

**NOAA Coral Reef Conservation Program
State of Hawaii FY 2010 Coral Reef Management Final Report**

A. Award Number: NA10NOS4190062

B. Amount of Award: \$636,121

C. Recipient: Department of Land and Natural Resources, Division of Aquatic Resources

D. Award Title: *State of Hawaii 2010 Coral Reef Management*

E. Award Period: 10/01/2010 - 09/30/2013

F. Period Covered by this Report: 10/01/2012 - 03/31/2013

G. Summary of Progress and Expenditures to Date:

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Hawaii Coral Program Planner and Contract Specialist	Emma Anders, Ray Uchimura	2
Division of Aquatic Resources (DAR) Legal Fellowship:C11501	Denise Antolini, UH-Law School	3
Conservation Action Planning for Kawaihae-Puako:C12717	Eric Conklin, TNC	3
Invasive algae management: Outplanting of cultured native urchins (<i>Tripneustes gratilla</i>) as a restoration tool for coral reefs" C13032 and 22178	David Duffy, UH-PCSU	3
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Characterization of dead zones at Kahekili Beach Park, Maui:C11722	Paul Jokiel, UH	4
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1. Staff Positions and Programmatic Projects:

A. Programmatic Staff Positions: Hawaii Coral Program/DAR Planner (Task 2)

Position Status (please x): Filled x

Summary of Staff Accomplishments:

- As of October 11, 2012, the civil service position has been filled and is fully funded by the State. The new State of Hawaii, Division of Aquatic Resources' planner is Ms. Emma Anders.
- Prior to the planner leaving, a contract for additional program support to continue program coordination was executed with the University of Hawaii, Social Science Research Institute was awarded to complete this Task (see Task 12). The contract was started was completed in December 2011. See the April 2012 progress report for details.

B. Programmatic Staff Positions: Contract Specialist

Position Status (please x): Filled x

Summary of Staff Accomplishments:

- Coordinated grant application/contract process.
- Prepared and managed procurement documents as mandated by State laws in order to solicit proposals and execute projects under multiple activities.
- Monitored and evaluated performance of contracted parties to ensure compliance with terms and conditions of various grants and contracts.
- Verified/reviewed budget information, personnel and/or program requirements for conformance with state and federal laws, rules, and regulations.
- Conducted post-award review for federal funding sources.
- Oversaw budget preparation and financial reports, including match requirements.
- Maintained fiscal records for all activities.
- Provided coral planner with contractual grant needs, including budget requirements in order to inform final project design.
- Assisted with equipment purchases.

C. Programmatic Staff Positions: DAR Legal Fellowship (Task 3)

Project Status: Complete X

Summary of Staff Accomplishments:

- This project was contracted to the University of Hawaii's Richardson School of Law in November 2010 and completed in October 2011. PI: Denise Antolini. Staff: Wayne Tanaka.

- Final Report on file.

2. Projects:

A. Task 5: Conservation Action Planning for Kawaihae-Puako-Kalaoa (Phase II)

Project Status: Completed X

Summary of Project Accomplishments:

- This project was contracted to The Nature Conservancy of Hawaii in November 2010 and completed in September 2012. PI: Eric Conklin.
- The final South Kohala Conservation Action Plan is posted on the HCRS website: <http://www.hawaiicoralreefstrategy.com/index.php/prioritysites/southkohala>
- The final Roi Research Report is also posted on the HCRS website: <http://www.hawaiicoralreefstrategy.com/index.php/prioritysites/southkohala>
- See October 2012 Progress Report for details.

B. Task 6: Invasive algae management: Outplanting of cultured native urchins (*Tripneustes gratilla*) as a restoration tool for coral reefs

Project Status: Completed X

Summary of Project Accomplishments:

- This project was contracted to the University of Hawaii's Pacific Cooperative Studies Unit in April 2011 to March 31, 2012. A continuing proposal was issued from April 1, 2012 to March 31, 2013. PI: David Duffy, Lead Staff: Jono Blodgett and David Cohen.
- No new updates since April 30, 2012.
- This project has been completed. Work at the project site continues on the FY11 project "*Invasive Algae Control through Native Grazer Replenishment.*"

C. Task 7. Marine Spatial Planning for Hawaii's Coral Strategy West Maui priority sites

Project Status: Completed X

Summary of Project Accomplishments:

- This project was contracted to Pacific Rim in June 2011 to May 2012. PI: Lee-Ann Choy, Lead Staff: Kalisi Mausio and Arielle Levine
- This project was completed and final deliverables are posted on the HCRS website. Deliverables include a mapbook, ArcGIS map, GIS Data files. There is also a link to the Digital Coast NOAA Coastal Services Center. <http://www.hawaiicoralreefstrategy.com/index.php/prioritysites/westmaui>

- See October 2012 Progress Report for details.
- As of March 27, 2013, this project data is now downloadable from the State GIS Program. The State will house and maintain this data. <http://hawaii.gov/dbedt/gis/>

D. Task 8.Characterization of dead zones and population demography of *Porites compressa* along a gradient of anthropogenic nutrient input at Kahekili Beach Park, Maui

Project Status: Completed X

Summary of Project Accomplishments:

- This project was contracted to University of Hawaii, Hawaii Institute of Marine Biology on December 30, 2010 to September 30, 2011. PI: Paul Jokiel, Lead Staff: Megan Ross
- This project was completed in April 2012 and final deliverables are posted on the HCRS website: <http://www.hawaiicoralreefstrategy.com/index.php/prioritysites/westmaui>
- See October 2012 Progress Report for details.

E. Task 9. Community-Based Coastal Marine Stewardship/Makai Watch Support

Project Status: Kaanapali is completed. X Puako is completed X

- Two subcontracts were issued to two different Makai Watch communities.
 - Ka'anapali Makai Watch in West Maui was issued to Project SEA Link in February 2012 and was completed January 31, 2013.
 - See April 2013 Progress Report for details.
 - Click here for their website: <https://www.facebook.com/kaanapalimakaiwatch>
 - Puako Makai Watch in South Kohala was issued to the Puako Community Association on September 14, 2012 and was completed in September 30, 2013.

Summary of Project Accomplishments (Puako Makai Watch)

1. Provide coral reef information

- Puakō has been a Makai Watch community since 2007 and started its information booth in 2011. Puakō is a two and a half mile dead end road with 12 beach access roads to the water. Paniau at the end of Puakō Beach Drive, being one of the most popular spots for snorkeling, scuba diving, fishing, surfing and general recreation, was chosen as our first location for the information booth.
- The booth is in operation twice monthly and staffed with two Makai Watch volunteers. The booth is not only operated in Puakō or Waialea but has been set up at the Hōkūle'a Festival, the Hawaii Tourism Association and Roi Removal events.
- The use of our grant to laminate posters and add additional printed materials has enhanced our visitors' experience. We've received generous support from the Coral Alliance, the Kohala Center, NOAA, the Nature Conservancy, DAR and others.

- In March 2012 we received permission from Dean Takebayashi of the Hawaii State Parks division to locate the booth at Waialea Beach Park. Waialea Beach Park is part of Hapuna State Park Recreational Area. We felt that this location, commonly called 69's, is a great location for the booth since it has such a high number of visitors.
- In January of this year we collaborated with the Kohala Center to train our volunteers using their ReefTeach program which has been extremely successful at Kahalu'u Bay. <http://kohalacenter.org/kahaluubay/about.html>
- On Feb. 2nd we conducted our first training session with Matt Connelly of the Kohala Center on ReefTeach technique (24 attendees). From this session we produced 13 short videos covering Hawaiian history, corals, reef fish and much more (see the link below). We wanted to make this information available to the general community and our volunteers, both new and experienced.
- http://www.youtube.com/playlist?list=PLXLTDLSS0pifbKMPMC43UIIHHr1MfWQZ&feature=edit_ok
- Our goal, beginning in October 2012, was to increase the number of volunteers to at least 25. Over the course of the grant period we've had 726 booth visitors and our volunteer base is 27.

2. Increase voluntary compliance

- Following an interview process that began in November 2012, Randy Clark was hired as our Puakō Coordinator on January 1, 2013. Puakō has 12 shoreline access entries and part of Randy's duties is to monitor activity and interface with beach users at these various access points. Randy would attempt to educate users on reef etiquette and regulations. Residences reported 4 monk seal sightings and shared information on proper distances to maintain.
- Our volunteers have undergone the DAR Makai Watch training which included identifying fishing violations. Yet even with this training volunteers were hesitant to report violations. This came from a fear of retribution or confrontation and made it difficult to get residents who lived on the water to volunteer as new members. Instead residents would contact Randy Clark who would determine if the caller had witnessed a violation or not. If it were a violation he would contact the proper agency and if it wasn't he then would explain the situation to the caller. This has worked very well for us over the past year.
- Puakō Makai Watch did a signage survey of the existing signs on our beach accesses (see survey in Appendix 1. Pg 13) and found the signage lacking in consistency and pertinent information. We produced five signs using universal symbols to install in our busiest accesses.
- We've had 8 violations reported to DLNR during the grant period. Violations included camping (27), trespassing (2), campfires (6), illegal sailboat mooring (2), lay net (2); the police department was contacted for an unstable homeless woman and a residential robbery and the fire department was contacted on numerous fire pit violations. Randy talked with most of the violators explaining the applicable regulation. An example would be unleashed dogs (20), Randy would explain the leash law and mitigate the situation.

3. Increase user/community interaction

- Section 2 (increase voluntary compliance) actually dovetails with this section (community interaction). Our coordinator, Randy Clarke is actually referred to as Ranger Randy. This title, along with his uniformed khaki ranger shirt, gives Randy more presence in his interactions and a look of authority. He

makes one-on-one contact with the reef users at our various access points during his time in Puakō. He has definitely established a presence, which certainly helps with voluntary compliance.

- See Appendix 2., Pg.25 for a sample of our interview form that is used to help track our interfaces with the beach users.

4. Manage Invasive species

- A Roi removal event was held on June 29th and 30th sponsored by The Nature Conservancy.
- The Puakō Makai Watch volunteered to participate with volunteers and to set up our information booth. The event was headquartered at the Puakō Boat Ramp.

5. Building Community Capacity

- November 10, 2012 there was a community meeting, called the South Kohala Reef Awareness Celebration that was held at Paniau. SkoreLLC set up this event with the Puakō Makai Watch. In attendance were Linda Preskitt (Eyes of the Reef) and Beth Goodwin (Jupiter Foundation) and Marc Rice (HPA turtle program) as well as 20 others. The primary focus of discussion was the information booth and how it could better serve the community. Also, how could we involve more community members as volunteers? It was a casual affair with a potluck following the discussions. Implementation of ideas was incorporated into our general plan.
- With the help of The Nature Conservancy we began to plan a community coastal management workshop that would invite various communities from up and down the Kohala Coast. Our goal would be to share projects, challenges, and successes and evaluate the potential for the communities that are active in managing coastal and marine life to support each other.
- September 20th and 21st our first Coastal Community Management Meeting was held at the Kawaihae Canoe Club in Kawaihae. (Half day on Friday and a full day on Saturday).
- On July 28th at Waialea an informal meeting was held with the Maui Community Fisheries Enforcement Unit (CFEU).
- All in all, it was a great exchange of information and a grand opportunity for the groups from three different islands to bond. We may all have different reasons for starting Makai Watch units, however, our end goals are the same....Educate the public, increase voluntary compliance with fishing regulations, and enhance our local fisheries. The CFEU group from Maui and the new Makai Watch Coordinator attended to learn about the success and experiences from the Puakō Makai Watch Program and maintain regular contact between groups.

6. Build Educational Partnerships

- Randy Clarke met with 12 students from HPA with Marc Rice on Feb 8th to conduct invertebrate and shoreline surveys.
- 48 visiting high school students from San Antonio, Texas were given reef etiquette training and a history of Paniau by Randy Clarke on June 12th

7. Promote coral reef-related outreach to raise awareness

- 1/12 Catherine Kim from Cornell spoke on coral health of our reef at the Puakō Community Association's annual meeting. 55 attendees.

- 1/30 Shawn Larson from the Seattle Aquarium spoke on their on-going fish survey in Puakō. 40 attendees. Her talk can be viewed on You Tube (in three sections):
<http://www.youtube.com/watch?v=N3Wr6sGNpmk&feature=youtu.be>
http://www.youtube.com/watch?v=iYl7_OuD034&feature=youtu.be
<http://www.youtube.com/watch?v=9QXeRVwEERo&feature=youtu.be>
- 4/17 Justin Viezbicke from NOAA spoke on monk seals at Hokuloa Church. 37 attendees.
- 5/22 Rene Umberger spoke on aquarium collecting along the Kohala coast. 42 attendees.
- 6/3 President of the Republic of Palau, the Honorable Thomas Remengesau spoke to an audience of 127 at Hokuloa Church. The President emphasized and highlighted the efforts this small nation has made to ensure the viable sustainability of its amazingly diverse marine resources. This was a joint presentation by the Nature Conservancy, Hokuloa Church and the Puakō Community Association (Puakō Makai Watch). 127 Attendees
- See video: <http://www.bigislandvideonews.com/2013/06/04/video-president-of-palau-speaks-in-puako/>
- 6/12 A Makai Watch Planning meeting was held at George Fry's home.
- 6/18 Randy Clarke with Mel Malinowski spoke about reef protection to the Waimea Rotary Club. 33 attendees
- 6/24 Glenn Almany of the National Center for Scientific Research shared stories and lessons learned from working with traditional fishing communities in the Pacific to understand the local and regional benefits of community-based marine management initiatives and the potential to better understand fisheries benefits through the study of larval dispersal in Hawaii. This meeting was held at Hamakua Macadamia Nut Factory in Kawaihae. 35 attendees
- 7/3 Bill Walsh PhD. of the Hawaii Division of Aquatic Resources spoke on a recently compiled Division of Aquatic Resources (DAR) briefing document detailing the downward environmental spiral of two coral reef systems in South Kohala, Island of Hawaii. The results of this long-term study, spanning over a quarter century, are presently being written up for scientific publication. The DAR findings at Puakō Reef and Pauoa Bay are highly concordant with another recent study in the general Puakō area (Minton, et al. 2012), which found that:
 - Coral cover decreased significantly from 80% in the mid-1970s to 32% in 2010.
 - Large fish, especially ecologically important prime spawners, are more rare at Puakō than at other Kona Coast locations.
 - The maximum size of five fish species targeted by fishermen has decreased by an average of 15% since 1982.
 - Many aquarium fish species, protected from harvest since 1985 (Puakō FMA), have increased in abundance.
 - Fishing pressure appears to have increased in the area since 1982.
 - Spearfishing, especially using SCUBA, was higher in 2010 than in 1982
 - Gill net fishing, now illegal in the Puakō FMA, has decreased but still occurs.
 - While other environmental stressors, such as sediment and pollution from septic systems and cesspools

cannot be ruled out, fishing appears to have contributed to declines in fish size and abundance on Puakō reefs over the last 30 years.

8. Data collection and management

- For over 5 years, volunteer James Heacock has conducted a daily survey of Puakō's Paniau beach area and a nearby beach access on behalf of the Nature Conservancy and also the Puakō Makai Watch program. Once a day, between 9am and 11am, he records the number of visitors, their vehicles, and the types of recreation and fishing activities in which they are engaged, producing an on-going, scientifically-defensible record of the human use of this section of the South Kohala coastline. So far, he has counted over 40,000 people enjoying and benefiting from this unique natural and cultural environment. The Nature Conservancy is currently compiling this data.
- Randy Clarke did counts of beach users and vehicles on each visit to Paniau, Puakō Boat Ramp and Waialea Bay. His data is Appendix 4, pg.29.
- Assessing water quality and coral health began January 7th with preliminary Enterococcus water sampling at several sites in Puako with Professor Drew Harvell of Cornell University and continued as a class project in EAS 3510 Conservation Oceanography. Three students with Cornell's Hawai'i semester field program, in collaboration with The Nature Conservancy further developed and assessed variation in Enterococcus between sites through a four-week internship in April and May. Samples along the coast and anchialine ponds were collected, held on ice, and filtered with a 0.45-micrometer membrane filtration system. Bacterial samples were incubated at 40 degrees Celsius for 3 days on M-Enterococcus selective media. Beginning May 28th, Catherine Kim, Cornell researcher, and Reyn Yoshioka, rising Cornell senior, began an integrated assessment of coral health, and Enterococcus concentrations at 10 different sites along the Puako coast. Coral health was assessed with 3 transects at each site and *Ulva fasciata* delta N15 bioassay was set up at 5 sites in Puako with 10 samples per site. The summer fieldwork was concluded on July 10th, 2013.
- This work was funded through the Makai Watch and is part of an ongoing project to determine the water quality of our reef. As a result of this study, a Marine Science Committee was formed to continue this work. The goal is to identify existing cesspools in Puakō. Then determine through dye testing if there is any outflow onto the reef.
- If outflow is identified then we are looking into a way to install low cost septic systems to replace the existing cesspools. We hope to find some type of funding to enable homeowners to replace leaking cesspools and are partnering with TNC, and the University of Hawaii at Hilo to plan a project proposal.

Management Outcomes

- This was an important year for it showed us how important it is for the community to work together and show strong progress on the goals we developed: establishing an information booth, hiring a ranger, adding signage, strengthening relationships between different user groups and starting a thorough water quality study.
- Here's article from North Hawai'i News about the Makai Watch program in Puakō:
<http://northhawaii.com/sections/news/puako-makai-watch.html>
- The information booth has been a great success and we hope to expand its operation. We had a total of 726 visitors during this period.

Obstacles or Delays

- The biggest obstacle for us is maintaining the interest level and the recruitment of volunteers. We'd love to see our information booth be open every weekend. It would be great to expand our volunteers to four at the booth so that we could walk the beach with information.
- We didn't do a great job of connecting with the schools and need to improve in that area. We've begun an outreach program to the schools (upper grades) to see if we can get them involved in our information booth program.

Future needs

- We need to establish a consistent source of funding in order to keep our coordinator, maintain the level of quality at our booth and continue our speaker program.
- We are currently researching a large grant, or some type of assistance (low interest loans), to pursue our goal of clean coastal waters for Puakō and its reef. This would include continuing the biological monitoring studies we are currently conducting.
- The chemical and human use data from these studies could contribute to the establishment of Puakō as some type of protected fisheries area, which is another long term goal.
- Randy Clarke's position has been funded for year 2 by the P.C.A., from community donations, and his position could be used as matching funds to seek additional grant opportunities to strengthen the Puakō Makai Watch Program.

F. Task 10. GIS Support for Projects at Priority Sites

Project Status: No activities to date x

- DAR re-tasked \$38,262 from Task 10 (Priority Site GIS Support) to a new Task 13, "*Meta-analysis of reef fish*" because this GIS work was covered by a partner agency. NOAA, PIRO was able to hire a full time GIS contractor and allowed that person to assist with GIS needs in the priority site.
- \$11,657 was re-tasked to Task 14, *Assessment of the Hawaii Coral Reef Strategy*.

G. Task 11. DLNR Statewide Day-Use Mooring Buoy Plan Part II

Project Status: Completed x

Summary of Project Accomplishments:

This project was contracted to the University of Hawaii's Social Science Research Institute on February 12, 2013 and was completed on September 30, 2013. PI: Michael Hamnett and Kristine Davidson. Staff: Aydee Zielke (GA) and Risa Minato

Background

The goal of this project was to draft clear recommendations through a DLNR reviewed process for rule changes to Hawaii Administrative Rules that allow for flexible implementation of the DMB Plan. The original objectives were:

- Objective 1: Collect and Review Data
- Objective 2: Develop goals and objectives for a DLNR DMB program
- Objective 3: Draft clear recommendations for DLNR rule changes
- Objective 4: Engage stakeholders in the review process.
- Objective 5: Acceptance of rule changes by DLNR staff

A change in scope was requested and Objective 3 was changed to “Develop list of decision items for potential rules” and Objective 5 was changed to: “Complete an DMB Internal Working Report.”

Summary of Project Accomplishments (by Objective):

This project will include five objectives. Below is a summary of the activities accomplished for each objective.

Objective 1: Review and summarize existing mooring systems.

- Reviewed existing mooring systems in Hawaii. Documents reviewed: *Hawaii Day-Use Mooring Buoy (DMB) 10 Year Strategic Plan & Appendix (2010)*, *Maui County Day-Use Moorings Guide (2009)*, & some background materials; various dates.
- Reviewed national and international mooring systems. Documents reviewed: Florida Keys National Marine Sanctuary, Australia’s Great Barrier Reef Marine Park, Flower Garden Banks National Marine Sanctuary, & others.
- Reviewed *1994 Statewide System of Day-Use Moorings Environmental Assessment (EA)* & consulted with Legal fellow about perhaps needing an updated EA.
- Summarized and presented the findings for DLNR staff. The summary is also included in the *DAR Interim Working Report*.

Deliverables:

1. DMB History and National-International Programs PPT
2. DMB Working Group Meeting Notes (6-5-2013)

Objective 2: Develop goals and objectives for the DMB program.

- Updated Goals and Objectives and added actions from working group meeting feedback.
- Reviewed and finalized notes from working group meeting.
- Conducted Kauai, Maui, and Big Island project scoping meetings to identify any potential interactions in order to formulate; (1) strong goals & objectives for the program, (2) ecological/cultural/social site selections criteria for mooring buoy locations, (3) practical management approaches, & (4) possible funding options.
- Finalized information for DLNR DAR-DOBOR brain trust group.
- Met to discuss possible funding opportunities within DLNR.
- Prepared slideshow and documents for presentation on existing inter/national DMB policies and plans.
- Comparison research for Programmatic Environmental Assessments.

- The DMB working group met on 6/5/2013 & 7/22/2013 to discuss goals & objectives among other DMB topics. The goals & objectives were adopted on 8/22/2013.

Deliverables:

3. DMB Goals and Objectives (8-23-2013)
4. DMB Working Group Meeting Notes (7-22-2013)

Objective 3: Develop list of decision items for potential rules.

- Collaborated with Law Fellow to clarify rule change possibilities, format for final document, funding possibilities, and laws.
- Reviewed possible relevant rules, including HAR 235.
- Converted some Kauai and Hawaii island's 173+ GPS coordinates for DMB locations to make ArcGIS shapefiles for each island to include in rule change package for easier readability.
- Investigated permitting avenues for mooring buoys report.

Deliverables:

5. ArcGIS file folder
6. DMB Working Group Meeting Notes (8-22-2013)

Objective 4: Engage stakeholders in the review process.

- Organized and participated in meeting with Kauai (June 14, 2013), Maui (July 28-30, 2013) and Hawaii island (August 13-15, 2013) stakeholders and DLNR staff on input for DMB. Agendas and interview questions are included in the Internal Working Report.
- Followed up with meeting contacts and compiled comments from meetings via phone calls.
- Held working group meeting for draft sanctuary management plan.
- Summarized stakeholder comments from Maui, Kauai, and Hawaii island meetings and included their suggestions in the final Internal Working Draft reported
- Developed matrix to capture comments.

Deliverables:

7. Community Feedback chart by island (summary of stakeholder meeting comments)
8. Stakeholder Comments by topic

Objective 5: Complete sections of DAR DMB Internal Working Draft

- The report had a few incarnations. At one point, the report was going to utilize an Environmental Assessment (EA) template. However, as the report was being drafted, it was clear that since no

consensus within DLNR was reached on the role and level of participation from each division, it was difficult to complete the sections in the EA. Draft EA sections for Chapter 1: About the Program, Chapter 2: Options, and Chapter 3: Affected Environments have been started and are available for use if the state decides that is the direction they would like to go in Phase II.

- The goal of the Internal Working Report is to help DLNR determine at what level they should participate in the installation, maintenance, and inspection of current and future Day-Use Mooring Buoys (DMB).
- There are nine sections in this report that include: 1) DMB and the role of DLNR, 2) History of DMB in Hawaii, 3) Laws, regulations, and policies, 4) DMB systems in other states/countries, 5) Goals and objectives for DMB in Hawaii, 6) Barriers to success in Hawaii, 7) Stakeholder suggestions for a DMB program, 8) Survey results from DLNR managers to see if there is any consensus on a DMB program from Hawaii, and 9) Recommended next steps.

Deliverables

9. DLNR Working Group Survey Results
10. Internal Working Draft report, including
11. NOAA Final Report

Management Outcomes (*How did this project address critical management needs?*)

This project helped move towards meeting the fifth priority objective of the *Hawaii Coral Strategy: Reduce anchor damage and trampling on coral reefs through the implementation of no anchor zones, utilization of day use mooring buoys and other means by 2020*. However, more work is needed to meet this objective. Phase II is planned to start by January 2014 to continue the work on this priority. The long-term goal is to "increased capacity to manage coral reef ecosystems" by implementing a DMB program that will better manage human activity to preserve coral reef ecosystems.

Obstacles or Delays: One delay was a storm on July 29, 2013 that forced the postponement of many of the stakeholder meetings on Maui. Some of these meetings were replaced with follow-up phone calls. Another obstacle was the early resignation of the graduate student hired for on this project. She left one month before the scheduled end date of the project and returned to school full time. The project deliverables were completed by the project PI and program coordinator from the Social Science Research Institute.

Future needs: Phase II is planned to start by January 2014 to continue the work on this priority. By the end of Phase II, the goal is to collect and compile all necessary information on assigned divisions and leads, annual costs, funding options, safety requirements, liability issues, approved standards, and proposed rule changes, for each of the different functions DLNR must address. These functions include: 1) installation, 2) repair, 3) inspection/maintenance, 4) replacement, 5) monitoring, 6) removal, 7) use, 8) enforcement, and 9) outreach/education. Some of this information was collected in Phase I, but there was not enough time from a part-time graduate student to gather and compile the information, along with planning and traveling to the neighbor islands for stakeholder engagement meetings.

H. Task 12: Hawaii Coral reef Strategy Implementation Support

Project Status (please x): Completed X

- This project was contracted to the University of Hawaii's Social Science Research Institute in November 2010 and was completed in November 2011. PI: Michael Hamnett and Kristine Davidson. Staff: Risa Minato
- This project was completed at the end of December 2011. See April 2012 progress report for details.

I. Task 13. Meta-analysis of reef fish data in Hawaii to examine natural and anthropogenic processes

Project Status: Completed X

Summary of Project Accomplishments:

- This project was contracted to the University of Hawaii's Hawaii Cooperative Fish Unit in November 2010 and was completed in November 2013. PI: Alan Friedlander. Staff: Megan Ross
- The final report is posted online. <http://www.hawaiicoralreefstrategy.com/index.php/fisheriescompleted>
Below is an executive summary.
 - One of the major obstacles to wise management of coral reef fisheries is the lack of sound information on population abundance at spatial scales commensurate with the uses of these resources. This information is critical to developing sustainable fisheries management strategies, improving management of existing Marine Protected Areas (MPAs), designing future MPA networks, and aiding in the development of comprehensive marine spatial planning.
 - There are currently a number of disparate data sets for reef fishes from around the Hawaiian Islands but no single data set is spatially comprehensive enough to explain the natural and anthropogenic processes that affect the distribution, abundance, and size of reef fishes around the state. This study, for the first time, has synthesized all these data sets into a single and spatially comprehensive database in order to characterize reef fish assemblages around Hawaii while controlling for habitat, wave exposure, and geographic influences.
 - Compiled 25 datasets, representing more than 25,000 individual fish surveys from throughout the entire Hawaiian Archipelago since the year 2000. These data were rigorously checked for errors and integrated into a common database with a standardized structure.
 - Information on fish species life history and ecology (e.g., length-weight parameters, trophic position, movement, feeding ecology) are imperative to the assessment of fish populations. We used this opportunity to compile all known information on these fishes so that a standardized database is now available for the scientific community.
 - Compared length-weight relationships of reef fishes over time and space. Overall the relationship across all species did not change over time, however on average fishes in the Northwestern Hawaiian Islands (NWHI) were heavier for a given length than in the main Hawaiian Islands (MHI).
 - Developed the first ever bioregionalization of the Hawaiian Archipelago based on abundance and biomass of reef fishes. Results show clear separation between the MHI and NWHI but also a number of additional faunal breaks driven primarily by the relative abundance of endemic species.
 - Endemic species were much more common at the northern end of the chain and showed a strong and statistically significant negative correlation with latitude. Endemics made up 52-55% of the

numerical abundance at the northern end of the archipelago but only 17% on Hawaii Island in the extreme south.

- Conducted unconventional assessments for 52 species within the MHI by comparing their abundance to the NWHI (Papahānaumokuākea Marine National Monument-PMNM)—a large (362,073 km²), virtually unfished reference area. This preliminary assessment has identified a number of species that require immediate management action. Over one-quarter of the species (27%) examined in the MHI appeared to be depleted below 10% of unfished abundance, while 42% were below 25% of unfished abundance.
- The traditional Hawaiian district or moku was used as a unit of spatial stratification. Moku explained 63% of the variability in resource fish biomass and explained much of the variability in many other fish assemblage metrics. We attributed a number of biological, physical, and human demographic information to each moku for analytical purposes.
- Biomass of resource species was negatively correlated with human population pressure among mokus. We used human population per moku divided by shoreline length for that moku as an index of human population pressure. There was a strong negative relationship between resource fish biomass and human population pressure showing that biomass was extremely low in areas with high human population pressure and even modest human population pressure had a negative impact on fish assemblage structure. However, a number of remote areas with low human populations maintain high standing stock of fishes and these areas are likely important refugia for maintaining fisheries production and biodiversity functioning in the MHI.
- Resource fish biomass was highest in mokus with northern and easterly exposures. Mokus with southern and westerly exposures have less severe sea conditions resulting in greater accessibility and therefore heavier fishing pressure in these locations.
- MPAs around the populated areas of Oahu and Maui showed higher biomass relative to fished areas. However, overall biomass within these protected areas was lower than MPAs on Hawaii Island and Lanai, where overall human pressure is lower.
- Ahihi-Kinohiwi Natural Area Reserve on Maui was the most effective fully protected MPA when MPA size is considered in calculating total resource fish biomass.
- Older MPAs had the highest resource fish biomass while newer MPAs had fewer numbers and smaller sizes of resource fishes.

Overall, this synthesis is the first ever, comprehensive examination of reef fish assemblage structure across Hawaii. The results show clear, distinct bioregions across the archipelago that give us a better understanding of reef fish macroecology and have important implications for management at the regional scale. The findings from this study also highlight the negative impacts of human population pressure on reef fishes, particularly around Oahu and Maui. When compared with the NWHI, a large proportion (42%) of MHI reef fish stocks were below 25% of unfished abundance. However, there are still remote areas in the MHI that provide refugia and help sustain fish stocks in the MHI and these areas are therefore important conservation hotspots. MPAs were shown to be effective in conserving fishes, especially around Oahu and Maui where fishing pressure is extremely high outside these MPAs. However, most are too small to have substantial fisheries benefits. As a result, a more holistic approach that includes community-based management, expansion of the MPA network with a greater emphasis on no-take reserves, improvements to current fisheries regulations including enhanced enforcement efforts, and finally a greater emphasis on marine education and ocean awareness are necessary.

J. Task 14: Assessment of the Hawaii Coral reef Strategy

Project Status (please x): Completed X

- Funds originally budgeted for the Programmatic "Hawaii Coral Planner" was re-tasked into a new Task 14. This project, *Assessment of the Hawaii Coral Reef Strategy*.
- This project was contracted to the University of Hawaii's Social Science Research Institute in April 2013 and was completed in September 2013. PI: Michael Hamnett and Kristine Davidson. Staff: Risa Minato

Objective 1: Assess outcomes - FY2010 HCRS projects

- Created a matrix of FY2010 HCRS projects to document if they met their stated goals and objectives, outputs/outcomes, and if their information was shared and utilized by resource managers, partners, and/or the community.
- Shared findings with DAR planner and CRWG at their meeting on September 30, 2013. The matrix format was accepted and will be used to document outcomes from the FY11 and 12 projects in a follow on contract.
- Created a shared Dropbox folder for the DAR planner and site coordinators to share documents.

Deliverable: HCRS FY10 Assessment Matrix (posted in Dropbox)

Objective 2: Strategy Implementation

- Facilitated meetings and dialogue with potential projects, DAR planner, site coordinators and contracts specialist to ensure grant projects were awarded, progress/final reports submitted, and match calculated. This included drafting a reprogram request and several SAC release requests. It also included coordinating the execution of the following sub-awards:
- FY2010 sub-awards issued to:
 - Day Use Mooring Buoy (\$36K) (project completed 9/30/2013)
- FY2011 sub-awards issued to:
 - DAR Legal Fellow (\$89K) (completed)
 - Implementation of the South Kohala Conservation Action Plan (\$80K) (completed)
 - Invasive Algae Control through Native Grazers (\$60K) (completed)
 - Pilot Wahikuli-Honokōwai Agricultural Road Drainage Improvement (\$30k) (in planning = pending submittal of SAC release request - anticipated start date 1/1/2014)
 - Preliminary Engineering Analysis and Development of Retrofit Designs: Sediment Retention at Honokōwai Structure #8, Wahikuli-Honokowai Priority Site (\$51K) (in planning = pending submittal of SAC release request - anticipated start date 1/1/2014)
 - Pohaku Beach Park Rain Gardens Installations and Signage(\$13k) (in planning = pending submittal of SAC release request - anticipated start date 1/1/2014)

- Ungulate Exclusion and Sediment Reduction in South Kohala (\$94K) (in progress)
- Uncovering Coral: Invasive Algae Control through Native Grazer Replenishment (\$60K) (project completed in 2012)
- FY2012 sub-awards issued to:
 - Kona Monitoring (\$123K) (in progress)
 - DAR Legal Fellow (\$89K) (in progress)
 - Ka'anapali Maiki Watch (\$14K) (completed)
 - West Maui Curb Inlet Baskets (\$20K) (in progress)
 - Understanding Coral Health (\$37K) (in progress)
 - Uncovering Coral: Invasive Algae Control through Native Grazer Replenishment (\$64K) (completed)
 - West Maui Fire Plan (\$10K) (in progress)
 - West Maui Friendly Landscaping Plans (\$40K) (in progress)
 - Stream Corridor Assessment (\$50K) (In progress)
 - Day Use Mooring Phase II (in planning)
- Created a matrix to keep track of the projects, PO, start/end date, status of project deliverables. Shared this matrix with the DAR planner, site coordinators, and grant specialist.
- Met with the DAR planner and grants specialist monthly and sometimes weekly to provide updates on the project status.
- Created and shared a calendar of report deadlines.
- Collected and prepared NOAA progress reports.
- Prepared quarterly cost share match report for the West Maui Ridge to Reef Cost Share Agreement with the US Army Corps of Engineers.
- Created an "Overview of DAR Coral Management Grant" PPT to share with the site coordinators as a tool to help them understand the deadlines, requirements, and procedures of the grant and subawards from the grant.
- Worked with site coordinators on drafting subaward solicitation announcements or reviewing proposals before official submission.
- Met with Bill Tam (DAR Interim Administrator), Emma Anders (DAR Planner), Kathy Chaston (NOAA grants manager) and NOAA's legal counsel to finalize the new SAC language imposed on projects that implement BMPs on private land.
- Participated in discussions with NOAA and DAR on NOAA's Reef Smart events.
- Assisted with some Makai Watch Strategic Workshop follow up with participants and working group members, until the new Makai Watch coordinator was hired in August.

Objective 3: Awareness-Raising

- Coordinated Sharing Session meeting between HCRS projects, state and federal resource managers, and academia at DLNR on September 30, 2013. Presentations are posted online at: www.hawaiicoralreefstrategy.com Over 35 people attended the meeting held at the DLNR building.
- Maintained the www.hawaiicoralreefstrategy.com website. Provided a tutorial handout and a short training to the DAR Planner and site coordinators. It was determined that this site will be minimally updated with the latest contacts and a link to the West Maui Ridge to Reef Initiative website (www.westmauir2r.com) and the upcoming South Kohala priority website. Those websites will be used to post the latest projects and reports. The current HCRS website is too difficult for non-web designers to update and there are other sites that are much easier to maintain. DAR may also be updating their website, which would allow the coral monitoring and coral management projects to be highlighted better.
- Updated the 2-page summary of West Maui Ridge 2 Reef activities as a handout during NOAA's Reef Smart event in August. This handout was drafted in InDesign, but not all the coordinators have the program. Therefore, the layout was converted into a free layout program, Scribus. This program does not seem to produce quality work and is a little hard to learn. DAR decided that Microsoft Word may be the best option, since it is a standard program. The DAR coral fellow created a new 2-page template in Word that can be used by all sub-award recipients to summarize their project.

Deliverables

- Hawaii Coral Reef Strategy (HCRS) FY10 Assessment Matrix (posted on the Dropbox site)
- HCRS website (completed: www.hawaiicoralreefstrategy.com)
- HCRS 2-pager templates(completed) (sample attached and posted in Dropbox)
- Bi-annual progress reports (completed)(drafted and submitted to DAR Planner for final review and submission)
- Coordinated two Coral Reef Working Group meetings (March 18, 2013 and September 30, 2013)
- Coordinate two Sharing Session meetings (completed: September 30, 2013). Powerpoint presentations with sound are posted in the HCRS website. <http://www.hawaiicoralreefstrategy.com/> >> Sharing Session PPT (on right navigation bar)>> September 2013 Sharing Session

Management Outcomes

This project increased the capacity of the DAR planner by coordinating project solicitations and execution. In the past, the Local Action Strategy (LAS) coordinators helped solicit project ideas and coordinate proposals. This past year, there was a transition from LAS coordinators to site coordinators. This project ensured projects were coordinated during this transition as well as the new DAR planner's transition.

Prior to this project, there was no consolidated record of all the projects funded. The matrix of the FY2010 projects is the first step in documenting the results of NOAA's FY10 grant and outcomes for local management. With continued funding, the matrix will be used to document FY11-12 project results and then

will be used to update the HCRS Targeted Activities List in the 10-year Strategic plan. The Coral Reef Working Group uses the HCRS Targeted Activities List to guide their selection of future projects to fund.

Another management outcome is the increased knowledge of project results that were shared by the project principal investigator (PI) with managers and stakeholders via the Sharing Sessions and website. The half-day Sharing Session format also provides a place to network. Researchers, managers, and other partners are given a chance to meet and talk informally about current or future projects and ways to collaborate.

Obstacles or Delays:

None

Future needs:

Now that the DAR planner position is filled and the two priority site coordinators are hired, sub-award coordination will transfer to them. However, documentation of the outcomes from these projects needs to continue along with using the information from the matrices to update the Hawaii Coral Reef Strategy Action items. The Coral Reef Working Group use the HCRS Action items to guide their selection of future projects to fund.

Progress Report Prepared by: Emma Anders

Signature of Point of Contact: Ray Uchimura