's Index.

Fish species were classified as herbivores. Herbivore biomass was then calculated for each fish survey radius count point, summed for the fish survey radius counts (SPC); and converted to kilograms/square meter. The average herbivore biomass is used and based on averaging the SPCs per site.

Macroalgae Cover: During the dive series along the transect, as aforementioned, the diver took ten (10) photos of the benthos cover. Classifications of live coral, dead coral, sand, silt, rubble, coralline algae, invertebrates, bare substrate, macroalgae, turfing algae and many other benthic cover components are made using photoquad analysis. Macroalgae was estimated as to the percentage of cover classified as macroalgae. Examples from this master benthic chart is shown in the data section.

Coral disease: Disease Prevalence is extracted from the demographic surveys of the species diversity. For the purpose of this study, only tissue loss diseases are cataloged rather than chronic, slow-developing diseases.

Anthropogenic Physical Impacts: During the dive series along the transect, as aforementioned, the diver took ten (10) photos for the species diversity. Review of signs of direct human impacts (fish nets, man-made rubble – i.e. concrete blocks, tires, litter, chemical dumping, plastics) or other indirect human impacts (fin damage, anchor damage, prop wash damage) are made using photoquad analysis and percent cover/impact calculated. Fishing pressure from a limited creel survey and sedimentation input from UH Manoa studies are also used for the anthropogenic physical impact analysis.

If anthropogenic physical impacts are noted within a transect, note of such intrusion is made for the photoquad analyzation.

Desktop: variables measured

Sedimentation proxies: During the dive series, along the transects, the diver took photos during the species diversity photoset of whether there were any signs of sedimentation (silt or mud deposits) within the percent cover. The on-site shoreline survey of erosion processes (silt pathways, carved gullies) was conducted by erosion subject matter experts and discharge flow direction is noted. This on-site examination is compared to watershed sediment loading models for West Maui with data inclusion from the USGS and the Watershed Coordinator(s).

WHALE Environmental Services LLC felt there were three (3) possible proxies that could be considered for sedimentation input: watershed sediment loading models from Watershed Data for the region, pollution indicators such as oil sheens on water, or erosion modeling of sediment movement from land to sea. We found the watershed loading models to be too general for the specificity needed for the reefs which many areas having the same broad application of a watershed sediment loading rate. In some areas with low sediment loading, we found that in the field on land, that the model did not reflect site specific locations where we found large amounts of sediment loading originating from areas with high watershed health rankings.

For the desktop need to develop a proxy for sediment loading, the University of Hawaii SOEST coastal erosion maps were used (al). These maps use shoreline migration from direct observation and erodability from that shoreline from photomosaic and GIS data interpretation. For each section within the georegion, a smoothed annual average erosion hazard rate (AEHR) is determined for each of the locations onshore of the reef studied. As the AEHR are estimated within a scale of 0 to 2' ft/yr of erosion rates loss, we have assigned a proxies for the histograms noted on the soil erosion maps on a scale of 0.0 to 1.0 based on an adjusted factor. For example, if a reef location has an onshore shoreline 1.2 ft/yr erosion rate, then this location is assigned a 0.4. Since a higher ranking means more erosion potential and thus sediment loading, the scores are normalized by subtracting from 1 so that higher scores mean less erodability – no erosion rate for a location is scored a 1.0.

<u>Fishing Access</u>:

To design a proxy for fishing pressure, a quantitative evaluation is used. Since the SOW does not include funds for a full creel study, a limited creel study was conducted during various seasons and times. Several parameters and indicators were selected and assigned a value if present or not. The indicators are:

- Reef observation of fishing pressure - presence of abandoned fishing lines, bait traps, speared fish or reef damage.
- Shoreline Ease of Access
- Active Anglers (Individual Count)
- Retained Fish
- Released Fish (angler reporting of release)

The biologists travelled by boat and shore and interviewed as many anglers as possible. Interviews were taken at public and private accesses when weather conditions were unsafe for boat travel and at other times to facilitate recording complete trip interviews. Bank anglers were always interviewed individually. Fish were noted if present in coolers or containers; note of released fish was provided by anglers. Anglers were also asked two questions regarding satisfaction with their fishing that day and in general: 1.) "On a scale of 1 to 10, with one being poor and ten being excellent, how would you rate your fishing success today?" 2.) "Is this location a common spot for your fishing access?".

It should be noted that offshore anglers in boats encountered on the water mostly indicated that they did not fish the reefs since the effluent waters from the septic injection wells are noted to be in existing from Lahaina harbor to Honolua where currents sweep the discharge further to sea. Many interviewed said they are only traversing the reef regions to get further off-shore and that most fishing is at least ten (10) miles out.

Reef, Shoreline/Bank and Angler observations occurred in August 2014, September/October 2014, February 2015, May, June July 2015. Various times of day were used, varying weather conditions were introduced and varying ocean conditions were used. This variability is to introduce randomness in observations to provide variability.

Fishing access pressure was developed as a desktop proxy with the assignment of proxies for the observations noted on the soil erosion maps on a scale of 0.0 to 1.0 based on an adjusted factor. Each indicator is assigned a value of 0.2. For example, if a reef study point has three positive indicators such as shoreline ease of access, active anglers, and retained fish, then this location is assigned a 0.6 (higher scores means more fishing access pressure). As with sedimentation, the scores are normalized by subtracting the value from 1, thus no indicators noted for a location is scored a 1.0)

Temperature Variability:
For purposes of the desktop analysis, observed sea surface temperature (SST) for the area were obtained from the NOAA Coral Reef Watch website, The data from July 2015 (one of three warmest months, DAR did not allow an extension for the latter two months to gain more data) is used and variability is calculated from the standard deviation of summer temperatures. Reefs with high temperature variability are scored high than those with low temperature variability since they have been seen to be more resilient to bleaching.

Data Analysis

Resilience Potential – Eight (8) variables were used to calculate resilience potential. These are: coral diversity, recruitment, herbivore biomass, bleaching resistance, temperature variability, macroalgae cover, sedimentation, and fishing pressure. To calculate the resilience potential, the raw data values from both the fieldwork and desktop inputs are anchored to the maximum value for the variable among the pool of sites and then normalized to a 0 to 1 scale. The site with the maximum value is given a score of 1 for that variable. All other sites with less than the maximum value are normalized to the score of 1 by dividing by the maximum value. For example, if the recruitment value is 60% for one site, that site receives a score of 1, and another site has a value of 40%, that site receives a score of 0.66.

This is unidirectional – a high score is always a good score. The scale for anchored and normalized scores is always 0-1. For certain variables such as macroalgae cover, nutrient input/sedimentation and fishing access in which a higher value is a *negative* for reef resilience, the scale is inverted by subtracting the anchored score from 1.

In this manner by normalizing scores to the 0 to 1 scale, a combined composite resilience score can be gained which is the average of all anchored and normalized scores. Sites are ranked from highest to lowest anchored resilience score.

For ranking purposes, reefs with an anchored resilience score of 0.85-1 are considered to have high resilience potential, 0.70-0.84 medium resilience potential, and < 0.70 to have low resilience potential. Standard "spotlight coloring" – red, yellow and green is used for graphic representation.

These scores are not the only indicators of the health or condition of a reef. A site can have a high ranking in relation to other site due to various combinations of the scores for variables. Some variables useful for assessing condition are not included in the scoring. Therefore conditions at the survey site are also presented – such as anthropogenic stress.

For anthropogenic stress, a composite score is produced by averaging the anchored scores for fishing access, nutrient input/sedimentation. A high score reflects low stress. As with resilience potential evaluations, reefs with an anchored score of 0.85-1 are considered to have low stress, 0.70-0.84 medium stress, and < 0.70 to have high stress. Again, these are graphically expressed in "stoplight colors", where red indicates high stress.

Mapping Outputs – Maps have been produced using CorelDraw and EXCEL which ranks each reef for its resiliency and stress scores and denotes location.

Additional Data

Our web-displayed interactive site map allows a user to view individual sites and display their ranking scores, with photo documentation and explanations of scores showing sites having greater coral reef resilience. The stressors impacting reef will also be emphasized. In this report, the interactive maps have been converted to Adobe .pdfs and incorporated in this report led by an overall scoring of all reefs from the ***Top Twelve*** most resilient reefs to the ***Bottom Twelve.*** That web site will be active in September 2015.

Outcomes

We feel our efforts addresses Hawai'i Coral Reef Strategy goals to "Identify, characterize and rank the most resilient reef areas in Hawaii" (The State of Hawai'i 2010).

To us, this project to "Identifying and preserving the resilience of West Maui Coral Reefs Hawaiian Islands" is the ideal start-up project for reef resilience assessments for Hawaii's reefs. Our team has conducted many biological resilience assessments in a variety of ecosystems around the world but has geared this assessment to some of Hawaii's unique conditions with this evaluation of West Maui's reefs.

Data Analysis

Eight variables were used to calculate resilience potential – coral diversity, recruitment, herbivore biomass, bleaching resistance, temperature variability, macroalgae cover, sedimentation and fishing pressure/access. To calculate resilience potential (the final results), values for each variable are anchored to the maximum value for the variable among the list of sites and then normalized to a 0 to 1 scale. For each variable, the site with a maximum value is given a score of 1. All other values for that variable (less than maximum value) are then normalized to the score of 1 by dividing by the maximum value. Anchoring values to the maximum value makes it easier to understand difference from one site's values to another's.

To produce the composite score, a scale is established that includes all anchored and normalized scores as the same (0-1) and are uni-directional (high score = 1). In this manner, a high score is always a good score. The three variables that requires normalization to the relative value are fishing access/pressure, sedimentation and macroalgae cover.

Normalizing all variables to a standard scale produces a composite resilience score; which is the average of all the anchored and normalized scores. As well, the anchoring and normalization procedure is used again whereby the site with the highest score receives a 1, and so forth.

These summary tables are shown on the next pages.

Sites are then "ranked" from the highest to lowest resilience score. Rankings, 1-60 are considered to have a high resilience potential if the scores are from 0.85-1.00, medium from .70-.84 and low if below .70. In the table output, these are graphically represented in stoplight colors – green, yellow, red and a conclusion could be drawn that the coloring indicate the conditions of the reef as far as resilience potential – green/safe, yellow/caution, and red/danger.

Table 1 represents the raw data entered for the sites from the eight (8) variables.

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* - the last three variables require normalization in final calculation

Coral Reef Raw Data for Variables

Data Acquisition Site	Coral Diversity	Recruitment	Bleaching Resistance	Temperature Variability	Herbivore Biomass	Macroalgae Cover*	Sedimentation *	Fishing Access*
WHALE Papawai Point	20.70	8.44	76.19	1.0000	3.99	0.35	0.3500	81.88
WHALE Manuohule Point	22.7	11.12	70	0.0000	2.83	0.31	0.3100	73.45
WHALE McGregor Point Two	60.5	6.13	30.77	0.0000	6.13	0.40	0.4000	37.70
WHALE McGregor Point Nearshore	40	1.28	55.55	0.0000	2.72	0.53	0.5300	59.33
WHALE McGregor Point Offshore	60.2	3.58	33.33	0.0000	2.12	0.40	0.4000	36.25
DAR Maalaea Nearshore	80	1.94	0	0.0000	1.65	0.06	0.0600	1.77
DAR Maalaea Offshore	6	2.3	50	0.0000	1.89	0.94	0.94	53.77
WHALE Maalaea Harbor	63	1.16	30.77	0.1000	1.95	0.34	0.3400	33.50
WHALE Papawai Shores	68	5.52	35.71	0.0000	1.91	0.32	0.3200	38.26
WHALE Olowalu Six Nearshore	51.5	6.87	48	0.0000	2.81	0.43	0.4300	51.67
WHALE Olowalu Six Offshore	69	10.12	21.43	0.0000	3.17	0.22	0.2200	25.04
WHALE Olowalu Seven Nearshore	58.5	7.24	45.16	0.0000	2.70	0.36	0.3600	48.58
WHALE Seven Five Offshore	68	9.44	22.22	0.0000	3.02	0.22	0.2200	25.68
WHALE Olowalu Beach	25.5	6.54	52	0.0000	3.03	0.07	0.0650	55.16
WHALE Kailili Beach	70.5	5.65	45.83	0.0000	2.10	0.21	0.2100	48.35
WHALE Papalaua Nearshore One	38	2.54	48	0.0000	2.08	0.17	0.1700	50.42
WHALE Papalaua Offshore One	36	3.28	31.58	0.0000	2.76	0.13	0.1300	34.60
WHALE Papalaua Nearshore Two	47.5	1.95	73.33	0.0000	2.03	0.51	0.5100	76.38
WHALE Papalaua Offshore Two	41.5	2.64	32.14	0.0000	2.37	0.12	0.1200	34.75
WHALE Ukumehane State Beach	59.5	2.21	44.44	0.0000	2.57	0.19	0.1900	47.39
WHALE Makumana Gulch	71.5	2.35	46.15	0.0000	2.68	0.21	0.2100	49.25
WHALE Manawainui Gulch	72	1.68	56.52	0.0000	2.29	0.05	0.0450	58.90
WHALE Papawai Shores 2	25.5	5.96	31.58	0.0000	2.05	0.11	0.1100	33.85
WHALE Kaumuipuko Beach	49.5	2.12	48	0.0000	1.33	0.25	0.2500	49.83
WHALE Honoapiilani Highway	67.5	6.65	46.15	0.0000	1.63	0.21	0.2100	48.20
WHALE Olowalu One Nearshore	68.5	9.52	58.33	0.0000	3.83	0.34	0.3400	62.84
WHALE Olowalu One Offshore	44	8.55	100	0.0000	0.61	0.10	0.1000	100.81
WHALE Olowalu Two Nearshore	4	9.32	48	0.0000	3.41	0.43	0.4300	52.27
WHALE Olowalu Two Offshore	52	10.25	59.09	0.0000	1.14	0.04	0.0400	60.31
WHALE Olowalu Three Nearshore	23.2	7.85	50	0.0000	2.38	0.43	0.4300	53.24
WHALE Olowalu Three Offshore	51.5	8.27	65	0.0000	1.24	0.03	0.0300	66.30
DAR Olowalu Four Nearshore	23	9.54	40	0.0000	2.25	0.77	0.7700	43.79
DAR Olowalu Four Offshore	8	9.61	0	0.0000	1.37	0.00	0.0000	1.37
WHALE Olowalu Five Nearshore	14	8.44	44.83	0.0000	2.40	0.42	0.4200	48.07
WHALE Olowalu Five Offshore	53	9.36	32.26	0.0000	1.40	0.21	0.2100	34.08
DAR Puamana Offshore	70	7.45	0	1.0000	1.68	0.92	0.9200	4.52
DAR Puamana Nearshore	0	5.22	50	0.0000	1.32	0.87	0.8700	53.06
WHALE Nohea Kai	10	4.32	50	0.0000	3.02	0.12	0.1200	53.26
WHALE Canoe Beach	46	2.14	50	0.1000	3.93	0.13	0.1300	54.29
WHALE Lahaina Harbor 1	44.7	3.14	35.48	0.1000	2.49	0.38	0.3800	38.83
WHALE Baby Beach	43.5	3.45	40.74	0.1000	1.4	0.40	0.4000	43.04
WHALE Puunoa Beach	38.5	2.36	40	0.1000	2.56	0.47	0.4700	43.60
WHALE Lahaina Harbor 2	30.5	3.68	43.48	0.1000	2.14	0.47	0.4700	46.66
WHALE Lahaina Marina	29.5	2.88	43.48	0.0000	6.59	0.48	0.4800	51.03
DAR Puamana Nearshore	29	2.69	50	0.0000	2.23	0.74	0.7400	53.71
DAR Puamana Offshore	14	3.58	50	0.1000	3.58	0.47	0.4700	54.62
WHALE Puamana	5	2.22	41.67	0.0000	1.76	0.45	0.4500	44.33
DAR Kahekili 1	32	5.21	66.67	0.1000	1.02	0.79	0.7900	69.37
DAR Kahekili 2	21	5.87	16.67	0.1000	0.98	0.58	0.5800	18.91
WHALE Kahekili Beach 3	22	6.24	60.87	0.1000	1.67	0.27	0.2700	63.18
WHALE Kahekili Beach 4	14	5.88	60.87	0.1000	1.03	0.31	0.3100	62.62
WHALE Kaanapali Beach Three	57.9	6.89	50	0.1000	2.33	0.29	0.2900	53.01
WHALE Kaanapali Beach Four	66.2	4.67	44	0.1000	3.05	0.32	0.3200	47.79
DAR Mahinahina Nearshore	62.5	3.58	0	0.1000	0.79	0.56	0.5600	2.01
DAR Mahinahina Offshore	1	4.11	50	0.1000	0.89	0.41	0.4100	51.81
DAR Honolua North	33	3.54	25	0.2000	1.23	0.76	62.9700	90.16
DAR Honolua South	16	2.88	25	0.1000	1.88	0.74	45.8600	73.58
WHALE Honolua NearShore	16	2.96	39.29	0.0000	1.99	0.50	60.2400	102.02
WHALE Kono Point	20.6	4.11	53.33	0.1000	1.16	0.78	79.3000	134.67
WHALE Kapalua Beach	26.7	5.26	40.91	0.0000	1.10	0.71	73.9700	116.69

Table 2 represents the conversion of raw data to anchored and normalized values and produces the average resilience score which then is anchored itself.

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Coral Reef Anchored and Normalized Data for Variables

Data Acquisition Site	Coral Diversity	Recruitment	Bleaching Resistance	Temperature Variability	Herbivore Biomass	Macroalgae Cover*	Sedimentation *	Fishing Access*	Average Resilience Score	Anchored Resilience Score
WHALE Papawai Point	0.80	0.76	0.76	0.00	0.65	0.65	0.95	1.00	0.70	0.95
WHALE Manuohule Point	0.98	1.00	0.70	0.00	0.46	0.69	1.00	1.00	0.73	1.00
WHALE McGregor Point Two	0.95	0.55	0.31	0.00	1.00	0.60	0.92	1.00	0.67	0.91
WHALE McGregor Point Nearshore	0.97	0.12	0.56	0.00	0.44	0.47	0.94	0.60	0.51	0.70
WHALE McGregor Point Offshore	0.95	0.32	0.33	0.00	0.35	0.60	0.94	0.80	0.54	0.73
DAR Maalaea Nearshore	0.93	0.17	0.00	0.00	0.27	0.94	0.94	0.40	0.46	0.63
DAR Maalaea Offshore	1.00	0.21	0.50	0.00	0.31	0.06	0.94	0.60	0.45	0.62
WHALE Maalaea Harbor	0.95	0.10	0.31	0.05	0.32	0.66	0.92	0.20	0.44	0.60
WHALE Papawai Shores	0.94	0.50	0.36	0.00	0.31	0.68	0.92	1.00	0.59	0.81
WHALE Olowalu Six Nearshore	0.96	0.62	0.48	0.00	0.46	0.57	0.94	0.60	0.58	0.79
WHALE Olowalu Six Offshore	0.94	0.91	0.21	0.00	0.52	0.78	0.94	0.60	0.61	0.84
WHALE Olowalu Seven Nearshore	0.95	0.65	0.45	0.00	0.44	0.64	0.94	0.20	0.53	0.73
WHALE Seven Five Offshore	0.94	0.85	0.22	0.00	0.49	0.78	0.94	0.40	0.58	0.79
WHALE Olowalu Beach	0.98	0.59	0.52	0.00	0.49	0.94	0.99	0.40	0.61	0.84
WHALE Kailili Beach	0.94	0.51	0.46	0.00	0.34	0.79	0.96	0.40	0.55	0.75
WHALE Papalaua Nearshore One	0.97	0.23	0.48	0.00	0.34	0.83	0.99	1.00	0.60	0.83
WHALE Papalaua Offshore One	0.97	0.29	0.32	0.00	0.45	0.87	0.99	0.80	0.59	0.80
WHALE Papalaua Nearshore Two	0.96	0.18	0.73	0.00	0.33	0.49	0.98	0.40	0.51	0.70
WHALE Papalaua Offshore Two	0.97	0.24	0.32	0.00	0.39	0.88	0.98	0.00	0.47	0.65
WHALE Ukumehane State Beach	0.95	0.20	0.44	0.00	0.42	0.81	0.82	0.40	0.51	0.69
WHALE Makumana Gulch	0.94	0.21	0.46	0.00	0.44	0.79	0.98	1.00	0.60	0.83
WHALE Manawainui Gulch	0.94	0.15	0.57	0.00	0.37	0.96	1.00	1.00	0.62	0.85
WHALE Papawai Shores 2	0.98	0.54	0.32	0.00	0.33	0.89	0.92	0.80	0.60	0.82
WHALE Kaumuipuko Beach	0.96	0.19	0.48	0.00	0.22	0.75	0.99	0.80	0.55	0.75
WHALE Honoapiilani Highway	0.94	0.60	0.46	0.00	0.27	0.79	1.00	0.40	0.56	0.76
WHALE Olowalu One Nearshore	0.94	0.86	0.58	0.00	0.62	0.66	0.97	0.60	0.65	0.90
WHALE Olowalu One Offshore	0.96	0.77	1.00	0.00	0.10	0.90	0.97	1.00	0.71	0.98
WHALE Olowalu Two Nearshore	1.00	0.84	0.48	0.00	0.56	0.57	0.97	1.00	0.68	0.93
WHALE Olowalu Two Offshore	0.96	0.92	0.59	0.00	0.19	0.96	0.97	0.60	0.65	0.89
WHALE Olowalu Three Nearshore	0.98	0.71	0.50	0.00	0.39	0.57	0.97	0.60	0.59	0.81
WHALE Olowalu Three Offshore	0.96	0.74	0.65	0.00	0.20	0.97	0.97	0.80	0.66	0.91
DAR Olowalu Four Nearshore	0.98	0.86	0.40	0.00	0.37	0.23	0.97	0.60	0.55	0.75
DAR Olowalu Four Offshore	0.99	0.86	0.00	0.00	0.22	1.00	0.97	1.00	0.63	0.86
WHALE Olowalu Five Nearshore	0.99	0.76	0.45	0.00	0.39	0.58	0.97	0.40	0.57	0.78
WHALE Olowalu Five Offshore	0.96	0.84	0.32	0.00	0.23	0.79	0.97	0.60	0.59	0.81
DAR Puamana Offshore	0.94	0.67	0.00	0.50	0.27	0.08	1.00	1.00	0.56	0.76
DAR Puamana Nearshore	1.00	0.47	0.50	0.00	0.22	0.13	1.00	1.00	0.54	0.74
WHALE Nohea Kai	0.99	0.39	0.50	0.00	0.49	0.88	0.98	0.20	0.55	0.76
WHALE Canoe Beach	0.96	0.19	0.50	0.05	0.64	0.87	0.99	0.80	0.63	0.86
WHALE Lahaina Harbor 1	0.96	0.28	0.35	0.05	0.41	0.62	0.94	0.20	0.48	0.65
WHALE Baby Beach	0.96	0.31	0.41	0.05	0.23	0.60	0.94	0.60	0.51	0.70
WHALE Puunoa Beach	0.97	0.21	0.40	0.05	0.42	0.53	1.00	0.40	0.50	0.68
WHALE Lahaina Harbor 2	0.98	0.33	0.43	0.05	0.35	0.53	0.92	0.40	0.50	0.68
WHALE Lahaina Marina	0.98	0.26	0.43	0.00	1.08	0.52	1.00	0.00	0.53	0.73
DAR Puamana Nearshore	0.98	0.24	0.50	0.00	0.36	0.26	1.00	1.00	0.54	0.74
DAR Puamana Offshore	0.99	0.32	0.50	0.05	0.58	0.53	1.00	1.00	0.62	0.85
WHALE Puamana	1.00	0.20	0.42	0.00	0.29	0.55	0.99	0.40	0.48	0.66
DAR Kahekili 1	0.97	0.47	0.67	0.05	0.17	0.21	1.00	0.40	0.49	0.67
DAR Kahekili 2	0.98	0.53	0.17	0.05	0.16	0.42	0.99	0.80	0.51	0.70
WHALE Kahekili Beach 3	0.98	0.56	0.61	0.05	0.27	0.73	1.00	0.60	0.60	0.82
WHALE Kahekili Beach 4	0.99	0.53	0.61	0.05	0.17	0.69	1.00	0.80	0.60	0.83
WHALE Kaanapali Beach Three	0.95	0.62	0.50	0.05	0.38	0.71	1.00	0.20	0.55	0.76
WHALE Kaanapali Beach Four	0.95	0.42	0.44	0.05	0.50	0.68	0.93	0.40	0.55	0.75
DAR Mahinahina Nearshore	0.95	0.32	0.00	0.05	0.13	0.44	0.95	1.00	0.48	0.66
DAR Mahinahina Offshore	1.00	0.37	0.50	0.05	0.15	0.59	0.95	1.00	0.58	0.79
DAR Honolua North	0.97	0.32	0.25	0.10	0.20	0.24	0.95	1.00	0.50	0.69
DAR Honolua South	0.99	0.26	0.25	0.05	0.31	0.26	0.95	1.00	0.51	0.70
WHALE Honolua NearShore	0.99	0.27	0.39	0.00	0.32	0.50	0.95	1.00	0.55	0.76
WHALE Kono Point	0.98	0.37	0.53	0.05	0.19	0.22	1.00	1.00	0.54	0.74
WHALE Kapalua Beach	0.98	0.47	0.41	0.00	0.18	0.29	1.00	0.80	0.52	0.71

Table 2 – Anchored and Normalized Scores

Table Three applies a sort function to the resiliency scores to produce a ranking.

WHALE Environmental Services LLC

Coral Reef Anchored and Normalized Data for Variables

Data Acquisition Site	Ranking	Ranking Sort	Coral Diversity	Recruitment	Bleaching Resistance	Temperature Variability	Herbivore Biomass	Macroalgae Cover*	Sedimentation *	Fishing Access*
			Verified	Verified	Verified	Verified	Verified	Verified	Verified	Verified
WHALE Manuohule Point	1	1.00	0.98	1.00	0.70	0.00	0.46	0.69	1.00	1.00
WHALE Olowalu One Offshore	2	0.98	0.95	0.55	0.31	0.00	1.00	0.60	0.92	1.00
WHALE Papawai Point	3	0.95	0.80	0.76	0.76	0.00	0.65	0.65	0.95	1.00
WHALE Olowalu Two Nearshore	4	0.93	0.97	0.12	0.56	0.00	0.44	0.47	0.94	0.60
WHALE McGregor Point Two	5	0.91	0.95	0.32	0.33	0.00	0.35	0.60	0.94	0.80
WHALE Olowalu Three Offshore	6	0.91	0.93	0.17	0.00	0.00	0.27	0.94	0.94	0.40
WHALE Olowalu One Nearshore	7	0.90	1.00	0.21	0.50	0.00	0.31	0.06	0.94	0.60
WHALE Olowalu Two Offshore	8	0.89	0.95	0.10	0.31	0.05	0.32	0.66	0.92	0.20
DAR Olowalu Four Offshore	9	0.86	0.94	0.50	0.36	0.00	0.31	0.68	0.92	1.00
WHALE Canoe Beach	10	0.86	0.96	0.62	0.48	0.00	0.46	0.57	0.94	0.60
WHALE Manawainui Gulch	11	0.85	0.94	0.91	0.21	0.00	0.52	0.78	0.94	0.60
DAR Puamana Offshore	12	0.85	0.95	0.65	0.45	0.00	0.44	0.64	0.94	0.20
WHALE Olowalu Beach	13	0.84	0.94	0.85	0.22	0.00	0.49	0.78	0.94	0.40
WHALE Olowalu Six Offshore	14	0.84	0.98	0.59	0.52	0.00	0.49	0.94	0.99	0.40
WHALE Papalaua Nearshore One	15	0.83	0.94	0.51	0.46	0.00	0.34	0.79	0.96	0.40
WHALE Kahekili Beach 4	16	0.83	0.97	0.23	0.48	0.00	0.34	0.83	0.99	1.00
WHALE Makumana Gulch	17	0.83	0.97	0.29	0.32	0.00	0.45	0.87	0.99	0.80
WHALE Kahekili Beach 3	18	0.82	0.96	0.18	0.73	0.00	0.33	0.49	0.98	0.40
WHALE Papawai Shores 2	19	0.82	0.97	0.24	0.32	0.00	0.39	0.88	0.98	0.00
WHALE Olowalu Three Nearshore	20	0.81	0.95	0.20	0.44	0.00	0.42	0.81	0.82	0.40
WHALE Olowalu Five Offshore	21	0.81	0.94	0.21	0.46	0.00	0.44	0.79	0.98	1.00
WHALE Papawai Shores	22	0.81	0.94	0.15	0.57	0.00	0.37	0.96	1.00	1.00
WHALE Papalaua Offshore One	23	0.80	0.98	0.54	0.32	0.00	0.33	0.89	0.92	0.80
WHALE Seven Five Offshore	24	0.79	0.96	0.19	0.48	0.00	0.22	0.75	0.99	0.80
WHALE Olowalu Six Nearshore	25	0.79	0.94	0.60	0.46	0.00	0.27	0.79	1.00	0.40
DAR Mahinahina Offshore	26	0.79	0.94	0.86	0.58	0.00	0.62	0.66	0.97	0.60
WHALE Olowalu Five Nearshore	27	0.78	0.96	0.77	1.00	0.00	0.10	0.90	0.97	1.00
DAR Puamana Offshore	28	0.76	1.00	0.84	0.48	0.00	0.56	0.57	0.97	1.00
WHALE Honoapiilani Highway	29	0.76	0.96	0.92	0.59	0.00	0.19	0.96	0.97	0.60
WHALE Nohea Kai	30	0.76	0.98	0.71	0.50	0.00	0.39	0.57	0.97	0.60
WHALE Honolua NearShore	31	0.76	0.96	0.74	0.65	0.00	0.20	0.97	0.97	0.80
WHALE Kaanapali Beach Three	32	0.76	0.98	0.86	0.40	0.00	0.37	0.23	0.97	0.60
DAR Olowalu Four Nearshore	33	0.75	0.99	0.86	0.00	0.00	0.22	1.00	0.97	1.00
WHALE Kailili Beach	34	0.75	0.99	0.76	0.45	0.00	0.39	0.58	0.97	0.40
WHALE Kaumuipuko Beach	35	0.75	0.96	0.84	0.32	0.00	0.23	0.79	0.97	0.60
WHALE Kaanapali Beach Four	36	0.75	0.94	0.67	0.00	0.50	0.27	0.08	1.00	1.00
WHALE Kono Point	37	0.74	1.00	0.47	0.50	0.00	0.22	0.13	1.00	1.00
DAR Puamana Nearshore	38	0.74	0.99	0.39	0.50	0.00	0.49	0.88	0.98	0.20
DAR Puamana Nearshore	39	0.74	0.96	0.19	0.50	0.05	0.64	0.87	0.99	0.80
WHALE McGregor Point Offshore	40	0.73	0.96	0.28	0.35	0.05	0.41	0.62	0.94	0.20
WHALE Olowalu Seven Nearshore	41	0.73	0.96	0.31	0.41	0.05	0.23	0.60	0.94	0.60
WHALE Lahaina Marina	42	0.73	0.97	0.21	0.40	0.05	0.42	0.53	1.00	0.40
WHALE Kapalua Beach	43	0.71	0.98	0.33	0.43	0.05	0.35	0.53	0.92	0.40
WHALE Baby Beach	44	0.70	0.98	0.26	0.43	0.00	1.08	0.52	1.00	0.00
DAR Kahekili 2	45	0.70	0.98	0.24	0.50	0.00	0.36	0.26	1.00	1.00
WHALE McGregor Point Nearshore	46	0.70	0.99	0.32	0.50	0.05	0.58	0.53	1.00	1.00
WHALE Papalaua Nearshore Two	47	0.70	1.00	0.20	0.42	0.00	0.29	0.55	0.99	0.40
DAR Honolua South	48	0.70	0.97	0.47	0.67	0.05	0.17	0.21	1.00	0.40
WHALE Ukumehane State Beach	49	0.69	0.98	0.53	0.17	0.05	0.16	0.42	0.99	0.80
DAR Honolua North	50	0.69	0.98	0.56	0.61	0.05	0.27	0.73	1.00	0.60
WHALE Lahaina Harbor 2	51	0.68	0.99	0.53	0.61	0.05	0.17	0.69	1.00	0.80
WHALE Puunoa Beach	52	0.68	0.95	0.62	0.50	0.05	0.38	0.71	1.00	0.20
DAR Kahekili 1	53	0.67	0.95	0.42	0.44	0.05	0.50	0.68	0.93	0.40
WHALE Puamana	54	0.66	0.95	0.32	0.00	0.05	0.13	0.44	0.95	1.00
DAR Mahinahina Nearshore	55	0.66	1.00	0.37	0.50	0.05	0.15	0.59	0.95	1.00
WHALE Lahaina Harbor 1	56	0.65	0.97	0.32	0.25	0.10	0.20	0.24	0.95	1.00
WHALE Papalaua Offshore Two	57	0.65	0.99	0.26	0.25	0.05	0.31	0.26	0.95	1.00
DAR Maalaea Nearshore	58	0.63	0.99	0.27	0.39	0.00	0.32	0.50	0.95	1.00
DAR Maalaea Offshore	59	0.62	0.98	0.37	0.53	0.05	0.19	0.22	1.00	1.00
WHALE Maalaea Harbor	60	0.60	0.98	0.47	0.41	0.00	0.18	0.29	1.00	0.80

Table 3 – Ranking of Sites

Table 4 is the final resiliency potential summary with sites scaled for high, medium, and low resilience potential – green=high, yellow=medium and red=low.

WHALE Environmental Services LLC

Score .85-1.00 high resilience potential
Score .70-.84 medium resilience potential
Score < .70 low resilience potential

Coral Reef Anchored and Normalized Data for Variables

Data Acquisition Site	Ranking	Ranking Sort	Coral Diversity	Recruitment	Bleaching Resistance	Temperature Variability	Herbivore Biomass	Macroalgae Cover*	Sedimentation *	Fishing Access*
			Verified	Verified	Verified	Verified	Verified	Verified	Verified	Verified
WHALE Manuohule Point	1	1.00	0.98	1.00	0.70	0.00	0.46	0.69	1.00	1.00
WHALE Olowalu One Offshore	2	0.98	0.95	0.55	0.31	0.00	1.00	0.60	0.92	1.00
WHALE Papawai Point	3	0.95	0.80	0.76	0.76	0.00	0.65	0.65	0.95	1.00
WHALE Olowalu Two Nearshore	4	0.93	0.97	0.12	0.56	0.00	0.44	0.47	0.94	0.60
WHALE McGregor Point Two	5	0.91	0.95	0.32	0.33	0.00	0.35	0.60	0.94	0.80
WHALE Olowalu Three Offshore	6	0.91	0.93	0.17	0.00	0.00	0.27	0.94	0.94	0.40
WHALE Olowalu One Nearshore	7	0.90	1.00	0.21	0.50	0.00	0.31	0.06	0.94	0.60
WHALE Olowalu Two Offshore	8	0.89	0.95	0.10	0.31	0.05	0.32	0.66	0.92	0.20
DAR Olowalu Four Offshore	9	0.86	0.94	0.50	0.36	0.00	0.31	0.68	0.92	1.00
WHALE Canoe Beach	10	0.86	0.96	0.62	0.48	0.00	0.46	0.57	0.94	0.60
WHALE Manawainui Gulch	11	0.85	0.94	0.91	0.21	0.00	0.52	0.78	0.94	0.60
DAR Puamana Offshore	12	0.85	0.95	0.65	0.45	0.00	0.44	0.64	0.94	0.20
WHALE Olowalu Beach	13	0.84	0.94	0.85	0.22	0.00	0.49	0.78	0.94	0.40
WHALE Olowalu Six Offshore	14	0.84	0.98	0.59	0.52	0.00	0.49	0.94	0.99	0.40
WHALE Papalaua Nearshore One	15	0.83	0.94	0.51	0.46	0.00	0.34	0.79	0.96	0.40
WHALE Kahekili Beach 4	16	0.83	0.97	0.23	0.48	0.00	0.34	0.83	0.99	1.00
WHALE Makumana Gulch	17	0.83	0.97	0.29	0.32	0.00	0.45	0.87	0.99	0.80
WHALE Kahekili Beach 3	18	0.82	0.96	0.18	0.73	0.00	0.33	0.49	0.98	0.40
WHALE Papawai Shores 2	19	0.82	0.97	0.24	0.32	0.00	0.39	0.88	0.98	0.00
WHALE Olowalu Three Nearshore	20	0.81	0.95	0.20	0.44	0.00	0.42	0.81	0.82	0.40
WHALE Olowalu Five Offshore	21	0.81	0.94	0.21	0.46	0.00	0.44	0.79	0.98	1.00
WHALE Papawai Shores	22	0.81	0.94	0.15	0.57	0.00	0.37	0.96	1.00	1.00
WHALE Papalaua Offshore One	23	0.80	0.98	0.54	0.32	0.00	0.33	0.89	0.92	0.80
WHALE Seven Five Offshore	24	0.79	0.96	0.19	0.48	0.00	0.22	0.75	0.99	0.80
WHALE Olowalu Six Nearshore	25	0.79	0.94	0.60	0.46	0.00	0.27	0.79	1.00	0.40
DAR Mahinahina Offshore	26	0.79	0.94	0.86	0.58	0.00	0.62	0.66	0.97	0.60
WHALE Olowalu Five Nearshore	27	0.78	0.96	0.77	1.00	0.00	0.10	0.90	0.97	1.00
DAR Puamana Offshore	28	0.76	1.00	0.84	0.48	0.00	0.56	0.57	0.97	1.00
WHALE Honoapiilani Highway	29	0.76	0.96	0.92	0.59	0.00	0.19	0.96	0.97	0.60
WHALE Nohea Kai	30	0.76	0.98	0.71	0.50	0.00	0.39	0.57	0.97	0.60
WHALE Honolua NearShore	31	0.76	0.96	0.74	0.65	0.00	0.20	0.97	0.97	0.80
WHALE Kaanapali Beach Three	32	0.76	0.98	0.86	0.40	0.00	0.37	0.23	0.97	0.60
DAR Olowalu Four Nearshore	33	0.75	0.99	0.86	0.00	0.00	0.22	1.00	0.97	1.00
WHALE Kailili Beach	34	0.75	0.99	0.76	0.45	0.00	0.39	0.58	0.97	0.40
WHALE Kaumuipuko Beach	35	0.75	0.96	0.84	0.32	0.00	0.23	0.79	0.97	0.60
WHALE Kaanapali Beach Four	36	0.75	0.94	0.67	0.00	0.50	0.27	0.08	1.00	1.00
WHALE Kono Point	37	0.74	1.00	0.47	0.50	0.00	0.22	0.13	1.00	1.00
DAR Puamana Nearshore	38	0.74	0.99	0.39	0.50	0.00	0.49	0.88	0.98	0.20
DAR Puamana Nearshore	39	0.74	0.96	0.19	0.50	0.05	0.64	0.87	0.99	0.80
WHALE McGregor Point Offshore	40	0.73	0.96	0.28	0.35	0.05	0.41	0.62	0.94	0.20
WHALE Olowalu Seven Nearshore	41	0.73	0.96	0.31	0.41	0.05	0.23	0.60	0.94	0.60
WHALE Lahaina Marina	42	0.73	0.97	0.21	0.40	0.05	0.42	0.53	1.00	0.40
WHALE Kapalua Beach	43	0.71	0.98	0.33	0.43	0.05	0.35	0.53	0.92	0.40
WHALE Baby Beach	44	0.70	0.98	0.26	0.43	0.00	1.08	0.52	1.00	0.00
DAR Kahekili 2	45	0.70	0.98	0.24	0.50	0.00	0.36	0.26	1.00	1.00
WHALE McGregor Point Nearshore	46	0.70	0.99	0.32	0.50	0.05	0.58	0.53	1.00	1.00
WHALE Papalaua Nearshore Two	47	0.70	1.00	0.20	0.42	0.00	0.29	0.55	0.99	0.40
DAR Honolua South	48	0.70	0.97	0.47	0.67	0.05	0.17	0.21	1.00	0.40
WHALE Ukumehame State Beach	49	0.69	0.98	0.53	0.17	0.05	0.16	0.42	0.99	0.80
DAR Honolua North	50	0.69	0.98	0.56	0.61	0.05	0.27	0.73	1.00	0.60
WHALE Lahaina Harbor 2	51	0.68	0.99	0.53	0.61	0.05	0.17	0.69	1.00	0.80
WHALE Puunoa Beach	52	0.68	0.95	0.62	0.50	0.05	0.38	0.71	1.00	0.20
DAR Kahekili 1	53	0.67	0.95	0.42	0.44	0.05	0.50	0.68	0.93	0.40
WHALE Puamana	54	0.66	0.95	0.32	0.00	0.05	0.13	0.44	0.95	1.00
DAR Mahinahina Nearshore	55	0.66	1.00	0.37	0.50	0.05	0.15	0.59	0.95	1.00
WHALE Lahaina Harbor 1	56	0.65	0.97	0.32	0.25	0.10	0.20	0.24	0.95	1.00
WHALE Papalaua Offshore Two	57	0.65	0.99	0.26	0.25	0.05	0.31	0.26	0.95	1.00
DAR Maalaea Nearshore	58	0.63	0.99	0.27	0.39	0.00	0.32	0.50	0.95	1.00
DAR Maalaea Offshore	59	0.62	0.98	0.37	0.53	0.05	0.19	0.22	1.00	1.00
WHALE Maalaea Harbor	60	0.60	0.98	0.47	0.41	0.00	0.18	0.29	1.00	0.80

Table 4 – "Stoplight" scaling of sites

Resiliency Scores for sites are not all-indicative of a reef's health or physical condition. In the McClanahan framework, a site can have a high resilience score relative to other sites due to the range of possible combinations of the variables. Other non-framework variables such a coral percent cover are not included in the analysis, but is also a valuable tool for analyzing reef health. The condition of a reef is partially covered by the section on anthropogenic stress.

Anthropogenic Stress

Following the sections describing the data collection and results for the eight (8) variables used is a section on anthropogenic stress. This section provides a composite score for the stress by averaging the scores for fishing access/pressure and sedimentation. Again high scores are good scores so the data is normalized and then averaged on a 0-1 scale. As mentioned above, sites with high scores for the resiliency potential might have low scores for anthropogenic stress that was balanced against high scores in other variables. Thus the anthropogenic stress is more of an indicator of "*condition*" of the reef site and more clearly defines stressors.

Results and Discussions

Results for the eight (8) variables used in the resilience analysis follow.

Coral Diversity

From the West Maui Benthic data input, a diversity index was developed. An example of the calculation used from a ten (10) quadrant transect is as such:

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papawai Point	20.773599	-156.537002	10	OPEN	65
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Six (6) species identified	No. of Variation in Coral Species		4		
Average of Variation = 2.0	No. of Variation in Coral Species		3		
Ranking 2.0/6	No. of Variation in Coral Species		3		
Averaging Score = .33	No. of Variation in Coral Species		1		
Scale of Ten Score = .165	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		

Data Acquisition Site	Diversity Averaging Score	Scale of Ten Score	Simpson's Index -1	Average
WHALE Papawai Point	0.40	0.20	0.801	0.80
WHALE Manuohuke Point	0.30	0.21	0.981	0.98
WHALE McGregor Point Two	0.52	0.25	0.950	0.95
WHALE McGregor Point Nearshore	0.57	0.4	0.967	0.97
WHALE McGregor Point Offshore	0.36	0.22	0.950	0.95
DAR Maalaea Nearshore	1.00	0.2	0.933	0.93
DAR Maalaea Offshore	1.00	0.2	0.995	1.00
WHALE Maalaea Harbor	0.54	0.27	0.948	0.95
WHALE Papawai Shores	0.43	0.26	0.943	0.94
WHALE Olowalu Six Nearshore	0.41	0.25	0.957	0.96
WHALE Olowalu Six Offshore	0.41	0.25	0.943	0.94
WHALE Olowalu Seven Nearshore	0.45	0.25	0.951	0.95
WHALE Seven Five Offshore	0.41	0.25	0.943	0.94
WHALE Olowalu Beach	0.58	0.23	0.979	0.98
WHALE Kailili Beach	0.35	0.25	0.941	0.94
WHALE Papalaua Nearshore One	0.38	0.23	0.968	0.97
WHALE Papalaua Offshore One	0.36	0.18	0.970	0.97
WHALE Papalaua Nearshore Two	0.43	0.3	0.960	0.96
WHALE Papalaua Offshore Two	0.56	0.28	0.965	0.97
WHALE Ukumehane State Beach	0.45	0.27	0.950	0.95
WHALE Makumana Gulch	0.41	0.29	0.940	0.94
WHALE Manawainui Gulch	0.60	0.24	0.940	0.94
WHALE Papawai Shores 2	0.36	0.18	0.979	0.98
WHALE Kaumuipuko Beach	0.35	0.25	0.959	0.96
WHALE Honoapiilani Highway	0.34	0.24	0.944	0.94
WHALE Olowalu One Nearshore	0.25	0.18	0.943	0.94
WHALE Olowalu One Offshore	0.30	0.3	0.963	0.96
WHALE Olowalu Two Nearshore	0.42	0.25	0.997	1.00
WHALE Olowalu Two Offshore	0.58	0.23	0.957	0.96
WHALE Olowalu Three Nearshore	0.42	0.25	0.981	0.98
WHALE Olowalu Three Offshore	0.58	0.23	0.957	0.96
DAR Olowalu Four Nearshore	1.00	0.5	0.981	0.98
DAR Olowalu Four Offshore	1.00	0.5	0.993	0.99
WHALE Olowalu Five Nearshore	0.40	0.29	0.988	0.99
WHALE Olowalu Five Offshore	0.52	0.31	0.956	0.96
DAR Puamana Offshore	1.00	0	0.942	0.94
DAR Puamana Nearshore	1.00	0.2	1.000	1.00
WHALE Nohea Kai	0.54	0.27	0.992	0.99
WHALE Canoe Beach	0.50	0.25	0.962	0.96
WHALE Lahaina Harbor 1	0.43	0.3	0.963	0.96
WHALE Baby Beach	0.39	0.27	0.964	0.96
WHALE Puunoa Beach	0.33	0.23	0.968	0.97
WHALE Lahaina Harbor 2	0.31	0.22	0.975	0.98
WHALE Lahaina Marina	0.35	0.21	0.975	0.98
DAR Puamana Nearshore	1.00	0.2	0.976	0.98
DAR Puamana Offshore	1.00	0.2	0.988	0.99
WHALE Puamana	0.46	0.23	0.996	1.00
DAR Kahekili 1	1.00	0.3	0.973	0.97
DAR Kahekili 2	1.00	0.5	0.983	0.98
WHALE Kahekili Beach 3	0.76	0.23	0.982	0.98
WHALE Kahekili Beach 4	0.76	0.23	0.988	0.99
WHALE Kaanapali Beach Three	0.56	0.28	0.952	0.95
WHALE Kaanapali Beach Four	0.48	0.24	0.945	0.95
DAR Mahinahina Nearshore	1.00	0.5	0.948	0.95
DAR Mahinahina Offshore	1.00	0.5	0.999	1.00
DAR Honolua North	1.00	0.4	0.973	0.97
DAR Honolua South	1.00	0.4	0.987	0.99
WHALE Honolua NearShore	0.41	0.2	0.987	0.99
WHALE Kono Point	0.34	0.17	0.983	0.98
WHALE Kapalua Beach	0.46	0.23	0.978	0.98

Applying the Simpson's Index of Diversity to the sites yield six (6) sites with high diversity with an average score of 1.00. There is not a large range of diversity with sites ranging from one (1) species to seven (7) with the majority of sites having five (5) to seven (7) species.

Again for Papawai Point, here's is an example from the West Maui Benthic Chart showing the identification of the six (6) species for that location.

Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0
0	0	0	0	0	1	0	5	0	0	0	0	5	0	0	0	0	0	5	0	0	0
0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	15	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	5	0	0	20	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0

Coral Recruitment

The highest recruit density was found at Manuohule Point (11.12 recruits/m^2), and the lowest at Maalaea Harbor (1.16 recruits/m^2). As can be seen on the next page, seven (7) sites had high recruitment values, seven (7) had medium values, and forty-six (46) had low. Spatial distribution appears to be related to reef size, with Olamulu the largest reef.

Seven (7) sites with High Recruitment values

Seven (7) sites with Medium Recruitment Values

Forty-Six (46) sites with Low Recruitment Vales

WHALE Environmental Services LLC

Coral Recruitment Summary

Data Acquisition Site	recruits/m2	Anchored
WHALE Manuohule Point	11.12	1.00
WHALE Olowalu Two Offshore	10.25	0.92
WHALE Olowalu Six Offshore	10.12	0.91
DAR Olowalu Four Offshore	9.61	0.86
DAR Olowalu Four Nearshore	9.54	0.86
WHALE Olowalu One Nearshore	9.52	0.86
WHALE Seven Five Offshore	9.44	0.85
WHALE Olowalu Five Offshore	9.36	0.84
WHALE Olowalu Two Nearshore	9.32	0.84
WHALE Olowalu One Offshore	8.55	0.77
WHALE Olowalu Five Nearshore	8.44	0.76
WHALE Papawai Point	8.44	0.76
WHALE Olowalu Three Offshore	8.27	0.74
WHALE Olowalu Three Nearshore	7.85	0.71
DAR Puamana Offshore	7.45	0.67
WHALE Olowalu Seven Nearshore	7.24	0.65
WHALE Kaanapali Beach Three	6.89	0.62
WHALE Olowalu Six Nearshore	6.87	0.62
WHALE Honoapiilani Highway	6.65	0.60
WHALE Olowalu Beach	6.54	0.59
WHALE Kahekili Beach 3	6.24	0.56
WHALE McGregor Point Two	6.13	0.55
WHALE Papawai Shores 2	5.96	0.54
WHALE Kahekili Beach 4	5.88	0.53
DAR Kahekili 2	5.87	0.53
WHALE Kailili Beach	5.65	0.51
WHALE Papawai Shores	5.52	0.50
WHALE Kapalua Beach	5.26	0.47
DAR Puamana Nearshore	5.22	0.47
DAR Kahekili 1	5.21	0.47
WHALE Kaanapali Beach Four	4.67	0.42
WHALE Nohea Kai	4.32	0.39
DAR Mahinahina Offshore	4.11	0.37
WHALE Kono Point	4.11	0.37
WHALE Lahaina Harbor 2	3.68	0.33
WHALE McGregor Point Offshore	3.58	0.32
DAR Puamana Offshore	3.58	0.32
DAR Mahinahina Nearshore	3.58	0.32
DAR Honolua North	3.54	0.32
WHALE Baby Beach	3.45	0.31
WHALE Papalaua Offshore One	3.28	0.29
WHALE Lahaina Harbor 1	3.14	0.28
WHALE Honolua NearShore	2.96	0.27
WHALE Lahaina Marina	2.88	0.26
DAR Honolua South	2.88	0.26
DAR Puamana Nearshore	2.69	0.24
WHALE Papalaua Offshore Two	2.64	0.24
WHALE Papalaua Nearshore One	2.54	0.23
WHALE Puunoa Beach	2.36	0.21
WHALE Makumana Gulch	2.35	0.21
DAR Maalaea Offshore	2.3	0.21
WHALE Puamana	2.22	0.20
WHALE Ukumehane State Beach	2.21	0.20
WHALE Canoe Beach	2.14	0.19
WHALE Kaumuipuko Beach	2.12	0.19
WHALE Papalaua Nearshore Two	1.95	0.18
DAR Maalaea Nearshore	1.94	0.17
WHALE Manawainui Gulch	1.68	0.15
WHALE McGregor Point Nearshore	1.28	0.12
WHALE Maalaea Harbor	1.16	0.10

Again, coral recruitment appears to be high values in areas where 1) lack of fishing access points, 2) lower density public use areas, and 3) large reef ecosystems. Conversely, poor sites are publically dominated areas such as harbors, beaches and marinas, areas with high sedimentation, and areas with fishing pressure.

(Note – as a biologist whose experience in ecosystem reconstruction includes reef construction in Bermuda; the following observations are noted by Mark Howland: "it is relatively apparent that the large majority of sites suffering from low recruitment values lack conditions which promote new growth. Many of the sites are offshore of locations where WHALE Environmental Services LLC in the prior on-shore stressor location work submitted previously noted strong stressor entry of sedimentation, nutrient overload, and pollutants. As well, many of the areas are exposed to prop wash, tourist visitation, and recreational use of jet skis and diving. Recruits (new growth) require sediment-free growth grounds, non-exposure to prop wash or agitated wave exposure, lack of pollution or nitrates and phosphates from runoff. A future management action could isolate a reef with a low recruitment value and institute mitigation on a trial basis. This could be stopping the erosive wash of runoff and sediment from Manawainui Gulch which is believed to be the key factor affecting recruitment, or evaluate isolating the reef at Canoe Beach from the influence of polluted runoff from onshore injection wells by placing permeable filter socks around that small reef to see if the pollutants can be stopped from reaching recruitment grounds. Or enter a discussion with resource managers if popular beach areas such as Kaanapali, Kaumuipuko or Ukumuhane can have its beachgoers educated about reef grounds disturbance from swimming, snorkeling, diving, etc.… These could be site specific actions entertained on a trial basis to judge impact and recovery."

Coral Bleaching Resistance

Each species identified at the reef locations was given a bleaching resistance score. As demonstrated previously, each coral species identified was given a bleaching resistance score obtained from published sources and NOAA CRED web site. Species with a score of 2 or less are considered resistant.

		Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
Data Acquisition Site																								
WHALE Papawai Point																								
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
% Resistant	76.19%		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	1	0	0	0
% Susceptible	23.81%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	21		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
WHALE Manuohule Point																								
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
% Resistant	70.00%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	30.00%		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	1	0	0	0
Total Number of Quads with coral	20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Bleaching Resistance Scores range from 100 at Olawalu One Offshore to 0 at DAR Puamana Offshore and DAR Mahinahina Nearshore. The next page shows the range of scores, and it should be noted that only one reef, the Olawalu One Offshore has high bleaching resistance and only three (3) others have medium resistance. The rest have poor bleaching resistance.

"Author's note – in the event that reef reconstruction becomes a viable option, another management tool is to experiment with a site such as DAR Puamana that would be relatively easy to isolate for a project and employ new plantings and/or transplant/seeding. Though experimental, there has been some success in reef reconstruction, and re-establishing coral colonies that are bleaching resistant will aid in recovery efforts.

It perhaps also could be judged if the West Maui area is limited historically to species that are not bleaching resistant. WES found no evidence of such documentation, but further research might detemrine if this is a natural condition or artificially induced".

High

Medium

Poor

Coral Bleaching Resistance Summary

Data Acquisition Site	Bleaching Resistance Score	Anchored
WHALE Olowalu One Offshore	100.00	1.00
WHALE Papawai Point	76.19	0.76
WHALE Papalaua Nearshore Two	73.33	0.73
WHALE Manuohule Point	70.00	0.70
DAR Kahekili 1	66.67	0.67
WHALE Olowalu Three Offshore	65.00	0.65
WHALE Kahekili Beach 3	60.87	0.61
WHALE Kahekili Beach 4	60.87	0.61
WHALE Olowalu Two Offshore	59.09	0.59
WHALE Olowalu One Nearshore	58.33	0.58
WHALE Manawainui Gulch	56.52	0.57
WHALE McGregor Point Nearshore	55.55	0.56
WHALE Kono Point	53.33	0.53
WHALE Olowalu Beach	52.00	0.52
DAR Maalaea Offshore	50.00	0.50
WHALE Olowalu Three Nearshore	50.00	0.50
DAR Puamana Nearshore	50.00	0.50
WHALE Nohea Kai	50.00	0.50
WHALE Canoe Beach	50.00	0.50
DAR Puamana Nearshore	50.00	0.50
DAR Puamana Offshore	50.00	0.50
WHALE Kaanapali Beach Three	50.00	0.50
DAR Mahinahina Offshore	50.00	0.50
WHALE Olowalu Six Nearshore	48.00	0.48
WHALE Papalaua Nearshore One	48.00	0.48
WHALE Kaumuipuko Beach	48.00	0.48
WHALE Olowalu Two Nearshore	48.00	0.48
WHALE Makumana Gulch	46.15	0.46
WHALE Honoapiilani Highway	46.15	0.46
WHALE Kailili Beach	45.83	0.46
WHALE Olowalu Seven Nearshore	45.16	0.45
WHALE Olowalu Five Nearshore	44.83	0.45
WHALE Ukumehane State Beach	44.44	0.44
WHALE Kaanapali Beach Four	44.00	0.44
WHALE Lahaina Harbor 2	43.48	0.43
WHALE Lahaina Marina	43.48	0.43
WHALE Puamana	41.67	0.42
WHALE Kapalua Beach	40.91	0.41
WHALE Baby Beach	40.74	0.41
DAR Olowalu Four Nearshore	40.00	0.40
WHALE Puunoa Beach	40.00	0.40
WHALE Honolua NearShore	39.29	0.39
WHALE Papawai Shores	35.71	0.36
WHALE Lahaina Harbor 1	35.48	0.35
WHALE McGregor Point Offshore	33.33	0.33
WHALE Olowalu Five Offshore	32.26	0.32
WHALE Papalaua Offshore Two	32.14	0.32
WHALE Papalaua Offshore One	31.58	0.32
WHALE Papawai Shores 2	31.58	0.32
WHALE McGregor Point Two	30.77	0.31
WHALE Maalaea Harbor	30.77	0.31
DAR Honolua North	25.00	0.25
DAR Honolua South	25.00	0.25
WHALE Seven Five Offshore	22.22	0.22
WHALE Olowalu Six Offshore	21.43	0.21
DAR Kahekili 2	16.67	0.17
DAR Maalaea Nearshore	0.00	0.00
DAR Olowalu Four Offshore	0.00	0.00
DAR Puamana Offshore	0.00	0.00
DAR Mahinahina Nearshore	0.00	0.00

Temperature Variability

Temperature variability in the summer, as measured by the standard deviations in summer months (July 2015) is approximated at 0-2 degrees Centrigrade across survey sites. In February of 2015, NOAA instituted 5mm pixel imagery of temperature variations to replace the old 50mm imagery that was difficult to interpret. WES had asked for an extension of its contract to judge the temperature variations during the three (3) hottest months – July, august September 2015. Upon denial, we used the information from July 2015 to garner data.

The DAR Honolua North site has the largest variability at 2.00 and forty-one (41) reefs had no variability (0.00). The summary chart follows on the next page.

"Author's Note – There is not great temperature variation, but some observations can be made. During the fishing access/pressure limited creel survey, consistently, off-shore fisherman remarked that they tended not to fish the waters from Lahaina to Honolua Bay. They are suspicious of the injection well insertion of contaminants to the region making the fish caught unhealthy or suspect to eat. They routine now leave the various ports or boat slips and traverse to farther off-shore location to at least 10 miles to avoid the influxes of the injection well plumes. They cite that the plumes do not disperse off-shore until Honolua Bay which is consistent with ancient Hawaiian records of that location being the launching points for war canoes because of the off-shore carrying current.

It is difficult to come up with a management solution for temperature variability. Since variability is viewed as a positive, upon looking at the chart on the next page, one would assume that the sites with a variability of one (1) would have greater resilience. Sadly, we do not agree – if there was greater variability due to climate change or natural condition, we agree that it would be a sign of resilience. However, the majority of the sites with the one (1) degree variance is also the area which has been documented as temperature intrusion by injection well uprising plumes on the ocean floor. During dives, our divers noted circular areas with marked upward sea temperatures below the surface. At the surface or dispersed over large water areas, the marked upward temperatures would of course be reduced. But man-made influences of spot and localized temperature rises from injection well uprise plumes should not be discarded in management planning".

WHALE Environmental Services LLC

Coral Temperature Variability Summary

Data Acquisition Site	No Watch = 0.0	Translated to scale of 1.0	Watch = 1.0	Translated to scale of 1.0	Warning = 2.0	Translated to scale of 1.0	Alert 1 = 3.0	Translated to scale of 1.0	Alert 2 = 4.0	Translated to scale of 1.0	Variability	Anchored
DAR Honolua North					2	0.20					0.2000	0.10
DAR Puamana Offshore			1	0.10							0.1000	0.05
WHALE Maalaea Harbor			1	0.10							0.1000	0.05
WHALE Canoe Beach			1	0.10							0.1000	0.05
WHALE Lahaina Harbor 1			1	0.10							0.1000	0.05
WHALE Baby Beach			1	0.10							0.1000	0.05
WHALE Puunoa Beach			1	0.10							0.1000	0.05
WHALE Lahaina Harbor 2			1	0.10							0.1000	0.05
DAR Puamana Offshore			1	0.10							0.1000	0.05
DAR Kahekili 1			1	0.10							0.1000	0.05
DAR Kahekili 2			1	0.10							0.1000	0.05
WHALE Kahekili Beach 3			1	0.10							0.1000	0.05
WHALE Kahekili Beach 4			1	0.10							0.1000	0.05
WHALE Kaanapali Beach Three			1	0.10							0.1000	0.05
WHALE Kaanapali Beach Four			1	0.10							0.1000	0.05
DAR Mahinahina Nearshore			1	0.10							0.1000	0.05
DAR Mahinahina Offshore			1	0.10							0.1000	0.05
DAR Honolua South			1	0.10							0.1000	0.05
WHALE Kono Point			1	0.10							0.1000	0.05
WHALE Papawai Point	0	0									0.0000	0.00
WHALE Manuohule Point	0	0									0.0000	0.00
WHALE McGregor Point Two	0	0									0.0000	0.00
WHALE McGregor Point Nearshore	0	0									0.0000	0.00
WHALE McGregor Point Offshore	0	0									0.0000	0.00
DAR Maalaea Nearshore	0	0									0.0000	0.00
DAR Maalaea Offshore	0	0									0.0000	0.00
WHALE Papawai Shores	0	0									0.0000	0.00
WHALE Olowalu Six Nearshore	0	0									0.0000	0.00
WHALE Olowalu Six Offshore	0	0									0.0000	0.00
WHALE Olowalu Seven Nearshore	0	0									0.0000	0.00
WHALE Olawalu Seven Offshore	0	0									0.0000	0.00
WHALE Olowalu Beach	0	0									0.0000	0.00
WHALE Kailili Beach	0	0									0.0000	0.00
WHALE Papalaua Nearshore One	0	0									0.0000	0.00
WHALE Papalaua Offshore One	0	0									0.0000	0.00
WHALE Papalaua Nearshore Two	0	0									0.0000	0.00
WHALE Papalaua Offshore Two	0	0									0.0000	0.00
WHALE Ukumehane State Beach	0	0									0.0000	0.00
WHALE Makumana Gulch	0	0									0.0000	0.00
WHALE Manawainui Gulch	0	0									0.0000	0.00
WHALE Papawai Shores 2	0	0									0.0000	0.00
WHALE Kaumuipuko Beach	0	0									0.0000	0.00
WHALE Honoapiilani Highway	0	0									0.0000	0.00
WHALE Olowalu One Nearshore	0	0									0.0000	0.00
WHALE Olowalu One Offshore	0	0									0.0000	0.00
WHALE Olowalu Two Nearshore	0	0									0.0000	0.00
WHALE Olowalu Two Offshore	0	0									0.0000	0.00
WHALE Olowalu Three Nearshore	0	0									0.0000	0.00
WHALE Olowalu Three Offshore	0	0									0.0000	0.00
DAR Olowalu Four Nearshore	0	0									0.0000	0.00
DAR Olowalu Four Offshore	0	0									0.0000	0.00
WHALE Olowalu Five Nearshore	0	0									0.0000	0.00
WHALE Olowalu Five Offshore	0	0									0.0000	0.00
DAR Puamana Nearshore	0	0									0.0000	0.00
WHALE Nohea Kai	0	0									0.0000	0.00
WHALE Lahaina Marina	0	0									0.0000	0.00
DAR Puamana Nearshore	0	0									0.0000	0.00
WHALE Puamana	0	0									0.0000	0.00
WHALE Honolua NearShore	0	0									0.0000	0.00
WHALE Kapalua Beach	0	0									0.0000	0.00

Herbivore BioMass

There is good biomass diversity for herbivores seen in the sites ranging from a low of 0.61 at WHALE Olawalu One Offshore to a high of 6.59 At the Lahaina Marina (next page). To some surprise, some of the closed areas (MLCD) have low herbivore biomass scores which would indicate that herbivore biomass is not correlated to fishing access/pressure. As seen in this sample from the Fish Biota Survey database, (again – Papawai Point), each site has species noted, size denoted, conversion from cm to mm, "a" and "b" sizing parameters research from fishbase.org, and implementation of the herbivore biomass formula.

"Author's note – from general observation doing data entry and research on the sixty (60) sites fish biota communities, it is apparent that in this georegion, that there is variety of species types from one end of the survey zones to the other. Species that appear below Lahaina do not appear in general above Lahaina. Sizes appear to vary offshore versus nearshore locations. Diversity in general seems to be larger in southern zones than northern ones. For management, it might be a consideration to take a site with high diversity and prohibit fishing to see if it maintains that status.

Fish Benthic Study

Papawai Point
Depth: 10m

SPC 1	no.	size (cm)	size (mm)	a	b	Mass in G
C. melampygus	1	18	180	0.02399	2.99	12.91
C. sordidus	1	22	220	0.01549	3.06	10.43
A. nigrofuscus	2	13	130	0.02692	2.97	20.79
A. nigrofuscus	1	10	100	0.02692	2.97	8.00
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	7	9	90	0.02692	2.97	50.37
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
N. lituratus	1	12	120	0.0302	2.97	10.76
N. lituratus	1	15	150	0.0302	2.97	13.45
N. hexacanthus	3	18	180	0.0257	2.95	40.94
S. bursa	2	18	180	0.02191	2.98	23.51
S. bursa	1	20	200	0.02191	2.98	13.06
P. aspricauda	1	16	160	0.02089	2.92	9.76
C. multicinctus	2	17	170	0.02487	3.05	25.79
Z. flavescens	10	15	150	0.02512	3.00	113.04
Z. flavescens	5	12	120	0.02512	3.00	45.22
Z. flavescens	7	10	100	0.02512	3.00	52.75
C. auriga	2	20	200	0.02698	2.95	31.84
F. flavissimus	2	12	120	0.02018	3.04	14.72
C. quadrimaculatus	2	15	150	0.0257	3.01	23.21
C. miliaris	5	12	120	0.03236	3.04	59.02
P. multifasciatus	1	18	180	0.01047	3.15	5.94
H. ornatissimus	1	18	180	0.02570	3.01	13.92
O. unifasciatus	1	25	250	0.01964	2.99	14.68
P. arcatus	1	6	60	0.00912	3.08	1.69
P. arcatus	1	6	60	0.00912	3.08	1.69
P. arcatus	1	7	70	0.00912	3.08	1.97
C. inermis	1	27	270	0.00380	3.1	3.18
T. duperrey	1	18	180	0.00832	2.99	4.48
S. baltieata	1	8	80	0.01023	2.99	2.45
S. baltieata	1	7	70	0.01023	2.99	2.14
Z. cornutus	2	12	120	0.00698	2.98	4.99
G. curiosus	1	6	60	0.00087	3.12	0.16
C. agilis	1	7	70	0.21020	2.99	43.99
C. agilis	3	5	50	0.21020	2.99	94.27
C. hanui	1	5	50	0.01987	3.01	2.99
C. hanui	1	4	40	0.01987	3.01	2.39
C. hanui	1	6	60	0.01987	3.01	3.59
C. vanderbilti	30	3	30	0.00102	3.06	2.81
C. vanderbilti	10	4	40	0.00102	3.06	1.25
A. abdominalis	10	15	150	0.00107	3.07	4.93
A. abdominalis	10	17	170	0.00107	3.07	5.58
A. varigiensis	3	18	180	0.01413	3.00	22.89
F. commersoni	1	85	850	0.00076	2.96	1.91
F. commersoni	1	40	400	0.00076	2.96	0.90
F. commersoni	1	45	450	0.00076	2.96	1.01
A. chinensis	1	48	480	0.00224	3.14	3.38
D. albisella	2	18	180	0.00954	2.98	10.23
C. ovalis	20	15	150	0.01479	2.99	132.67
C. ovalis	10	17	170	0.01479	2.99	75.18
	181	813				1087.60
	# of fish	average size		Convert to kg		10.88
				Overall Ranking (kg/m squared		**3.39**

SPC 2	no.	size (cm)	size (mm)	a	b	Mass in G
M. granosulis	1	17	170	0.01995	2.98	10.11
M. granosulis	4	13	130	0.01995	2.98	30.91
C. perspicillatus	2	18	180	0.02548	2.98	27.33
C. perspicillatus	1	17	170	0.02548	2.98	12.91
C. perspicillatus	1	14	140	0.02548	2.98	10.63
Z. flavescens	3	14	140	0.02512	3.00	31.65
Z. flavescens	5	12	120	0.02512	3.00	45.22
Z. flavescens	3	16	160	0.02512	3.00	36.17
Z. flavescens	2	15	150	0.02512	3.00	22.61
Z. flavescens	1	17	170	0.02512	3.00	12.81
Z. flavescens	6	10	100	0.02512	3.00	45.22
Z. flavescens	5	11	110	0.02512	3.00	41.45
Z. flavescens	1	20	200	0.02512	3.00	15.07
C. striatus	2	10	100	0.02465	3.03	14.94
C. striatus	1	11	110	0.02465	3.03	8.22
C. striatus	1	13	130	0.02465	3.03	9.71
C. striatus	1	3	30	0.02465	3.03	2.24
N. lituratus	1	15	150	0.0302	2.97	13.45
N. lituratus	1	12	120	0.0302	2.97	10.76
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	6	8	80	0.02692	2.97	38.38
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
A. nigrofuscus	1	4	40	0.02692	2.97	3.20
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	1	13	130	0.02692	2.97	10.39
A. nigrofuscus	4	10	100	0.02692	2.97	31.98
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
R. aculeatus	2	14	140	0.02630	2.98	21.94
R. aculeatus	1	17	170	0.02630	2.98	13.32
C. miliaris	2	10	100	0.03236	3.04	19.67
C. miliaris	1	8	80	0.03236	3.04	7.87
C. miliaris	2	16	160	0.03236	3.04	
C. multicintus	2	10	100	0.02487	3.05	
C. multicintus	1	8	80	0.02487	3.05	
C. multicintus	2	16	160	0.02487	3.05	
C. ornatissimus	2	19	190	0.02570	3.01	
M. flavolineatus	1	15	150	0.00891	3.08	
P. multifasciatus	1	15	150	0.01047	3.15	
T. duperrey	1	14	140	0.00832	2.99	
T. duperrey	1	12	120	0.00832	2.99	
T. duperrey	1	4	40	0.00832	2.99	
O. unifasciatus	1	15	150	0.01964	2.99	
C. jactator	1	6	60	0.02239	2.96	
D. albisella	1	2	20	0.00954	2.98	
D. albisella	3	8	80	0.00954	2.98	
C. hanui	1	3	30	0.01987	3.01	
C. hanui	1	4	40	0.01987	3.01	
C. vanderbilti	11	3	30	0.00102	3.06	
C. agilis	2	5	50	0.21020	2.99	
P. arcatus	2	5	50	0.00912	3.08	
P. arcatus	1	6	60	0.00912	3.08	
P. forsteri	1	17	170	0.00912	3.08	
	108	590				606.54
						6.07

"Author's Note – It is not certain, but from the literature reviewed, it would appear that 2kg/m² is considered a good herbivore biomass indicator. If that is true, then over half the sites (34) would be considered to have good herbivore biomass ratings.

In our opinion, there is little to judge from a management perspective. BioMass appears to be isolated from fishing pressure and access and declaring some of these high herbivore biomass areas as off limits to fishing as new MCLD's districts seems unlikely as the high scorer Lahaina Marina for example – would never be declared a MLCD.

It would seem that resource managers need to develop other strategies for management of these areas with high herbivore biomass scores. As WES believes that reef fishes are more prone to eradication due to aquarium gatherers rather than traditional food fisherpersons, a general overall ban of collecting aquarium species throughout the West Maui geo-region might expand the biomass diversity from the current thirty-four (34) sites to includes many others.

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Herbivore BioMass Summary

Data Acquisition Site	kg/m2	Anchored
WHALE Lahaina Marina	6.59	1.00
WHALE McGregor Point Two	6.13	0.93
WHALE Papawai Point	3.99	0.61
WHALE Canoe Beach	3.93	0.60
WHALE Olowalu One Nearshore	3.83	0.58
DAR Puamana Offshore	3.58	0.54
WHALE Olowalu Two Nearshore	3.41	0.52
WHALE Olowalu Six Offshore	3.17	0.48
WHALE Kaanapali Beach Four	3.05	0.46
WHALE Olowalu Beach	3.03	0.46
WHALE Seven Five Offshore	3.02	0.46
WHALE Nohea Kai	3.02	0.46
WHALE Manuohule Point	2.83	0.43
WHALE Olowalu Six Nearshore	2.81	0.43
WHALE Papalaua Offshore One	2.76	0.42
WHALE McGregor Point Nearshore	2.72	0.41
WHALE Olowalu Seven Nearshore	2.70	0.41
WHALE Makumana Gulch	2.68	0.41
WHALE Ukumehane State Beach	2.57	0.39
WHALE Puunoa Beach	2.56	0.39
WHALE Lahaina Harbor 1	2.49	0.38
WHALE Olowalu Five Nearshore	2.40	0.36
WHALE Olowalu Three Nearshore	2.38	0.36
WHALE Papalaua Offshore Two	2.37	0.36
WHALE Kaanapali Beach Three	2.33	0.35
WHALE Manawainui Gulch	2.29	0.35
DAR Olowalu Four Nearshore	2.25	0.34
DAR Puamana Nearshore	2.23	0.34
WHALE Lahaina Harbor 2	2.14	0.32
WHALE McGregor Point Offshore	2.12	0.32
WHALE Kailili Beach	2.10	0.32
WHALE Papalaua Nearshore One	2.08	0.32
WHALE Papawai Shores 2	2.05	0.31
WHALE Papalaua Nearshore Two	2.03	0.31
WHALE Honolua NearShore	1.99	0.30
WHALE Maalaea Harbor	1.95	0.30
WHALE Papawai Shores	1.91	0.29
DAR Maalaea Offshore	1.89	0.29
DAR Honolua South	1.88	0.29
WHALE Puamana	1.76	0.27
DAR Puamana Offshore	1.68	0.25
WHALE Kahekili Beach 3	1.67	0.25
DAR Maalaea Nearshore	1.65	0.25
WHALE Honoapiilani Highway	1.63	0.25
WHALE Olowalu Five Offshore	1.40	0.21
WHALE Baby Beach	1.4	0.21
DAR Olowalu Four Offshore	1.37	0.21
WHALE Kaumuipuko Beach	1.33	0.20
DAR Puamana Nearshore	1.32	0.20
WHALE Olowalu Three Offshore	1.24	0.19
DAR Honolua North	1.23	0.19
WHALE Kono Point	1.16	0.18
WHALE Olowalu Two Offshore	1.14	0.17
WHALE Kapalua Beach	1.10	0.17
WHALE Kahekili Beach 4	1.03	0.16
DAR Kahekili 1	1.02	0.15
DAR Kahekili 2	0.98	0.15
DAR Mahinahina Offshore	0.89	0.14
DAR Mahinahina Nearshore	0.79	0.12
WHALE Olowalu One Offshore	0.61	0.09

Macroalgae Cover

Algal community structure is complex often interrelated with the presence of or competition with other algae, intensity of herbivory, and productivity (and productivity-related environmental factors such as light, nutrients, and water motion). Most herbivore groups are able to feed on turfs, while fewer feed on macroalgae and even fewer on corallines Crustose corallines are able to withstand or resist most intensive grazing due to the mechanical properties of their calcified thallus; and many macroalgae have structural or chemical defenses to deter grazing; but turf algae are not as effective in resisting or deterring herbivory, although they are capable of rapid growth and regeneration. Increased herbivory reduces algal biomass and shifts algal community dominance from macroalgae to turf algae and eventually to encrusting corallines.

Macroalgae are larger (canopy height usually >10mm) erect algae often with anatomically complex forms. Most macroalgae possess some form of deterrent against herbivory, either through chemical deterrents or structural resistance. Although macroalgae are often more resistant to physical and biological disturbances than corallines and turfs, grazing by certain herbivores and high wave action can inhibit macroalgal growth. High macroalgal biomass can interfere with coral recruitment and reduce coral survival.

Turf algae are a multispecific assemblage of diminutive, often filamentous, algae that attain a canopy height of only 1 to 10 mm. These microalgal species have a high diversity although only 30 to 50 species commonly occur at one time. There is a high turnover of individual turf algal species seasonally and only a few species are able to persist or remain abundant throughout the year. But turf algae, when observed as a functional group, remain relatively stable year round . They are often able to recovery rapidly after being partially consumed by herbivores. Turfs are capable of trapping ambient sediment and kill corals by gradual encroachment.

Crustose corallines are calcified, often encrusting algae usually pink to dark burgundy in color. Crustose coralline algae play two important roles in the coral reef community, first by contributing calcium carbonate to reef structure and second by possibly facilitating settlement of coral recruits. The ecology of crustose corallines is complex often interrelated with the presence of macro and turf algae, grazing intensity by herbivores, and productivity.

As with the coral diversity and percent cover inventories, each site had algal coverage calculated and recorded. The sites varied from 0% coverage by macroalgal components at DAR Olawalu Four Offshore to 94% at DAR Maalaea Offshore. This chart provides the results and anchored scores for macroalgae coverage.

The results are also normalized by subtracting 1 to insure that the sites with none to low macroalgae coverage rank higher than those with larger coverage levels.

"Author's Note – again during data entry, trends may be noted. It appears that the macroalgae cover is lower at sites that also have lower herbivore biomass scores. As herbivory presence is vital to control macroalgae communities, the management strategy to insure that herbivore communities survive aquarium species gathering, fishing pressure, pollution entry and artificially induced temperatures becomes a viable management strategy".

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Coral Macroalgae Percent Cover Summary

Data Acquisition Site	Percent Cover Macroalgae	Macroalgae Score minus 1.0 for reverse variables for normalization	Anchored
DAR Olowalu Four Offshore	0.00	1.00	1.00
WHALE Olowalu Three Offshore	0.03	0.97	0.97
WHALE Olowalu Two Offshore	0.04	0.96	0.96
WHALE Manawainui Gulch	0.05	0.96	0.96
DAR Maalaea Nearshore	0.06	0.94	0.94
WHALE Olowalu Beach	0.07	0.94	0.94
WHALE Olowalu One Offshore	0.10	0.90	0.90
WHALE Papawai Shores 2	0.11	0.89	0.89
WHALE Papalaua Offshore Two	0.12	0.88	0.88
WHALE Nohea Kai	0.12	0.88	0.88
WHALE Papalaua Offshore One	0.13	0.87	0.87
WHALE Canoe Beach	0.13	0.87	0.87
WHALE Papalaua Nearshore One	0.17	0.83	0.83
WHALE Ukumehane State Beach	0.19	0.81	0.81
WHALE Kailili Beach	0.21	0.79	0.79
WHALE Makumana Gulch	0.21	0.79	0.79
WHALE Honoapiilani Highway	0.21	0.79	0.79
WHALE Olowalu Five Offshore	0.21	0.79	0.79
WHALE Olowalu Six Offshore	0.22	0.78	0.78
WHALE Olawalu Seven Offshore	0.22	0.78	0.78
WHALE Kaumuipuko Beach	0.25	0.75	0.75
WHALE Kahekili Beach 3	0.27	0.73	0.73
WHALE Kaanapali Beach Three	0.29	0.71	0.71
WHALE Manuohule Point	0.31	0.69	0.69
WHALE Kahekili Beach 4	0.31	0.69	0.69
WHALE Papawai Shores	0.32	0.68	0.68
WHALE Kaanapali Beach Four	0.32	0.68	0.68
WHALE Maalaea Harbor	0.34	0.66	0.66
WHALE Olowalu One Nearshore	0.34	0.66	0.66
WHALE Papawai Point	0.35	0.65	0.65
WHALE Olowalu Seven Nearshore	0.36	0.64	0.64
WHALE Lahaina Harbor 1	0.38	0.62	0.62
WHALE McGregor Point Two	0.40	0.60	0.60
WHALE McGregor Point Offshore	0.40	0.60	0.60
WHALE Baby Beach	0.40	0.60	0.60
DAR Mahinahina Offshore	0.41	0.59	0.59
WHALE Olowalu Five Nearshore	0.42	0.58	0.58
WHALE Olowalu Six Nearshore	0.43	0.57	0.57
WHALE Olowalu Two Nearshore	0.43	0.57	0.57
WHALE Olowalu Three Nearshore	0.43	0.57	0.57
WHALE Puamana	0.45	0.55	0.55
WHALE Puunoa Beach	0.47	0.53	0.53
WHALE Lahaina Harbor 2	0.47	0.53	0.53
DAR Puamana Offshore	0.47	0.53	0.53
WHALE Lahaina Marina	0.48	0.52	0.52
WHALE Honolua NearShore	0.50	0.50	0.50
WHALE Papalaua Nearshore Two	0.51	0.49	0.49
WHALE McGregor Point Nearshore	0.53	0.47	0.47
DAR Mahinahina Nearshore	0.56	0.44	0.44
DAR Kahekili 2	0.58	0.42	0.42
WHALE Kapalua Beach	0.71	0.29	0.29
DAR Puamana Nearshore	0.74	0.26	0.26
DAR Honolua South	0.74	0.26	0.26
DAR Honolua North	0.76	0.24	0.24
DAR Olowalu Four Nearshore	0.77	0.23	0.23
WHALE Kono Point	0.78	0.22	0.22
DAR Kahekili 1	0.79	0.21	0.21
DAR Puamana Nearshore	0.87	0.13	0.13
DAR Puamana Offshore	0.92	0.08	0.08
DAR Maalaea Offshore	0.94	0.06	0.06

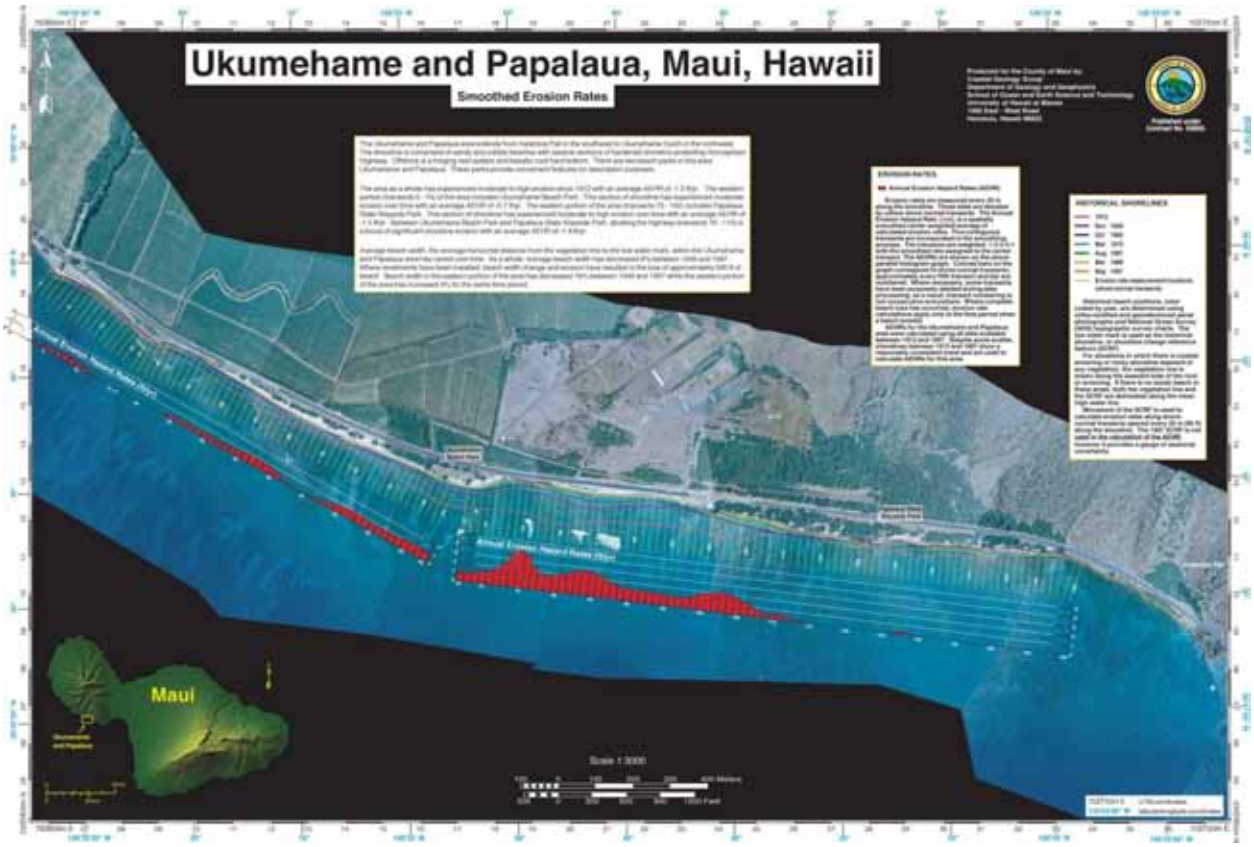
Sedimentation

As mentioned in the *Methods* section, the normal variable input of relating nutrient input and sedimentation is to assume it is directly proportional to watershed size, percentage of land in classifications of barren/urban/vegetated/developed, or related land use. However, a review of watershed sizes, land classifications and other factors make this tool not desirable for the purposes of this study.

As can be seen in this picture upslope of Old Airport Beach during a WES survey of reef stressors earlier in the decade, the watershed above the reef is defined and rated as "good" with little contributing sediment loading or nutrient input. But as the picture shows, during storm events, one can see in the middle upper region of the photo how silt and sediment is coming out of each row of the sugar cane which gave this region the high "vegetated" rating. But the silt and sediment generated from the agricultural fields above carry silt and sediment directly to the reefs in the ocean.

This is a common scene in many locales with good ratings for watershed that make using it a a good value for resilience analysis somewhat impractical – field evidence contradicts empirical evaluations.

So instead we turned to a different model of sedimentation developed by UH SOEST. This highly intensive study including the exact geo-region of West Maui that this study entails. Estimates of beach erosions and contributing sedimentation yield erosive rates for transect sections along the West Maui coastline. An example of a section is shown here.



It was apparent that this is the best model for evaluating sedimentation on West Maui reefs. The convenience of many multiple transects that lined up with reef location allowed us to accurately denote the erosive rate of sedimentation at a particular study point. As such, we were able to apply values to each transect result.

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Scores are 0 = no erosion potential
2 = -2ft/year - score 0.50
1 = -1 ft/year -score 0.25
3 = -3ft/year - score .75
4 = -4ft/year - score 1.00

Coral Sedimentation Proxy Summary

Data Acquisition Site	Annual Erosion Hazard Rating (Minimum)	Translated to scale of 1.0	Annual Erosion Hazard Rating (Maximum)	Translated to scale of 1.0	Annual Erosion Hazard Rating (Average)	Translated to scale of 1.0	Sedimentation Proxy Score	Sedimentation Proxy Score minus 1.0 for reverse variables for normalization	Anchored
WHALE Papawai Point	0.125	0.03125	0.25	0.06	0.19	0.0469	0.0469	0.9531	0.95
WHALE Manuohule Point	0	0	0.125	0.03	0.02	0.0039	0.0039	0.9961	1.00
WHALE McGregor Point Two	1	0.25	1.5	0.38	0.31	0.0781	0.0781	0.9219	0.92
WHALE McGregor Point Nearshore	0.85	0.2125	1	0.25	0.23	0.0578	0.0578	0.9422	0.94
WHALE McGregor Point Offshore	0.85	0.2125	1	0.25	0.23	0.0578	0.0578	0.9422	0.94

As the UH SOEST transects are small segments and provide multiple information for each study zone, we analyzed the position of the reef in relation to the UH SOEAST maps and denoted high and low erosion potential values for that particular location. We then averaged the findings and developed

a final sedimentation proxy score. As a higher score is not a benefit for reef resiliency, we normalized the scores by subtracting from 1 and then anchored the scores. As can be seen, we had scores at a high at Manawainui Gulch at 1.00 to a low of 0.82 at Ukumehane Beach. Results were:

"Author's Note –

From the shoreline stressor analysis provided in the previously submitted report, it appears that a subjective evaluation of these results are consistent with field observations. In general, sites with agricultural fields, sediment and runoff entry point notations seen in the photography of the coral reef health survey correlate with the locations here seen with lower sedimentation proxy scores.

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Scores are 0 = no erosion potential
2 = -2ft/year - score 0.50
1 = -1 ft/year -score 0.25
3 = -3ft/year - score .75
4 = -4ft/year - score 1.00

Coral Sedimentation Proxy Summary

Data Acquisition Site	Annual Erosion Hazard Rating (Minimum)	Translated to scale of 1.0	Annual Erosion Hazard Rating (Maximum)	Translated to scale of 1.0	Annual Erosion Hazard Rating (Average)	Translated to scale of 1.0	Sedimentation Proxy Score	Sedimentation Proxy Score minus 1.0 for reverse variables for normalization	Anchored
WHALE Manawainui Gulch	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
DAR Puamana Offshore	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
DAR Puamana Nearshore	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
WHALE Puunoa Beach	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
DAR Puamana Nearshore	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
DAR Puamana Offshore	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
DAR Kahekili 1	0	0	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
WHALE Kono Point	0	0.0000	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
WHALE Kapalua Beach	0	0.0000	0	0.00	0.00	0.0000	0.0000	1.0000	1.00
WHALE Honoapiilani Highway	0	0	0.025	0.01	0.00	0.0008	0.0008	0.9992	1.00
WHALE Kaanapali Beach Three	0.001	0.0003	0.03	0.01	0.00	0.0010	0.0010	0.9990	1.00
WHALE Lahaina Marina	0	0	0.05	0.01	0.01	0.0016	0.0016	0.9984	1.00
WHALE Kahekili Beach 3	0.025	0.0063	0.05	0.01	0.01	0.0023	0.0023	0.9977	1.00
WHALE Kahekili Beach 4	0.025	0.006	0.05	0.01	0.01	0.0023	0.0023	0.9977	1.00
WHALE Manuohule Point	0	0	0.125	0.03	0.02	0.0039	0.0039	0.9961	1.00
WHALE Puamana	0	0	0.20	0.05	0.03	0.0063	0.0063	0.9938	0.99
DAR Kahekili 2	0	0	0.20	0.05	0.03	0.0063	0.0063	0.9938	0.99
WHALE Papalaua Offshore One	0	0	0.25	0.06	0.03	0.0078	0.0078	0.9922	0.99
WHALE Canoe Beach	0	0	0.25	0.06	0.03	0.0078	0.0078	0.9922	0.99
WHALE Kaumuipuko Beach	0.025	0.0063	0.25	0.06	0.03	0.0086	0.0086	0.9914	0.99
WHALE Papalaua Nearshore One	0	0	0.3	0.08	0.04	0.0094	0.0094	0.9906	0.99
WHALE Olowalu Beach	0.03	0.0075	0.3	0.08	0.04	0.0103	0.0103	0.9897	0.99
WHALE Nohea Kai	0	0	0.5	0.13	0.06	0.0156	0.0156	0.9844	0.98
WHALE Papalaua Nearshore Two	0.05	0.0125	0.5	0.13	0.07	0.0172	0.0172	0.9828	0.98
WHALE Papalaua Offshore Two	0.05	0.0125	0.5	0.13	0.07	0.0172	0.0172	0.9828	0.98
WHALE Makumana Gulch	0.05	0.0125	0.5	0.13	0.07	0.0172	0.0172	0.9828	0.98
WHALE Olowalu Five Nearshore	0.0025	0.0006	0.8	0.20	0.10	0.0251	0.0251	0.9749	0.97
WHALE Olowalu Five Offshore	0.0025	0.0006	0.8	0.20	0.10	0.0251	0.0251	0.9749	0.97
WHALE Olowalu Two Nearshore	0.005	0.0013	0.85	0.21	0.11	0.0267	0.0267	0.9733	0.97
WHALE Olowalu Two Offshore	0.005	0.0013	0.85	0.21	0.11	0.0267	0.0267	0.9733	0.97
WHALE Olowalu One Nearshore	0.0025	0.0006	1	0.25	0.13	0.0313	0.0313	0.9687	0.97
WHALE Olowalu One Offshore	0.0025	0.0006	1	0.25	0.13	0.0313	0.0313	0.9687	0.97
DAR Olowalu Four Nearshore	0.0025	0.0006	1	0.25	0.13	0.0313	0.0313	0.9687	0.97
DAR Olowalu Four Offshore	0.0025	0.0006	1	0.25	0.13	0.0313	0.0313	0.9687	0.97
WHALE Olowalu Three Nearshore	0.005	0.0013	1	0.25	0.13	0.0314	0.0314	0.9686	0.97
WHALE Olowalu Three Offshore	0.005	0.0013	1	0.25	0.13	0.0314	0.0314	0.9686	0.97
WHALE Kailili Beach	0.05	0.0125	1.125	0.28	0.15	0.0367	0.0367	0.9633	0.96
DAR Mahinahina Nearshore	0.5	0.1250	1	0.25	0.19	0.0469	0.0469	0.9531	0.95
DAR Maalaea Offshore	1	0.25	1	0.25	0.25	0.0625	0.0625	0.9375	0.94
WHALE Olowalu Six Nearshore	1	0.25	1	0.25	0.25	0.0625	0.0625	0.9375	0.94
WHALE Olowalu Six Offshore	1	0.25	1	0.25	0.25	0.0625	0.0625	0.9375	0.94
WHALE Olowalu Seven Nearshore	0.03	0.0075	2	0.50	0.25	0.0634	0.0634	0.9366	0.94
WHALE Olawalu Seven Offshore	0.03	0.0075	2	0.50	0.25	0.0634	0.0634	0.9366	0.94
WHALE Lahaina Harbor 1	0.05	0.0125	2	0.50	0.26	0.0641	0.0641	0.9359	0.94
WHALE Baby Beach	0.05	0.0125	2	0.50	0.26	0.0641	0.0641	0.9359	0.94
WHALE Kaanapali Beach Four	1	0.2500	1.25	0.31	0.28	0.0703	0.0703	0.9297	0.93
WHALE McGregor Point Two	1	0.25	1.5	0.38	0.31	0.0781	0.0781	0.9219	0.92
WHALE Maalaea Harbor	1.5	0.375	1	0.25	0.31	0.0781	0.0781	0.9219	0.92
WHALE Papawai Shores	1	0.25	1.5	0.38	0.31	0.0781	0.0781	0.9219	0.92
WHALE Papawai Shores 2	1	0.25	1.5	0.38	0.31	0.0781	0.0781	0.9219	0.92
WHALE Lahaina Harbor 2	0.5	0.1250	2	0.50	0.31	0.0781	0.0781	0.9219	0.92
WHALE Ukumehane State Beach	1.75	0.4375	4	1.00	0.72	0.1797	0.1797	0.8203	0.82

Fishing Access/Pressure

As a wave exposure study has not been done for West Maui or complete creel studies, WHALE Environmental Services LLC developed a limited creel model which included angler interviews, site survey, reef evaluations, and other indicators that could be given a value to be analyzed.

This allowed us to retain the scale of 0-1 and assigned values to findings among the locations. A fortunate byproduct of the delays in this project allowed us to interview many local shore anglers, interview offshore boat operators during dive series, evaluate reef imagery and observations, and review access points. That collation of information over a year provides a solid basis for data entry and subsequent analysis as seen on the next page.

As can be seen, we have nineteen (19) sites with no fishing pressure. Conversely, we have two sites with high fishing pressure.

"Author's Note – a general observation is that sites with larger developed reefs also have more fishing pressure such as Olawalu. The large range of values between sites indicate that this can be a driver for reef resiliency. Though not reflected well in correlation with herbivory, fishing pressure is a human-induced anthropogenic stress impact and is one that can be mitigated to reduce the influence of a single variable. It was also assumed that sites with less fishing access experience less fishing pressure such as the lack of interviewees on the cliffs near Manuahule Gulch due to the cliffs providing no shoreline fishing and the currents limiting offshore fishing"

WHALE Environmental Services LLC

Coral Fishing Pressure Summary

Data Acquisition Site	Off-shore Fishing Noted	On-Shore Fishing Noted	Shoreline Ease of Access	Retained Fish by Angler	Reef Observation of Fishing Pressure	Fishing Pressure Score	Fishing Pressure Score minus 1.0 for reverse variables for normalization	Anchored
WHALE Papawai Point	0	0	0	0	0	0.00	1.00	1.00
WHALE Manuohule Point	0	0	0	0	0	0.00	1.00	1.00
WHALE McGregor Point Two	0	0	0	0	0	0.00	1.00	1.00
WHALE Papawai Shores	0	0	0	0	0	0.00	1.00	1.00
WHALE Papalaua Nearshore One	0	0	0	0	0	0.00	1.00	1.00
WHALE Makumana Gulch	0	0	0	0	0	0.00	1.00	1.00
WHALE Manawainui Gulch	0	0	0	0	0	0.00	1.00	1.00
WHALE Olowalu One Offshore	0	0	0	0	0	0.00	1.00	1.00
WHALE Olowalu Two Nearshore	0	0	0	0	0	0.00	1.00	1.00
DAR Olowalu Four Offshore	0	0	0	0	0	0.00	1.00	1.00
DAR Puamana Offshore	0	0	0	0	0	0.00	1.00	1.00
DAR Puamana Nearshore	0	0	0	0	0	0.00	1.00	1.00
DAR Puamana Nearshore	0	0	0	0	0	0.00	1.00	1.00
DAR Puamana Offshore	0	0	0	0	0	0.00	1.00	1.00
DAR Mahinahina Nearshore	0	0	0	0	0	0.00	1.00	1.00
DAR Mahinahina Offshore	0	0	0	0	0	0.00	1.00	1.00
DAR Honolua North	0	0	0	0	0	0.00	1.00	1.00
DAR Honolua South	0	0	0	0	0	0.00	1.00	1.00
WHALE Honolua NearShore	0	0	0	0	0	0.00	1.00	1.00
WHALE Kono Point	0	0	0	0	0	0.00	1.00	1.00
WHALE McGregor Point Offshore	0	0	0.2	0	0	0.20	0.80	0.80
WHALE Papalaua Offshore One	0.2	0	0	0	0	0.20	0.80	0.80
WHALE Papawai Shores 2	0.2	0	0	0	0	0.20	0.80	0.80
WHALE Kaumuipuko Beach	0.2	0	0	0	0	0.20	0.80	0.80
WHALE Olowalu Three Offshore	0.2	0	0	0	0	0.20	0.80	0.80
WHALE Canoe Beach	0.2	0	0	0	0	0.20	0.80	0.80
DAR Kahekili 2	0	0.2	0	0	0	0.20	0.80	0.80
WHALE Kahekili Beach 4	0	0.2	0	0	0	0.20	0.80	0.80
WHALE Kapalua Beach	0.2	0	0	0	0	0.20	0.80	0.80
WHALE McGregor Point Nearshore	0	0.2	0.2	0	0	0.40	0.60	0.60
DAR Maalaea Offshore	0.2	0	0.2	0	0	0.40	0.60	0.60
WHALE Olowalu Six Nearshore	0.2	0	0	0.2	0	0.40	0.60	0.60
WHALE Olowalu Six Offshore	0.2	0	0	0.2	0	0.40	0.60	0.60
WHALE Olowalu One Nearshore	0	0.2	0.2	0	0	0.40	0.60	0.60
WHALE Olowalu Two Offshore	0.2	0	0	0.2	0	0.40	0.60	0.60
WHALE Olowalu Three Nearshore	0.2	0	0	0.2	0	0.40	0.60	0.60
DAR Olowalu Four Nearshore	0	0.2	0.2	0	0	0.40	0.60	0.60
WHALE Olowalu Five Offshore	0	0.2	0.2	0	0	0.40	0.60	0.60
WHALE Baby Beach	0	0.2	0	0	0.2	0.40	0.60	0.60
WHALE Kahekili Beach 3	0	0.2	0.2	0	0	0.40	0.60	0.60
DAR Maalaea Nearshore	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Olawalu Seven Offshore	0.2	0.2	0.2	0	0	0.60	0.40	0.40
WHALE Olowalu Beach	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Kailili Beach	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Papalaua Nearshore Two	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Ukumehane State Beach	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Honoapiilani Highway	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Olowalu Five Nearshore	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Puunoa Beach	0	0.2	0	0.2	0.2	0.60	0.40	0.40
WHALE Lahaina Harbor 2	0.2	0.2	0.2	0	0	0.60	0.40	0.40
WHALE Puamana	0	0.2	0.2	0.2	0	0.60	0.40	0.40
DAR Kahekili 1	0	0.2	0.2	0.2	0	0.60	0.40	0.40
WHALE Kaanapali Beach Four	0.2	0	0.2	0	0.2	0.60	0.40	0.40
WHALE Maalaea Harbor	0.2	0.2	0.2	0.2	0	0.80	0.20	0.20
WHALE Olowalu Seven Nearshore	0.2	0.2	0.2	0	0.2	0.80	0.20	0.20
WHALE Nohea Kai	0.2	0.2	0.2	0.2	0	0.80	0.20	0.20
WHALE Lahaina Harbor 1	0.2	0.2	0.2	0	0.2	0.80	0.20	0.20
WHALE Kaanapali Beach Three	0.2	0	0.2	0.2	0.2	0.80	0.20	0.20
WHALE Papalaua Offshore Two	0.2	0.2	0.2	0.2	0.2	1.00	0.00	0.00
WHALE Lahaina Marina	0.2	0.2	0.2	0.2	0.2	1.00	0.00	0.00

*MCLD sites automatically get a score of 0
and a score of 1.0 when reversed for normalization

Combined Anthropogenic Stress

Anthropogenic Stress scores were produced by averaging anchored stress scores for sedimentation and fishing access/pressure. Anchoring these scores allows us to describe anthropogenic stress at each site relative to the site having the less anthropogenic stress of all surveyed sites. This process yielded twenty-nine (29) sites with low anthropogenic stress (0.85-1.00), fourteen (14) sites with medium (0.70-0.84), and seventeen sites (17) with high as shown on the next page.

Author's Note – Sites with high anthropogenic stress appear to be related to sites with 1) ease of access, 2) noted runoff entry points from previous stressor study, and 3) sites exposed to sedimentation and/or pollutants. Some of these sites such as Canoe Beach have relatively high resilience scores, so efforts made to reduce the factors leading to high anthropogenic stress would be advantageous.

WHALE Environmental Services LLC

Coral Anthropogenic Stress Summary

Data Acquisition Site	Sedimentation Proxy	Fishing Access	Combined Anthropogenic Stress Score	Combined Anthropogenic Stress Score minus 1.0 for reverse variables for normalization	Anchored
WHALE Manawainui Gulch	0.0000	0.0000	0.0000	1.0000	1.00
DAR Puamana Offshore	0.0000	0.0000	0.0000	1.0000	1.00
DAR Puamana Nearshore	0.0000	0.0000	0.0000	1.0000	1.00
DAR Puamana Offshore	0.0000	0.0000	0.0000	1.0000	1.00
WHALE Kono Point	0.0000	0.0000	0.0000	1.0000	1.00
WHALE Lahaina Marina	0.0016	0.0000	0.0008	0.9992	1.00
WHALE Manuohule Point	0.0039	0.0000	0.0020	0.9981	1.00
WHALE Papalaua Nearshore One	0.0094	0.0000	0.0047	0.9953	1.00
WHALE Makumana Gulch	0.0172	0.0000	0.0086	0.9914	0.99
WHALE Olowalu Two Nearshore	0.0267	0.0000	0.0134	0.9867	0.99
WHALE Olowalu One Offshore	0.0313	0.0000	0.0157	0.9844	0.98
WHALE Papawai Point	0.0469	0.0000	0.0235	0.9766	0.98
DAR Olowalu Four Offshore	0.0313	0.0000	0.0157	0.9844	0.98
DAR Mahinahina Nearshore	0.0469	0.0000	0.0235	0.9766	0.98
DAR Mahinahina Offshore	0.0469	0.0000	0.0235	0.9766	0.98
DAR Honolua North	0.0550	0.0000	0.0275	0.9725	0.97
DAR Honolua South	0.0550	0.0000	0.0275	0.9725	0.97
WHALE Honolua NearShore	0.0550	0.0000	0.0275	0.9725	0.97
WHALE McGregor Point Two	0.0781	0.0000	0.0391	0.9610	0.96
WHALE Papawai Shores	0.0781	0.0000	0.0391	0.9610	0.96
WHALE Kapalua Beach	0.0000	0.2000	0.1000	0.9000	0.90
WHALE Kahekili Beach 4	0.0023	0.2000	0.1012	0.8989	0.90
DAR Kahekili 2	0.0063	0.2000	0.1032	0.8969	0.90
WHALE Papalaua Offshore One	0.0078	0.2000	0.1039	0.8961	0.90
WHALE Kaumuipuko Beach	0.0086	0.2000	0.1043	0.8957	0.90
WHALE Nohea Kai	0.0156	0.2000	0.1078	0.8922	0.89
WHALE Olowalu Three Offshore	0.0314	0.2000	0.1157	0.8843	0.88
WHALE McGregor Point Offshore	0.0578	0.2000	0.1289	0.8711	0.87
WHALE Papawai Shores 2	0.0781	0.2000	0.1391	0.8610	0.86
WHALE Kahekili Beach 3	0.0023	0.4000	0.2012	0.7989	0.80
WHALE Olowalu Five Offshore	0.0251	0.4000	0.2126	0.7875	0.79
WHALE Olowalu Two Offshore	0.0267	0.4000	0.2134	0.7867	0.79
WHALE Olowalu One Nearshore	0.0313	0.4000	0.2157	0.7844	0.78
DAR Olowalu Four Nearshore	0.0313	0.4000	0.2157	0.7844	0.78
WHALE Olowalu Three Nearshore	0.0314	0.4000	0.2157	0.7843	0.78
WHALE McGregor Point Nearshore	0.0578	0.4000	0.2289	0.7711	0.77
DAR Maalaea Offshore	0.0625	0.4000	0.2313	0.7688	0.77
WHALE Olowalu Six Nearshore	0.0625	0.4000	0.2313	0.7688	0.77
WHALE Olowalu Six Offshore	0.0625	0.4000	0.2313	0.7688	0.77
WHALE Lahaina Harbor 1	0.0641	0.4000	0.2321	0.7680	0.77
WHALE Puunoa Beach	0.0000	0.6000	0.3000	0.7000	0.70
DAR Kahekili 1	0.0000	0.6000	0.3000	0.7	0.70
WHALE Puamana	0.0063	0.6000	0.3032	0.6969	0.70
WHALE Honoapiilani Highway	0.0080	0.6000	0.3040	0.6960	0.70
WHALE Olowalu Beach	0.0103	0.6000	0.3052	0.6949	0.69
WHALE Papalaua Nearshore Two	0.0172	0.6000	0.3086	0.6914	0.69
WHALE Olowalu Five Nearshore	0.0251	0.6000	0.3126	0.6875	0.69
WHALE Kailili Beach	0.0367	0.6000	0.3184	0.6817	0.68
DAR Maalaea Nearshore	0.0625	0.6000	0.3313	0.6688	0.67
WHALE Olawalu Seven Offshore	0.0634	0.6000	0.3317	0.6683	0.67
WHALE Baby Beach	0.0641	0.6000	0.3321	0.6680	0.67
WHALE Kaanapali Beach Four	0.0703	0.6000	0.3352	0.6649	0.66
WHALE Ukumehane State Beach	0.1797	0.6000	0.3899	0.6102	0.61
DAR Puamana Nearshore	0.0000	0.8000	0.4000	0.6000	0.60
WHALE Kaanapali Beach Three	0.0010	0.8000	0.4005	0.5995	0.60
WHALE Canoe Beach	0.0078	0.8000	0.4039	0.5961	0.60
WHALE Olowalu Seven Nearshore	0.0634	0.8000	0.4317	0.5683	0.57
WHALE Maalaea Harbor	0.0781	0.8000	0.4391	0.5610	0.56
WHALE Papalaua Offshore Two	0.0172	1.0000	0.5086	0.4914	0.49
WHALE Lahaina Harbor 2	0.0781	1.0000	0.5391	0.4610	0.46

Suggestions for Managers

Based on the resilience analysis and the anthropogenic stress analysis, WHALE Environmental Services LLC has made a series of suggestions for resource managers to entertain.

Assumptions are:

- Climate change will continue to include higher temperature, carbon loading, greenhouse gas increases, rising seas, increased storm action and other factors. This will contribute to reef decline.
- Sites with high resilience scores deserve attention from resources managers
- Actions that remove stressors will contribute to reef health and resilience
- Protecting herbivore fish populations will reduce macroalgae thus preserving reef habitat

Suggestions for managers include:

- All twelve (12) sites with high resilience scores are not in protected MLCD areas. It would be beneficial to include these sites for inclusion into MLCDs and removed them from open status. In particular, the massive Olawalu reef system with six (6) of the twelve (12) high resilience scores should positively been considered a candidate for inclusion.
- As heard during the limited creel survey, fishing pressure is not always from traditional anglers fishing for food or for recreation. Though not observed, many spoke of an active aquarium harvesting operation. Though these areas with high resilience scores lend admirably to tourism activities of snorkel and scuba, a ban on aquarium harvesting of reef fishes should be considered.
- Targeted actions to reduce anthropogenic stress at site with both high resilience scores and high anthropogenic stress should be considered. Eliminating runoff entry points identified in the previous submitted study, restricting boat access points to reduce prop wash damage, moving sites into MLCDs will reach a desired goal.

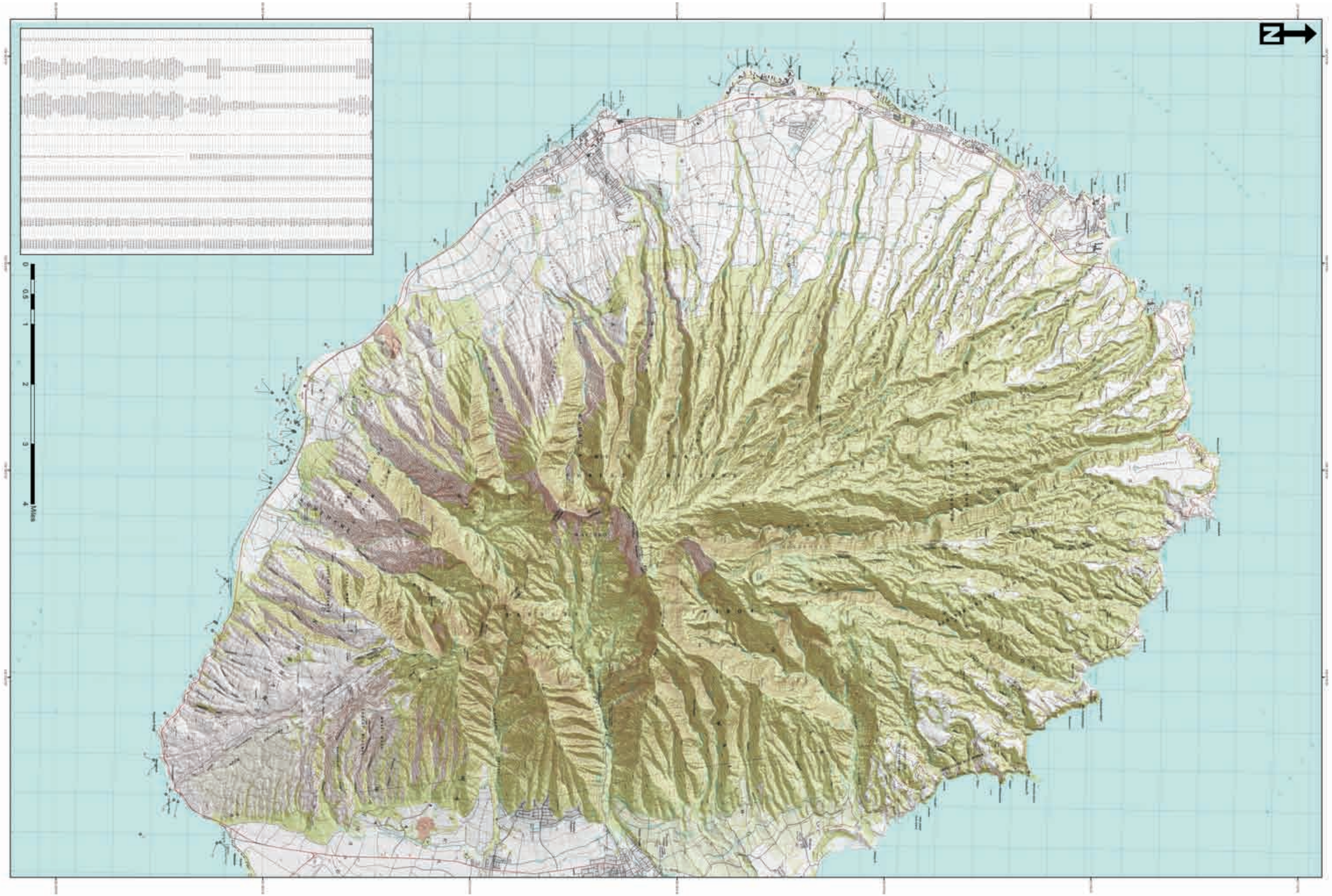
- Resource managers should look at the activities which assist in producing low resilience scores such as seen in Lahaina and Maalaea harbors, or activities which assist in producing medium resilience score in resort areas such as Kaanapali. Harbor activities, such as the release of oil and greases from boats, improper travel paths over reefs maximizing prop wash, resource stress from overuse of waters should be reviewed and regulations promulgated or enforced. Resort activities such as floating jet ski bars above reefs, allowing runoff from golf course to directly discharge into the ocean, or concentrated tourist presence on isolated sites should be reviewed and regulations promulgated or enforced.
- There are sites mainly between the Olawalu reef system and McGregor Point that have close to high resilience scores and low anthropogenic stress. Resource managers should study these sites and develop methods that assist in improving resilience. Focus on sedimentation reduction and improving recruitment habitat will advance this goal.
- For the most part, sites with a high resilience score have low macroalgae cover and high herbivore biomass. Efforts to maintain the herbivore populations in these areas are vital and can be accomplished by using regulations promulgated or enforced.
- Reefs with low resilience scores are driven by higher temperatures, higher bleaching potential, low herbivore biomass, and increased sedimentation. Action by the community and resource managers to understand these conditions at these locations is vital to prevent further decline in those reefs' resiliency. Keeping physical impacts off the reefs, and controlling point source pollution is only one of the steps that could be entertained. Increased monitoring of the sites will also give resource managers more understanding of the actions that possibly could be taken to improve resiliency. Targeted actions to remove stressors should be undertaken.
- There needs to be an understanding that this is a study comparing reef resiliency in a specific geo-region, West Maui. Resiliency studies in other locales on Maui such as offshore at Wailea may yield resiliency scores that surpass the twelve (12) high resiliency scores in the West Maui geo-region. It should be clear that though the study has identified sites with high resiliency scores, it may be that those scores would decrease when put into a pool of expanded locations. Thus the goal of maintaining the high resilience scores in West Maui might not suffice if the pool of sites increases. Stronger actions to not only maintain resilience, but actually also increase it would be advantageous for resource managers to insure that while there is a geo-region focus; the ultimate goal is to increase the overall health of reef in Hawaii.

Further Actions

WHALE Environmental Services LLC will continue to work with resources managers and DAR to educate the community about the resilience findings. WHALE Environmental Services LLC will add/modify the web site established for community viewing by adding new resiliency information to the site. Over the next several months, WHALE Environmental Services LLC will communicate with interested participants and present findings at meetings if so requested.

Appendix One

Site Survey Waypoints


N
0
0.5
1
2
3
4
Miles

Appendix Two
Site Specific
Coral Benthic Data

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papawai Point	20.773599	-156.537002	10	OPEN	65
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Five (5) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 2.0	No. of Variation in Coral Species		3		
Ranking 2.0/5	No. of Variation in Coral Species		3		
Averaging Score = .40	No. of Variation in Coral Species		1		
Scale of Ten Score = .20	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		

Coral																						Inorganics						
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0	30	0	0	0	64	100
0	0	0	0	0	1	0	5	0	0	0	0	5	0	0	0	0	0	5	0	0	0	64	0	0	0	20	100
0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	15	0	0	0	60	0	0	0	22	100
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	5	0	0	20	0	0	0	50	0	0	0	23	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	0	0	10	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	5	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	5	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0

Inverts																								
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Manuohule Point	20.774099	-156.529006	3	OPEN	66
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 2.1	No. of Variation in Coral Species		2		
Ranking 2.1/7	No. of Variation in Coral Species		3		
Score = .30	No. of Variation in Coral Species		1		
Scale of Ten Score = .21	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		1		

Coral																													
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	0	0	0	0		30	0	0	0	64	100
0	0	0	0	0	4	0	4	0	0	0	0	3	0	0	0	0	0	5	0	0	0		64	0	0	0	20	100
0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	15	0	0	0		60	0	0	0	22	100
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	5	0	0	20	0	0	0		50	0	0	0	23	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		10	0	0	0	5	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	20	0	0	0		0	0	0	0	10	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0		0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	5	0	0	25	0	0	0		0	0	0	0	10	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0		0	0	0	0	5	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	5	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	0	0

Inverts																									
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE McGregor Point Two	20.776599	-156.522003	10	OPEN	67
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		4		
Five (5) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.6	No. of Variation in Coral Species		3		
Ranking 2.6/5	No. of Variation in Coral Species		2		
Score = .52	No. of Variation in Coral Species		3		
Scale of Ten Score = .26	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral																						Inorganics						
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	25	0	15	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	20	0	20	0	0	0	5	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	22	0	0	0	0	0	5	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	55	0	0	0	0	0	1	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	45	0	0	0	0	0	5	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	23	0	0	0	0	52	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	100
0	0	0	0	0	30	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0

Inverts																							
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0	0
0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE McGregor Point Nearshore	20.779499	-156.520004	3	OPEN	68
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Seven (7) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 4.0	No. of Variation in Coral Species		3		
Ranking 4.0/7	No. of Variation in Coral Species		1		
Score = .57	No. of Variation in Coral Species		2		
Scale of Ten Score = .40	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		

Coral																							Inorganics						
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	15	0	0	5	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10	0	0	0	60	0	0	0	10	100
0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	5	45	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	40	0	5	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	100
0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	0	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0

Inverts																									
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE McGregor Point Offshore	20.778499	-156.520004	10	OPEN	69
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.2	No. of Variation in Coral Species		3		
Ranking 2.2/6	No. of Variation in Coral Species		2		
Score = .36	No. of Variation in Coral Species		2		
Scale of Ten Score = .22	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		0		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	35	0	10	0	0	0	0	0	0	0	0	30	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	40	0	0	0	5	0	0	0	5	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	5	0	0	0	0	40	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	55	0	0	0	0	0	1	0	0	0	0	14	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	80	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	45	0	0	0	0	0		0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	50	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	45	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Maalaea Nearshore	20.7938	-156.516998	3	OPEN	70
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species				
Two (2) species identifed	No. of Variation in Coral Species				
Average of Variation = 2.0	No. of Variation in Coral Species				
Ranking 2/2	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .20	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
									36			44																	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																											6

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Maalaea Offshore	20.7926	-156.516998	6	OPEN	71
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species				
Two (2) species identifed	No. of Variation in Coral Species				
Average of Variation = 2.0	No. of Variation in Coral Species				
Ranking 2/2	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .20	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
																1			5											100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
					2																						92

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Maalaea Harbor	20.770399	-156.511993	10	OPEN	72
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		4		
Five (5) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.7	No. of Variation in Coral Species		3		
Ranking 2.7/5	No. of Variation in Coral Species		2		
Score = .54	No. of Variation in Coral Species		3		
Scale of Ten Score = .27	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	25	0	15	0	0	0	0	0	0	0	0	30	0	0	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	20	0	25	0	0	0	15	0	0	0	15	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	5	0	0	0	0	40	0	0	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	55	0	0	0	0	0	1	0	0	0	0	24	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	45	0	0	0	0	0	5	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	20	0	0	0	0	45	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	15	100
	0	0	0	0	0	30	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0		0	0	0	0	10	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papawai Shores	20.7737	-156.529998	10	OPEN	86
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.6	No. of Variation in Coral Species		3		
Ranking 2.6/6	No. of Variation in Coral Species		2		
Score = .43	No. of Variation in Coral Species		2		
Scale of Ten Score = .26	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	35	0	10	0	0	0	10	0	0	0	0	30	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	40	0	0	0	5	0	0	0	5	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	10	0	0	0	0	40	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	55	0	0	0	0	0	5	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	75	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	55	0	0	0	0	0		0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	50	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	45	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	10	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	5	0	0	0	0	10	0	0	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Six Nearshore	20.8075	-156.613998	3	OPEN	73
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		2		
Ranking 2.5/6	No. of Variation in Coral Species		3		
Score = .41	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	80	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10	0	50	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	40	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	50	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	50	0	0	0	0	0	10	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	20	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	20	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Six Offshore	20.8059	-156.613998	10	OPEN	74
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species		2		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		3		
Ranking 2.5/6	No. of Variation in Coral Species		4		
Score = .41	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		3		

Coral																						Inorganics						
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
0	0	0	0	0	50	0	15	0	0	0	0	0	0	0	20	0	0	5	0	0	0	10	0	0	0	0		100
0	0	0	0	0	20	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0		100
0	0	0	0	0	20	0	30	0	0	0	15	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0		100
0	0	0	0	0	20	0	20	0	0	0	5	0	0	0	20	0	0	20	0	0	0	15	0	0	0	0		100
0	0	0	0	0	20	0	30	0	0	0	15	0	0	0	0	10	0	0	0	0	0	25	0	0	0	0		100
0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0		100
0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		100
0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0		100
0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		100
0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	20	0	0	5	0	0	0	0	0	0	0	0		100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0

Inverts																								
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Seven Nearshore	20.8087	-156.610992	3	OPEN	79
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 2.8	No. of Variation in Coral Species		2		
Ranking 2.8/6	No. of Variation in Coral Species		3		
Score = .46	No. of Variation in Coral Species		3		
Scale of Ten Score = .28	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	80	0	0	0		5	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	0	45	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	5	0	0	0	0	40	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	45	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	50	0	0	0	0	0	15	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	10	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	15	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	15	0	0	0	0	0	0	0	15	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	5	10	0	0	0	0	5	0	15	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olawalu Seven Offshore	20.807199	-156.608993	10	OPEN	76
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species		2		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		3		
Ranking 2.5/6	No. of Variation in Coral Species		4		
Score = .41	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	35	0	15	0	0	0	0	0	0	0	20	0	0	5	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	20	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	20	0	30	0	0	0	15	0	0	0	0	0	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	20	0	20	0	0	0	5	0	0	0	20	0	0	20	0	0	0		5	0	0	0	0	100
	0	0	0	0	0	20	0	30	0	0	0	15	0	0	0	0	10	0	0	0	0	0		5	0	0	0	0	100
	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5	0	0	0	0	100
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	20	0	0	5	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Beach	20.8062	-156.604995	10	OPEN	77
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Four (4) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 2.3	No. of Variation in Coral Species		1		
Ranking 2.3/4	No. of Variation in Coral Species		2		
Score = .58	No. of Variation in Coral Species		3		
Scale of Ten Score = .23	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	20	10	0	0		10	0	0	0	45		100
	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	25	0	0	0		50	0	0	0	10		100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		5	0	0	0	75		100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	85		100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	75		100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0		0	0	0	0	70		100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	15	5	0	0		0	0	0	0	65		100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	65		100
	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	15	0	0	0		0	0	0	0	70		100
	0	0	0	0	0	10	0	0	0	0	0	5	0	0	0	0	0	0	15	0	0	0		0	0	0	0	55		100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kailili Beach	20.8019	-156.597	3	OPEN	78
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		3		
Ranking 2.5/7	No. of Variation in Coral Species		2		
Score = .35	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	40	0	0	0		35	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		40	0	0	0	0	100
	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	15	0	0	45	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	15	50	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	30	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	20	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	30	0	25	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papalaua Nearshore One	20.7914	-156.572998	3	OPEN	79
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.3	No. of Variation in Coral Species		4		
Ranking 2.3/6	No. of Variation in Coral Species		3		
Score = .38	No. of Variation in Coral Species		1		
Scale of Ten Score = .23	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	40	0	35	0	0	0	0	0	0	0	0	15	0	0	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	15	0	65	0	0	0		15	0	0	0	0	100
	0	0	0	0	0	20	0	10	0	0	0	0	0	0	0	0	5	0	20	0	0	0		45	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	5	0	10	0	0	0	0	20	0	0	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	60	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	65	0	0	0	0	15	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papalaua Offshore One	20.7908	-156.574005	10	OPEN	80
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 1.8	No. of Variation in Coral Species		1		
Ranking 1.8/5	No. of Variation in Coral Species		1		
Score = .36	No. of Variation in Coral Species		0		
Scale of Ten Score = .18	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		0		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	5	15	0	0	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	65	0	5	0	0	0	0	0	0	0	0	10	0	0	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	0	0	10	0	0	0	5	0	0	0	5	5	0	0	0	0	0		70	0	0	0	0	100
	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	0	0	0	40	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	100	100
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	10	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	100	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	5	0	0	10	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Coloboceintrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papalaua Nearshore Two	20.788799	-156.563003	3	OPEN	81
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 3.0	No. of Variation in Coral Species		3		
Ranking 3.0/7	No. of Variation in Coral Species		1		
Score = .43	No. of Variation in Coral Species		2		
Scale of Ten Score = .30	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		

Coral																												
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	25	0	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	15	0	0	20	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10	0	0	0		60	0	0	0	15	100
0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	45	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	40	0	20	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0	0	0		0	0	0	0	0	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
0	0	0	0	0	20	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0

Inverts																							
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papalaua Offshore Two	20.788299	-156.563003	10	OPEN	82
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 2.8	No. of Variation in Coral Species		2		
Ranking 2.8/5	No. of Variation in Coral Species		1		
Score = .56	No. of Variation in Coral Species		3		
Scale of Ten Score = .28	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	50	0	10	0	0	0	0	0	0	0	15	15	0	0	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	50	0	5	0	0	0	0	0	0	0	0	10	0	0	0	0	0		20	0	0	0	5	100
	0	0	0	0	0	0	0	10	0	0	0	5	0	0	0	5	5	0	0	0	0	0		70	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0		20	0	0	0	5	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	0	0	0	35	100
	0	0	0	0	0	25	0	0	0	0	0	10	0	0	0	0	10	0	0	0	0	0		20	0	0	0	30	100
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	45	0	0	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	40	0	0	0	0	0	10	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	5	0	0	0	0	25	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	15	0	0	0	0	20	0	0	0	0	0		0	0	0	0	40	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Ukumehane State Beach	20.787799	-156.561004	3	OPEN	83
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.7	No. of Variation in Coral Species		3		
Ranking 2.7/6	No. of Variation in Coral Species		4		
Score = .45	No. of Variation in Coral Species		2		
Scale of Ten Score = .27	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		

Coral																													
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
0	0	0	0	0	5	0	0	0	0	0	20	0	0	0	0	0	0	40	0	0	0		35	0	0	0	0		100
0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		30	0	0	0	0		100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	45	0	0	0		20	0	0	0	0		100
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	10	50	0	0	0	0	0		0	0	0	0	0		100
0	0	0	0	0	15	0	0	0	0	0	5	0	0	0	0	0	0	70	0	0	0		0	0	0	0	0		100
0	0	0	0	0	40	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0		100
0	0	0	0	0	25	0	0	0	0	0	10	0	0	0	0	10	0	25	0	0	0		0	0	0	0	0		100
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	30	40	0	0	0		0	0	0	0	0		100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	20	0	40	0	0	0		0	0	0	0	0		100
0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	30	0	25	0	0	0		15	0	0	0	0		100

Algae																										
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0

Inverts																								
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Makumana Gulch	20.7826	-156550003	3	OPEN	84
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.9	No. of Variation in Coral Species		3		
Ranking 2.9/7	No. of Variation in Coral Species		5		
Score = .41	No. of Variation in Coral Species		2		
Scale of Ten Score = .29	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	15	0	0	0	10	0	0	0	0	0	0	40	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		40	0	0	0	0	100
	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	15	0	0	45	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	10	50	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	5	0	0	0	0	0	0	70	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	30	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	20	0	40	0	0	0		0	0	0	0	0	110
	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	35	0	25	0	0	0		15	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Manawainui Gulch	20.7763	-156.541	10	OPEN	85
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Four (4) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 2.4	No. of Variation in Coral Species		1		
Ranking 2.4/4	No. of Variation in Coral Species		2		
Score = .60	No. of Variation in Coral Species		3		
Scale of Ten Score = .24	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	15	10	0	0		10	0	0	0	50	100
	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	25	0	0	0		50	0	0	0	10	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		5	0	0	0	80	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	90	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	75	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0		0	0	0	0	70	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	15	5	0	0		0	0	0	0	65	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	65	100
	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	25	0	0	0		0	0	0	0	55	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	75	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Papawai Shores 2	20.7737	-156.529998	10	OPEN	86
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 1.8	No. of Variation in Coral Species		1		
Ranking 1.8/5	No. of Variation in Coral Species		1		
Score = .36	No. of Variation in Coral Species		0		
Scale of Ten Score = .18	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		0		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	50	0	0	0	0	0	0	0	0	0	5	25	0	0	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	65	0	5	0	0	0	0	0	0	0	0	10	0	0	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	0	0	10	0	0	0	5	0	0	0	10	5	0	0	0	0	0		70	0	0	0	0	100
	0	0	0	0	0	70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	0	0	0	40	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	100	100
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	35	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	15	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	100	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kaumuipuko Beach	20.51.426	156.40.270	3	OPEN	87
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		3		
Ranking 2.5/7	No. of Variation in Coral Species		2		
Score = .35	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	40	0	0	0		35	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		40	0	0	0	0	100
	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	15	0	0	45	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	10	50	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	30	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	20	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	30	0	20	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

www.whalees.com

P.O. Box 455, KAHUKU, HI 96731 808-224-9254

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Honoapiilani Highway	20.50.295	156.39.199	6	OPEN	88
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.4	No. of Variation in Coral Species		3		
Ranking 2.4/7	No. of Variation in Coral Species		2		
Score = .34	No. of Variation in Coral Species		2		
Scale of Ten Score = .24	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		1		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
	0	0	0	0	0	5	0	15	0	0	0	0	0	0	0	0	0	0	40	0	0	0		35	0	0	0	0		100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		40	0	0	0	0		100
	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	15	0	0	45	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	15	50	0	0	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0	0		0	0	0	0	0		105
	0	0	0	0	0	40	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0		30	0	0	0	0		100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	30	25	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	20	0	40	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	30	0	20	0	0	0		10	0	0	0	0		100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu One Nearshore	20.49.091	156.37.500	3	OPEN	89
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Seven (7) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 1.8	No. of Variation in Coral Species		1		
Ranking 1.8/7	No. of Variation in Coral Species		1		
Score = .25	No. of Variation in Coral Species		0		
Scale of Ten Score = .18	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		0		

Coral																												
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	0	55	0	0	0		20	0	0	0	0	100
0	0	0	0	0	5	5	0	0	0	0	0	10	0	0	0	0	0	45	0	0	0		35	0	0	0	0	100
0	0	0	0	0	5	0	10	0	0	0	0	0	0	0	20	0	0	25	0	0	0		40	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	5	0	0	0	0	0	20	0	0	0		50	0	0	0	10	100
0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	0	0	0		65	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	70	0	0	0		0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0

Inverts																								
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu One Offshore	20.48.544	156.37.494	10	OPEN	90
	No. of Variation in Coral Species		0		
Coral Diversity	No. of Variation in Coral Species		1		
One (1) species identifed	No. of Variation in Coral Species		0		
Average of Variation = 0.3	No. of Variation in Coral Species		0		
Ranking 0.3/1	No. of Variation in Coral Species		0		
Score = .30	No. of Variation in Coral Species		0		
Scale of Ten Score = .30	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		0		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		0		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		10	0	0	0	90	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		50	0	0	0	15	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5	0	0	0	95	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		5	0	0	0	95	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	100	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	60	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	70	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	95	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	75	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	95	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Two Nearshore	28.48.327	156.37.293	3	OPEN	91
	No. of Variation in Coral Species		2		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		3		
Ranking 2.5/6	No. of Variation in Coral Species		2		
Score = .42	No. of Variation in Coral Species		3		
Scale of Ten Score = .25	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	80	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	15	0	50	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	40	0	15	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	25	0	0	0	0	0	0	0	0	45	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	50	0	0	0	0	0	10	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	20	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	20	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Two Offshore	20.48.180	156.37.104	10	OPEN	92
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Four (4) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 2.3	No. of Variation in Coral Species		1		
Ranking 2.3/4	No. of Variation in Coral Species		2		
Score = .58	No. of Variation in Coral Species		3		
Scale of Ten Score = .23	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	10	0	0		10	0	0	0	55	100
	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	25	0	0	0		50	0	0	0	10	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		5	0	0	0	80	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	90	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	75	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0		0	0	0	0	70	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	15	5	0	0		0	0	0	0	65	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	65	100
	0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	15	0	0	0		0	0	0	0	75	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	75	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Three Nearshore	20.48.207	156.37.070	3	OPEN	93
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.5	No. of Variation in Coral Species		2		
Ranking 2.5/6	No. of Variation in Coral Species		3		
Score = .42	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral																													
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	80	0	0	0		0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10	0	50	0	0	0		25	0	0	0	0	100
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	40	0	15	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	50	0	0	0	0	0		30	0	0	0	0	100
0	0	0	0	0	50	0	0	0	0	0	10	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	20	0	0	0	0	20	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
0	0	0	0	0	10	0	0	0	0	20	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0

Inverts																							
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Three Offshore	20.48.171	156.37.007	10	OPEN	94
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Four (4) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 2.3	No. of Variation in Coral Species		1		
Ranking 2.3/4	No. of Variation in Coral Species		2		
Score = .58	No. of Variation in Coral Species		3		
Scale of Ten Score = .23	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		

Coral																													
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	5	0	0		10	0	0	0	55	100
0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	25	0	0	0		50	0	0	0	10	100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		5	0	0	0	80	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		5	0	0	0	90	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	75	100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	5	0	0		0	0	0	0	70	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	15	5	0	0		0	0	0	0	70	100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	65	100
0	0	0	0	0	5	0	0	0	0	0	5	0	0	0	0	0	0	15	0	0	0		0	0	0	0	75	100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	80	100

Algae																										
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0

Inverts																									
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Olowalu Four Nearshore	20.48.505	156.36.693	3	OPEN	95
	No. of Variation in Coral Species		5		
Coral Diversity	No. of Variation in Coral Species				
Five (5) species identifed	No. of Variation in Coral Species				
Average of Variation = 5	No. of Variation in Coral Species				
Ranking 5/5	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .50	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
						3	2		1										1	1								15	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									66		11

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Olowalu Four Offshore	20.48.363	156.36.733	7	OPEN	96
	No. of Variation in Coral Species		6		
Coral Diversity	No. of Variation in Coral Species				
Six (6) species identifed	No. of Variation in Coral Species				
Average of Variation = 6	No. of Variation in Coral Species				
Ranking 6/6	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .60	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Five Nearshore	20.48.189	156.36.080	3	OPEN	97
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 2.9	No. of Variation in Coral Species		2		
Ranking 2.9/6	No. of Variation in Coral Species		3		
Score = .40	No. of Variation in Coral Species		3		
Scale of Ten Score = .29	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		4		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	80	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	0	45	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	5	0	0	0	0	40	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	50	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	50	0	0	0	0	0	10	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	5	0	0	0	0	20	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	20	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	15	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	5	0	0	0	0	0	5	0	5	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	1	0	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Olowalu Five Offshore	20.48.159	156.36.070	10	OPEN	98
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species		3		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 3.1	No. of Variation in Coral Species		5		
Ranking 3.1/6	No. of Variation in Coral Species		4		
Score = .52	No. of Variation in Coral Species		3		
Scale of Ten Score = .31	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	45	0	15	0	0	0	0	0	0	0	20	0	0	5	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	20	0	50	0	0	0	0	0	0	0	0	0	0	5	0	0	0		15	0	0	0	0	100
	0	0	0	0	0	20	0	30	0	0	0	15	0	0	0	0	0	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	20	0	20	0	0	0	5	0	0	0	15	0	0	20	0	0	0		15	0	0	0	0	100
	0	0	0	0	0	25	0	30	0	0	0	5	0	0	0	0	10	0	0	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	40	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	45	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	5	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	20	0	0	15	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Puamana Offshore	20.8589	156.669998	13	OPEN	107
	No. of Variation in Coral Species		0		
Coral Diversity	No. of Variation in Coral Species				
Zero (0) species identifed	No. of Variation in Coral Species				
Average of Variation = 0	No. of Variation in Coral Species				
Ranking 0/0	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .00	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
																												8	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									89		3

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Puamana Nearshore	20.8603	156.667999	3	OPEN	106
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species				
Two (2) species identifed	No. of Variation in Coral Species				
Average of Variation = 2.0	No. of Variation in Coral Species				
Ranking 2/2	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .20	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
																1			9									3		100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									87		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Nohea Kai	20.55.022	156.41.534	3	OPEN	99
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		4		
Five (5) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 2.7	No. of Variation in Coral Species		3		
Ranking 2.7/5	No. of Variation in Coral Species		3		
Score = .54	No. of Variation in Coral Species		2		
Scale of Ten Score = .27	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		4		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral																												
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	10	0	30	0	0	0		40	0	0	0	10	100
0	0	0	0	0	10	0	5	0	0	0	0	0	0	0	0	25	0	15	0	0	0		30	0	0	0	15	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		20	0	0	0	25	100
0	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		15	0	0	0	30	100
0	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		55	0	0	0	0	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		5	0	0	0	35	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0		0	0	0	0	40	100
0	0	0	0	0	30	5	0	0	0	0	0	0	0	0	0	5	0	25	0	0	0		0	0	0	0	0	100
0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	45	100
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0		0	0	0	0	60	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Inverts																								
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Canoe Beach	20.56.274	156.41.623	10	OPEN	100
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		4		
Five (5) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 2.5	No. of Variation in Coral Species		3		
Ranking 2.5/5	No. of Variation in Coral Species		3		
Score = .50	No. of Variation in Coral Species		2		
Scale of Ten Score = .25	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	10	0	35	0	0	0		40	0	0	0	10	100
	0	0	0	0	0	5	0	2	0	0	0	0	0	0	0	0	25	0	20	0	0	0		33	0	0	0	15	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0	0		20	0	0	0	25	100
	0	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		15	0	0	0	30	100
	0	0	0	0	0	10	5	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		0	0	0	0	35	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	40	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0		0	0	0	0	45	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	0		0	0	0	0	60	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	1	0	0	0	0	0	1	3	0	0	0	2	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Lahaina Harbor 1	20.54.530	156.41.500	2	OPEN	101
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 3.0	No. of Variation in Coral Species		4		
Ranking 3.0/7	No. of Variation in Coral Species		4		
Score = .43	No. of Variation in Coral Species		4		
Scale of Ten Score = .30	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	15	0	0	0	0	0	0	10	0	0	0	0	0	25	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	25	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		45	0	0	0	0	100
	0	0	0	0	0	5	0	30	0	0	0	0	0	0	0	15	0	0	10	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	15	0	5	0	0	0	0	0	0	0	20	30	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	10	0	0	0	10	0	0	10	0	0	0		5	0	0	0	5	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	5	0	0	25	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	5	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	5	0	0	20	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Baby Beach	20.55.091	156.41.530	3	OPEN	102
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.7	No. of Variation in Coral Species		4		
Ranking 2.7/7	No. of Variation in Coral Species		3		
Score = .39	No. of Variation in Coral Species		4		
Scale of Ten Score = .27	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	15	0	0	0	0	0	0	5	0	0	0	0	0	25	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	25	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0		65	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		45	0	0	0	0	100
	0	0	0	0	0	15	0	30	0	0	0	0	0	0	0	10	0	0	10	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0	0		40	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	5	0	0	0	10	0	0	10	0	0	0		5	0	0	0	5	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Puunoa Beach	20.56.407	156.41.367	3	OPEN	103
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.3	No. of Variation in Coral Species		3		
Ranking 2.3/7	No. of Variation in Coral Species		3		
Score = .33	No. of Variation in Coral Species		2		
Scale of Ten Score = .23	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	25	0	5	0	0	0	0	5	0	0	0	0	0	10	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	15	0	30	0	0	0	0	0	0	0	0	0	0	10	0	0	0		35	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	15	25	0	0	0	0	0		45	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	10	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Lahaina Harbor 2	20.56.593	156.41.342	3	OPEN	104
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.2	No. of Variation in Coral Species		4		
Ranking 2.2/7	No. of Variation in Coral Species		3		
Score = .31	No. of Variation in Coral Species		2		
Scale of Ten Score = .22	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	25	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0		65	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	15	0	30	0	0	0	0	0	0	0	10	0	0	10	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0	0		50	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	10	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Lahaina Marina	20.52.094	156.40.471	3	OPEN	105
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.1	No. of Variation in Coral Species		4		
Ranking 2.1/6	No. of Variation in Coral Species		3		
Score = .35	No. of Variation in Coral Species		1		
Scale of Ten Score = .21	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	25	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0		65	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		55	0	0	0	0	100
	0	0	0	0	0	15	0	30	0	0	0	0	0	0	0	10	0	0	10	0	0	0		35	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0	0		50	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Puamana Nearshore	20.51.369	156.40.033	3	OPEN	106
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species				
Two (2) species identifed	No. of Variation in Coral Species				
Average of Variation = 2	No. of Variation in Coral Species				
Ranking 2/2	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .20	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
																3			11									12		100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									74		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Puamana Offshore	20.51.322	156.40.111	13	OPEN	107
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species				
Two (2) species identifed	No. of Variation in Coral Species				
Average of Variation = 2.0	No. of Variation in Coral Species				
Ranking 2/2	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .20	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
																2			3									48	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									47		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesoma spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Puamana	20.51.201	156.39.597	3	OPEN	108
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		2		
Six (6) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.3	No. of Variation in Coral Species		4		
Ranking 2.3/5	No. of Variation in Coral Species		3		
Score = .46	No. of Variation in Coral Species		2		
Scale of Ten Score = .23	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	25	0	5	0	0	0	0	5	0	0	0	0	0	0	0	0	0		65	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		50	0	0	0	0	100
	0	0	0	0	0	15	0	30	0	0	0	0	0	0	0	10	0	0	10	0	0	0		35	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	10	25	0	0	0	0	0		45	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	15	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		5	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	85	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Kahekili 1	20.56.257	156.41.595	3	OPEN	109
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species				
Three (3) species identifed	No. of Variation in Coral Species				
Average of Variation = 3	No. of Variation in Coral Species				
Ranking 3/3	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .30	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
								1									15		5										100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																										76	3

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Kahekili 2	20.56.274	156.41.623	7	OPEN	110
	No. of Variation in Coral Species		5		
Coral Diversity	No. of Variation in Coral Species				
Five (5) species identifed	No. of Variation in Coral Species				
Average of Variation = 5	No. of Variation in Coral Species				
Ranking 5/5	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .50	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
								6		1	8	5				1			1									20	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																											58

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kahekili Beach 3	20.56.407	156.41.367	3	OPEN	111
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Three (3) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.3	No. of Variation in Coral Species		3		
Ranking 2.3/3	No. of Variation in Coral Species		2		
Score = .76	No. of Variation in Coral Species		2		
Scale of Ten Score = .23	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	20	0	45	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	15	0	55	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	15	0	35	0	0	0		15	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	15	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0		0	0	0	0	80	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0	0
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kahekili Beach 4	20.56.593	156.41.342	4	OPEN	112
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Three (3) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.3	No. of Variation in Coral Species		3		
Ranking 2.3/3	No. of Variation in Coral Species		2		
Score = .76	No. of Variation in Coral Species		2		
Scale of Ten Score = .23	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	15	0	50	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	17	0	55	0	0	0		10	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	15	0	35	0	0	0		14	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	8	0	6	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0		0	0	0	0	80	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	74	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	94	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kaanapali Beach Three	20.55.091	156.41.530	3	OPEN	113
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.8	No. of Variation in Coral Species		2		
Ranking 2.8/5	No. of Variation in Coral Species		4		
Score = .56	No. of Variation in Coral Species		3		
Scale of Ten Score = .28	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	10	0	60	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	40	0	0	0	25	0	0	0	0	15	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	5	0	0	0	0	0	0	0	0	0	0	40	0	0	0		25	0	0	0	0	100
	0	0	0	0	0	15	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0		27	0	0	0	0	100
	0	0	0	0	0	20	0	10	0	0	0	0	0	0	0	0	20	0	15	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	10	0	9	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	30	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	25	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kaanapali Beach Four	20.54.530	156.41.500	3	OPEN	114
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.4	No. of Variation in Coral Species		2		
Ranking 2.4/5	No. of Variation in Coral Species		4		
Score = .48	No. of Variation in Coral Species		1		
Scale of Ten Score = .24	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		2		

Coral																												
Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
0	0	0	0	0	0	0	15	0	0	0	0	0	0	0	0	5	0	60	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	40	0	0	0	25	0	0	0	0	15	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	30	0	5	0	0	0	0	0	0	0	0	0	0	40	0	0	0		25	0	0	0	0	100
0	0	0	0	0	15	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0		30	0	0	0	0	100
0	0	0	0	0	20	0	10	0	0	0	0	0	0	0	0	20	0	15	0	0	0		0	0	0	0	0	100
0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	30	0	0	0		0	0	0	0	0	100
0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0		0	0	0	0	0	100
0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0		0	0	0	0	0	100
0	0	0	0	0	25	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100

Algae																									
Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0
0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	25	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0

Inverts																								
Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (EchoBl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Mahinahina Nearshore	20.57.436	156.41.252	3	OPEN	115
	No. of Variation in Coral Species		1		
Coral Diversity	No. of Variation in Coral Species				
One (1) species identifed	No. of Variation in Coral Species				
Average of Variation = 1	No. of Variation in Coral Species				
Ranking 1/1	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .50	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
												1																43	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									56		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Mahinahina Offshore	20.57.431	156.41.336	10	OPEN	116
	No. of Variation in Coral Species		5		
Coral Diversity	No. of Variation in Coral Species				
Five (5) species identifed	No. of Variation in Coral Species				
Average of Variation = 5	No. of Variation in Coral Species				
Ranking 5/5	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .50	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
						9		3			1						1	15	4									26	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									41		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Honolua North	21.00.923	156.38.343	3	MLCD	117
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species				
Four (4) species identifed	No. of Variation in Coral Species				
Average of Variation = 4	No. of Variation in Coral Species				
Ranking 4/4	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .40	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
						4		1								1			10									8	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									76		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
DAR Honolua South	21.00.831	156.38.380	3	MLCD	118
	No. of Variation in Coral Species		4		
Coral Diversity	No. of Variation in Coral Species				
Four (4) species identifed	No. of Variation in Coral Species				
Average of Variation = 4	No. of Variation in Coral Species				
Ranking 4/4	No. of Variation in Coral Species				
Score = 1.0	No. of Variation in Coral Species				
Scale of Ten Score = .40	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				
	No. of Variation in Coral Species				

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
						2		2								4			8									10	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
																									74		

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Honolua NearShore	21.00.532	156.38.254	3	MLCD	119
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		2		
Seven (7) species identifed	No. of Variation in Coral Species		4		
Average of Variation = 2.9	No. of Variation in Coral Species		5		
Ranking 2.9/7	No. of Variation in Coral Species		3		
Score = .41	No. of Variation in Coral Species		3		
Scale of Ten Score = .29	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		2		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	20	0	30	0	0	0	0	0	0	0	0	0	0	30	0	0	0		20	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	70	0	0	0		15	0	0	0	0	100
	0	0	0	0	0	0	5	5	0	0	0	0	0	0	0	8	2	0	65	0	0	0		0	0	0	0	5	100
	0	0	0	0	0	2	0	10	0	0	0	3	0	0	0	40	5	0	0	0	0	0		30	0	0	0	0	100
	0	0	0	0	0	10	0	10	0	0	0	0	0	0	0	0	5	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	15	0	0	0	0	0	5	0	0	0	0	0	0	20	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	5	0	0	0	0	0	0	0	30	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	6	2	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kono Point	21.00.458	156.38.441	3	MLCD	120
	No. of Variation in Coral Species		2		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		2		
Average of Variation = 1.7	No. of Variation in Coral Species		1		
Ranking 1.7/5	No. of Variation in Coral Species		3		
Score = .34	No. of Variation in Coral Species		2		
Scale of Ten Score = .17	No. of Variation in Coral Species		0		
	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		1		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)	Total
	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	25	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5	0	0	30	0	0	0		0	0	0	0	10	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	10	0	0	0		0	0	0	0	0	100
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	93	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	90	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0
	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	0	0
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site	Latitude	Longitude	Depth	Marine Status	Map
WHALE Kapalua Beach	21.00.036	156.40.092	3	OPEN	121
	No. of Variation in Coral Species		3		
Coral Diversity	No. of Variation in Coral Species		3		
Five (5) species identifed	No. of Variation in Coral Species		3		
Average of Variation = 2.3	No. of Variation in Coral Species		2		
Ranking 2.3/5	No. of Variation in Coral Species		3		
Score = .46	No. of Variation in Coral Species		2		
Scale of Ten Score = .23	No. of Variation in Coral Species		1		
	No. of Variation in Coral Species		2		
	No. of Variation in Coral Species		3		
	No. of Variation in Coral Species		1		

Coral	Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni	Inorganics	Basalt (Basalt)	Rubble	Limestone (Limest)	Quad (Quad)	Sand (Sand)		Total
	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	8	0	0	15	0	0	0		0	0	0	0	15		100
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	30	0	0	10	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0	15	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	9	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5	0	0	30	0	0	0		0	0	0	0	11		100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0	0	5	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	25	0	0	10	0	0	0		0	0	0	0	0		100
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0		100

Algae	Asparagopsis taxiformis (Asptax)	Caulerpa racemosa (Caurac)	Caulerpa serrulata (Caulser)	Caulerpa sertularioides (Caulsert)	Codium arabicum (Codara)	Crustose Coralline (CCA)	Cyanophyta (BG)	Dasya iridescens (Dasyir)	Grateloupia phuquocensis	Dichotomaria marginata (Dichmar)	Dictyospaeria cavernosa (Dictcav)	Dictyosphaeria versluysii (Dictver)	Dictyota species (Dicty)	Gismithia hawaiiensis (Gibhaw)	Halimeda opuntia (Halop)	Lobophora variegata (Lobvar)	Martensia flabelliformis (Marflab)	Martensia fragilis (Marfrag)	Neomeris annulata (Neoman)	Padina species (Padina)	Portieria hornemanii (Porhor)	Predaea weldii (Prewel)	Sargassum (Sarg)	Turbinaria ornata (Turbor)	Turf (Turf)	Ventricaria ventricosa (venven)	green algae
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	59	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	0	0
	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	53	0	0
	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	91	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	0	0
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	0	0

Inverts	Acanthaster planci (Acanpla)	Actinopyga mauritiana (Actmaur)	Actionopyga obesa (Actobe)	Calcinus species	Chondrocidaris gigantea (Chongig)	Colobocentrotus atratus (Coloat)	Conus species	Diadema paucispinum (Diapau)	Echinometra mathaei (Echmat)	Echinometra oblonga (Echobl)	Echinothrix species (Echinot)	Heterocentrotus mammillatus (Hemam)	Holothuria atra (Holatr)	Holothuria whitmaei (Holwit)	Morula species	Ophiocomoa species (Ophio)	Ophodesomoa spectabilis (Ophspec)	Plagusia squamosa	Stenopus hispidus	Spirobranchus giganteus (Spigig)	Sponge (Sponge)	Spirastrella vagabunda	Tripnuestes gratilla	Palythoa tuberculosa
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Appendix Three
Site Specific
Fish Biota Data

Fish Benthic Study

Ukumehane State Beach

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. rubroviolaceus	4	22	220	0.01288	3.04	34.46
C. strigosus	2	20	200	0.02465	3.03	29.88
C. strigosus	1	15	150	0.02465	3.03	11.20
C. strigosus	2	12	120	0.02465	3.03	17.93
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
A. nigrofuscus	4	10	100	0.02692	2.97	31.98
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
N. lituratus	6	22	220	0.03020	2.97	118.40
N. lituratus	1	25	250	0.03020	2.97	22.42
N. unicornis	2	22	220	0.02570	2.95	33.36
M. vidua	4	25	250	0.01000	3.04	30.40
Z. flavescens	1	12	120	0.02512	3.00	9.04
C. unimaculatus	4	14	140	0.01230	3.04	20.94
C. ornatissimus	2	17	170	0.02570	3.01	26.30
C. ornatissimus	3	16	160	0.02570	3.01	37.13
M. vanicolensis	1	9	90	0.00794	3.05	2.18
L. phthirophagus	1	5	50	0.00955	3.05	1.46
T. duperrey	6	14	140	0.00832	2.99	20.90
S. balteata	3	8	80	0.01023	2.99	7.34
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	6	6	60	0.00661	2.97	7.07
G. varius	1	9	90	0.00661	2.97	1.77
C. vanderbilti	4	2	20	0.00102	3.06	0.25
C. vanderbilti	5	3	30	0.00102	3.06	0.47
C. vanderbilti	4	5	50	0.00102	3.06	0.62
A. vaigiensis	3	16	160	0.01413	3.00	20.35
P. johnstonianus	2	4	40	0.02291	2.95	5.41
Totals	78	10.50				541.05
	# of fish	average size		Convert to kg		5.41
Overall Ranking (kg/m squared		**2.57**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	8	4	40	0.02465	3.03	23.90
C. strigosus	3	5	50	0.02465	3.03	11.20
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	7	8	80	0.02465	3.03	41.83
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
A. nigrofuscus	20	8	80	0.02692	2.97	127.92
A. nigrofuscus	3	13	130	0.02692	2.97	31.18
A. nigrofuscus	4	7	70	0.02692	2.97	22.39
A. nigrofuscus	16	7	70	0.02692	2.97	89.55
A. nigrofuscus	8	4	40	0.02692	2.97	25.58
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	9	12	120	0.02692	2.97	86.35
R. aculeatus	2	10	100	0.02630	2.98	15.67
C. auriga	6	15	150	0.02698	2.95	71.63
C. multicintus	1	7	70	0.02487	3.05	5.31
P. multifasciatus	2	24	240	0.01047	3.15	15.83
P. multifasciatus	1	6	60	0.01047	3.15	1.98
P. multifasciatus	2	5	50	0.01047	3.15	3.30
P. multifasciatus	1	9	90	0.01047	3.15	2.97
L. phthirofagus	3	4	40	0.00955	3.05	3.50
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	2	5	50	0.00661	2.97	1.96
T. duperrey	1	5	50	0.00832	2.99	1.24
T. duperrey	5	4	40	0.00832	2.99	4.98
T. duperrey	4	5	50	0.00832	2.99	4.98
T. duperrey	1	7	70	0.00832	2.99	1.74
C. vanderbilti	11	3	30	0.00102	3.06	1.03
C. vanderbilti	20	5	50	0.00102	3.06	3.12
C. vanderbilti	8	4	40	0.00102	3.06	1.00
P. johnstonianus	12	4	40	0.02291	2.95	32.44
P. johnstonianus	3	6	60	0.02291	2.95	12.17
S. marginatus	7	5	50	0.00087	3.12	0.95
P.arcatus	4	7	70	0.00912	3.08	7.87
Totals	187	5.60				746.36
	# of fish	average size				7.46

Fish Benthic Study

Puunoa Beach

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. laysan	1	25	250	0.00331	3.05	2.52
C. argus	1	16	160	0.00102	3.06	0.50
S. rubroviolaceus	2	27	270	0.01288	3.04	21.14
C. carolinus	2	22	220	0.02358	2.98	30.92
C. carolinus	1	16	160	0.02358	2.98	11.24
S. psittacus	2	18	180	0.01622	3.05	17.81
A. olivaceus	7	18	180	0.02485	3.05	95.50
A. olivaceus	6	19	190	0.02485	3.05	86.40
A. nigrofuscus	9	8	80	0.02692	2.97	57.57
A. nigrofuscus	5	9	90	0.02692	2.97	35.98
N. brevirostris	3	18	180	0.02399	2.99	38.73
N. brevirostris	7	20	200	0.02399	2.99	100.42
N. unicornis	1	22	220	0.02570	2.95	16.68
N. unicornis	1	15	150	0.02570	2.95	11.37
N. lituratus	1	19	190	0.03020	2.97	17.04
A. dussumieri	1	18	180	0.03311	2.95	17.58
A. dussumieri	3	24	240	0.03311	2.95	70.33
A. dussumieri	1	15	150	0.03311	2.95	14.65
A. leucopareius	1	18	180	0.02692	2.97	14.39
A. leucopareius	1	20	200	0.02692	2.97	15.99
A. blochii	1	26	260	0.02692	3.01	21.07
A. blochii	1	22	220	0.02692	3.01	17.83
A. blochii	2	18	180	0.02692	3.01	29.17
A. blochii	1	15	150	0.02692	3.01	12.15
F. flavissimus	1	12	120	0.02018	3.04	7.36
P. multifaciatus	1	18	180	0.01047	3.15	5.94
P. multifaciatus	1	19	190	0.01047	3.15	6.27
T. duperrey	2	6	60	0.00832	2.99	2.99
T. duperrey	1	8	80	0.00832	2.99	1.99
P. arcatus	1	5	50	0.00912	3.08	1.40
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	1	7	70	0.00661	2.97	1.37
P. johnstonianus	1	5	50	0.02291	2.95	3.38
C. jactator	1	5	50	0.02239	2.96	3.31
Totals	72	15.85				792.84
	# of fish	average size		Convert to kg		7.93
Overall Ranking (kg/m squared		**2.56**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	1	16	160	0.01995	2.98	9.51
Z. veliferum	2	32	320	0.02630	2.94	49.49
Z. veliferum	1	26	260	0.02630	2.94	20.10
A. olivaceus	5	19	190	0.02485	3.05	72.00
A. olivaceus	8	18	180	0.02485	3.05	109.14
N. brevirostris	1	12	120	0.02399	2.99	8.61
N. brevirostris	1	10	100	0.02399	2.99	7.17
A. leucopareius	9	18	180	0.02692	2.97	129.52
A. nigrofuscus	2	6	60	0.02692	2.97	9.59
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	2	11	110	0.03020	2.97	19.73
R. rectangulus	1	16	160	0.01991	2.87	9.14
P. multifasciatus	1	8	80	0.01047	3.15	2.64
S. balteata	2	7	70	0.01023	2.99	4.28
S. balteata	1	11	110	0.01023	2.99	3.36
T. duperrey	3	10	100	0.00832	2.99	7.46
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	12	120	0.00832	2.99	2.99
Totals	45	6.04				484.81
	# of fish	average size				4.85

Fish Benthic Study

Puamana Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. laysan	2	18	180	0.00331	3.05	3.63
C. argus	2	18	180	0.00102	3.06	1.12
S. rubroviolaceus	2	22	220	0.01288	3.04	17.23
C. carolinus	2	20	200	0.02358	2.98	28.11
C. carolinus	3	16	160	0.02358	2.98	33.73
S. psittacus	2	18	180	0.01622	3.05	17.81
A. olivaceus	3	20	200	0.02485	3.05	45.48
A. olivaceus	5	18	180	0.02485	3.05	68.21
A. nigrofuscus	1	8	80	0.02692	2.97	6.40
A. nigrofuscus	3	9	90	0.02692	2.97	21.59
N. brevirostris	1	19	190	0.02399	2.99	13.63
N. brevirostris	2	21	210	0.02399	2.99	30.13
N. unicornis	1	22	220	0.02570	2.95	16.68
N. lituratus	4	17	170	0.03020	2.97	60.99
A. dussumieri	3	18	180	0.03311	2.95	52.74
A. dussumieri	1	14	140	0.03311	2.95	13.67
A. leucopareius	1	18	180	0.02692	2.97	14.39
A. leucopareius	1	20	200	0.02692	2.97	15.99
A. blochii	1	22	220	0.02692	3.01	17.83
A. blochii	2	16	160	0.02692	3.01	25.93
P. multifaciatus	4	18	180	0.01047	3.15	23.75
P. multifaciatus	2	18	180	0.01047	3.15	11.87
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	1	9	90	0.00832	2.99	2.24
P. arcatus	1	7	70	0.00912	3.08	1.97
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	2	7	70	0.00661	2.97	2.75
P. johnstonianus	2	5	50	0.02291	2.95	6.76
C. jactator	1	5	50	0.02239	2.96	3.31
R. rectangulus	1	22	220	0.01991	2.87	12.57
M. niger	2	19	190	0.01588	3.08	18.59
F. flavissimus	1	12	120	0.02018	3.04	7.36
Z. cornutus	1	17	170	0.00698	2.98	3.54
Z. cornutus	1	18	180	0.00698	2.98	3.74
P. cyclostomus	1	14	140	0.01047	3.15	4.62
Totals	64	15.79				611.68
	# of fish	average size		Convert to kg		6.12
Overall Ranking (kg/m squared		**1.76**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	2	17	170	0.01995	2.98	20.21
Z. veliferum	1	22	220	0.02630	2.94	17.01
Z. veliferum	2	24	240	0.02630	2.94	37.11
A. olivaceus	1	20	200	0.02485	3.05	15.16
A. olivaceus	3	18	180	0.02485	3.05	40.93
N. brevirostris	1	12	120	0.02399	2.99	8.61
N. brevirostris	1	11	110	0.02399	2.99	7.89
A. leucopareius	5	12	120	0.02692	2.97	47.97
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	1	13	130	0.03020	2.97	11.66
R. rectangulus	1	15	150	0.01991	2.87	8.57
P. multifasciatus	1	8	80	0.01047	3.15	2.64
S. balteata	1	15	150	0.01023	2.99	4.59
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	12	120	0.00832	2.99	2.99
Z. cornutus	1	18	180	0.00698	2.98	3.74
Totals	30	5.93				267.01
	# of fish	average size				2.67

Fish Benthic Study

Papawai Point
Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. virescens	2	58	580	0.01349	2.95	46.16
C. sordidus	3	35	350	0.01549	3.06	49.77
C. sordidus	4	22	220	0.01549	3.06	41.71
S. rubroviolaceus	1	28	280	0.01288	3.04	10.96
S. rubroviolaceus	2	18	180	0.01288	3.04	14.10
C. strigosus	3	12	120	0.02465	3.03	26.89
C. strigosus	2	15	150	0.02465	3.03	22.41
C. strigosus	5	8	80	0.02465	3.03	29.88
A. blochii	1	20	200	0.02692	3.01	16.21
A. blochii	1	18	180	0.02692	3.01	14.59
N. brevirostris	5	19	190	0.02399	2.99	68.14
A. nigrofuscus	5	10	100	0.02692	2.97	39.98
N. hexacanthus	4	20	200	0.02570	2.95	60.65
M. vidua	2	22	220	0.01000	3.04	13.38
S. bursa	1	18	180	0.02191	2.98	11.75
F. flavissimus	2	15	150	0.02018	3.04	18.40
Z. flavescens	3	10	100	0.02512	3.00	22.61
C. multicinctus	2	12	120	0.02487	3.05	18.20
P. multifasciatus	2	18	180	0.01047	3.15	11.87
P. multifasciatus	3	15	150	0.01047	3.15	14.84
M. vanicolensis	4	24	240	0.00794	3.05	23.25
M. vanicolensis	1	18	180	0.00794	3.05	4.36
B. bilinulatus	1	45	450	0.01259	3.02	17.11
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	2	18	180	0.00832	2.99	8.96
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	8	80	0.00832	2.99	1.99
G. varius	5	12	120	0.00661	2.97	11.78
P. forsteri	3	20	200	0.00912	3.07	16.80
H. ornatissimus	2	9	90	0.0257	3.01	13.92
P. arcatus	2	8	80	0.00912	3.08	4.49
C. potteri	1	8	80	0.01914	3.04	4.65
C. potteri	2	7	70	0.01914	3.04	8.15
C. agilis	2	4	40	0.21020	2.99	50.28
C. hanui	2	4	40	0.01987	3.01	4.78
P. johnstonianus	1	7	70	0.02291	2.95	4.73
Z. cornutus	1	14	140	0.00698	2.98	2.91
C. inermis	2	32	320	0.00380	3.1	7.54
	87	650				742.93
	# of fish	average size		Convert to kg		7.43
		Overall Ranking (kg/m squared				**2.05**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. granoculis	2	13	130	0.01995	2.98	15.46
M. granoculis	2	20	200	0.01995	2.98	23.78
C. perspicillatus	3	15	150	0.02548	2.98	34.17
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	1	3	30	0.02465	3.03	2.24
C. strigosus	7	5	50	0.02465	3.03	26.14
C. strigosus	2	2	20	0.02465	3.03	2.99
C. strigosus	3	6	60	0.02465	3.03	13.44
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
R. aculeatus	1	15	150	0.02630	2.98	11.76
R. aculeatus	3	8	80	0.02630	2.98	18.81
M. vidua	1	23	230	0.01000	3.04	6.99
M. vidua	1	24	240	0.01000	3.04	7.30
C. miliaris	1	10	100	0.03236	3.04	9.84
C. miliaris	2	13	130	0.03236	3.04	25.58
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	4	11	110	0.00832	2.99	10.95
P. johnstonianus	3	6	60	0.02291	2.95	12.17
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. johnstonianus	1	8	80	0.02291	2.95	5.41
S. marginatus	5	10	100	0.00087	3.12	1.36
S. marginatus	2	9	90	0.00087	3.12	0.49
S. marginatus	2	7	70	0.00087	3.12	0.38
S. marginatus	1	8	80	0.00087	3.12	0.22
S. marginatus	3	12	120	0.00087	3.12	0.98
	60	300				279.76
						2.80

Fish Benthic Study

Papawai Shores Two

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	3	35	350	0.01549	3.06	49.77
C. sordidus	4	20	200	0.01549	3.06	37.92
S. rubroviolaceus	1	25	250	0.01288	3.04	9.79
S. rubroviolaceus	2	18	180	0.01288	3.04	14.10
C. strigosus	3	12	120	0.02465	3.03	26.89
C. strigosus	2	17	170	0.02465	3.03	25.39
C. strigosus	5	8	80	0.02465	3.03	29.88
A. blochii	1	18	180	0.02692	3.01	14.59
A. blochii	1	17	170	0.02692	3.01	13.77
N. brevirostris	5	18	180	0.02399	2.99	64.56
A. nigrofuscus	5	10	100	0.02692	2.97	39.98
M. vidua	2	22	220	0.01000	3.04	13.38
S. bursa	1	18	180	0.02191	2.98	11.75
F. flavissimus	4	15	150	0.02018	3.04	36.81
Z. flavescens	3	12	120	0.02512	3.00	27.13
C. multicinctus	2	12	120	0.02487	3.05	18.20
P. multifasciatus	2	18	180	0.01047	3.15	11.87
P. multifasciatus	5	15	150	0.01047	3.15	24.74
B. bilinulatus	1	40	400	0.01259	3.02	15.21
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	11	18	180	0.00832	2.99	49.26
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	8	80	0.00832	2.99	1.99
G. varius	6	14	140	0.00661	2.97	16.49
P. forsteri	3	20	200	0.00912	3.07	16.80
P. arcatus	2	8	80	0.00912	3.08	4.49
C. potteri	1	8	80	0.01914	3.04	4.65
C. potteri	2	7	70	0.01914	3.04	8.15
C. hanui	2	4	40	0.01987	3.01	4.78
P. johnstonianus	5	7	70	0.02291	2.95	23.65
Z. cornutus	1	13	130	0.00698	2.98	2.70
C. inermis	2	32	320	0.00380	3.1	7.54
	90	508				630.95
	# of fish	average size		Convert to kg		6.31
		Overall Ranking (kg/m squared				**1.91**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. granoculis	5	20	200	0.01995	2.98	59.45
C. perspicillatus	3	16	160	0.02548	2.98	36.45
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	9	5	50	0.02465	3.03	33.61
C. strigosus	2	2	20	0.02465	3.03	2.99
C. strigosus	3	7	70	0.02465	3.03	15.68
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
R. aculeatus	1	15	150	0.02630	2.98	11.76
M. vidua	1	22	220	0.01000	3.04	6.69
M. vidua	1	24	240	0.01000	3.04	7.30
C. miliaris	5	10	100	0.03236	3.04	49.19
C. miliaris	2	13	130	0.03236	3.04	25.58
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	12	120	0.00832	2.99	2.99
P. johnstonianus	4	7	70	0.02291	2.95	18.92
P. johnstonianus	1	8	80	0.02291	2.95	5.41
S. marginatus	5	10	100	0.00087	3.12	1.36
S. marginatus	2	9	90	0.00087	3.12	0.49
S. marginatus	3	6	60	0.00087	3.12	0.49
S. marginatus	3	8	80	0.00087	3.12	0.65
S. marginatus	3	12	120	0.00087	3.12	0.98
	63	265				325.07
						3.25

Fish Benthic Study

Papawai Point

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. melampygus	1	18	180	0.02399	2.99	12.91
C. sordidus	1	22	220	0.01549	3.06	10.43
A. nigrofuscus	2	13	130	0.02692	2.97	20.79
A. nigrofuscus	1	10	100	0.02692	2.97	8.00
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	7	9	90	0.02692	2.97	50.37
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
N. lituratus	1	12	120	0.0302	2.97	10.76
N. lituratus	1	15	150	0.0302	2.97	13.45
N. hexacanthus	3	18	180	0.0257	2.95	40.94
S. bursa	2	18	180	0.02191	2.98	23.51
S. bursa	1	20	200	0.02191	2.98	13.06
P. aspricaudus	1	16	160	0.02089	2.92	9.76
C. multicinctus	2	17	170	0.02487	3.05	25.79
Z. flavescens	10	15	150	0.02512	3.00	113.04
Z. flavescens	5	12	120	0.02512	3.00	45.22
Z. flavescens	7	10	100	0.02512	3.00	52.75
C. auriga	2	20	200	0.02698	2.95	31.84
F. flavissimus	2	12	120	0.02018	3.04	14.72
C. quadrimaculatus	2	15	150	0.0257	3.01	23.21
C. miliaris	5	12	120	0.03236	3.04	59.02
P. multifasciatus	1	18	180	0.01047	3.15	5.94
H. ornatissimus	1	18	180	0.02570	3.01	13.92
O. unifasciatus	1	25	250	0.01964	2.99	14.68
P. arcatus	1	6	60	0.00912	3.08	1.69
P. arcatus	1	6	60	0.00912	3.08	1.69
P. arcatus	1	7	70	0.00912	3.08	1.97
C. inermis	1	27	270	0.00380	3.1	3.18
T. duperrey	1	18	180	0.00832	2.99	4.48
S. balteata	1	8	80	0.01023	2.99	2.45
S. balteata	1	7	70	0.01023	2.99	2.14
Z. cornutus	2	12	120	0.00698	2.98	4.99
G. curiosus	1	6	60	0.00087	3.12	0.16
C. agilis	1	7	70	0.21020	2.99	43.99
C. agilis	3	5	50	0.21020	2.99	94.27
C. hanui	1	5	50	0.01987	3.01	2.99
C. hanui	1	4	40	0.01987	3.01	2.39
C. hanui	1	6	60	0.01987	3.01	3.59
C. vanderbilti	30	3	30	0.00102	3.06	2.81
C. vanderbilti	10	4	40	0.00102	3.06	1.25
A. abdominalis	10	15	150	0.00107	3.07	4.93
A. abdominalis	10	17	170	0.00107	3.07	5.58
A. vaigiensis	3	18	180	0.01413	3.00	22.89
F. commersonii	1	85	850	0.00076	2.96	1.91
F. commersonii	1	40	400	0.00076	2.96	0.90
F. commersonii	1	45	450	0.00076	2.96	1.01
A. chinensis	1	48	480	0.00224	3.14	3.38
D. albisella	2	18	180	0.00954	2.98	10.23
C. ovalis	20	15	150	0.01479	2.99	132.67
C. ovalis	10	17	170	0.01479	2.99	75.18
	181	813				1087.60
	# of fish	average size		Convert to kg		10.88
		Overall Ranking (kg/m squared				**3.39**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. granoculis	1	17	170	0.01995	2.98	10.11
M. granoculis	4	13	130	0.01995	2.98	30.91
C. perspicillatus	2	18	180	0.02548	2.98	27.33
C. perspicillatus	1	17	170	0.02548	2.98	12.91
C. perspicillatus	1	14	140	0.02548	2.98	10.63
Z. flavescens	3	14	140	0.02512	3.00	31.65
Z. flavescens	5	12	120	0.02512	3.00	45.22
Z. flavescens	3	16	160	0.02512	3.00	36.17
Z. flavescens	2	15	150	0.02512	3.00	22.61
Z. flavescens	1	17	170	0.02512	3.00	12.81
Z. flavescens	6	10	100	0.02512	3.00	45.22
Z. flavescens	5	11	110	0.02512	3.00	41.45
Z. flavescens	1	20	200	0.02512	3.00	15.07
C. strigosus	2	10	100	0.02465	3.03	14.94
C. strigosus	1	11	110	0.02465	3.03	8.22
C. strigosus	1	13	130	0.02465	3.03	9.71
C. strigosus	1	3	30	0.02465	3.03	2.24
N. lituratus	1	15	150	0.0302	2.97	13.45
N. lituratus	1	12	120	0.0302	2.97	10.76
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	6	8	80	0.02692	2.97	38.38
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
A. nigrofuscus	1	4	40	0.02692	2.97	3.20
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	1	13	130	0.02692	2.97	10.39
A. nigrofuscus	4	10	100	0.02692	2.97	31.98
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
R. aculeatus	2	14	140	0.02630	2.98	21.94
R. aculeatus	1	17	170	0.02630	2.98	13.32
C. miliaris	2	10	100	0.03236	3.04	19.67
C. miliaris	1	8	80	0.03236	3.04	7.87
C. miliaris	2	16	160	0.03236	3.04	
C. multicintus	2	10	100	0.02487	3.05	
C. multicintus	1	8	80	0.02487	3.05	
C. multicintus	2	16	160	0.02487	3.05	
C. ornatissimus	2	19	190	0.02570	3.01	
M. flavolineatus	1	15	150	0.00891	3.08	
P. multifasciatus	1	15	150	0.01047	3.15	
T. duperrey	1	14	140	0.00832	2.99	
T. duperrey	1	12	120	0.00832	2.99	
T. duperrey	1	4	40	0.00832	2.99	
O. unifasciatus	1	15	150	0.01964	2.99	
C. jactator	1	6	60	0.02239	2.96	
D. albisella	1	2	20	0.00954	2.98	
D. albisella	3	8	80	0.00954	2.98	
C. hanui	1	3	30	0.01987	3.01	
C. hanui	1	4	40	0.01987	3.01	
C. vanderbilti	11	3	30	0.00102	3.06	
C. agilis	2	5	50	0.21020	2.99	
P. arcatus	2	5	50	0.00912	3.08	
P. arcatus	1	6	60	0.00912	3.08	
P. forsteri	1	17	170	0.00912	3.08	
	108	590				606.54
						6.07

Fish Benthic Study

Papalaua Offshore One
Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	1	18	180	0.01995	2.98	10.70
C. argus	1	25	250	0.00102	3.06	0.78
S. rubroviolaceaus	1	22	220	0.01288	3.04	8.61
C. sordidus	1	17	170	0.01549	3.06	8.06
C. sordidus	1	19	190	0.01549	3.06	9.01
C. strigosus	20	8	80	0.02465	3.03	119.50
C. strigosus	7	10	100	0.02465	3.03	52.28
C. strigosus	3	15	150	0.02465	3.03	33.61
C. strigosus	10	4	40	0.02465	3.03	29.88
A. nigrofuscus	12	6	60	0.02692	2.97	57.57
A. nigrofuscus	15	10	100	0.02692	2.97	119.93
A. nigrofuscus	10	9	90	0.02692	2.97	71.96
N. brevirostris	7	14	140	0.02399	2.99	70.30
N. brevirostris	3	17	170	0.02399	2.99	36.58
A. nigroris	4	22	220	0.02570	2.97	67.17
A. nigroris	1	18	180	0.02570	2.97	13.74
S. bursa	1	16	160	0.02191	2.98	10.45
C. ornatissimus	2	18	180	0.02570	3.01	27.85
C. ornatissimus	1	15	150	0.02570	3.01	11.60
C. multicintus	3	10	100	0.02487	3.05	22.76
C. multicintus	1	8	80	0.02487	3.05	6.07
P. multifasciatus	1	14	140	0.01047	3.15	4.62
P. multifasciatus	1	5	50	0.01047	3.15	1.65
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	9	90	0.00832	2.99	2.24
P. octotaenia	3	6	60	0.01495	2.94	7.91
P. octotaenia	1	9	90	0.01495	2.94	3.96
S. balteata	1	7	70	0.01023	2.99	2.14
G. varius	1	8	80	0.00661	2.97	1.57
P. johnstonianus	7	6	60	0.02291	2.95	28.39
P. johnstonianus	2	8	80	0.02291	2.95	10.81
S. faciolatus	15	6	60	0.01514	2.99	40.74
S. faciolatus	10	8	80	0.01514	2.99	36.21
S. faciolatus	10	10	100	0.01514	2.99	45.27
C. hanui	2	4	40	0.01987	3.01	4.78
C. hanui	1	5	50	0.01987	3.01	2.99
C. jactator	1	4	40	0.02239	2.96	2.65
	163	421				987.06
	# of fish	average size		Convert to kg		9.87
		Overall Ranking (kg/m squared				**2.76**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	1	15	150	0.01995	2.98	8.92
C. perspicillatus	2	13	130	0.02548	2.98	19.74
C. perspicillatus	1	16	160	0.02548	2.98	12.15
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	10	8	80	0.02692	2.97	63.96
A. nigrofuscus	2	4	40	0.02692	2.97	6.40
A. nigrofuscus	1	3	30	0.02692	2.97	2.40
A. nigrofuscus	3	7	70	0.02692	2.97	16.79
A. nigrofuscus	3	10	100	0.02692	2.97	23.99
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	1	5	50	0.02692	2.97	4.00
A. nigrofuscus	1	6	60	0.02692	2.97	4.80
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	7	6	60	0.02465	3.03	31.37
C. strigosus	12	5	50	0.02465	3.03	44.81
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	7	70	0.02465	3.03	10.46
C. strigosus	3	3	30	0.02465	3.03	6.72
Z. flavescens	1	3	30	0.02512	3.00	2.26
R. aculeatus	1	18	180	0.02630	2.98	14.11
P. multifasciatus	1	13	130	0.01047	3.15	4.29
P. multifasciatus	2	4	40	0.01047	3.15	2.64
P. multifasciatus	1	6	60	0.01047	3.15	1.98
T. duperrey	1	3	30	0.00832	2.99	0.75
T. duperrey	1	2	20	0.00832	2.99	0.50
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	4	8	80	0.00832	2.99	7.96
T. duperrey	1	6	60	0.00832	2.99	1.49
P. octotaenia	1	7	70	0.01495	2.94	3.08
P. octotaenia	1	14	140	0.01495	2.94	6.15
P. octotaenia	2	10	100	0.01495	2.94	8.79
P. octotaenia	1	6	60	0.01495	2.94	2.64
P. octotaenia	1	6	60	0.01495	2.94	2.64
P. octotaenia	2	7	70	0.01495	2.94	6.15
S. marginatus	1	5	50	0.00087	3.12	0.14
C. vanderbilti	13	3	30	0.00102	3.06	1.22
P. johnstonianus	2	7	70	0.02291	2.95	9.46
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. arcatus	1	3	30	0.00912	3.08	0.84
G. undulatus	1	20	200	0.01514	2.99	9.05
	98	301				391.99
						3.92

Fish Benthic Study

Papalaua Offshore Two

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. rubroviolaceaus	2	22	220	0.01288	3.04	17.23
C. sordidus	1	17	170	0.01549	3.06	8.06
C. sordidus	1	14	140	0.01549	3.06	6.64
C. strigosus	20	8	80	0.02465	3.03	119.50
C. strigosus	7	10	100	0.02465	3.03	52.28
A. nigrofuscus	12	7	70	0.02692	2.97	67.16
A. nigrofuscus	13	10	100	0.02692	2.97	103.94
A. nigrofuscus	10	9	90	0.02692	2.97	71.96
N. brevirostris	5	14	140	0.02399	2.99	50.21
N. brevirostris	3	17	170	0.02399	2.99	36.58
A. nigroris	4	22	220	0.02570	2.97	67.17
A. nigroris	1	18	180	0.02570	2.97	13.74
S. bursa	4	16	160	0.02191	2.98	41.79
C. multicintus	3	10	100	0.02487	3.05	22.76
C. multicintus	1	8	80	0.02487	3.05	6.07
P. multifasciatus	1	14	140	0.01047	3.15	4.62
P. multifasciatus	1	5	50	0.01047	3.15	1.65
T. duperrey	1	12	120	0.00832	2.99	2.99
P. octotaenia	4	9	90	0.01495	2.94	15.82
S. balteata	1	7	70	0.01023	2.99	2.14
G. varius	3	8	80	0.00661	2.97	4.71
P. johnstonianus	7	6	60	0.02291	2.95	28.39
P. johnstonianus	2	8	80	0.02291	2.95	10.81
S. faciolatus	12	7	70	0.01514	2.99	38.03
S. faciolatus	8	8	80	0.01514	2.99	28.97
C. hanui	1	5	50	0.01987	3.01	2.99
C. jactator	1	4	40	0.02239	2.96	2.65
	129	295				828.84
	# of fish	average size		Convert to kg		8.29
		Overall Ranking (kg/m squared				**2.37**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	16	160	0.02548	2.98	36.45
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	2	4	40	0.02692	2.97	6.40
A. nigrofuscus	1	3	30	0.02692	2.97	2.40
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	5	5	50	0.02692	2.97	19.99
A. nigrofuscus	1	6	60	0.02692	2.97	4.80
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	7	6	60	0.02465	3.03	31.37
C. strigosus	12	5	50	0.02465	3.03	44.81
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	7	70	0.02465	3.03	10.46
R. aculeatus	3	18	180	0.02630	2.98	42.32
P. multifasciatus	1	13	130	0.01047	3.15	4.29
P. multifasciatus	2	4	40	0.01047	3.15	2.64
P. multifasciatus	1	6	60	0.01047	3.15	1.98
T. duperrey	5	3	30	0.00832	2.99	3.73
T. duperrey	4	8	80	0.00832	2.99	7.96
T. duperrey	1	6	60	0.00832	2.99	1.49
P. octotaenia	1	7	70	0.01495	2.94	3.08
P. octotaenia	3	14	140	0.01495	2.94	18.46
P. octotaenia	2	10	100	0.01495	2.94	8.79
P. octotaenia	1	6	60	0.01495	2.94	2.64
P. octotaenia	2	6	60	0.01495	2.94	5.27
C. vanderbilti	20	3	30	0.00102	3.06	1.87
P. johnstonianus	2	7	70	0.02291	2.95	9.46
P. johnstonianus	5	6	60	0.02291	2.95	20.28
P. arcatus	3	3	30	0.00912	3.08	2.53
	99	212				357.58
						3.58

Fish Benthic Study

Papalau Nearshore
Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	1	22	220	0.01549	3.06	10.43
C. sordidus	1	12	120	0.01549	3.06	5.69
S. rubroviolaceus	1	27	270	0.01288	3.04	10.57
C. strigosus	2	20	200	0.02465	3.03	29.88
C. strigosus	1	18	180	0.02465	3.03	13.44
C. strigosus	5	17	170	0.02465	3.03	63.49
C. strigosus	3	12	120	0.02465	3.03	26.89
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
A. nigrofuscus	5	10	100	0.02692	2.97	39.98
A. nigrofuscus	6	11	110	0.02692	2.97	52.77
N. lituratus	2	18	180	0.03020	2.97	32.29
N. lituratus	1	25	250	0.03020	2.97	22.42
N. unicornis	1	22	220	0.02570	2.95	16.68
M. vidua	1	27	270	0.01000	3.04	8.21
Z. flavescens	2	12	120	0.02512	3.00	18.09
C. unimaculatus	1	13	130	0.01230	3.04	4.86
C. ornatissimus	1	22	220	0.02570	3.01	17.02
C. ornatissimus	1	18	180	0.02570	3.01	13.92
C. ornatissimus	1	16	160	0.02570	3.01	12.38
M. vanicolensis	1	9	90	0.00794	3.05	2.18
L. phthirophagus	1	5	50	0.00955	3.05	1.46
T. duperrey	1	17	170	0.00832	2.99	4.23
S. balteata	1	8	80	0.01023	2.99	2.45
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	2	5	50	0.00661	2.97	1.96
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	10	100	0.00661	2.97	1.96
C. vanderbilti	20	2	20	0.00102	3.06	1.25
C. vanderbilti	15	3	30	0.00102	3.06	1.40
C. vanderbilti	1	4	40	0.00102	3.06	0.12
A. vaigiensis	7	13	130	0.01413	3.00	38.57
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	1	3	30	0.02291	2.95	2.03
Totals	92	13.18				485.66
	# of fish	average size		Convert to kg		4.86
Overall Ranking (kg/m squared		**2.08**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	1	8	80	0.02548	2.98	6.07
C. perspicillatus	1	16	160	0.02548	2.98	12.15
C. strigosus	2	4	40	0.02465	3.03	5.98
C. strigosus	3	5	50	0.02465	3.03	11.20
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	3	10	100	0.02465	3.03	22.41
C. strigosus	3	8	80	0.02465	3.03	17.93
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
A. nigrofuscus	19	8	80	0.02692	2.97	121.53
A. nigrofuscus	3	13	130	0.02692	2.97	31.18
A. nigrofuscus	4	7	70	0.02692	2.97	22.39
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	6	4	40	0.02692	2.97	19.19
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
R. aculeatus	1	11	110	0.02630	2.98	8.62
C. auriga	1	16	160	0.02698	2.95	12.73
C. auriga	4	15	150	0.02698	2.95	47.75
C. multicintus	1	7	70	0.02487	3.05	5.31
P. multifasciatus	1	24	240	0.01047	3.15	7.92
P. multifasciatus	1	6	60	0.01047	3.15	1.98
P. multifasciatus	1	5	50	0.01047	3.15	1.65
P. multifasciatus	1	8	80	0.01047	3.15	2.64
L. phthirofagus	1	4	40	0.00955	3.05	1.17
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	1	3	30	0.00661	2.97	0.59
G. varius	1	5	50	0.00661	2.97	0.98
T. duperrey	1	3	30	0.00832	2.99	0.75
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	6	6	60	0.00832	2.99	8.96
T. duperrey	1	8	80	0.00832	2.99	1.99
N. ornatissimus	4	6	60	0.0257	3.01	18.57
C. vanderbilti	186	3	30	0.00102	3.06	17.42
C. vanderbilti	45	5	50	0.00102	3.06	7.02
C. vanderbilti	29	4	40	0.00102	3.06	3.62
P. johnstonianus	1	4	40	0.02291	2.95	2.70
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	1	8	80	0.02291	2.95	5.41
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	1	5	50	0.00087	3.12	0.14
P.arcatus	1	7	70	0.00912	3.08	1.97
Totals	355	7.22				551.91
	# of fish	average size				5.52

Fish Benthic Study

Papalau Nearshore Two
Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	2	20	200	0.01549	3.06	18.96
C. sordidus	1	12	120	0.01549	3.06	5.69
S. rubroviolaceus	1	25	250	0.01288	3.04	9.79
C. strigosus	2	20	200	0.02465	3.03	29.88
C. strigosus	1	18	180	0.02465	3.03	13.44
C. strigosus	4	16	160	0.02465	3.03	47.80
C. strigosus	3	12	120	0.02465	3.03	26.89
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
A. nigrofuscus	4	9	90	0.02692	2.97	28.78
A. nigrofuscus	4	11	110	0.02692	2.97	35.18
N. lituratus	2	20	200	0.03020	2.97	35.88
N. lituratus	1	24	240	0.03020	2.97	21.53
N. unicornis	2	22	220	0.02570	2.95	33.36
M. vidua	1	27	270	0.01000	3.04	8.21
Z. flavescens	1	12	120	0.02512	3.00	9.04
C. unimaculatus	1	13	130	0.01230	3.04	4.86
C. ornatissimus	1	22	220	0.02570	3.01	17.02
C. ornatissimus	2	17	170	0.02570	3.01	26.30
C. ornatissimus	1	15	150	0.02570	3.01	11.60
M. vanicolensis	1	9	90	0.00794	3.05	2.18
L. phthirophagus	1	5	50	0.00955	3.05	1.46
T. duperrey	1	16	160	0.00832	2.99	3.98
S. balteata	1	8	80	0.01023	2.99	2.45
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	2	5	50	0.00661	2.97	1.96
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	9	90	0.00661	2.97	1.77
C. vanderbilti	14	2	20	0.00102	3.06	0.87
C. vanderbilti	5	3	30	0.00102	3.06	0.47
C. vanderbilti	1	4	40	0.00102	3.06	0.12
A. vaigiensis	6	14	140	0.01413	3.00	35.61
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	1	3	30	0.02291	2.95	2.03
Totals	73	12.94				466.15
	# of fish	average size		Convert to kg		4.66
Overall Ranking (kg/m squared		**2.03**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	2	8	80	0.02548	2.98	12.15
C. perspicillatus	1	15	150	0.02548	2.98	11.39
C. strigosus	2	4	40	0.02465	3.03	5.98
C. strigosus	3	5	50	0.02465	3.03	11.20
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	3	9	90	0.02465	3.03	20.17
C. strigosus	3	8	80	0.02465	3.03	17.93
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
A. nigrofuscus	15	8	80	0.02692	2.97	95.94
A. nigrofuscus	3	13	130	0.02692	2.97	31.18
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
A. nigrofuscus	3	7	70	0.02692	2.97	16.79
A. nigrofuscus	8	4	40	0.02692	2.97	25.58
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
R. aculeatus	1	11	110	0.02630	2.98	8.62
C. auriga	1	17	170	0.02698	2.95	13.53
C. auriga	6	15	150	0.02698	2.95	71.63
C. multicintus	1	7	70	0.02487	3.05	5.31
P. multifasciatus	1	24	240	0.01047	3.15	7.92
P. multifasciatus	1	6	60	0.01047	3.15	1.98
P. multifasciatus	2	5	50	0.01047	3.15	3.30
P. multifasciatus	1	8	80	0.01047	3.15	2.64
L. phthirofagus	1	4	40	0.00955	3.05	1.17
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	1	3	30	0.00661	2.97	0.59
G. varius	2	5	50	0.00661	2.97	1.96
T. duperrey	1	3	30	0.00832	2.99	0.75
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	4	5	50	0.00832	2.99	4.98
T. duperrey	1	8	80	0.00832	2.99	1.99
N. ornatissimus	4	6	60	0.0257	3.01	18.57
C. vanderbilti	23	3	30	0.00102	3.06	2.15
C. vanderbilti	31	5	50	0.00102	3.06	4.84
C. vanderbilti	15	4	40	0.00102	3.06	1.87
P. johnstonianus	1	4	40	0.02291	2.95	2.70
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	4	8	80	0.02291	2.95	21.63
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	4	5	50	0.00087	3.12	0.54
P.arcatus	1	7	70	0.00912	3.08	1.97
Totals	169	7.20				547.76
	# of fish	average size				5.48

Fish Benthic Study

Olowalu Offshore Two

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. argus	4	14	140	0.00102	3.06	1.75
N. brevirostris	6	17	170	0.02399	2.99	73.16
N. hexacanthus	2	14	140	0.0257	2.95	21.23
A. olivaceaus	1	14	140	0.02485	3.05	10.61
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	17	11	110	0.02692	2.97	149.51
S. bursa	5	18	180	0.02191	2.98	58.76
C. kleinii	1	8	80	0.02692	3.01	6.48
P. multifaciatus	1	7	70	0.01047	3.15	2.31
P. plurostigma	2	9	90	0.00844	2.98	4.53
T. duperrey	3	4	40	0.00832	2.99	2.99
T. duperrey	2	8	80	0.00832	2.99	3.98
T. duperrey	8	5	50	0.00832	2.99	9.95
P. arcatus	1	4	40	0.00912	3.08	1.12
P. arcatus	1	8	80	0.00912	3.08	2.25
B. bilunulatus	1	17	170	0.00329	3.02	1.69
C. gaimard	2	7	70	0.00832	2.99	3.48
G. varius	1	5	50	0.00661	2.97	0.98
G. varius	1	6	60	0.00661	2.97	1.18
S. balteata	5	7	70	0.01023	2.99	10.71
C. vanderbilti	4	3	30	0.00102	3.06	0.37
	75	196				423.01
	# of fish	average size		Convert to kg		4.23
		Overall Ranking (kg/m squared				**1.14**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
M. vidua	1	16	160	0.01000	3.04	4.86
R. aculeatus	2	14	140	0.02630	2.98	21.94
P. multifasciatus	6	6	60	0.01047	3.15	11.87
T. duperrey	5	6	60	0.00832	2.99	7.46
T. duperrey	11	7	70	0.00832	2.99	19.16
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	13	130	0.00832	2.99	3.23
C. gaimard	3	7	70	0.00832	2.99	5.22
P. octotaenia	1	6	60	0.00924	3.02	1.67
P. johnstonianus	7	5	50	0.02291	2.95	23.65
P. johnstonianus	3	6	60	0.02291	2.95	12.17
C. vanderbilti	6	7	70	0.00102	3.06	1.31
C. vanderbilti	3	9	90	0.00102	3.06	0.84
	55	118				147.38
						1.47

Fish Benthic Study

Olowalu Offshore Three

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. argus	5	14	140	0.00102	3.06	2.18
N. brevirostris	6	17	170	0.02399	2.99	73.16
N. hexacanthus	2	12	120	0.0257	2.95	18.20
A. olivaceaus	1	14	140	0.02485	3.05	10.61
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	17	11	110	0.02692	2.97	149.51
S. bursa	5	18	180	0.02191	2.98	58.76
C. kleinii	4	8	80	0.02692	3.01	25.93
P. multifaciatus	1	8	80	0.01047	3.15	2.64
P. plurostigma	2	9	90	0.00844	2.98	4.53
T. duperrey	3	5	50	0.00832	2.99	3.73
T. duperrey	2	8	80	0.00832	2.99	3.98
T. duperrey	8	5	50	0.00832	2.99	9.95
P. arcatus	1	4	40	0.00912	3.08	1.12
P. arcatus	4	8	80	0.00912	3.08	8.99
B. bilunulatus	1	17	170	0.00329	3.02	1.69
C. gaimard	3	7	70	0.00832	2.99	5.22
G. varius	1	5	50	0.00661	2.97	0.98
G. varius	1	6	60	0.00661	2.97	1.18
S. balteata	4	6	60	0.01023	2.99	7.34
C. vanderbilti	5	3	30	0.00102	3.06	0.47
	83	195				446.15
	# of fish	average size		Convert to kg		4.46
		Overall Ranking (kg/m squared				**1.24**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	6	10	100	0.02692	2.97	47.97
M. vidua	1	18	180	0.01000	3.04	5.47
R. aculeatus	2	15	150	0.02630	2.98	23.51
P. multifasciatus	6	6	60	0.01047	3.15	11.87
T. duperrey	5	6	60	0.00832	2.99	7.46
T. duperrey	11	7	70	0.00832	2.99	19.16
T. duperrey	5	7	70	0.00832	2.99	8.71
T. duperrey	1	13	130	0.00832	2.99	3.23
C. gaimard	3	7	70	0.00832	2.99	5.22
P. octotaenia	1	6	60	0.00924	3.02	1.67
P. johnstonianus	8	5	50	0.02291	2.95	27.03
P. johnstonianus	3	6	60	0.02291	2.95	12.17
C. vanderbilti	6	7	70	0.00102	3.06	1.31
C. vanderbilti	4	8	80	0.00102	3.06	1.00
	62	121				175.79
						1.76

Fish Benthic Study

Olowalu Offshore One

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
D. macarellus	1	17	170	0.01660	2.97	8.38
C. argus	1	15	150	0.00102	3.06	0.47
N. brevirostris	3	17	170	0.02399	2.99	36.58
N. hexacanthus	2	15	150	0.0257	2.95	22.74
A. olivaceaus	1	14	140	0.02485	3.05	10.61
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
S. bursa	2	18	180	0.02191	2.98	23.51
C. kleinii	1	8	80	0.02692	3.01	6.48
P. multifaciatus	1	8	80	0.01047	3.15	2.64
P. plurostigma	2	9	90	0.00844	2.98	4.53
T. duperrey	3	4	40	0.00832	2.99	2.99
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	5	50	0.00832	2.99	1.24
P. arcatus	1	4	40	0.00912	3.08	1.12
P. arcatus	1	8	80	0.00912	3.08	2.25
B. bilunulatus	1	17	170	0.00329	3.02	1.69
C. gaimard	1	7	70	0.00832	2.99	1.74
G. varius	1	4	40	0.00661	2.97	0.79
G. varius	1	6	60	0.00661	2.97	1.18
S. balteata	1	7	70	0.01023	2.99	2.14
C. vanderbilti	1	3	30	0.00102	3.06	0.09
	37	215				215.51
	# of fish	average size		Convert to kg		2.16
		Overall Ranking (kg/m squared				**0.61**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	4	7	70	0.02692	2.97	22.39
M. vidua	1	18	180	0.01000	3.04	5.47
R. aculeatus	1	15	150	0.02630	2.98	11.76
P. multifasciatus	6	6	60	0.01047	3.15	11.87
T. duperrey	4	6	60	0.00832	2.99	5.97
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	14	140	0.00832	2.99	3.48
C. gaimard	1	7	70	0.00832	2.99	1.74
P. octotaenia	1	6	60	0.00924	3.02	1.67
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	1	6	60	0.02291	2.95	4.06
C. vanderbilti	1	7	70	0.00102	3.06	0.22
C. vanderbilti	2	9	90	0.00102	3.06	0.56
	28	129				89.10
						0.89

Fish Benthic Study

Olowalu Offshore Five

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
D. macarellus	5	16	160	0.01660	2.97	39.44
C. argus	1	15	150	0.00102	3.06	0.47
N. brevirostris	7	16	160	0.02399	2.99	80.34
N. hexacanthus	4	12	120	0.0257	2.95	36.39
A. olivaceaus	2	15	150	0.02485	3.05	22.74
A. nigrofuscus	15	10	100	0.02692	2.97	119.93
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
S. bursa	3	16	160	0.02191	2.98	31.34
C. kleinii	3	8	80	0.02692	3.01	19.45
P. multifaciatus	1	8	80	0.01047	3.15	2.64
P. plurostigma	2	9	90	0.00844	2.98	4.53
T. duperrey	14	5	50	0.00832	2.99	17.41
T. duperrey	6	5	50	0.00832	2.99	7.46
P. arcatus	1	4	40	0.00912	3.08	1.12
C. gaimard	3	8	80	0.00832	2.99	5.97
G. varius	3	5	50	0.00661	2.97	2.94
G. varius	6	7	70	0.00661	2.97	8.25
S. balteata	4	6	60	0.01023	2.99	7.34
C. vanderbilti	3	3	30	0.00102	3.06	0.28
	85	148				438.49
	# of fish	average size		Convert to kg		4.38
		Overall Ranking (kg/m squared				**1.40**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	4	7	70	0.02692	2.97	22.39
A. nigrofuscus	7	12	120	0.02692	2.97	67.16
M. vidua	3	18	180	0.01000	3.04	16.42
R. aculeatus	2	15	150	0.02630	2.98	23.51
P. multifasciatus	6	6	60	0.01047	3.15	11.87
T. duperrey	8	9	90	0.00832	2.99	17.91
T. duperrey	16	7	70	0.00832	2.99	27.86
T. duperrey	6	7	70	0.00832	2.99	10.45
T. duperrey	15	13	130	0.00832	2.99	48.51
C. gaimard	3	7	70	0.00832	2.99	5.22
P. octotaenia	2	7	70	0.00924	3.02	3.91
P. johnstonianus	7	6	60	0.02291	2.95	28.39
C. vanderbilti	5	7	70	0.00102	3.06	1.09
	80	114				262.30
						2.62

Fish Benthic Study

Olawalu Two Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. furca	4	18	180	0.02691	3.01	58.32
A. nigrofuscus	5	12	120	0.02692	2.97	47.97
A. nigrofuscus	5	11	110	0.02692	2.97	43.97
A. nigrofuscus	8	8	80	0.02692	2.97	51.17
A. leucopareius	4	15	150	0.02692	2.97	47.97
R. rectangulus	1	20	200	0.01991	2.87	11.43
M. niger	1	18	180	0.01588	3.08	8.80
Z. cornutus	1	20	200	0.00698	2.98	4.16
T. duperrey	3	7	70	0.00832	2.99	5.22
T. duperrey	1	9	90	0.00832	2.99	2.24
G. varius	2	6	60	0.00661	2.97	2.36
G. varius	1	5	50	0.00661	2.97	0.98
S. balteata	4	5	50	0.01023	2.99	6.12
S. balteata	2	6	60	0.01023	2.99	3.67
E. brevis	2	5	50	0.01995	3.01	6.00
P. ewaensis	2	6	60	0.0038	3.22	1.47
P. imparipennis	2	5	50	0.01549	2.99	4.63
S. faciolatus	5	6	60	0.01514	2.99	13.58
S. faciolatus	5	7	70	0.01514	2.99	15.84
Totals	58	5.56				335.92
	# of fish	average size		Convert to kg		3.36
Overall Ranking (kg/m squared		**3.41**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	3	14	140	0.01995	2.98	24.97
A. nigrofuscus	22	10	100	0.02692	2.97	175.90
A. nigrofuscus	14	8	80	0.02692	2.97	89.55
A. nigrofuscus	5	4	40	0.02692	2.97	15.99
A. nigrofuscus	61	15	150	0.02692	2.97	731.56
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
N. lituratus	5	11	110	0.03020	2.97	49.33
N. lituratus	1	20	200	0.03020	2.97	17.94
N. lituratus	3	23	230	0.03020	2.97	61.89
R. rectangulus	1	18	180	0.01991	2.87	10.29
R. rectangulus	3	16	160	0.01991	2.87	27.43
R. rectangulus	1	18	180	0.01991	2.87	10.29
M. niger	2	22	220	0.01588	3.08	21.52
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	5	8	80	0.00832	2.99	9.95
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	4	15	150	0.00832	2.99	14.93
G. varius	1	12	120	0.00661	2.97	2.36
L. phthirophagus	1	6	60	0.00955	3.05	1.75
S. marginatus	4	8	80	0.00087	3.12	0.87
S. marginatus	5	6	60	0.00087	3.12	0.81
S. marginatus	1	5	50	0.00087	3.12	0.14
P. imparipennis	1	4	40	0.01549	2.99	1.85
P. imparipennis	2	6	60	0.01549	2.99	5.56
P. imparipennis	1	5	50	0.01549	2.99	2.32
C. vanderbilti	23	3	30	0.00102	3.06	2.15
C. vanderbilti	11	4	40	0.00102	3.06	1.37
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. johnstonianus	1	6	60	0.02291	2.95	4.06
C. vanderbilti	5	5	50	0.00102	3.06	0.78
N. unicornis	2	12	120	0.02570	2.95	18.20
N. hexacanthus	2	14	140	0.0257	2.95	21.23
C. jactator	2	6	60	0.02239	2.96	7.95
Totals	201	7.51				1368.11
	# of fish	average size				13.68

Fish Benthic Study

Olawalu Three Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	4	12	120	0.02692	2.97	38.38
A. nigrofuscus	5	11	110	0.02692	2.97	43.97
A. nigrofuscus	8	8	80	0.02692	2.97	51.17
A. leucopareius	4	15	150	0.02692	2.97	47.97
R. rectangulus	1	20	200	0.01991	2.87	11.43
M. niger	4	16	160	0.01588	3.08	31.30
Z. cornutus	1	18	180	0.00698	2.98	3.74
T. duperrey	1	9	90	0.00832	2.99	2.24
G. varius	2	6	60	0.00661	2.97	2.36
G. varius	3	5	50	0.00661	2.97	2.94
S. balteata	4	5	50	0.01023	2.99	6.12
S. balteata	2	7	70	0.01023	2.99	4.28
P. ewaensis	3	6	60	0.0038	3.22	2.20
P. imparipennis	2	5	50	0.01549	2.99	4.63
S. faciolatus	5	6	60	0.01514	2.99	13.58
Totals	49	4.38				266.32
	# of fish	average size		Convert to kg		2.66
Overall Ranking (kg/m squared		**2.38**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	15	10	100	0.02692	2.97	119.93
A. nigrofuscus	14	8	80	0.02692	2.97	89.55
A. nigrofuscus	5	4	40	0.02692	2.97	15.99
A. nigrofuscus	21	15	150	0.02692	2.97	251.85
A. nigrofuscus	12	8	80	0.02692	2.97	76.75
N. lituratus	5	11	110	0.03020	2.97	49.33
N. lituratus	1	22	220	0.03020	2.97	19.73
R. rectangulus	9	18	180	0.01991	2.87	92.57
R. rectangulus	5	16	160	0.01991	2.87	45.71
R. rectangulus	1	18	180	0.01991	2.87	10.29
M. niger	2	22	220	0.01588	3.08	21.52
T. duperrey	9	9	90	0.00832	2.99	20.15
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	4	15	150	0.00832	2.99	14.93
G. varius	1	12	120	0.00661	2.97	2.36
S. marginatus	3	8	80	0.00087	3.12	0.65
S. marginatus	5	6	60	0.00087	3.12	0.81
S. marginatus	1	5	50	0.00087	3.12	0.14
C. vanderbilti	5	3	30	0.00102	3.06	0.47
C. vanderbilti	11	4	40	0.00102	3.06	1.37
P. johnstonianus	5	6	60	0.02291	2.95	20.28
P. johnstonianus	4	7	70	0.02291	2.95	18.92
P. johnstonianus	1	6	60	0.02291	2.95	4.06
N. unicornis	4	12	120	0.02570	2.95	36.39
C. jactator	2	6	60	0.02239	2.96	7.95
Totals	146	5.71				923.19
	# of fish	average size				9.23

Fish Benthic Study

Olawalu Six Offshore

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	1	18	180	0.01995	2.98	10.70
C. argus	1	34	340	0.00102	3.06	1.06
C. sordidus	2	27	270	0.01549	3.06	25.60
C. sordidus	1	30	300	0.01549	3.06	14.22
C. sordidus	1	35	350	0.01549	3.06	16.59
C. sordidus	3	18	180	0.01549	3.06	25.60
C. strigosus	10	12	120	0.02465	3.03	89.63
C. strigosus	15	10	100	0.02465	3.03	112.03
C. strigosus	7	8	80	0.02465	3.03	41.83
A. nigrofuscus	15	8	80	0.02692	2.97	95.94
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
A. nigrofuscus	16	12	120	0.02692	2.97	153.51
A. nigrofuscus	8	14	140	0.02692	2.97	89.55
N. lituratus	1	18	180	0.03020	2.97	16.14
C. ornatissimus	1	25	250	0.02570	3.01	19.34
C. ornatissimus	1	11	110	0.02570	3.01	8.51
C. ornatissimus	1	10	100	0.02570	3.01	7.74
S. bursa	1	15	150	0.02191	2.98	9.79
F. flavissimus	1	13	130	0.02818	3.04	11.14
C. multicinctus	4	12	120	0.02487	3.05	36.41
C. unimaculatus	2	12	120	0.01230	3.04	8.97
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	5	50	0.00832	2.99	1.24
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	3	6	60	0.00832	2.99	4.48
O. unifasciatus	1	9	90	0.01964	2.99	5.29
L. phthirophagus	1	7	70	0.00955	3.05	2.04
P. arcatus	1	6	60	0.00912	3.08	1.69
S. balteata	1	7	70	0.01023	2.99	2.14
S. balteata	1	8	80	0.01023	2.99	2.45
C. vanderbilti	3	4	40	0.00102	3.06	0.37
C. vanderbilti	10	3	30	0.00102	3.06	0.94
C. jactator	1	5	50	0.02239	2.96	3.31
	125	429				892.57
	# of fish	average size		Convert to kg		8.93
		Overall Ranking (kg/m squared				**3.17**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	2	18	180	0.02548	2.98	27.33
C. perspicillatus	3	14	140	0.02548	2.98	31.89
C. strigosus	6	8	80	0.02465	3.03	35.85
C. strigosus	3	6	60	0.02465	3.03	13.44
C. strigosus	12	7	70	0.02465	3.03	62.74
C. strigosus	7	10	100	0.02465	3.03	52.28
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	1	12	120	0.02465	3.03	8.96
C. strigosus	1	11	110	0.02465	3.03	8.22
C. strigosus	1	14	140	0.02465	3.03	10.46
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	2	11	110	0.02692	2.97	17.59
A. nigrofuscus	16	9	90	0.02692	2.97	115.13
A. nigrofuscus	15	8	80	0.02692	2.97	95.94
A. nigrofuscus	1	7	70	0.02692	2.97	5.60
Z. flavescens	2	4	40	0.02512	3.00	6.03
Z. flavescens	1	11	110	0.02512	3.00	8.29
C. ornatissimus	1	15	150	0.02570	3.01	11.60
C. ornatissimus	2	10	100	0.02570	3.01	15.47
C. multicinctus	2	9	90	0.02487	3.05	13.65
C. argus	1	17	170	0.00102	3.06	0.53
G. varius	2	7	70	0.00661	2.97	2.75
O. unifasciatus	1	10	100	0.01964	2.99	5.87
O. unifasciatus	1	12	120	0.01964	2.99	7.05
O. unifasciatus	1	15	150	0.01964	2.99	8.81
O. unifasciatus	1	11	110	0.01964	2.99	6.46
T. duperrey	3	8	80	0.00832	2.99	5.97
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	13	130	0.00832	2.99	3.23
T. duperrey	1	7	70	0.00832	2.99	1.74
P. johnstonianus	3	6	60	0.02291	2.95	12.17
P. johnstonianus	1	8	80	0.02291	2.95	5.41
C. vanderbilti	18	4	40	0.00102	3.06	2.25
C. vanderbilti	3	5	50	0.00102	3.06	0.47
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	1	9	90	0.00087	3.12	0.24
C. jactator	1	6	60	0.02239	2.96	3.98
C. vanderbilti	1	8	80	0.00102	3.06	0.25
	132	371				694.43
						6.94

Fish Benthic Study

Olawalu Six Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. argus	1	18	180	0.00102	3.06	0.56
S. rubroviolaceus	1	18	180	0.01288	3.04	7.05
S. rubroviolaceus	1	25	250	0.01288	3.04	9.79
S. rubroviolaceus	1	12	120	0.01288	3.04	4.70
C. strigosus	3	4	40	0.02465	3.03	8.96
C. strigosus	7	7	70	0.02465	3.03	36.60
C. strigosus	8	8	80	0.02465	3.03	47.80
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	2	13	130	0.02465	3.03	19.42
A. nigrofuscus	15	5	50	0.02692	2.97	59.96
A. nigrofuscus	10	8	80	0.02692	2.97	63.96
A. nigrofuscus	10	12	120	0.02692	2.97	95.94
A. triostegus	1	12	120	0.02484	2.86	8.53
N. lituratus	1	14	140	0.03020	2.97	12.56
S. bursa	1	12	120	0.02191	2.98	7.84
M. niger	2	18	180	0.01588	3.08	17.61
C. ornatissimus	1	19	190	0.02570	3.01	14.70
C. multicinctus	2	12	120	0.02487	3.05	18.20
T. duperrey	5	8	80	0.00832	2.99	9.95
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	4	11	110	0.00832	2.99	10.95
T. duperrey	3	9	90	0.00832	2.99	6.72
G. varius	1	4	40	0.00661	2.97	0.79
G. varius	1	3	30	0.00661	2.97	0.59
P. forsteri	1	8	80	0.00912	3.08	2.25
C. vanderbilti	8	3	30	0.00102	3.06	0.75
C. vanderbilti	2	4	40	0.00102	3.06	0.25
A. abdominalis	2	16	160	0.00107	3.11	1.06
S. faciolatus	3	6	60	0.01514	2.99	8.15
P. johnstonianus	5	4	40	0.02291	2.95	13.52
S. balteata	1	7	70	0.01023	2.99	2.14
Totals	114	9.71				568.46
	# of fish	average size		Convert to kg		5.68
Overall Ranking (kg/m squared		**2.81**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	11	110	0.02548	2.98	25.06
C. perspicillatus	2	21	210	0.02548	2.98	31.89
C. perspicillatus	1	22	220	0.02548	2.98	16.70
A. nigrofuscus	4	5	50	0.02692	2.97	15.99
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	17	10	100	0.02692	2.97	135.92
A. nigrofuscus	10	9	90	0.02692	2.97	71.96
A. nigrofuscus	4	12	120	0.02692	2.97	38.38
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
C. strigosus	15	10	100	0.02465	3.03	112.03
C. strigosus	2	11	110	0.02465	3.03	16.43
C. strigosus	3	5	50	0.02465	3.03	11.20
C. strigosus	3	12	120	0.02465	3.03	26.89
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	3	8	80	0.02465	3.03	17.93
C. strigosus	2	4	40	0.02465	3.03	5.98
C. dumerilii	1	20	200	0.02042	2.94	12.01
C. dumerilii	1	16	160	0.02042	2.94	9.61
R. aculeatus	3	22	220	0.02630	2.98	51.73
R. aculeatus	1	13	130	0.02630	2.98	10.19
C. lunulatus	2	15	150	0.02571	3.01	23.22
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	3	6	60	0.00832	2.99	4.48
T. duperrey	9	5	50	0.00832	2.99	11.19
T. duperrey	1	3	30	0.00832	2.99	0.75
L. phthirophagus	1	6	60	0.00955	3.05	1.75
G. varius	4	5	50	0.00661	2.97	3.93
G. varius	2	8	80	0.00661	2.97	3.14
G. varius	1	10	100	0.00661	2.97	1.96
G. varius	1	13	130	0.00661	2.97	2.55
G. varius	1	6	60	0.00661	2.97	1.18
S. balteata	1	7	70	0.01023	2.99	2.14
P. johnstonianus	3	7	70	0.02291	2.95	14.19
C. vanderbilti	44	4	40	0.00102	3.06	5.49
C. vanderbilti	4	6	60	0.00102	3.06	0.75
S. marginatus	2	8	80	0.00087	3.12	0.43
S. marginatus	1	7	70	0.00087	3.12	0.19
A. abdominalis	1	14	140	0.00107	3.11	0.47
C. jactator	4	5	50	0.02239	2.96	13.25
Totals	181	8.87				838.88
	# of fish	average size				8.39

Fish Benthic Study

Olawalu Seven Offshore

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	3	25	250	0.01549	3.06	35.55
C. sordidus	2	28	280	0.01549	3.06	26.54
C. sordidus	2	35	350	0.01549	3.06	33.18
C. sordidus	2	19	190	0.01549	3.06	18.01
C. strigosus	8	12	120	0.02465	3.03	71.70
C. strigosus	15	10	100	0.02465	3.03	112.03
C. strigosus	8	9	90	0.02465	3.03	53.78
A. nigrofuscus	15	8	80	0.02692	2.97	95.94
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
A. nigrofuscus	16	13	130	0.02692	2.97	166.30
A. nigrofuscus	9	14	140	0.02692	2.97	100.74
N. lituratus	1	18	180	0.03020	2.97	16.14
C. ornatissimus	1	24	240	0.02570	3.01	18.57
C. ornatissimus	4	11	110	0.02570	3.01	34.04
C. ornatissimus	1	10	100	0.02570	3.01	7.74
S. bursa	2	15	150	0.02191	2.98	19.59
C. multicinctus	4	12	120	0.02487	3.05	36.41
C. unimaculatus	2	12	120	0.01230	3.04	8.97
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	5	50	0.00832	2.99	1.24
T. duperrey	2	9	90	0.00832	2.99	4.48
T. duperrey	3	6	60	0.00832	2.99	4.48
O. unifasciatus	1	9	90	0.01964	2.99	5.29
L. phthirophagus	1	7	70	0.00955	3.05	2.04
P. arcatus	2	6	60	0.00912	3.08	3.37
S. balteata	1	7	70	0.01023	2.99	2.14
C. vanderbilti	3	4	40	0.00102	3.06	0.37
C. vanderbilti	8	4	40	0.00102	3.06	1.00
C. jactator	3	5	50	0.02239	2.96	9.94
	129	356				961.93
	# of fish	average size		Convert to kg		9.62
		Overall Ranking (kg/m squared				**3.02**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	6	9	90	0.02465	3.03	40.33
C. strigosus	3	6	60	0.02465	3.03	13.44
C. strigosus	9	7	70	0.02465	3.03	47.05
C. strigosus	7	10	100	0.02465	3.03	52.28
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	1	12	120	0.02465	3.03	8.96
C. strigosus	1	11	110	0.02465	3.03	8.22
C. strigosus	1	14	140	0.02465	3.03	10.46
A. nigrofuscus	7	9	90	0.02692	2.97	50.37
A. nigrofuscus	2	11	110	0.02692	2.97	17.59
A. nigrofuscus	11	9	90	0.02692	2.97	79.15
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	1	7	70	0.02692	2.97	5.60
Z. flavescens	6	4	40	0.02512	3.00	18.09
Z. flavescens	1	11	110	0.02512	3.00	8.29
C. ornatissimus	1	12	120	0.02570	3.01	9.28
C. multicinctus	2	9	90	0.02487	3.05	13.65
C. argus	1	15	150	0.00102	3.06	0.47
G. varius	2	7	70	0.00661	2.97	2.75
O. unifasciatus	1	10	100	0.01964	2.99	5.87
O. unifasciatus	1	12	120	0.01964	2.99	7.05
O. unifasciatus	5	14	140	0.01964	2.99	41.11
O. unifasciatus	1	11	110	0.01964	2.99	6.46
T. duperrey	3	9	90	0.00832	2.99	6.72
T. duperrey	3	6	60	0.00832	2.99	4.48
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	7	70	0.00832	2.99	1.74
P. johnstonianus	3	7	70	0.02291	2.95	14.19
P. johnstonianus	1	8	80	0.02291	2.95	5.41
C. vanderbilti	16	4	40	0.00102	3.06	2.00
C. vanderbilti	3	6	60	0.00102	3.06	0.56
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	3	9	90	0.00087	3.12	0.73
C. jactator	1	6	60	0.02239	2.96	3.98
	115	305				547.57
						5.48

Fish Benthic Study

Olawalu Seven Nearshore
Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. rubroviolaceus	4	18	180	0.01288	3.04	28.19
S. rubroviolaceus	1	24	240	0.01288	3.04	9.40
S. rubroviolaceus	1	12	120	0.01288	3.04	4.70
C. strigosus	3	4	40	0.02465	3.03	8.96
C. strigosus	6	7	70	0.02465	3.03	31.37
C. strigosus	8	8	80	0.02465	3.03	47.80
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	5	9	90	0.02465	3.03	33.61
C. strigosus	2	13	130	0.02465	3.03	19.42
A. nigrofuscus	11	5	50	0.02692	2.97	43.97
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
A. nigrofuscus	5	12	120	0.02692	2.97	47.97
A. triostegus	1	12	120	0.02484	2.86	8.53
N. lituratus	1	14	140	0.03020	2.97	12.56
S. bursa	5	12	120	0.02191	2.98	39.18
M. niger	2	19	190	0.01588	3.08	18.59
C. ornatissimus	1	18	180	0.02570	3.01	13.92
C. multicinctus	3	12	120	0.02487	3.05	27.31
T. duperrey	5	8	80	0.00832	2.99	9.95
T. duperrey	4	11	110	0.00832	2.99	10.95
T. duperrey	3	9	90	0.00832	2.99	6.72
G. varius	1	4	40	0.00661	2.97	0.79
G. varius	2	3	30	0.00661	2.97	1.18
P. forsteri	1	8	80	0.00912	3.08	2.25
C. vanderbilti	6	4	40	0.00102	3.06	0.75
C. vanderbilti	2	4	40	0.00102	3.06	0.25
S. faciolatus	3	6	60	0.01514	2.99	8.15
P. johnstonianus	5	4	40	0.02291	2.95	13.52
S. balteata	2	7	70	0.01023	2.99	4.28
Totals	106	8.44				555.55
	# of fish	average size		Convert to kg		5.56
Overall Ranking (kg/m squared		**2.70**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	21	210	0.02548	2.98	47.84
C. perspicillatus	1	22	220	0.02548	2.98	16.70
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	14	10	100	0.02692	2.97	111.93
A. nigrofuscus	8	9	90	0.02692	2.97	57.57
A. nigrofuscus	4	12	120	0.02692	2.97	38.38
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
C. strigosus	15	10	100	0.02465	3.03	112.03
C. strigosus	2	11	110	0.02465	3.03	16.43
C. strigosus	3	6	60	0.02465	3.03	13.44
C. strigosus	3	12	120	0.02465	3.03	26.89
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	2	8	80	0.02465	3.03	11.95
C. strigosus	2	4	40	0.02465	3.03	5.98
C. dumerilii	1	22	220	0.02042	2.94	13.21
C. dumerilii	1	16	160	0.02042	2.94	9.61
R. aculeatus	3	24	240	0.02630	2.98	56.43
R. aculeatus	2	13	130	0.02630	2.98	20.38
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	2	6	60	0.00832	2.99	2.99
T. duperrey	5	5	50	0.00832	2.99	6.22
T. duperrey	1	3	30	0.00832	2.99	0.75
L. phthirophagus	2	6	60	0.00955	3.05	3.50
G. varius	2	8	80	0.00661	2.97	3.14
G. varius	1	10	100	0.00661	2.97	1.96
G. varius	2	13	130	0.00661	2.97	5.10
G. varius	1	6	60	0.00661	2.97	1.18
S. balteata	1	8	80	0.01023	2.99	2.45
P. johnstonianus	3	7	70	0.02291	2.95	14.19
C. vanderbilti	14	4	40	0.00102	3.06	1.75
C. vanderbilti	4	6	60	0.00102	3.06	0.75
S. marginatus	5	8	80	0.00087	3.12	1.09
S. marginatus	1	7	70	0.00087	3.12	0.19
C. jactator	9	6	60	0.02239	2.96	35.79
Totals	141	8.07				792.37
	# of fish	average size				7.92

Fish Benthic Study

Olawalu One Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. furca	1	18	180	0.02691	3.01	14.58
A. nigrofuscus	10	12	120	0.02692	2.97	95.94
A. nigrofuscus	15	10	100	0.02692	2.97	119.93
A. nigrofuscus	20	8	80	0.02692	2.97	127.92
A. leucopareius	1	15	150	0.02692	2.97	11.99
R. rectangulus	1	20	200	0.01991	2.87	11.43
M. niger	1	18	180	0.01588	3.08	8.80
Z. cornutus	1	22	220	0.00698	2.98	4.58
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	1	9	90	0.00832	2.99	2.24
G. varius	1	6	60	0.00661	2.97	1.18
G. varius	1	5	50	0.00661	2.97	0.98
S. balteata	4	5	50	0.01023	2.99	6.12
S. balteata	2	6	60	0.01023	2.99	3.67
E. brevis	1	5	50	0.01995	3.01	3.00
P. ewaensis	2	5	50	0.0038	3.22	1.22
P. imparipennis	3	5	50	0.01549	2.99	6.95
S. faciolatus	7	5	50	0.01514	2.99	15.84
S. faciolatus	4	7	70	0.01514	2.99	12.68
Totals	77	5.53				450.80
	# of fish	average size		Convert to kg		4.51
Overall Ranking (kg/m squared		**3.83**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	1	15	150	0.01995	2.98	8.92
A. nigrofuscus	29	10	100	0.02692	2.97	231.86
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	1	4	40	0.02692	2.97	3.20
A. nigrofuscus	80	16	160	0.02692	2.97	1023.39
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
N. lituratus	1	11	110	0.03020	2.97	9.87
N. lituratus	1	20	200	0.03020	2.97	17.94
N. lituratus	1	23	230	0.03020	2.97	20.63
R. rectangulus	1	18	180	0.01991	2.87	10.29
R. rectangulus	1	16	160	0.01991	2.87	9.14
R. rectangulus	1	20	200	0.01991	2.87	11.43
M. niger	1	22	220	0.01588	3.08	10.76
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	2	8	80	0.00832	2.99	3.98
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	1	15	150	0.00832	2.99	3.73
G. varius	1	14	140	0.00661	2.97	2.75
L. phthirophagus	1	6	60	0.00955	3.05	1.75
S. marginatus	4	7	70	0.00087	3.12	0.76
S. marginatus	3	6	60	0.00087	3.12	0.49
S. marginatus	1	5	50	0.00087	3.12	0.14
P. imparipennis	1	4	40	0.01549	2.99	1.85
P. imparipennis	1	6	60	0.01549	2.99	2.78
P. imparipennis	1	5	50	0.01549	2.99	2.32
C. vanderbilti	75	4	40	0.00102	3.06	9.36
C. vanderbilti	1	3	30	0.00102	3.06	0.09
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	1	5	50	0.02291	2.95	3.38
C. vanderbilti	1	6	60	0.00102	3.06	0.19
N. unicornis	2	12	120	0.02570	2.95	18.20
N. hexacanthus	1	14	140	0.0257	2.95	10.61
C. jactator	2	6	60	0.02239	2.96	7.95
Totals	225	7.64				1464.25
	# of fish	average size				14.64

Fish Benthic Study

DAR Olawalu Four Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	6	14	140	0.02692	2.97	67.16
A. nigrofuscus	5	11	110	0.02692	2.97	43.97
A. nigrofuscus	8	9	90	0.02692	2.97	57.57
A. leucopareius	4	15	150	0.02692	2.97	47.97
R. rectangulus	1	20	200	0.01991	2.87	11.43
M. niger	7	17	170	0.01588	3.08	58.20
Z. cornutus	4	18	180	0.00698	2.98	14.98
T. duperrey	1	9	90	0.00832	2.99	2.24
G. varius	2	6	60	0.00661	2.97	2.36
G. varius	3	5	50	0.00661	2.97	2.94
S. balteata	4	6	60	0.01023	2.99	7.34
S. balteata	1	7	70	0.01023	2.99	2.14
P. ewaensis	3	6	60	0.0038	3.22	2.20
P. imparipennis	2	5	50	0.01549	2.99	4.63
S. faciolatus	3	5	50	0.01514	2.99	6.79
Totals	54	4.50				331.92
	# of fish	average size		Convert to kg		3.32
Overall Ranking (kg/m squared		**2.25**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	8	12	120	0.02692	2.97	76.75
A. nigrofuscus	11	8	80	0.02692	2.97	70.36
A. nigrofuscus	4	4	40	0.02692	2.97	12.79
A. nigrofuscus	15	17	170	0.02692	2.97	203.88
A. nigrofuscus	21	8	80	0.02692	2.97	134.32
N. lituratus	6	11	110	0.03020	2.97	59.20
N. lituratus	4	20	200	0.03020	2.97	71.76
R. rectangulus	2	18	180	0.01991	2.87	20.57
R. rectangulus	1	16	160	0.01991	2.87	9.14
R. rectangulus	1	18	180	0.01991	2.87	10.29
M. niger	1	22	220	0.01588	3.08	10.76
T. duperrey	5	9	90	0.00832	2.99	11.19
T. duperrey	3	6	60	0.00832	2.99	4.48
T. duperrey	4	16	160	0.00832	2.99	15.92
G. varius	4	12	120	0.00661	2.97	9.42
S. marginatus	1	8	80	0.00087	3.12	0.22
S. marginatus	3	6	60	0.00087	3.12	0.49
S. marginatus	1	6	60	0.00087	3.12	0.16
C. vanderbilti	4	3	30	0.00102	3.06	0.37
C. vanderbilti	6	4	40	0.00102	3.06	0.75
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. johnstonianus	3	7	70	0.02291	2.95	14.19
P. johnstonianus	2	5	50	0.02291	2.95	6.76
N. unicornis	2	12	120	0.02570	2.95	18.20
C. jactator	4	6	60	0.02239	2.96	15.91
Totals	120	5.78				794.10
	# of fish	average size				7.94

Fish Benthic Study

Olawalu Five Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	11	14	140	0.02692	2.97	123.13
A. nigrofuscus	5	11	110	0.02692	2.97	43.97
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
A. leucopareius	8	15	150	0.02692	2.97	95.94
R. rectangulus	1	20	200	0.01991	2.87	11.43
M. niger	2	17	170	0.01588	3.08	16.63
Z. cornutus	1	18	180	0.00698	2.98	3.74
T. duperrey	1	10	100	0.00832	2.99	2.49
G. varius	2	6	60	0.00661	2.97	2.36
G. varius	7	5	50	0.00661	2.97	6.87
S. balteata	4	6	60	0.01023	2.99	7.34
S. balteata	5	8	80	0.01023	2.99	12.24
P. ewaensis	3	6	60	0.0038	3.22	2.20
P. imparipennis	2	6	60	0.01549	2.99	5.56
S. faciolatus	4	5	50	0.01514	2.99	9.05
Totals	64	4.62				406.91
	# of fish	average size		Convert to kg		4.07
Overall Ranking (kg/m squared		**2.40**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	21	11	110	0.02692	2.97	184.69
A. nigrofuscus	6	10	100	0.02692	2.97	47.97
A. nigrofuscus	7	4	40	0.02692	2.97	22.39
A. nigrofuscus	11	17	170	0.02692	2.97	149.51
A. nigrofuscus	8	9	90	0.02692	2.97	57.57
N. lituratus	6	11	110	0.03020	2.97	59.20
N. lituratus	4	22	220	0.03020	2.97	78.93
R. rectangulus	2	18	180	0.01991	2.87	20.57
R. rectangulus	3	16	160	0.01991	2.87	27.43
R. rectangulus	1	18	180	0.01991	2.87	10.29
M. niger	2	22	220	0.01588	3.08	21.52
T. duperrey	5	9	90	0.00832	2.99	11.19
T. duperrey	5	5	50	0.00832	2.99	6.22
T. duperrey	4	16	160	0.00832	2.99	15.92
G. varius	5	12	120	0.00661	2.97	11.78
S. marginatus	1	8	80	0.00087	3.12	0.22
S. marginatus	5	6	60	0.00087	3.12	0.81
S. marginatus	1	6	60	0.00087	3.12	0.16
C. vanderbilti	4	3	30	0.00102	3.06	0.37
C. vanderbilti	5	5	50	0.00102	3.06	0.78
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. johnstonianus	5	7	70	0.02291	2.95	23.65
P. johnstonianus	2	5	50	0.02291	2.95	6.76
N. unicornis	1	12	120	0.02570	2.95	9.10
C. jactator	3	6	60	0.02239	2.96	11.93
Totals	121	5.87				795.18
	# of fish	average size				7.95

Fish Benthic Study

Olawalu Beach

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	2	18	180	0.01995	2.98	21.40
C. sordidus	3	24	240	0.01549	3.06	34.13
C. sordidus	2	28	280	0.01549	3.06	26.54
C. sordidus	2	35	350	0.01549	3.06	33.18
C. sordidus	2	19	190	0.01549	3.06	18.01
C. strigosus	8	12	120	0.02465	3.03	71.70
C. strigosus	5	11	110	0.02465	3.03	41.08
C. strigosus	8	9	90	0.02465	3.03	53.78
A. nigrofuscus	8	8	80	0.02692	2.97	51.17
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
A. nigrofuscus	16	13	130	0.02692	2.97	166.30
A. nigrofuscus	11	14	140	0.02692	2.97	123.13
N. lituratus	1	18	180	0.03020	2.97	16.14
C. ornatissimus	1	22	220	0.02570	3.01	17.02
C. ornatissimus	6	11	110	0.02570	3.01	51.06
C. ornatissimus	1	10	100	0.02570	3.01	7.74
S. bursa	2	15	150	0.02191	2.98	19.59
C. multicinctus	6	12	120	0.02487	3.05	54.61
C. unimaculatus	2	12	120	0.01230	3.04	8.97
T. duperrey	4	8	80	0.00832	2.99	7.96
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	2	9	90	0.00832	2.99	4.48
T. duperrey	3	6	60	0.00832	2.99	4.48
O. unifasciatus	1	9	90	0.01964	2.99	5.29
L. phthirophagus	2	7	70	0.00955	3.05	4.08
P. arcatus	2	6	60	0.00912	3.08	3.37
S. balteata	1	7	70	0.01023	2.99	2.14
C. vanderbilti	3	5	50	0.00102	3.06	0.47
C. vanderbilti	5	4	40	0.00102	3.06	0.62
C. jactator	4	5	50	0.02239	2.96	13.25
	122	374				933.54
	# of fish	average size		Convert to kg		9.34
		Overall Ranking (kg/m squared				**3.03**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	2	16	160	0.02548	2.98	24.30
C. strigosus	5	9	90	0.02465	3.03	33.61
C. strigosus	3	6	60	0.02465	3.03	13.44
C. strigosus	6	7	70	0.02465	3.03	31.37
C. strigosus	7	11	110	0.02465	3.03	57.51
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	2	12	120	0.02465	3.03	17.93
C. strigosus	1	11	110	0.02465	3.03	8.22
C. strigosus	4	14	140	0.02465	3.03	41.83
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
A. nigrofuscus	5	9	90	0.02692	2.97	35.98
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	1	7	70	0.02692	2.97	5.60
Z. flavescens	5	4	40	0.02512	3.00	15.07
Z. flavescens	3	12	120	0.02512	3.00	27.13
C. ornatissimus	1	12	120	0.02570	3.01	9.28
C. multicinctus	2	9	90	0.02487	3.05	13.65
C. argus	1	14	140	0.00102	3.06	0.44
G. varius	4	7	70	0.00661	2.97	5.50
O. unifasciatus	1	10	100	0.01964	2.99	5.87
O. unifasciatus	1	12	120	0.01964	2.99	7.05
O. unifasciatus	6	14	140	0.01964	2.99	49.33
O. unifasciatus	3	10	100	0.01964	2.99	17.62
T. duperrey	3	9	90	0.00832	2.99	6.72
T. duperrey	3	6	60	0.00832	2.99	4.48
T. duperrey	2	9	90	0.00832	2.99	4.48
T. duperrey	1	7	70	0.00832	2.99	1.74
P. johnstonianus	2	7	70	0.02291	2.95	9.46
P. johnstonianus	1	8	80	0.02291	2.95	5.41
C. vanderbilti	6	4	40	0.00102	3.06	0.75
C. vanderbilti	3	6	60	0.00102	3.06	0.56
S. marginatus	2	8	80	0.00087	3.12	0.43
S. marginatus	2	9	90	0.00087	3.12	0.49
C. jactator	1	6	60	0.02239	2.96	3.98
	106	324				583.63
						5.84

Fish Benthic Study

Nohea Kai

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	2	17	170	0.01995	2.98	20.21
N. hexacanthus	5	18	180	0.0257	2.95	68.23
N. hexacanthus	1	12	120	0.0257	2.95	9.10
A. nigrofuscus	7	11	110	0.02692	2.97	61.56
C. strigosus	5	8	80	0.02465	3.03	29.88
C. strigosus	2	10	100	0.02465	3.03	14.94
N. brevirostris	3	16	160	0.02399	2.99	34.43
N. lituratus	2	15	150	0.03020	2.97	26.91
S. bursa	1	14	140	0.02191	2.98	9.14
C. sandwichensis	1	16	160	0.02457	3.02	11.87
C. miliaris	2	12	120	0.03236	3.04	23.61
C. multicinctus	2	10	100	0.02487	3.05	15.17
C. ornitissimus	1	18	180	0.02570	3.01	13.92
C. ornitissimus	1	19	190	0.02570	3.01	14.70
T. duperrey	3	12	120	0.00832	2.99	8.96
S. balteata	1	8	80	0.01023	2.99	2.45
G. varius	1	9	90	0.00661	2.97	1.77
C. venusta	2	10	100	0.02348	3.02	14.18
P. johnstonianus	3	7	70	0.02291	2.95	14.19
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	1	4	40	0.02291	2.95	2.70
C. jactator	2	5	50	0.02239	2.96	6.63
C. jactator	1	6	60	0.02239	2.96	3.98
P. aspricaudus	2	6	60	0.02089	2.92	7.32
Totals	52	7.88				419.23
	# of fish	average size		Convert to kg		4.19
Overall Ranking (kg/m squared		**3.02**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	1	8	80	0.02548	2.98	6.07
C. perspicillatus	1	14	140	0.02548	2.98	10.63
C. perspicillatus	2	13	130	0.02548	2.98	19.74
C. perspicillatus	1	11	110	0.02548	2.98	8.35
C. spilurus	1	16	160	0.01202	3.06	5.88
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	5	5	50	0.02692	2.97	19.99
A. nigrofuscus	8	8	80	0.02692	2.97	51.17
A. nigrofuscus	8	7	70	0.02692	2.97	44.77
N. hexacanthus	15	11	110	0.0257	2.95	125.09
N. hexacanthus	21	12	120	0.0257	2.95	191.05
C. strigosus	22	6	60	0.02465	3.03	98.59
C. strigosus	9	7	70	0.02465	3.03	47.05
C. strigosus	3	4	40	0.02465	3.03	8.96
C. strigosus	4	5	50	0.02465	3.03	14.94
C. strigosus	1	10	100	0.02465	3.03	7.47
C. strigosus	4	12	120	0.02465	3.03	35.85
C. strigosus	2	3	30	0.02465	3.03	4.48
N. lituratus	4	9	90	0.03020	2.97	32.29
N. brevirostris	3	10	100	0.02399	2.99	21.52
N. brevirostris	12	16	160	0.02399	2.99	137.72
P. aspricaudus	3	7	70	0.02089	2.92	12.81
C. dumerilii	2	15	150	0.02042	2.94	18.01
C. multicintus	2	11	110	0.02487	3.05	16.69
C. miliaris	5	8	80	0.03236	3.04	39.35
P. multifasciatus	1	16	160	0.01047	3.15	5.28
P. multifasciatus	1	13	130	0.01047	3.15	4.29
P. multifasciatus	6	18	180	0.01047	3.15	35.62
P. multifasciatus	4	8	80	0.01047	3.15	10.55
P. multifasciatus	1	10	100	0.01047	3.15	3.30
P. multifasciatus	1	5	50	0.01047	3.15	1.65
P. tetrataenia	1	5	50	0.01445	2.94	2.12
P. tetrataenia	2	6	60	0.01445	2.94	5.10
P. tetrataenia	1	7	70	0.01445	2.94	2.97
T. duperrey	5	10	100	0.00832	2.99	12.44
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	3	4	40	0.00832	2.99	2.99
T. duperrey	1	5	50	0.00832	2.99	1.24
G. varius	2	10	100	0.00661	2.97	3.93
Totals	173	8.31				1090.09
	# of fish	average size				10.90

Fish Benthic Study

McGregor Point Two Offshore

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	1	21	210	0.01995	2.98	12.48
C. sordidus	2	32	320	0.01549	3.06	30.34
C. sordidus	5	22	220	0.01549	3.06	52.14
S. rubroviolaceus	1	25	250	0.01288	3.04	9.79
S. rubroviolaceus	2	18	180	0.01288	3.04	14.10
C. strigosus	5	12	120	0.02465	3.03	44.81
C. strigosus	2	15	150	0.02465	3.03	22.41
C. strigosus	5	8	80	0.02465	3.03	29.88
A. blochii	1	18	180	0.02692	3.01	14.59
A. blochii	1	18	180	0.02692	3.01	14.59
N. brevirostris	5	19	190	0.02399	2.99	68.14
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
N. hexacanthus	1	18	180	0.02570	2.95	13.65
M. vidua	2	23	230	0.01000	3.04	13.98
S. bursa	1	16	160	0.02191	2.98	10.45
S. bursa	1	12	120	0.02191	2.98	7.84
F. flavissimus	2	15	150	0.02018	3.04	18.40
Z. flavescens	1	10	100	0.02512	3.00	7.54
C. multicinctus	2	12	120	0.02487	3.05	18.20
P. multifasciatus	2	18	180	0.01047	3.15	11.87
P. multifasciatus	1	15	150	0.01047	3.15	4.95
M. vanicolensis	2	25	250	0.00794	3.05	12.11
M. vanicolensis	3	20	200	0.00794	3.05	14.53
M. vanicolensis	2	18	180	0.00794	3.05	8.72
B. bilinulatus	1	45	450	0.01259	3.02	17.11
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	8	80	0.00832	2.99	1.99
G. varius	6	10	100	0.00661	2.97	11.78
P. forsteri	1	18	180	0.00912	3.07	5.04
H. ornatissimus	2	9	90	0.0257	3.01	13.92
P. arcatus	1	8	80	0.00912	3.08	2.25
C. potteri	1	8	80	0.01914	3.04	4.65
C. potteri	2	7	70	0.01914	3.04	8.15
C. agilis	4	6	60	0.21020	2.99	150.84
C. hanui	3	4	40	0.01987	3.01	7.18
P. johnstonianus	1	7	70	0.02291	2.95	4.73
Z. cornutus	1	16	160	0.00698	2.98	3.33
P. aspricaudus	1	7	70	0.02089	2.92	4.27
	90	618				787.88
	# of fish	average size		Convert to kg		7.88
		Overall Ranking (kg/m squared				**2.12**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. granoculis	1	25	250	0.01995	2.98	14.86
M. granoculis	2	20	200	0.01995	2.98	23.78
C. perspicillatus	1	16	160	0.02548	2.98	12.15
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	1	3	30	0.02465	3.03	2.24
C. strigosus	6	5	50	0.02465	3.03	22.41
C. strigosus	2	2	20	0.02465	3.03	2.99
C. strigosus	2	6	60	0.02465	3.03	8.96
C. strigosus	3	7	70	0.02465	3.03	15.68
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
R. aculeatus	1	16	160	0.02630	2.98	12.54
R. aculeatus	1	16	160	0.02630	2.98	12.54
R. aculeatus	1	9	90	0.02630	2.98	7.05
M. vidua	1	22	220	0.01000	3.04	6.69
M. vidua	2	25	250	0.01000	3.04	15.20
C. ornatissimus	1	14	140	0.0257	3.01	10.83
C. miliaris	1	10	100	0.03236	3.04	9.84
C. miliaris	2	13	130	0.03236	3.04	25.58
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	12	120	0.00832	2.99	2.99
C. gaimard	1	7	70	0.00414	3.00	0.87
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. johnstonianus	1	8	80	0.02291	2.95	5.41
S. marginatus	2	10	100	0.00087	3.12	0.54
S. marginatus	1	9	90	0.00087	3.12	0.24
S. marginatus	1	8	80	0.00087	3.12	0.22
S. marginatus	1	10	100	0.00087	3.12	0.27
S. marginatus	1	13	130	0.00087	3.12	0.35
	50	357				274.56
						2.75

Fish Benthic Study

Manuohule Point

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	2	16	160	0.01549	3.06	15.17
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	3	10	100	0.02692	2.97	23.99
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
A. nigrofuscus	5	13	130	0.02692	2.97	51.97
C. strigosus	8	8	80	0.02465	3.03	47.80
C. strigosus	7	6	60	0.02465	3.03	31.37
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	3	15	150	0.02465	3.03	33.61
C. strigosus	5	11	110	0.02465	3.03	41.08
A. leucopareius	18	15	150	0.02691	2.95	214.34
N. unicornis	2	18	180	0.02570	2.95	27.29
A. achilles	1	8	80	0.02951	2.93	6.92
R. rectangulus	1	18	180	0.02694	3.01	14.60
C. dumerilii	2	16	160	0.02042	2.94	19.21
C. dumerilii	1	9	90	0.02042	2.94	5.40
Z. flavescens	2	8	80	0.02512	3.00	12.06
Z. flavescens	9	9	90	0.02512	3.00	61.04
Z. flavescens	1	10	100	0.02512	3.00	7.54
Z. flavescens	3	8	80	0.02512	3.00	18.09
Z. flavescens	1	9	90	0.02512	3.00	6.78
C. ornatissimus	1	19	190	0.02570	3.01	14.70
C. ornatissimus	5	17	170	0.02570	3.01	65.75
G. varius	1	12	120	0.00661	2.97	2.36
G. varius	1	16	160	0.00661	2.97	3.14
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	4	18	180	0.00832	2.99	17.91
T. duperrey	1	15	150	0.00832	2.99	3.73
T. duperrey	3	10	100	0.00832	2.99	7.46
S. balteata	1	8	80	0.01023	2.99	2.45
S. balteata	3	7	70	0.01023	2.99	6.42
S. fasciolatus	6	8	80	0.01514	2.99	21.73
S. fasciolatus	3	12	120	0.01514	2.99	16.30
Synodus spp.	1	18	180	0.01215	3.00	6.56
C. jactator	1	5	50	0.02239	2.96	3.31
Totals	119	12.06				908.02
	# of fish	average size		Convert to kg		9.08
Overall Ranking (kg/m squared		**2.83**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	1	8	80	0.02145	3.02	5.18
C. perspicillatus	3	10	100	0.02145	3.02	19.43
A. nigrofuscus	2	15	150	0.02692	2.97	23.99
A. nigrofuscus	6	12	120	0.02692	2.97	57.57
A. nigrofuscus	1	5	50	0.02692	2.97	4.00
A. nigrofuscus	1	6	60	0.02692	2.97	4.80
A. nigrofuscus	2	12	120	0.02692	2.97	19.19
A. nigrofuscus	3	8	80	0.02692	2.97	19.19
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	2	11	110	0.02692	2.97	17.59
A. nigrofuscus	1	13	130	0.02692	2.97	10.39
C. strigosus	1	5	50	0.02465	3.03	3.73
C. strigosus	1	11	110	0.02465	3.03	8.22
C. strigosus	4	8	80	0.02465	3.03	23.90
C. strigosus	7	9	90	0.02465	3.03	47.05
C. strigosus	3	7	70	0.02465	3.03	15.68
C. strigosus	4	6	60	0.02465	3.03	17.93
Z. flavescens	2	13	130	0.02512	3.00	19.59
Z. flavescens	1	8	80	0.02512	3.00	6.03
Z. flavescens	1	10	100	0.02512	3.00	7.54
C. ornatissimus	1	12	120	0.02570	3.01	9.28
C. ornatissimus	2	9	90	0.02570	3.01	13.92
T. duperrey	3	15	150	0.00832	2.99	11.19
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	19	190	0.00832	2.99	4.73
T. duperrey	2	7	70	0.00832	2.99	3.48
T. duperrey	2	6	60	0.00832	2.99	2.99
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	3	11	110	0.00832	2.99	8.21
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	1	12	120	0.00832	2.99	2.99
T. duperrey	2	16	160	0.00832	2.99	7.96
T. duperrey	1	16	160	0.00832	2.99	3.98
S. balteata	2	10	100	0.01023	2.99	6.12
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	15	150	0.00661	2.97	2.94
S. marginatus	3	9	90	0.00087	3.12	0.73
S. marginatus	3	12	120	0.00087	3.12	0.98
S. marginatus	1	8	80	0.00087	3.12	0.22
P. johnstonianus	2	6	60	0.02291	2.95	8.11
P. johnstonianus	2	7	70	0.02291	2.95	9.46
C. vanderbilti	8	3	30	0.00102	3.06	0.75
C. vanderbilti	6	2	20	0.00102	3.06	0.37
C. vanderbilti	10	4	40	0.00102	3.06	1.25
A. meleagris	3	16	160	0.03631	2.81	48.97
P. arcatus	1	6	60	0.00912	3.08	1.69
Totals	113	10.02				508.73
	# of fish	average size				5.09

Fish Benthic Study

Manawainui Gulch

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	5	17	170	0.01549	3.06	40.29
C. sordidus	1	14	140	0.01549	3.06	6.64
C. strigosus	15	8	80	0.02465	3.03	89.63
C. strigosus	9	10	100	0.02465	3.03	67.22
A. nigrofuscus	12	7	70	0.02692	2.97	67.16
A. nigrofuscus	11	11	110	0.02692	2.97	96.74
A. nigrofuscus	8	9	90	0.02692	2.97	57.57
N. brevirostris	5	14	140	0.02399	2.99	50.21
N. brevirostris	4	17	170	0.02399	2.99	48.78
A. nigroris	3	22	220	0.02570	2.97	50.38
A. nigroris	1	18	180	0.02570	2.97	13.74
S. bursa	4	15	150	0.02191	2.98	39.18
C. multicintus	3	10	100	0.02487	3.05	22.76
C. multicintus	3	8	80	0.02487	3.05	18.20
P. multifasciatus	1	14	140	0.01047	3.15	4.62
P. multifasciatus	1	5	50	0.01047	3.15	1.65
T. duperrey	3	11	110	0.00832	2.99	8.21
P. octotaenia	2	9	90	0.01495	2.94	7.91
S. balteata	1	7	70	0.01023	2.99	2.14
G. varius	5	8	80	0.00661	2.97	7.85
P. johnstonianus	7	6	60	0.02291	2.95	28.39
P. johnstonianus	2	8	80	0.02291	2.95	10.81
S. faciolatus	9	7	70	0.01514	2.99	28.52
S. faciolatus	5	8	80	0.01514	2.99	18.11
C. hanui	4	5	50	0.01987	3.01	11.96
C. jactator	3	5	50	0.02239	2.96	9.94
	127	273				808.59
	# of fish	average size		Convert to kg		8.09
		Overall Ranking (kg/m squared				**2.29**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	4	8	80	0.02692	2.97	25.58
A. nigrofuscus	5	9	90	0.02692	2.97	35.98
A. nigrofuscus	2	4	40	0.02692	2.97	6.40
A. nigrofuscus	1	3	30	0.02692	2.97	2.40
A. nigrofuscus	5	10	100	0.02692	2.97	39.98
A. nigrofuscus	5	5	50	0.02692	2.97	19.99
A. nigrofuscus	1	6	60	0.02692	2.97	4.80
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	5	7	70	0.02465	3.03	26.14
C. strigosus	6	5	50	0.02465	3.03	22.41
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	4	7	70	0.02465	3.03	20.91
R. aculeatus	3	16	160	0.02630	2.98	37.62
P. multifasciatus	1	14	140	0.01047	3.15	4.62
P. multifasciatus	4	4	40	0.01047	3.15	5.28
P. multifasciatus	1	6	60	0.01047	3.15	1.98
T. duperrey	3	3	30	0.00832	2.99	2.24
T. duperrey	4	8	80	0.00832	2.99	7.96
T. duperrey	4	6	60	0.00832	2.99	5.97
P. octotaenia	1	7	70	0.01495	2.94	3.08
P. octotaenia	2	15	150	0.01495	2.94	13.19
P. octotaenia	2	11	110	0.01495	2.94	9.67
P. octotaenia	1	6	60	0.01495	2.94	2.64
P. octotaenia	1	6	60	0.01495	2.94	2.64
C. vanderbilti	5	3	30	0.00102	3.06	0.47
P. johnstonianus	2	7	70	0.02291	2.95	9.46
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. arcatus	1	3	30	0.00912	3.08	0.84
	79	197				337.41
						3.37

Fish Benthic Study

Makumana Gulch

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. strigosus	4	20	200	0.02465	3.03	59.75
C. strigosus	1	15	150	0.02465	3.03	11.20
C. strigosus	4	12	120	0.02465	3.03	35.85
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	4	9	90	0.02692	2.97	28.78
A. nigrofuscus	4	10	100	0.02692	2.97	31.98
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
N. lituratus	5	22	220	0.03020	2.97	98.66
N. lituratus	1	25	250	0.03020	2.97	22.42
N. unicornis	2	20	200	0.02570	2.95	30.33
M. vidua	3	25	250	0.01000	3.04	22.80
Z. flavescens	1	12	120	0.02512	3.00	9.04
C. unimaculatus	5	14	140	0.01230	3.04	26.17
C. ornatissimus	2	17	170	0.02570	3.01	26.30
C. ornatissimus	3	16	160	0.02570	3.01	37.13
M. vanicolensis	1	9	90	0.00794	3.05	2.18
L. phthirophagus	4	5	50	0.00955	3.05	5.83
T. duperrey	6	14	140	0.00832	2.99	20.90
S. balteata	3	8	80	0.01023	2.99	7.34
S. balteata	4	6	60	0.01023	2.99	7.34
G. varius	6	6	60	0.00661	2.97	7.07
G. varius	3	8	80	0.00661	2.97	4.71
C. vanderbilti	4	2	20	0.00102	3.06	0.25
C. vanderbilti	5	3	30	0.00102	3.06	0.47
C. vanderbilti	7	5	50	0.00102	3.06	1.09
A. vaigiensis	3	16	160	0.01413	3.00	20.35
P. johnstonianus	3	4	40	0.02291	2.95	8.11
Totals	92	9.68				564.44
	# of fish	average size		Convert to kg		5.64
Overall Ranking (kg/m squared		**2.68**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	5	6	60	0.02465	3.03	22.41
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	7	8	80	0.02465	3.03	41.83
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	10	10	100	0.02692	2.97	79.95
A. nigrofuscus	18	8	80	0.02692	2.97	115.13
A. nigrofuscus	3	12	120	0.02692	2.97	28.78
A. nigrofuscus	4	7	70	0.02692	2.97	22.39
A. nigrofuscus	17	7	70	0.02692	2.97	95.14
A. nigrofuscus	7	4	40	0.02692	2.97	22.39
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	9	12	120	0.02692	2.97	86.35
R. aculeatus	2	10	100	0.02630	2.98	15.67
C. auriga	7	14	140	0.02698	2.95	78.00
C. multicintus	1	7	70	0.02487	3.05	5.31
P. multifasciatus	4	24	240	0.01047	3.15	31.66
P. multifasciatus	1	6	60	0.01047	3.15	1.98
P. multifasciatus	2	5	50	0.01047	3.15	3.30
P. multifasciatus	3	8	80	0.01047	3.15	7.92
L. phthirofagus	3	4	40	0.00955	3.05	3.50
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	1	5	50	0.00661	2.97	0.98
T. duperrey	1	5	50	0.00832	2.99	1.24
T. duperrey	6	4	40	0.00832	2.99	5.97
T. duperrey	4	5	50	0.00832	2.99	4.98
T. duperrey	1	6	60	0.00832	2.99	1.49
C. vanderbilti	8	3	30	0.00102	3.06	0.75
C. vanderbilti	23	5	50	0.00102	3.06	3.59
C. vanderbilti	8	4	40	0.00102	3.06	1.00
P. johnstonianus	14	4	40	0.02291	2.95	37.85
P. johnstonianus	5	5	50	0.02291	2.95	16.90
S. marginatus	7	5	50	0.00087	3.12	0.95
P.arcatus	5	7	70	0.00912	3.08	9.83
Totals	191	5.42				776.06
	# of fish	average size				7.76

Fish Benthic Study

Maalaea Harbor

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. virescens	2	50	500	0.01349	2.95	39.80
M. grandoculis	2	22	220	0.01995	2.98	26.16
C. sordidus	4	22	220	0.01549	3.06	41.71
S. rubroviolaceus	1	27	270	0.01288	3.04	10.57
S. rubroviolaceus	2	18	180	0.01288	3.04	14.10
C. strigosus	2	15	150	0.02465	3.03	22.41
C. strigosus	5	8	80	0.02465	3.03	29.88
A. blochii	1	18	180	0.02692	3.01	14.59
A. blochii	1	18	180	0.02692	3.01	14.59
N. brevirostris	5	19	190	0.02399	2.99	68.14
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
M. vidua	2	23	230	0.01000	3.04	13.98
S. bursa	1	18	180	0.02191	2.98	11.75
S. bursa	2	12	120	0.02191	2.98	15.67
F. flavissimus	2	15	150	0.02018	3.04	18.40
Z. flavescens	2	10	100	0.02512	3.00	15.07
C. multicinctus	4	12	120	0.02487	3.05	36.41
P. multifasciatus	2	16	160	0.01047	3.15	10.55
P. multifasciatus	3	15	150	0.01047	3.15	14.84
M. vanicolensis	2	24	240	0.00794	3.05	11.62
M. vanicolensis	3	18	180	0.00794	3.05	13.08
B. bilinulatus	1	45	450	0.01259	3.02	17.11
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	12	120	0.00832	2.99	2.99
T. duperrey	4	8	80	0.00832	2.99	7.96
G. varius	5	10	100	0.00661	2.97	9.82
H. ornatissimus	1	8	80	0.0257	3.01	6.19
P. arcatus	1	8	80	0.00912	3.08	2.25
C. potteri	4	8	80	0.01914	3.04	18.62
C. potteri	2	7	70	0.01914	3.04	8.15
C. agilis	2	4	40	0.21020	2.99	50.28
C. hanui	2	4	40	0.01987	3.01	4.78
P. johnstonianus	6	7	70	0.02291	2.95	28.39
M. geoffroy	1	5	50	0.01514	3.01	2.28
Z. cornutus	1	16	160	0.00698	2.98	3.33
C. inermis	1	30	300	0.00380	3.1	3.53
P. aspricaudus	1	8	80	0.02089	2.92	4.88
	90	578				679.81
	# of fish	average size		Convert to kg		6.80
		Overall Ranking (kg/m squared				**1.95**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. granoculis	2	12	120	0.01995	2.98	14.27
M. granoculis	1	26	260	0.01995	2.98	15.46
C. perspicillatus	1	15	150	0.02548	2.98	11.39
C. strigosus	3	3	30	0.02465	3.03	6.72
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	2	2	20	0.02465	3.03	2.99
C. strigosus	3	6	60	0.02465	3.03	13.44
C. strigosus	3	7	70	0.02465	3.03	15.68
A. nigrofuscus	6	8	80	0.02692	2.97	38.38
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
R. aculeatus	1	14	140	0.02630	2.98	10.97
M. vidua	3	23	230	0.01000	3.04	20.98
M. vidua	1	25	250	0.01000	3.04	7.60
C. ornatissimus	1	13	130	0.0257	3.01	10.06
C. miliaris	1	10	100	0.03236	3.04	9.84
C. miliaris	2	10	100	0.03236	3.04	19.67
T. duperrey	1	17	170	0.00832	2.99	4.23
T. duperrey	4	11	110	0.00832	2.99	10.95
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	2	12	120	0.00832	2.99	5.97
P. johnstonianus	5	6	60	0.02291	2.95	20.28
P. johnstonianus	1	8	80	0.02291	2.95	5.41
P. johnstonianus	4	8	80	0.02291	2.95	21.63
S. marginatus	2	9	90	0.00087	3.12	0.49
S. marginatus	5	8	80	0.00087	3.12	1.09
S. marginatus	1	7	70	0.00087	3.12	0.19
P. aspricaudus	1	8	80	0.02089	2.92	4.88
P. arcatus	1	8	80	0.00912	3.08	2.25
	61	299				294.66
						2.95

Fish Benthic Study

Lahaina Harbor 2

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. laysan	3	14	140	0.00331	3.05	4.24
C. argus	1	18	180	0.00102	3.06	0.56
S. rubroviolaceus	2	25	250	0.01288	3.04	19.58
C. carolinus	2	21	210	0.02358	2.98	29.51
C. carolinus	1	16	160	0.02358	2.98	11.24
S. psittacus	2	18	180	0.01622	3.05	17.81
A. olivaceus	5	19	190	0.02485	3.05	72.00
A. olivaceus	6	19	190	0.02485	3.05	86.40
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	5	9	90	0.02692	2.97	35.98
N. brevirostris	1	19	190	0.02399	2.99	13.63
N. brevirostris	3	20	200	0.02399	2.99	43.04
N. unicornis	1	22	220	0.02570	2.95	16.68
N. lituratus	1	19	190	0.03020	2.97	17.04
A. dussumieri	2	18	180	0.03311	2.95	35.16
A. dussumieri	1	15	150	0.03311	2.95	14.65
A. leucopareius	1	17	170	0.02692	2.97	13.59
A. leucopareius	1	20	200	0.02692	2.97	15.99
A. blochii	1	26	260	0.02692	3.01	21.07
A. blochii	2	15	150	0.02692	3.01	24.31
P. multifaciatus	1	18	180	0.01047	3.15	5.94
P. multifaciatus	3	17	170	0.01047	3.15	16.82
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	3	8	80	0.00832	2.99	5.97
P. arcatus	2	6	60	0.00912	3.08	3.37
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	2	7	70	0.00661	2.97	2.75
P. johnstonianus	2	6	60	0.02291	2.95	8.11
C. jactator	1	5	50	0.02239	2.96	3.31
Totals	59	12.85				554.88
	# of fish	average size		Convert to kg		5.55
Overall Ranking (kg/m squared		**2.14**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	2	20	200	0.01995	2.98	23.78
Z. veliferum	2	31	310	0.02630	2.94	47.94
Z. veliferum	1	28	280	0.02630	2.94	21.65
A. olivaceus	5	19	190	0.02485	3.05	72.00
A. olivaceus	8	17	170	0.02485	3.05	103.08
N. brevirostris	2	12	120	0.02399	2.99	17.22
N. brevirostris	1	11	110	0.02399	2.99	7.89
A. leucopareius	9	18	180	0.02692	2.97	129.52
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	2	12	120	0.03020	2.97	21.53
R. rectangulus	1	16	160	0.01991	2.87	9.14
P. multifasciatus	3	8	80	0.01047	3.15	7.92
S. balteata	1	12	120	0.01023	2.99	3.67
T. duperrey	3	10	100	0.00832	2.99	7.46
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	3	9	90	0.00832	2.99	6.72
T. duperrey	1	11	110	0.00832	2.99	2.74
Totals	49	5.91				513.22
	# of fish	average size				5.13

Fish Benthic Study

Lahaina Harbor One

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	4	16	160	0.01995	2.98	38.05
N. hexacanthus	5	20	200	0.0257	2.95	75.82
N. hexacanthus	1	12	120	0.0257	2.95	9.10
A. nigrofuscus	9	11	110	0.02692	2.97	79.15
C. strigosus	2	10	100	0.02465	3.03	14.94
N. brevirostris	3	16	160	0.02399	2.99	34.43
N. lituratus	2	16	160	0.03020	2.97	28.70
S. bursa	1	14	140	0.02191	2.98	9.14
C. sandwichensis	1	16	160	0.02457	3.02	11.87
C. miliaris	5	14	140	0.03236	3.04	68.86
C. multicinctus	2	12	120	0.02487	3.05	18.20
C. ornitissimus	2	18	180	0.02570	3.01	27.85
C. ornitissimus	1	19	190	0.02570	3.01	14.70
T. duperrey	3	12	120	0.00832	2.99	8.96
S. balteata	1	9	90	0.01023	2.99	2.75
G. varius	3	9	90	0.00661	2.97	5.30
C. venusta	2	10	100	0.02348	3.02	14.18
P. johnstonianus	3	6	60	0.02291	2.95	12.17
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	3	4	40	0.02291	2.95	8.11
C. jactator	1	6	60	0.02239	2.96	3.98
P. aspricaudus	4	5	50	0.02089	2.92	12.20
Totals	59	7.65				501.83
	# of fish	average size		Convert to kg		5.02
Overall Ranking (kg/m squared		**2.49**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	9	90	0.02548	2.98	20.50
C. perspicillatus	1	13	130	0.02548	2.98	9.87
C. perspicillatus	2	13	130	0.02548	2.98	19.74
C. perspicillatus	2	11	110	0.02548	2.98	16.70
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	6	6	60	0.02692	2.97	28.78
A. nigrofuscus	8	8	80	0.02692	2.97	51.17
A. nigrofuscus	6	7	70	0.02692	2.97	33.58
N. hexacanthus	5	12	120	0.0257	2.95	45.49
N. hexacanthus	3	13	130	0.0257	2.95	29.57
C. strigosus	8	8	80	0.02465	3.03	47.80
C. strigosus	6	7	70	0.02465	3.03	31.37
C. strigosus	3	4	40	0.02465	3.03	8.96
C. strigosus	4	6	60	0.02465	3.03	17.93
C. strigosus	2	10	100	0.02465	3.03	14.94
C. strigosus	4	13	130	0.02465	3.03	38.84
C. strigosus	5	3	30	0.02465	3.03	11.20
N. lituratus	4	9	90	0.03020	2.97	32.29
N. brevirostris	3	12	120	0.02399	2.99	25.82
N. brevirostris	9	17	170	0.02399	2.99	109.75
C. dumerilii	2	15	150	0.02042	2.94	18.01
C. multicintus	2	11	110	0.02487	3.05	16.69
C. miliaris	4	9	90	0.03236	3.04	35.41
P. multifasciatus	4	15	150	0.01047	3.15	19.79
P. multifasciatus	3	13	130	0.01047	3.15	12.86
P. multifasciatus	1	5	50	0.01047	3.15	1.65
P. tetrataenia	1	5	50	0.01445	2.94	2.12
T. duperrey	4	10	100	0.00832	2.99	9.95
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	3	7	70	0.00832	2.99	5.22
T. duperrey	3	4	40	0.00832	2.99	2.99
G. varius	4	10	100	0.00661	2.97	7.85
Totals	119	6.82				745.23
	# of fish	average size				7.45

Fish Benthic Study

Kaumuipuko Beach

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	1	23	230	0.01549	3.06	10.90
S. rubroviolaceus	1	20	200	0.01288	3.04	7.83
A. nigrofuscus	3	8	80	0.02692	2.97	19.19
A. nigrofuscus	5	7	70	0.02692	2.97	27.98
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
C. strigosus	6	8	80	0.02465	3.03	35.85
C. strigosus	3	10	100	0.02465	3.03	22.41
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	1	22	220	0.03020	2.97	19.73
A. achilles	1	20	200	0.02591	2.93	15.18
M. niger	5	22	220	0.01588	3.08	53.80
C. dumerilii	2	28	280	0.02042	2.94	33.62
A. dussumieri	1	20	200	0.03311	2.95	19.53
C. ornatissimus	1	15	150	0.02570	3.01	11.60
C. multicinctus	2	12	120	0.02487	3.05	18.20
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	9	90	0.00832	2.99	2.24
G. varius	1	7	70	0.00661	2.97	1.37
P. insularis	1	20	200	0.01047	3.11	6.51
S. faciolatus	5	8	80	0.01514	2.99	18.11
P. johnstonianus	6	7	70	0.02291	2.95	28.39
C. jactator	1	5	50	0.02239	2.96	3.31
G. flavimarginatus	1	120	1200	0.00087	3.12	3.26
Totals	52	12.56				391.60
	# of fish	average size		Convert to kg		3.92
Overall Ranking (kg/m squared		**1.33**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
T. obesus	2	90	900	0.00256	2.98	13.73
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	2	10	100	0.02465	3.03	14.94
C. strigosus	2	8	80	0.02465	3.03	11.95
N. unicornis	1	17	170	0.02570	2.95	12.89
M. niger	6	22	220	0.01588	3.08	64.56
C. unimaculatus	2	11	110	0.01230	3.04	8.23
S. balteata	8	6	60	0.01023	2.99	14.68
T. duperrey	4	6	60	0.00832	2.99	5.97
T. duperrey	3	7	70	0.00832	2.99	5.22
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	5	50	0.00832	2.99	1.24
G. varius	1	9	90	0.00661	2.97	1.77
G. varius	1	8	80	0.00661	2.97	1.57
S. marginatus	3	7	70	0.00087	3.12	0.57
S. marginatus	2	8	80	0.00087	3.12	0.43
S. marginatus	2	10	100	0.00087	3.12	0.54
S. marginatus	1	9	90	0.00087	3.12	0.24
P. johnstonianus	7	6	60	0.02291	2.95	28.39
P. johnstonianus	2	5	50	0.02291	2.95	6.76
P. johnstonianus	6	7	70	0.02291	2.95	28.39
P. johnstonianus	1	8	80	0.02291	2.95	5.41
C. vanderbilti	16	5	50	0.00102	3.06	2.50
C. vanderbilti	115	3	30	0.00102	3.06	10.77
C. vanderbilti	1	6	60	0.00102	3.06	0.19
P. arcatus	1	8	80	0.00912	3.08	2.25
Totals	195	6.67				272.56
	# of fish	average size				2.73

Fish Benthic Study

Kapalua Beach

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. melampygus	2	25	250	0.02399	2.95	35.39
A. triostegus	1	17	170	0.02484	2.86	12.08
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	8	12	120	0.02692	2.97	76.75
A. nigrofuscus	3	9	90	0.02692	2.97	21.59
N. lituratus	2	16	160	0.03020	2.97	28.70
N. brevirostris	3	20	200	0.02399	2.99	43.04
N. unicornis	1	18	180	0.02570	2.95	13.65
R. rectangulus	1	20	200	0.01991	2.87	11.43
S. bursa	2	15	150	0.02191	2.98	19.59
C. dumerilii	1	16	160	0.02042	2.94	9.61
P. cyclostomus	2	27	270	0.01037	3.17	17.75
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	12	120	0.00832	2.99	2.99
T. trilobatum	2	16	160	0.00955	3.04	9.29
P. imparipennis	1	5	50	0.01519	2.99	2.27
Z. cornutus	1	17	170	0.00698	2.98	3.54
Z. cornutus	2	20	200	0.00698	2.98	8.32
Totals	32	7.44				318.59
	# of fish	average size		Convert to kg		3.19
Overall Ranking (kg/m squared		**1.10**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	2	6	60	0.02692	2.97	9.59
A. nigrofuscus	7	7	70	0.02692	2.97	39.18
A. nigrofuscus	3	8	80	0.02692	2.97	19.19
A. nigrofuscus	5	10	100	0.02692	2.97	39.98
A. nigrofuscus	2	12	120	0.02692	2.97	19.19
N. lituratus	2	10	100	0.03020	2.97	17.94
N. lituratus	1	12	120	0.03020	2.97	10.76
N. unicornis	1	9	90	0.03020	2.97	8.07
R. rectangulus	3	13	130	0.01991	2.87	22.29
R. rectangulus	1	16	160	0.01991	2.87	9.14
C. quadrimaculatus	1	13	130	0.02570	3.01	10.06
P. multifasciatus	1	15	150	0.01047	3.15	4.95
T. duperrey	3	6	60	0.00832	2.99	4.48
T. duperrey	4	3	30	0.00832	2.99	2.99
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	2	5	50	0.00832	2.99	2.49
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	12	120	0.00832	2.99	2.99
T. duperrey	1	15	150	0.00832	2.99	3.73
P. imparipennis	2	4	40	0.01519	2.99	3.63
C. jactator	1	5	50	0.02239	2.96	3.31
C. jactator	1	4	40	0.02239	2.96	2.65
P. arcatus	1	4	40	0.00912	3.08	1.12
P. arcatus	1	6	60	0.00912	3.08	1.69
Totals	39	3.40				233.18
	# of fish	average size				2.33

Fish Benthic Study

Kailili Beach

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. rubroviolaceus	4	24	240	0.01288	3.04	37.59
C. strigosus	2	20	200	0.02465	3.03	29.88
C. strigosus	1	16	160	0.02465	3.03	11.95
C. strigosus	2	12	120	0.02465	3.03	17.93
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	1	12	120	0.02692	2.97	9.59
A. nigrofuscus	4	9	90	0.02692	2.97	28.78
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
N. lituratus	2	22	220	0.03020	2.97	39.47
N. lituratus	1	24	240	0.03020	2.97	21.53
N. unicornis	2	22	220	0.02570	2.95	33.36
M. vidua	4	27	270	0.01000	3.04	32.83
Z. flavescens	1	12	120	0.02512	3.00	9.04
C. unimaculatus	1	14	140	0.01230	3.04	5.23
C. ornatissimus	2	17	170	0.02570	3.01	26.30
C. ornatissimus	3	16	160	0.02570	3.01	37.13
M. vanicolensis	1	9	90	0.00794	3.05	2.18
L. phthirophagus	1	5	50	0.00955	3.05	1.46
T. duperrey	1	16	160	0.00832	2.99	3.98
S. balteata	3	8	80	0.01023	2.99	7.34
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	2	6	60	0.00661	2.97	2.36
G. varius	1	9	90	0.00661	2.97	1.77
C. vanderbilti	10	2	20	0.00102	3.06	0.62
C. vanderbilti	5	3	30	0.00102	3.06	0.47
C. vanderbilti	4	5	50	0.00102	3.06	0.62
A. vaigiensis	6	15	150	0.01413	3.00	38.15
P. johnstonianus	3	4	40	0.02291	2.95	8.11
Totals	72	10.62				447.88
	# of fish	average size		Convert to kg		4.48
Overall Ranking (kg/m squared		**2.10**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	8	4	40	0.02465	3.03	23.90
C. strigosus	3	5	50	0.02465	3.03	11.20
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	7	8	80	0.02465	3.03	41.83
C. strigosus	1	7	70	0.02465	3.03	5.23
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
A. nigrofuscus	14	8	80	0.02692	2.97	89.55
A. nigrofuscus	3	13	130	0.02692	2.97	31.18
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
A. nigrofuscus	6	7	70	0.02692	2.97	33.58
A. nigrofuscus	8	4	40	0.02692	2.97	25.58
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
A. nigrofuscus	7	12	120	0.02692	2.97	67.16
R. aculeatus	1	11	110	0.02630	2.98	8.62
C. auriga	6	15	150	0.02698	2.95	71.63
C. multicintus	1	7	70	0.02487	3.05	5.31
P. multifasciatus	3	24	240	0.01047	3.15	23.75
P. multifasciatus	1	6	60	0.01047	3.15	1.98
P. multifasciatus	2	5	50	0.01047	3.15	3.30
P. multifasciatus	1	8	80	0.01047	3.15	2.64
L. phthirofagus	3	4	40	0.00955	3.05	3.50
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	3	5	50	0.00661	2.97	2.94
T. duperrey	1	3	30	0.00832	2.99	0.75
T. duperrey	5	4	40	0.00832	2.99	4.98
T. duperrey	4	5	50	0.00832	2.99	4.98
T. duperrey	1	8	80	0.00832	2.99	1.99
C. vanderbilti	18	3	30	0.00102	3.06	1.69
C. vanderbilti	41	5	50	0.00102	3.06	6.40
C. vanderbilti	22	4	40	0.00102	3.06	2.75
P. johnstonianus	5	4	40	0.02291	2.95	13.52
P. johnstonianus	3	6	60	0.02291	2.95	12.17
S. marginatus	4	5	50	0.00087	3.12	0.54
P.arcatus	1	7	70	0.00912	3.08	1.97
Totals	197	5.58				603.35
	# of fish	average size				6.03

Fish Benthic Study

Kahekili Beach Four

Depth: 4m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	1	18	180	0.01549	3.06	8.53
A. nigrofuscus	3	2	20	0.02692	2.97	4.80
C. strigosus	3	2	20	0.02465	3.03	4.48
C. strigosus	3	7	70	0.02465	3.03	15.68
S. bursa	1	16	160	0.02191	2.98	10.45
R. rectangulus	1	18	180	0.01991	2.87	10.29
C. multicinctus	1	17	170	0.02487	3.05	12.90
C. multicinctus	2	14	140	0.02487	3.05	21.24
P. multifaciatus	1	8	80	0.01047	3.15	2.64
T. duperrey	7	10	100	0.00832	2.99	17.41
T. duperrey	5	9	90	0.00832	2.99	11.19
T. duperrey	1	15	150	0.00832	2.99	3.73
G. varius	1	12	120	0.00661	2.97	2.36
G. varius	1	9	90	0.00661	2.97	1.77
G. varius	1	9	90	0.00661	2.97	1.77
S. balteata	1	8	80	0.01023	2.99	2.45
P. arcatus	1	7	70	0.00912	3.08	1.97
P. arcatus	1	8	80	0.00912	3.08	2.25
M. geoffroy	1	1	10	0.01950	2.97	0.58
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	2	6	60	0.02291	2.95	8.11
C. vanderbilti	1	5	50	0.00102	3.06	0.16
C. jactator	1	7	70	0.02239	2.96	4.64
Totals	41	6.29				153.43
	# of fish	average size		Convert to kg		1.53
Overall Ranking (kg/m squared		**1.03**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
S. dermatogenys	1	7	70	0.00537	3.27	1.23
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
A. nigrofuscus	5	7	70	0.02692	2.97	27.98
A. nigrofuscus	8	6	60	0.02692	2.97	38.38
A. nigrofuscus	1	9	90	0.02692	2.97	7.20
A. nigrofuscus	3	5	50	0.02692	2.97	11.99
A. nigrofuscus	1	3	30	0.02692	2.97	2.40
A. nigrofuscus	1	10	100	0.02692	2.97	8.00
S. strigosus	2	12	120	0.02465	3.03	17.93
S. strigosus	3	8	80	0.02465	3.03	17.93
S. strigosus	2	9	90	0.02465	3.03	13.44
S. strigosus	2	7	70	0.02465	3.03	10.46
S. strigosus	1	3	30	0.02465	3.03	2.24
S. strigosus	5	6	60	0.02465	3.03	22.41
R. aculeatus	1	18	180	0.02630	2.98	14.11
R. aculeatus	1	10	100	0.02630	2.98	7.84
C. ornatissimus	1	17	170	0.02570	3.01	13.15
C. multicinctus	1	10	100	0.02487	3.05	7.59
C. multicinctus	2	8	80	0.02487	3.05	12.14
F. flavissimus	1	8	80	0.02018	3.04	4.91
P. multifasciatus	1	16	160	0.01047	3.15	5.28
T. duperrey	2	12	120	0.00832	2.99	5.97
T. duperrey	1	15	150	0.00832	2.99	3.73
T. duperrey	5	8	80	0.00832	2.99	9.95
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	2	12	120	0.00832	2.99	5.97
S. balteata	1	10	100	0.01023	2.99	3.06
S. balteata	3	9	90	0.01023	2.99	8.26
S. balteata	5	7	70	0.01023	2.99	10.71
G. varius	2	9	90	0.00661	2.97	3.53
G. varius	1	10	100	0.00661	2.97	1.96
P. johnstonianus	5	7	70	0.02291	2.95	23.65
P. johnstonianus	3	7	70	0.02291	2.95	14.19
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	3	4	40	0.02291	2.95	8.11
Totals	78	7.00				360.66
	# of fish	average size				3.61

Fish Benthic Study

Kaanapali Beach Three

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	5	16	160	0.01995	2.98	47.56
C. argus	1	18	180	0.00102	3.06	0.56
C. sordidus	2	18	180	0.01549	3.06	17.06
C. sordidus	1	15	150	0.01549	3.06	7.11
S. psittacus	5	9	90	0.01622	3.05	22.26
S. psittacus	15	12	120	0.01622	3.05	89.05
S. psittacus	2	15	150	0.01622	3.05	14.84
A. nigrofuscus	4	12	120	0.02692	2.97	38.38
A. nigrofuscus	6	10	100	0.02692	2.97	47.97
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	3	9	90	0.02465	3.03	20.17
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	12	120	0.02465	3.03	17.93
C. strigosus	7	10	100	0.02465	3.03	52.28
A. dussumieri	1	18	180	0.03311	2.95	17.58
N. lituratus	2	11	110	0.03020	2.97	19.73
M. niger	1	26	260	0.01588	3.08	12.72
C. dumerilii	1	18	180	0.02042	2.94	10.81
C. dumerilii	1	19	190	0.02042	2.94	11.41
C. quadrimaculatus	2	15	150	0.02570	3.01	23.21
C. unimaculatus	2	16	160	0.01230	3.04	11.97
C. multicinctus	1	17	170	0.02487	3.05	12.90
C. multicinctus	2	15	150	0.02487	3.05	22.76
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	11	110	0.00832	2.99	2.74
P. arcatus	1	7	70	0.00912	3.08	1.97
C. vanderbilti	3	4	40	0.00102	3.06	0.37
P. johnstonianus	6	8	80	0.02291	2.95	32.44
P. johnstonianus	5	6	60	0.02291	2.95	20.28
S. fasciolatus	5	9	90	0.01514	2.99	20.37
S. fasciolatus	2	7	70	0.01514	2.99	6.34
C. amboinensis	1	6	60	0.02239	2.96	3.98
C. jactator	2	5	50	0.02239	2.96	6.63
O. meleagris	1	4	40	0.03631	2.81	4.08
P. aspricaudus	2	5	50	0.02029	2.92	5.92
Totals	102	12.03				668.66
	# of fish	average size		Convert to kg		6.69
Overall Ranking (kg/m squared		**2.33**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	12	120	0.02548	2.98	27.33
C. perspicillatus	2	10	100	0.02548	2.98	15.19
C. perspicillatus	2	9	90	0.02548	2.98	13.67
C. perspicillatus	1	14	140	0.02548	2.98	10.63
A. nigrofuscus	15	9	90	0.02692	2.97	107.94
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	1	10	100	0.02692	2.97	8.00
A. nigrofuscus	1	4	40	0.02692	2.97	3.20
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	1	7	70	0.02465	3.03	5.23
C. strigosus	1	5	50	0.02465	3.03	3.73
N. lituratus	1	11	110	0.03020	2.97	9.87
M. niger	1	22	220	0.01588	3.08	10.76
M. niger	8	18	180	0.01588	3.08	70.43
M. niger	3	17	170	0.01588	3.08	24.94
M. niger	1	20	200	0.01588	3.08	9.78
M. niger	1	22	220	0.01588	3.08	10.76
M. niger	1	23	230	0.01588	3.08	11.25
F. flavissimus	4	17	170	0.02018	3.04	41.72
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	1	9	90	0.00661	2.97	1.77
G. varius	1	10	100	0.00661	2.97	1.96
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	4	7	70	0.00832	2.99	6.97
T. duperrey	3	9	90	0.00832	2.99	6.72
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	3	6	60	0.00832	2.99	4.48
C. vanderbilti	4	5	50	0.00102	3.06	0.62
C. vanderbilti	5	4	40	0.00102	3.06	0.62
S. marginatus	9	7	70	0.00087	3.12	1.71
S. marginatus	1	4	40	0.00087	3.12	0.11
S. marginatus	5	7	70	0.00087	3.12	0.95
S. marginatus	4	8	80	0.00087	3.12	0.87
Totals	99	8.51				496.53
	# of fish	average size				4.97

Fish Benthic Study

Honoapiliani Highway

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. rubroviolaceus	3	22	220	0.01288	3.04	25.84
A. nigrofuscus	3	8	80	0.02692	2.97	19.19
A. nigrofuscus	5	7	70	0.02692	2.97	27.98
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
C. strigosus	9	8	80	0.02465	3.03	53.78
C. strigosus	3	10	100	0.02465	3.03	22.41
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	4	20	200	0.03020	2.97	71.76
A. achilles	1	20	200	0.02591	2.93	15.18
M. niger	5	22	220	0.01588	3.08	53.80
C. dumerilii	2	28	280	0.02042	2.94	33.62
A. dussumieri	1	20	200	0.03311	2.95	19.53
C. ornatissimus	4	16	160	0.02570	3.01	49.51
C. multicinctus	2	12	120	0.02487	3.05	18.20
T. duperrey	1	8	80	0.00832	2.99	1.99
G. varius	1	6	60	0.00661	2.97	1.18
P. insularis	3	20	200	0.01047	3.11	19.54
S. faciolatus	5	9	90	0.01514	2.99	20.37
P. johnstonianus	6	7	70	0.02291	2.95	28.39
C. jactator	2	6	60	0.02239	2.96	7.95
Totals	63	8.15				520.80
	# of fish	average size		Convert to kg		5.21
Overall Ranking (kg/m squared		**1.63**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	6	9	90	0.02465	3.03	40.33
C. strigosus	2	12	120	0.02465	3.03	17.93
C. strigosus	2	8	80	0.02465	3.03	11.95
N. unicornis	1	17	170	0.02570	2.95	12.89
M. niger	6	20	200	0.01588	3.08	58.69
C. unimaculatus	2	12	120	0.01230	3.04	8.97
S. balteata	9	6	60	0.01023	2.99	16.52
T. duperrey	4	6	60	0.00832	2.99	5.97
T. duperrey	3	7	70	0.00832	2.99	5.22
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	5	50	0.00832	2.99	1.24
G. varius	4	9	90	0.00661	2.97	7.07
G. varius	1	8	80	0.00661	2.97	1.57
S. marginatus	3	7	70	0.00087	3.12	0.57
S. marginatus	2	8	80	0.00087	3.12	0.43
S. marginatus	4	10	100	0.00087	3.12	1.09
P. johnstonianus	7	6	60	0.02291	2.95	28.39
P. johnstonianus	2	5	50	0.02291	2.95	6.76
P. johnstonianus	6	7	70	0.02291	2.95	28.39
P. johnstonianus	4	8	80	0.02291	2.95	21.63
C. vanderbilti	26	4	40	0.00102	3.06	3.25
C. vanderbilti	11	7	70	0.00102	3.06	2.40
P. arcatus	5	8	80	0.00912	3.08	11.24
Totals	112	4.42				294.98
	# of fish	average size				2.95

Fish Benthic Study

DAR Puamana Offshore

Depth: 13m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	5	23	230	0.01549	3.06	54.51
S. rubroviolaceus	1	20	200	0.01288	3.04	7.83
A. nigrofuscus	8	9	90	0.02692	2.97	57.57
A. nigrofuscus	5	7	70	0.02692	2.97	27.98
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
C. strigosus	6	8	80	0.02465	3.03	35.85
C. strigosus	9	10	100	0.02465	3.03	67.22
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	1	22	220	0.03020	2.97	19.73
A. achilles	1	20	200	0.02591	2.93	15.18
M. niger	5	24	240	0.01588	3.08	58.69
C. dumerilii	2	28	280	0.02042	2.94	33.62
A. dussumieri	1	20	200	0.03311	2.95	19.53
C. ornatissimus	1	15	150	0.02570	3.01	11.60
C. multicinctus	2	12	120	0.02487	3.05	18.20
T. duperrey	4	8	80	0.00832	2.99	7.96
T. duperrey	1	9	90	0.00832	2.99	2.24
G. varius	5	7	70	0.00661	2.97	6.87
P. insularis	1	20	200	0.01047	3.11	6.51
S. faciolatus	5	8	80	0.01514	2.99	18.11
P. johnstonianus	6	7	70	0.02291	2.95	28.39
C. jactator	3	5	50	0.02239	2.96	9.94
Totals	75	9.12				538.12
	# of fish	average size		Convert to kg		5.38
Overall Ranking (kg/m squared		**1.68**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	8	9	90	0.02465	3.03	53.78
C. strigosus	2	11	110	0.02465	3.03	16.43
C. strigosus	2	8	80	0.02465	3.03	11.95
N. unicornis	1	17	170	0.02570	2.95	12.89
M. niger	6	24	240	0.01588	3.08	70.43
C. unimaculatus	2	11	110	0.01230	3.04	8.23
S. balteata	7	6	60	0.01023	2.99	12.85
T. duperrey	4	6	60	0.00832	2.99	5.97
T. duperrey	3	7	70	0.00832	2.99	5.22
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	4	5	50	0.00832	2.99	4.98
G. varius	1	9	90	0.00661	2.97	1.77
G. varius	5	8	80	0.00661	2.97	7.85
S. marginatus	3	7	70	0.00087	3.12	0.57
S. marginatus	2	8	80	0.00087	3.12	0.43
S. marginatus	8	10	100	0.00087	3.12	2.17
S. marginatus	1	9	90	0.00087	3.12	0.24
P. johnstonianus	9	6	60	0.02291	2.95	36.50
P. johnstonianus	2	5	50	0.02291	2.95	6.76
P. johnstonianus	6	7	70	0.02291	2.95	28.39
P. johnstonianus	1	8	80	0.02291	2.95	5.41
C. vanderbilti	16	6	60	0.00102	3.06	3.00
C. vanderbilti	12	4	40	0.00102	3.06	1.50
C. vanderbilti	1	6	60	0.00102	3.06	0.19
P. arcatus	1	8	9	0.00912	3.08	0.25
Totals	108	4.78				300.23
	# of fish	average size				3.00

Fish Benthic Study

DAR Puamana Offshore

Depth: 13m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. carolinus	1	18	180	0.02358	2.98	12.65
C. carolinus	4	16	160	0.02358	2.98	44.97
S. psittacus	2	18	180	0.01622	3.05	17.81
A. olivaceus	2	18	180	0.02485	3.05	27.29
A. olivaceus	5	20	200	0.02485	3.05	75.79
A. nigrofuscus	1	8	80	0.02692	2.97	6.40
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
N. brevirostris	1	20	200	0.02399	2.99	14.35
N. unicornis	1	22	220	0.02570	2.95	16.68
N. lituratus	2	17	170	0.03020	2.97	30.50
A. dussumieri	3	18	180	0.03311	2.95	52.74
A. leucopareius	1	17	170	0.02692	2.97	13.59
A. leucopareius	1	20	200	0.02692	2.97	15.99
A. blochii	1	22	220	0.02692	3.01	17.83
A. blochii	1	17	170	0.02692	3.01	13.77
P. multifaciatus	2	18	180	0.01047	3.15	11.87
P. multifaciatus	2	18	180	0.01047	3.15	11.87
T. duperrey	1	6	60	0.00832	2.99	1.49
P. arcatus	1	7	70	0.00912	3.08	1.97
S. balteata	1	6	60	0.01023	2.99	1.84
G. varius	1	7	70	0.00661	2.97	1.37
P. johnstonianus	2	6	60	0.02291	2.95	8.11
C. jactator	1	5	50	0.02239	2.96	3.31
M. niger	1	16	160	0.01588	3.08	7.83
Z. cornutus	1	15	150	0.00698	2.98	3.12
Totals	41	10.71				427.53
	# of fish	average size		Convert to kg		4.28
Overall Ranking (kg/m squared		**1.32**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. olivaceus	2	18	180	0.02485	3.05	27.29
A. olivaceus	3	19	190	0.02485	3.05	43.20
N. brevirostris	2	11	110	0.02399	2.99	15.78
N. brevirostris	1	12	120	0.02399	2.99	8.61
A. leucopareius	3	13	130	0.02692	2.97	31.18
A. nigrofuscus	4	6	60	0.02692	2.97	19.19
A. blochii	2	20	200	0.02692	3.01	32.41
N. lituratus	1	14	140	0.03020	2.97	12.56
P. multifasciatus	2	8	80	0.01047	3.15	5.28
S. balteata	2	14	140	0.01023	2.99	8.56
T. duperrey	4	11	110	0.00832	2.99	10.95
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	3	13	130	0.00832	2.99	9.70
Z. cornutus	2	16	160	0.00698	2.98	6.66
Totals	32	4.09				233.60
	# of fish	average size				2.34

Fish Benthic Study

DAR Puamana NearShore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	7	7	70	0.02692	2.97	39.18
A. nigrofuscus	2	11	110	0.02692	2.97	17.59
C. strigosus	9	8	80	0.02465	3.03	53.78
C. strigosus	3	10	100	0.02465	3.03	22.41
A. blochii	2	17	170	0.02692	3.01	27.55
N. lituratus	7	20	200	0.03020	2.97	125.57
C. dumerilii	2	28	280	0.02042	2.94	33.62
A. dussumieri	1	20	200	0.03311	2.95	19.53
C. ornatissimus	4	16	160	0.02570	3.01	49.51
C. multicinctus	2	11	110	0.02487	3.05	16.69
T. duperrey	2	8	80	0.00832	2.99	3.98
G. varius	1	6	60	0.00661	2.97	1.18
P. insularis	2	20	200	0.01047	3.11	13.02
P. johnstonianus	5	7	70	0.02291	2.95	23.65
C. jactator	2	6	60	0.02239	2.96	7.95
Totals	53	5.97				468.00
	# of fish	average size		Convert to kg		4.68
Overall Ranking (kg/m squared		**1.47**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. strigosus	3	12	120	0.02465	3.03	26.89
C. strigosus	2	8	80	0.02465	3.03	11.95
N. unicornis	2	16	160	0.02570	2.95	24.26
M. niger	6	20	200	0.01588	3.08	58.69
C. unimaculatus	3	12	120	0.01230	3.04	13.46
S. balteata	9	6	60	0.01023	2.99	16.52
T. duperrey	4	6	60	0.00832	2.99	5.97
T. duperrey	2	5	50	0.00832	2.99	2.49
G. varius	5	9	90	0.00661	2.97	8.83
G. varius	1	8	80	0.00661	2.97	1.57
S. marginatus	3	8	80	0.00087	3.12	0.65
S. marginatus	5	8	80	0.00087	3.12	1.09
S. marginatus	4	12	120	0.00087	3.12	1.30
P. johnstonianus	7	6	60	0.02291	2.95	28.39
P. johnstonianus	6	7	70	0.02291	2.95	28.39
P. johnstonianus	4	8	80	0.02291	2.95	21.63
C. vanderbilti	15	4	40	0.00102	3.06	1.87
C. vanderbilti	5	8	80	0.00102	3.06	1.25
P. arcatus	6	8	80	0.00912	3.08	13.48
Totals	92	3.80				268.68
	# of fish	average size				2.69

Fish Benthic Study

DAR Puamana Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
S. laysan	2	20	200	0.00331	3.05	4.04
C. argus	2	18	180	0.00102	3.06	1.12
S. rubroviolaceus	2	25	250	0.01288	3.04	19.58
C. carolinus	2	21	210	0.02358	2.98	29.51
C. carolinus	3	16	160	0.02358	2.98	33.73
S. psittacus	2	18	180	0.01622	3.05	17.81
A. olivaceus	3	20	200	0.02485	3.05	45.48
A. olivaceus	5	19	190	0.02485	3.05	72.00
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	7	9	90	0.02692	2.97	50.37
N. brevirostris	1	19	190	0.02399	2.99	13.63
N. brevirostris	2	21	210	0.02399	2.99	30.13
N. unicornis	1	22	220	0.02570	2.95	16.68
N. lituratus	4	17	170	0.03020	2.97	60.99
A. dussumieri	3	18	180	0.03311	2.95	52.74
A. dussumieri	1	15	150	0.03311	2.95	14.65
A. leucopareius	1	18	180	0.02692	2.97	14.39
A. leucopareius	2	20	200	0.02692	2.97	31.98
A. blochii	1	22	220	0.02692	3.01	17.83
A. blochii	2	16	160	0.02692	3.01	25.93
P. multifaciatus	4	18	180	0.01047	3.15	23.75
P. multifaciatus	2	18	180	0.01047	3.15	11.87
T. duperrey	3	6	60	0.00832	2.99	4.48
T. duperrey	1	8	80	0.00832	2.99	1.99
P. arcatus	2	7	70	0.00912	3.08	3.93
S. balteata	3	6	60	0.01023	2.99	5.51
G. varius	2	7	70	0.00661	2.97	2.75
P. johnstonianus	2	5	50	0.02291	2.95	6.76
C. jactator	2	5	50	0.02239	2.96	6.63
R. rectangulus	1	22	220	0.01991	2.87	12.57
M. niger	2	19	190	0.01588	3.08	18.59
F. flavissimus	1	12	120	0.02018	3.04	7.36
Z. cornutus	2	17	170	0.00698	2.98	7.07
Z. cornutus	1	18	180	0.00698	2.98	3.74
P. cyclostomus	1	14	140	0.01047	3.15	4.62
Totals	77	16.00				686.99
	# of fish	average size		Convert to kg		6.87
Overall Ranking (kg/m squared		**2.23**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. grandoculis	1	18	180	0.01995	2.98	10.70
Z. veliferum	2	26	260	0.02630	2.94	40.21
Z. veliferum	2	28	280	0.02630	2.94	43.30
A. olivaceus	5	18	180	0.02485	3.05	68.21
A. olivaceus	5	17	170	0.02485	3.05	64.42
N. brevirostris	1	12	120	0.02399	2.99	8.61
N. brevirostris	1	11	110	0.02399	2.99	7.89
A. leucopareius	7	12	120	0.02692	2.97	67.16
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. blochii	1	18	180	0.02692	3.01	14.59
N. lituratus	3	13	130	0.03020	2.97	34.98
R. rectangulus	1	16	160	0.01991	2.87	9.14
P. multifasciatus	3	8	80	0.01047	3.15	7.92
S. balteata	1	14	140	0.01023	2.99	4.28
T. duperrey	4	10	100	0.00832	2.99	9.95
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	3	9	90	0.00832	2.99	6.72
T. duperrey	1	12	120	0.00832	2.99	2.99
Z. cornutus	2	20	200	0.00698	2.98	8.32
Totals	47	6.11				425.52
	# of fish	average size				4.26

Fish Benthic Study

DAR Olowalu Offshore Four

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
N. brevirostris	7	16	160	0.02399	2.99	80.34
N. hexacanthus	2	12	120	0.0257	2.95	18.20
A. olivaceaus	2	15	150	0.02485	3.05	22.74
A. nigrofuscus	15	10	100	0.02692	2.97	119.93
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
S. bursa	5	17	170	0.02191	2.98	55.50
C. kleinii	3	8	80	0.02692	3.01	19.45
P. multifaciatus	1	8	80	0.01047	3.15	2.64
P. plurostigma	2	9	90	0.00844	2.98	4.53
T. duperrey	14	5	50	0.00832	2.99	17.41
T. duperrey	6	5	50	0.00832	2.99	7.46
P. arcatus	1	4	40	0.00912	3.08	1.12
C. gaimard	3	7	70	0.00832	2.99	5.22
G. varius	4	5	50	0.00661	2.97	3.93
G. varius	6	7	70	0.00661	2.97	8.25
S. balteata	4	6	60	0.01023	2.99	7.34
C. vanderbilti	7	3	30	0.00102	3.06	0.66
	90	148				445.06
	# of fish	average size		Convert to kg		4.45
		Overall Ranking (kg/m squared				**1.37**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	8	10	100	0.02692	2.97	63.96
M. vidua	3	18	180	0.01000	3.04	16.42
R. aculeatus	2	15	150	0.02630	2.98	23.51
P. multifasciatus	6	6	60	0.01047	3.15	11.87
T. duperrey	8	6	60	0.00832	2.99	11.94
T. duperrey	21	7	70	0.00832	2.99	36.57
T. duperrey	6	7	70	0.00832	2.99	10.45
T. duperrey	11	13	130	0.00832	2.99	35.57
C. gaimard	3	7	70	0.00832	2.99	5.22
P. octotaenia	1	6	60	0.00924	3.02	1.67
P. johnstonianus	5	6	60	0.02291	2.95	20.28
C. vanderbilti	9	7	70	0.00102	3.06	1.97
	83	108				239.44
						2.39

Fish Benthic Study

DAR Mahinahina Beach 2

Depth: 10m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
C. strigosus	4	10	100	0.02465	3.03	29.88
S. bursa	4	16	160	0.02191	2.98	41.79
C. multicinctus	3	17	170	0.02487	3.05	38.69
P. multifaciatus	2	10	100	0.01047	3.15	6.60
T. duperrey	2	8	80	0.00832	2.99	3.98
T. duperrey	3	16	160	0.00832	2.99	11.94
G. varius	1	11	110	0.00661	2.97	2.16
G. varius	3	9	90	0.00661	2.97	5.30
S. balteata	3	8	80	0.01023	2.99	7.34
P. arcatus	2	9	90	0.00912	3.08	5.06
M. geoffroy	1	1	10	0.01950	2.97	0.58
P. johnstonianus	4	10	100	0.02291	2.95	27.03
C. vanderbilti	3	6	60	0.00102	3.06	0.56
C. jactator	1	7	70	0.02239	2.96	4.64
Totals	43	4.35				241.50
	# of fish	average size		Convert to kg		2.42
Overall Ranking (kg/m squared		**0.89**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	3	12	120	0.02692	2.97	28.78
A. nigrofuscus	2	6	60	0.02692	2.97	9.59
A. nigrofuscus	1	8	80	0.02692	2.97	6.40
A. nigrofuscus	2	3	30	0.02692	2.97	4.80
S. strigosus	2	14	140	0.02465	3.03	20.91
S. strigosus	3	8	80	0.02465	3.03	17.93
S. strigosus	2	9	90	0.02465	3.03	13.44
S. strigosus	2	3	30	0.02465	3.03	4.48
S. strigosus	3	9	90	0.02465	3.03	20.17
R. aculeatus	1	11	110	0.02630	2.98	8.62
C. ornatissimus	1	18	180	0.02570	3.01	13.92
C. multicinctus	2	9	90	0.02487	3.05	13.65
P. multifasciatus	1	15	150	0.01047	3.15	4.95
T. duperrey	2	12	120	0.00832	2.99	5.97
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	2	9	90	0.00832	2.99	4.48
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	3	15	150	0.00832	2.99	11.19
S. balteata	2	8	80	0.01023	2.99	4.89
G. varius	2	9	90	0.00661	2.97	3.53
P. johnstonianus	1	6	60	0.02291	2.95	4.06
S. marginatus	7	9	90	0.00087	3.12	1.71
S. marginatus	3	7	70	0.00087	3.12	0.57
C. vanderbilti	2	5	50	0.00102	3.06	0.31
C. jactator	2	7	70	0.02239	2.96	9.28
P. arcatus	2	5	50	0.00912	3.08	2.81
Totals	38	4.44				203.19
	# of fish	average size				2.03

Fish Benthic Study

DAR Mahinahina Beach 1

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
C. strigosus	3	9	90	0.02465	3.03	20.17
S. bursa	2	18	180	0.02191	2.98	23.51
C. multicinctus	1	17	170	0.02487	3.05	12.90
C. multicinctus	2	12	120	0.02487	3.05	18.20
P. multifaciatus	2	8	80	0.01047	3.15	5.28
T. duperrey	7	8	80	0.00832	2.99	13.93
T. duperrey	3	12	120	0.00832	2.99	8.96
T. duperrey	1	16	160	0.00832	2.99	3.98
G. varius	1	11	110	0.00661	2.97	2.16
G. varius	2	9	90	0.00661	2.97	3.53
S. balteata	1	8	80	0.01023	2.99	2.45
P. arcatus	2	7	70	0.00912	3.08	3.93
P. arcatus	2	12	120	0.00912	3.08	6.74
M. geoffroy	1	1	10	0.01950	2.97	0.58
P. johnstonianus	1	10	100	0.02291	2.95	6.76
C. vanderbilti	1	6	60	0.00102	3.06	0.19
C. jactator	2	6	60	0.02239	2.96	7.95
Totals	39	5.24				173.19
	# of fish	average size		Convert to kg		1.73
Overall Ranking (kg/m squared		**0.79**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
A. nigrofuscus	2	6	60	0.02692	2.97	9.59
A. nigrofuscus	1	8	80	0.02692	2.97	6.40
A. nigrofuscus	2	3	30	0.02692	2.97	4.80
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
S. strigosus	2	12	120	0.02465	3.03	17.93
S. strigosus	3	8	80	0.02465	3.03	17.93
S. strigosus	2	9	90	0.02465	3.03	13.44
S. strigosus	2	7	70	0.02465	3.03	10.46
S. strigosus	2	3	30	0.02465	3.03	4.48
S. strigosus	2	6	60	0.02465	3.03	8.96
R. aculeatus	1	11	110	0.02630	2.98	8.62
C. ornatissimus	1	18	180	0.02570	3.01	13.92
C. multicinctus	2	12	120	0.02487	3.05	18.20
C. multicinctus	2	9	90	0.02487	3.05	13.65
P. multifasciatus	1	16	160	0.01047	3.15	5.28
T. duperrey	2	12	120	0.00832	2.99	5.97
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	2	8	80	0.00832	2.99	3.98
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	2	15	150	0.00832	2.99	7.46
S. balteata	1	10	100	0.01023	2.99	3.06
S. balteata	3	9	90	0.01023	2.99	8.26
S. balteata	2	8	80	0.01023	2.99	4.89
G. varius	2	9	90	0.00661	2.97	3.53
P. johnstonianus	1	5	50	0.02291	2.95	3.38
S. marginatus	7	9	90	0.00087	3.12	1.71
S. marginatus	3	8	80	0.00087	3.12	0.65
C. vanderbilti	2	5	50	0.00102	3.06	0.31
C. jactator	2	6	60	0.02239	2.96	7.95
E. brevis	1	10	100	0.01995	3.01	6.00
E. brevis	2	8	80	0.01995	3.01	9.61
P. arcatus	1	6	60	0.00912	3.08	1.69
Totals	44	5.33				220.58
	# of fish	average size				2.21

Fish Benthic Study

DAR Maalaea Offshore

Depth: 6m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	3	20	200	0.01995	2.98	35.67
C. sordidus	2	32	320	0.01549	3.06	30.34
C. sordidus	4	22	220	0.01549	3.06	41.71
S. rubroviolaceus	1	19	190	0.01288	3.04	7.44
C. strigosus	5	12	120	0.02465	3.03	44.81
C. strigosus	2	15	150	0.02465	3.03	22.41
C. strigosus	5	10	100	0.02465	3.03	37.34
N. brevirostris	5	19	190	0.02399	2.99	68.14
A. nigrofuscus	6	10	100	0.02692	2.97	47.97
A. nigrofuscus	5	12	120	0.02692	2.97	47.97
N. hexacanthus	2	18	180	0.02570	2.95	27.29
M. vidua	2	20	200	0.01000	3.04	12.16
S. bursa	2	16	160	0.02191	2.98	20.89
Z. flavescens	2	10	100	0.02512	3.00	15.07
C. multicinctus	2	12	120	0.02487	3.05	18.20
P. multifasciatus	1	16	160	0.01047	3.15	5.28
P. multifasciatus	1	14	140	0.01047	3.15	4.62
B. bilinulatus	1	40	400	0.01259	3.02	15.21
T. duperrey	2	9	90	0.00832	2.99	4.48
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	1	12	120	0.00832	2.99	2.99
T. duperrey	1	8	80	0.00832	2.99	1.99
G. varius	5	10	100	0.00661	2.97	9.82
P. arcatus	1	8	80	0.00912	3.08	2.25
C. hanui	3	5	50	0.01987	3.01	8.97
P. johnstonianus	1	7	70	0.02291	2.95	4.73
Z. cornutus	3	15	150	0.00698	2.98	9.36
	69	407				551.09
	# of fish	average size		Convert to kg		5.51
		Overall Ranking (kg/m squared				**1.82**

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
M. granoculis	4	25	250	0.01995	2.98	59.45
M. granoculis	4	22	220	0.01995	2.98	52.32
C. perspicillatus	1	16	160	0.02548	2.98	12.15
C. strigosus	1	3	30	0.02465	3.03	2.24
C. strigosus	10	6	60	0.02465	3.03	44.81
C. strigosus	2	2	20	0.02465	3.03	2.99
C. strigosus	3	6	60	0.02465	3.03	13.44
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
R. aculeatus	3	15	150	0.02630	2.98	35.27
R. aculeatus	4	16	160	0.02630	2.98	50.16
R. aculeatus	1	8	80	0.02630	2.98	6.27
M. vidua	1	24	240	0.01000	3.04	7.30
M. vidua	1	25	250	0.01000	3.04	7.60
C. miliaris	2	13	130	0.03236	3.04	25.58
T. duperrey	1	17	170	0.00832	2.99	4.23
T. duperrey	1	12	120	0.00832	2.99	2.99
T. duperrey	3	10	100	0.00832	2.99	7.46
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. johnstonianus	1	8	80	0.02291	2.95	5.41
S. marginatus	4	8	80	0.00087	3.12	0.87
S. marginatus	1	9	90	0.00087	3.12	0.24
S. marginatus	3	10	100	0.00087	3.12	0.81
S. marginatus	1	11	110	0.00087	3.12	0.30
	55	282				361.01
						3.61

Fish Benthic Study

DAR Maalaea Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	1	10	100	0.02692	2.97	8.00
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
A. nigrofuscus	2	13	130	0.02692	2.97	20.79
C. strigosus	2	8	80	0.02465	3.03	11.95
C. strigosus	7	6	60	0.02465	3.03	31.37
C. strigosus	8	10	100	0.02465	3.03	59.75
C. strigosus	1	13	130	0.02465	3.03	9.71
C. strigosus	4	12	120	0.02465	3.03	35.85
N. unicornis	2	16	160	0.02570	2.95	24.26
A. achilles	2	8	80	0.02951	2.93	13.83
C. dumerilii	2	16	160	0.02042	2.94	19.21
Z. flavescens	2	10	100	0.02512	3.00	15.07
Z. flavescens	7	9	90	0.02512	3.00	47.48
Z. flavescens	1	12	120	0.02512	3.00	9.04
Z. flavescens	1	9	90	0.02512	3.00	6.78
C. ornatissimus	3	16	160	0.02570	3.01	37.13
G. varius	1	14	140	0.00661	2.97	2.75
G. varius	3	16	160	0.00661	2.97	9.42
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	3	12	120	0.00832	2.99	8.96
S. balteata	1	8	80	0.01023	2.99	2.45
S. fasciolatus	6	10	100	0.01514	2.99	27.16
Synodus spp.	1	16	160	0.01215	3.00	5.83
C. jactator	3	4	40	0.02239	2.96	7.95
Totals	72	8.12				475.35
	# of fish	average size		Convert to kg		4.75
Overall Ranking (kg/m squared		**1.65**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	2	8	80	0.02145	3.02	10.36
A. nigrofuscus	2	14	140	0.02692	2.97	22.39
A. nigrofuscus	4	12	120	0.02692	2.97	38.38
A. nigrofuscus	1	5	50	0.02692	2.97	4.00
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	2	11	110	0.02692	2.97	17.59
C. strigosus	2	6	60	0.02465	3.03	8.96
C. strigosus	1	11	110	0.02465	3.03	8.22
C. strigosus	5	9	90	0.02465	3.03	33.61
C. strigosus	6	7	70	0.02465	3.03	31.37
Z. flavescens	2	13	130	0.02512	3.00	19.59
Z. flavescens	3	8	80	0.02512	3.00	18.09
C. ornatissimus	1	12	120	0.02570	3.01	9.28
C. ornatissimus	1	10	100	0.02570	3.01	7.74
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	19	190	0.00832	2.99	4.73
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	2	15	150	0.00832	2.99	7.46
S. balteata	1	10	100	0.01023	2.99	3.06
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	16	160	0.00661	2.97	3.14
S. marginatus	4	9	90	0.00087	3.12	0.98
P. johnstonianus	3	6	60	0.02291	2.95	12.17
P. johnstonianus	2	7	70	0.02291	2.95	9.46
C. vanderbilti	6	3	30	0.00102	3.06	0.56
P. arcatus	2	6	60	0.00912	3.08	3.37
Totals	69	6.78				347.81
	# of fish	average size				3.48

Fish Benthic Study

DAR Kahekili Beach 2

Depth: 7m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
C. strigosus	4	10	100	0.02465	3.03	29.88
S. bursa	4	16	160	0.02191	2.98	41.79
C. multicinctus	3	17	170	0.02487	3.05	38.69
P. multifaciatus	2	10	100	0.01047	3.15	6.60
T. duperrey	4	8	80	0.00832	2.99	7.96
T. duperrey	3	16	160	0.00832	2.99	11.94
G. varius	1	11	110	0.00661	2.97	2.16
G. varius	3	9	90	0.00661	2.97	5.30
S. balteata	3	8	80	0.01023	2.99	7.34
P. arcatus	4	9	90	0.00912	3.08	10.11
M. geoffroy	1	1	10	0.01950	2.97	0.58
P. johnstonianus	4	10	100	0.02291	2.95	27.03
C. vanderbilti	3	6	60	0.00102	3.06	0.56
C. jactator	4	7	70	0.02239	2.96	18.56
Totals	50	4.35				264.46
	# of fish	average size		Convert to kg		2.64
Overall Ranking (kg/m squared		**0.98**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	3	12	120	0.02692	2.97	28.78
A. nigrofuscus	4	6	60	0.02692	2.97	19.19
A. nigrofuscus	1	8	80	0.02692	2.97	6.40
A. nigrofuscus	2	3	30	0.02692	2.97	4.80
S. strigosus	2	14	140	0.02465	3.03	20.91
S. strigosus	3	8	80	0.02465	3.03	17.93
S. strigosus	2	9	90	0.02465	3.03	13.44
S. strigosus	2	3	30	0.02465	3.03	4.48
S. strigosus	4	9	90	0.02465	3.03	26.89
R. aculeatus	1	11	110	0.02630	2.98	8.62
C. ornatissimus	1	18	180	0.02570	3.01	13.92
C. multicinctus	2	9	90	0.02487	3.05	13.65
P. multifasciatus	1	15	150	0.01047	3.15	4.95
T. duperrey	2	12	120	0.00832	2.99	5.97
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	4	9	90	0.00832	2.99	8.96
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	3	15	150	0.00832	2.99	11.19
S. balteata	2	8	80	0.01023	2.99	4.89
G. varius	2	9	90	0.00661	2.97	3.53
P. johnstonianus	1	6	60	0.02291	2.95	4.06
S. marginatus	7	9	90	0.00087	3.12	1.71
S. marginatus	3	7	70	0.00087	3.12	0.57
C. vanderbilti	2	5	50	0.00102	3.06	0.31
C. jactator	2	5	50	0.02239	2.96	6.63
C. jactator	2	6	60	0.02239	2.96	7.95
E. brevis	1	10	100	0.01995	3.01	6.00
E. brevis	2	8	80	0.01995	3.01	9.61
P. arcatus	4	7	70	0.00912	3.08	7.87
P. arcatus	1	11	110	0.00912	3.08	3.09
Totals	43	4.44				223.98
	# of fish	average size				2.24

Fish Benthic Study

DAR Kahekili Beach 1

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	1	18	180	0.01549	3.06	8.53
A. nigrofuscus	2	5	50	0.02692	2.97	8.00
C. strigosus	3	2	20	0.02465	3.03	4.48
C. strigosus	3	9	90	0.02465	3.03	20.17
S. bursa	1	16	160	0.02191	2.98	10.45
R. rectangulus	1	18	180	0.01991	2.87	10.29
C. multicinctus	1	17	170	0.02487	3.05	12.90
C. multicinctus	2	14	140	0.02487	3.05	21.24
P. multifaciatus	2	8	80	0.01047	3.15	5.28
T. duperrey	7	10	100	0.00832	2.99	17.41
T. duperrey	5	11	110	0.00832	2.99	13.68
T. duperrey	1	15	150	0.00832	2.99	3.73
G. varius	1	12	120	0.00661	2.97	2.36
G. varius	1	9	90	0.00661	2.97	1.77
G. varius	1	11	110	0.00661	2.97	2.16
S. balteata	1	8	80	0.01023	2.99	2.45
P. arcatus	1	7	70	0.00912	3.08	1.97
P. arcatus	2	11	110	0.00912	3.08	6.18
M. geoffroy	1	1	10	0.01950	2.97	0.58
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	2	10	100	0.02291	2.95	13.52
C. vanderbilti	1	6	60	0.00102	3.06	0.19
C. jactator	1	7	70	0.02239	2.96	4.64
Totals	42	6.79				176.00
	# of fish	average size		Convert to kg		1.76
Overall Ranking (kg/m squared		**1.02**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
S. dermatogenys	1	7	70	0.00537	3.27	1.23
A. nigrofuscus	2	12	120	0.02692	2.97	19.19
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
A. nigrofuscus	5	6	60	0.02692	2.97	23.99
A. nigrofuscus	1	9	90	0.02692	2.97	7.20
A. nigrofuscus	3	5	50	0.02692	2.97	11.99
A. nigrofuscus	1	3	30	0.02692	2.97	2.40
A. nigrofuscus	1	11	110	0.02692	2.97	8.79
S. strigosus	2	12	120	0.02465	3.03	17.93
S. strigosus	3	8	80	0.02465	3.03	17.93
S. strigosus	2	9	90	0.02465	3.03	13.44
S. strigosus	2	7	70	0.02465	3.03	10.46
S. strigosus	2	3	30	0.02465	3.03	4.48
S. strigosus	4	6	60	0.02465	3.03	17.93
R. aculeatus	1	18	180	0.02630	2.98	14.11
R. aculeatus	1	10	100	0.02630	2.98	7.84
C. ornatissimus	1	17	170	0.02570	3.01	13.15
C. multicinctus	2	10	100	0.02487	3.05	15.17
C. multicinctus	2	8	80	0.02487	3.05	12.14
F. flavissimus	1	8	80	0.02018	3.04	4.91
P. multifasciatus	1	15	150	0.01047	3.15	4.95
T. duperrey	2	12	120	0.00832	2.99	5.97
T. duperrey	1	15	150	0.00832	2.99	3.73
T. duperrey	2	8	80	0.00832	2.99	3.98
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	2	14	140	0.00832	2.99	6.97
S. balteata	1	10	100	0.01023	2.99	3.06
S. balteata	3	9	90	0.01023	2.99	8.26
S. balteata	4	7	70	0.01023	2.99	8.56
G. varius	2	9	90	0.00661	2.97	3.53
G. varius	1	11	110	0.00661	2.97	2.16
P. johnstonianus	5	7	70	0.02291	2.95	23.65
P. johnstonianus	3	8	80	0.02291	2.95	16.22
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	3	4	40	0.02291	2.95	8.11
P. johnstonianus	1	5	50	0.02291	2.95	3.38
S. marginatus	7	8	80	0.00087	3.12	1.52
S. marginatus	1	6	60	0.00087	3.12	0.16
S. marginatus	3	8	80	0.00087	3.12	0.65
C. vanderbilti	4	5	50	0.00102	3.06	0.62
C. jactator	3	5	50	0.02239	2.96	9.94
C. jactator	2	6	60	0.02239	2.96	7.95
E. brevis	1	10	100	0.01995	3.01	6.00
E. brevis	4	9	90	0.01995	3.01	21.62
P. arcatus	1	7	70	0.00912	3.08	1.97
P. arcatus	1	11	110	0.00912	3.08	3.09
Totals	69	7.13				333.60
	# of fish	average size				3.34

Fish Benthic Study

DAR Honolua South

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. melempygus	1	22	220	0.02399	2.95	15.57
C. sordidus	3	20	200	0.01549	3.06	28.44
C. sordidus	3	24	240	0.01549	3.06	34.13
N. lituratus	2	22	220	0.03020	2.97	39.47
A. nigrofuscus	8	15	150	0.02692	2.97	95.94
A. nigrofuscus	1	20	200	0.02692	2.97	15.99
C. strigosus	1	17	170	0.02465	3.03	12.70
C. strigosus	2	10	100	0.02465	3.03	14.94
C. strigosus	2	12	120	0.02465	3.03	17.93
N. unicornis	1	26	260	0.02570	2.95	19.71
M. vidua	1	27	270	0.01000	3.04	8.21
C. multicinctus	2	9	90	0.02487	3.05	13.65
C. agilis	4	16	160	0.21020	2.99	402.24
P. multifasciatus	1	17	170	0.01047	3.15	5.61
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	3	8	80	0.00832	2.99	5.97
T. duperrey	4	5	50	0.00832	2.99	4.98
P. arcatus	1	8	80	0.00912	3.08	2.25
P. arcatus	2	7	70	0.00912	3.08	3.93
O. unifasciatus	1	16	160	0.01964	2.99	9.40
G. varius	1	6	60	0.00661	2.97	1.18
G. varius	1	9	90	0.00661	2.97	1.77
S. balteata	2	5	50	0.01023	2.99	3.06
S. balteata	1	9	90	0.01023	2.99	2.75
H. ornatisimus	1	8	80	0.02570	3.01	6.19
S. faciolatus	2	9	90	0.01514	2.99	8.15
C. vanderbilti	2	2	20	0.00102	3.06	0.12
C. vanderbilti	3	3	30	0.00102	3.06	0.28
P. johnstonianus	2	6	60	0.02291	2.95	8.11
P. johnstonianus	2	8	80	0.02291	2.95	10.81
CHUB	1	20	200	0.01413	3.00	8.48
C. jactator	2	4	40	0.02239	2.96	5.30
C. jactator	1	6	60	0.02239	2.96	3.98
Totals	34	8.18				729.74
	# of fish	average size		Convert to kg		7.30
Overall Ranking (kg/m squared		**1.88**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	2	12	120	0.02548	2.98	18.22
N. lituratus	2	16	160	0.03020	2.97	28.70
A. nigrofuscus	2	4	40	0.02692	2.97	6.40
A. nigrofuscus	7	5	50	0.02692	2.97	27.98
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	7	7	70	0.02692	2.97	39.18
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	7	70	0.02465	3.03	10.46
C. strigosus	1	5	50	0.02465	3.03	3.73
C. strigosus	3	3	30	0.02465	3.03	6.72
C. strigosus	1	13	130	0.02465	3.03	9.71
C. multicintus	2	12	120	0.02487	3.05	18.20
T. duperrey	2	5	50	0.00832	2.99	2.49
T. duperrey	3	4	40	0.00832	2.99	2.99
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	2	3	30	0.00832	2.99	1.49
T. duperrey	2	11	110	0.00832	2.99	5.47
G. varius	3	3	30	0.00661	2.97	1.77
G. varius	1	2	20	0.00661	2.97	0.39
C. hanui	2	4	40	0.01987	3.01	4.78
C. vanderbilti	5	3	30	0.00102	3.06	0.47
C. vanderbilti	3	4	40	0.00102	3.06	0.37
C. vanderbilti	2	5	50	0.00102	3.06	0.31
C. vanderbilti	1	7	70	0.00102	3.06	0.22
S. marginatus	4	6	60	0.00087	3.12	0.65
S. marginatus	5	5	50	0.00087	3.12	0.68
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	1	4	40	0.00087	3.12	0.11
C. jactator	3	5	50	0.02239	2.96	9.94
C. jactator	1	8	80	0.02239	2.96	5.30
C. jactator	1	6	60	0.02239	2.96	3.98
C. jactator	1	7	70	0.02239	2.96	4.64
P. johnstonianus	5	5	50	0.02291	2.95	16.90
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	2	4	40	0.02291	2.95	5.41
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. arcatus	2	7	70	0.00912	3.08	3.93
P. arcatus	2	6	60	0.00912	3.08	3.37
Totals	41	2.69				209.43
	# of fish	average size				2.09

Fish Benthic Study

DAR Honolua North

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
C. sordidus	2	24	240	0.01549	3.06	22.75
N. lituratus	1	20	200	0.03020	2.97	17.94
A. nigrofuscus	6	19	190	0.02692	2.97	91.15
A. nigrofuscus	4	20	200	0.02692	2.97	63.96
C. strigosus	1	17	170	0.02465	3.03	12.70
C. strigosus	2	10	100	0.02465	3.03	14.94
C. strigosus	2	12	120	0.02465	3.03	17.93
N. unicornis	1	24	240	0.02570	2.95	18.20
M. vidua	3	24	240	0.01000	3.04	21.89
C. multicinctus	2	9	90	0.02487	3.05	13.65
C. agilis	1	17	170	0.21020	2.99	106.84
P. multifasciatus	1	17	170	0.01047	3.15	5.61
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	2	6	60	0.00832	2.99	2.99
P. arcatus	1	9	90	0.00912	3.08	2.53
P. arcatus	2	7	70	0.00912	3.08	3.93
G. varius	1	6	60	0.00661	2.97	1.18
S. balteata	2	5	50	0.01023	2.99	3.06
S. balteata	1	9	90	0.01023	2.99	2.75
C. vanderbilti	6	2	20	0.00102	3.06	0.37
C. vanderbilti	3	3	30	0.00102	3.06	0.28
P. johnstonianus	2	7	70	0.02291	2.95	9.46
P. johnstonianus	2	8	80	0.02291	2.95	10.81
CHUB	1	22	220	0.01413	3.00	9.33
C. jactator	3	4	40	0.02239	2.96	7.95
C. jactator	1	5	50	0.02239	2.96	3.31
Totals	32	7.24				419.73
	# of fish	average size		Convert to kg		4.20
Overall Ranking (kg/m squared		**1.23**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
A. nigrofuscus	3	4	40	0.02692	2.97	9.59
A. nigrofuscus	7	7	70	0.02692	2.97	39.18
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	9	7	70	0.02692	2.97	50.37
A. nigrofuscus	2	7	70	0.02692	2.97	11.19
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	7	70	0.02465	3.03	10.46
C. strigosus	1	5	50	0.02465	3.03	3.73
C. strigosus	4	3	30	0.02465	3.03	8.96
C. strigosus	1	13	130	0.02465	3.03	9.71
C. multicintus	2	10	100	0.02487	3.05	15.17
T. duperrey	4	5	50	0.00832	2.99	4.98
T. duperrey	3	4	40	0.00832	2.99	2.99
T. duperrey	2	10	100	0.00832	2.99	4.98
G. varius	3	3	30	0.00661	2.97	1.77
G. varius	1	2	20	0.00661	2.97	0.39
C. vanderbilti	6	3	30	0.00102	3.06	0.56
C. vanderbilti	2	7	70	0.00102	3.06	0.44
C. vanderbilti	1	6	60	0.00102	3.06	0.19
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	1	4	40	0.00087	3.12	0.11
C. jactator	4	6	60	0.02239	2.96	15.91
C. jactator	1	5	50	0.02239	2.96	3.31
C. jactator	1	8	80	0.02239	2.96	5.30
C. jactator	1	7	70	0.02239	2.96	4.64
P. johnstonianus	3	5	50	0.02291	2.95	10.14
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	2	4	40	0.02291	2.95	5.41
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. arcatus	3	7	70	0.00912	3.08	5.90
P. arcatus	2	6	60	0.00912	3.08	3.37
Totals	48	2.24				193.83
	# of fish	average size				1.94

Fish Benthic Study

Baby Beach

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	1	16	160	0.01995	2.98	9.51
N. hexacanthus	5	20	200	0.0257	2.95	75.82
N. hexacanthus	1	12	120	0.0257	2.95	9.10
A. nigrofuscus	4	11	110	0.02692	2.97	35.18
C. strigosus	1	10	100	0.02465	3.03	7.47
N. brevirostris	2	16	160	0.02399	2.99	22.95
N. lituratus	1	16	160	0.03020	2.97	14.35
S. bursa	1	14	140	0.02191	2.98	9.14
C. sandwichensis	1	16	160	0.02457	3.02	11.87
C. miliaris	3	14	140	0.03236	3.04	41.32
C. multicinctus	2	12	120	0.02487	3.05	18.20
C. ornitissimus	1	18	180	0.02570	3.01	13.92
C. ornitissimus	1	19	190	0.02570	3.01	14.70
T. duperrey	1	12	120	0.00832	2.99	2.99
S. balteata	1	9	90	0.01023	2.99	2.75
G. varius	3	9	90	0.00661	2.97	5.30
C. venusta	2	10	100	0.02348	3.02	14.18
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	1	4	40	0.02291	2.95	2.70
C. jactator	1	6	60	0.02239	2.96	3.98
P. aspricaudus	1	5	50	0.02089	2.92	3.05
Totals	36	7.65				325.92
	# of fish	average size		Convert to kg		3.26
Overall Ranking (kg/m squared		**1.40**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	8	80	0.02548	2.98	18.22
C. perspicillatus	1	11	110	0.02548	2.98	8.35
C. perspicillatus	1	13	130	0.02548	2.98	9.87
C. perspicillatus	2	11	110	0.02548	2.98	16.70
A. nigrofuscus	1	5	50	0.02692	2.97	4.00
A. nigrofuscus	2	6	60	0.02692	2.97	9.59
A. nigrofuscus	1	8	80	0.02692	2.97	6.40
A. nigrofuscus	3	7	70	0.02692	2.97	16.79
N. hexacanthus	5	11	110	0.0257	2.95	41.70
N. hexacanthus	3	13	130	0.0257	2.95	29.57
C. strigosus	2	8	80	0.02465	3.03	11.95
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	1	4	40	0.02465	3.03	2.99
C. strigosus	1	6	60	0.02465	3.03	4.48
C. strigosus	2	12	120	0.02465	3.03	17.93
C. strigosus	1	13	130	0.02465	3.03	9.71
C. strigosus	2	3	30	0.02465	3.03	4.48
N. lituratus	1	9	90	0.03020	2.97	8.07
N. brevirostris	2	12	120	0.02399	2.99	17.22
N. brevirostris	3	18	180	0.02399	2.99	38.73
C. dumerilii	1	15	150	0.02042	2.94	9.01
C. multicintus	2	11	110	0.02487	3.05	16.69
C. miliaris	1	9	90	0.03236	3.04	8.85
P. multifasciatus	2	15	150	0.01047	3.15	9.89
P. multifasciatus	1	13	130	0.01047	3.15	4.29
P. multifasciatus	1	5	50	0.01047	3.15	1.65
P. tetrataenia	1	5	50	0.01445	2.94	2.12
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	15	150	0.00832	2.99	3.73
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	3	4	40	0.00832	2.99	2.99
G. varius	2	11	110	0.00661	2.97	4.32
Totals	59	6.82				373.90
	# of fish	average size				3.74

WHALE Environmental Services LLC

Fish Benthic Study

McGregor Point Nearshore

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
C. sordidus	1	18	180	0.01549	3.06	8.53
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	3	11	110	0.02692	2.97	26.38
A. nigrofuscus	5	12	120	0.02692	2.97	47.97
C. strigosus	12	8	80	0.02465	3.03	71.70
C. strigosus	7	6	60	0.02465	3.03	31.37
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	3	15	150	0.02465	3.03	33.61
C. strigosus	10	11	110	0.02465	3.03	82.16
A. leucopareius	15	17	170	0.02691	2.95	202.43
N. unicornis	2	18	180	0.02570	2.95	27.29
A. achilles	1	8	80	0.02951	2.93	6.92
R. rectangulus	1	17	170	0.02694	3.01	13.79
C. dumerilii	2	15	150	0.02042	2.94	18.01
C. dumerilii	1	9	90	0.02042	2.94	5.40
Z. flavescens	2	8	80	0.02512	3.00	12.06
Z. flavescens	3	9	90	0.02512	3.00	20.35
Z. flavescens	1	10	100	0.02512	3.00	7.54
Z. flavescens	3	8	80	0.02512	3.00	18.09
Z. flavescens	1	9	90	0.02512	3.00	6.78
C. ornatissimus	1	19	190	0.02570	3.01	14.70
C. ornatissimus	1	17	170	0.02570	3.01	13.15
G. varius	1	12	120	0.00661	2.97	2.36
G. varius	1	18	180	0.00661	2.97	3.53
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	1	15	150	0.00832	2.99	3.73
T. duperrey	3	10	100	0.00832	2.99	7.46
S. balteata	1	8	80	0.01023	2.99	2.45
S. balteata	1	7	70	0.01023	2.99	2.14
S. fasciolatus	7	8	80	0.01514	2.99	25.35
S. fasciolatus	3	10	100	0.01514	2.99	13.58
Synodus spp.	1	18	180	0.01215	3.00	6.56
C. jactator	1	5	50	0.02239	2.96	3.31
Totals	114	12.09				870.71
	# of fish	average size		Convert to kg		8.71
Overall Ranking (kg/m squared		**2.72**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
C. perspicillatus	1	7	70	0.02145	3.02	4.53
C. perspicillatus	3	9	90	0.02145	3.02	17.49
A. nigrofuscus	2	15	150	0.02692	2.97	23.99
A. nigrofuscus	8	12	120	0.02692	2.97	76.75
A. nigrofuscus	1	5	50	0.02692	2.97	4.00
A. nigrofuscus	1	6	60	0.02692	2.97	4.80
A. nigrofuscus	2	10	100	0.02692	2.97	15.99
A. nigrofuscus	3	8	80	0.02692	2.97	19.19
A. nigrofuscus	2	9	90	0.02692	2.97	14.39
A. nigrofuscus	2	11	110	0.02692	2.97	17.59
A. nigrofuscus	1	14	140	0.02692	2.97	11.19
C. strigosus	1	5	50	0.02465	3.03	3.73
C. strigosus	1	10	100	0.02465	3.03	7.47
C. strigosus	5	8	80	0.02465	3.03	29.88
C. strigosus	5	9	90	0.02465	3.03	33.61
C. strigosus	3	7	70	0.02465	3.03	15.68
C. strigosus	4	6	60	0.02465	3.03	17.93
Z. flavescens	2	13	130	0.02512	3.00	19.59
Z. flavescens	1	8	80	0.02512	3.00	6.03
Z. flavescens	1	10	100	0.02512	3.00	7.54
C. ornatissimus	1	12	120	0.02570	3.01	9.28
C. ornatissimus	2	8	80	0.02570	3.01	12.38
T. duperrey	4	14	140	0.00832	2.99	13.93
T. duperrey	3	10	100	0.00832	2.99	7.46
T. duperrey	1	15	150	0.00832	2.99	3.73
T. duperrey	2	7	70	0.00832	2.99	3.48
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	2	11	110	0.00832	2.99	5.47
T. duperrey	1	17	170	0.00832	2.99	4.23
T. duperrey	1	12	120	0.00832	2.99	2.99
T. duperrey	2	16	160	0.00832	2.99	7.96
T. duperrey	1	18	180	0.00832	2.99	4.48
S. balteata	1	10	100	0.01023	2.99	3.06
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	15	150	0.00661	2.97	2.94
S. marginatus	3	9	90	0.00087	3.12	0.73
S. marginatus	5	10	100	0.00087	3.12	1.36
S. marginatus	1	8	80	0.00087	3.12	0.22
P. johnstonianus	4	6	60	0.02291	2.95	16.22
P. johnstonianus	2	7	70	0.02291	2.95	9.46
C. vanderbilti	17	3	30	0.00102	3.06	1.59
C. vanderbilti	15	2	20	0.00102	3.06	0.94
C. vanderbilti	6	4	40	0.00102	3.06	0.75
A. meleagris	1	18	180	0.03631	2.81	18.37
P. arcatus	1	6	60	0.00912	3.08	1.69
Totals	129	9.82				489.14
	# of fish	average size				4.89

Fish Benthic Study

McGregor Point Offshore
Depth: 10m

	no.	size (cm)	size mm	a	b	Mass/G
C. chanos	1	85	850	0.01259	3.02	32.32
A. virescens	1	60	600	0.01349	2.95	23.88
M. grandoculis	2	22	220	0.01995	2.98	26.16
C. sordidus	2	35	350	0.01549	3.06	33.18
C. sordidus	5	22	220	0.01549	3.06	52.14
S. rubroviolaceus	1	27	270	0.01288	3.04	10.57
S. rubroviolaceus	2	18	180	0.01288	3.04	14.10
C. strigosus	5	12	120	0.02465	3.03	44.81
C. strigosus	2	15	150	0.02465	3.03	22.41
C. strigosus	7	8	80	0.02465	3.03	41.83
A. blochii	1	20	200	0.02692	3.01	16.21
A. blochii	1	18	180	0.02692	3.01	14.59
N. brevirostris	5	19	190	0.02399	2.99	68.14
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
N. hexacanthus	3	18	180	0.02570	2.95	40.94
M. vidua	2	23	230	0.01000	3.04	13.98
S. bursa	1	18	180	0.02191	2.98	11.75
S. bursa	1	12	120	0.02191	2.98	7.84
F. flavissimus	2	15	150	0.02018	3.04	18.40
Z. flavescens	2	10	100	0.02512	3.00	15.07
C. multicinctus	2	12	120	0.02487	3.05	18.20
P. multifasciatus	2	18	180	0.01047	3.15	11.87
P. multifasciatus	1	15	150	0.01047	3.15	4.95
M. vanicolensis	2	25	250	0.00794	3.05	12.11
M. vanicolensis	3	20	200	0.00794	3.05	14.53
M. vanicolensis	4	18	180	0.00794	3.05	17.44
B. bilinulatus	1	45	450	0.01259	3.02	17.11
T. duperrey	1	9	90	0.00832	2.99	2.24
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	8	80	0.00832	2.99	1.99
G. varius	8	10	100	0.00661	2.97	15.71
P. forsteri	1	20	200	0.00912	3.07	5.60
H. ornatissimus	1	8	80	0.0257	3.01	6.19
H. ornatissimus	1	9	90	0.0257	3.01	6.96
P. arcatus	1	8	80	0.00912	3.08	2.25
C. potteri	1	8	80	0.01914	3.04	4.65
C. potteri	2	7	70	0.01914	3.04	8.15
C. agilis	2	4	40	0.21020	2.99	50.28
C. agilis	3	5	50	0.21020	2.99	94.27
C. hanui	3	4	40	0.01987	3.01	7.18
P. johnstonianus	1	7	70	0.02291	2.95	4.73
M. geoffroy	1	5	50	0.01514	3.01	2.28
Z. cornutus	2	16	160	0.00698	2.98	6.66
G. meleagris	1	110	1100	0.03361	2.81	103.89
C. inermis	1	30	300	0.00380	3.1	3.53
P. aspricaudus	1	7	70	0.02089	2.92	4.27
	107	931				1030.26
	# of fish	average size		Convert to kg		10.30
		Overall Ranking (kg/m squared				**2.73**

	no.	size (cm)	size mm	a	b
M. granoculis	1	12	120	0.01995	2.98
M. granoculis	3	13	130	0.01995	2.98
M. granoculis	1	26	260	0.01995	2.98
M. granoculis	4	22	220	0.01995	2.98
C. perspicillatus	1	15	150	0.02548	2.98
C. strigosus	1	4	40	0.02465	3.03
C. strigosus	1	3	30	0.02465	3.03
C. strigosus	8	5	50	0.02465	3.03
C. strigosus	2	2	20	0.02465	3.03
C. strigosus	3	6	60	0.02465	3.03
C. strigosus	3	7	70	0.02465	3.03
A. nigrofuscus	2	8	80	0.02692	2.97
A. nigrofuscus	2	9	90	0.02692	2.97
R. aculeatus	1	15	150	0.02630	2.98
R. aculeatus	1	16	160	0.02630	2.98
R. aculeatus	1	8	80	0.02630	2.98
M. vidua	1	23	230	0.01000	3.04
M. vidua	1	25	250	0.01000	3.04
C. ornatissimus	1	13	130	0.0257	3.01
C. miliaris	1	10	100	0.03236	3.04
C. miliaris	2	13	130	0.03236	3.04
T. duperrey	1	17	170	0.00832	2.99
T. duperrey	1	11	110	0.00832	2.99
T. duperrey	1	10	100	0.00832	2.99
T. duperrey	1	12	120	0.00832	2.99
C. gaimard	1	7	70	0.00414	3.00
P. johnstonianus	3	6	60	0.02291	2.95
P. johnstonianus	1	7	70	0.02291	2.95
P. johnstonianus	1	8	80	0.02291	2.95
S. marginatus	4	10	100	0.00087	3.12
S. marginatus	1	9	90	0.00087	3.12
S. marginatus	1	8	80	0.00087	3.12
S. marginatus	1	11	110	0.00087	3.12
S. marginatus	1	12	120	0.00087	3.12
P. aspricaudus	1	8	80	0.02089	2.92
	60	391			

Fish Benthic Study

Lahaina Marina
Depth: 3m

	no.	size (cm)	size mm	a	b	Mass/G		no.	size (cm)	size mm	a	b	Mass/G
S. laysan	1	28	280	0.00331	3.05	2.83	*M. grandoculis*	1	17	170	0.01995	2.98	10.11
C. argus	1	18	180	0.00102	3.06	0.56	*Z. veliferum*	1	35	350	0.02630	2.94	27.06
S. rubroviolaceus	1	27	270	0.01288	3.04	10.57	*Z. veliferum*	1	30	300	0.02630	2.94	23.20
C. carolinus	1	22	220	0.02358	2.98	15.46	*A. olivaceus*	20	19	190	0.02485	3.05	288.01
C. carolinus	1	18	180	0.02358	2.98	12.65	*A. olivaceus*	8	18	180	0.02485	3.05	109.14
S. psittacus	2	18	180	0.01622	3.05	17.81	*N. brevirostris*	1	11	110	0.02399	2.99	7.89
A. olivaceus	7	18	180	0.02485	3.05	95.50	*N. brevirostris*	1	10	100	0.02399	2.99	7.17
A. olivaceus	6	20	200	0.02485	3.05	90.95	*A. leucopareius*	27	20	200	0.02692	2.97	431.74
A. olivaceus	4	25	250	0.02485	3.05	75.79	*A. nigrofuscus*	33	9	90	0.02692	2.97	237.46
A. olivaceus	15	22	220	0.02485	3.05	250.12	*A. nigrofuscus*	4	8	80	0.02692	2.97	25.58
A. nigrofuscus	27	8	80	0.02692	2.97	172.70	*A. nigrofuscus*	2	6	60	0.02692	2.97	9.59
A. nigrofuscus	10	10	100	0.02692	2.97	79.95	*A. blochii*	40	20	200	0.02692	3.01	648.23
N. brevirostris	10	18	180	0.02399	2.99	129.11	*N. lituratus*	2	11	110	0.03020	2.97	19.73
N. brevirostris	7	20	200	0.02399	2.99	100.42	*R. rectangulus*	1	16	160	0.01991	2.87	9.14
N. unicornis	1	22	220	0.02570	2.95	16.68	*P. multifasciatus*	1	7	70	0.01047	3.15	2.31
N. unicornis	1	19	190	0.02570	2.95	14.40	*S. balteata*	3	7	70	0.01023	2.99	6.42
N. lituratus	1	19	190	0.03020	2.97	17.04	*S. balteata*	1	10	100	0.01023	2.99	3.06
A. dussumieri	2	20	200	0.03311	2.95	39.07	*T. duperrey*	3	10	100	0.00832	2.99	7.46
A. dussumieri	3	25	250	0.03311	2.95	73.26	*T. duperrey*	1	5	50	0.00832	2.99	1.24
A. dussumieri	1	15	150	0.03311	2.95	14.65	*T. duperrey*	1	7	70	0.00832	2.99	1.74
A. leucopareius	1	19	190	0.02692	2.97	15.19	*T. duperrey*	1	8	80	0.00832	2.99	1.99
A. leucopareius	1	20	200	0.02692	2.97	15.99	*T. duperrey*	1	14	140	0.00832	2.99	3.48
A. blochii	1	25	250	0.02692	3.01	20.26	*Z. cornutus*	2	10	100	0.00698	2.98	4.16
A. blochii	1	25	250	0.02692	3.01	20.26							
A. blochii	1	18	180	0.02692	3.01	14.59							
A. blochii	1	17	170	0.02692	3.01	13.77							
R. rectangulus	1	27	270	0.01991	2.87	15.43							
M. niger	1	25	250	0.01588	3.08	12.23							
F. flavissimus	1	12	120	0.02018	3.04	7.36							
Z. cornutus	1	18	180	0.00698	2.98	3.74							
Z. cornutus	1	19	190	0.00698	2.98	3.95							
P. cyclostomus	1	15	150	0.01047	3.15	4.95							
P. multifaciatus	1	23	230	0.01047	3.15	7.59							
P. multifaciatus	1	18	180	0.01047	3.15	5.94							
T. duperrey	2	6	60	0.00832	2.99	2.99							
T. duperrey	1	9	90	0.00832	2.99	2.24							
P. arcatus	1	5	50	0.00912	3.08	1.40							
S. balteata	1	6	60	0.01023	2.99	1.84							
G. varius	1	8	80	0.00661	2.97	1.57							
P. johnstonianus	1	5	50	0.02291	2.95	3.38							
C. jactator	1	4	40	0.02239	2.96	2.65							
	124	716				1406.83		156	308				1885.94
						14.07							18.86
				Score		**6.59**							

Fish Benthic Study

Canoe Beach
Depth: 10m

	no.	size (cm)	size mm	a	b	Mass/G
M. grandoculis	1	18	180	0.01995	2.98	10.70
N. hexacanthus	7	18	180	0.0257	2.95	95.53
N. hexacanthus	3	12	120	0.0257	2.95	27.29
A. nigrofuscus	7	10	100	0.02692	2.97	55.97
C. strigosus	5	8	80	0.02465	3.03	29.88
C. strigosus	4	10	100	0.02465	3.03	29.88
N. brevirostris	3	18	180	0.02399	2.99	38.73
N. lituratus	2	15	150	0.03020	2.97	26.91
S. bursa	1	14	140	0.02191	2.98	9.14
C. sandwichensis	1	18	180	0.02457	3.02	13.36
C. miliaris	4	12	120	0.03236	3.04	47.22
C. multicinctus	2	10	100	0.02487	3.05	15.17
C. ornitissimus	1	19	190	0.02570	3.01	14.70
C. ornitissimus	1	20	200	0.02570	3.01	15.47
T. duperrey	1	12	120	0.00832	2.99	2.99
S. balteata	1	8	80	0.01023	2.99	2.45
G. varius	1	9	90	0.00661	2.97	1.77
C. venusta	1	11	110	0.02348	3.02	7.80
P. johnstonianus	3	7	70	0.02291	2.95	14.19
P. johnstonianus	1	5	50	0.02291	2.95	3.38
P. johnstonianus	1	4	40	0.02291	2.95	2.70
C. jactator	1	5	50	0.02239	2.96	3.31
C. jactator	1	6	60	0.02239	2.96	3.98
P. aspricaudus	1	7	70	0.02089	2.92	4.27
	54	276				476.77
						4.77

	no.	size (cm)	size mm	a	b	Mass/G
C. perspicillatus	2	7	70	0.02548	2.98	10.63
C. perspicillatus	1	14	140	0.02548	2.98	10.63
C. perspicillatus	1	15	150	0.02548	2.98	11.39
C. perspicillatus	1	11	110	0.02548	2.98	8.35
C. spilurus	1	15	150	0.01202	3.06	5.52
A. nigrofuscus	4	6	60	0.02692	2.97	19.19
A. nigrofuscus	5	5	50	0.02692	2.97	19.99
A. nigrofuscus	16	7	70	0.02692	2.97	89.55
A. nigrofuscus	9	8	80	0.02692	2.97	57.57
N. hexacanthus	30	10	100	0.0257	2.95	227.45
N. hexacanthus	36	12	120	0.0257	2.95	327.52
C. strigosus	20	5	50	0.02465	3.03	74.69
C. strigosus	13	7	70	0.02465	3.03	67.97
C. strigosus	3	4	40	0.02465	3.03	8.96
C. strigosus	4	6	60	0.02465	3.03	17.93
C. strigosus	1	10	100	0.02465	3.03	7.47
C. strigosus	1	12	120	0.02465	3.03	8.96
C. strigosus	2	3	30	0.02465	3.03	4.48
N. lituratus	3	10	100	0.03020	2.97	26.91
N. brevirostris	3	10	100	0.02399	2.99	21.52
N. brevirostris	19	18	180	0.02399	2.99	245.32
P. aspricaudus	1	7	70	0.02089	2.92	4.27
C. dumerilii	1	15	150	0.02042	2.94	9.01
C. multicintus	2	11	110	0.02487	3.05	16.69
C. miliaris	8	8	80	0.03236	3.04	62.96
P. multifasciatus	1	16	160	0.01047	3.15	5.28
P. multifasciatus	1	15	150	0.01047	3.15	4.95
P. multifasciatus	1	18	180	0.01047	3.15	5.94
P. multifasciatus	1	7	70	0.01047	3.15	2.31
P. multifasciatus	1	10	100	0.01047	3.15	3.30
P. multifasciatus	1	5	50	0.01047	3.15	1.65
P. tetrataenia	1	5	50	0.01445	2.94	2.12
P. tetrataenia	1	6	60	0.01445	2.94	2.55
P. tetrataenia	1	7	70	0.01445	2.94	2.97
T. duperrey	2	10	100	0.00832	2.99	4.98
T. duperrey	1	16	160	0.00832	2.99	3.98
T. duperrey	1	7	70	0.00832	2.99	1.74
T. duperrey	1	4	40	0.00832	2.99	1.00
T. duperrey	1	5	50	0.00832	2.99	1.24
G. varius	1	10	100	0.00661	2.97	1.96
P. octotaenia	2	7	70	0.01495	2.94	6.15
P. octotaenia	1	10	100	0.01495	2.94	4.40
M. geoffroy	1	5	50	0.01950	2.97	2.90
Z. cornutus	1	15	150	0.00698	2.98	3.12
P. johnstonianus	8	6	60	0.02291	2.95	32.44
P. johnstonianus	1	7	70	0.02291	2.95	4.73
C. hanui	1	4	40	0.01987	3.01	2.39
C. jactator	3	5	50	0.02239	2.96	9.94
C. jactator	3	6	60	0.02239	2.96	11.93
P. arcatus	1	6	60	0.00912	3.08	1.69
	225	448				1490.55
						14.91

Fish Benthic Study

Kaanapali Beach Four
Depth: 3m

	no.	size (cm)	size mm	a	b	Mass/G		no.	size (cm)	size mm	a	b	Mass/G
M. grandoculis	10	15	150	0.01995	2.98	89.18	*C. perspicillatus*	2	13	130	0.02548	2.98	19.74
C. argus	1	18	180	0.00102	3.06	0.56	*C. perspicillatus*	2	10	100	0.02548	2.98	15.19
C. sordidus	1	18	180	0.01549	3.06	8.53	*C. perspicillatus*	1	9	90	0.02548	2.98	6.83
C. sordidus	1	15	150	0.01549	3.06	7.11	*C. perspicillatus*	1	15	150	0.02548	2.98	11.39
S. psittacus	10	8	80	0.01622	3.05	39.58	*A. nigrofuscus*	26	9	90	0.02692	2.97	187.09
S. psittacus	15	12	120	0.01622	3.05	89.05	*A. nigrofuscus*	15	8	80	0.02692	2.97	95.94
S. psittacus	2	15	150	0.01622	3.05	14.84	*A. nigrofuscus*	1	10	100	0.02692	2.97	8.00
A. nigrofuscus	20	12	120	0.02692	2.97	191.89	*A. nigrofuscus*	1	4	40	0.02692	2.97	3.20
A. nigrofuscus	10	10	100	0.02692	2.97	79.95	*C. strigosus*	6	8	80	0.02465	3.03	35.85
C. strigosus	5	10	100	0.02465	3.03	37.34	*C. strigosus*	2	9	90	0.02465	3.03	13.44
C. strigosus	3	8	80	0.02465	3.03	17.93	*C. strigosus*	1	7	70	0.02465	3.03	5.23
C. strigosus	1	8	80	0.02465	3.03	5.98	*C. strigosus*	1	5	50	0.02465	3.03	3.73
C. strigosus	2	12	120	0.02465	3.03	17.93	*N. lituratus*	1	10	100	0.03020	2.97	8.97
C. strigosus	8	10	100	0.02465	3.03	59.75	*M. niger*	1	22	220	0.01588	3.08	10.76
A. dussumieri	1	18	180	0.03311	2.95	17.58	*M. niger*	9	19	190	0.01588	3.08	83.64
N. lituratus	1	11	110	0.03020	2.97	9.87	*M. niger*	3	17	170	0.01588	3.08	24.94
M. niger	1	27	270	0.01588	3.08	13.21	*M. niger*	1	20	200	0.01588	3.08	9.78
C. dumerilii	1	18	180	0.02042	2.94	10.81	*M. niger*	1	24	240	0.01588	3.08	11.74
C. dumerilii	1	19	190	0.02042	2.94	11.41	*M. niger*	1	23	230	0.01588	3.08	11.25
C. quadrimaculatus	2	15	150	0.02570	3.01	23.21	*F. flavissimus*	2	17	170	0.02018	3.04	20.86
C. unimaculatus	2	18	180	0.01230	3.04	13.46	*G. varius*	1	8	80	0.00661	2.97	1.57
C. multicinctus	1	17	170	0.02487	3.05	12.90	*G. varius*	1	7	70	0.00661	2.97	1.37
C. multicinctus	1	15	150	0.02487	3.05	11.38	*G. varius*	1	9	90	0.00661	2.97	1.77
T. duperrey	1	8	80	0.00832	2.99	1.99	*G. varius*	1	10	100	0.00661	2.97	1.96
T. duperrey	1	12	120	0.00832	2.99	2.99	*T. duperrey*	1	20	200	0.00832	2.99	4.98
P. arcatus	1	7	70	0.00912	3.08	1.97	*T. duperrey*	3	7	70	0.00832	2.99	5.22
C. vanderbilti	3	4	40	0.00102	3.06	0.37	*T. duperrey*	3	9	90	0.00832	2.99	6.72
P. johnstonianus	8	7	70	0.02291	2.95	37.85	*T. duperrey*	1	18	180	0.00832	2.99	4.48
P. johnstonianus	5	6	60	0.02291	2.95	20.28	*T. duperrey*	1	8	80	0.00832	2.99	1.99
S. fasciolatus	7	9	90	0.01514	2.99	28.52	*T. duperrey*	3	6	60	0.00832	2.99	4.48
S. fasciolatus	2	6	60	0.01514	2.99	5.43	*C. vanderbilti*	2	6	60	0.00102	3.06	0.37
C. amboinensis	1	6	60	0.02239	2.96	3.98	*C. vanderbilti*	7	4	40	0.00102	3.06	0.87
C. jactator	1	5	50	0.02239	2.96	3.31	*S. marginatus*	6	7	70	0.00087	3.12	1.14
O. meleagris	1	4	40	0.03631	2.81	4.08	*S. marginatus*	1	4	40	0.00087	3.12	0.11
P. aspricaudus	1	4	40	0.02029	2.92	2.37	*S. marginatus*	6	6	60	0.00087	3.12	0.98
							S. marginatus	3	8	80	0.00087	3.12	0.65
	132	407				896.55		119	396				626.24
						8.97							6.26
				Score		**3.05**							

Fish Benthic Study

Honolua NearShore

Depth: 3m

	no.	size (cm)	size mm	a	b	Mass/G
C. melempygus	1	27	270	0.02399	2.95	19.11
C. sordidus	7	20	200	0.01549	3.06	66.36
C. sordidus	4	25	250	0.01549	3.06	47.40
N. lituratus	1	22	220	0.03020	2.97	19.73
A. nigrofuscus	8	15	150	0.02692	2.97	95.94
A. nigrofuscus	4	20	200	0.02692	2.97	63.96
C. strigosus	1	17	170	0.02465	3.03	12.70
C. strigosus	2	10	100	0.02465	3.03	14.94
C. strigosus	2	12	120	0.02465	3.03	17.93
N. unicornis	1	26	260	0.02570	2.95	19.71
M. vidua	1	27	270	0.01000	3.04	8.21
C. multicinctus	2	9	90	0.02487	3.05	13.65
C. agilis	2	17	170	0.21020	2.99	213.69
P. multifasciatus	1	17	170	0.01047	3.15	5.61
T. duperrey	1	11	110	0.00832	2.99	2.74
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	3	8	80	0.00832	2.99	5.97
T. duperrey	2	6	60	0.00832	2.99	2.99
P. arcatus	1	8	80	0.00912	3.08	2.25
P. arcatus	2	7	70	0.00912	3.08	3.93
O. unifasciatus	1	18	180	0.01964	2.99	10.57
G. varius	1	6	60	0.00661	2.97	1.18
G. varius	1	9	90	0.00661	2.97	1.77
S. balteata	2	5	50	0.01023	2.99	3.06
S. balteata	1	9	90	0.01023	2.99	2.75
H. ornatisimus	1	8	80	0.02570	3.01	6.19
S. faciolatus	2	8	80	0.01514	2.99	7.24
C. vanderbilti	10	2	20	0.00102	3.06	0.62
C. vanderbilti	3	3	30	0.00102	3.06	0.28
P. johnstonianus	2	6	60	0.02291	2.95	8.11
P. johnstonianus	2	8	80	0.02291	2.95	10.81
CHUB	1	22	220	0.01413	3.00	9.33
C. jactator	2	4	40	0.02239	2.96	5.30
C. jactator	1	5	50	0.02239	2.96	3.31
	77	427				709.82
						7.10

	no.	size (cm)	size mm	a	b	Mass/G
C. perspicillatus	1	11	110	0.02548	2.98	8.35
N. lituratus	2	16	160	0.03020	2.97	28.70
A. nigrofuscus	5	4	40	0.02692	2.97	15.99
A. nigrofuscus	7	5	50	0.02692	2.97	27.98
A. nigrofuscus	3	6	60	0.02692	2.97	14.39
A. nigrofuscus	8	7	70	0.02692	2.97	44.77
A. nigrofuscus	2	8	80	0.02692	2.97	12.79
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	7	70	0.02465	3.03	10.46
C. strigosus	1	5	50	0.02465	3.03	3.73
C. strigosus	2	3	30	0.02465	3.03	4.48
C. strigosus	1	13	130	0.02465	3.03	9.71
C. multicintus	2	10	100	0.02487	3.05	15.17
T. duperrey	4	5	50	0.00832	2.99	4.98
T. duperrey	3	4	40	0.00832	2.99	2.99
T. duperrey	1	6	60	0.00832	2.99	1.49
T. duperrey	2	3	30	0.00832	2.99	1.49
T. duperrey	2	10	100	0.00832	2.99	4.98
G. varius	3	3	30	0.00661	2.97	1.77
G. varius	1	2	20	0.00661	2.97	0.39
C. hanui	2	4	40	0.01987	3.01	4.78
C. vanderbilti	8	3	30	0.00102	3.06	0.75
C. vanderbilti	13	4	40	0.00102	3.06	1.62
C. vanderbilti	2	5	50	0.00102	3.06	0.31
C. vanderbilti	1	6	60	0.00102	3.06	0.19
S. marginatus	4	6	60	0.00087	3.12	0.65
S. marginatus	5	5	50	0.00087	3.12	0.68
S. marginatus	1	7	70	0.00087	3.12	0.19
S. marginatus	1	4	40	0.00087	3.12	0.11
C. jactator	1	4	40	0.02239	2.96	2.65
C. jactator	1	5	50	0.02239	2.96	3.31
C. jactator	1	6	60	0.02239	2.96	3.98
C. jactator	1	7	70	0.02239	2.96	4.64
P. johnstonianus	5	5	50	0.02291	2.95	16.90
P. johnstonianus	1	6	60	0.02291	2.95	4.06
P. johnstonianus	2	4	40	0.02291	2.95	5.41
P. johnstonianus	1	7	70	0.02291	2.95	4.73
P. arcatus	2	7	70	0.00912	3.08	3.93
P. arcatus	2	6	60	0.00912	3.08	3.37
P. arcatus	1	8	80	0.00912	3.08	2.25
P. arcatus	1	5	50	0.00912	3.08	1.40
	109	250				286.50
						2.87

WHALE Environmental Services LLC

Fish Benthic Study

Kono Point
Depth: 3m

	no.	size (cm)	size mm	a	b	Mass/G
C. melampygus	1	27	270	0.02399	2.95	19.11
A. triostegus	1	17	170	0.02484	2.86	12.08
A. nigrofuscus	1	15	150	0.02692	2.97	11.99
A. nigrofuscus	8	11	110	0.02692	2.97	70.36
A. nigrofuscus	3	9	90	0.02692	2.97	21.59
N. lituratus	1	15	150	0.03020	2.97	13.45
N. brevirostris	3	20	200	0.02399	2.99	43.04
N. unicornis	1	18	180	0.02570	2.95	13.65
R. rectangulus	1	20	200	0.01991	2.87	11.43
S. bursa	2	15	150	0.02191	2.98	19.59
C. dumerilii	1	18	180	0.02042	2.94	10.81
P. cyclostomus	1	27	270	0.01037	3.17	8.88
T. duperrey	1	10	100	0.00832	2.99	2.49
T. duperrey	1	12	120	0.00832	2.99	2.99
T. trilobatum	1	18	180	0.00955	3.04	5.23
P. imparipennis	1	5	50	0.01519	2.99	2.27
Z. cornutus	1	19	190	0.00698	2.98	3.95
Z. cornutus	1	22	220	0.00698	2.98	4.58
	30	298				277.46
						2.77
				Score		**1.16**

	no.	size (cm)	size mm	a	b
A. nigrofuscus	1	5	50	0.02692	2.97
A. nigrofuscus	2	6	60	0.02692	2.97
A. nigrofuscus	7	7	70	0.02692	2.97
A. nigrofuscus	9	8	80	0.02692	2.97
A. nigrofuscus	5	10	100	0.02692	2.97
A. nigrofuscus	3	11	110	0.02692	2.97
N. lituratus	2	10	100	0.03020	2.97
N. lituratus	1	11	110	0.03020	2.97
N. unicornis	1	9	90	0.03020	2.97
R. rectangulus	2	14	140	0.01991	2.87
R. rectangulus	2	15	150	0.01991	2.87
C. quadrimaculatus	2	13	130	0.02570	3.01
P. multifasciatus	1	15	150	0.01047	3.15
T. duperrey	3	2	20	0.00832	2.99
T. duperrey	3	3	30	0.00832	2.99
T. duperrey	1	4	40	0.00832	2.99
T. duperrey	4	5	50	0.00832	2.99
T. duperrey	2	10	100	0.00832	2.99
T. duperrey	1	12	120	0.00832	2.99
T. duperrey	1	13	130	0.00832	2.99
P. imparipennis	3	3	30	0.01519	2.99
C. jactator	1	5	50	0.02239	2.96
C. jactator	1	4	40	0.02239	2.96
P. arcatus	1	4	40	0.00912	3.08
P. arcatus	1	5	50	0.00912	3.08
	60	204			

Fish Benthic Study

Kaanapali Beach Three

Depth: 3m

	no.	size (cm)	size (mm)	a	b	Mass in G
SPC 1						
M. grandoculis	5	16	160	0.01995	2.98	47.56
C. argus	1	18	180	0.00102	3.06	0.56
C. sordidus	2	18	180	0.01549	3.06	17.06
C. sordidus	1	15	150	0.01549	3.06	7.11
S. psittacus	5	9	90	0.01622	3.05	22.26
S. psittacus	15	12	120	0.01622	3.05	89.05
S. psittacus	2	15	150	0.01622	3.05	14.84
A. nigrofuscus	4	12	120	0.02692	2.97	38.38
A. nigrofuscus	6	10	100	0.02692	2.97	47.97
C. strigosus	5	10	100	0.02465	3.03	37.34
C. strigosus	3	9	90	0.02465	3.03	20.17
C. strigosus	1	8	80	0.02465	3.03	5.98
C. strigosus	2	12	120	0.02465	3.03	17.93
C. strigosus	7	10	100	0.02465	3.03	52.28
A. dussumieri	1	18	180	0.03311	2.95	17.58
N. lituratus	2	11	110	0.03020	2.97	19.73
M. niger	1	26	260	0.01588	3.08	12.72
C. dumerilii	1	18	180	0.02042	2.94	10.81
C. dumerilii	1	19	190	0.02042	2.94	11.41
C. quadrimaculatus	2	15	150	0.02570	3.01	23.21
C. unimaculatus	2	16	160	0.01230	3.04	11.97
C. multicinctus	1	17	170	0.02487	3.05	12.90
C. multicinctus	2	15	150	0.02487	3.05	22.76
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	1	11	110	0.00832	2.99	2.74
P. arcatus	1	7	70	0.00912	3.08	1.97
C. vanderbilti	3	4	40	0.00102	3.06	0.37
P. johnstonianus	6	8	80	0.02291	2.95	32.44
P. johnstonianus	5	6	60	0.02291	2.95	20.28
S. fasciolatus	5	9	90	0.01514	2.99	20.37
S. fasciolatus	2	7	70	0.01514	2.99	6.34
C. amboinensis	1	6	60	0.02239	2.96	3.98
C. jactator	2	5	50	0.02239	2.96	6.63
O. meleagris	1	4	40	0.03631	2.81	4.08
P. aspricaudus	2	5	50	0.02029	2.92	5.92
Totals	102	12.03				668.66
	# of fish	average size		Convert to kg		6.69
Overall Ranking (kg/m squared		**2.33**				

	no.	size (cm)	sixe (mm)	a	b	Mass in G
SPC 2						
C. perspicillatus	3	12	120	0.02548	2.98	27.33
C. perspicillatus	2	10	100	0.02548	2.98	15.19
C. perspicillatus	2	9	90	0.02548	2.98	13.67
C. perspicillatus	1	14	140	0.02548	2.98	10.63
A. nigrofuscus	15	9	90	0.02692	2.97	107.94
A. nigrofuscus	5	8	80	0.02692	2.97	31.98
A. nigrofuscus	1	10	100	0.02692	2.97	8.00
A. nigrofuscus	1	4	40	0.02692	2.97	3.20
C. strigosus	4	9	90	0.02465	3.03	26.89
C. strigosus	2	9	90	0.02465	3.03	13.44
C. strigosus	1	7	70	0.02465	3.03	5.23
C. strigosus	1	5	50	0.02465	3.03	3.73
N. lituratus	1	11	110	0.03020	2.97	9.87
M. niger	1	22	220	0.01588	3.08	10.76
M. niger	8	18	180	0.01588	3.08	70.43
M. niger	3	17	170	0.01588	3.08	24.94
M. niger	1	20	200	0.01588	3.08	9.78
M. niger	1	22	220	0.01588	3.08	10.76
M. niger	1	23	230	0.01588	3.08	11.25
F. flavissimus	4	17	170	0.02018	3.04	41.72
G. varius	1	8	80	0.00661	2.97	1.57
G. varius	1	7	70	0.00661	2.97	1.37
G. varius	1	9	90	0.00661	2.97	1.77
G. varius	1	10	100	0.00661	2.97	1.96
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	4	7	70	0.00832	2.99	6.97
T. duperrey	3	9	90	0.00832	2.99	6.72
T. duperrey	1	18	180	0.00832	2.99	4.48
T. duperrey	1	8	80	0.00832	2.99	1.99
T. duperrey	3	6	60	0.00832	2.99	4.48
C. vanderbilti	4	5	50	0.00102	3.06	0.62
C. vanderbilti	5	4	40	0.00102	3.06	0.62
S. marginatus	9	7	70	0.00087	3.12	1.71
S. marginatus	1	4	40	0.00087	3.12	0.11
S. marginatus	5	7	70	0.00087	3.12	0.95
S. marginatus	4	8	80	0.00087	3.12	0.87
Totals	99	8.51				496.53
	# of fish	average size				4.97

Appendix Four
Site Specific
Coral Bleaching
Susceptibility Data

WHALE Environmental Services LLC

West Maui Benthic Data Chart

Data Acquisition Site		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Papawai Point																								
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
% Resistant	76.19%		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	1	0	0	0
% Susceptible	23.81%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	21		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
WHALE Manuohule Point																								
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
% Resistant	70.00%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	30.00%		0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	1	0	0	0
Total Number of Quads with coral	20		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE McGregor Point Two																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Resistant	30.77%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Susceptible	69.23%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	26		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
WHALE McGregor Point Nearshore																								
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	4	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	55.55%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	1	0	0	0	0	0
% Susceptible	44.45%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	18		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE McGregor Point Offshore																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Resistant	33.33%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Susceptible	66.67%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	24		0	0	0	0	0	4	0	0	0	0	0		0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
DAR Maalaea Nearshore																								
											4			3										
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	0.00%																							
% Susceptible	100.00%																							
Total Number of Quads with coral	2																							

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Maalaea Offshore																								
																		4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	50.00%																							
% Susceptible	50.00%																							
Total Number of Quads with coral	2																							
WHALE Maalaea Harbor																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Resistant	30.77%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Susceptible	69.23%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	26		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Papawai Shores																								
			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Resistant	35.71%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
% Susceptible	64.29%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	28		0	0	0	0	0	4	0	0	0	0	0		0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
WHALE Olowalu Six Nearshore																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
% Resistant	48.00%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
% Susceptible	52.00%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Olowalu Six Offshore																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0
% Resistant	21.43%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	1	0	0	0
% Susceptible	78.57%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	28		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
WHALE Olowalu Seven Nearshore																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0
% Resistant	45.16%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
% Susceptible	54.84%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	31		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	3	0	0	0	0	1	0	1	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Olawalu Seven Offshore																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0
% Resistant	22.22%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	1	0	0	0
% Susceptible	77.78%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	27		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
WHALE Olowalu Beach																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	52.00%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	48.00%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Kailili Beach																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	45.83%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
% Susceptible	54.17%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	24		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0
WHALE Papalaua Nearshore One																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
% Resistant	48.00%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
% Susceptible	52.00%		0	0	0	0	0	4	0	0	0	3	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Papalaua Offshore One																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	3	0	0	0	4	1	0	0	0	0	0
% Resistant	31.58%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Susceptible	68.42%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number of Quads with coral	19		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WHALE Papalaua Nearshore Two																								
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	73.33%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
% Susceptible	26.67%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	15		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Papalaua Offshore Two																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	3	0	0	0	4	1	0	0	0	0	0
% Resistant	32.14%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
% Susceptible	67.86%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number of Quads with coral	28		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
WHALE Ukumehane State Beach																								
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	44.44%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
% Susceptible	55.56%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	27		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Makumana Gulch																								
			0	0	0	0	0	0	0	4	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	46.15%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
% Susceptible	53.85%		0	0	0	0	0	4	0	0	0	0	0	5	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	26		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0
WHALE Manawainui Gulch																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	56.52%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	43.48%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	23		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	5	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Papawai Shores 2																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	3	0	0	0	4	1	0	0	0	0	0
% Resistant	31.58%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Susceptible	68.42%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number of Quads with coral	19		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WHALE Kaumuipuko Beach																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	48.00%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
% Susceptible	52.00%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Honoapiilani Highway																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	46.15%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
% Susceptible	53.85%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	26		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0
WHALE Olowalu One Nearshore																								
			0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	1	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	4	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	58.33%		0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
% Susceptible	41.67%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	24		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Olowalu One Offshore																								
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Resistant	100.00%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Susceptible	0.00%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Number of Quads with coral	3		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WHALE Olowalu Two Nearshore																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
% Resistant	48.00%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0
% Susceptible	52.00%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Olowalu Two Offshore																								
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	59.09%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	40.91%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	22		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
WHALE Olowalu Three Nearshore																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
% Resistant	50.00%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0
% Susceptible	50.00%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0
Total Number of Quads with coral	24		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Olowalu Three Offshore																								
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	65.00%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	35.00%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	20		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
DAR Olowalu Four Nearshore																								
								4	4		4										1	1		
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	40.00%																							
% Susceptible	60.00%																							
Total Number of Quads with coral	5																							

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Olowalu Four Offshore																								
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	#DIV/0!																							
% Susceptible	#DIV/0!																							
Total Number of Quads with coral	0																							
WHALE Olowalu Five Nearshore																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	1	0	0	0
% Resistant	44.83%		0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
% Susceptible	55.17%		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	29		0	0	0	0	0	4	0	0	0	0	0	5	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	5	0	0	0	0	0	1	0	1	0	0	0

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Olowalu Five Offshore																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0
% Resistant	32.26%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	0	0	1	0	0	0
% Susceptible	67.74%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	31		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
DAR Puamana Offshore																								
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	#DIV/0!																							
% Susceptible	#DIV/0!																							
Total Number of Quads with coral	0																							

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Puamana Nearshore																								
																		4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	50.00%																							
% Susceptible	50.00%																							
Total Number of Quads with coral	2																							
WHALE Nohea Kai																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	50.00%		0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	50.00%		0	0	0	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	26		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Canoe Beach																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	50.00%		0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	50.00%		0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	24		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
WHALE Lahaina Harbor 1																								
			0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	35.48%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Susceptible	64.52%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Total Number of Quads with coral	31		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Baby Beach																								
			0	0	0	0	0	4	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	40.74%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Susceptible	59.26%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Total Number of Quads with coral	27		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
WHALE Puunoa Beach																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	40.00%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Susceptible	60.00%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Lahaina Harbor 2																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	43.48%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Susceptible	56.52%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Total Number of Quads with coral	23		0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
WHALE Lahaina Marina																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	43.48%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Susceptible	56.52%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Total Number of Quads with coral	23		0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Puamana Nearshore																								
																		4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	50.00%																							
% Susceptible	50.00%																							
Total Number of Quads with coral	2																							
DAR Puamana Offshore																								
																		4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	50.00%																							
% Susceptible	50.00%																							
Total Number of Quads with coral	2																							

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Puamana																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	41.67%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Susceptible	58.33%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0
Total Number of Quads with coral	24		0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
DAR Kahekili 1																								
										4									1		1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	66.67%																							
% Susceptible	33.33%																							
Total Number of Quads with coral	3																							

WHALE Environmental Services LLC

West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Kahekili 2																								
										4		3	4	3				4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	16.67%																							
% Susceptible	83.33%																							
Total Number of Quads with coral	6																							
WHALE Kahekili Beach 3																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
% Resistant	60.87%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
% Susceptible	39.13%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total Number of Quads with coral	23		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Kahekili Beach 4																								
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
% Resistant	60.87%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
% Susceptible	39.13%		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total Number of Quads with coral	23		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
WHALE Kaanapali Beach Three																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	4	0	0	0	3	0	0	0	0	1	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	50.00%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Susceptible	50.00%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Total Number of Quads with coral	28		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Kaanapali Beach Four																								
			0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	4	0	0	0	3	0	0	0	0	1	0	0	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	44.00%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Susceptible	56.00%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Total Number of Quads with coral	25		0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
DAR Mahinahina Nearshore																								
														3										
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	0.00%																							
% Susceptible	100.00%																							
Total Number of Quads with coral	1																							

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Mahinahina Offshore																								
								4		4			4						1	1	1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	50.00%																							
% Susceptible	50.00%																							
Total Number of Quads with coral	6																							
DAR Honolua North																								
								4		4								4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	25.00%																							
% Susceptible	75.00%																							
Total Number of Quads with coral	4																							

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
DAR Honolua South																								
								4		4								4			1			
Bleaching Susceptibility Ranking																								
Score of 2 or less considered resistant																								
% Resistant	25.00%																							
% Susceptible	75.00%																							
Total Number of Quads with coral	4																							
WHALE Honolua NearShore																								
			0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	4	1	0	1	0	0	0
% Resistant	39.29%		0	0	0	0	0	4	0	4	0	0	0	3	0	0	0	4	1	0	0	0	0	0
% Susceptible	60.71%		0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total Number of Quads with coral	28		0	0	0	0	0	4	0	0	0	0	0	3	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0

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West Maui Benthic Data Chart

		Coral	cypag	cypoc	Funscu	Leppur	lepinc	Moncap	Monfla	Monpat	Monsp		Pavdue	Pavvar	Pocdam	Poceyd	Poclig	Pocmea	Porcom	Porev	Porlob		Tubcoc	
			Cyphastrea agassizi (cypag)	Cyphastrea ocellina (cypoc)	Fungia scutaria (Funscu)	Leptastrea purpurea (Leppur)	Leptoseris incrustans (lepinc)	Montipora capitata (Moncap)	Montipora flabellata (Monfla)	Montipora patula (Monpat)	Montipora species (Monsp)	Palythoa caesia	Pavona duerdeni (Pavdue)	Pavona varians (Pavvar)	Pocillopora damicornis (Pocdam)	Pocillopora eydouxi (Poceyd)	Pocillopora ligulata (Poclig)	Pocillopra meandrina (Pocmea)	Porites compressa (Porcom)	Porites evermanni (Porev)	Porites lobata (Porlob)	Porites rus	Tubastrea coccinea (Tubcoc)	Sarcothelia edmondsoni
WHALE Kono Point																								
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
% Resistant	53.33%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
% Susceptible	46.67%		0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Total Number of Quads with coral	15		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
WHALE Kapalua Beach																								
			0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	0	1	0	0	0
Bleaching Susceptibility Ranking			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Score of 2 or less considered resistant			0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Resistant	40.91%		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
% Susceptible	59.09%		0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
Total Number of Quads with coral	22		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0
			0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
			0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0
			0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0