

Marshall Islands
Marine
Resources
Authority



ANNUAL REPORT 2016

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Front cover: Coastal Fisheries staff conduct reef survey at Ebon Atoll. **Photo:** Emma Kabua-Tibon.

Back cover: Coastal Division community engagement at Ebon; fisherman at Lae Atoll; Coastal outreach team on the move in Ebon Atoll. **Photos:** Benedict Yamamura.

Inside photos: Emma Kabua-Tibon, Benedict Yamamura, Maria Sahib, Clyde James, Hilary Hosia, Karen Earnshaw, Giff Johnson, Steven Victor and Pacific International Inc.

Fisheries management pays multiple dividends

It is increasingly obvious that no one nation, or one island, can manage its fishery in isolation. Moreover, multiple fisheries — both oceanic and coastal — have differing management requirements. This is why the Marshall Islands Marine Resources Authority has adopted a holistic approach to its fishery and why active participation in developing policies at home, and at the regional and international level for implementing sustainable fisheries management are essential to the health of the fishery in our island nation.

At home, MIMRA is sponsoring such initiatives as the first National Oceans Symposium that involved all of the agencies, non-government organizations and community members that have an interest in fisheries in identifying key issues for policy action and implementation. The symposium was among MIMRA initiatives to increase visibility of the range of fishery issues affecting the nation and to encourage active participation by all stakeholders.

In the oceanic fishery, the Marshall Islands' participation as a member of the Parties to the Nauru Agreement (PNA) remains the foundation of our management of the tuna fishery in Marshall Islands and PNA waters. Proof of the success of the PNA's Vessel Day Scheme as a management tool for the purse seine fishery can be seen in both the business and conservation sides of the fishery. In 2010, PNA nations received US\$60 million annually from this fishery. By 2016, the amount of revenue accruing to PNA nations increased to over \$450 million. In the Marshall Islands, we've seen VDS-generated revenue increase exponentially from a few million dollars to nearly \$24 million in 2016.

**Message from the
Chairman of the MIMRA
Board of Directors Alfred
Alfred, Jr., Minister of
Natural Resources and
Commerce.**



BOARD MEMBERS

Permanent: Minister of Natural Resources and Commerce Alfred Alfred, Jr.; Attorney General Fili-mon Manoni; Secretary of Foreign Affairs, Bruce Kijiner. **Two-year terms:** Bobby Muller, Danny Wase, Saane Aho, Tommy Kijiner, Jr.

The VDS, however, is not merely a business management tool. The establishment of hard limits for fishing days within PNA waters and related management initiatives — 100 percent observer coverage, in-port transshipment, closure of high seas pockets, annual moratorium on use of fish aggregating devices — is proving its conservation value. A recent study on bigeye tuna, an over-fished stock of great concern and value to island nations, showed positive trends in growth of this important tuna stock.

The VDS is a regional initiative for management of the purse seine fishery through which the PNA asserts its sovereign rights to control fishing in our waters. The Marshall Islands highly values its membership in the PNA and the benefits

from implementation of the VDS as well as other PNA initiatives that are increasing our participation in the tuna fishery. In addition, the Marshall Islands views work of and policies adopted by the Western and Central Pacific Fisheries Commission as essential to sustainable management of the vast fishery in the Western and Central Pacific Ocean. The Marshall Islands has and will continue to engage significantly with the WCPFC and its various committees.

Our domestic coastal fisheries program involves both subsistence level fishing by island communities and small-scale commercial fishing activities. Engaging our local communities in planning and implementing their own fisheries resource management plans is an essential part of MIMRA's domestic coastal fisheries focus.

This annual report for FY2016 provides an overview of the major programs and activities of the Marshall Islands Marine Resources Authority during 2016.

Alfred Alfred, Jr.

**Minister of Natural Resources
and Commerce, Chairman,
MIMRA Board of Directors**

Focus on raising local

The over-arching goal of the Marshall Islands Marine Resources Authority is to sustainably manage the multiple elements of our fisheries resource, from coastal to oceanic. We are doing this by engaging with all concerned in the fishery at the international, regional, national and local levels.

Improvements in technology are improving data acquisition by fisheries observers and monitoring of fishing vessels. An increasing number of Marshall Islands fisheries observers have been trained and are involved in dozens of trips annually on both purse seiners and longliners.

MIMRA is building a new headquarters facility that will meet our agency's growing needs, while investing in a new office facility for the Parties to the Nauru Agreement.

We have an active community engagement program that works with communities on remote islands to develop practical resource management plans the communities themselves can implement. MIMRA also engages with many agencies at the national level to develop policy initiatives through the Coastal Management Advisory Council.

Among important areas of focus for MIMRA in FY2016:

- **Community engagement.** MIMRA continued engagement with local governments and the communities they serve on remote islands in order to increase public participation in coastal fisheries management.

Through site visits, MIMRA staff was both able to conduct needed fisheries research while working with local communities to expand awareness about and participation in conservation management. In addition, MIMRA began planning for the first National Ocean Symposium, to be held in FY2017, to engage all of the many government and community stakeholders in awareness and action on fisheries.



Message from the Director of MIMRA Glen Joseph.

- **Fisheries observers.** MIMRA continued to build its fisheries observer force with multiple trainings in FY2016 jointly sponsored with the support of the College of the Marshall Islands and the Pacific Community (SPC). During the year, the RMI Observer Program's 63 active observers carried out 175 purse seine and 28 longline trips during 2016.

Observers were also utilized to monitor transshipment activity in Majuro port since the initiative started in late 2015. We continue to increase the number of fisheries observers with the aim of having 100 certified fisheries observers.

- **Use of technology for fisheries management.** MIMRA continued to expand the use of tablets for data collection by fisheries observers onboard fishing vessels.

These tablets also improve safety of fisheries observers because they allow direct communication with their on-

shore managers and also have distress signals that can be activated in case of emergency.

MIMRA is cooperating with several other PNA nations and The Nature Conservancy in a pilot project of monitoring domestically-based longline fishing vessels using video cameras installed on board.

This will be trialed over the coming year as a measure to improve surveillance of longliners.

Finally, using drone technology, MIMRA will be generating geographic information system (GIS) data to document island and individual land parcel boundaries as part of improving conservation management domestically.

- **Facilities expansion.** MIMRA is funding construction of a new three-story office facility that will improve operations and meet the expansion needs of our growing programs. Construction will begin in FY2017.

participation in fisheries



The PII Net Yard in Delap.

MIMRA also purchased business facilities near the Uliga Dock, which is used for domestic transport services, that will be turned into a new office complex for the Parties to the Nauru Agreement Office.

MIMRA has committed to funding the new PNA headquarters along with contributions from PNA member governments.

- **Expansion of local engagement in fisheries.** During FY2016, Pacific International Inc. made substantial progress for developing the first net repair yard and associated support facilities in the Marshall Islands.

The net yard opened in FY2017 and will help to cement Majuro's position as a hub for purse seine tuna transshipment.

In addition, MIMRA supported a joint PNA-Office of Commerce and Investment-sponsored small-scale tuna canning training on Majuro.

The aim is to encourage local com-

panies and entrepreneurs to begin canning tuna for the domestic market taking advantage of inexpensive or free bycatch.

panies and entrepreneurs to begin canning tuna for the domestic market taking advantage of inexpensive or free bycatch from the longline and purse seine transshipment operations in Majuro.

Another business development that is an off-shoot of the tuna transship-

ment operation centered in Majuro is the establishment of an office for Hansen Helicopters, which services the purse seine fleet using Majuro as a transshipment point.

- **Funding for the national government.** Revenue generated by the Marshall Islands' participation in the PNA's Vessel Day Scheme, sale of fishing rights, and MIMRA's joint venture fishing vessel combined to increase the fisheries sector's contribution to the national government. In FY2016, MIMRA transferred \$26.3 million to the national government, a 60 percent increase over the FY2015 contribution of \$15.8 million.

MIMRA will continue working with government, business, industry and communities for effective management of our important fisheries resources.

Glen Joseph
Director

COASTAL

MIMRA's Kalena deBrum interviews a family on Ebon.

AND COMMUNITY AFFAIRS

Managing marine resources

The Coastal and Community Affairs Division engages with stakeholders at all levels in the Marshall Islands, linking MIMRA to grassroots communities as well as regulatory agencies and elected leaders. Through its partnership with a variety of agencies and non-government groups in the Coastal Management Advisory Committee, the Coastal Division collaborates with people involved in many aspects of fisheries and marine resource management as well as being able to more effectively develop programs that meet sustainability needs of our islands.

The Coastal Fisheries Division provides socio-economic services to island communities through ecosystem-based fisheries management through the Reimaanlok (Looking to the Future) process, coastal fisheries development such as aquaculture and fish aggregating device projects, fisheries research and assessment, fisheries marketing and promotions, compliance and enforcement,

and public awareness and capacity building. During FY2016, it continued to provide these services to remote outer island communities despite challenges of transportation and weather/sea conditions.

This year's community-based activities continued within Majuro as well as seeing an increase on the outer islands.

□ This year's community-based activities continued within Majuro as well as seeing an increase on the outer islands. This included briefings with new Majuro Mayor Ladie Jack and his Council. □

This included briefings with new Majuro Mayor Ladie Jack and his Council, as well as work with the landowners of two islands on Majuro's north shore to finalize resource management plans that were developed through the Reimaanlok process.

Funding through the World Bank's Pacific Islands Regional Oceanscape Program (PROP) allowed the Division to not only incorporate new activities but helped with delivery of project activities requested by several local government councils and traditional leaders on remote outer atolls.

The Reimaanlok process continues to be the guiding blueprint to working with outer island communities, along with plans for revisiting the process to build capacity in the terrestrial component as part of meeting the Marshall Islands commitment to the Micronesia Challenge, which set a goal of 30 percent of near-shore marine resources and 20 percent of land areas under ef-

COASTAL

Both Coastal Division-managed fish markets purchased fish from outer islands fishers in 2015, contributing to local economies. Below a Lae resident deploys a fishing net into the lagoon.

at the local, community level

fective conservation management by 2020.

With the support of the International Atomic Energy Agency and other partners, the Division expanded its research into the causes of ciguatera fish poisoning in the outer islands. Staff conducted marine sampling from three atolls and laboratory testing on the plankton specimens to identify toxicity.

This research will help inform a response to the ongoing problem of ciguatera fishing poisoning in the Marshall Islands. From 2005 to 2014, 776 cases of ciguatera fish poisoning were reported by the Ministry of Health in Majuro, underlining the point that this is a serious concern for people in the Marshall Islands who depend on seafood for their diet and livelihoods.

Exports of fish and invertebrates for the international aquarium trade continued in FY2016, but were fewer in number than the previous year because of a decrease in the number of local ex-

□ From 2005 to 2014, 776 cases of ciguatera fish poisoning were reported by the Ministry of Health in Majuro, underlining the point that this is a serious concern. □

ports. Only three exporters were active at Majuro and Kwajalein, compared to seven the previous year.

The Outer Island Fish Market Center (OIFMC) in Majuro made slightly fewer trips to the outer islands to purchase fish than in 2015, while the Kwajalein Atoll Fish Market Center (KAFMC) increased visits despite unfavorable

sea conditions and maintenance needs of boats and facilities.

In addition to the yearly repairs and maintenance work for MIMRA vessels, facilities and equipment, age and environmental factors have taken their toll. Assessments have been initiated to develop plans for repair and renovation needed for several of the outer island fish bases.

These focused on KAFMC related fishbases at Namu, Ailinglaplap and Likiep atolls.

The giant clam hatcheries on Arno and Likiep underwent major repairs during the year, and by year's end, were in the final stage of maintenance.

As the hatcheries are being readied for resumption of aquaculture activity, the Coastal Division will be resuming consultations with clam farmers on both atolls.

Likiep's hatchery operates directly with the involvement of the Likiep Aquaculture Association.



Marketing fish in Majuro

FISH MARKETS

The Coastal Division carried out 43 trips to the outer islands to purchase fish for marketing through the Outer Islands Fish Market Center (OIFMC) in Majuro. Although the number of trips declined by 25 percent compared to 56 made in 2015, the OIFMC purchased almost the same number of pounds of fish as it did with the higher number of trips the previous year.

And fishers on the eight outer atolls serviced received more money than in 2015 for purchase of their fish.

OIFMC bought fish from Arno (27 trips), Maloelap (7 trips), Wotje (4 trips), and from Aur, Jaluit, Namu, Mili, and Likiep (1 trip each).

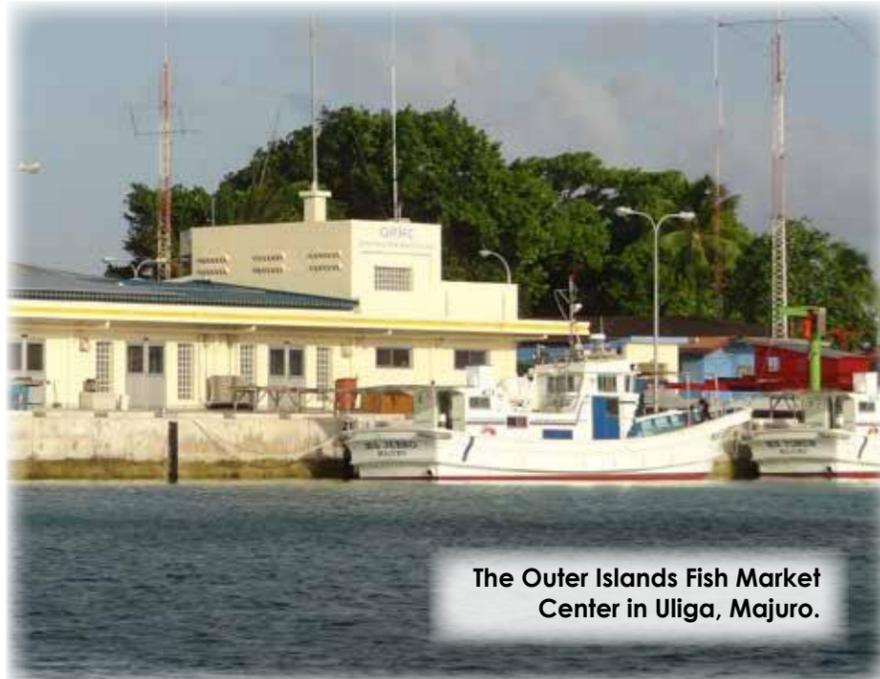
These visits by MIMRA vessels continued to provide fishers on these remote atolls with income by purchasing fish and fish products.

Arno fishers received \$84,614 for 62,753 pounds of fish; Aur and Maloelap fishermen received \$21,235 for 22,153 pounds of fish; and Jaluit, Likiep, Namu, Wotje and Mili fishers received \$24,500 for 17,976 pounds of fish.

The monetary benefit the fishermen of these eight atolls received directly from MIMRA totaled \$130,349 for the 102,882 lbs of fish purchased, compared to 109,874 pounds purchased in 2015 for \$129,306.

The OIFMC continues to enforce quality and size limits on the fish that are purchased from the outer islands. With fuel costs continuing to remain high, OIFMC initiated a system of grouping atolls (Wotje-Likiep, Wotje-Ailuk, and Aur-Maloelap) in one trip to maximize the amount of fish per trip landed on Majuro.

The number of trips to the



The Outer Islands Fish Market Center in Uliga, Majuro.

Outer Islands Fish Market Center, Majuro Fish Purchased/Sold FY2016

Island	Lbs. Purchased	Price	Lbs. Sold	Sales \$
Arno	62,753	\$84,614	44,237	\$90,656
Aur, Maloelap	22,153	\$21,235	13,395	\$28,016
Wotje, Mili, Namu, & Likiep	17,976	\$24,500	10,456	\$21,458
Total	102,882	\$130,349	68,088	\$140,130

eight atolls decreased from 56 last year to 43 trips this year.

A combination of factors caused this decrease in visits: unfavorable sea conditions, extra repairs needed to facilities/boats, and the priority placed on use of MIMRA vessels to accommodate emergency medical evacuation charters requested by the Ministry of Health.

This fiscal year, repairs to Jaluit

community boats took place putting Jaluit fishing boats out of commission for a long period of time.

Work continues to promote the efficiency of fish collection and distribution activities from trips to the outer islands, the transportation to the market, the sorting and reweighing, value adding of the products, facility security and safety, accounting procedures and sales to customers.



and Kwajalein Atolls

The Kwajalein Atoll Fish Market Center (KAFMC) now has a vessel to use for trips to its fish base partners and projects on the outer islands, but due to limited availability and high cost of fuel on Ebeye, trips have remained limited and inconsistent.

However, KAFMC was able to increase its total trips to the outer islands to six in 2016, an increase over the four the previous year. These six visits to outer islands included Ailuk, Namu, and Likiep to purchase fish and local produce. KAFMC also purchased fish from Ebeye Island fishers.

From January through the first half of April, no trips to the outer islands were conducted for safety reasons, as major repairs were needed on F/V Laintok. Nonetheless, KAFMC continued to supply limited amounts fish to the Ebeye community through direct purchase of fish from Namu, Ailuk, Likiep and Ebeye fishers as well as providing assistance with fuel and ice provisions.

For this year, fishers received \$19,906 for fish and \$3,768 for local produce sold to the KAFMC. Purchases of fish from Ailinglaplap Atoll remained on hold due to ciguatera fish poisoning concerns.

Ailinglaplap was one of several atolls that Coastal Division staff collected plankton samples from as part of a Marshall Islands-wide assessment of ciguatera fish poisoning.

This will be followed up in the next fiscal year with the dispatch of a MIMRA team to continue assessment of the situation with the support of World Bank funding.

KAFMC continued to look for avenues to secure fuel to increase trips to the outer islands to purchase fish and local produce from the fish base-communities of Likiep, Ailinglaplap, Namu and Ailuk.



The Kwajalein Atoll Fish Market Center.

Kwajalein Atoll Fish Market Center Fish Purchased/Sold FY2016

Fish Purchased	Local Produce Purchased	Ice Sold	Fish Sold	Local Produce Sold	Misc Sales*
\$19,906	\$3,768	\$34,532	\$20,892	\$4,937	\$637

Fish and local produce purchased from fishers on Namu, Ailuk, Likiep, Jaluit and Ebeye.

Outer Islands Fish Bought/Sold in Majuro and Kwajalein FY2015/16

Year	Site	Lbs. Purchased	Price	Lbs. Sold	Sales \$
2015	OIFMC*	109,874	\$129,306	81,914	\$157,924
2016	OIFMC	102,882	\$130,349	68,088	\$140,130
2015	KAFMC*	N/A	\$29,011	N/A	\$21,667
2016	KAFMC	15,388	\$19,906	N/A	\$20,892

*Outer Islands Fish Market Center, Majuro; Kwajalein Atoll Fish Market Center.



Working together for 25 years

MIMRA and the Japan-based Overseas Fisheries Cooperation Foundation (OFCF) have a 25-year partnership for developing coastal fishing opportunities on the outer islands. OFCF cooperation began the Fisheries Development Assistance for Pacific Island Nations (FDAPIN) project in the Marshall Islands in 1992. Beginning with 1995, FDAPIN II was implemented for a duration of five years.

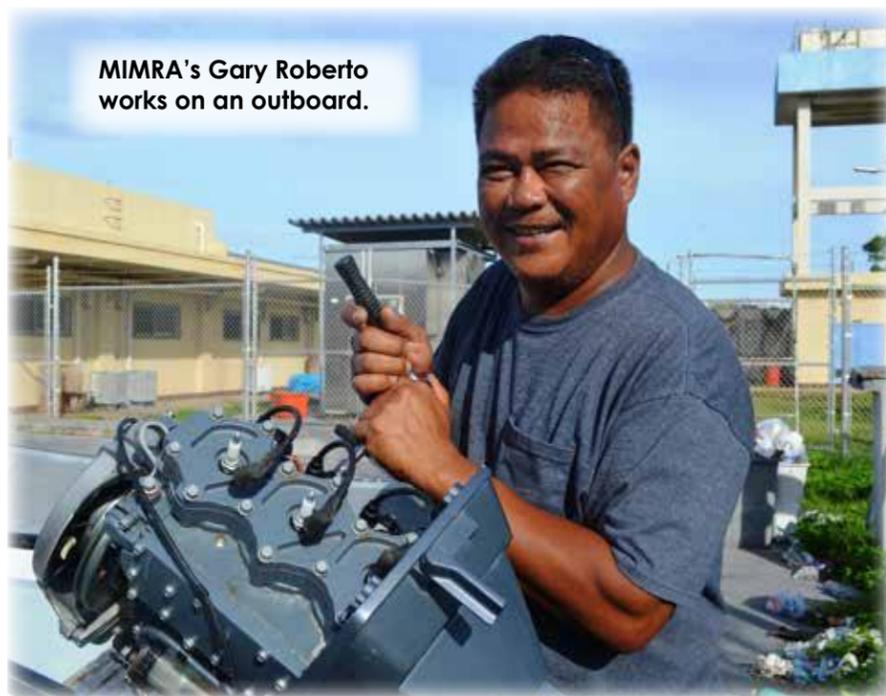
This second phase consisted of assistance ranging from repairs and restoration of fisheries facilities and equipment, to related skills, technology and knowledge being transferred. Each year, during the annual OFCF Japan/Pacific Island Nations Fisheries Directors Meeting on Fisheries Cooperation, OFCF receives requests from the Marshall Islands and other Pacific countries for FDAPIN projects.

After conducting field surveys and consultations with MIMRA, the scope of the projects are developed and followed by a drafting and signing of a memorandum of understanding (MOU) and Implementation Plan.

This year, MIMRA requests that were implemented with the support of the OFCF:

- Maintenance and Restoration of MIMRA transport vessels.
 - Repair and maintenance of MIMRA ice plants.
 - Advice provided to MIMRA workshop engineers for stable operation of MIMRA transport boats, ice plants and fishing boats.
- Requests submitted for consideration for next fiscal year 2015/2016 are as follows:
- Replacement and repair of KAFMC radio network system.
 - Maintenance and repair of MIMRA transport vessels.
 - Repair and maintenance of MIMRA ice plants.

OFCF PARTNERSHIP



MIMRA's Gary Roberto works on an outboard.

- Advice for management of MIMRA fish bases.
- In addition to OFCF FDAPIN funding, MIMRA's annual budget allocated funds to complement the Japan support in order to ensure repair work necessary for other MIMRA facilities and equipment happened during the fiscal year. This work included:
 - Yearly dry-dock and maintenance service and repairs of all MIMRA fish transport vessels (Jolok, Timur, Jebro, Lentanir and Laintok).
 - Jaluit community boat repair: Nine boats.
 - Wotje fish base maintenance and repair: Ice machine and outboard engine repairs.
 - Arno fish base and Ine sub-fish base maintenance and repair: Building repairs and ice machine maintenance.

- OIFMC, Majuro maintenance and repair: Ice machine maintenance and inspection and OIFMC equipment inspection and maintenance.
- Namu fish base maintenance and repair: Repairs to water catchment tanks and assessment report for other repairs needed.
- Likiep Loto Giant Clam Hatchery maintenance and repair: Raceway tank maintenance.
- Woja, Majuro hatchery maintenance and repair: Building repairs and grounds clearing for proposed new tanks.
- Arno Giant Clam Hatchery maintenance and repair: on Arno Giant Clam Hatchery: Building repairs and electrical wiring check.
- MIMRA vehicle maintenance service and repair: Eight vehicles.



AQUARIUM EXPORTS

The brightly colored Flame Angel.

Angel at the top of export list

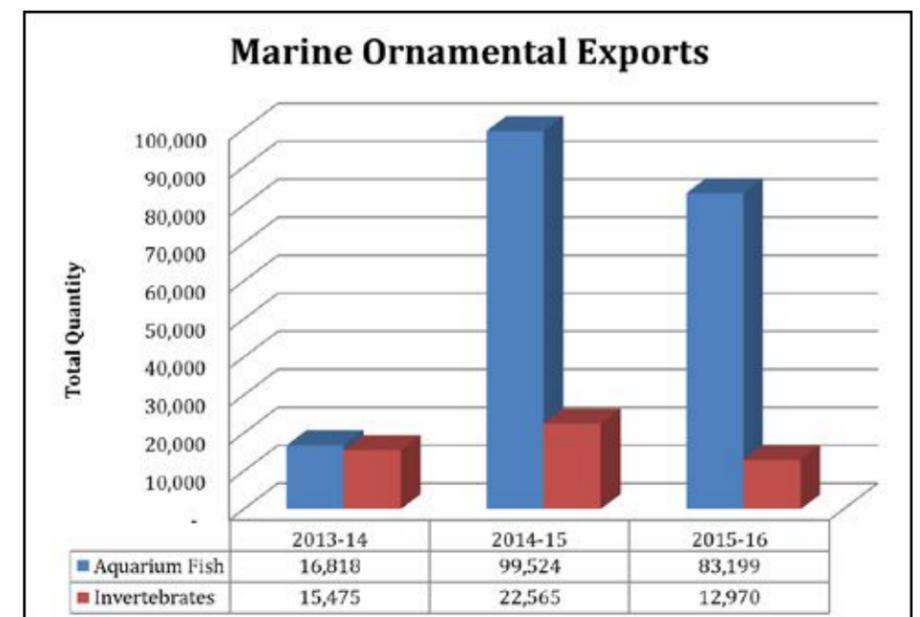
What had been a steady increase in the Marine Ornamental Export trade from the Marshall Islands dropped off during FY2016. Both exports of aquarium fish and invertebrates declined compared to the previous fiscal year. This may be due to the decrease in number of local exporters. There were seven operating in the Marshall Islands last fiscal year. But in 2016, the number of exporters in operation was down to three local companies, two on Majuro (TSL Enterprises & ARRO Corporation) and one on Ebeye (Kwajalein Fish Exports). These three companies export these commodities to aquarium markets in Asia, Europe and the United States.

The Flame Angel, *Centropyge loricula*, was the most in-demand fish, with 40,483 of this individual species exported this fiscal year. Although this number is high, it is another drop compared to the previous year.

Top 10 Aquarium Exports 2014-2016

Common Name	2014	2015	2016
Flame Angel	48,388	56,684	40,367
Multicolor Angel	9,500	6,837	8,377
Helfrich's Firefish	4,209	7,126	5,994
Lemon Peel Angel	7,207	5,914	4,153
Golden Wrasse	1,658	2,689	4,055
Mystery Wrasse	7,820	4,879	3,656
Bartlett's Anthias	8,186	6,887	3,124
Helfrich Goby	7,855	3,694	1,831
Lemon Peel Hybrid	761	530	632
Chevron Tang	800	879	118

Below, a comparison of Aquarium Fish and Invertebrate Exports from the Marshall Islands.





POISON FISH

A MIMRA staffer harvests samples of seaweed so plankton can be extracted for laboratory analysis regarding ciguatera toxin.



Ciguatera project responds to global problem

The population in the Marshall Islands and other islands globally faces daily threats from toxic seafood that is caused by marine algae. Marine food, however, is not only a major source of protein for Marshall Islands and millions of people around the world, but is also an important part of economic growth of the region. This means toxic fish and marine life endangers public health and causes socioeconomic problems.

Due to increases in human land-based activities leading to excessive nutrients in the ocean that causes dense growth of algae (known as “eutrophication”), natural events such as typhoons that cause reef destruction, and significant changes in global climate, an increase in frequency and intensity in blooms of harmful algae (HAB) has been recorded over recent decades.

In some countries in Asia and the Pacific, the potentially deadly para-

‘In some countries in Asia and the Pacific, the potentially deadly paralytic shellfish poisoning (PSP) syndrome is a serious public health issue despite implementation of monitoring programs. □

lytic shellfish poisoning (PSP) syndrome is a serious public health issue despite implementation of monitoring programs. With rapid development of tourism and international trade of seafood, marine life poisoning has become a potential threat on a global scale.

Responding to the growing problem, seafood safety requirements are being proposed for fish imported into large nations such as the United States and the European Union.

These requirements have the potential to impact the economy of the Marshall Islands and other nations that depend on marine seafood as an important export product.

The International Atomic Energy Agency’s Board of Governors responded to these concerns by approving a regional project, “Supporting the Use of Receptor Binding Assay to Reduce the Adverse Impacts of Harmful Algal Toxins on Seafood Safety” for 2014-2017.

The aim of the project is to strengthen HAB monitoring capabilities in Asia and the Pacific region through use of the radiological and RBA (radioligand binding assay) techniques for ciguatera fish poisoning.



Fish poisoning studies help on creating policy action

The Coastal Division expanded its research work on ciguatera fish poisoning in the Marshall Islands and increased the skill base of staff through related training programs during FY2016. This work is supported by a multi-national group of donor and participating countries and agencies.

Ciguatera fish poisoning (CFP) has been identified as a major global concern because it impacts not only people’s health but livelihoods in and economies of many nations.

The Coastal Division launched work on CFP in FY2015 with the start of four-year project designed to establish effective CFP monitoring, research programs and data management. This four-year project is supported by the International Atomic Energy Agency with additional funding from the Peaceful Use Initiative of the U.S. In addition to the Marshall Islands, participating nations include Australia, New Zealand, Palau, Indonesia, Malaysia, Republic of Korea, Thailand and Philippines in close collaboration with the U.S. National Oceanic and Atmospheric Administration, Institut Louis Malardé (ILM) of Papeete, French Polynesia, and the Intergovernmental Oceanographic Institute of the United Nations Educational, Scientific and Cultural Organization (UNESCO).



MIMRA project helping to determine locations at risk for ciguatera.

Varieties of toxic plankton found on Wotho, Ailinglaplap

Ciguatera fish poisoning monitoring teams were dispatched to Wotho Atoll and Ailinglaplap Atoll to collect samples using the “window screen” method. The samples collected from the reefs in these two atolls were brought back to Majuro to be processed and analyzed under microscopes. Sampling at some other outer islands had to be postponed due to the unavailability of a suitable boat. However, the Coastal Division was able to obtain some seaweed samples from Ebon Atoll, which has reported toxic fish problems.

The results were illuminating about the potential threat to fish and marine life on these outer islands. Several varieties of toxic or potentially toxic plankton were identified in the samples collected from Wotho and Ailinglaplap. At least three species of *Gambier-*

discus were found in the samples and two were identified as *Gambierdiscus toxicus* and *Gambierdiscus carolinianus*.

This species is known to cause ciguatera fish poisoning. It was not surprising to the Coastal Division staff to find that the samples from these two atolls were dominated by the dinoflagellate *Ostreopsis* (which is known for toxic algae blooms they sometimes cause), particularly *O. ovata*, *O. lenticularis* and *O. marinus*. The research discovered that the potentially toxic *Prorocentrum lima* was quite abundant. *Coolia* — a toxic dinoflagellate (plankton) — was surprisingly rare.

The seaweed sample from Ebon Atoll showed a high density of *Gambierdiscus carolinianus*, the same as was found in Wotho and Ailinglaplap.



POISON FISH

MIMRA Coastal, EPA, and other agency staff prepare for ciguatera lab tests.



Major health issue in RMI

A workshop on RBA (Radioligand Receptor Binding) Techniques focused on “Benthic Dinoflagellate Sampling, Identification and Culturing in Marshall Islands” took place in Majuro. It included participants from many local agencies involved in health and environment issues, including the MIMRA, Marshall Islands Environmental Protection Authority, Majuro Atoll Local Government, Ministry of Health, Marshall Islands Conservation Society and College of the Marshall Islands. During the two-week training, participants learned different techniques for the collection and identification of benthic algal species that play a major role in contributing to ciguatera fish poisoning. Seafood tainted with natural algal toxins is a major public health and socioeconomic problem in the Marshall Islands, especially in the outer islands that rely on seafood as a major source of protein and economic activity.

The participants took part in classroom lectures, collecting water samples from the Majuro lagoon, conducting laboratory work and examining samples taken in the field. Examination of the water samples showed that a few plankton cells were identified as toxic species but not to the extent of determining their levels of toxicity. The three toxic species found in Majuro lagoon are of the genus Gambierdiscus, Procoentrum and Coolia.

It was no surprise to find toxic species as ciguatera fish poisoning has been documented by the Ministry of Health. Majuro hospital reported 776 cases of ciguatera fish poisoning between 2005 and 2014, an average of 78 per year. Although the numbers reported declined from this average beginning in 2011, there are still a significant number being reported in Majuro and on the outer islands.

The symptoms

Ciguatera is a foodborn illness caused by eating fish that is contaminated by ciguatera toxin. Ciguatera toxin can cause nausea, pain, cardiac, and neurological symptoms in humans when ingested. The toxin may be found concentrated in large reef fish, most commonly barracuda, grouper, red snapper, eel, amberjack, sea bass, and Spanish mackerel.

These fish live in coral reef waters and accumulate the toxin when they eat smaller reef fish which feed on the dinoflagellates.

Ciguatera toxin is harmless to fish, but is poisonous to humans. The toxin is odorless and tasteless and cooking does not destroy the toxin.

Although there is no specific antidote to ciguatera fish poisoning, intravenous mannitol therapy has been applied with positive results, particularly in acute cases of ciguatera fish poisoning.

“Until the introduction of intravenous mannitol therapy, treatment for ciguatera was only symptomatic and supportive,” reported the Pacific Community’s (SPCs) Ciguatera Information Bulletin in 1992. “Mannitol was first used in the Marshall Islands (in 1988) and soon after in Australia. These studies both reported dramatic and sustained improvement in many of the victims of ciguatera. Specifically mannitol appeared to reduce the duration and severity of ciguatera. Several recent experiences with mannitol and ciguatera lend further support to these earlier studies. Mannitol is now the treatment of choice in the acute phase of ciguatera in Australia.”

A review of dozens of ciguatera treatment studies published by the U.S. National Institutes of Health in 2017 concluded: “It is reasonable to consider using intravenous mannitol in cases of acute ciguatera fish poisoning.”



Participants in the two-day retreat that completed a new CMAC Strategic Action Plan.

Reimaanlok expands its engagement with atolls

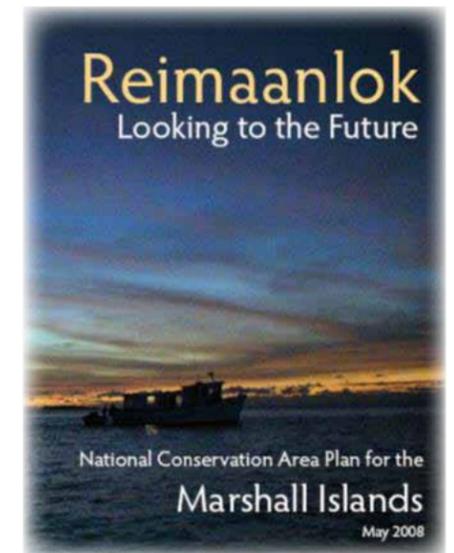
MIMRA-led Reimaanlok activities in 2016 focused on Majuro and the outer atolls Lae, Ujae and Ebon. It also involved significant engagement with the Coastal Management Advisory Council (CMAC) including a two-day retreat that completed a new CMAC Strategic Action Plan and Terms of Reference as well as updating the CMAC memorandum of understanding for final review. The consultations and field work with four atolls is detailed below as is the work with CMAC.

Reimaanlok supports the Micronesia Challenge goals

In support of the Micronesia Challenge, which was launched in 2006 to effectively conserve at least 30 percent of near-shore marine resources and 20 percent of terrestrial resources across Micronesia by 2020, the Reimaanlok National Conservation Plan was developed in 2008 to provide a method for community-based resource management plans. “Reimaanlok” translates as “looking to the Future.”

What makes this plan different from what was done in the past is that it does not attempt to identify specific sites for conservation areas.

Rather the initiative develops the principles, processes and guidelines for the design, establishment and management of conservation areas that are endorsed, owned, and led by local communities based on scientific evidence, cultural values and future needs.



The plan was enhanced with a Reimaanlok Facilitators Field Guide created in 2012 to help implement the Reimaanlok process on a site-by-site basis.



Mayor supports existence of marine protected areas

Landowners of the two recently established conservation areas in Majuro, Bokanbotin and Ene Kalamur, endorsed their respective management plans as a sign of commitment to their conservation goals. This completed “Step 6 – Sign-Off” for the Reimaanlok process. Ene Kalamur has established a five-year management plan (2015-2020) while Bokanbotin has completed a 10-year plan (2015-2025). These plans include a vision statement with clear management goals, objectives and actions as well as their marine protected areas (MPA) boundaries and rules.

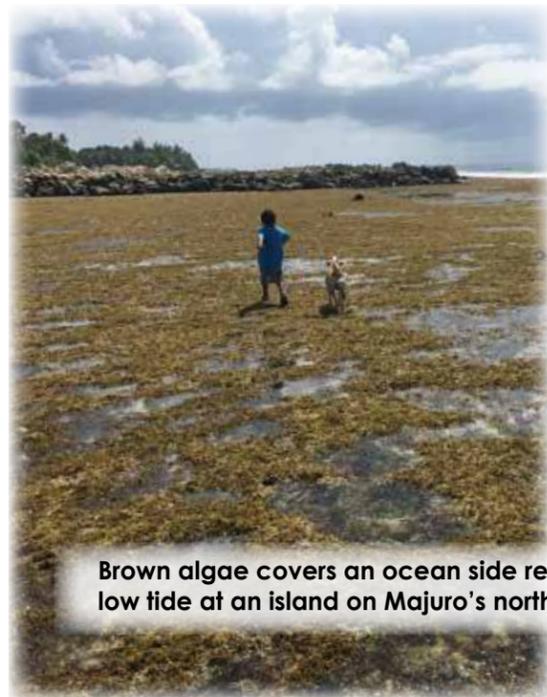
With the election of a new mayor and council for Majuro at the end of 2015, Coastal Division staff visited Mayor Ladie Jack and local council members to brief them on Reimaanlok efforts, particularly on Majuro. During the meeting, the endorsed resource management plans for Bokanbo-

REIMAANLOK

tin and Ene Kalamur were presented to the mayor and council for support by means of a local ordinance. Additionally, MIMRA presented results from coral monitoring efforts on Majuro including issues such as overfishing, seaweed overgrowth, pollution, and other related issues. Recommendations were shared such as development of ordinances for marine protected areas in Majuro, fishing seasonality, catch size limits, and other measures to promote sustainable fishing practices and for better coral reef protection. Mayor Jack spoke in support of the Reimaanlok work and requested regular visits by MIMRA regarding updates on current projects and opportunities for collaboration.



Mayor Ladie Jack



Brown algae covers an ocean side reef in Rairok, Majuro (left); low tide at an island on Majuro's north shore.



MIMRA staff survey Lae's lagoon and, below, Ujae lagoon.

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Coastal staff work with Lae, Ujae folk

Coastal Fisheries staff has been working with the Lae and Ujae Atoll communities since the previous year. Reimaanlok activities for Lae and Ujae Atolls continued in the summer of 2016. While a diving team explored the reefs to collect baseline data on corals, fish, and invertebrates, a land team conducted socioeconomic surveys within the communities. These are activities spelled out under “Step 4 – Collecting and Managing Information” of the Reimaanlok process. Later in the year, Coastal Fisheries staff revisited the two atolls to share the information

collected by the surveyors and to begin drafting resource management plans for Lae and Ujae as part of “Step 5 – Developing the Management Plan.” Drafting activities included identifying and prioritizing resources and threats, listing stakeholders, identifying a community vision, and indicating strategies and actions important for achieving the goals of the community. Once the terms of the drafts have been reviewed and endorsed by the respective mayors and Senator/Irooj Michael Kabua, Lae and Ujae will be ready with their final resource management plans for implementation.





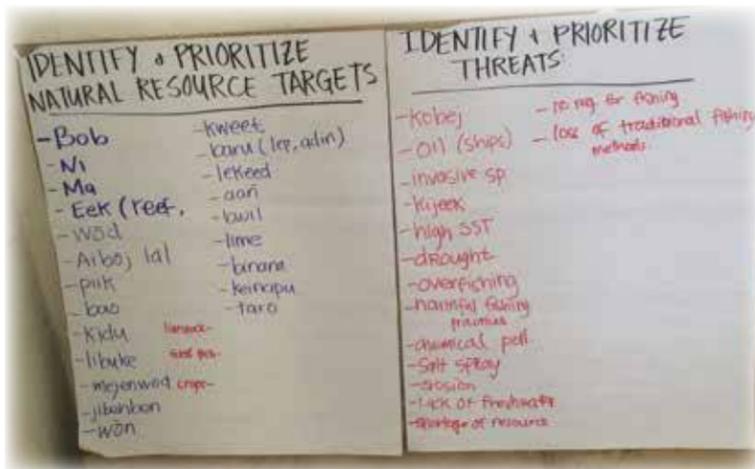
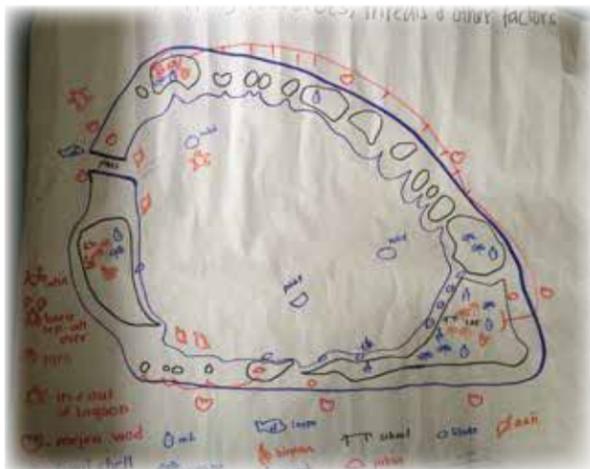
REIMAANLOK



Surveys continue at Lae, Ujae



Coastal Division staff work through detailed consultations with local communities on the outer islands. Staff interviewed community members on Lae Atoll (top photos), and developed coastal resources map (below left) of the atoll to assist the community identifying threats and priorities for resource management. At Ujae, a community consultation listed priority natural resource targets and threats as part of developing resource Management Plans. A view of marine life on a reef at Ujae (left).



MIMRA staff conduct a Reimaanlok meeting at the community center on Ebon Atoll.

Consulting with the Ebon community

All of the ideas and information generated from this consultation helped formulate a draft management plan for the people of Ebon Atoll.

After executing “Step 3 – Building Commitment” for the Reimaanlok process in 2015, the team moved on to “Step 4 – Collecting and Managing Information” by visiting the atoll to collect data both on land and underwater. Following the surveys, the Coastal Division team returned to Ebon to facilitate a week-long community consultation using the data collected from the previous trips.

Exercises involved identifying and mapping of natural resource targets, crafting goals and objectives, and community visioning. All of the ideas and information generated from this consultation helped formulate a draft management plan for the people of Ebon Atoll. MIMRA will be reviewing the draft management plan together with the Ebon Local Resources Committee later in the year.

Key field guide to be updated

Partner agencies in the Coastal Management Advisory Council (CMAC) bring together a multi-agency organization approach to the Reimaanlok process by providing a platform for collaboration, integration, and technical advice. This consultation process brings multiple sectors to engage in and support this national conservation effort. Partners in CMAC with MIMRA are the College of the Marshall Islands, Marshall Islands EPA, Marshall Islands Conservation Society, RMI Environmental Protection Authority, Ministry of Resources

and Development, Office of Environmental Planning and Policy Coordination, RMI Historic Preservation Office, Marshall Islands Visitors Authority, Marshall Islands Conservation Society, College of the Marshall Islands, Land Grant, University of Hawaii Sea Grant, Women United Together Marshall Islands, International Organization of Migration RMI Office, and University of the South Pacific.

CMAC held regular monthly meetings during the year in support of integrated resource management. The major highlight for the year was a two-day

group retreat on Eneko Island, facilitated by The Nature Conservancy. Outcomes of the retreat included: 1) Finalizing and adopting the CMAC Strategic Action Plan and Terms of Reference, and 2) Updating the CMAC memorandum of understanding (MOU) among all collaborating partners for final review by CMAC members.

In 2017, CMAC will be reviewing and updating the Reimaanlok field guide to ensure we are using the best tools available to best assist our local communities in resource management planning.



Above, the giant clam farm training. Left, artificial spawning of *Tridacna maxima*. Right, the signing of the Micronesian Association for Aquaculture Development agreement in Palau in 2015.



Developing aquaculture to

Profiling island habitats

MIMRA is committed to promote and develop aquaculture as a source of economic development and alternative income for communities throughout the Marshall Islands. To meet this goal, the Aquaculture Section has added additional activities to its work plan that target development of an Aquaculture Profile across the Marshall Islands. MIMRA is compiling and collecting information for all atolls and islands to identify suitable habitats and viable marine species for potential aquaculture projects. The assessments include site and habitat surveys, documentation of viable marine species, and aquaculture socio-economic surveys. Community

consultations are an essential element of these visits to develop awareness on MIMRA's aquaculture projects, and engage the community in activities to be conducted. Three atolls — Ailinglaplap, Ebon and Likiep — were surveyed in 2016. With this as a benchmark, a minimum of three communities per year will be targeted for aquaculture assessments.

Giant clam farming

Arno and Likiep giant clam hatcheries were the focus of extensive repair and maintenance that has put them back into full operation. Hatchery technicians and aquaculture specialists have successfully induced artificial spawning. By the end of the reporting period, juve-

nile clams had not yet reached suitable size for distribution to local farmers. In anticipation of distribution for the grow out phase, construction of lagoon nursery cages have been carried out in Likiep Atoll as part of one of a training project supported by United Nations Development Program, Small Grant Program funding awarded to the Likiep Atoll Aquaculture Association. Additional trainings for construction and maintenance of a raceway tank, artificial spawning of *Tridacna Maxima*, and giant clam stock enhancement in the Marine Protected Area in Likiep Atoll will be conducted later.

A giant clam farming workshop, supported by the National Training Council (NTC) and Majuro Atoll Local Government, was conducted in April 2016 for local communities in Majuro Atoll. The



AQUACULTURE

Sixteen trainees from around Majuro participated in a three-month giant clam farm training consisting of both classroom and practical/field sessions.

benefit island communities

objectives were to promote giant clam farming in Majuro as an alternative income generating opportunity for local communities and to enhance sustainable resource management.

Sixteen trainees from around Majuro participated in the three-month training consisting of both classroom and practical/field sessions. Trainees learned skills required for effective maintenance of nursery cages for juvenile giant clams, how to construct ocean nursery cages, concrete cookie trays, and how to carry out giant clam artificial spawning. MIMRA staff monitored the status of the trainees' cages and giant clams once a week for 10 weeks. Considering the condition of Majuro's lagoon, the weekly monitoring was carried out to both review the status of participants' cage maintenance efforts and to assess the

mortality and survival rate of the giant clams at the various sites. MIMRA does not have a giant clam hatchery in Majuro. Information gained from this training will help to assess other potential sites for giant clam farming and assist in MIMRA's giant clam expansion plans.

Aquaculture development association

A new intergovernmental network, the Micronesian Association for Aquaculture Development (MASA), came into force in November 2015 when high level officials of the founding member governments signed its charter in Palau. The adoption of the MASA agreement marked the transition of MASA as a

project assisted by the Food and Agriculture Organization (FAO) to MASA as an independent organization, owned and operated by its member governments. Member countries are the Republic of Palau, Marshall Islands, Federated States of Micronesia, and Republic of Nauru. Palau is hosting the headquarters of the association.

The inaugural meeting was convened immediately after the signing of the MASA agreement where the MASA administrative instruments were endorsed by the high level officials meeting. These include the Rules of Procedures and Financial Regulations. Members also adopted a three-year Technical Work Program and Headquarters Agreement subject to further negotiations between the association and the host government.



The US purse seiner Raffaello offloads tuna onto a mother ship in Majuro lagoon.

Responsibly managing the multi-faceted tuna fishery

The oceanic tuna fishery is an increasingly complex entity to manage, with a multi-species fishery, fishing fleets from numerous nations, including the Marshall Islands, that operate purse seine, longline and pole-and-line vessels, domestic laws and regulations, and regional/international fishery management obligations. The Marshall Islands Marine Resources Authority's (MIMRA)'s Oceanic Division is fully engaged in all aspects of managing the fishery both in the Marshall Islands' 200-mile exclusive economic zone (EEZ) and through membership in the Parties to the Nauru Agreement (PNA), a resource rights-based management organization, as well as through membership and active engagement with the Western and Central Pacific Fisheries Commission and the Forum Fisheries Agency.

□The VDS is a management tool for the purse seine fishery that has generated dramatically increased fisheries revenue to the Marshall Islands (and other PNA members)'

Management of PNA's Vessel Day Scheme (VDS) and associated management mechanisms is the single most significant development for the eight founding members (which include Marshall Islands) plus Tokelau. The VDS is

a management tool for the purse seine fishery that has generated dramatically increased fisheries revenue to the Marshall Islands (and other PNA members) while also establishing conservation management and monitoring systems that control and regulate the fishery. The latter include the requirement of 100 percent fisheries observer presence on all purse seiners, a three-month moratorium on the use of fish aggregating devices (FADs), in-port transshipment, closure to fishing of high seas pockets, a hard limit to the number of fishing days available each year, and other measures.

Under the VDS, the minimum fishing day price is \$8,000, though in practice fishing days often sell for more because of market competition and the fact that PNA caps the number of fishing days to be sold by all parties at approximately 45,000 per year. In 2016, MIMRA de-



Taking care of the details

voted about 40 percent of its fishing day allotment under the VDS to its domestic fleet, with significant portions of the balance going to the United States fleet, "pool" days with other PNA members that offer multi-zone access, and other bilateral partners, including Japan and Taiwan.

The Oceanic Division, in collaboration with the Legal Division, devotes a large portion of staff time to engagement with PNA in management of the VDS. It also works with Forum Fisheries Agency island members on monitoring and enforcement of the regional fishery as well as coordinating with FFA members on policy proposals to submit to the Western and Central Pacific Fisheries Commission that governs fishing on the high seas.

The Oceanic Division works closely with the Pacific Community (SPC) on data collection and analysis, and stock assessment activities.

MIMRA's Oceanic Division oversees monitoring and data collection of all purse seiners fishing in Marshall Islands waters, including the domestic fleet, and monitors to a limited extent longline vessels operating in the country's EEZ.

Oceanic staff and its team of fisheries observers monitor all in-port transshipments by purse seine and longline vessels. The Division also engages with Marshall Islands Ports Authority, Marshall Islands Sea Patrol, Majuro Atoll



MIMRA Enforcement Officers check the offloading of a purse seiner in Majuro.

□A World Bank/Global Environment Facility-supported management improvement program moved into full implementation in 2016 to assist the Oceanic Division with developing monitoring and enforcement.□

Local Government Police, Marshall Islands Environmental Protection Authority and others involved in monitoring and enforcement of laws and regulations governing tuna transshipment operations in Port Majuro.

A World Bank/Global Environment Facility-supported management improvement program moved into full implementation in 2016 to assist the Oceanic Division with developing and expanding monitoring and enforcement in collaboration with the Marshall Islands Sea Patrol and international partners.

Establishment of a Competent Authority remains on the agenda of this program.

Impact of the VDS

Ten years ago, oceanic fisheries revenue contributed to the national government's annual budget ranged from \$2 million to \$3 million a year. In 2016, MIMRA provided \$26,285,938 to the national government. The transfer to the national government in 2016 was up significantly from 2015, when \$15,773,000 was provided to support national government budget needs. The ability of MIMRA to contribute this level of revenue to the national government — now accounting for about 13 percent of all government revenue — is largely based on implementation of the PNA's Vessel Day Scheme (VDS). By setting a minimum price for a fishing day, PNA revenue among all members has risen from \$60 million in 2010 to a projected \$500,000 in 2017. The Marshall Islands' EEZ is on the fringe of the main tuna fishing zones in the region but has still benefited hugely by participating in PNA, demonstrating the economic and fisheries management power of this organization.



Majuro now the biggest tuna port

In 2015, the VDS generated \$24,406,606 (a combination of VDS and “fishing rights” revenue) for the Marshall Islands. This increased 11 percent in 2016 to \$26,970,078. The increase in VDS revenue from 2015 to 2016 is not as dramatic as the change from the 2014 revenue level of \$15,555,239 to 2015, a 57 percent jump. This is because fishing day minimum price remained stable at \$8,000 in 2015 and 2016.

Tuna transshipment and exports

The PNA requirement of in-port transshipment has seen Majuro develop into the busiest tuna transshipment port in the world. The number of transshipments was fewer in 2016 than the previous year, but a similar level of tonnage was moved from purse seiners to carrier vessels in Port Majuro in 2015 and 2016. In 2016, there were 573 tuna transshipments in Majuro accounting for an estimated 410,948mt. This compares to 704 transshipments in 2015 involving 444,393mt of tuna. The number of vessel transshipments declined 19 percent in 2016 but tonnage was only 10 percent lower than the previous year.

Taiwan purse seiner vessels accounted for the largest segment of transshipment, with 161 — or 30 percent — of the total number of transshipments. The next most active users of Port Majuro for



A transshipment vessel takes care of the catches of two purse seiners in Majuro.

transshipment were Marshall Islands and Papua New Guinea, each conducting 77 transshipments, the U.S. fleet, with 74 and China-flagged vessels, with 73.

Of the 410,948mt transshipped in Majuro in 2016, skipjack tuna accounted for the bulk of the tonnage, with 346,097mt, while yellowfin tuna was next at 58,038mt and last was bigeye tuna at 6,239mt.

The 573 tuna transshipments generated \$799,000 in revenue for MIMRA, up from \$677,000 the previous year.

These purse seine vessel tuna transshipment operations involve the deployment of dozens of MIMRA fisheries observers to monitor the transshipment work and collect data.

In addition to the transshipment fees, the presence of hundreds of fishing boats and carrier vessels in Majuro lagoon in 2016 meant that thousands of fishermen and other crew members injected money into the local economy through purchases at stores and use of restaurants, hotels, bars and nightclubs. Vessels also re-provision and buy fuel, further benefiting the local economy.

In addition to monitoring purse seine vessel transshipment, MIMRA fisheries observers also monitor the off-loading of catch by 24 longline vessels associated

with the Marshall Islands Fishing Venture. In 2016, these longline vessels off-loaded 3,862mt of fish, primarily bigeye and yellowfin tuna.

Most of this tuna — 3,246mt — was exported as fresh chilled product to off-island sashimi and sushi markets in the U.S., China and Canada. Frozen fish (rejects and bycatch), designated as “Local,” accounted for 616mt were shipped to China and Philippines via ocean freezer containers or sold locally. The breakdown of the MIFV longline catch in 2016 was bigeye tuna 1,979mt and yellowfin tuna 1,319mt.

Pan Pacific Foods loining plant in Majuro, which has three associated purse seine vessels, exported 3,132mt of tuna. This was a combination of 679mt of skipjack loins and 2,453mt of whole skipjack and yellowfin.

A total of 9mt of fishmeal was also produced. The majority of the loins and whole tuna went to canneries in Thailand (223mt skipjack loins, 880mt whole skipjack/yellowfin), Vietnam (1,152mt whole skipjack/yellowfin) and the United States (347mt skipjack, 13mt whole skipjack/yellowfin).

Tuna tonnage caught in Marshall Islands waters in 2016 increased dramatically over 2015. An estimated



Fishing within the RMI EEZ

79,669mt of tuna was caught by purse seine, longline and pole-and-line vessels in 2016 compared to 31,059mt the previous year. This reflects tuna school movement and an increase in the number of vessels registered, mainly purse seiners.

The number of foreign fishing vessels licensed to fish in the Marshall Islands EEZ increased in 2016 by eight percent over the previous year because of a surge in the number of purse seine vessels licensed to fish.

A total of 190 purse seine vessels were licensed to fish in 2016, a 17 percent increase over the previous year and well above the 156 purse seine vessel license average per year for the previous four years. In 2016, pole-and-line vessels registered to fish dropped from 13 to 11, while foreign longline vessels licensed dropped to 41 after two years at 50.

Fleets with the biggest increases in licensed vessels in 2016 compared to 2015 included S. Korea purse seine vessels (from five to 25) and FSM Agreement purse seine vessels (from 54 to 76). Japan, the only foreign flag operating pole-and-line vessels in Marshall Islands waters, decreased its pole-and-line presence from 13 to 11 vessels, and its longline fleet from eight to two. Japan increased its purse seine fleet from 29 to 30 vessels licensed.

China’s fleet of longline vessels increased by one, to 27, while it had no purse seine vessels licensed in 2016



Off-loading tuna from a Marshall Islands Fishing Venture longliner.

compared to seven the year before. The U.S. purse seine vessel number licensed to fish dropped to 33 after four years at 39. Taiwan continued a strong presence of purse seine vessels by increasing one, to 26. Overall, the 242 foreign vessels of all gears registered to fish in the Marshall Islands was the second highest total for the past five years.

Catch tonnage for the three types of fishing vessels operating in the Marshall Islands in 2016:

- Foreign and domestic flagged purse seine fleets caught an estimated 76,384mt in the Marshall Islands’ EEZ during 2016, a nearly 200 percent increase over the 26,344mt caught in 2015. The largest share of this tonnage was hauled in by the S. Korean purse seine fleet, which recorded 19,824mt or 26 percent of the total tonnage caught in Marshall Islands waters. Rounding out the top-five catches by fleet: U.S. 13,819mt, Taiwan 13,088mt, Papua New Guinea (licensed under the FSMA) 12,433mt, and Marshall Islands 8,875mt. Skipjack tuna continues to be the dominant species, accounting for 92 percent of the total catch in 2016.

- It is estimated that longline fleets caught 2,855mt of tuna in Marshall Islands water in 2016, a 30 percent

decline compared to the 4,097mt in 2015. The domestically-based foreign longline fleet — with vessels from China and FSM — is managed by the Marshall Islands Fishing Venture, a subsidiary of Luen Thai. All 24 vessels associated with MIFV off-load their tuna in Port Majuro, where it is recorded by MIMRA fisheries observers. The Japanese longline fleet offloads its catch in ports in Japan. Therefore, tonnage figures that include all fleets are estimates. Bigeye and yellowfin tonnage accounts for most of the tuna caught by longline vessels. Similar to the purse seine fishery, most of the longline fishing effort occurs in the southern areas of the Marshall Islands EEZ. The longline effort, however, is more widely distributed throughout the zone.

- Catches from the pole-and-line fleet decreased by 30 percent in 2016 compared to the previous year, dropping to 430mt from 618mt. The short-term trend continues to show year-to-year variability, although the 2016 catch was the lowest in five years. Skipjack accounts for almost 100 percent of the catch composition for this fleet. The Marshall Islands has not yet been able to place fisheries observers on board these vessels to validate catch data.



The Marshall 201, which brought in nearly \$800,000 for MIMRA in 2016.

Koo's partnership still going strong

MIMRA continues to benefit from its joint venture with Koo's Fishing Company for the operation of purse seine vessel, Marshalls 201.

It is managed by the joint venture company, Marshall Islands Fishing Company. MIMRA's share of revenue from the vessel in 2016 was \$794,704. From 2014 through 2016, the vessel generated over \$2 million for the Marshall Islands, averaging \$718,000 per year.

Observer fees down

Fisheries observer fees declined in 2016 to \$544,040 from \$647,419 the year before. Fisheries enforcement fines generated \$380,000.

Total Catch Pole-and-Line Fleet* in the Marshall Islands EEZ 2012-2016

Year	BET	SKJ	YFT	Total
2012	3	3,578	15	3,596
2013	3	1,719	4	1,726
2014	3	3,317	21	3,341
2015	0	615	2	618
2016	0	429	1	430

Figures are metric tons.

* Pole-and-line fleet is exclusively Japan.

Source: Unraised logsheet data collected by MIMRA.

Key: BET=Bigeye Tuna, SKJ=Skipjack Tuna, YFT=Yellowfin Tuna

Total Catch Purse Seine Fleets* in the Marshall Islands EEZ 2012-2016

Year	BET	SKJ	YFT	OTH	Total
2012	416	22,977	835	14	24,242
2013	538	40,113	1,514	6	42,171
2014	668	66,196	3,477	18	70,359
2015	126	21,923	4,295	0	26,344
2016	569	70,172	5,643	0	76,384

Figures are metric tons.

* China, FSM, Japan, Kiribati, S. Korea, Papua New Guinea, Philippines, Marshall Islands, Solomon Islands, Tuvalu, Taiwan, USA, Vanuatu.

Source: Unraised logsheet data collected by MIMRA.

Key: BET=Bigeye Tuna, SKJ=Skipjack Tuna, YFT=Yellowfin Tuna, OTH=Other

Total Catch Longline Fleets* in the Marshall Islands EEZ 2012-2016

Year	ALB	BET	YFT	OTH	Total
2012	254	4,027	1,372	737	6,390
2013	237	2,972	2,014	779	6,002
2014	172	4,680	2,346	600	7,798
2015	122	2,286	1,380	309	4,097
2016	71	1,616	1,168	0	2,855

Figures are metric tons.

* China, FSM, Japan, RMI, Taiwan.

Source: Unraised logsheet data collected by MIMRA.

Key: ALB=Albacore, BET=Bigeye Tuna, YFT=Yellowfin Tuna, OTH=Other



Oceanic highlights in 2016

- Net operating revenues increased slightly in FY2016 to \$31,666,145 compared to \$31,569,468 the previous year. While Vessel Day Scheme (VDS), fishing rights, licensing and registration fees, and transshipment fees continued to grow, there was modest decline in MIMRA's other revenue centers.

- Port Majuro maintained its status as the world's busiest tuna transshipment port with 573 transshipments transferring 410,948 metric tons from purse seiners to carrier vessels for onward transport to canneries.

- The top five purse seine flag states who used Port Majuro the most in FY2016 for tuna transshipment were Taiwan (161),

Marshall Islands and PNG (77), United States (74) and China (73).

- MIMRA earned \$794,704 in FY2016 from its partnership in the joint venture with Koo's Fishing Company for operation of "Marshalls 201" purse seine vessel.

- MIMRA contributed \$26,285,938 to the Marshall Islands Government's General Fund to meet national government budget needs in FY2016. This compares to \$15,773,000 transferred in FY2015.

- The 63 Marshall Islands fisheries observers monitored catches on 175 purse seine trips and 28 longline trips, as well as overseeing 573 purse seine transshipments hundreds of longline off-loadings

in Port Majuro.

- Purse seiners licensed to fish in Marshall Islands waters increased from 162 in 2015 to 190 in 2016. This was among factors contributing to a big increase in tuna tonnage caught in Marshall Islands waters, from 26,344mt to 76,384mt in FY2016.

- Preliminary data showed purse seine vessels had interactions with three sea turtles, all of which were released alive. Interactions with 37 marine mammals were recorded. All were unintentionally caught and all released dead. No seabird interactions were observed, while four interactions with whale sharks were noted and all were released alive.



Provisional purse seine transshipments in Majuro port in 2016

Flag	Number of PS Transshipment	SKJ	YFT	BET	TOTAL
China	73	44,980	6,002	474	51,529
Spain	1	936	70	378	1,385
FSM	22	12,423	1,266	387	14,098
Kiribati	17	11,123	1,746	222	13,108
Korea	27	24,829	2,502	248	27,606
RMI	77	50,105	6,415	650	57,247
NZ	1	899	23	23	946
PNG	77	40,142	8,488	643	49,350
Philippines	20	8,998	2,425	112	11,555
Solomon Is.	11	6,813	1,753	34	8,611
Tuvalu	6	5,945	110	0	6,061
CH-Taipei	161	92,060	19,720	1,940	113,882
USA	74	41,462	7,298	1,128	49,962
Vanuatu	6	5,382	220	0	5,608
TOTAL	573	346,097	58,038	6,239	410,948



Commercial catch data in the Marshalls EEZ in 2016

The number of foreign longline, pole and line and purse seine fishing vessels increased in FY2016, continuing an up-and-down trend since 2012. The 190 foreign vessels licensed in FY2016 was a five-year high, beating the 185 licensed two years earlier. The increase from FY2015 of 162 vessels to 190 in FY2016 saw a near tripling of catch tonnage, from just over 30,000mt in FY2015 to 79,669mt.

• **Purse seine vessels:** Total catch by purse seiners operating in the Marshall Islands EEZ was 76,384* metric tons (mt), a significant increase over the previous year when 26,344 tons were caught. The 76,384mt is the highest in the past five years, and reflects location of tuna schools during the year. South Korea, which had 32 boats registered in Marshall Islands in FY2016 compared to five the previous year, had 25 percent of the catch with 19,824mt. US, Taiwan and Papua New Guinea purse seiners had the next highest catches in Marshall Islands waters. About 90 percent of the catch was skipjack tuna.

• **Longline vessels:** FY2016 saw the second year of declining catches following a five-year high of 7,798mt in 2014. In FY2016, 2,855mt were caught. Longline vessels catching tuna in RMI waters in FY2016 were from China, Federated States of Micronesia and Japan, and Marshall Islands-chartered longline vessels. Forty-four percent of this total catch (1,245mt) was brought in by Marshall Islands longliners. FSM vessels had the next highest production at 970mt, while Chinese vessels pulled in 586mt. Of the 2,855mt tons caught, 1,616mt was bigeye tuna, 1,168mt was yellowfin tuna, while 71mt was albacore tuna.

• **Pole and line vessels:** Pole and line-caught tuna tonnage continued to decline



Processing tuna at Marshall Islands Fishing Venture. Below, MIFV boats.



for the second year. A total of 430mt was caught in the Marshall Islands EEZ in FY2016, down from FY2015's 618mts. The number of pole and line vessels licensed to fish in the Marshall Islands has dropped by nearly 50 percent, from 20 in FY2014 to 13 in FY2015 and 11 in FY2016. Skipjack tuna accounted for all but one metric ton of the total caught in FY2016.

* *Note:* tonnage figures are from fisheries observer logsheet data collected by MIMRA and are subject to change following evaluation and analysis. For example, the MIMRA FY2015 annual report stated that the FY2015 purse seine catch in Marshall Islands EEZ was reported at 26,694 metric tons. The final figure was revised to 26,344mt.

'Longline vessels catching tuna in RMI waters in FY2016 were from China, Federated States of Micronesia and Japan, and Marshall Islands-chartered longline vessels. Forty-four percent of this total catch (1,245mt) was brought in by Marshall Islands-chartered longliners. □



Above, a fisheries observers training group with their CMI instructors. Right, fisheries observers being briefed.



Fisheries observers move into the digital world

MIMRA's Observer Program collaborated with the College of the Marshall Islands and the Pacific Community (SPC) to recruit and train more fisheries observers to monitor the tuna fishery. During 2016, MIMRA maintained a group of 63 fisheries observers who both traveled on purse seine and longline vessels as independent monitors as well as overseeing purse seine and longline transshipments in Port Majuro.

The College of the Marshall Islands held two observer trainings in FY2016. These involved teaching trainees essential maritime knowledge ranging from basic ocean safety and survival to crewmanship and first aid. From this base of knowledge, the trainees moved into the

fisheries observer portion of the course. These trainings are held at the college's Arrak Campus on Majuro and engaged between 10 and 15 trainees per session.

During the year, 63 active observers carried out 175 purse seine and 28 longline trips during 2016. The fisheries catch data that these on-board observers collect is essential tuna stock assessments and for monitoring and enforcement of fishing rules in the Western and Central Pacific Ocean.

Observers were also utilized extensively to monitor and record transshipment activity in Port Majuro.

MIMRA expanded the use of digital tablets used by fisheries observers to record data both on vessels and during in-port transshipments. The Oceanic

Division continued ongoing work on improving direct importation of tuna unloading data into the TUFMAN II database. This data work was assisted by the SPC.

Plans are also in the pipeline for a trial of video cameras on-board a number of the foreign longline vessels that are based domestically in the Marshall Islands. Once the video camera trial is launched, it will require significant Oceanic Division staff training and time to reviewing video generated from longline fishing trips. This project is supported by The Nature Conservancy and is to be trialed on longline vessels in Marshall Islands, Palau, FSM, Solomon Islands and Japan.

Notable future prospects for the Oce-



Above, line workers at the Pan Pacific Foods loining plant in Majuro. Right, processed tuna. Below, grading fish at the Marshall Islands Fishing Venture plant in Majuro.



De-briefing key to data quality

anic Division's management of the tuna fishery involve expanded observer and de-briefer capacity development in 2017 and beyond as MIMRA continues to progressively train and recruit additional fisheries observers. MIMRA also aims to recruit and train additional port coordinators to monitor the large number of transshipments taking place in Majuro port.

The increasing number of fisheries observers require ongoing supervision and training, which is why the Oceanic Division focused on developing additional de-briefers during the year.

De-briefing of observers as soon as practical after a fishing trip is essential

to assuring quality of data as well as follow up on any issues that arose involving fisheries rules or involving the fisheries observer and crew members.

While purse seiners cannot leave port without a fisheries observer on board, observer coverage of longline vessels by MIMRA observers is minimal — although MIMRA observers did make 28 trips on longline vessels in 2016.

MIMRA did not place observers on board Japan's pole-and-line vessels in 2016 and as a result observer coverage for validation purposes was not achieved for the 11 pole-and-line vessels licensed to fish in the Marshall Islands' EEZ.

While purse seiners cannot leave port without a fisheries observer on board, observer coverage of longline vessels by MIMRA observers is minimal — although MIMRA observers did make 28 trips on longline vessels in 2016.

LEGAL

Treaties, laws, and domestic regulations and enforcement

The Legal Division focused its work on regional and international treaties, domestic fishery regulations, enforcement of fisheries law, legal trainings for MIMRA staff, and on-site consultations. During FY2016, this work included domestic enforcement

of fisheries laws and regulations and finalization of work on international treaty efforts for the Marshall Islands: legal documents necessary for domestic approval of the Niue Treaty on Co-operation in Fisheries Surveillance and Law Enforcement in the South Pacific

Region, and documentation of the Marshall Islands' marine boundaries. The Legal Division also initiated review of options needed for establishment of a Competent Authority for ensuring the quality of fish exports to the European Union and other nations.

REGIONAL/INTERNATIONAL ISSUES

Boundaries

Following passage of the Marshall Islands Maritime Zones Declaration Act 2016, the Minister of Foreign Affairs John Silk, with support staff from MIMRA and the Ministry of Foreign Affairs, deposited the maritime boundary legislation with the United Nations Headquarters in New York City.

This was the culmination of a three-year project in collaboration with the Ministry of Foreign Affairs and the Attorney General's office to define the marine boundaries of the Marshall Islands' 200-mile exclusive economic zone was successfully completed.



Minister John Silk

Niue Treaty

The Marshall Islands Nitijela (parliament) voted unanimously to adopt a resolution to ratify the Niue Treaty on September 20, 2016. This followed a Cabinet Minute approving ratification of the Niue Treaty. Nitijela approval is a positive milestone for the Marshall Islands, which will now be able to join other Member Parties to strengthen efforts in fisheries surveillance and law enforcement within the region to combat Illegal, Unreported and Unregulated fishing.

The final step in achieving its full membership in the treaty is to submit an Instrument of Ratification to the Director General of the Forum Fisheries Agency in the Solomon Islands.

New sea cucumber rules approved

Two new MIMRA domestic fishery regulations were put into effect in 2016. In December 2015, MIMRA submitted new Sea Cucumber Regulations along with supporting documents to the Marshall Islands High Court for public access

by Cabinet. The new regulations provide for significant penalties for anyone exporting sea cucumbers without a license.

Aquarium Fisheries Regulations were approved by Cabinet.

MIMRA submitted the Aquarium Fisheries Regulations to the Marshall

Islands High Court for public access online. MIMRA has authority to regulate the holding, purchase, sale and export of marine ornamentals.

The regulations also provide measures to control and support local governments' capacity to regulate the collection of marine ornamentals.



LEGAL

An example of illegal shark fishing.

Enforcement earns \$380K

MIMRA continued active enforcement of fisheries laws and regulations. This resulted in court filings against a number of fishing vessels and settlements leading to fines of \$380,000. MIMRA, with the support of the Marshall Islands Police

Department/Sea Patrol and the Attorney General's office, actively monitored commercial tuna fishing operations in Marshall Islands waters. Three fishing vessels/companies paid fines ranging from \$55,000 to \$250,000 during FY2016. Fishing vessels were fined for

various violations, including interference with a Fisheries Observer in the performance of his duties, violating the terms of their licenses, and possession of sharks and shark fins. A total of three fishing vessels/companies paid fines during this period.

Trainings and consultations

- **The Legal Division** conducted an in-house training for MIMRA Fisheries Enforcement Officers, both Coastal and Oceanic. With the support of the World Bank, MIMRA's legal advisor, Laurence E. Edwards, II, conducted an internal one-day workshop (with a morning session for the Coastal Division and an afternoon session for the Oceanic Division) for MIMRA Monitoring, Control and Surveillance (MCS) officers. The objective of the workshop was to provide an overview of MCS and explain their roles and responsibilities under relevant fisheries laws and regulations. In addition, the workshop catered for those responsible with daily activities during boarding and inspection of fishing vessels. A small group exercise was given to the participants on a hypothetical scenario to assist them in managing an investigation, including producing an investigation report, collecting of evidence, developing witness statements or affidavits, applying for search and seizure warrants and arrest warrants, discovery, and other actions).

- **Competent Authority in-house consultations** were held in November 2016

with FFA Trade Development Advisor, Market Access Specialist Jope Tamani. He conducted consultations with MIMRA and other relevant stakeholders in Majuro regarding the establishment of a Competent Authority. The objectives of the visit by the FFA Trade Development Advisor were to ascertain views and level of interest of the fishing industry for establishing a Competent Authority; and review the situation and suggest a way forward including recommendations on: Location of a Competent Authority; staffing needs; equipment; and activities needed to move

□ The objective of the workshop was to provide an overview of MCS and explain their roles and responsibilities under relevant fisheries laws and regulations. □

the Competent Authority forward.

Three options were put forward for consideration to assist MIMRA to establish a Competent Authority:

- **Option 1:** Establish a Memorandum of Understanding with the Ministry of Health for the delegation of powers to MIMRA for implementation of food safety measures in the fishery sector. The scope of delegation should cover at minimum exports of fishery products, but may also extend to imports and domestic controls especially in relation to management of the ciguatera hazard. Within the scope of an agreement with the Ministry of Health, the staff of the Sanitary Control Unit should be empowered as authorized officers under the Food Safety Act 2010.

- **Option 2:** Review and update the MIMRA Act and Regulations to address the need for the Competent Authority, including a request for technical assistance to FFA.

- **Option 3:** Utilize the provision of Chapter 1 of the MIMRA Act to develop a MIMRA Fish and Fishery Products Safety Standards that would guide the Competent Authority.

FINANCE

AND CORPORATE AFFAIRS

Highlights of FY2016: VDS, fishing rights revenue grows

The Marshall Islands Marine Resources Authority once again received an “unqualified” annual audit in FY2016 from auditors Deloitte & Touche. MIMRA maintained a high-standard of financial accountability while managing an expanding revenue portfolio.

The “unqualified” audit confirms that MIMRA maintained its financial reporting, including documentation required, in satisfactory condition for the annual audit.

“In our opinion, the financial statements...present fairly, in all material respects, the financial position of the Marshall Islands Marine Resources Authority as of September 30, 2016 and 2015, and the results of its operations and its cash flows for the years then ended in accordance with accounting principles generally accepted in the United States of America,” said the Deloitte & Touche report.

MIMRA continued to see revenue growth in sale of fishing days through the Vessel Day Scheme (VDS) operated by the Parties to the Nauru Agreement for its eight member nations, including the Marshall Islands. Overall, net operating revenue was up slightly in FY2016 compared to the previous year, with most of the revenue growth resulting from VDS and related fishing rights revenue. MIMRA reported a nearly 60 percent increase in operating revenue between FY2014 and FY2015, as VDS and

‘MIMRA continued to see revenue growth in sale of fishing days through the Vessel Day Scheme operated by the Parties to the Nauru Agreement. □

fishing rights revenue escalated dramatically through the PNA's cooperative effort and increase in fishing day prices. In FY2016, VDS and fishing rights revenue increased 11 percent on FY2015 as fishing day prices remained relatively stable. In FY2016, MIMRA received \$26,970,078 from VDS and fishing rights compared to \$24,406,606 the previous year.

Licensing and registration fees rose modestly, from \$1,621,500 in FY2015 to \$2,202,988 in FY2016. As tuna transshipment activities in Port Majuro continued to grow, MIMRA generated increased revenue from these in-port activities. In FY2016, transshipment fees generated \$799,000 compared to \$677,000 the previous year. The FY2016 transshipment fees amount was a nearly 50 percent increase over FY2014, indicating Majuro's development as the busiest tuna transshipment hub in the world.

Boat charter fees remained stable over the three years FY2014-16 at \$700,000 annually. Fisheries Observer fees dropped to \$544,040 in FY2016 compared to \$647,419 the previous year. Fishing violation fines were down significantly from FY2015, with \$380,000 collected in FY2016 compared to \$3,235,000 the previous year. Finally, “other” revenue as \$70,039 compared to FY2015's \$426,092.

Non-operating revenue of \$2,122,054 was recorded in FY2016, a significant increase over FY2015, when \$608,612 was collected. This included \$794,704 from MIMRA's equity in “Marshalls 201” purse seiner, a joint venture with Koo's Fishing Company of Taiwan. Grants brought in \$865,468, while interest on funds invested in savings accounts provide \$441,615.

MIMRA reduced its operating expenses for FY2016 to \$3,520,937 compared to \$3,821,084 the previous year, giving it total operating income of \$28,145,208. Of that amount, \$26,285,938 was transferred to the Marshall Islands national government to support budget requirements of the country.

After combining operating and non-operating revenue, and deducting transfers to the national government and operating expenses, MIMRA had net revenue of \$3,981,357 in FY2015. This helped MIMRA's net assets increase to \$41,229,375, an 11 percent rise compared to FY2015.

FINANCE

MIMRA: Management Discussion and Analysis for fiscal years 2016, 2015 and 2014

MARSHALL ISLANDS MARINE RESOURCES AUTHORITY
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Financial Condition and Operations of MIMRA

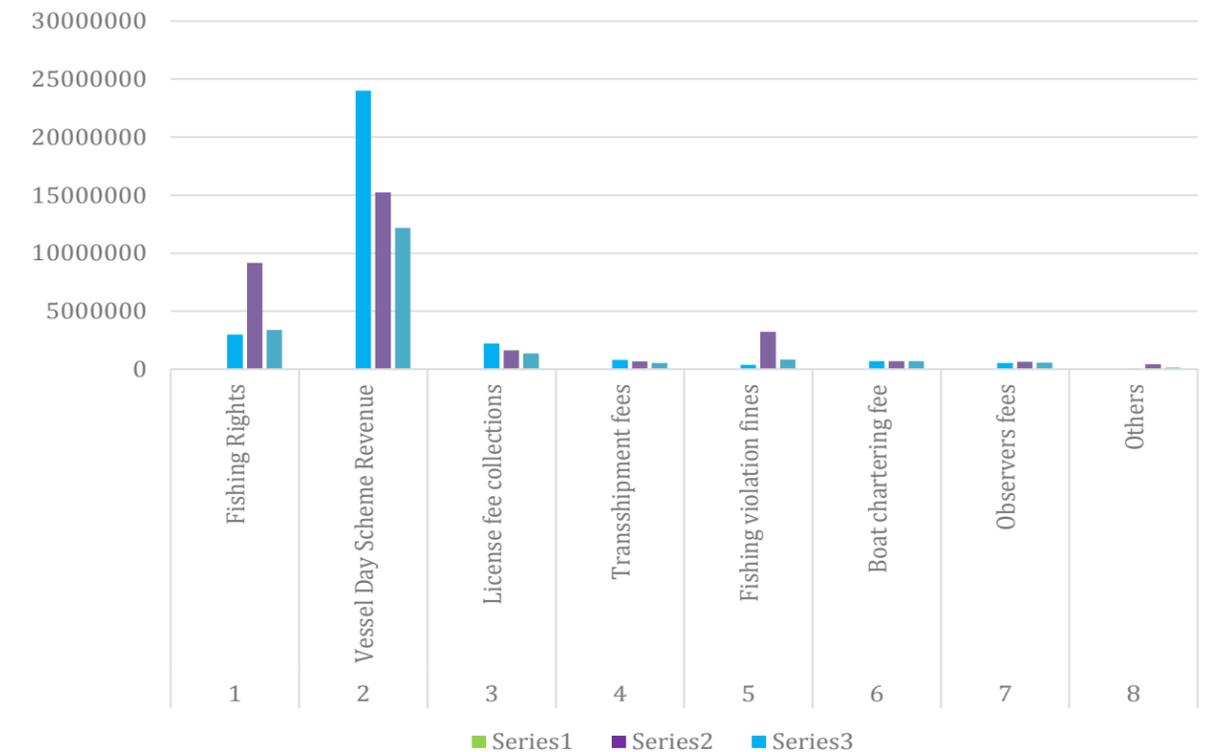
This table summarizes the financial condition and operations of MIMRA for fiscal years 2016, 2015 and 2014. This appears in the FY2016 audit.

	2016	2015	Change(%)	2014
ASSETS:				
Current and other assets	\$35,141,562	32,741,649	7%	\$19,662,248
Capital assets	305,109	202,955	50%	206,048
Non-depreciable assets	808,500	-		-
Investment in JV	5,298,919	4,811,417	10%	5,530,922
Total Assets	\$41,624,090	\$37,756,021	10%	\$25,399,218
LIABILITIES:				
Current liabilities	\$ 394,715	\$ 508,003	(22)%	735,196
Long-term liabilities	- 0 -	- 0 -		- 0 -
Total Liabilities	\$ 394,715	\$ 508,003		735,196
NET ASSETS:				
Investment in capital Assets	1,183,609	202,955	483%	206,048
Restricted	443,886	-	-	-
Unrestricted	39,601,880	37,045,063	6%	24,457,974
Total Net Assets	\$41,624,090	\$37,756,021	10%	25,399,218
Revenue, Expenses and Changes in Net Assets:				
Operating Revenue	31,666,145	\$31,569,468	.31%	\$19,815,209
Non-Operating Revenue	2,122,054	608,612	249 %	1,355,891
Total Revenue	\$33,788,232	\$32,178,080	5%	21,171,100
Operating revenues	3,520,937	3,821,084	(8)%	2,708,186
Non-operating expenses	26,285,938	15,773,000	67%	11,549,000
Total Expenses	29,806,875	19,594,084	52%	14,257,186
Changes in net assets	3,981,357	12,583,996	(68)%	6,913,914
Net assets at beg. of year	37,248,018	24,664,022	51%	17,750,108
NET ASSETS at end of year	\$41,229,375	37,248,018	11%	17,750,118

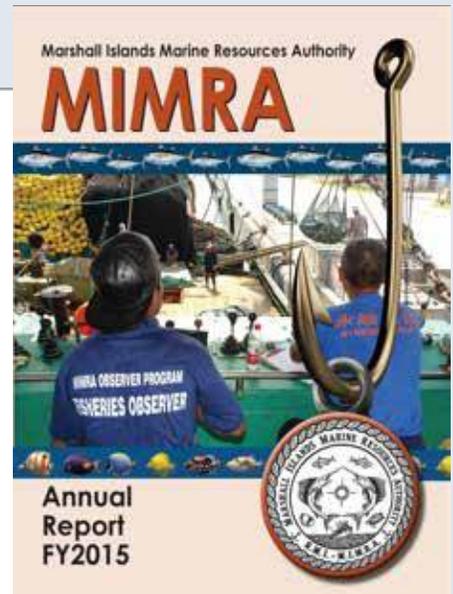
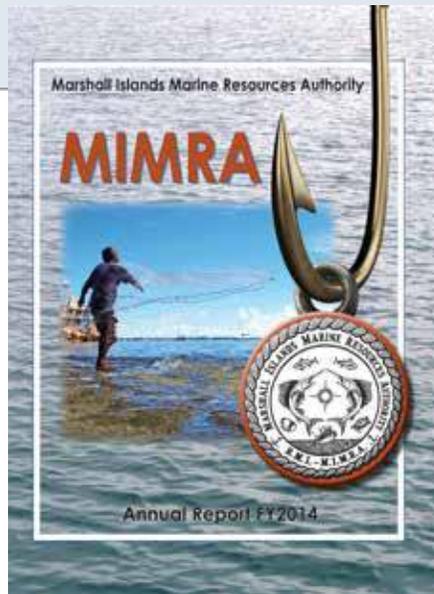
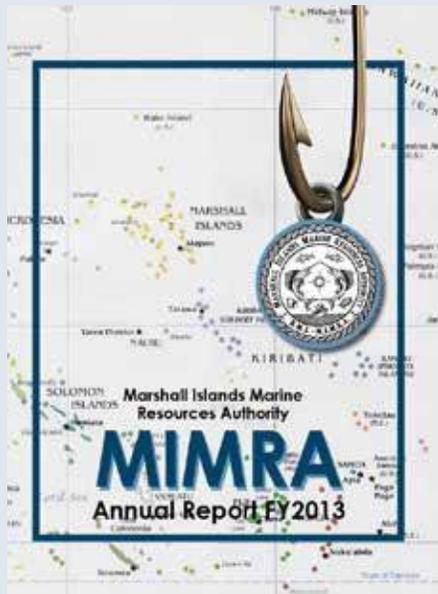
FINANCE

MIMRA: Management Discussion and Analysis for fiscal years 2016, 2015 and 2014

Comparative Revenue: FY2016 vs FY2015



	2016	2015	2014
1 Fishing Rights	2,978,087	9,177,671	3,383,643
2 Vessel Day Scheme Revenue	23,991,991	15,228,935	12,171,596
3 License fee collections	2,202,988	1,621,500	1,363,549
4 Transshipment fees	799,000	677,000	547,000
5 Fishing violation fines	380,000	3,235,000	825,000
6 Boat chartering fee	700,000	700,000	700,000
7 Observers fees	544,040	647,419	561,924
8 Others	70,039	426,092	146,523
9 TOTAL REVENUES	31,666,145	31,713,617	19,699,235
Recovery (Allowance) for bad debts	(144,149)	115,974	
NET REVENUES	31,666,145	31,569,468	19,815,209
Overall Change for FY2016 vs FY2015	96,677	0.31%	



Doing it by the book

The Marshall Islands Marine Resources Authority was singled out for praise by a book published by the Pacific Community (SPC) that provides a detailed overview of fisheries management in the Pacific.

The book, “Fisheries in the Economies of Pacific Island Countries and Territories,” by fisheries expert Robert Gillett, said MIMRA is one of the few fisheries departments in the island region that produces an annual report, which is essential for both promoting fisheries and being transparent in operations.

“Over the period 2001-2015 one of the most striking changes in relation to measuring fisheries benefits is the reduction in the amount of fisheries information that is readily available,” the author wrote in the book published in 2016.

“In the past, one of the most important tools for learning what was happening in a na-

“He praised MIMRA for the quality of its annual reports. “In this respect,” he said, “the annual report of the Marshall Islands Marine Resources Authority is exemplary.””

tional fisheries sector was the annual report of the government fisheries agency.”

These reports provide an important level of transparency about fisheries developments in each country not only for fishery researchers but the general public as well as the many people in island communities who have some link to fisheries.

Annual reports both promote the fisheries sector and “provide some degree of accountability of the fisheries agency,” said Gillett’s fisheries review.

But, he pointed out, “most fisheries agencies in the region do not currently produce a good annual report.”

By “good,” Gillett said he meant one that “gives accurate and concise information on the activities of the agency and on fisheries of the country, and is produced in a timely manner.”

He praised MIMRA for the quality of its annual reports. “In this respect,” he said, “the annual report of the Marshall Islands Marine Resources Authority is exemplary.”

Gillett urged regional and international development agencies to initiate programs to increase the capacity of government fisheries agencies to produce good quality annual reports.