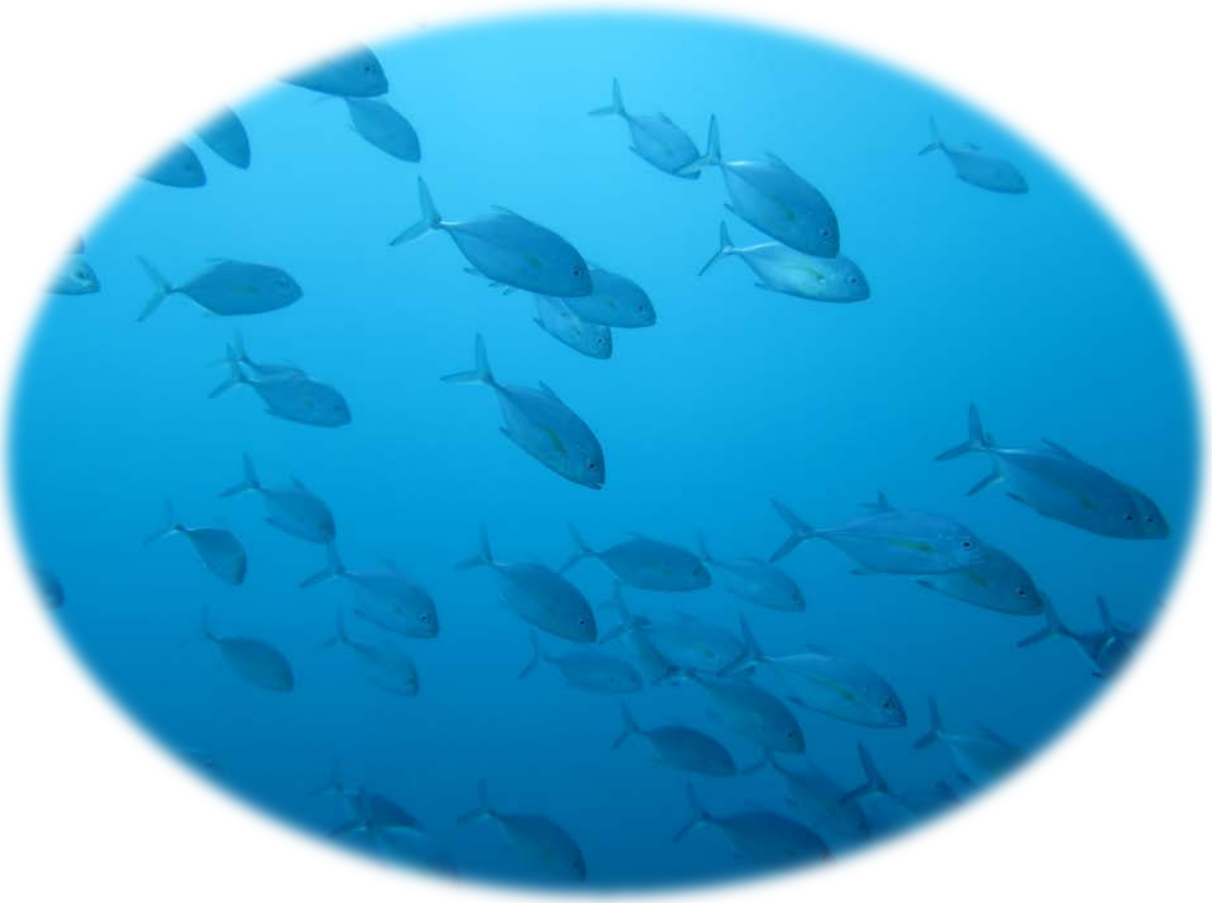

‘Aha Pilina 2018

DEPARTMENT OF LAND AND NATURAL RESOURCES

DIVISION OF AQUATIC RESOURCES

HNL Interisland Conference Center | Honolulu | 29 November 2018

'Aha Pilina 2018
Thursday, November 29, 2018 – Honolulu Interisland Conference Center

PROGRAM

8:00am	Coffee and sign in
8:25am	Naomi Ahu – Pule
8:30am	Brian Neilson – Opening Remarks
8:35am	Ryan Okano – Housekeeping
8:40am	DLNR Communications Office – Introduction
8:45am	Adam Wong and Naomi Ahu – Pilina Activity

Talk Session 1 – Mauka, 9:00am – 10:19am

9:00am	Skippy Hau – Wailuku River Research
9:08am	Glenn Higashi – Impacts of Water Releases on Instream Habitat and Biota in Waimea River, Kauai using the High Definition Stream Survey (HDSS) and High Definition Fish Survey (HDFS) Techniques
9:20am	Daniel Lager – New Methods for Detecting the Invasive Water Fern Giant Salvinia (*Salvinia molesta*) Using Environmental DNA (eDNA)
9:33am	Troy Shimoda – Statewide Cast Net Monitoring for Juvenile Sport-fish in Muliwai
9:46am	Timothy Shindo – Using Baited Remote Underwater Video (BRUV) to Sample Juvenile Sport-fishes in Muliwai
9:54am	Troy Sakihara – Shedding Light on Cryptic Anchialine Habitats
10:07am	Kimberly Peyton – Fill in the Blank: How Many Muliwai are in Hawaii?
10:19am	Break

Talk Session 2 – Holoholo, 10:35am – 12:03pm

10:35am	Thomas Ogawa – Pilot Surveys to Improve Monitoring of Marine Recreational Fisheries in Hawaii
10:48am	Haruko Koike – Hawaii Marine Recreational Fishing Survey Data Analysis Results
10:56am	Kimberlee Harding – Main Hawaiian Islands Commercial Fisheries Fast Track Data Project
11:04am	Ryan Okano – Oahu's Aquarium Fishery
11:17am	Jules Kuo – Hawaii's Ballast Water and Biofouling Program: Managing the Top Two Vectors of Aquatic Alien Species Transfer
11:30am	Kimberly Fuller – Utilizing iNaturalist as a Tool for Citizen Science
11:38am	David Delaney – Application of Citizen Science and Refining Sampling Methods to Optimally Detect a Species at Low Density

11:51am Kendall Tucker – Laulima: Community Partnership in Mapping Invasive Algae Along Molokai's Southern Shoreline

12:03pm Lunch

Talk Session 3 – Makai, 12:30pm – 2:12pm

12:30pm Skippy Hau – Maui Hawksbill Turtle Nesting in 2018

12:38pm Stacia Marcoux – Shallow Water Resource Fish Surveys

12:46pm Kazuki Kageyama – Oahu Shoreline Fishing Survey Findings

12:54pm Kailikea Shayler – Kauai Fish and Habitat Monitoring

1:02pm Russell Sparks – The Kahekili Herbivore Fisheries Management Area: Fisheries Management to Control Invasive Algae on Maui's Coral Reefs with Implications to Guide Broader Statewide Herbivore Management

1:15pm Kristy Stone – Maui Fish and Habitat Utilization Survey (FAHU) Data Summary and Comparison from Past Monitoring Methods [Habitat and Fish Assessment (HAFA) Method]

1:23pm Kazuki Kageyama – Oahu Biological Monitoring Findings

1:36pm Megan Lamson Leatherman – West Hawaii Monitoring Project (WHAP/WHMP)

1:44pm Nikki Sanderlin – West Hawaii Coral Reef Monitoring Overview

1:52pm Wesley Dukes – Reef Restoration in Kaneohe Bay

2:00pm Brian Neilson – Bloom and Bust: The Proliferation and Decline of Invasive Macroalgae in Kaneohe Bay, Hawaii

2:12pm Break

Talk Session 4 – Makai continued, 2:30pm – 3:53pm

2:30pm David Cohen – Culture of the Sea Urchin, *Tripneustes gratilla* at the Anuenue Fisheries Research Center

2:38pm Ross Martin – The West Hawaii Coral Recruitment Project

2:46pm Natalie Dunn – Evaluating the Efficacy of a Reef Restoration Strategy Using a New Photomosaic Method

2:59pm Lindsey Kramer – Benthic Monitoring on Leeward Hawaii Island

3:07pm David Gulko – What DAR Can Learn from Australia's Approach to Massive Reef Loss

3:20pm Justin Goggins – Protecting Hawaii from Aquatic Invasive Species Through Prevention Rapid Response, Monitoring and Control

3:33pm Anne Chung – Roadmap to 30x30: Achieving 30% Effective Management by 2030

3:46pm Eko Lapp – Transitioning to a Database Management System: Supporting DAR to Improve Management of our Aquatic Resources by Providing Tools to See a Bigger Picture

4:00pm Brian Neilson – Wrap Up

List of Participants

Hawaii Island – Hilo
Troy Sakihara
Jordyn Carter
Naomi Ahu
Troy Shimoda
Tim Shindo
Lance Nishiura

Hawaii Island – Kona
Laura Jackson
Bill Walsh
Stacia Marcoux
Megan Lamson
Nikki Sanderlin
Ross Martin
Lindsey Kramer

Maui
Sue Baker
Russell Sparks
Skippy Hau
Adam Wong
Kristy Stone
Linda Castro
Cole Peralto
Itana Silva
Tatiana Martinez

Oahu – Kalanimoku
Brian Neilson
Ryan Okano
Glenn Higashi
Tom Ogawa
Kim Harding
David Delaney
Kendall Tucker
Anne Chung
Eko Lapp
Mike Fujimoto
Cathy Gewecke
Dave Gulko
Jason Mehlinger
Risa Minato
Andrew Porter
David Sakoda
Ray Uchimur
Carole Fagaragan
Kelly Yoshizaki

Oahu – AFRC
Dan Lager
Kim Peyton
Hal Koike
Jule Kuo
Kim Fuller
Kazuki Kageyama
Wes Dukes
Dave Cohen
Justin Goggins
Natalie Dunn
Norton Chan
Nikki Cunanan
Vincent Goo
Neal Hazama
Paul Murakawa
Chelsea Wolke
Matthew Lewis
Sean Louie
Patrick Gorong
Neina Chapa
Christina Jayne
Darla White
Frederick Shopnitz
Lani Muss
Gen Devine
Kristen Kelly

Kauai
Christine Garcia
Kaili Shayler
Mckenna Allen

DLNR Communications
AJ McWhorter
Gary Chun

Mauka 1.1 − **Wailuku River Research**

Presenting Author: Skippy Hau, *Maui District Office*

Project PI: Skippy Hau

Abstract: Between 2000 to 2014, post larvae were monitored in lower Wailuku River. Native animals dominated stream recruitment. Opae kuahiwi (*Atyoida bisulcata*) made up 88% of the collection. ‘O’opu alamo’o (*Lentipes concolor*) was six percent. The intentionally introduced Tahitian prawn (*Macrobrachium lar*) made up three percent. ‘O’opu nopili (*Sicyopterus stimpsoni*) was two percent. And ‘o’opu nakea (*Awaous stamineus*) was one percent. The native prawn opae o’e ha’a (*Macrobrachium grandimanus*) was absent in fifteen years of sampling. Continuous stream flow was restored in October 2014. This species is now present in Wailuku River. Juvenile hihiwai (*Neritina granosa*) have been found beneath the Waiehu Bridge between 10.5 and 26.7mm shell length. Both species indicates successful flow restoration.

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‘opae ‘oe ha’a (*Macrobrachium grandimanus*)

Hihiwai (*Neritina granosa*) migrating

Mauka 1.2 − **Impacts of Water Releases on Instream Habitat and Biota in Waimea River, Kauai using the High Definition Stream Survey (HDSS) and High Definition Fish Survey (HDFS) Techniques**

Presenting Author: Glenn R. Higashi, *Kalanimoku Building, Honolulu*

Co-Authors: James E. Parham

Project PI: Glenn R. Higashi

Abstract: Requested by the State of Hawaii, Commission on Water Resource Management (CWRM), the Division of Aquatic Resources (DAR) staff performed High Definition Stream Surveys (HDSS) and High Definition Fish Surveys (HDFS) associated with trial flow releases from the Waiahulu and Koaiʻe diversions on the Waimea River, Kauai. Primary objectives were: 1) documentation of the species within the study reach; 2) documentation of instream habitat at the diverted and restored flow rates; and, 3) estimation of change in suitable habitat for native species in response to increased flow rate. A backpack-mounted HDSS system captured geo-referenced video of 1.6 miles of stream channel habitat conditions at three different flow rates and the HDFS system documented species occurrence. HDSS video output was classified for habitat type (riffle, run, and pool), water depth and ʻoʻopu nōpili habitat suitability. The HDFS video was reviewed for the presence of aquatic animals and their relative abundance. We observed marginal gains in habitat suitability between diverted and partially restored flow conditions and a more rapid gain between partially restored and fully restored flow conditions. Results showed that a stream flow of approximately 6.5 mgd or greater was necessary to achieve improved habitat for ʻoʼopu nōpili. These instream habitat benefits would likely continue through downstream reaches and possibly within the stream mouth estuary as well. The HDSS and HDSFS approaches provided better documentation of instream flow changes, and were completed more quickly, with lower man-power and for a lower cost than our traditional transect-based approach.

Funding Source(s): Commission on Water Resource Management and Dingell Johnson

Research Partners: Neal Hazama; CWRM-Jeffrey Pearson, Dean Uyeno, Ayron Strauch, Maile Beach-Smith, Kathy Yoda

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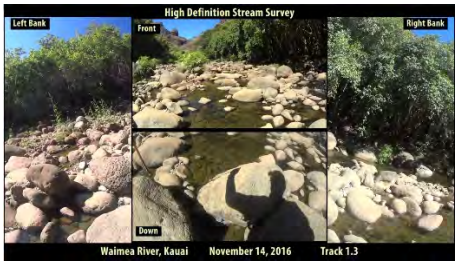

Mauka 1.3 – New Methods for Detecting the Invasive Water Fern Giant Salvinia (*Salvinia molesta*) Using Environmental DNA (eDNA)

Presenting Author: Daniel Lager, *Anuenue Fishery Research Center, Sand Island, Oahu*

Co-Authors: Justin Goggins, Brian Neilson, Glenn Higashi, Brett Olds, Mark Renshaw

Project PI: Justin Goggins, Brian Neilson

Office staff who is the unsung hero of your project: Kelly Yoshizaki

Abstract: *Salvinia molesta* is a freshwater fern originating from Brazil that was brought to Hawai'i in the ornamental horticulture trade. The initial infestation in Hawaiian waterways occurred in 1999 and is currently listed as a Federal Noxious Weed. *S. molesta* alters aquatic ecosystems by blocking sunlight and reducing dissolved oxygen concentrations. It became a major nuisance on Lake Wilson in 2002, covering 264 acers (80%) of its surface and costing approximately one million dollars to eradicate. In 2017, community members noticed an increase in the *S. molesta* population on the Kilauea River, Kauai. A working group of community members, conservation groups, researchers, and government agencies have come together to develop a control plan for *S. molesta* on Kaua'i. To create a well-informed management strategy for *S. molesta*, it is crucial to understand its distribution throughout windward Kaua'i. In the current study, surveys for *S. molesta* utilized environmental DNA (eDNA) for detecting species presence or absence. Water samples were collected and filtered from 24 perennial streams on the windward side of Kaua'i. DNA extracted from the filters was analyzed using a species-specific genetic marker for *S. molesta* to determine the presence or absence at or above each sample point on the stream. The results were used to map the distribution of *S. molesta* within Kaua'i watersheds and help focus control efforts in specific areas and prevent its further spread. The eDNA monitoring approach proved to be an effective and highly efficient tool to monitor the presence of a species of interest.

Funding: OCCL allowed Pila'a funds to be used for this project

Research Partners: Oceanic Institute

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Mauka 1.4 − **Statewide Cast Net Monitoring for Juvenile Sport-fish in Muliwai**

Presenting Author: Troy Shimoda, *State Fisheries Research Station, Hilo, Hawaii Island*

Co-Authors: Skippy Hau, Troy Sakihara, Lance Nishiura, Tim Shindo, Neal Hazama, Vince Goo, Kimberly Peyton

Project PI: Kimberly Peyton

Office staff who are unsung heroes of your project: Naomi Ahu, Christine Garcia, Sue Baker, Ray Uchimura, Carole Fagaragan, Jordyn Carter, Nora Hicks, Kelly Yoshizaki, Brigette Agustin

Abstract: Freshwater inflow is essential in maintaining healthy estuarine habitats and it is believed that these estuaries play a key role in early life stages of many coastal sports-fish and associated species here in Hawaii. To determine this the Division of Aquatic Resources has been conducting quarterly cast net surveys at 11 estuaries throughout four Major Hawaiian Islands using two survey methods, Visual Casting and Probability of Encounter (POE) Casting, for over three years. Surveys use cast nets to record species presence, abundance, size, biomass, diversity, and seasonality of sports-fish within estuaries. Results demonstrate that Hawaiian estuaries have a multitude of species varying in diversity, richness, abundance, size and life history stages (ranging from juveniles to, for certain species, adults). Monitoring estuarine systems is important to DAR for assessing sports-fish stocks and overall estuarine health. This in turn will support DAR to improve our understanding of Hawaiian estuarine ecosystems, and, in turn, aid in developing and implementing effective management strategies.

Funding:

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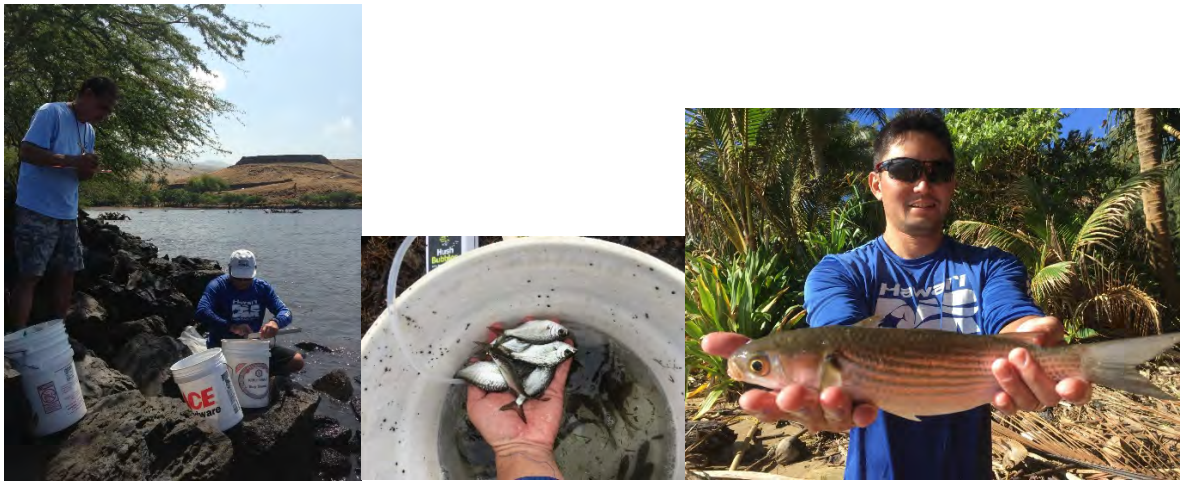

Mauka 1.5 – **Using Baited Remote Underwater Video (BRUV) to sample juvenile sport-fishes in muliwai**

Presenting Author: Tim Shindo,

Co-Authors: Lance Nishiura, Darrell Kuamoo, Troy Sakihara, Troy Shimoda, Skippy Hau, Neil Hazama, Vince Goo, Kimberly Peyton

Project PI: Kimberly Peyton

Office staff who are unsung heroes of your project: Naomi Ahu, Christine Garcia, Sue Baker, Ray Uchimura, Carole Fagaragan, Jordyn Carter, Nora Hicks, Kelly Yoshizaki, Brigette Agustin

Abstract: Pioneering work to sample fishes in challenging habitats by sending video cameras underwater originated in Hawaii. The first baited remote underwater video (BRUV) focused on deep water fishes, including the Deep 7 Complex. BRUV systems have evolved quite a bit since these early attempts and, importantly, this type of fish sampling has grown into world-wide applications, ranging from freshwater lakes, polar oceans, coral reefs and estuaries. Acceptance of this sampling method is reflected in a commercially available software package (SeaGIS), which allows for calibration of digital cameras and interpretation of imagery to count fish, study behavior and measure fish to the nearest one millimeter. Many habitats in Hawaiian estuaries, difficult to impossible to sample with cast nets, seine nets or fyke nets, can be studied with BRUV. Our early work with BRUV sampling in estuaries has allowed for access to vegetated habitats, which, as turns out, support size classes and abundances of sport-fishes that are different as compared to results from to cast net surveys in the same estuary. Both active and passive sampling of fishes in estuaries is currently being applied to improve our understanding and management of this critical aquatic resource.

Funding:

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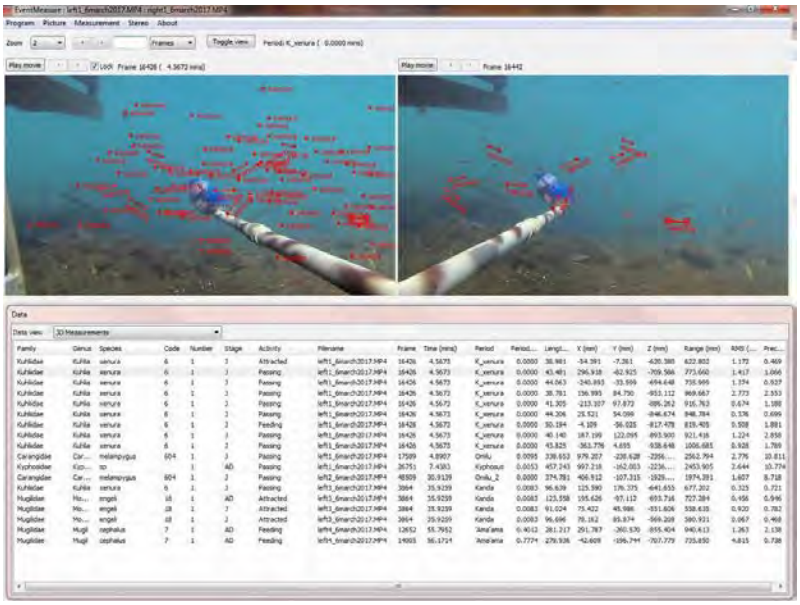

Makai 1.6 − Shedding light on cryptic anchialine habitats

Presenting Author: Troy Sakihara, *Hilo District Office, Hawaii Island*

Project PI: Troy Sakihara

Office staff who is the unsung hero of your project: Troy Shimoda, Lance Nishiura, Tim Shindo, Megan Lamson Leatherman, Darrell Kuamo'o, Naomi Ahu, Jordyn Carter, Skippy Hau, Annette Tagawa, Kim Peyton

Abstract: Hawaiian anchialine pools have steadily become a focal point of research among coastal ecosystems. These inconspicuous pools in Hawaii constitute roughly 50% of the world's known anchialine habitats while supporting a unique endemic fauna. However, anthropogenic disturbances and invasive species have heavily and rapidly impacted these systems, with only a few series of pools that remain undisturbed and unimpacted. Over the years, studies in anchialine pools have expanded from mapping and inventory surveys to research focusing on biology, life history, population genetics, foodwebs, trophic dynamics, invasive species, water quality and hydrology. The burgeoning interest in anchialine pools throughout natural resource management, academia, cultural practices and public sectors warrant continued and advanced research in these systems. Our collective efforts will provide valuable insight for management to what remains a mysterious and considerably unknown ecosystem under our feet.

Funding:

Research Partners: Division of Forestry and Wildlife, Natural Area Reserves System, Hawaii Wildlife Fund, US Fish and Wildlife Service, National Park Service, The Nature Conservancy, Hui Loko

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Mauka 1.7 − **Fill in the blank: how many muliwai are in Hawaii?**

Presenting Author: Kimberly Peyton, *Anuenue Fisheries Research Center on Sand Island, Oahu*

Co-Authors: Eko Lapp, Troy Sakihara, Troy Shimoda, Skippy Hau, Tim Shindo, Lance Nishiura, Darrell Kuamoo

Project PI: Kimberly Peyton

Office staff who are the unsung heroes of your project: Naomi Ahu, Christine Garcia, Sue Baker, Ray Uchimura, Carole Fagaragan, Jordyn Carter, Nora Hicks, Kelly Yoshizaki, Brigette Agustin

Abstract: Some of the most isolated estuaries in the world are found in the Hawaiian Islands. The nearest continental estuaries are over 3,200 km away, and the closest insular estuaries (Marquesas Islands) are a similar distance from Hawaii. This geographic isolation further underscores the importance of Hawaii's estuaries as critical nursery grounds for coastal species, valued for fishing and cultural practices as well as for their biological diversity. Hawaiian estuaries are composed of diverse geomorphological types, reflected in island ages that range from the volcanically active Hawaii Island to the senescent Kauai, 0.4 to 5.1 Ma, respectively. The work presented here was undertaken because previously there was no comprehensive inventory or geodatabase of estuaries in Hawaii, meaning that managers and scientists lacked basic information on extent of this aquatic system. Coastal Marine Estuarine Classification System (CMECS) was adopted for this inventory because it provided common language capable of describing insular estuaries on volcanic islands in a tropical setting that is both understandable and defendable internationally. Using CMECS approach we have mapped over 100 estuarine systems across the islands, more than doubling previous estimates of this habitat.

Funding:

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Holoholo 2.1 − Pilot surveys to improve monitoring of marine recreational fisheries in Hawai`i

Presenting Author: Tom Ogawa, *Kalanimoku Building, Honolulu*

Co-Authors: Hongguang Ma, Tom K. Ogawa, Thomas R. Sminkey, F. Jay Breidt, Virginia M. Lesser, Jean D. Opsomer, John R. Foster, and David A. Van Vorhees

Project PI: Hongguang Ma and Tom Ogawa

Office staff who are unsung heroes of your project: HMRFS field surveyors

Abstract: The Hawai`i Marine Recreational Fishing Survey (HMRFS) is a collaborative effort between NOAA Fisheries Marine Recreational Information Program (MRIP) and the Hawai`i Division of Aquatic Resources to monitor non-commercial fishing catch and effort in Hawai`i. Since 2010, various pilot studies were conducted focusing on supplemental or alternative survey designs to the current HMRFS sampling design with the intent of improving upon spatial/temporal coverage and overall precision of the data. This presentation will provide a brief review of the current HMRFS surveys and an overview of the more recent pilot surveys. Some of the proposed alternative survey designs are now pending certification and subsequent implementation by MRIP.

Funding: NOAA Fisheries Marine Recreational Information Program

Research Partners: Pacific Islands Fisheries Group, Resource Mapping Hawai'i, SAMAS Research LLC, and Pelagic Research Group LLC

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Holoholo 2.2 − **Hawaii Marine Recreational Fishing Survey Data Analysis Result**

Presenting Author: Haruko Koike, *Anuenue Fisheries Research Center, Honolulu*

Co-Authors: Tom K. Ogawa

Project PI: Tom K. Ogawa

Office staff who are unsung heroes of your project: HMRFS field surveyors

Abstract: The Hawai`i Marine Recreational Fishing Survey (HMRFS) has collected non-commercial fishery data around the Main Hawaiian Islands since 2001. We combined the data from 2011 to 2015 to examine the fishing pressure, catch, CPUE, and seasonality of non-commercial shoreline fishing in Hawaii. Oahu and Maui had the highest fishing effort followed by Big Island and Kauai. Rod and reel was the most common gear used for fishing followed by spear and throwneting. Catch composition and CPUE differed by gear type. Summer time was the peak in fishing effort and CPUE.

Funding: NOAA Fisheries Marine Recreational Information Program, Dingell Johnson Sport Fish Restoration Fund

Research Partners: NOAA Fisheries Pacific Islands Fisheries Science Center

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Holoholo 2.3 − **Main Hawaiian Islands Commercial Fisheries Fast Track Data Project**

Presenting Author: Kimberlee Harding, *Kalanimoku Building, Honolulu*

Co-Authors: Reginald Kokubun

Project PI: Doug Lum, Joint Institute Marine Atmospheric Research (JIMAR)

Office staff who is the unsung hero of your project: Brian Akizuki, Eric Yokomori, Nikky Siu

Abstract: The Hawaii State Department of Land and Natural Resources, Division of Aquatic Resources (DLNR-DAR) requires commercial fishermen to purchase a commercial marine license and to report their fishing data every month. In 2008, the current Federal Annual Catch Limit (ACL) rule was implemented by NOAA Fisheries in the State of Hawaii to manage the "Deep 7" bottomfish species caught in the main Hawaiian Islands (MHI). The Deep 7 complex is comprised of six eteline snappers, known locally as onaga (*Etelis coruscans*), ehu (*Etelis carbunculus*), opakapaka (*Pristipomoides filamentosus*), kalekale (*Pristipomoides sieboldii*), gindai (*Pristipomoides zonatus*), lehi (*Aphareus rutilans*), and an endemic grouper, known as hapu'upu'u (*Hyporthodus quernus*).

Under this project, JIMAR staff works in close collaboration with DLNR-DAR and the NOAA Pacific Islands Fisheries Science Center (PIFSC) to ensure that data reported for the Deep 7 bottomfish are entered and proofed on a timely basis. The federal fishing year for the Deep 7 bottomfish fishery opens annually on September 1 and closes whenever total landings for the Deep 7 species are estimated to have reached the Annual Catch Limit (ACL), or by August 31, whichever occurs first. The goal of the JIMAR Main Hawaiian Islands Commercial Fisheries Fast Track Data Project is to improve accuracy, timely reporting and data collection, and consistently reliable processing methods for the State of Hawaii's commercial fisheries and fish dealer data.

Funding: Joint Institute Marine Atmospheric Research (JIMAR), Pacific Islands Fishery Science Center (PIFSC)

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Holoholo 2.4 – Oahu's Aquarium Fishery

Presenting Author: Ryan Okano, *Kalanimoku Building, Honolulu*

Co-Authors: Reginald Kokubun, Dr. William Walsh, and Brian Akizuki

Abstract: West Hawaii's aquarium fishery was considered one of the best managed fisheries in the state. However, relative to West Hawaii little is known about Oahu's aquarium fishery. In an attempt to better understand Oahu's aquarium fishery, we used the Division of Aquatic Resources commercial fishing data from 2007 - 2016 to identify the most collected species and temporal trends in catch, effort, and value. Additionally, for top species we analyzed number of fish kept in relation to dollar value per fish. In an economical sense value represents demand, and number of fish kept represents supply. Species with a positive correlation between dollar value of fish (demand) and fish kept (supply) suggests a demand driven market. While species with a negative correlation between dollar value of fish (demand) and fish kept (supply) suggests a supply driven market. As an agency mandated to manage aquatic resources, DAR may choose to focus management considerations on species that are affiliated with supply driven markets.

Funding: General Funds

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Holoholo 2.5 − **Hawaii's Ballast Water and Biofouling Program: Managing the top two vectors of aquatic alien species transfer**

Presenting Author: Jules Kuo, *Anuenue Fisheries Research Station on Sand Island, Oahu*

Project PI: Jules Kuo

Office staff who are unsung heroes of your project: Everyone on the DAR staff (past and present) have been heroes to BW and BF projects in one or more ways!

Abstract: Hawaii residents rely on more than 80% of all consumer products to be delivered overseas by the commercial shipping industry (ie: furniture, fruits/veggies, cars, etc) requiring around 1000 commercial ship visits annually which include container vessels, oil tanker, bulk carriers, etc. As a result, ballast water (BW) discharge and vessel biofouling (BF) are the top two vectors of aquatic alien species introductions into the State of Hawaii, even more so than vectors associated with aquaculture, aquarium pet release, and marine debris! BW and BF have been linked to a range of environmental implications and human health disease transfers worldwide and compels the need for proactive management. While Hawaii has highest number of aquatic alien species establishments compared to other US continental states (~400 alien species), the good news is that not all 400 species have become invasive…yet. I invite you to join me during my presentation to learn about how the top two vectors of aquatic alien species transfer is being managed in the State of Hawaii.

Funding:

Research Partners: Christy Martin, Andrew Porter, Josh Atwood, Josh Fisher, Chris Scianni, Eugene Georgiades, Tracey Bates, DOH, DOT, DOA, DOCARE, NOAA, UH, HIMB, CZM

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Holoholo 2.6 − **Utilizing iNaturalist as a Tool for Citizen Science**

Presenting Author: Kimberly Fuller, *Anuenue Fisheries Research Center, Sand Island, Oahu*

Project PI: Kimberly Fuller

Abstract: Citizen Science can be a powerful tool, from contributing to peer reviewed and published articles, to informing natural resource management decisions. During the 2017 State of Hawai‘i Aquatic Invasive Species (AIS) Team Strategic Planning meeting, citizen reporting was designated as high priority for AIS outreach. Consequently, the “State of Hawaii: Aquatic Invasive Species” (SH: AIS) project was created on iNaturalist. iNaturalist is an online crowdsourced organism occurrence recording tool and identification system that is free to join. The SH: AIS project asks citizens to add observations of introduced aquatic species in Hawaii to the project so that the AIS team may use these observations for informed management. Currently there are 164 observations, 28 species and 24 people in the project. Further reporting within the current project or development of species specific projects utilizing iNaturalist could significantly contribute to known distribution of aquatic invasive or introduced species within the State of Hawai‘i.

Research Partners: Citizens participating on iNaturalist

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Holoholo 2.7 − Application of Citizen Science and Refining Sampling Methods to Optimally Detect a Species at Low Density

Presenting Author: Dr. David Delaney, *Kalanimoku Building, Honolulu, HI*

Project PI: Dr. David Delaney

Abstract: Monitoring is an important precursor to effective management of invasive species. Unfortunately, resources for monitoring are typically limited and large spatial gaps will likely continue to exist in the monitoring coverage. False negatives are probably quite common in monitoring, no matter the scale or the sampling approach. For eradication of invasive species to be feasible, detection of the bioinvaders must be accomplished at an early stage, when the population is localized and at a low density. Unfortunately, introduced species often remain undetected or are usually only detected years after the initial colonization, when eradication is no longer an option. We conducted an experiment in rocky intertidal areas of New England and New York to determine how effective different levels of sampling intensity using two sampling techniques, total area search (TAS) and random quadrat sampling, were in detecting different mobile and sessile targets at low densities (i.e., early detection). Using logistic regression we built detection curves for each sampling approach that related the number of searchers and the density of targets to the probability of detection. The TAS approach reduced the probability of false negatives and detected targets faster than the quadrat approach. Mobility of targets increased the time to detection but did not affect detection success. This technique allowed us to estimate the sampling intensity needed for a certain level of effectiveness for each sampling approach. Given high levels of sampling intensity and the right approach, false negatives were infrequent even at sites with low densities of the introduced species. Nevertheless, given real-world limitations (insufficient funding, personnel), we are currently underprepared for early detection on a large-scale. Volunteer-based monitoring could be a potential solution to this problem by supplementing scarce resources, provided the results of the volunteers are accurate. To increase the available effort we developed a citizen scientist monitoring network to increase our monitoring coverage and conducted a validation study that evaluated the accuracy of approximately 1,000 volunteers to assess the presence of native and invasive crabs within the intertidal zones of seven coastal states of the U.S., from New Jersey to Maine. Citizen scientists, even with limited training, collected data with high levels of accuracy.

Funding Source(s): NOAA's National Sea Grant Aquatic Invasive Species Research and Outreach Program (NA05OAR4171088)

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Holoholo 2.8 − **Laulima: Community partnership in mapping invasive algae along Moloka`i's southern shoreline**

Presenting Author: Kendall Tucker, *Anuenue Fisheries Research Center, Sand Island, Oahu*

Co-Authors: Justin Goggins, Daniel Lager, Kimberly Fuller, Brian Neilson

Project PI: Brian Neilson

Office Staff who are unsung hero of your project: Natasha and Sheila (former DAR secretaries), Ray Uchimura

Abstract: Several invasive algae species have established on Moloka`i Island and have become one of the dominant benthic feature on reef flat habitats, spanning miles of the southern shoreline. Invasive algae species impact reef ecosystems by overgrowing native algae and corals. Local community leader's recognizing this threat to their marine resources, initiated efforts to develop an invasive algae management plan. Community members, conservation groups, managers, researchers, and practitioners were brought together to provide input into the management plan. In 2015, a large survey effort was implemented including over 40 Molokai `i community members. The goals of the project were to: 1) map invasive algae species distribution; 2) map additional coastal features including sediment and mangroves; 3) train volunteers on the identification of invasive algae and GPS mapping techniques; 4) Use the data to inform community led discussions by the end of the 4-day survey period. In total teams mapped over 30-miles and 2,800 acres of shoreline. Gorilla ogo was the most prominent invasive algae species and seemed to concentrate around mangrove stands (another invasive species). In addition, local volunteers were trained on GPS invasive algae mapping technique and continued with three additional survey events. Using these results, a community driven action plan is underway to help prioritize removal of the densest sections of algae and begin the restoration of reef flat habitats. The project was also successful in bringing together a wide range of participants and establishing a new partnership to help implement invasive algae management in Moloka`i.

Funding: OHA, HISC, State General Funds

Research Partners: OHA, TNC, KUA

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Makai 3.1 − **Maui Hawksbill Turtle Nesting in 2018**

Presenting Author: Skippy Hau, *Maui District Office*

Co-Authors: Shandell Brunson; Courtney Brown; Hannah Bernard and Luke Sundquist

Project PI: Skippy Hau

Abstract: Since 1996, we collaborated with volunteers and organizations to document and monitor possible beaches for turtle nesting. We started informally excavating hawksbill nests at Kealia Beach during the late 1980s. This year, we had one hawksbill turtle laid five nests at Palauea Beach. The fourth nest was transplanted to a safer location away from storm surf on July 21. We released 219 live hatchlings for the season. We estimated 60% hatchling success (613/1022). She laid an average of 204 eggs per nest. Emergence occurred between 53 to 58 days old.

Research Partners: National Marine Fisheries Service - Protected Species Division; Kealia Pond National Wildlife Refuge; Hawai'i Wildlife Fund

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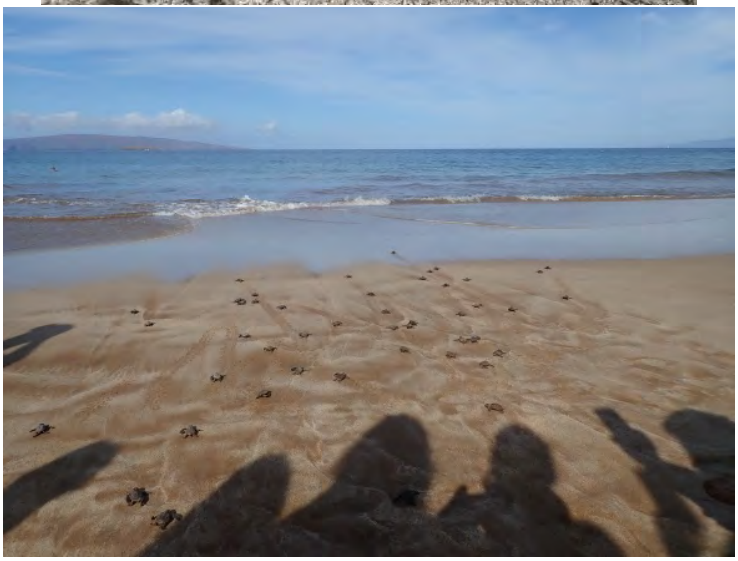

Makai 3.2 − **Shallow Water Resource Fish Surveys**

Presenting Author: Stacia Marcoux, *Kona District Office, Hawaii Island*

Co-Authors: William Walsh, Lindsey Kramer, Megan Leatherman, Nikki Sanderlin, Ross Martin

Project PI: William Walsh

Office staff who is the unsung hero of your project: Laura Jackson

Abstract: Kona DAR conducted Shallow Water Resource Fish Surveys in West Hawaii from February 27 to April 24, 2018 across 72 sites from Lapakahi (North Kohala) to Manuka (Kaʻu). Sites were selected to include sites previously surveyed in 2009 using the same methodology. The total distance surveyed in this round was 15,380 m (50,459 ft.), for a total surveyed area of 76,900 m^2. The objective was to document the abundance of adult resource fish species in shallow water (2m-6m depth) habitats where they are typically most abundant during the day.

2018 surveys had a significantly lower abundance of herbivores and surgeonfish than previous years, starting in 2008. However, there was a large peak in abundance of herbivores, surgeonfish and parrotfish in 2008, making the overall declines of herbivores and surgeonfish from 2009 to 2018 seem larger. The most dramatic decline was seen in *Acanthurus achilles* abundance. This decrease is significant even when the peak year of 2008 is removed from analysis.

Funding:

Research Partners: Jamie Gove, Ivor Williams

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Makai 3.3 − **Oahu Shoreline Fishing Survey Findings**

Presenting Author: Kazuki Kageyama, *Anuenue Fisheries Research Center on Sand Island, Oahu*

Co-Authors: Haruko Koike, Paul Murakawa

Project PI: Paul Murakawa

Office staff who are unsung heroes of your project: Naomi Ahu, Mike Fujimoto, and Brian Kanenaka

Abstract: Shoreline survey project was originally established in July 2011 to collect a more detailed data of recreational fishing effort on Oahu, since HMRF was not established to collect non-harbor data. Spot check surveys allowed the estimation of instantaneous fishing effort of the shorelines of Oahu. The survey showed that area between Honolulu Harbor and Ala Wai Canal and Kaena Point were the most fished areas for the island of Oahu.

Funding:

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Makai 3.4 − **Kauai Fish and Habitat Monitoring**

Presenting Author: Cameron Kailikea Shayler, *Kauai District Office*

Co-Authors: McKenna Allen, Paul Murakawa

Project PI: Paul Murakawa

Office staff who is the unsung hero of your project: Naomi Ahu, Mike Fujimoto, Brian Kanenaka, Katie Nalesere and Christine Garcia

Abstract: In 2017, the Division of Aquatic Resources (DAR) established the Kauai fish and habitat monitoring team. It consists of a monitoring coordinator and two monitoring technicians. Their role is to monitor the resources around Kauai to give management an idea of the efficacy of rules and regulations in the nearshore waters. Some of the sites that they survey are the Haena Community Based Subsistence Fishing Area, Hanalei Bay and Pilaa Bay.

Funding: Pila‘a Settlement Trust Fund

Research Partners: Hawaii Institute of Marine Biology (HIMB) Point Lab (aka Coral Reef Assessment and Monitoring Program-CRAMP)

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Makai 3.5 − The Kahekili Herbivore Fisheries Management Area: Fisheries Management to Control Invasive Algae on Maui's Coral Reefs with Implications to Guide Broader Statewide Herbivore Management.

Presenting Author: Russell Sparks, *Maui District Office (Maui, Lanai, Molokai)*

Co-Authors: Linda Castro, Skippy Hau, Kevin Lino, Itana Silva, Kristy Stone, Tatiana Martinez, Darla White, Ivor Williams, Adam Wong

Project PI: Russell Sparks / Ivor Williams

Office staff who are unsung heroes of your project: Sue Baker and NOAA office and administrative Staff

Abstract: Overgrowth of corals by algae has been a chronic and severe problem along much of Maui's nearshore reefs. The reefs offshore from Maui's North Ka'anapali Beach have shown clear signs of these ecosystem stresses with over 20 years of monitoring demonstrating significant declines in coral cover (54% - 32%). To help stabilize this reef ecosystem, the State of Hawaii established the Kahekili Herbivore Fisheries Management Area in July of 2009. This new management strategy was designed to utilize fisheries management tools to help protect and restore the coral reef ecosystems. To date, assessment surveys have shown a rapid recovery of some herbivore species which has resulted in increases of parrotfish and surgeonfish biomass by 331% and 71% respectively. The substrate has also demonstrated beneficial changes with macro-algae and thick turf algae being reduced to very low levels and with subsequent increases in crustose coralline algae from 2.5% prior to management to 12% today. These changes in the substrate should help improve future coral recruitment and growth. The results of this management effort are helping to guide future reef resiliency management plans as we look to helping coral reefs survive into the future.

Funding: DJ Sportsfish Restoration funding for the Maui DAR monitoring staff participation, NOAA CRCP funding for the NOAA Staff Collaboration

Research Partners: NOAA, PIFSC, Ecosystem Science Division

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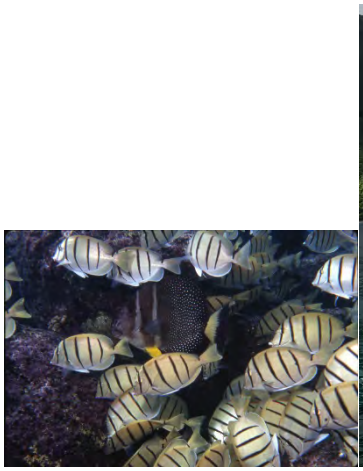

Makai 3.6 − Maui Fish and Habitat Utilization Survey (FAHU) data summary and comparison from past monitoring methods [Habitat and Fish Assessment method (HAFA)].

Presenting Author: Kristy Stone, *Maui District Office (Maui, Lanai, Molokai)*

Co-Authors: Linda Castro, Skippy Hau, Itana Silva, Russell Sparks, Tatiana Martinez, Darla White, Ivor Williams, Adam Wong

Project PI: Russell Sparks

Office staff who are unsung heroes of your project: Sue Baker; casual hires and volunteer divers

Abstract: Based on recent management actions on Maui (2007 Lay gillnet ban, 2014 Parrotfish and Goatfish rules, etc.), it has become increasingly important to accurately and timely evaluate temporal changes in fish and benthic resources. As a result, we have recently changed survey methods from the Habitat and Fish Assessments (HAFA) to the new Fish and Habitat Utilization (FAHU) surveys. The new FAHU method allows us to continue surveying the original HAFA sites (Paia, Waihee, Alaeloa, Olowalu, Kihei, and Makena), but with greater statistical power and allows for greatly enhanced analysis. The HAFA method was designed around three repeated survey efforts per year that revisited 8 permanent 5-minute swim transects within a 2-3-mile section of the coastline at each site (24 total replicate surveys/site/year). Benthic data was collected with DACOR based qualitative assessments, and these surveys were conducted utilizing snorkel methods rather than SCUBA diving. The newly developed FAHU method is a slight alteration of both the Alan Frielander Fish and Habitat Utilization Surveys and the NOAA Kahekili Herbivore FMA Surveys. This new approach allows us to gather between 3-4 times more replicate transects/site/year. We are also able to gather quantified benthic data. By changing these survey methods, we are able to increase our survey replicates, lower the data variability and increase the statistical power. In addition, this new approach allows for a broader representation of the survey area as whole, rather than just a few permanent transect points on the reef. Finally, the new FAHU method also allow for direct comparisons between benthic and fish data which greatly increases our ability to conduct detailed analysis of fish biomass in relation to habitat characteristics.

Funding Source: DJ Sportsfish Restoration

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Makai 3.7 − **Oahu Biological Monitoring Findings**

Presenting Author: Kazuki Kageyama, *Anuenue Fisheries Research Center on Sand Island, Oahu*

Co-Authors: Haruko Koike, Paul Murakawa

Project PI: Paul Murakawa

Office staff who are unsung heroes of your project: Naomi Ahu, Mike Fujimoto, and Brian Kanenaka

Abstract: DAR has been conducting annual SCUBA fish surveys since the 1960s. Current method of Oahu biological monitoring was established in 2007 (one method was changed in 2012). There are three main types of surveys conducted: Fixed Fish Transect Surveys (FFTS), SCUBA 5 minutes Surveys, and Snorkel 5 minutes Surveys. The surveys were conducted every quarter to assess the fishery status of the areas around Oahu. Benthic cover was recorded every three years at the FFTS sites. For most parts of the island, resource fish biomass showed an increase from 2013 to 2017.

Funding:

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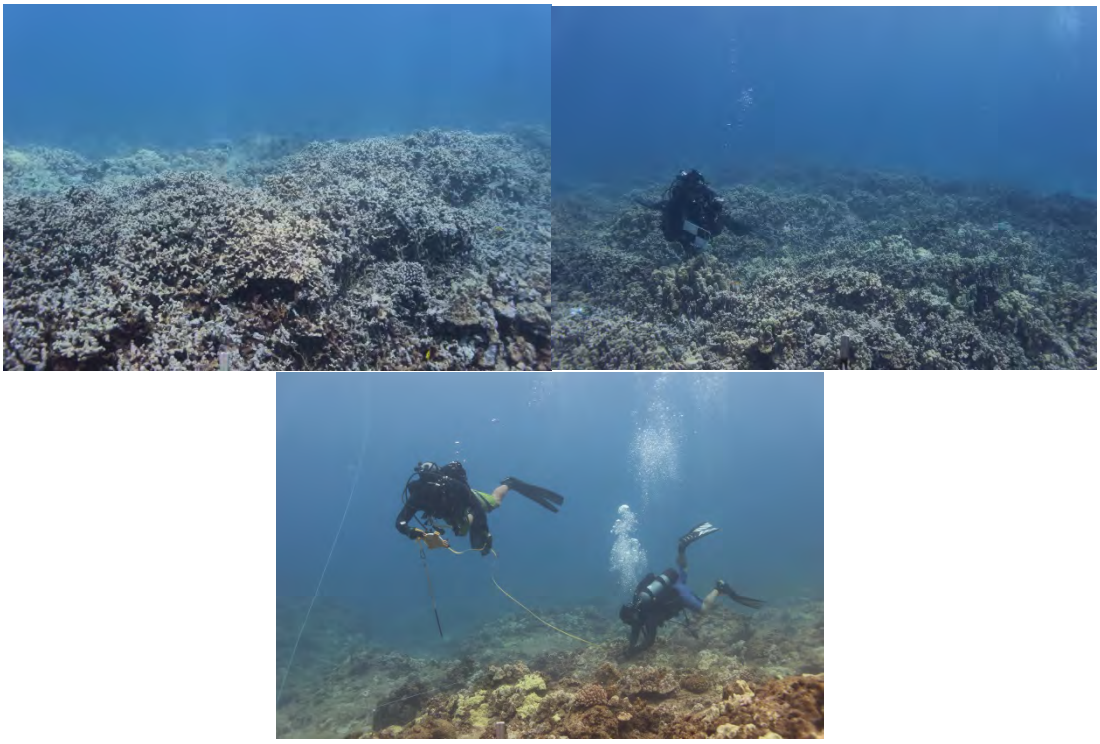

Makai 3.8 − West Hawai'i Monitoring Project (WHAP/WHMP)

Presenting Author: Megan Lamson, *Kona District Office, Hawaii Island*

Co-Authors: William Walsh, Lindsey Kramer, Stacia Marcoux, Ross Martin, Nikki Sanderlin

Project PI: William Walsh

Office staff who is the unsung hero of your project: Laura Jackson

Abstract: The Hawai'i Division of Aquatic Resources' West Hawai'i Monitoring Project (WHMP) has been intensively monitoring reefs in West Hawai'i since 1999. This represents a region that spans more than 85 miles (140 km) of coastline, and includes 25 regular monitoring sites from Lapakahi (North Kohala) to Manukā Bay (Ka'ū). In 1999, the West Hawai'i Fishery Council designated a network of nine Fish Replenishment Areas (FRAs), comprising 35.2% of the West Hawai'i coastline, that were closed to aquarium collecting. Over the past 16 years of monitoring, a total of 70 survey divers have conducted over 6,700 100m^2 transects both inside and outside these marine protected areas (MLCDs, FRAs), in addition to hundreds of other related surveys. Over this same time period, populations of the most commonly captured aquarium fishes: #1 Yellow tang (*Zebrasoma flavenscens*) and #2 Kole tang (*Ctenochaetus strigosus*) have increased in abundance, whereas the #3 Achilles tang (*Acanthurus achilles*) has notably decreased. This sort of information is utilized to assess the condition of the West Hawai'i's marine resources and (*can hopefully be used*) to inform management decisions.

Funding:

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Makai 3.9 − **West Hawai'i Coral Reef Monitoring Overview**

Presenting Author: Nikki Sanderlin, *Kona District Office, Hawaii Island*

Co-Authors: William Walsh, Lindsey Kramer, Megan Leatherman, Ross Martin, Stacia Marcoux

Project PI: William Walsh

Office staff who is the unsung hero of your project: Laura Jackson

Abstract: Kona DAR has conducted many different types of monitoring surveys over the years. These include: West Hawai'i Monitoring Project (WHAP), Coral Health Surveys, Benthic Habitat Surveys, Stony Coral Recruitment, Shallow Water Resource Fish Surveys, Adult Yellow Tang Surveys, and Retrospective Studies. WHAP has been intensively monitoring reefs at 25 permanent sites along the West Hawai'i coastline since 1999, with a total of 70 survey divers conducting over 6,700 100m^2 transects. DAR Kona regularly conducts coral health surveys approximately every 4 years at a subset of permanent monitoring sites, or on an as-needed basis. The West Hawai'i Coral Recruitment Project investigates the spatial-temporal variability of Scleractinian coral recruitment at nine sites along West Hawai'i. Shallow Water Resource Fish Surveys and Adult Yellow Tang Surveys are conducted in shallow water habitats (2m-6m depth) across approximately 70 sites, where these species are typically most abundant during the day. Retrospective Studies are also conducted at three sites: Hōnaunau, Ke'ei, and Puakō. These surveys all began in the late 70s and have employed a consistent methodology to collect long term monitoring data. This wide range of monitoring surveys allows us to evaluate the conditions of West Hawai'i's marine resources and can be used to advise management decisions.

Funding:

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Makai 3.10 − **Reef Restoration in Kāne‘ohe Bay**

Presenting Author: Wesley Dukes, *Anuenue Fisheries Research Center on Sand Island, Oahu*

Project PI: Justin Goggins

Office staff who are unsung heroes of your project: AIS field team and Urchin hatchery staff

Abstract: Despite various environmental stressors, Kāne‘ohe Bay contains some of the highest coral cover on O`ahu and serves as a nursery ground for many native juvenile fish and invertebrates. Fast growing alien invasive algae has smothered many reefs throughout the Bay. This phase shift from healthy coral to algae dominated environment has severely degraded the reef and lead to a loss of ecosystem function. Since 2007, DLNR has carried out invasive algae control efforts in the Bay using a combination of mechanical removal (The Super Sucker) and biocontrol (sea urchins), effectively reducing invasive algae cover bay-wide, whereby currently only biocontrol is needed to keep algae levels low.

In addition to continuing biocontrol of invasive algae, we are working to restore coral reef habitat in He’eia through watershed restoration. This location is heavily affected by sedimentation, eutrophication, pollution, and freshwater run-off. He’eia is a NOAA Sentinel Site and a NOAA National Estuarine Research Reserve with many different agency and community partners. Interdisciplinary research and restoration projects throughout the watershed coupled with strong community support make He`eia an ideal restoration location. DAR’s “ridge-to-reef” management strategy for Kāne‘ohe Bay is founded on holistic restoration of the watershed, including essential wetland habitat that serves as a buffer zone, protecting adjacent reefs from these land-based stressors.

DLNR is also incorporating coral re-attachment into its suite of restoration tools to restore reef areas killed by invasive algae and other stressors. The coral reattachment project uses coral fragments created by boat strikes or other impacts that may otherwise die if not reattached. The reattachment project salvages doomed coral tissue to restore dead areas, causing no further negative impact to the donor sites.

Funding: Cape Flattery settlement

Research Partners: HCRI, NOAA, US Fish and Wildlife Service

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Makai 3.11 − **Bloom and Bust: The Proliferation and Decline of Invasive Macroalgae in Kāneʻohe Bay, Hawaiʻi**

Presenting Author: Brian Neilson, *Kalanimoku Building, Honolulu*

Co-Authors: Mary Donovan, Morgan Winston, Justin Goggins

Project PI: Brian Neilson

Office staff who is the unsung hero of your project: Brian Kanenaka, Ray Uchimura, Risa Minato, Carole Fagaragan, Kelly Yoshizaki, Nora Hicks, Brigette Agustin

Abstract: Invasive macroalgae species *Eucheuma* sp. and *Kappaphycus* spp. (E/K) became a dominant benthic feature in Kāneʻohe Bay throughout the past four decades. At its peak, E/K occurred on up to 74 hectares of reef area and grew up to three meters thick at some locations, prompting intensive management action, including physical removal and outplanting of herbivorous sea urchins. In 2013, E/K began to naturally decline in the Bay at unmanaged sites, raising questions as to what the causes of the decline were. E/K continued to decline into 2017 and remains sparse in the bay today. The aim of this study was to evaluate 1) the extent and timing of the E/K cover decline in the Bay, and 2) evaluate the possible drivers including environmental, ecological, and management factors. We considered a wide range of variables in a generalized additive mixed model and used model selection to determine the best model and most important predictors of macroalgae cover over time. Results confirm a significant decline in E/K in the bay beginning in August 2013, and cover remained below 6 % after 2016. The major drivers of E/K percent cover decline over time were herbivore biomass, and stream discharge flow rates. We investigated these patterns to further understand the timing of E/K decline, and the mechanisms that may help explain the overall relationships with herbivore biomass and stream discharge. This study emphasizes the importance of herbivory and watershed management in relation to invasive algae blooms.

Funding: NOAA, USFWS, Port Royal Trust, Flattery Trust, HISC, State General Funds

Research Partners: TNC, NOAA, UH HIMB, UH Manoa, HPU

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Makai 4.1 − CULTURE OF THE SEA URCHIN, *Tripneustes gratilla* AT THE ĀNUENUE FISHERIES RESEARCH CENTER

Presenting Author: David L. Cohen*, Anuenue Fisheries Reseach Center, Sand Island, Oahu*

Co-Authors: Sean Louie, Matthew Lewis, Frederick Shopnitz, Patrick Gorong, Lani Musselman

Project Leader: David Cohen

Office staff who are the unsung heroes of your project: Ray Uchimura, Carole Fagaragan

Abstract: The native sea urchin *Tripneustes gratilla* is raised as a biocontrol agent to mitigate the effects of invasive seaweeds in Kāne'ohe Bay. *Tripneustes gratilla* is being raised in the hatchery at the Ānuenue Fisheries Research Center in Honolulu. Wild broodstock are collected and spawned monthly. First feed is administered three days after fertilization. Pelagic larvae are grown in round tanks with mild aeration and are fed two microalgae species that are grown on site in pure culture. Feeding density is adjusted as needed. Larvae are maintained in pre-filtered UV treated 25C seawater. Water is changed daily, and tank changes are performed as needed to maintain hygiene. At three to four weeks larvae are ready to metamorphose and are moved into tanks for settlement. Settlement tanks are prepared with biofilm encrusted plates made from PVC roofing material. Larvae are stocked into settlement tanks where they settle and adhere to settlement plates. Post-larval urchins remain in settlement tanks for about three weeks. These 0.5mm – 1.5mm urchins are counted and moved into grow-out tanks. At 5mm to 7mm juvenile urchins are switched to a diet of cultured macroalgae. Urchins are outplanted in Kāne'ohe Bay at four to six months, at a minimum size of 15mm.

Funding: Cape Flattery Trust

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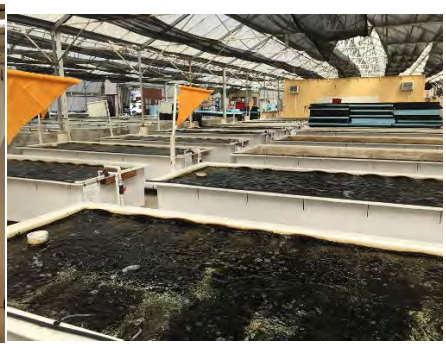
Partners: UH Mānoa, UH Hilo, HIMB, PCSU, TNC, HPU, Waikīkī Aquarium, Chaminade University, NOAA, USFWS



Makai 4.2 −**The West Hawai'I Coral Recruitment Project**

Presenting Author: Ross Martin, *Kona District Office, Hawaii Island*

Co-Authors: William Walsh

Project PI: William Walsh

Office staff who is the unsung hero of your project: Laura Jackson

Abstract: Maintenance of adequate levels of coral recruitment is vital to sustain coral reefs. As early life stages are often more susceptible than adults to environmental stressors, data on settlement and recruitment can help predict potential effects of disturbance from, and resilience to, environmental changes. The spatial-temporal variability of scleractinian coral recruitment is currently being investigated along the west coast of Hawai'i Island. From April 2004 to the present, terra-cotta coral settlement tiles have been placed at nine sites spanning the leeward side of Hawai'i. Recruitment rates (average of all sites: 27 recruits $m^{-2}/year^{-1}$) recorded along the Kona coast are low compared to other areas around the state. The low coral recruitment rates noted in this study indicate that recovery from natural and/or anthropogenic influences will likely be slow.

Funding: Hawai'i DAR Division of Aquatic Resources; National Park Service

Research Partners: Sallie Beavers, National Park Service

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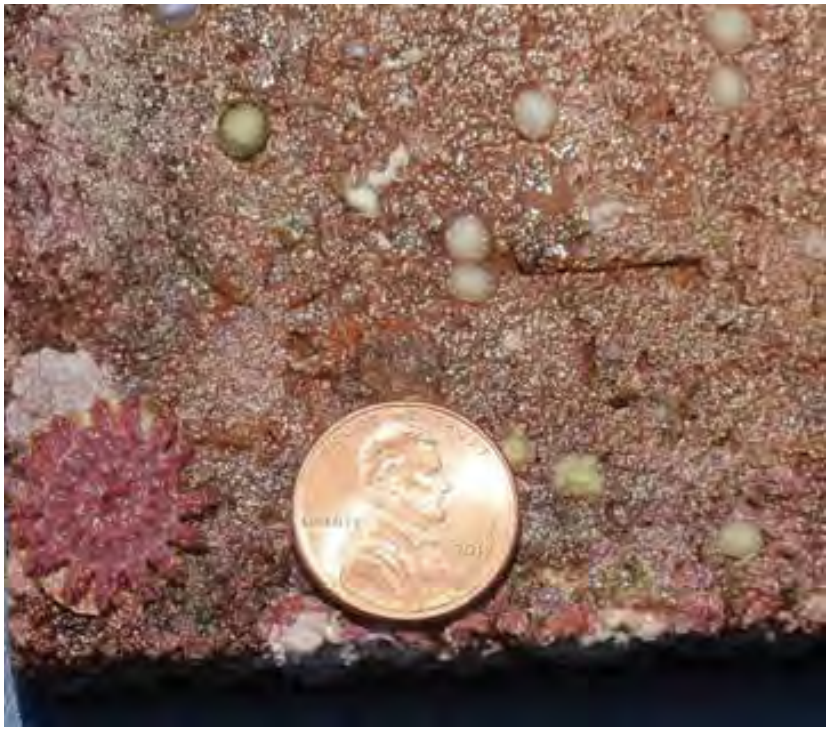

Makai 4.3 − **Evaluating the efficacy of a reef restoration strategy using a new photomosaic method**

Presenting Author: Natalie Dunn, *Anuenue Fisheries Research Center on Sand Island, Oahu*

Project PI: Justin Goggins

Office staff who are unsung heroes of your project: Dan Lager for mentoring me and Wes Dukes and Kim Fuller for their help in the field

Abstract: The AIS team launched a pilot project in Spring 2017 to investigate reattaching corals of opportunity as an addition to our toolbox for reef restoration. Monitoring was carried out using “photomosaic” methodology, which was developed by the SCRIPPS Institute and consists of stitching together a series of photos in a software program called Agisoft. ArcGIS was then used for image analysis using a protocol adapted from NOAA. This presentation will discuss preliminary findings and future direction for the project.

Funding: Cape Flattery setttement

Research Partners: RCUH, NOAA, SCRIPPS Institute

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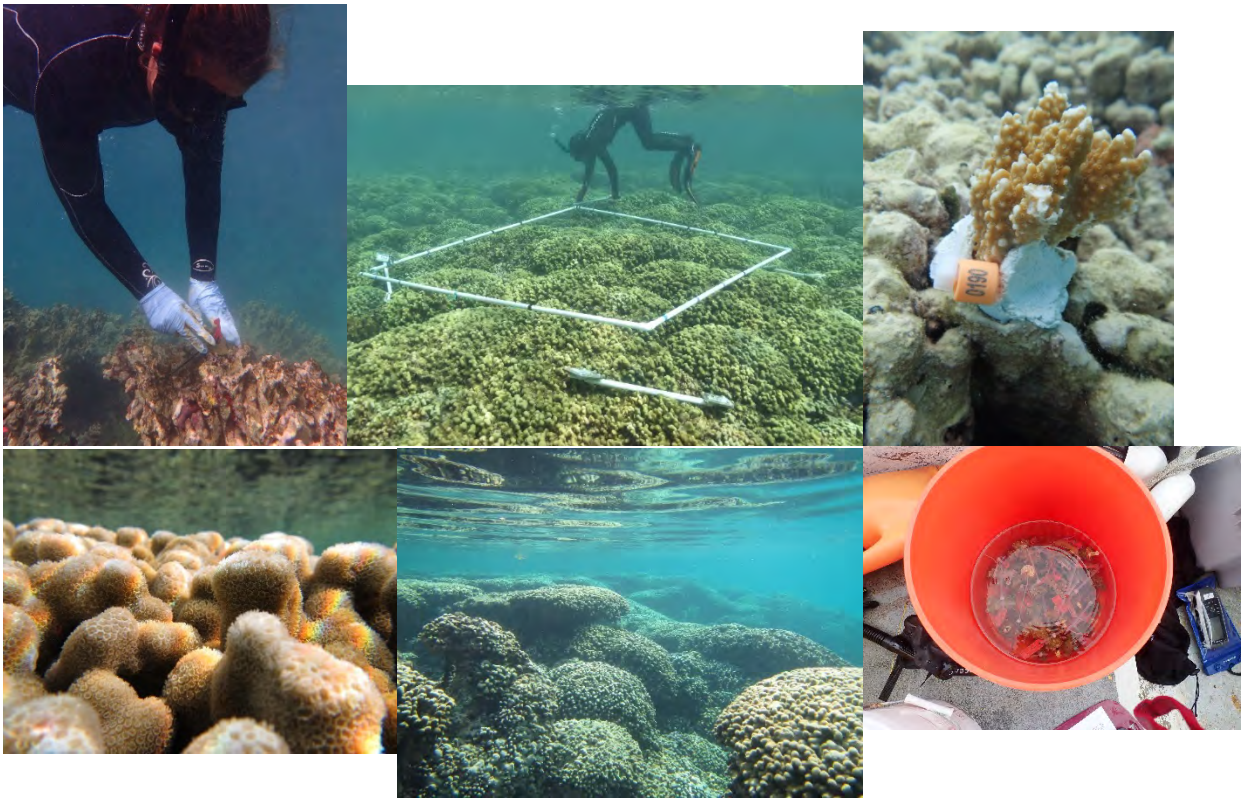

Makai 4.4 − **Benthic Monitoring on Leeward Hawaii Island**

Presenting Author: Lindsey Kramer, *Kona District Office, Hawaii Island*

Co-Authors: William Walsh, Megan Leatherman, Ross Martin

Project PI: William Walsh

Office staff who is the unsung hero of your project: Laura Jackson

Abstract: Benthic communities, including healthy corals, create critical habitat for nearshore fisheries in West Hawai'i. DAR Kona has conducted benthic monitoring since 2003 using a standardized image analysis method approximately every four years at 26 long-term monitoring sites. In cases of suspected high coral mortality (e.g. following the 2015 coral bleaching event), benthic image analyses has been conducted annually. In addition, DAR Kona regularly conducts coral health surveys using an *in-situ* belt transect method. Coral health surveys are conducted approximately every 4 years at a subset of permanent monitoring sites, or on an as-needed basis in the event of an observed health condition. Coral health surveys conducted in October 2015 documented a coast-wide severe coral bleaching event, with varying susceptibility among coral species. Consequently, benthic image analysis results documented a dramatic decline in mean coral cover (-49.6%) in 2016, with limited recovery at certain sites in 2017. Benthic monitoring data is complemented by regular reports from the Eyes of the Reef Community Reporting Network.

Funding:

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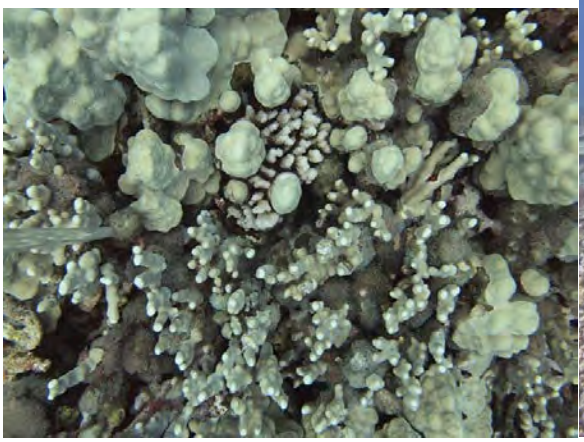

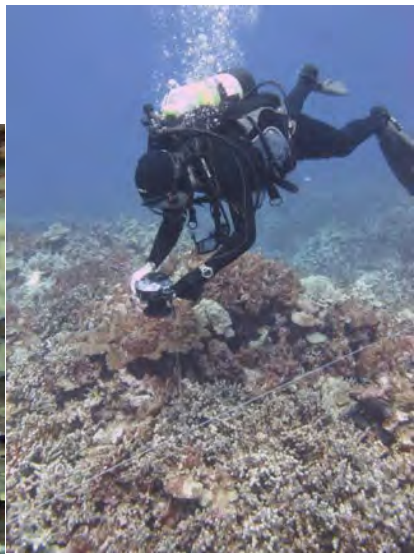

Makai 4.5 − **What DAR Can Learn from Australia's Approach to Massive Reef Loss**

Presenting Author: David Gulko, *Hawaii Coral Restoration Nursery, AFRC*

Project PI: David Gulko

Abstract: In 2016, half (50%) of the Great Barrier Reef died in under three months. The Great Barrier Reef Marine Park Authority was (is) the best funded, enforced, researched, monitored and well-zoned large MPA in the world. None of that helped them with a 50% loss of their management units. Last year the Australian government allocated $444 million to research and development of active tools to mitigate and restore the GBR. As part of that Dave Gulko was invited to a problem-solving symposia to share what Hawaii is doing on coral restoration. What is resulting from this is a series of collaborations and concerns for Hawaii as to how we will directly address the same causes of reef loss as Australia.

Funding: DAR and Australian Govt

Research Partners: GBRMPA, AIMS, Dr. Peter Harrison

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Makai 4.6 − **Protecting Hawai‘i from Aquatic Invasive Species Through Prevention, Rapid Response, Monitoring and Control**

Presenting Author: Justin Goggins, *Kalanimoku Building and AFRC, Sand Island, O‘ahu*

Co-Authors: Dan Lager, Kendall Tejchma, Kim Fuller, Wes Dukes, Natalie Dunn, Brian Neilson

Project PI: Justin Goggins

Office staff who are unsung heroes of your project: Brian Kaneanaka, Ray Urchimura, Risa Minato, Carole Fagaragan, Kelly Yoshizaki, Nora Hicks

Abstract: The goal of the Aquatic Invasive Species (AIS) program is to minimize the harmful ecological, economic, and human health impacts of AIS through the prevention and management of their introduction, expansion, and dispersal into, within, and from Hawai‘i. As such, the AIS team has three main divisions working on pre-border, border, and post-border biosecurity issues. Pre-border prevention is rapidly expanding through the Ballast Water and Hull Fouling Program. Border issues are addressed by providing technical advice on species imports permits and through rapid response assessments to species sightings reported through the Eyes of Reef and Marine Debris networks. Post-border activities comprise of AIS monitoring and active control projects. This presentation will highlight our current efforts that build on previous projects and how we’re expanding our toolbox to meet Hawai‘i’s needs in the future.

Funding: Cape Flattery Trust Fund, Aquatic Nuisance Species U.S. Fish and Wildlife Services Grant, OCCL Pila‘a Trust Fund

Research Partners: DOBOR, HDOA, NOAA – Habitat Mapping Branch/Marine Debris Program/Office of Response and Restoration Center/National Marine Monument, Hawai‘i Institute of Marine Biology, Mālama Maunalua, USFWS, USCG, EOR, HPU Oceanic Institute, KUPU

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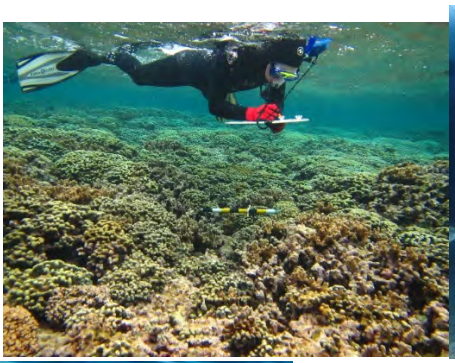

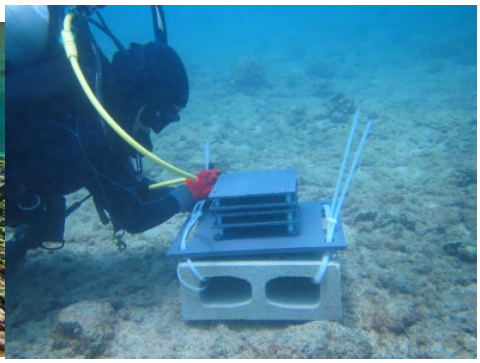

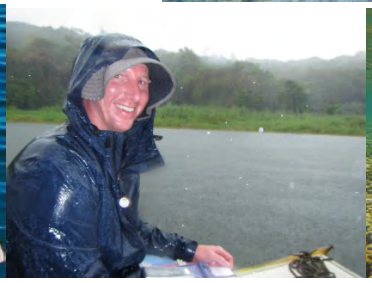

Makai 4.7 – Roadmap to 30x30: Achieving 30% Effective Management by 2030

Presenting Author: Anne Chung, *Kalanimoku Building, Honolulu*

Co-Authors: Amber Meadows, Mary Donovan, Rebecca Most, Allie Shea, David Delaney, Gina McGuire

Office staff who is the unsung hero of your project: Risa Minato

Abstract: In September 2016, Governor David Ige announced the Sustainable Hawaii Initiative at the IUCN World Conservation Congress. This initiative outlines specific sustainability targets, including a "30x30" marine target to "effectively manage 30% of nearshore ocean waters by 2030." The objectives of this initiative are centered on supporting sustainable use of marine resources while also promoting the health and resilience of nearshore marine ecosystems, and include implementing additional statewide fisheries rules, creating a cohesive network of marine managed areas, improving enforcement and outreach capacity, and ensuring comprehensive marine monitoring efforts. The Marine 30x30 Initiative is being led by the Department of Land and Natural Resources (DLNR), Division of Aquatic Resources (DAR) whose staff have recently developed the *Roadmap to 30x30*, a strategic plan to guide actions to achieve sustainable fisheries and a healthy nearshore environment by 2030.

Funding: Harold K.L. Castle Foundation, Division of Aquatic Resources, Office of Planning, Pacific Islands Climate Change Cooperative, NOAA Coral Reef Conservation Program

Research Partners: The Nature Conservancy, University of Hawaii, Center for Ocean Solutions, University of California, Santa Barbara

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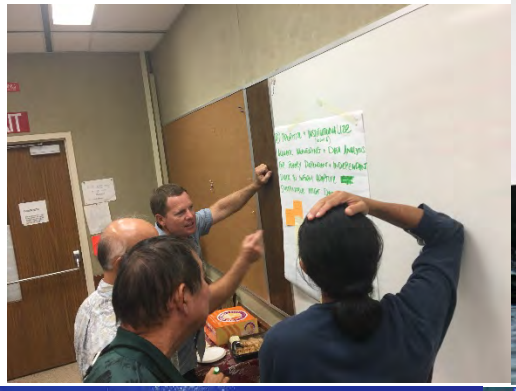

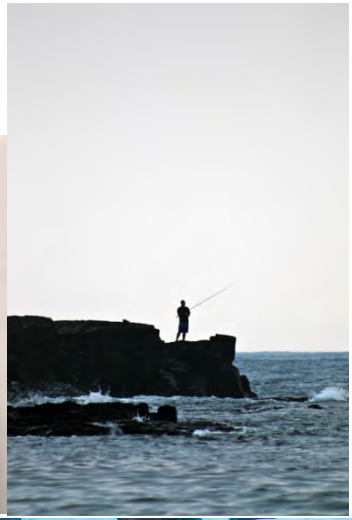

Makai 4.8 − Transitioning to a database management system: supporting DAR to improve management of our aquatic resources by providing tools to see a bigger picture

Presenting Author: Eko Lapp, *Kalanimoku Building, Oahu*

Co-Authors: Kimberly Peyton, Hal Horiko, Glenn Higashi

Project PI: Kimberly Peyton

Office staff who is the unsung hero of your project: Naomi Ahu, Estuary staff who have been patient as we use their data as a test project.

Abstract:

For DAR to improve management of our aquatic resources there is a need to evolve from our single user databases to a multi-user, centralized database. As a product of Database Workshop held in July DAR's database management team has been working with staff to specify how to construct each projects' front-end of the database. To customize a front-end for each project staff will be receiving a survey questionnaire with both general and specific questions for individual projects. This will be followed by a test phase, a modification phase, and then a full transition over to our new system. Once we have fully transitioned over to our new database and data have been entered then you can expect that quarterly reports, annual reports, and data summaries will be as simple as a few clicks (or something close to that dream). This presentation will describe what we have in store for you.

Funding:

Research Partners: Annette DesRochers and Paulo Maurin, NOAA

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