MCT-NOAA Cooperative Agreement Final Report 31 March 2017

I. Project Information

A. **Grant Number:** NA14NOS4820021
B. **Project Title:** Enhancing Sustainable Coral Reef Monitoring and Management Capacity for the Micronesia Challenge, and Beyond
C. Grantee: Micronesia Conservation Trust
D. Award Period: 01 October 2014 to 31 December 2016

II. Executive Summary

The Micronesia Challenge represents a locally-driven conservation movement that was originated and perpetuated by the political leaders of Micronesia. The challenge is for jurisdictions to meet effective conservation thresholds across 30% of their marine resources and 20% of their terrestrial resources by 2020. The NOAA cooperative agreement has advanced the Micronesia Challenge by enhancing local coral reef management and monitoring capacity in the Freely Associated States (FAS) of the Federated States of Micronesia (FSM), the Republic of the Marshall Islands (RMI) and the Republic of Palau (ROP). The Micronesia Conservation Trust (MCT) and its partners, listed in the box on the right, have achieved activities in the following areas: 1) all FAS coral-reef monitoring teams are fully trained and have standardized and quality-controlled local databases that are in line with MC measures and indicators; 2) provided analytical support for database needs, transmitting data to MC-database, and reporting back to local programs for decision support; 3) assembled a Micronesia Socioeconomic Monitoring Team that is relevant in scope and spatial scale to the regional biological monitoring teams.

Through the NOAA cooperative agreement, sustained progress and tangible results continue to emerge from our evolving science-to-management networks. Key accomplishments during this project period included: 1) field-based monitoring to establish temporal trends across Micronesia(in the Federated States of Micronesia (FSM) and the Republic of the Marshall Islands)2) storage of all past and present data into the online, standardized Micronesia Challenge database (see: www.micronesiareefmonitoring.com), 3) several peer-reviewed and technical publications describing the drivers of reef status and deeper causes behind changing coral health and fish resources, 4) analytical data analysis workshops where science-to-management translations were built in partnership with Dr. Houk (UOGML) and local partners, and 5) generation of simple translations of science for local consumption, presentations, and evaluating management strategies.

Key findings from this coral reef monitoring program help to unravel the causes behind declining coral reef resources while also discovering the evidence-based knowledge needed to improve the situation across Micronesia. These findings were first presented in peer-reviewed literature to ensure their efficacy. Findings were then translated into lay terms for local management agencies eliciting management

MCT's Partners

Chuuk Conservation Society (CCS)

Yap Community Action Program (YapCAP)

Kosrae Conservation and Safety Organization (KCSO)

Conservation Society of Pohnpei (CSP)

College of Marshall Islands (CMI)

Palau International Coral Reef Center (PICRC)

University of Guam Marine Lab (UOGML)

Mariana Islands Nature Alliance (MINA)

The Nature Conservancy (TNC)

responses and actions.

MCT's and its partners' continuing efforts to apply scientific knowledge to guide policy and legislation are also creating results at the jurisdictional level. For example, in Pohnpei State in the FSM, data collected under this and previous NOAA Cooperative Agreements, and fisheries and market data gathered under separate projects were combined to create a clear and easily communicated message about the status of Pohnpei's reefs. Pohnpei State subsequently created a Fisheries Working Group and supported the establishment of the State's first fisher-market owner-led Fisheries Advisory Council that continued conducting a fisheries awareness campaign during this project. As a result; State, Municipal, and Traditional Leaders strengthened their support for fisheries management and several new laws and regulations were adopted in the second and third quarters of 2015 (Figure 1). New rules include size-based regulations for key herbivores and additional regulations for harvesting predators. These two examples, the region-wide assessment, and the specific policy updates in Pohnpei showcase how the activities supported by this Cooperative Agreement are creating a vibrant and effective science-to-management network in the region.

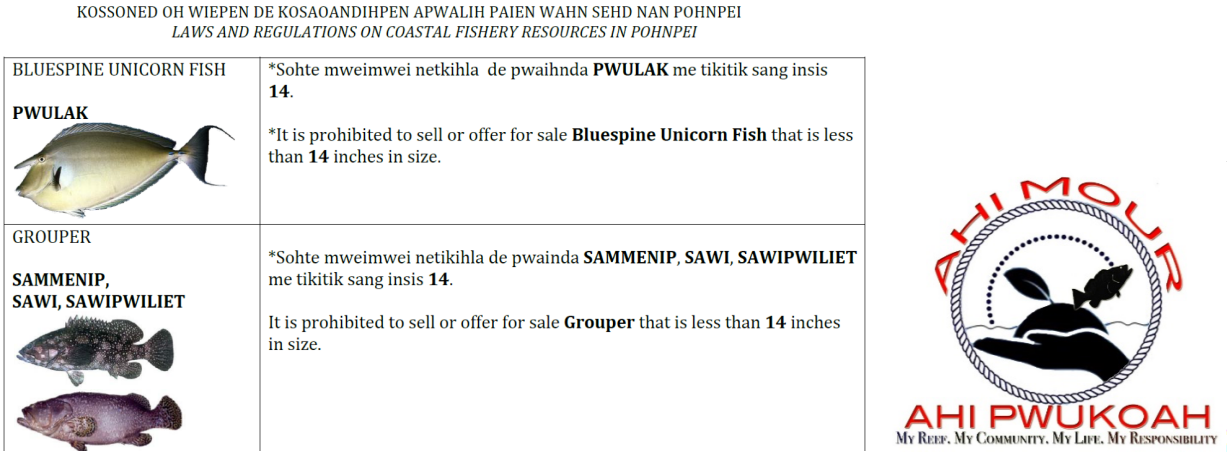

Figure 1. Snapshot of new regulations for size-based harvesting of key herbivores and predators on Pohnpei reefs (left). These new regulations were coupled with dedicated outreach (right, logo) by the Conservation Society of Pohnpei, MCT, The Nature Conservancy, Rare, Inc., and other partners.

The Conservation Society of Pohnpei (CSP), the Micronesian Conservation Trust (MCT), and The Nature Conservancy (TNC) worked with the Mwoalen Wahu Ileileh en Pohnpei (Council of Paramount Chiefs), Pohnpei State Legislature, Pohnpei State resource management agencies, and the National Government of the FSM to provide technical input into the management and scope of a potential commercial sea cucumber harvest on Pohnpei. MCT and CSP shared data on sea cucumbers collected as part of previous and this NOAA-supported monitoring. As a result, Pohnpei State delayed the commercial harvesting and resource management partners are now working on more assessments on the status of sea cucumbers and the potential impact of a large-scale sea cucumber harvest on the marine ecosystem. This is a prime example of how the marine monitoring work that is supported by NOAA is part of an established and functioning science-to-management network in the region.

Another notable success of the cooperative agreement is that the Palau International Coral Reef Center (PICRC) completed baseline assessments of all the marine protected areas (MPAs) in Palau. This is a milestone achievement and lays the foundation for future analysis of MPA effectiveness in Palau. Thanks to the NOAA-supported data collection and analysis, PICRC and its partners will be able to assess the effectiveness of MPAs over time and between sites and provide more accurate recommendations to the Palau Protected Areas Network managers and State Governments. This will include identifying sites in need of management adjustments and the development of recommendations for more effective MPA management. This is yet another example of how with NOAA support, MCT and its partners are strengthening science-to-management networks.

III. Purpose

A. Justification for Proposed Activities:

Lessons learned from previous NOAA cooperative agreements prompted further efforts as proposed for this now-completed cooperative agreement. The three key areas on lessons learned include: monitoring, capacity building, and financing.

There is a need to understand which aspects of the following monitoring programs require long-term dedicated support from experts and which are most easily taught and self-sustaining:

- Fish monitoring
- Benthic data processing
- Incorporating additional protocols to assess coral assemblages to produce species-level datasets

These concerns combined with frequent turnover of trained staff points to a need to maintain oversight and technical guidance for the programs. There is also a need to further strengthen local ownership of the monitoring program and maintain the provision of technical guidance.

In addition to biological monitoring, recognition of the importance of complementary socioeconomic monitoring to inform management decisions more fully has begun to gain traction. In August of 2012, the First Micronesia Challenge Socioeconomic Measures workshop was held in Palau. The fifth in a series of ongoing meetings of the larger Micronesia Challenge Measures Working Group, this gathering provided the Measures group to continue their work in identifying and establishing measures of progress towards achieving the goals of effective conservation. The SEM program is essential to provide support to bridge gaps between socioeconomic monitoring and biological monitoring to maximize monitoring and management effectiveness.

Another critical task to consider in moving forward was to continue to strengthen the entities and networks who lead capacity- building work in the region. These include the Micronesians in Island Conservation (MIC), the Pacific Islands Managed and Protected Areas Community (PIMPAC), and the Locally Managed Marine Areas (LLMA) network. The Micronesia Challenge has provided the political will, increased financial resources and overarching framework that have enabled these networks to effectively function and come together to work at a scale appropriate for effective conservation across the region. However, some capacity gaps will require further focus and improvement. Further financial, logistical, and scientific capacity improvements are needed for the Micronesia Challenge to succeed and eventually achieve its goals. PIMPAC members need more scientific, planning, and monitoring support. MIC members needs vary from organization to organization and range from human resource management, fundraising and financial management skills to improved understanding of conservation issues in the region. Communities with LMMAs need training in enforcement and compliance.

Some participating governments have yet to fully implement the Micronesia Sustainable Finance Plan which was endorsed by the Micronesia Island Forum (former Micronesia Chief Executives) in 2011. MCT will continue to assist FAS partners to implement recommendations for sustainable income generating mechanisms identified in the Plan. RMI and FSM have been providing funds to the endowment accounts using tuna fishing revenues. While there have been some small wins such as these, challenges in political will and limited financial capacities across the FAS will mean a tenacious and long term commitment from

MCT, TNC, MC Champions and other local and international partners to continue to work closely with the two governments to make this and other revenue-generating schemes identified in the Plan a more permanent undertaking.

B. Goals and Objectives:

Our overall project goal was to enhance coral reef monitoring and management capacity for the Micronesia Challenge and beyond. The four main objectives of this project for the two year-period were

1. All FAS monitoring teams have continued training and oversight needed to ensure data development needs for the Micronesia Challenge and beyond;
2. Provision of analytical support for transmitting data to the Micronesia Challenge database and reporting back to local programs for decision support;
3. Establish a Micronesia Socioeconomic Monitoring Team (SEM) to collaborate with the regional biological monitoring teams;
4. Sustainable funding efforts for these Micronesia Challenge activities in the RMI and the FSM are progressed.

IV. Approach

MCT and its partners negotiated and implemented sub-awards in accordance with MCT's proposal for this cooperative agreement. These implementing partners from the Micronesia jurisdictions, with support from Dr. Peter Houk of UOGML, utilized the standardized monitoring protocol and scored ecosystem conditions across monitoring sites in the FSM, the RMI, the ROP, and the Commonwealth of the Northern Mariana Islands (CNMI). This monitoring framework dictates which sites are selected to be representative of each island, encompassing locations in no-take populations (see methods of paper "*The Micronesia Challenge: Assessing the Relative Contribution of Stressors on Coral Reefs to Facilitate Science-to-Management Feedback").* The implementation of the monitoring activities was to incorporate data into a science-to-management network and provide actionable information to advance the goals of the Micronesia Challenge.

To achieve the goal of this project, MCT and its partners conducted activities under each of the following 4 objectives.

Objective 1: All FAS monitoring teams have continued training and oversight needed to ensure data development for the Micronesia Challenge (MC) and beyond.

As mentioned earlier, jurisdictional biophysical marine monitoring teams in the Republic of Palau (ROP), the RMI, and the four states of the FSM were established and supported under the previous Cooperative Agreement with NOAA for the *Building Sustainable Coral Reef Monitoring and Management Capacity for the Micronesia Challenge, and Beyond* program. These local implementing teams utilized the Micronesia Challenge standardized protocol for marine monitoring to collect, store, and analyze data. Dr. Peter Houk of the University of Guam Marine Lab (UOGML) led these efforts and conducted analytical trainings for the monitoring team members. The following reflects the progress on activities in each jurisdiction.

During the project period, a few partners reported unexpected weather delays to conduct monitoring surveys due to an unusual storm season and the onset of El Nino conditions in November 2014. All impacted partners rescheduled activities and completed their monitoring on time.

RMI: The College of the Marshall Islands (CMI), in partnership with the Marshall Islands Marine Resource Authority (MIMRA), conducted coral reef monitoring around the Majuro atoll. Following Mr. Don Hess's (the former Principal Investigator for this sub-award) departure in May 2016 from CMI, a no-cost extension to November 15, 2016 was granted to CMI to allow time to complete the implementation of remaining project activities that were delayed during the transition period. MIMRA, as CMI's implementing partner, developed and submitted an updated work-plan including an itemized budget for the no-cost extension period.

In the beginning of the first year of this Cooperative Agreement, CMI focused its efforts on evaluating the impact of the worst coral-bleaching event ever recorded for RMI in 2014. The event saw the highest bleaching impacts from mid-September through October, with evidence of bleaching as recent as mid-December. This had significant consequences for coral reef health, food security, and coastal protection. Given the severity of the situation, CMI mobilized the RMI monitoring team to conduct coral bleaching surveys. CMI led these surveys in November and December of 2014 using manta tows and video transects and produced a report with the collected data for the Marshall Islands Coastal Management Advisory Council (CMAC) and NOAA Coral Watch. CMI's report on coral bleaching in the RMI is included as an attachment to this report. A presentation on the results of data was made to the Climate Change Working Group of the U.S. Coral Reef Task Force meeting in Guam in January 2016, as well as to the RMI CMAC and the United States Embassy in Majuro. MCT can provide a copy of this presentation to NOAA upon request as the file size is over 30MB.

The RMI monitoring team faced challenges conducting additional surveys due to weather conditions and supply and capacity challenges. To address these challenges, ten new divers received SCUBA certification to help with the marine monitoring. CMI also ordered new air compressors (per correspondence with MCT and NOAA) and other monitoring supplies. CMI and MIMRA ensured that all data collected during monitoring was stored and analyzed immediately with assistance from UOGML. This has made a positive difference as CMI and MIMRA are more rapidly able to share data and results with their partners including: The Coastal Management Advisory Council, the Climate Change Working Group of the Coral Reef Task Force, and the United States Embassy in Majuro. All monitoring data collected by the RMI monitoring team have been entered into a local database housed at MIMRA as well as permanently and safely stored in the Micronesia Challenge regional database at the UOG Marine Lab. This database continues to grow as more initiatives join the effort and contribute their data findings. These include work supporting the RMI's Reimaanlok process (local conservation community engagement process), the National Conservation Area Plan, and the RMI pledge to the Micronesia Challenge. Specific examples include those described below.

A ciguatera monitoring training consisting of lectures and fieldwork was conducted from the 19th -30th of September 2016 with relevant key technical staff within MIMRA and other government agencies. The purpose of the training was to demonstrate collection and identification techniques of benthic algal species that contribute to ciguatera fish poisoning which is a major public health and socioeconomic problem in the RMI, especially in the outer islands where seafood is the primary and only healthy source of protein.
Two of the three proposed MPA billboard signs have already been placed on site (Ene Kalamur and Bokanbotin) in both Marshallese and English (see Figure 2). MIMRA still awaits confirmation from the landowners of the newest MPA site (Buruon) on contents for their billboard.


Figure 2. Billboard at MPA sites at Ene Kalamur (left) and Bokanbotin (right)

Kosrae: The Kosrae monitoring team is comprised of representatives from the Kosrae Conservation and Safety Organization (KCSO), the Kosrae Island Resource Management Authority, and the Department of Resources and Economic Affairs - Division of Fisheries. Together they continued collecting monitoring data and ensured the proper entry of this data into a database system. In Kosrae, fish monitoring activities are conducted twice a year while coral reefs are monitored once a year. All scheduled monitoring trips were completed on time during this grant's reporting period. All the data collected from the 12 sites in Kosrae were entered and stored in a local database at KCSO and shared with the UOGML to be included in the Micronesia Challenge database. With technical support from Dr. Peter Houk at the UOGML, the Kosrae project team received in-house and on-line refresher trainings on fish and coral taxonomy, and data management and interpretation. The outcome of these interpretations has been shared with local resource management committees and other stakeholders during community meetings. In September, the Kosrae monitoring team visited the Utwe MPA community to share results from data collected from the MPA monitoring sites. The monitoring results showed that managed areas Tafunsak MPA and Utwe Biosphere Reserve have higher fish populations than the unmanaged (see Figure 3). In addition, flyers were produced and circulated for general awareness and outreach purposes and were distributed to Tafunsak and Utwe communities. Simple reports and updates were also included in KCSO's organizational newsletter.

The data collected and analyzed from this biophysical monitoring program has become an important tool for local Resource Management Committees in Kosrae. The results of collected data have been used to guide and better inform the process of implementing management actions. The data were also used during the development of each MPA management plan in Kosrae. The UOGML and the Kosrae team also developed a State of the Reef PowerPoint presentation based on data collected and held a workshop session on the status of coral reefs in Kosrae and invited the directors of State government resource agencies. In addition to this government-level outreach, the Kosrae team shared information with 7th graders in all of Kosrae's public schools. Graphs were used to help the schoolchildren understand the status of their coral reefs. Figure 3 below is an example of the information presented.

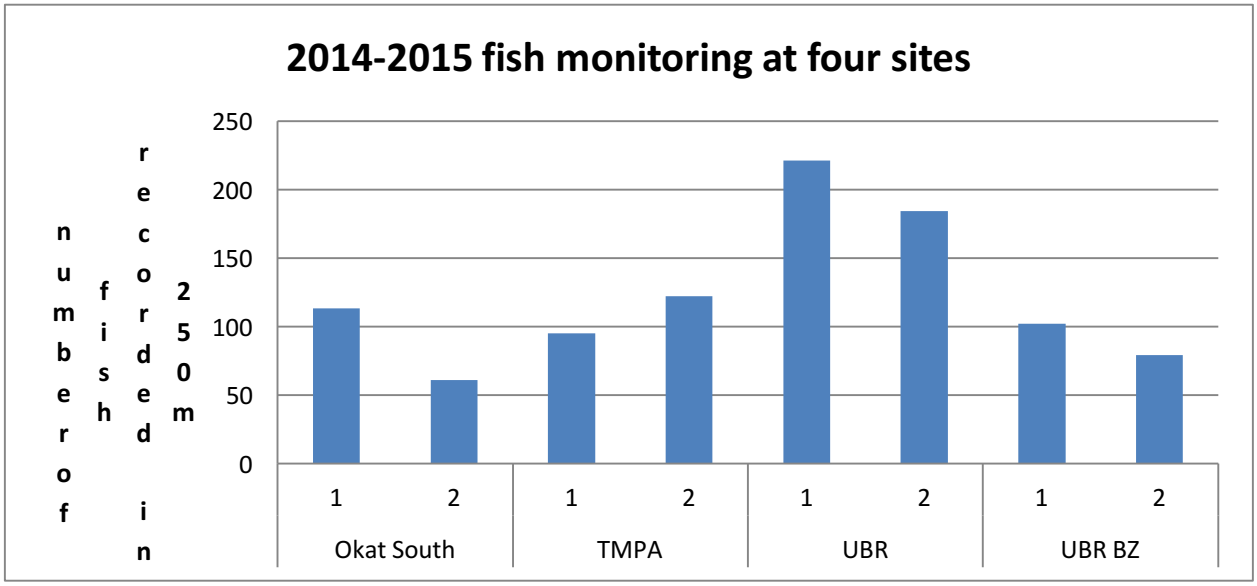

Figure 3. The graph above indicates that managed areas (TMPA, UBR) have higher fish populations than the unmanaged areas.

Pohnpei: The Pohnpei Coral Reef Monitoring Team (CRM), including the Conservation Society of Pohnpei (CSP) and the Pohnpei State Office of Fisheries and Aquaculture, conducted coral reef monitoring under this grant. The CRM team completed the standardized dataset collection at 26 sites and the UOGML conducted formal analysis of these datasets. CRM also monitored the annual grouper spawning aggregation at the Black Coral Marine Sanctuary including recording fish density and size estimates across different depths ranging from forty to ninety feet.

The data collected under this and the previous Cooperative Agreements were used in a public information campaign spearheaded by the Pohnpei Fisheries Working Group and the Marine Advisory Council with support from CSP, TNC, MCT, and Rare, Inc. The "Ahi Mour, Ahi Pwukoah. My Reef. My Community. My Life. My Responsibility. Pohnpei Fisheries Management Program Campaign" team included coral reef monitoring information along with other data on fisheries to create compelling and understandable messages about Pohnpei's fisheries. This campaign was a broad awareness-raising program designed to bring stakeholders up to speed on recent scientific findings and anecdotal evidence of resource declining. The campaign also highlighted the ways in which communities, traditional leaders, and resource managers can address fisheries-induced impacts and improve community livelihoods. As a direct result of this campaign outreach in August 2015, the Paramount Chief of U joined the Paramount Chief of Kitti to declare that no undersized and illegal fish will be used at any traditional functions in these two Municipalities. As highlighted above, in the second and third quarters of 2015 the Pohnpei State Legislature also adopted new fisheries legislation and regulations based on the recommendations from CRM.

In early 2016, CSP, MCT, and TNC provided technical input into the management and scope of a potential commercial sea cucumber harvest for export project on Pohnpei. The partners worked in conjunction with the Mwoalen Wahu Ileileh en Pohnpei (Council of Paramount Chiefs), Pohnpei State Legislature, Pohnpei State resource management agencies, and the national government of the Federated States of Micronesia. In late 2015 Pohnpei State issued a foreign investment permit and began preparations to manage a sea cucumber harvest. The Council of Paramount Chiefs has a traditional mandate to effectively manage natural resources. With technical input from CSP, MCT, TNC, UOGML, and others, the chiefs questioned the sustainability of the scope of, and management plan for, this commercial harvest. As a result, several hearings were conducted with the State Legislature, Municipal Governments, and the

Council of Paramount Chiefs about the potential impacts on Pohnpei's lagoon and reef ecosystems from this proposed harvest. Using collected data from CRM's previous coral reef monitoring efforts, UOGML extracted and compiled data on the prominence of sea cucumbers between 2012 to 2015. This information is shown below in figure 4. Although the monitoring program is designed to compile information on the general invertebrate population, the data collected on sea cucumbers over time is also an indicator of the state of these critical contributors to healthy marine ecosystems. In general, the data shows a decline in sea cucumbers at all sites surveyed during both time frames due to drought and ensuing heavy rains. CSP also presented the graph below during a Council of Paramount Chiefs hearing as part of a presentation on the importance of sea cucumbers and the need for a revised scope and management plan prior to any commercial harvesting. The outcome of the hearing was a declaration restricting sea cucumber harvesting within the waters of each of Pohnpei's Municipalities. The Council of the Paramount Chiefs is also requiring that the State and Municipal Governments work with conservation and resource management agencies and organizations to conduct further assessments on the stock of these vulnerable marine animals before any commercial sea cucumber harvesting takes place.

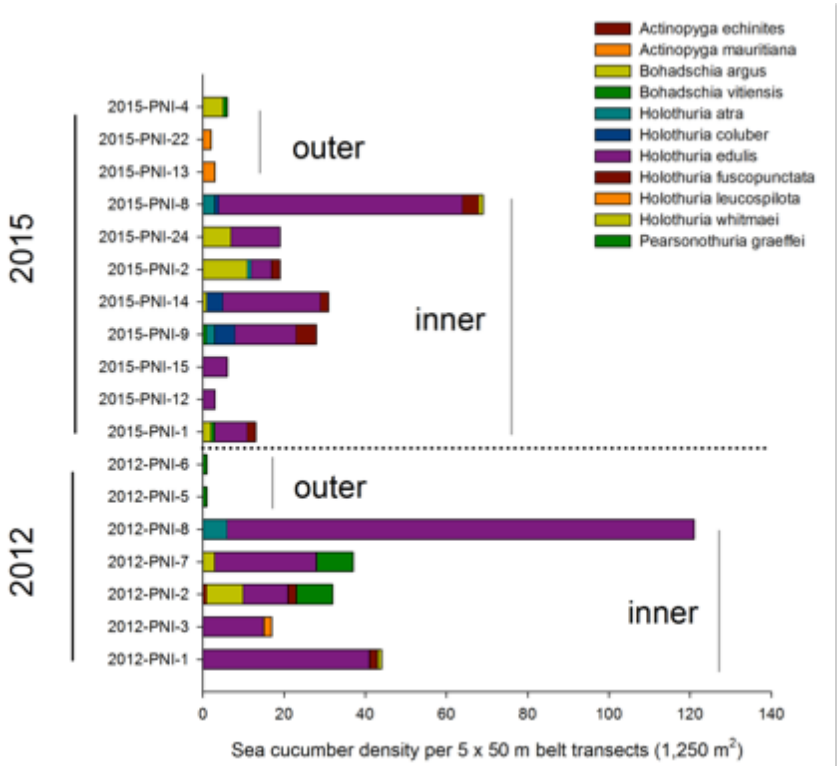

Figure 4. Sea cucumber data collected in 2012 to 2015

Chuuk: The Chuuk marine monitoring team, Chuuk Conservation Society (CCS) and Chuuk State Department of Marine Resources, with support from UOGML, collected data on fishes, corals, and macroinvertebrates across 20 sites within the Chuuk Lagoon in an intensive effort to understand reef resilience in Chuuk. This was a joint effort supported by this Cooperative Agreement and donors associated with TNC. CCS continued building its capacity to conduct monitoring to participate in the efforts and will be able to share the analyzed data with their communities to enhance positive resource management decision making. CCS staff also participated in a number of dives with TNC, increasing their technical capacity to conduct marine monitoring. These dives occurred at Pianu Pass in Faichuk and a location northwest of the islands of Wonei and Paata on the lagoon's outer reef. Building the technical dive skills of CCS and other Chuuk partners is a continuing priority for the state. Under this Cooperative Agreement, with support from a larger TNC project, the Chuuk biophysical marine monitoring team

gathered the most extensive set of monitoring data ever collected for Chuuk. TNC provided logistical boat support for the more remote reefs in Chuuk, as well as to two outer atolls associated with the Hall Islands. Surveys were conducted on 75 coral reefs associated with Chuuk Lagoon and nearby Kuop atoll. Standardized protocols were used to evaluate the coral assemblages, macroinvertebrates abundances, and foodfishes. The collected data from this monitoring trip produced the following information relevant to resource management decisions.

In recent years, the Crown of Thorns (COTs) and typhoon disturbances on Chuuk have clearly impacted the reef-building corals the most. In response, it is likely that increases in nutrients associated with coral mortality provides the opportunity for small foodfishes to flourish. Photographic benthic data were collected and assessed to verify these expectations. Larger foodfishes were also expected to show a positive response to disturbances, but their response should be weaker based upon slower growth rates. It appears that fishing pressure was more influential to changes in the larger fishes compared to disturbances.

The assessment of the 75 sites in 2016 showed that coral cover and foodfish biomass were also related. Clearly, corals and fishes are dependent upon each other. When exposed to disturbances, healthy reefs with abundant fish stocks are more resilient. This was previously seen in Yap, the Federated States of Micronesia, when COTS abundance was elevated across most of their reefs in 2009, but not in a key marine protected area (MPA) with fishing restrictions. In general, coral declined during this timeframe in Yap, but not within the MPA. In contrast, disturbances typically impact small, non-food fishes the most. These include damselfishes, butterflyfishes, and angelfishes that are often associated with coral hosts. However, there are potential cascading impacts to larger fishes if these species no longer exist in the corals.

There were no similar linkages between sea cucumbers and changes in corals. Sea cucumbers may be more influential to seagrass and reef flat habitats not examined by this research and therefore relationships may have been missed. Regardless, sea cucumbers represent a significant food and economic resource for fishermen that is declining, thus improved management is needed.

Large fish and sharks are declining the most through time and management should focus on protecting these groups that are critical for ecosystem function. Determining sustainable harvesting levels for both fishes and sea cucumbers will require dedicated studies to determine thresholds in these populations that must be maintained for sustainable income and healthy reefs. Some of these studies are currently under way for Chuuk and have begun to identify species-based targets for management considerations. Management practices need to evolve to address the growing pressures of western economies and of climate change. A suite of strategies that resonate with traditional forms of management include: 1) no-take networks of reefs, 2) spatial planning to determine where subsistence and commercial fishing is allowed, and 3) both species-based and gear-based regulations to sustain fisheries stocks. Approaching local management planning with a ‘menu’ of options might best meet the specific needs of individual communities.

Figure 5. Diver carefully holding a Crown-of-Thorn's Starfish (COTS) that was found during the surveys (left). Acropora table corals are one preferred prey for COTS (right). The feeding scar is the white part of the coral in the center of the photograph with recent mortality

Yap: The Yap marine monitoring team includes: the Yap Community Action Program (YapCAP), Yap State Department of Resources and Development, Yap Division of Marine Resources and Management, and Yap Environment Protection Agency. During this project period, the Yap team completed the monitoring of all 20 target sites in Yap. The team continued to manage, store, and back-up Yap data into the local database housed at YapCAP and shared with UOGML to upload into the Micronesia Challenge regional database. Formal analysis of these datasets was completed by UOGML.

YapCAP and UOGML also offered trainings to build the capacity of the Yap team to conduct biological monitoring and data analysis. Dr. Houk and graduate student Steven Johnson from UOGML traveled to Yap in December 2015 to further build the Yap team's capacity to conduct marine biological monitoring. UOGML built YapCAP's capacity to conduct spatial assessments of coral-reef ecosystem conditions across Yap using proxy indicators for pollution and fishing. UOGML assisted ten members of the Yap marine monitoring team to analyze FY2015 data. Analysis of data collected in Yap was used to assess the effectiveness of protected areas, refine a 'State of the Reef' power-point presentation and create outreach materials. YapCAP conducted widespread outreach within the State in the months of May and June 2016. Figure 6 below is an example of the type of information YapCAP shared based on data analysis.

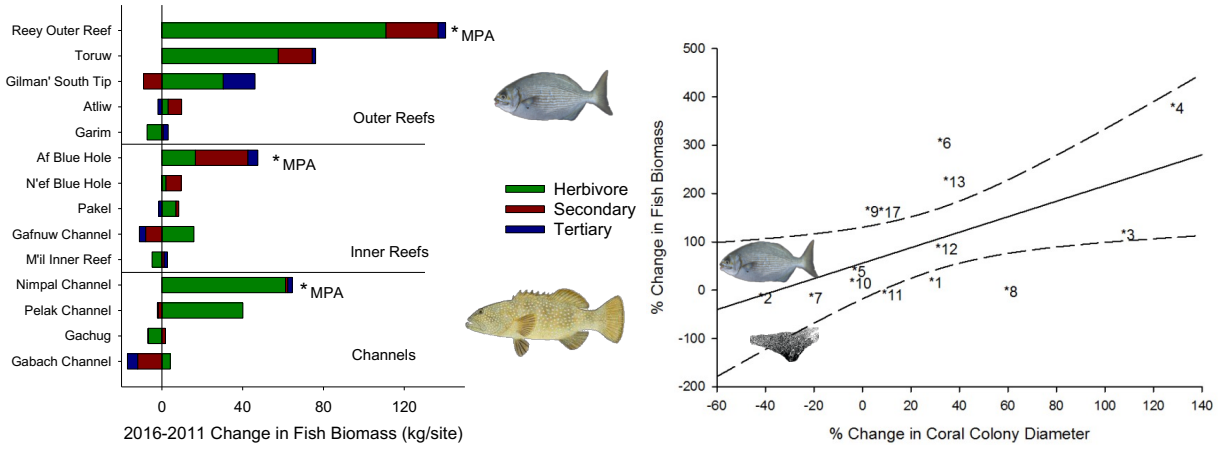

Figure 6. Trends in fish biomass on Yap reefs (left). Within all reef types, MPA's have recently had management plans formally developed, enforced, and now are starting to show improving fish biomass and reef resilience. MPA have the greatest improvements in fish, but also in coral health (right). These findings are being spread through locally-managed partnerships between the Yap communities, and new MPA and management actions are now in progress.

The Yap monitoring team conducted a series of community and stakeholder consultations to share these important results. They presented analyzed data and the results from their previous Coral Reef Monitoring surveys, highlighting the importance of Marine Protected Areas around Yap State. The team shared monitoring results with relevant government agencies including Yap State Department of Resources and Development, Yap Division of Marine Resources and Management, and Yap Environmental Protection Agency and updated Yap's State-of-the-Reef PowerPoint presentation. This collaboration allowed for cost-sharing between agencies that helped to maximize limited financial resources. This coral reef monitoring information being used in the planning processes for community-based marine managed areas, State planning, and allocation of resources to areas of biological significance. The Yap monitoring team presented to a network of Traditional Chiefs who were working with their communities to improve fisheries management in Reey and Tamil. Yap's efforts to improve coral reef ecosystems are making a positive impact. The Yap monitoring team reported an increase in compliance to the rules and regulations of the Nimpal Marine Conservation Area that in turn showed corresponding improvements in reef condition, This site is monitored under this Cooperative Agreement. To see how the Yap monitoring team is improving the capacity of community-based organizations to manage their coastal resources, see the text box on the right. YapCAP continued to provide routine community support. The YapCAP team also conducted community outreach to three secondary level educational institutions: Yap Catholic High School, Yap High School, and St. Mary's School.

Community-based Monitoring in Yap

The Tamil municipality in the main island of Yap declared a traditionally managed marine protected area in 2012. In the same year, municipal leaders called for the creation of the Tamil Resources Conservation Trust (TRCT) to manage the municipality's protected area(s). A management plan for TRCT was finalized in 2013, and with funding from the Global Environment Facility's Small Grants Programme, TRCT initiated active resource management activities in the marine protected area in 2014. TRCT reached out to the Yap monitoring team to learn how to conduct coral reef monitoring and the Yap monitoring team trained members of the Tamil community in monitoring techniques. The Yap monitoring team and TRCT jointly conducted the monitoring in the Tamil marine protected area in September 2015, gathering the key baseline data for the site.

In Yap, the network of MPAs has recently expanded. The new data from the first assessment of the expanded network produced encouraging evidence suggesting that all MPAs had substantial increases in fish stocks. Increases were mainly in herbivorous fishes that grow quickly and respond to MPA protection. Documenting ensuing benefits to fishes in higher trophic levels (i.e., predator fishes such as groupers) and examining whether or non-MPA reefs benefit from a 'spillover' effect were both extremely important activities that were facilitated through this grant opportunity. Furthermore, communities in Yap plan to expand management planning beyond just MPAs and the Yap monitoring team has a data analysis working group meeting scheduled for November 2016 to augment their work on the management planning. Details of the workshop will be reported under the new cooperative agreement.

As a result of this marine monitoring work, a new protected areas network bill is currently under consideration by the Yap Governor and the state legislature. This bill will establish the Yap protected areas network and formal criteria for communities to apply to have their sites included in the network. The bill also contains a sustainable financing component that will secure local resources (i.e. tourism fees, government budget input, etc.) to support Yap's protected areas efforts.

Republic Of Palau (ROP): MCT's partner under this Cooperative Agreement in Palau is the Palau International Coral Reef Center (PICRC). PICRC completed monitoring projects funded through this grant including monitoring seagrass marine protected areas, marine protected areas baseline monitoring, and coral reef monitoring at 23 permanent monitoring sites conducted every 2 years as well as grouper aggregations surveys). For each of these projects, data are analyzed and results are communicated through reports and presentations to local communities and to the Palau State government. The data is stored at PICRC and will be transferred to the UOGML Micronesia Challenge database when reports and publications are completed no later than two years after data is collected. PICRC completed baseline surveys for all of Palaus MPAs after surveying Ngermasech Conservation Area and Ngemelis Island Complex between October and November 2015. PICRC has already developed and publicly released technical reports on the baseline assessments. The reports are available on the PICRC website at: www.picrc.org.

The PICRC monitoring team worked monthly in four grouper aggregationssites (Ngerumekaol, Denges channel, Ebiil, and Nagaremlengui channel) between October 2014 and March 2015. In June 2015, PICRC released "Grouper Spawning Aggregations: the effectiveness of protection and fishing regulations": http://picrc.org/picrcpage/wp-content/uploads/2016/01/Gouezo_et_al_2015_Groupers_Aggregations_20151.pdf. For this paper, PICRC analyzed all grouper spawning aggregation monitoring data collected since 2010. They reported that there are now up to 9 times more groupers in the two permanently closed spawning sites in Palau than can be found in nonE protected areas during the grouper spawning season. The PICRC team also completed its biE annual monitoring trips to eight seagrass marine protected areas: Ngermeosar, Badesmarech, Ngelukes, Uedangel, Teluleu, Ngebtakl, Ngederrak, and Ucheliunges. A scorecard of Palau's MPAs was developed with the help of Dr. Peter Houk using very similar methodology to Houk et al. (2015, PlosOne). A technical report is available on PICRC's website (PICRC Technical Report No 16E 06) and findings have been presented to major governmental agencies including the Palau PAN Office and during the local environmental symposium in September 2016 in Palau.
Six community meetings were conducted for both socio-economic (SE) studies and the presentation of MPA baseline results to the following communities in Palau: Kayangel, Ngaraard, Ngiwal, Ngchesar, Airai, and Peleliu. Educational materials such as brochures and posters were also distributed in the communities. During these meetings, the community members reacted positively to reported results, attended the presentations, and were proactively involved in the discussions. Peleliu's community was concerned about the quality of the water surrounding their MPA and as a result, there will be increased focus on this concern during the next Cooperative Agreement. This same sentiment was reflected throughout the rest of the communities leading to members requesting for continued monitoring of their MPAs on a regular basis including updates on status to the communities.

In addition to biological monitoring activities, PICRC also participated in two community meetings. The first in Ngardmau State engaged community members to complete a survey of the status of sea cucumbers within that community's marine protected area. The second meeting took place with communities in Ngatpang State where PICRC shared data and information about nearby marine protected areas, socio-economic studies, and a giant clam research project. Media accounts of these meetings appeared in local newspapers and are available on PICRC's website.

PICRC also presented the findings for the MPAs ecological scorecard to major government agencies including the Protected Areas Network Office (PANO), Koror State Government and National Legislature (OEK). PANO was very receptive to the scorecard and found it useful to adjust the management at the MPA-level. PICRC also presented the impacts of typhoons on the eastern reefs of Palau, the Socio-economic survey findings and the Seagrass monitoring data at the International Coral Reef Symposium in Hawaii in June 2016 (see attached brochures). Afterwards, PICRC released 2 press releases (09/02/2016

"National Environment Symposium a Success" and "PICRC at the 13th ICRS") that were published in two local newspapers and on the PICRC website and Facebook page.

The following technical reports were published and can be accessed at the PICRC Website (picrc.org/picrcwebsite) and on the PICRC Facebook page:
Baseline assessment of Medal Ngediull Conservation Area
Baseline assessment of Bkulengriil Conservation Area
Baseline assessment of Ngelukes Conservation Area
Baseline assessment of Ngermasech Conservation Area
Baseline assessment of Ngemelis Island Complex
Ecological Conditions of Coral Reef and Seagrass MPA's in Palau
Socio-economic Baseline Study of Ngaraard State
Socio-economic Baseline Study of Peleliu State
Socio-economic Study of Ngiwal State PICRC
Socio-economic Baseline Study of Ngchesar State

Socio-economic Baseline Study of Kayangel State

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Objective 2: Regionalization of data entry into a Micronesia Challenge database by all jurisdictional monitoring teams

UOGML and PICRC: PICRC and UOGML made existing data collected from biological monitoring widely available throughout the region despite PICRC's reported challenges in collaborating with the other jurisdictions to access collected data that is stored locally due to the slow internet in Palau. To address this issue UOGML, through its researchers' trips to the other jurisdictions and ongoing work with marine monitoring teams, is now directly collecting the data themselves. Through a separate project funded by MCT by the Margaret A. Cargill Foundation, UOGML was able to work with database developers to create a streamlined, online data storage facility that builds upon the existing Micronesia Challenge database and improves the user access, data quality, and data sharing. UOGML has completed the online Micronesia Challenge database and the live URL is: https://micronesiareefmonitoring.com/. PICRC continued to store Palau data in their existing database and will share that data for inclusion in the Micronesia Challenge database following the production of reports and within a two-year period from when the data was collected. All biophysical marine monitoring teams have collected and stored datasets on-site and shared with UOGML to upload to the online Micronesia Challenge database. Data that are two years old will be continuously deposited into the NOAA archive.

Using the standardized approach (see methods of paper, in Figure 7 below, the UOGML was able to compare the suite of monitoring sites across the Micronesia jurisdictions. Utilizing the MC database, UOGML generated management queries and reports.

PLOS ONE

RESEARCH ARTICLE

The Micronesia Challenge: Assessing the Relative Contribution of Stressors on Coral Reefs to Facilitate Science-to-Management Feedback

Figure 7. Peer-reviewed paper developed to establish a defendable approach to evaluate the Micronesia Challenge, and beyond. Online and freely available (http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0130823

The scores for each island were normalized between 0 to 100% so that islands could be compared using the same relative scale (Figure 8). While ecosystem condition scores were a valuable contribution towards assessing progress, it was relevant to provide information needed for improving management. To accomplish this, the study addressed the drivers of ecosystem condition. Both natural environmental regimes and proxies to human stressors were examined. UOGML reported that only 42% of the major reef habitats exceeded the ecosystem-condition threshold pollution in some lagoons, best predicted both the decline and variance in ecosystem condition (Figure 8). The study concluded that fish assemblages appeared to have a hierarchical influence upon coral-reef ecosystems in Micronesia compared with localized pollution. Prioritizing management approaches based upon herbivore size and diversity, which are both mediated by predators, is expected to best preserve the underlying trophic relationships responsible for the ecosystem services that coral reefs provide to Micronesian societies in the face of ongoing climate change. These findings were also reported at local scales, furthered below, where site-specific management could be evaluated and/or recommended. Researchers summarized how monitoring data can feed adaptive management at many locales in Micronesia, so that networks within and beyond Micronesia can better understand adaptive management approaches in practice (Figure 9). Funding for the regional analysis came mainly from the Cooperative Agreement, with a Packard Foundation grant contributing to some co-investigators focusing on localized translations.

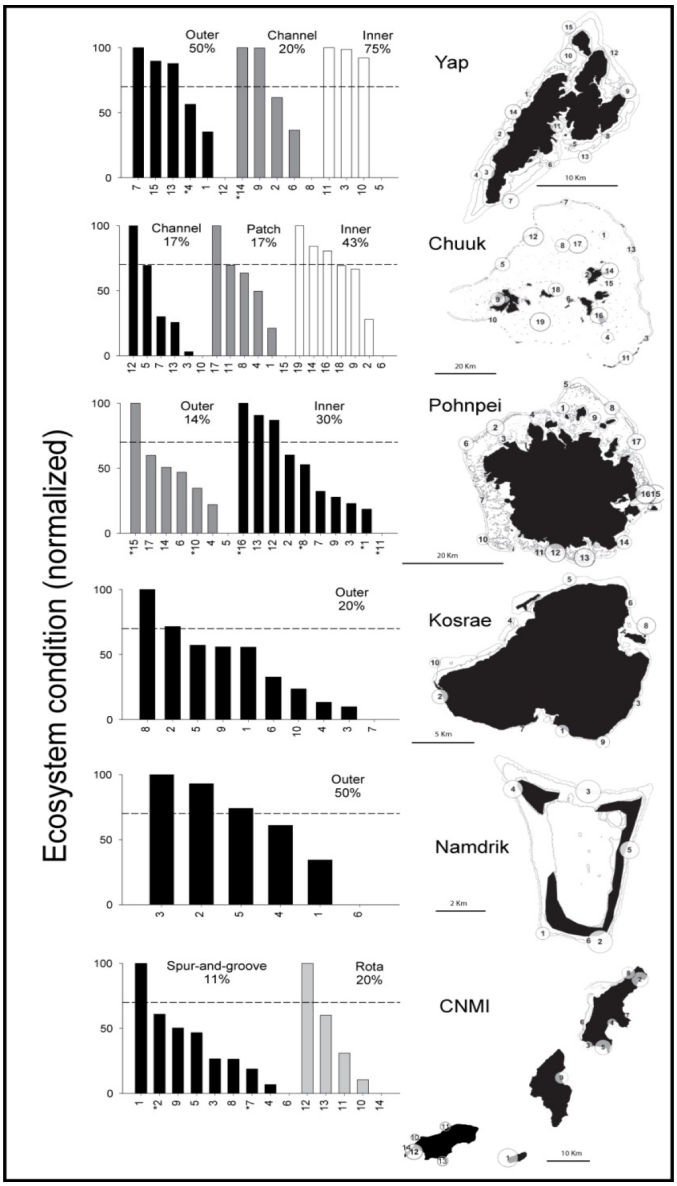
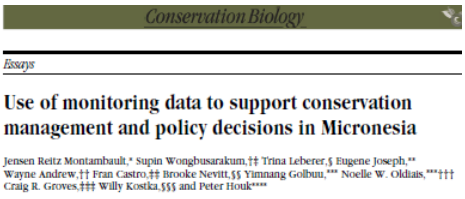


Figure 8 Current Micronesia Challenge scores across the region


Conservation Biology

Essays

Use of monitoring data to support conservation management and policy decisions in Micronesia

Jensen Reitz Montambault,* Supin Wongbusarakum,†† Trina Leberer,§ Eugene Joseph,** Wayne Andrew,†† Fran Castro,‡‡ Brooke Nevitt,§§ Yimnang Golbuu,*** Noelle W. Oldfath,***††† Craig R. Groves,‡‡‡ Willy Kostka,§§§ and Peter Houk****

Figure 9. Publication of an adaptive management framework that exists in a few instance across Micronesia. We aim to highlight positive deviants in this paper, to help other locales both within and outside of Micronesia. The article is published at (http://onlinelibrary.wiley.com/doi/10.1111/cobi.12542/full).

Beyond scientific publications, marine monitoring results were also disseminated through local and regional media.

E science news:
http://esciencenews.com/sources/science.daily/2015/09/24/the.micronesia.challenge.sustainable.coral.reefs.and.fisheries

Saipan Tribune:
http://www.saipantribune.com/index.php/new-method-measures-coral-reef-ecosystem-condition/

UOGML worked with the jurisdiction monitoring teams in Yap, Chuuk, Pohnpei, Kosrae, and RMI to analyze collected data and create State-of-the Reef presentations to share information with resource managers and community members. These presentations are provided in local languages in venues such as traditional chiefs networks, community-based meetings, church groups, and their respective jurisdictions legislatures (Figure 10). These outlets help to link the science being generated with policy and legislation. Through simplified translations of the above noted materials, many influential stakeholders were better informed and this helped support size-based legislation in Pohnpei and improved enforcement leading to effective MPAs on Yap. This represents the first time in many years that fisheries regulations have been legislatively modified in many jurisdictions. Future work aims to expand such progress in Chuuk, Kosrae, and Majuro in coming years. In addition, these efforts will be expanded to other communities in each jurisdiction where management improvements have been identified. In this sense, collective effort aims to expand both locally and regionally.

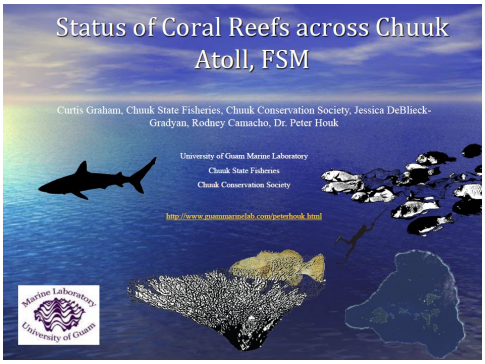


Figure 10. Introduction slide for state of the reef presentations developed for local consumption (left). Photograph during a localized data analysis workshop held on Pohnpei with monitoring partners (right), leading to publications, local translations, and management evaluation and recommendations.

Objective 3: Micronesia socioeconomic monitoring team is collecting baseline data for regional Micronesia Challenge indicators, and collaborating with the regional biological monitoring teams.

MCT and its key partner for socio-economic monitoring Micronesia Islands Nature Alliance (MINA), along with project partners NOAA, Pacific Islands Managed and Protected Areas Community (PIMPAC), Rare, Inc. and TNC accomplished the following key milestones: 1) Completed the formation of an eight-member Micronesia Socioeconomic Monitoring Team (SEM Team), with one representative from each of the Micronesia Challenge Jurisdictions: 2) Developed a draft Micronesia Socioeconomic Monitoring Plan to be finalized and endorsed by partners; 3) Created a Communication Plan for the SEM Team; 4) Trained the regional team in assessment development, data collecting methods, data analysis and data communication,

based on the MC socio-economic measures; 5) Implemented the Micronesia-wide Socioeconomic Monitoring Plan and protocol in at least one site (Dehpehk and Takaieu, Pohnpei); 6) Supported locally-targeted outreach through focus groups, key informants interviews, household surveys, and the sharing of data results with communities and on the internet 7) Provided a Socioeconomic Data Analysis Training Workshop and 8) Contributed to the Second Micronesia Challenge Socioeconomic Measures Workshop during which participants further refined socioeconomic monitoring indicators for the region. More specific information for each achievement is below:

1. SEM Team: During the initial reporting period, MCT, MINA, NOAA, PIMPAC, TNC, and Rare, Inc. recruited a strong core team to conduct socioeconomic monitoring. In order to ensure the support, participation, and collaboration of communities in which the socioeconomic monitoring will take place, MCT and MINA selected team members that are representative of each jurisdiction and backed by effective non-governmental conservation and resource management organizations. The SEM Team members are: Shirley Koshiba (Palau International Coral Reef Center), Bertha Reyuw (Yap Community Action Program), Kriskitina Kanemoto (formerly Chuuk Conservation Society), Angel Jonathan (Conservation Society of Pohnpei), Bond Segal (Kosrae Conservation and Safety Organization), and Mark Stege (Marshall Islands Conservation Society), Marybelle Quinata (NOAA) from Guam, and Kodep Ogumoro-Uludong (MINA) from CNMI. For over a year and a half of the grant, Brooke Nevitt from MINA served as the coordinator for this team, however with Ms. Nevitt's departure from MINA on June 1st, 2016, Kodep Ogumoro-Uludong has since taken over this role. MCT's Capacity Building Program Manager and PIMPAC Co-Coordinator Betty Sigrah is also providing support. In the second year of the grant, MINA has continued to provide regular support to the SEM focal points. As part of the Communication Plan, they have initiated quarterly meetings to facilitate regular communication of the group with each other and with the advisors. Initially Ms. Nevitt, and now Mr. Ogumoro-Uludong regularly check in with the focal points to provide assistance and support, assess needs, and discuss opportunities for future trainings and monitoring. In addition, they also facilitate when there are needs of assistance from other partners such as Dr. Supin Wongbusarakum with NOAA.

2. Micronesia Socioeconomic Monitoring Plan: With funding from the NOAA Cooperative Agreement and technical assistance from NOAA, MINA coordinated a two-week regional training for the SEM Team from September 23 through October 2, 2015 in Guam. The training focused on building the skills of participants on data collection methods and data communication. During this training, the SEM Team worked together to develop a draft Micronesia Socioeconomic Monitoring Plan. The plan provides detailed information for team members as they work to further socioeconomic monitoring in their respective jurisdictional sites including: monitoring objectives, indicators, data collection methods (including household surveys, key informant interviews, and focus group discussions), and guidance on sampling design. In September 2016, at an intensive advanced data analysis training in Palau, team members had another opportunity to further discuss the SEM efforts in the region and how to best meet the objectives of the team with the Micronesia Challenge to conserve 30% marine resources and 20% terrestrial by year 2020 milestone coming quickly. The outcomes of this discussion have led to an updated Monitoring plan that will soon be shared with the purpose of gaining endorsement by partners. This plan was designed to be a live working document and will be refined and updated as the SEM Team implements monitoring activities in their jurisdictions and undergo further trainings.

3. Communications Plan: During the September 2015 two-week training, the participants developed a Communications Plan. The plan defines a clear and detailed framework to follow for regular communication among the SEM Team. This internal communication format will help to encourage trans-jurisdictional support, sharing, assistance and guidance for the SEM Team. It will also provide a space for members to raise SEM related issues, challenges, and successes. The Communications Plan includes the following key elements: 1) identification of a rotating volunteer communications coordinator; 2) a

schedule for quarterly meetings via Skype and/or conference call; 3) outline agenda that calls for updates from jurisdiction representatives on SEM work followed by a presentation or conversation based on at least one of the following topics: building support for SEM work, site/jurisdiction updates on ongoing SEM work, team needs, and sustainable financing/fundraising for SEM work. Kodep Ogumoro-Uludong of MINA took on the volunteer communications coordinator's role for the group and to spearheaded implementation of the plan. He will continue to take the lead going forward.

4. Training in Assessment Development, Data Collection Methods, Data Analysis and Data Communication: As all SEM team members were trained in assessment development, data collection methods, data analysis and data communication during the September 2015 two-week training in Guam, the next step was to begin the process of 'train-the-trainer' for the team. From February 1st to 12th 2016, Bond Segal, (Kosrae focal point) joined trainers Brooke Nevitt and Kodep Ogumoro-Uludong in Pohnpei to serve as a trainer-in-training. This workshop provided the opportunity for Mr. Segal to gain further experience in SEM, as well as to lead segments of the training and implementation to help further prepare him to lead efforts on his home island of Kosrae. Following the training, Mr. Segal acknowledge the value of serving in the role and the trainers observed his increased confidence and skill in the process.

5. Micronesia-wide Socioeconomic Monitoring Plan and Protocol Implemented in at least one site: During the above-mentioned workshop in February of 2016, the team implemented the plan and protocol in the Pohnpeian communities of Dehpehk and Takaieu in partnership with the Conservation Society of Pohnpei, MCT, and PIMPAC. During this two-week effort, participants and trainers worked with the communities to identify monitoring activities, develop indicators (including the MC indicators) and gather baseline data. Following the SEM workshop in Pohnpei, the team, consisting of team leader Kodep Ogumoro-Uludong (MINA), Bertha Rayuw (Yap CAP), Rachael Nash (Micronesia Challenge Regional Coordinator), Angel Jonathan (Conservation Society of Pohnpei), and local partner Bond Segal (KCSO) held a follow up assessment in the Kosrean community of Walung. This gave all team members further capacity building opportunities and gave Mr. Segal the chance to lead the assessment in his own home state.

6. Supported Locally-Targeted Outreach: As with every socioeconomic assessment, the team who implemented the assessment in Dehpehk and Takaieu conducted focus groups, key informant interviews, household surveys, and reported back to the communities. The MINA team is currently developing its final report which will be shared with the communities and posted for wide access on the internet. Likewise, following the monitoring work in Walung, Kosrae, the team members and their local counterparts returned to the community to report back their findings and engage the community in discussions for next steps. This process reinforced to the team the importance of reporting to the communities. While the data collected is critical in long term monitoring efforts, it also provides immediate information to communities anxious to learn and use the learning to help conserve their environment.

7. Provided a Socioeconomic Data Analysis Training Workshop: While originally scheduled to occur in May of 2016, the advanced socioeconomic data analysis training workshop was postponed by 4 months to September due to an extreme drought in the region. From September 12th – 17th, 2016 the SEM team participated in this important training workshop in Palau. Hosted by the Palau International Coral Reef Center (PICRC), the training was led by Matt Gorstein (NOAA/NOS) and Dr. Supin Wongbusaraku. The training used IBM SPSS Statistics version 24 and Excel. The example data set used in the training was a part of a survey conducted in the Merizo community of Manell-Geus in Guam. The workshop objectives included the understanding of basic statistics, understanding principles of qualitative and quantitative data analysis, understanding how to properly code and document data, knowing how to use SPSS to run descriptive data analysis and test hypotheses and how to better communicate results of data analysis and effectively communicate data visually.

8. Attended the Second Micronesia Challenge Socioeconomic Measures Workshop: In June of 2015, MINA, TNC, NOAA, PIMPAC, Rare, Inc., and with participation from MCT, brought most of the SEM Team to Guam (except for the representative of RMI) for the Second Micronesia Challenge Socioeconomic Measures Workshop. This workshop was part of a series of ongoing Micronesia Challenge Measures Group meetings. The Measures Working Group is tasked with measuring progress towards achieving the Micronesia Challenge goal of effectively managing 30 percent of the region's nearshore coastal resources and 20 percent terrestrial resources. During this five-day workshop, the SEM Team discussed how to sustain socioeconomic monitoring in the region and possibilities for integrated monitoring. The participants also reviewed and updated the 2012 Micronesia Challenge socioeconomic monitoring indicators, and began discussions for a Communications Plan and a region-wide Micronesia Socioeconomic Monitoring Plan.

Objective 4: The sustainable Finance strategies for 1. a Protected Areas Network (PAN) Legislation in the RMI is in place and 2. for at least 1 Feasibility Study on a potential revenue raising scheme for the FSM states as identified in the Micronesia Sustainable Finance Plan

MCT and TNC worked with the RMI National Government to advance policies and legislation that will support more effective protected areas and fisheries management in the country. MCT, along with its partner the Nature Conservancy worked with the Office of Environmental Planning and Policy Coordination (OEPPC), and the RMI National Government to pass the RMI Protected Areas Network legislation. In September of 2015, the RMI passed its National Protected Areas Network (PAN) Law. The new law calls for the establishment of a PAN Fund office to oversee the RMI PAN. MCT and its partners, notably TNC, continued to work with the RMI Government to begin implementing this law and create the new PAN Fund office. To support this work, during this project period, MCT was awarded a grant from a private foundation to conduct a cost-benefit analysis of sustainable financing options for the RMI PAN Fund. MCT is working with its partners in RMI to conduct this cost-benefit analysis that will inform the RMI's Country Program Strategy for the use of investment income from the Micronesia Challenge Endowment Fund and other sources of financing for resource management. MCT is conducting similar analysis for the Federated States of Micronesia and is working with its partners to establish an extension to the no commercial fishing zones.

In December 2014, MCT and its partners, including TNC, Rare, and CSP, finalized a Memorandum of Understanding with various agencies from the Nett Municipal and Pohnpei State governments. Through this MOU, the signatories agreed to enact legislation to amend fees for water usage in Nett to include a surcharge that will be deposited into a revolving fund, called the Nett Water Fund. The Nett Water Fund will provide financing to landowners in Nett to relocate crops (including sakau) from and near rivers and stream banks and pursue more sustainable farming methods. In the coming months, MCT will continue to support the MOU signatories to establish a steering committee to oversee the fund. The development of the Nett Water Fund was directly informed by a 2012- 2013 study conducted by TNC and CSP. MCT and its partners, including TNC, Rare, and CSP, continued working with various agencies from the Nett Municipal and Pohnpei State governments to implement the Memorandum of Understanding in support of the Nett Watershed Fund.

Throughout this reporting period, MCT and TNC held high-level meetings with Government partners across the region. MCT's Executive Director, Mr. Willy Kostka, attended the Micronesia Presidents' Summit, Association of Pacific Island Legislatures (APIL) and the Micronesia Islands Forum (previously the Micronesia Chief Executives Summit) in Palau in February 2016. As a member of the Micronesia Challenge Steering Committee, MCT contributed to the Micronesia Challenge 10th Anniversary presentation to Micronesia's leaders. This presentation included information about progress under the Micronesia Challenge to establish sustainable financing mechanisms for more effective natural resource management

including sustainable financing. . As a result of this presentation the Micronesia Chief Executives Summit issued a communiqué reaffirming commitment to the Micronesia Challenge and urging each jurisdiction to aggressively establish sustainable finance mechanisms to cover respective financing gaps.

V. Results:

As a result of collaboration between MCT and its partners, monitoring protocols and the science-to-management framework are well established resulting in emerging policy and legislation at the jurisdictional levels. This important work has resulted in initiatives opposing the unregulated or unmanaged harvesting of sea cucumbers in Pohnpei. It has also led some municipalities to act on creating their own coastal fisheries management plans to ensure their resources are used sustainably. And in Yap and Chuuk, the work has inspired the development of new and improved comprehensive coastal fisheries and protected area legislation for the time in over a decade.

MCT obtained extramural funding to leverage the existing NOAA cooperative agreement and leveraged partnership projects that will help reduce the impacts from land-based sources of pollution, invasive species, and unsustainable fishing practices in the participating jurisdictions for the Micronesia Challenge. MCT also provided information services and up-to-date information on eco-system-based management activities, coral reef monitoring, sustainable fishing practices, invasive species management, and sediment reduction, and other related projects to project partners and stakeholders.

MCT secured funding for two additional projects where the activities complement other efforts under this cooperative agreement: a $120,000 from The Nature Conservancy titled “Building the Resilience of Communities and their Ecosystems to the Impacts of Climate Change in Micronesia and Melanesia project” to assess community vulnerability to climate change and identify activities to build ecosystem-based resiliency and $60,000 from the David and Lucille Packard Foundation to develop Coastal Fisheries Management Plan for the 4 States of the FSM.

One of the key take-home themes reinforced by the completion of this NOAA cooperative agreement is that local monitoring programs across Micronesia working together are much stronger than their individual programs working independently in the past. Building from this foundation, collaborations with scientists like Dr. Houk have added significant value to the programs and datasets being developed. Establishing a permanent regional online database with an institution that is based in Micronesia is also a key factor to success and sustainability of the marine monitoring program. These datasets are also not only being used across our region, but are shared with global scientists and this made possible when common visions exist and when all stakeholders agree to contribute and verify data.
For Micronesia, key next steps include expanding our data collection network to include fisheries dependent datasets, and improving our ability to guide ecosystem-based fisheries management (EBFM).