An aerial photograph of a tropical coastline. In the foreground, a dense, dark green forest covers a hillside. Beyond the forest, the ocean is visible, with several small, forested islands and peninsulas. The water is a mix of deep blue and lighter turquoise, indicating different depths and reef structures. The sky is a pale blue with some light, wispy clouds. The overall scene is serene and natural.

PALAU

NORTHERN REEF ASSESSMENT

CONTROL AND VIGILANCE SYSTEM DESIGN

ASSESSMENT METHODOLOGY

This assessment represents the work of a multi-national team and was carried out in Palau over a 3-week period in March 2014. Research methods were developed and applied by WildAid in cooperation with The Nature Conservancy. Interviews were carried out with the following actors: Minister of Justice, Minister of Natural Resources, Fish and Wildlife Service Division, Division of Marine Law Enforcement, Koror State Department of Conservation and Law Enforcement Rangers, Attorney General, Ngarchelong Governor, Kayangel Governor, Ngarchelong State Conservation Rangers, Kayangel State Conservation Rangers, Palau Conservation Society (PCS), Bureau of Marine Transportation, Protected Area Network (PAN), Imperial Palau Corporation (IMPAC), Blue Marlin, Fish-N-Fins, Alliance of Palau Conservation Officers (APCO), among others. The Kayangel Protected Areas Network 2013–2018 Management Plan and 2012–2017 Ngarchelong Marine Managed Area Management Plan proved very useful. We are especially thankful for the time, guidance and support of Noah Idechong, Steven Victor and Bibbie Kumungai.

INVESTIGATIVE LEAD AND REPORT WRITING

Marcel Bigue, Marine Program Director
Oswaldo Rosero, Marine Operations Officer

COLLABORATORS

The Nature Conservancy

Noah Idechong, Consultant
Steven Victor, Deputy Director for Conservation
Chuck Cook, Senior Advisor for Fisheries
Lotus Vermeer, Marine Program Director
Matt Merrifield, Director of GeoDesign

The David and Lucile Packard Foundation

John Claussen, Program Officer, Western Pacific Subprogram
Stuart Green, Regional Advisor

Attorney at Law

Siegfried B. Nakamura
Ebil Matsutaro

Graphic Designer

Hugo Ugaz

ABOUT WILDAID

WildAid's mission is to end the illegal wildlife trade in our lifetimes by reducing demand through public awareness campaigns and providing comprehensive marine protection. We have successfully developed a comprehensive marine enforcement model that strengthens the key elements of the law enforcement chain: surveillance, interdiction, prosecution, and sanction in several MPAs throughout the developing world. We work with governments in the design of strategic control and vigilance strategies that use the power of technology to increase efficacy while lowering patrolling costs. Given weak judicial systems, we also work with partners to develop innovative fining mechanisms that ensure compliance.

www.wildaid.org

ACRONYMS

AIS	Automatic Identification System
CAPEX	Capital Expenses
C&V	Control and Vigilance
EMS	Electronic Monitoring Systems
EEZ	Economic Exclusive Zone
HP	Horse Power
MMA	Marine Managed Area
MPA	Marine Protected Area
NM	Nautical Miles
NGO	Non Governmental Organization
NTZ	No-take Zone
IMO	International Maritime Organization
OPEX	Operating Expenses
SOP	Standard Operating Protocols
UAV	Unmanned Aerial Vehicle
VHF	Very High Frequency
VMS	Vessel Monitoring System

Special thanks to:

the David
&
Lucile Packard
FOUNDATION

TABLE OF CONTENTS

01

05 EXECUTIVE SUMMARY

02

06 ASSESSMENT OBJECTIVE

03

07 CONTEXT ANALYSIS

07 National Level Considerations

10 State Level Considerations

04

12 RELEVANT SITE INFORMATION BY STATE

12 Relevant Site Information for Kayangel

14 Relevant Site Information for Ngarchelong

05

16 CONTROL & VIGILANCE ANALYSIS OF EXISTING
ENFORCEMENT OPERATIONS

16 Analysis of Existing Enforcement Operations

06

18 CONTROL AND VIGILANCE SYSTEM DESIGN

18 Control and Vigilance System Design Summary

19 PHASE I

27 PHASE II

07

30 ANNEXES

30 Timeline

34 Budget OPEX & CAPEX by State

37 Fuel Consumption

38 Cash Flow by State

39 Human Resources

41 High-power Video Camera Specifications

42 VHF Radio Network Specifications

44 Safety and Vigilance Equipment Requirements for Patrol Vessels

46 Floating Barge Refit Requirements



EXECUTIVE SUMMARY

The Northern Reef Project is home to some of Palau's most productive fishing grounds and encompasses a total of 3,930 Km² of territorial waters pertaining to the states of Kayangel and Ngarchelong. Its waters include important habitats of coral reef systems, barrier reef, patch reefs, sea grass, nesting beaches, unique atoll forests; and offer spawning and aggregation sites for nationally protected fish species and breeding areas for sea-birds among other species. Given the decline in fisheries, both states have recently established marine law enforcement programs to reverse trends and protect their near shore territorial waters (12NM).

In this report, we analyze the legal framework, competencies and jurisdictions of all marine enforcement agencies in order to design an enforcement system for the Northern Reef project that is practical, affordable and feasible to implement over a four-year time-frame. While it is the responsibility of each state to implement activities according to their respective timelines, it would behoove them to develop their programs in tandem given their similar stage in development and the synergies afforded through cooperation.

As illustrated in Figure 01, the final enforcement system design provides strategic sensor coverage to key fishing areas, MPAs and access ways. Our strategy combines high-power video cameras and a robust VHF marine radio network with the strategic placement of buoys, patrol vessels and a floating barge to provide a constant presence and fast response capacity throughout both Marine Managed Areas (MMAs). All CAPEX and OPEX decisions were

made in consideration of a highly limited budget, which is currently underwritten by the Protected Areas Network (PAN). More importantly, we have defined a blueprint of critical steps for the capacity building and professionalization of the Rangers, who truly are the core component of the Northern Reef enforcement program. Please find a budget summary below which highlights costs by state.

CAPITAL EXPENSES	KAYANGEL	NGARCHELONG
Surveillance System Cost & Control Center	\$36,800	\$36,800
Tower Repair/Construction with Emergency Power Supply	\$26,200	\$75,700
Telecommunications Equipment	\$8,940	\$8,940
Mooring System	\$15,110	\$20,600
Floating Barge Refit w/ Spare Parts	\$0	\$59,000
<i>Subtotal</i>	<i>\$87,050</i>	<i>\$201,040</i>
ANNUAL OPERATING EXPENSES		
Staffing	\$75,600	\$75,600
Fuel	\$40,481	\$40,841
Maintenance and Repair	\$19,349	\$19,412
Office Expenses	\$3,863	\$3,863
<i>Subtotal</i>	<i>\$139,293</i>	<i>\$139,716</i>
<i>Total</i>	<i>\$226,343</i>	<i>\$340,756</i>

FIGURE NO. 01
Final Surveillance Coverage after Phase I & II
with Zonification

ASSESSMENT OBJECTIVES

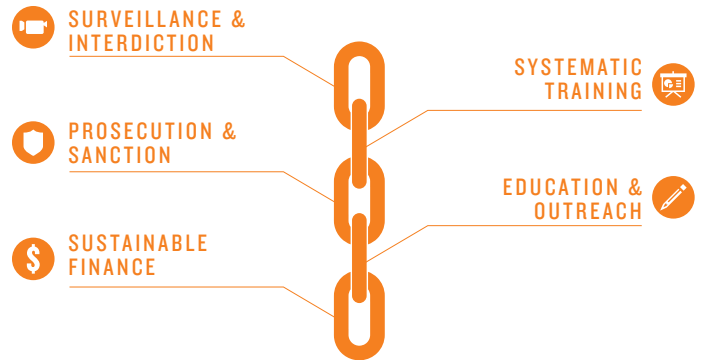
The main objective of this assessment is to design a cost effective control and vigilance system for the Northern Reef project, which is comprised of all state waters in Kayangel as well as the most ecologically important and productive waters of Ngarchelong state. The specific objectives are:

1. Develop a practical control and vigilance strategy for the Northern Reef project based on interviews of local enforcement actors and fishers, analysis of existing management strategies and a comprehensive site visit.
2. Prioritize a series of recommendations to optimize patrol strategies/costs as well as increase detection efficacy. The final recommendations will include the surveillance system design including potential electronic systems, vessels, human resource requirements, energy supply needs and overall cost estimate (CAPEX and OPEX).
3. Provide a blueprint for decentralizing the administration of justice to State authorities that is grounded in existing constitutional law and is supported by the traditional bul system.

METHODOLOGY

WildAid focuses on the law enforcement chain, that encompasses the activities of detection, interdiction, prosecution and the fining of lawbreakers. An effective law enforcement system should dissuade potential lawbreakers from committing illegal activities as the consequences/risks associated with apprehension outweigh economic gain. The law enforcement chain requires that each link function in an effective manner and no one link is more important than the other. Also critical, yet not part of the enforcement chain, is the vital role that outreach and the education of stakeholders plays in MPA acceptance and compliance.

While all five components are vital, we will focus on the following four key components of the law enforcement chain for Phase 1:



Surveillance & Interdiction: We will examine cost effective ways to improve surveillance and interdiction for the Northern Reef Project. Advances in technology can help us reduce costs while increasing coverage, however, technology too has its limitations, as we still need a strong and clear legal framework, vessels and trained personnel in the water.

Systematic Training: We will examine the key elements required to establish and sustain an effective law enforcement training program. The regulations, systems and assets are only as useful as those who are trained to operate and maintain them.

Prosecution & Sanction: We will examine traditional and non-traditional strategies to enforce regulations. Bottom line: Without criminal or administrative sanctions, fishers will return tomorrow.

Education & Outreach: We will explore strategies to obtain stakeholder buy-in, disseminate the benefits of conservation and ensure compliance.

Sustainable Finance: While there is no magic formula, there is a price tag to enforcement. We aim to examine who among stakeholders will ultimately pay to enforce MPAs.

CONTEXT ANALYSIS

NATIONAL LEVEL CONSIDERATIONS

In general, there is promising political will to prioritize marine conservation in Palau that is best exemplified by the following legislation and initiatives:

- The Palau Marine Protection Act of 1994 which represents the first attempt to address declining fisheries;
- The creation of the Palau Protected Areas Network (PAN) in 2003. The PAN is a national mechanism designed to protect the nation's critical biodiversity and ensure the effective conservation of resources;
- Palau's 2005 commitment to "effectively conserve at least 30% of the near-shore marine resources and 20% of the terrestrial resources across Micronesia by 2020" via its leading role in bringing the Micronesia Challenge to fruition;
- The 2009 establishment of the Green Fee (a US\$30 tourist exit fee) of which 50% serves as a sustainable PAN funding mechanism to ensure effective conservation;
- Palau's declaration to create the world's first "shark sanctuary" in 2009,

which would prohibit all commercial shark fishing within its Economic Exclusive Zone (EEZ) waters; and

- The recent executive declaration for the cessation of all commercial fishing within Palau's EEZ waters thereby allowing the expiration of current fishing permits.

Prior to the design of the Northern Reef enforcement strategy, we carried out an exhaustive investigation into the legal framework and into the various actors involved in maritime enforcement. While the final design is primarily focused on the state level, a clear understanding of the national framework is critical for identifying jurisdictions and competencies so that final recommendations take into account all possible scenarios and do not contradict existing national law. As most national and state institutions possess limited resources, we also aim to identify possible inter-institutional mechanisms to fill gaps and strengthen compliance. Finally, we will analyze the feasibility for greater decentralization of sanction authority to state Rangers and provide a blueprint to improve administrative and criminal sanctions.

Despite being a nation of 19,907 residents¹, Palau possesses numerous laws and a complex regulatory framework, which delegates competencies to a number of Bureaus and/or agencies for their execution. For brevity, we only highlight the following laws and their relevance to enforcement of maritime regulations and the role of states as determined by constitutional law.



IMAGE NO. 01
National Image of Prosperity on Capitol Building

LAW	DETAIL
<i>Republic of Palau Constitution</i>	<ul style="list-style-type: none"> Palau claims a total territory that includes Velasco and Ngeruangel Reef and Kayangel Island down to Hatohobei Island and Helen's Reef extending to a 200 nautical mile EEZ, subject to bilateral agreements or treaty obligations under international law.² States entitled to revenues derived from resources and fines collected for violation of any law within the marine area that is 12 nautical miles seaward from traditional baselines.³
Title 2: <i>Organization of the Executive</i> <i>Branch—Relevant Ministries</i>	<ul style="list-style-type: none"> 104 Ministry of State: Responsible for treaty matters, relations between national and state governments, relations with other nations, UN and other international organizations. 105 Ministry of Justice: Provides legal services to the national government, protects safety and peace of the public, maintains order, and enforces all laws. 106 Ministry of Public Infrastructure, Industries and Commerce: Responsible for government-owned facilities and equipment; sea transportation, including ports; and communications. 108 Ministry of Finance: Responsible for revenue, personnel, & property. 121 MNRET⁴: Include providing monetary and technical assistance to state governments on a non-discriminatory and equitable basis to further the goals of the Ministry; BMI⁵ must: <ul style="list-style-type: none"> Assist development of fisheries programs at state level; Assess & evaluate the commercial viability of certain marine life; Assist MNRET Minister in establishing guidelines and conservation measures to safeguard against over exploitation of near shore marine resources, including developing and implementing a comprehensive fisheries policy and in negotiating multi-lateral, sub-regional, and bilateral fisheries agreements.
Title 24: <i>Environmental Protection</i> <i>Includes:</i> <i>Protected Sea Life, Endangered Species Act, and Protected Areas Network</i>	<ul style="list-style-type: none"> 102: EQPB⁶ is established, which can call upon any department or agency of the national government for technical assistance; Board administers a permit system for any pollutant into the water 1201 Protected Sea Life – General Provisions: all protected sea life and all property used in violation of protection of sea life laws must be forfeited to the Republic: <ul style="list-style-type: none"> Any citizen or resident of Palau may initiate a civil action in the Supreme Court to enjoin violations All laws protecting the dugong may be enforced by citizens or residents, and must also be enforced by BPS⁷, state law enforcement officers, and personnel in BMR as designated by the Minister. 1231 Protected Sea Life – Dugong: Taking or possessing dugong prohibited unless granted by MNRET Minister through regulation; penalty ranges from imprisonment of 6 months to 1 year or a fine of \$5,000 to \$10,000 for the first violation; for every violation thereafter, imprisonment of at least 6 mos. but not more than 3 years, or a fine between \$10,000 to \$20,000 or both. 1001 Endangered Species Act: MNRET administers this, with endangered and threatened species listed by regulations and prohibited from being taken, with certain exceptions; penalty of a fine of up to \$10,000 or imprisonment of up to 1 year or both. 3401 Protected Areas Network (PAN): System of designating protected areas, with funding and technical assistance provided to states; states own resources within their PAN; MNRET administers, along with PAN Management Committee and PAN Technical Committee; allows for enforcement powers to go to state authorities; criminal penalties are a fine of at least \$500, imprisonment of up to 1 year, or both; second violation is a \$2,500 fine, imprisonment of up to 2 years, or both; subsequent violations have a penalty of up to \$10,000, 5 years imprisonment, or both.
Title 27: <i>Fishing</i> <i>Includes:</i> <i>Marine Protection Act of 1994</i>	<ul style="list-style-type: none"> 123 MNRET Functions: Adopts regulations regarding all living resources in Palau's EEZ; negotiates and concludes foreign fishing agreements; issues foreign fishing permits, reports to the President and OEK every year. 181 Enforcement and Penalties: Powers of officers authorized by the AG's office include the ability to make arrests, board and search any fishing vessel subject to this chapter, seize any fishing vessel, gear, or other evidence, execute a warrant, or exercise any other lawful authority; anyone providing information to the AG about violations or initiating a civil proceeding may also receive an award; criminal penalties include fines of up to \$250,000 for some violations, or \$500,000 for others; if in committing an offense, an officer authorized to enforce this law is injured or fears imminent bodily injury, the fine goes up to \$1,000,000 for each violation; each day of continuing violation is considered a separate offense; civil penalties include \$500,000 for each violation, each day being a separate offense; any fishing vessel in violation will be forfeited to the national government; there are also reward provisions for anyone providing information to the AG about violations. 202 Monitoring of Foreign Vessels in EEZ: All foreign vessels must have an automatic location communicator that continuously transmits data to the Bureau of Oceanic Fishery Management; tampering with the automatic location communicator may result in a felony, including imprisonment of up to 2 years, a fine of \$50,000 or both. 1201 Marine Protection Act: Regulates the taking of certain species of marine and terrestrial organisms and prohibits or limits certain fishing methods; BPS has primary enforcement responsibility, but Minister or his designee can authorize others, including state employees, to take certain steps to enforce this Act. <ul style="list-style-type: none"> Criminal penalties are \$250 for the first conviction; \$500 and 30 days in jail for the second; \$1,000 and up to 6 months jail for the third; \$5,000 and up to 1 year in jail after the third conviction; may increase or decrease, depending on species taken. Civil penalties go up to \$200,000; liable jointly to the affected state and national government.
Title 34: <i>Public Health, Safety and Welfare—Water Safety</i>	<ul style="list-style-type: none"> 5212 Division of Marine Law Enforcement: has the power to license all boats operated for hire to transport passengers; licenses the use of SCUBA and other equipment; can appoint water safety inspectors who have the authority and powers in this section, who must be members of BPS and can issue citations and make examinations, subject to certain limitations; investigates water-related accidents; penalty is imprisonment of up to 1 year, fine of up to \$1,000 or both.

INTER-INSTITUTIONAL COORDINATION & DECENTRALIZATION

The legal analysis reveals that inter-institutional agreements among the national and state government agencies are required to enforce comprehensive management plans for Kayangel and Ngarchelong. When drafting state regulations, it will be important to take into consideration existing nationally set fines and national/state competencies. For example, Palau's international treaties or existing national laws may limit state authority in the promulgation or enforcement of certain species-specific regulations. National laws such as the Marine Protection Act delegate authority to a national agency, the Division of Marine Law Enforcement

(DMLE), thereby requiring states to coordinate directly with these agencies in the enforcement of certain regulations.

While state capacity is currently limited, national agencies would ideally delegate authority to state Rangers to enforce national regulations over time. The act of "deputization" is supported by Palauan constitutional law and essentially requires the Bureau of Public Safety (BPS) of the Ministry of Justice (MOJ) to grant "temporary powers" to state government Rangers via the signing of a Memorandum of Understanding (MOU). The MOUs empower state officers to enforce national laws, improve response time and allow

for a comprehensive approach to law enforcement. Importantly, deputization is not new, as a precedent exists between the BPS and state governments, such as Peleliu.

SANCTIONS

In cooperation with legal counsel, our investigation into the efficiency of prosecution and sanction at both the national and state level was met with limited success. We normally aim to identify general trends, the amount of time from citation to case resolution, potential bottlenecks among other factors that can affect the effectiveness of the legal system. Our brief analysis revealed that illegal fishing cases have historically taken anywhere from 5–36 months from

citation to final resolution. International fishing violations took the most time for resolution and 80% of all cases processed by the AG resulted in a monetary fine and/or jail time. As criminal cases take priority over civil cases in Palau, the average case time was 6 months for criminal cases while 2-3 years for civil cases. No case information was available at the state level due to the absence of environmental laws and regulations. It is worth mentioning that the amount of existing fines are too low and as a result there is limited return on state investment in prosecution. Finally, delays are primarily caused by the scheduling conflicts of both lawyers and judges.

At the national level, we interviewed the following key actors involved in maritime enforcement.

GOVERNMENT AGENCY	COMPETENCY	PHYSICAL PRESENCE	SCOPE OF ACTIVITIES	BUDGET, PERSONNEL & INFRASTRUCTURE	OBSERVATIONS
<i>Division of Fish and Wildlife Protection (DFWP)</i>	Fish and wildlife resources enforcement according to provisions of Titles 24 and 27 of the Palau National Code. Community Liaison, Intelligence Gathering and Undercover investigations. Officers bear firearms and possess power of arrest. Jurisdiction: 0 -12 NM.	Base in Koror; limited presence in states given budgetary constraints.	Focus on enforcement of coastal fisheries. Intelligence and target sharing: Customs Division, Immigration Division, BPS Maritime Law Enforcement, Drug Enforcement, and Criminal Investigations Divisions.	\$142,200 (2014): \$123,320 for staff & \$18,800 for operating expenses. 8 staff including Chief. FWS officers possess firearms, private VHF network with limited handhelds, binoculars, and cameras. No GPS, radar or night vision devices. 4 patrol vessels with 85-220 HP outboard motors (1 was not operational). Marine patrols carried out 2 days a week.	Officers undergo 3-month official training and have an average 2-year tenure. Peak season for DFWP (June - January). DFWP officers do not currently possess administrative citation capacity, but did over 7 years ago. All violations are sent to the Attorney General (AG) for resolution.
<i>Division of Marine Law Enforcement (DMLE)</i>	Fishery Enforcement / Immigration & Customs / Deep Sea Search and Rescue. Officers bear firearms and possess power of arrest. Jurisdiction: 12 - 200 NM.	Koror	Focus on enforcement of commercial fisheries. 75 commercial vessels permitted to fish within EEZ: 50 are Taiwanese & 25 Japanese.	\$600,000 (2014)/ 26 staff (24 of which rotate on patrols). Radar aboard vessels, VMS for Foreign Fisher Agency (FFA) licensed fishing vessels/ 4-hour frequency. Australian government + Nippon Foundation who underwrite operating costs (fuel, spare parts and maintenance.) 3 patrol vessels: 105 ft./ Endurance 9 day/ Australian 13 minimum crew, CAT motors / 48ft.vessel, CAT motors donated by Nippon Foundation for surveillance 12 nautical Velasco Reef / Additional 48ft. patrol vessel and one year funding for 5 crew arriving in 2014. One 8 -10 day marine patrol per month/ 48 footer: depending on weather & availability of crew.	Officers undergo 1-year official training in Palau and also receive training at the Australia Maritime Safety Authority in Hobart, Tasmania. There is very little turnover. 600,000+ km ² EEZ is very large for only one oceanic patrol vessel. DMLE officers do not possess administrative citation capacity. All violations are sent to the AG for resolution.
<i>Attorney General (AG)</i>	Enforcement of national level infractions originating primarily from DFWP and DMLE.	Koror	Few DFWP cases processed given limited budget of DFWP. 3 international violations in 2013: 1 Indonesian & 2 Philippine vessels. Confiscate vessel, crew detained for 3 months and levy \$150,000 fine.	8 Attorneys and 4 staff.	The AG stated that the clan structure still precedes constitutional law which poses difficulties for enforcing regulations.
<i>Bureau of Marine Management (BMM)</i>	Maritime authority	Koror	BMM responsible for registration of all outboard motors and carries out national vessel registry for all vessels above 65 feet.	Less than \$75,000 budget and 4 staff dedicated to maritime transportation division.	No central database for vessel registration as competency of states. BMM has no access to VMS. Limited training and inspection capacity.

In summary, the DFWP and DMLE have clear jurisdictions and competencies, however, given resource constraints, their effectiveness is limited. With only \$18,800 for operating expenses, the DFWP limits its number of patrols, concentrates its efforts in

Koror and operates on port inspection, outreach and undercover investigations. The DMLE is markedly better equipped and funded than the DFWP, however, it possesses only one oceanic vessel for patrolling 600,000 km² of territorial waters. Even with the

deployment of satellite VMS on commercial fishing vessels and Unmanned Aerial Vehicles (UAVs) (in the not so distant future), there is a clear need to strengthen their interdiction capacity. The AG appears keen on enforcing environmental crimes, however, the attorneys are only able to process cases as they arrive on their desk. In 2013, the AG processed 7 and 3 environmental crimes for the DFWP and DMLE, respectfully. The AG assumes that most illegal activities go undetected due to lack of presence of enforcement agents.

It is important to note that the BMM is truly limited in its scope of work as a maritime authority. The BMM focuses primarily on the annual registration of all “commercial vessels” greater than 65 feet, however, 90% of all vessels in Palau waters are of shorter length. Typically, a national vessel registry would be needed to ensure control of vessels and seafarers, especially if a collaborative monitoring system such as Automatic Identification System (AIS) were to be deployed to improve vessel traffic monitoring. Vessel

registration is currently left to states while marine motor registration is carried out by the BMM. As a minimum we recommend the standardization of vessel registration among states that should then be available for universal maritime agency access via the web. In addition, states or the BMM should mandate that all vessels clearly paint their boat registry number in plain view for identification purposes. This simple measure would greatly assist Kayangel and Ngarchelong Rangers in the identification of all vessels operating in territorial waters and coordinating with neighboring States in the event of an infraction by an out-of-state vessel. Fisher vessel origin could be further defined by requiring vessel operators to fly or paint their respective state flag on their vessel. This would have the added benefit of enabling local fishers in easily identifying and reporting out-of-state vessels to their respective authorities.

STATE LEVEL CONSIDERATIONS

The Constitution of the Republic of Palau delegates specific powers to state governments, and reserves all other powers to the national government. The states have been specifically granted “ownership” of their water resources within the water area surrounding their land (to 12 nautical miles). The Constitution specifically expands the scope of this ownership right by allowing the states to collect revenues with regard to their territorial waters. State constitutional authority shares management of near shore marine resources with the traditional leaders, state owners, and other national management bodies.

At the time of our visit, neither Kayangel nor Ngarchelong possessed state rules, regulations or fines for the enforcement of PAN sites or fisheries policies within their respective territorial waters. These regulations are critical as without them, Rangers are only able to ask offenders to either leave territorial waters or stop an activity. In this section, we propose a blueprint for states to follow as they establish their regulations and set fines for violations. This does not require reinventing the wheel as Koror State can serve as an example⁸. One obstacle faced by the states is the cost of hiring private attorneys to represent the States in enforcing their laws.

Most states in Palau hire private attorneys to help them in legal matters. Private attorneys in Palau charge on average \$100 to \$150 per hour (excluding costs). Utilizing a private attorney to enforce state laws will likely result in legal fees that would be considerably more than the amount of the fine. In the event a fine is contested, a one-day citation trial (plus preparation) will cost about \$800 to \$1,000 and thus, the state will have to absorb the cost of such enforcement/prosecution, if the fine being collected is less than the legal fees.

OUR GENERAL RECOMMENDATIONS ARE:

1. Hire one lawyer to draft regulations for both states in cooperation with the Palau Conservation Society (PCS). Traditional leaders should be involved in the process in order to incorporate bul considerations as Rangers cannot enforce traditional laws and we must attempt to codify key traditions into constitutional law if at all possible. In addition, we recommend involving the co-management advisory group established within the Cooperative Agreement Between the States of Kayangel and Ngarchelong on



CITATION OR WARNING

CITATION* ISSUED OR VIOLATOR WARNED AND NOT CITED.



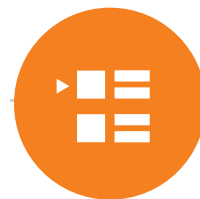
GOVERNOR'S OFFICE

IF CITED, THEN CITATION IS FORWARDED TO THE GOVERNOR'S OFFICE OR THE LAW ENFORCEMENT DEPARTMENT FOR REVIEW AND PROCESSING.



CITATION FILED TO COURT

STATE LAWYER OR LAW ENFORCEMENT OFFICER FILES A COPY OF THE CITATION IN COURT.**



CITATION PAID OR CONTESTED

IN MOST CASES, A VIOLATOR CAN PAY OFF THE CITATION AT THIS POINT. IF THE VIOLATOR CHOOSES TO CHALLENGE THE CITATION THEN THE CASE GOES TO COURT.

Sustainable Fisheries Management and PAN Sites Management (signed and dated November 22, 2013). As mentioned earlier, it is vital to ensure that national and state law jurisdictions are also taken into account;

2. Fines should be set as high as possible to ensure compliance. The lawyers should utilize existing national and PAN legislation as a point of reference. The legal fees or costs of prosecution should be taken into account when setting the fines for violations within the Northern Reefs;
3. Design a simple citation format with checklists that requires minimal open-ended writing;
4. Provide laws to clerk of courts (log book);
5. All citations can be contested in the court of law in Koror & the state must have an attorney on retainer to litigate on the state's behalf. Kayangel and Ngarchelong should retain one attorney to prosecute citations relating to the Northern reef and share the legal costs.

NORTHERN REEF FISHERY CHARACTERISTICS

"The people of Palau have traditionally depended on fish and other marine resources for a major part of their diet. Coastal fisheries in the Republic are generally considered to be concentrated between the barrier reef and the shore. Palauan villagers have traditionally held exclusive rights to harvest marine resources in their own traditional fishing areas under a system of customary marine tenure (Johannes,

1981; 1991), where boundaries are well known and conservation enforced by village chiefs. Although this system remains valid at the village level today, poaching is widespread and enforcement of traditional conservation regimes is weak. This has led to chiefs and fishermen recommending the establishment and enforcement of laws to protect their traditional areas, especially from outsiders; both foreigners and people from other states."⁹

Relevant fisher information for both Kayangel and Ngarchelong includes:

- There are an estimated 208 recreational/subsistence and 4 full-time fishers for both States distributed over no more than 70 vessels. Fishing is not a primary source of income for locals, but a tradition.
- Target species: Groupers, rabbit fish, snapper, parrotfish, wrasse, lobster, unicorn and surgeon fish, emperor fish, sea cucumber, giant clams, corals, trochus, green turtles, mangrove and coconut crabs.
- Finfish fishers mainly target the lagoon, but a quarter of all male fishers also fish the outer reef. The sheltered coastal reef is the least targeted habitat for finfish. Invertebrate collection focuses on soft benthos (sea grass) for bêche-de-mer and reeftop for giant clams.¹⁰
- Typical finfish catches from the lagoon, the main habitat targeted, include the greatest variety of different fish species and species groups, with emperor fish determining 28%, and snappers accounting for another 17%, parrotfish (13%), followed by groupers

(10%), surgeon and unicorn fish (9%) and rabbit fish (>7%). Outer-reef catches mainly include emperor fish (39%), jacks (29%), groupers (21%) and snappers (13%).¹¹

- Fishing gear: Hand lines, spear guns, rod and reel, and reef fishing with nets (no smaller than 3-inch mesh). Use of gillnets and SCUBA gear prohibited.

TOURISM

There are currently two tourism companies operating in the Northern Reef area: the Imperial Palau Corporation (IMPAC) and Blue Marlin. Both carry out snorkeling and islands visits while IMPAC also includes sport fishing (catch and consume). IMPAC, the larger of the two, has seen its business grow from 2 trips of 2-5 passengers a week to daily trips with 10 customers in 2013. IMPAC expects to grow the business by sending two to three 10-passenger vessels daily within the next 5 years. IMPAC will make a significant investment at the Ollei dock in Ngarchelong as they want to develop a sport fishing service for the Northern Reefs. Their plans include investing \$300,000 to construct a marina, gas station and fish market at the Ollei dock (major logistic improvement). Blue Marlin, on the other hand, had yet to reinstate its Northern Reef tours after Typhoon Haiyan destroyed the town in Kayangel. When compared to the Rock Islands, the amount of tourists is negligible, however, there is tremendous potential and IMPAC will be driving tourism growth into the region. It will be important to monitor the growth of the sports fishing industry and its effects on the fisheries in the Northern Reefs.



COURT PROCEDURES

COURT PROCEEDINGS

- STATE IS REPRESENTED BY ITS ATTORNEY;
- DEFENDANT IS REPRESENTED BY HIS OR HER PRIVATE ATTORNEY OR IF DEFENDANT QUALIFIES THEN HE OR SHE CAN BE REPRESENTED BY A COURT APPOINTED ATTORNEY OR THE OFFICE OF THE PUBLIC DEFENDER.



DEFENDANT'S OPTION

DEFENDANT EITHER:

- A) ENTERS A NOT GUILTY PLEA AND PAYS A BAIL SET BY THE COURT AND GOES TO TRIAL AND THE COURT DECIDES***;
- B) ENTERS INTO A PLEA AGREEMENT WITH THE STATE AND ACCEPTS A LESSER SENTENCE OR;
- C) DEFENDANT'S CASE IS DISMISSED.

1. *At any point in the process, the actor in each box may decide to hold the citation instead of forwarding it to be pursued (i.e. Decline prosecution).
2. **Prior to the citation arriving in court, the state must arrange with the clerk of courts and set up the citation process, including but not limited to providing its state laws that are listed in the citation to the clerk of courts.
3. ***The amount of the bail is set by the court or the court could decide to release the defendant on his own recognizance.

RELEVANT SITE INFORMATION BY STATE

RELEVANT SITE INFORMATION FOR KAYANGEL

KAYANGEL LOCATION & SIZE

Kayangel is a sandy atoll island located 25 nautical miles north of Babeldaob in the northern most State of the Republic. The

Kayangel Atoll lagoon is roughly 12.1 Km² within a proposed management area encompassing approximately 1,966 Km².

BIODIVERSITY INFORMATION

The Kayangel Protected Areas Network is formed by five protected areas connected by the managed territorial waters of Kayangel. The network includes important habitats of coral reef systems, barrier reef, patch reefs, sea grass, nesting beaches, unique atoll forests, and the full functionality of an atoll island ecosystem. The marine protected areas in the network offer spawning and aggregation sites for nationally protected fish species, nesting beaches

for turtles, breeding areas for seabirds, and homes to the IUCN Red Listed *Etelis carbunculus* or Ruby Snapper, the locally popular Onaga or *Etelis coruscans*, the flame snapper, and other highly valued deep water snappers.¹² Limited surveys have recorded 126 species of stony corals (Maragos et al. 1994), 51 species of algae, and 5 species of sea grass (Tsuda 1981)¹³.

KEY MANAGEMENT AUTHORITY

The Kayangel Conservation Act of 2012 (KYPL 14–9) establishes the Kayangel Protected Areas Network (KPAN). The law further established the Department of Natural Resources and Enforcement Services (DNRCES), and provides a process for adoption of the Management Plan and its Rules and Regulations. While

ultimately the Governor is responsible for the implementation of the management plan, the DNRCES is responsible for the daily administration, enforcement, planning, resourcing, budgeting, and reporting on behalf of the Governor.

LICENSED ACTIVITIES PER MANAGEMENT PLANS

- Commercial fishing
- Sport fishing (Catch and Release)
- Tourism: Scuba diving and snorkeling
- Trochus harvest
- Education and Research
- No license required for subsistence fishing nor green turtle harvesting

COMMUNITY, ISLAND INFRASTRUCTURE AND EQUIPMENT

- 70+ residents divided into 32 households. An estimated 80% are involved in fishing activities.
- Typhoon Haiyan in November 2013 destroyed the town. Currently residents in Koror awaiting reconstruction of school and prefabricated homes.
- Community center located by large wharf, ice machine (\$5 basket) and state office.
- Energy: Two large State generators & one generator of the

Palauan National Communication Company (PNCC). PNCC also possesses a small solar generation plant located near the cellular tower.

- **Logistics:** A state vessel supplies Island on paydays every two weeks.
- **Radio Network:** One VHF vessel base station and no handheld radios at time of interview.

- **Cellular:** Knocked out by storm. Microwave link was operational, which allows three-line fixed telephone service. When operational, cellular service is limited to land and approximately 5NM coverage at sea.
- **Port:** One centrally located port and other private access points around the Island.

Zoning Map

PROTECTED AREA SITE	SIZE IN KM ²	USE CATEGORY	CONSERVATION TARGET
Ngeruangel Marine Reserve	34 Km ²	Non-extractive / Sustainable Harvest of Trochus	Green/Hawksbill turtle nesting, Great Nested Tern and Micronesia Megapode breeding area
Ngkesol Marine Protected Area	163 Km ²	Sustainable	Deepwater snappers
Ngeriungs Bird Sanctuary IBA	0.34 Km ²	Sustainable	Micronesia Megapodes / Coconut Crab / Sea turtles
Chermall	.003186 Km ²	Restricted/ Non-extractive	Sacred sites / Flora
Ngerusebek	.003404 Km ²	Restricted/ Non-extractive	Sacred sites / Flora
Kayangel Territorial Waters	1,685 Km ²	Sustainable	Coral reef system

NATURE OF THREATS AND MANAGEMENT CONCERNS

<i>Illegal Fishing</i>	<ul style="list-style-type: none"> • Out-of-state fishers access Kayangel by 5-7 meter skiff using 100-200 HP outboard motors. • Foreign fishers: Philippines, Chinese and Indonesia (Live Reef Fish Trade) • Overfishing from unlicensed local commercial fishing & unpermitted fishing for customs • The targeting of undersized and out of season marine species
<i>Tourism:</i>	<ul style="list-style-type: none"> • Unlicensed tourism operators • Anchoring in sensitive areas and coral destruction
<i>Climate Change:</i>	<ul style="list-style-type: none"> • Salt water intrusion into taro patch and shoreline erosion are examples of impacts
<i>Development:</i>	<ul style="list-style-type: none"> • Dredging of Ulach Channel during the construction of the Kayangel dock is believed to have caused algal bloom in the Kayangel lagoon.
<i>Pollution/ Contamination:</i>	<ul style="list-style-type: none"> • Poor fuel management as well as used hydrocarbons (oil) and battery disposal.
<i>Invasive Species</i>	<ul style="list-style-type: none"> • Rats, mice and cats • Invasive species from unquarantined cargo and smuggling of non-native plants and animals.

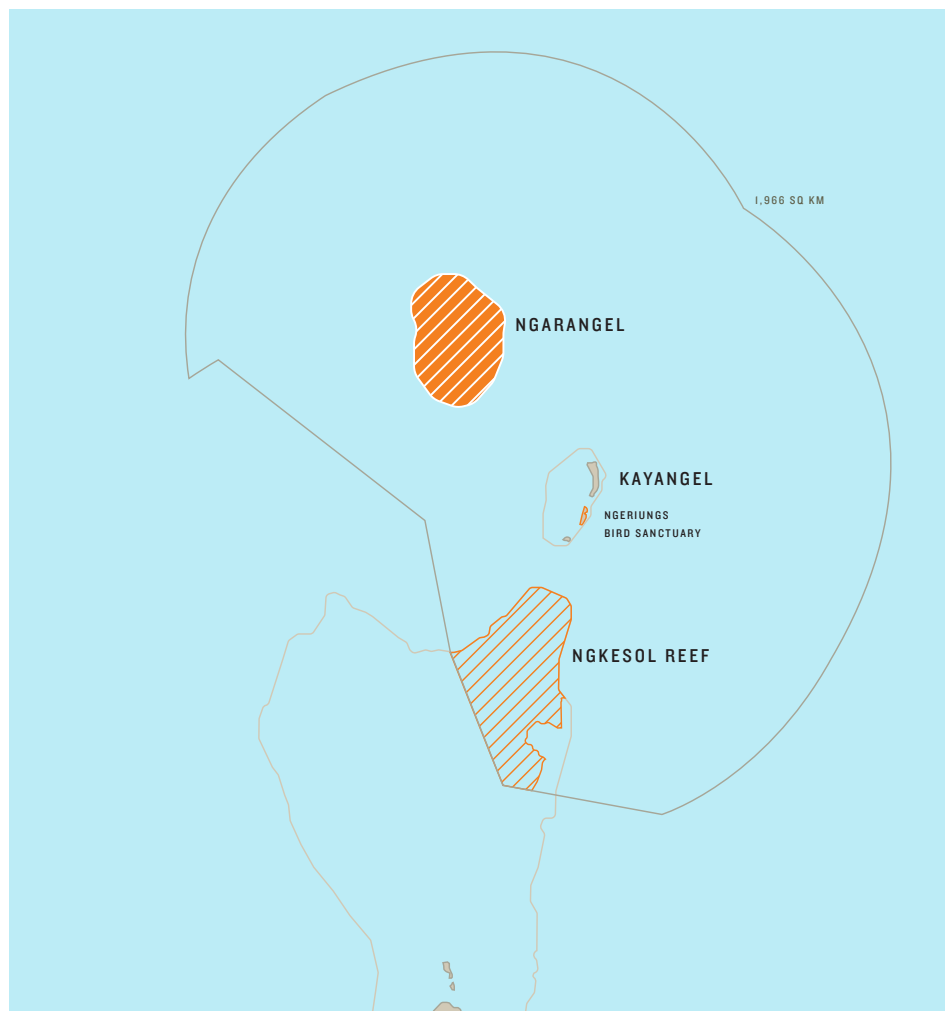


FIGURE NO. 02
Kayangel Territorial Waters and Zonification

RELEVANT SITE INFORMATION FOR NGARCHELONG

NGARCHELONG LOCATION: & SIZE:

Ngarchelong State is the northernmost state on Babeldaob Island, a one-hour drive from Koror, and is home to some of Palau's most abundant and productive fishing grounds. The State landmass is about six km from north to south, and 0.5 to 2.5 km wide, with a land area of about 12 km². The State's marine territory includes 1,964 Km² of reef, channels, lagoon, mangrove, and open ocean out to 12 miles. All of the state's marine territory is included in the Ngarchelong Marine Managed Area (NMMA).

Zoning Map:

BIODIVERSITY INFORMATION:

The NMMA has many habitats including: high seas, barrier and fringe reefs, deep water channels, seagrass beds, sand beaches and mangroves. All ecosystems exhibit connectivity and support diverse marine life, including: migratory reef fish, sharks, rays, sea turtles, dugongs, crocodiles, and giant clams. Fish surveyed included economically important species: Parrotfish, Surgeonfish, Rabbitfish, Emperors, Sweetlips, Kemedukl, Maml, Cherangel, Chum, Kedesau, Keremlal, Tiau, Ksau, and Meteungerel.

KEY MANAGEMENT AUTHORITY:

The Ngarchelong Department of Resources and Development (NDRD) was created via the adoption of Bill No. 16-01 on January 15, 2013. The NDRD mandate is to manage, implement, and enforce the natural resource laws and regulations of the state of Ngarchelong.

PROTECTED AREA SITE	SITES	USE CATEGORY	TARGET
ZONE 1: Permanent Conservation and Recreational Areas	Ebiil / Ngerael / Telbadel ra Ngerael / Enjinkoto shoal / Clam Management Area	No-take, restricted entry. All entry (residents and visitors) must be accompanied.	SPAG, Giant clams
ZONE 2: General Tourist Recreation Area	Access and space for unguided tourism (kayaking).	Restricted take for subsistence, open entry. Take restricted to residents only for subsistence. No commercial take. Unaccompanied entry for tourism allowed.	
ZONE 3: Seasonal Closed Channel Areas	Btil Ngkesol, Ngebard, Kloul, Tmecherur, Bkula Mutelchur	Restricted take, restricted entry. No-take April to September. Take allowed for residents and visitors from October to March.	SPAG
ZONE 4: Exclusive Resident Use Areas	Exclusive Resident Use Areas	Restricted take, restricted entry. All entry by tourists must be accompanied. Take restricted to residents only. Commercial harvesting prohibited in Subsistence Collection Area.	
ZONE 5: Areas managed for coral replenishment	Ileakl el Chei Management Area	No-take, No-entry. Only permitted monitoring and enforcement allowed. Limited education entry allowed with permit.	
ZONE 6: General Use Area	All areas not in Zones 1-5	Open take, open entry.	

LICENSED ACTIVITIES:

- Commercial fishing
- Sport fishing (Catch and Release)
- Tourism: Scuba diving and snorkeling. 6 dive sites.
- Trochus harvest
- Education and Research
- No license required for subsistence fishing nor green turtle harvesting

COMMUNITY, ISLAND INFRASTRUCTURE AND EQUIPMENT:

- 190 permanent residents, 53 households, and 48 fishing vessels spread out over 5 villages. Estimated 80% are involved in fishing activities. Only 3 full-time fishers.
- Energy: Electricity is readily available in Ngarchelong; however, an extension of grid is needed to Todai.
- Radio Network: There was not an operative radio network.
- Cellular: Operative GSM network without data capacity. Service provided by PNCC only provides coverage with limited (5NM) at sea.
- Port: There are small boat harbors and concrete jetties at Ollei and Oketol on the west and Ngerelau on the east side. IMPAC will develop the Ollei marina over the next few years in order to cater to a sport fishing market for the Velasco Straits. A gas station will be built and there are plans for a fish market as well.

NATURE OF THREATS AND MANAGEMENT CONCERNS

Illegal Fishing	<ul style="list-style-type: none"> • Overfishing from commercial and subsistence fishing. 48+ vessels with average 85HP outboards though some possess up to 200HP • Poaching from restricted areas • The targeting of undersized and out of season marine species
Tourism:	<ul style="list-style-type: none"> • Anchoring in sensitive areas and coral destruction
Climate Change:	<ul style="list-style-type: none"> • Coral bleaching
Development:	<ul style="list-style-type: none"> • Land based erosion and sedimentation from farming, forest burning and road construction.
Pollution/Contamination:	<ul style="list-style-type: none"> • Excess nutrients from solid/liquid wastes and other pollutants • Oil and fuel spills/disposal
Invasive Species	<ul style="list-style-type: none"> • Rats, mice, dogs and cats
Maritime Traffic	<ul style="list-style-type: none"> • All boats traveling to Kayangel from other locations in Koror pass through the NMMA. Large ships traveling north/south in Palau may also pass through the open ocean waters of the NMMA.

15

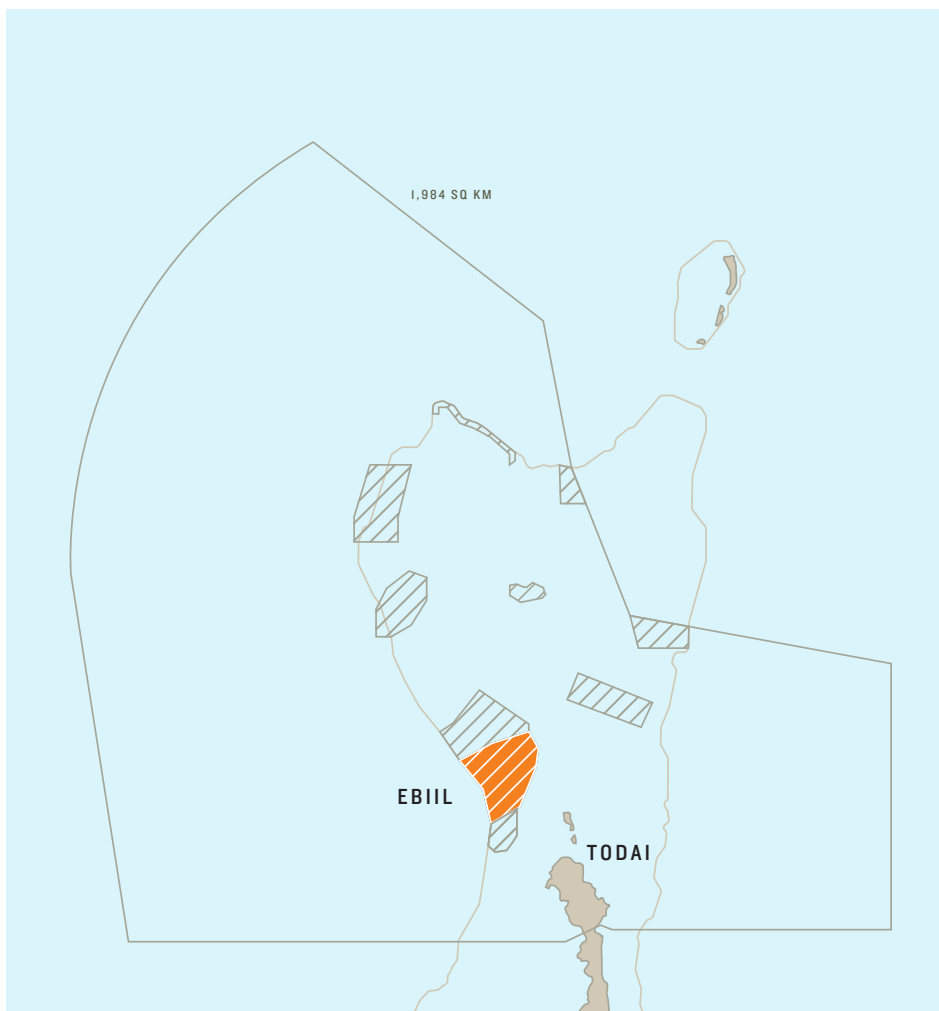


FIGURE NO. 03
Ngarchelong Territorial Waters and Zonification

CONTROL & VIGILANCE ANALYSIS

ANALYSIS OF EXISTING ENFORCEMENT OPERATIONS

As part of the assessment, we carried out a site visit to interview local Rangers, visually observe conditions of all assets and participate on patrols. A summary of key findings can be found in the table below.

OBSERVED FACTOR	KAYANGEL	NGARCHELONG
Personnel	2014 Budget: \$143,000: \$60,000 for staff, \$50,000 for OPEX and \$33,000 CAPEX. 4 Rangers and 1 Director who spends 50% in Koror and 50% in Kayangel. Ranger salaries are low. The Rangers only carry out patrols during the day. Only three Rangers have undergone 3-month Police Academy training and most recently a 1-week Special Enforcement Tactical Training (SETT). There are currently no regulations that they are enforcing and they are asking illegal fishers to leave their territorial waters when interdicted. The Rangers do possess uniforms, but do not utilize SOPS, manuals, nor reporting formats. Limited outreach to communities and schools.	2014 Budget: \$80,000 Budget: \$50,000 for staff and \$30,000 for OPEX. 5 Rangers and 1 Coordinator (position currently vacant). The past Coordinator spent 75% of time in Koror and apparently provided no direction to Rangers. Ranger salaries are low. The Rangers state they operate 24 hours with 2 Rangers per shift/3 shifts per day. Only three Rangers have undergone 3-month Police Academy training and most recently a 1 week Special Enforcement Tactical Training (SETT). 1 Ranger is certified Boat Captains. There are currently no regulations that they are enforcing and they are asking illegal fishers to leave their territorial waters when interdicted. The Rangers do not possess uniforms nor do they utilize SOPS, manuals, or reporting formats. Limited outreach to communities and schools.
Size and complexity of marine area	The KMMA is 1,685 Km ² in size (1,966 Km ² when using 12 nautical mile from baseline) and possesses one main port. Out-of-state fishers can access Kayangel territorial waters (Velasco Reef) from the south via the Ngarchelong lagoon or outside of barrier reefs. The local population has easy access to the primary lagoon and must travel 7NM to access Ngeruangel Marine Reserve/ Velasco Reef. Historically, winds blow from West to East which causes vessels to approach from the wind protected East side and from September - April the winds blow from East to West causing vessels to approach via western reefs. The monsoon season limits vessel activity from November to April. The primary fishing season begins in April and ends in August. Due to its remote location, a logistics vessel serves Kayangel every two weeks correlating with payday. Logistics have posed problems with fuel availability for Rangers in the past.	The NMMA is 1,994 Km ² in size and possesses three key ports (2 on the West and 1 on the East). There are a number of passageways on the Western side of the Island, which are used by out-of-state fishers to access Ngarchelong and Kayangel territorial waters. The local population has easy access to the primary lagoon and outer reefs. From May - August vessels approach territorial waters via the wind protected Eastern side and via the western canals from September - April. The monsoon season limits vessel activity from November to April.
Vigilance means	The Kayangel State Rangers possess two patrol vessels: a 23 ft. with one 150 HP (2 stroke Mercury) & a 27ft. patrol vessel with one 200 HP (2 stroke -Yamaha). The vessels possess WOT speeds of up to >30 knots. As the motors are 2 strokes, Rangers carry out routine maintenance while serious motor maintenance is carried out in Koror. At the time of our visit, one vessel was in Koror.	The Ngarchelong State Rangers possess two patrol vessels: a 27 ft. with one 225 HP (4 stroke Mercury) and 23 ft. with one 150HP (4-stroke Mercury). Dealer in Koror carries out motor maintenance.

IMAGE NO. 02
Today Ranger Post

OBSERVED FACTOR	KAYANGEL	NGARCHELONG
Technology used in vigilance	The Kayangel State Rangers possess one radar at the State office building that has never operated. At the time of our visit, the Rangers possess only one base VHF radio and the Director stated that an order had been placed for an additional base radio and handhelds. Rangers used personal cellular phones with voice and SMS for communication with team members when necessary and also coordinated with Ngarchelong Rangers on occasion. The Rangers did possess binoculars, a satellite phone with no prepaid minutes, and a camera. They did not have GPS, video cameras, safety gear or any other equipment for patrols.	The Ngarchelong State Rangers did not possess any VHF radios and Rangers used personal cellular phones with voice and SMS for communication with team members. The Rangers did possess binoculars and a camera. They did not have GPS, video cameras, safety gear or any other equipment for patrols. Note: personal cellular phones should not be used for patrols.
Distance of populations and multiple uses within the MPA	Kayangel possesses an estimated 14 local vessels that are involved in fishing activities. Rangers report the entrance of 1-2 out-of-state vessels a week. There are a minimum of 10 tourist sites for snorkeling, scuba, research and sports fishing (both catch and release & catch and consume.)	Ngarchelong possesses an estimated 48 local vessels that are involved in fishing activities. There are a minimum of 16 tourist sites for snorkeling, scuba, research and sport fishing (both catch and release & catch and consume.) There are tourism and fisher vessels that pass through territorial waters en route to Kayangel.
MPA close to maritime traffic routes	No maritime traffic routes near MPAs.	Kayangel residents pass through Ngarchelong waters.
Availability of means	Vessel availability does not appear to be a problem, as they possess two vessels leaving one operative while the other is under maintenance. Fuel appears to be the limiting factor.	Vessel availability does not appear to be a problem, as they possess two vessels leaving one operative while the other is under maintenance. Fuel appears to be the limiting factor.
Systematization and planning of vigilance	The Kayangel Rangers currently carry out limited strategic annual and monthly planning though the Director states that patrols are planned according to weather conditions. Neither written registries nor formal reporting formats exist. On any given patrol, 3 Rangers tend to participate aboard vessels and 1 remains at the State building.	The Ngarchelong Rangers currently carry out limited strategic annual and monthly planning. The Rangers are in urgent need of a Director to assist them in operations planning and logistics. Neither written registries nor formal reporting formats exist. Currently there is no radio communication between patrol vessel and control center.
Availability of intelligence information	Limited coordination and intelligence gathering exists.	Limited coordination and intelligence gathering exists.
Days operating per month/ year	Given their limited budget, the Kayangel Rangers currently patrol 3 days/week. The Director states that they possess an annual fuel budget of 3,100 gallons, which limits the number and duration of patrols.	The Ngarchelong Rangers face similar budget constraints. The Rangers stated they averaged 18 gallons of fuel for 8-hour patrols.

Both Kayangel and Ngarchelong state Rangers possess a limited budget and personnel to carry out enforcement of their respective territorial waters. As each state has yet to develop their respective rules, regulations and fines for licensed activities, Rangers are currently only able to ask out-of-state vessels to leave their waters when committing an infraction. As of March 2014, PCS was working on the elaboration of regulations & fees with state attorneys, which should be completed by August 2014: a critical first step. While each state possesses two patrol vessels, which are appropriate for the nature of threats and types of vessels used by infractors, they have limited fuel and are unable to carry out consistent patrols in a strategic manner. Professionalization and training of Rangers is imperative as is the hiring of highly qualified candidates for the Marine Law Enforcement Director position. This position is mission critical for strategic planning, logistics, coordination, outreach and overall management of the many enforcement activities. With respect to inter-institutional coordination between states, there is currently no joint concrete cooperation though both Governors recently signed an MOU.

As both Kayangel and Ngarchelong are new enforcement agencies, we identified the

following five priorities and considerations for strengthening enforcement and safety for Rangers in the Northern Reef project.

1. Rangers require additional training, professionalization and the elaboration of regulations and SOPs;
2. Systematic patrol planning with a Marine Law Enforcement Director and the strategic deployment of assets;

3. The provision of basic surveillance and onboard safety equipment.
4. Lack of VHF marine radio network limits coordination of patrols with control center and puts safety of crew in danger.
5. No technology to assist in surveillance beyond binoculars requires Rangers to carry out more patrols and waste fuel.



CONTROL & VIGILANCE SYSTEM DESIGN



IMAGE NO. 03

Kayangel Dock and Cellular Tower

CONTROL & VIGILANCE SYSTEM DESIGN SUMMARY:

The following control and vigilance plan is designed with the following criteria:

1. Limit Capital Expenditures (CAPEX) by utilizing existing infrastructure and keeping the number of vigilance posts and equipment costs to a minimum.
2. Minimize Operating Expenditures (OPEX) by strategic placement of vigilance posts, moorings and vessels, the deployment of a VHF marine radio network and high-power video cameras, improved coordination between States and the operation of a floating barge in Phase II.
3. The incorporation of fisher and traditional leaders into the control and vigilance system as we assume exclusive rights holders have a vested interest in ensuring the protection of fisheries and habitat and should be incorporated as "Surveillance Agents." In addition, we aim to ensure buy-in and the support of the bul system.

COMPONENT	RECOMMENDATIONS		PHASE I (2 YEARS)
	KAYANGEL	NGARCHELONG	
<i>Prosecution and Sanction</i>	<ol style="list-style-type: none"> Staffing: 7 Full time Officers Training/SOPs: <ul style="list-style-type: none"> Basic IMO Safety Courses and Boat Captain's Course. Marine Coastal Enforcement Operations Strategic Planning and Use of Available Assets Rules, Regulations & Fees: <ul style="list-style-type: none"> Draft regulations Develop Outreach and Education Campaign to Stakeholders Implement Small Vessel Registration Provision of basic surveillance and safety equipment. One (1) fully equipped control center at Kayangel and installation of Marine VHF Radio Network: 1 base radio at Kayangel, 1 base radio per patrol vessel (2 radios) and 2 handhelds for on-duty Rangers. Installation of high-power camera at Kayangel and installation of 2 mooring buoys throughout State waters that are "strategic" for deployment of patrol vessels and floating barge. Development of inter-institutional agreement and SOPs with Ngarchelong for joint operations. Development of inter-institutional agreement and SOPs with DFWP and DMLE to carry out joint patrols in territorial waters, especially Velasco Straits. 	<ol style="list-style-type: none"> Staffing: 7 Full time Officers Training/SOPs: <ul style="list-style-type: none"> Basic IMO Safety Courses and Boat Captain's Course. Marine Coastal Enforcement Operations Strategic Planning and Use of Available Assets Rules, Regulations & Fees: <ul style="list-style-type: none"> Draft regulations Develop Outreach and Education Campaign to Stakeholders Implement Small Vessel Registration Provision of basic surveillance and safety equipment. One (1) fully equipped control center at Todai and installation of Marine VHF Radio Network: 1 base radio at Kayangel, 1 base radio per patrol vessel (2 radios) and 2 handhelds for on-duty Rangers. Installation of high-power camera at Todai and installation of 4 mooring buoys throughout State waters that are "strategic" for deployment of patrol vessels and floating barge. Development of inter-institutional agreement and SOPs with Kayangel for joint operations. Development of inter-institutional agreement and SOPs with DFWP to carry out joint patrols in territorial waters. 	
<i>Interdiction</i>	<ol style="list-style-type: none"> Elaboration of control center, patrolling and boarding SOPs. Establish reporting formats. Establishment of a critical spare parts inventory, a series of 2-stroke maintenance workshops and Maintenance SOPs. 	<ol style="list-style-type: none"> Elaboration of control center, patrolling and boarding SOPs. Establish reporting formats. Establishment of a critical spare parts inventory, a series of 4-stroke maintenance workshops and Maintenance SOPs. 	
<i>Prosecution and Sanction</i>	<ol style="list-style-type: none"> Establish a practical database that allows for case monitoring and the recording of repeat offenders. Establish an inter-institutional agreement between the State Rangers and the state attorney to ensure correct report writing and timely processing of both illegal fishing and tourism violations. 	<ol style="list-style-type: none"> Establish a practical database that allows for case monitoring and the recording of repeat offenders. Establish an inter-institutional agreement between the State Rangers and the state attorney to ensure correct report writing and timely processing of both illegal fishing and tourism violations. 	

19

COMPONENT	RECOMMENDATIONS		PHASE II (2 YEARS)
	KAYANGEL	NGARCHELONG	
<i>Surveillance</i>	<ol style="list-style-type: none"> Incorporate fishers into enforcement framework as Surveillance Agents. 	<ol style="list-style-type: none"> Incorporate fishers into enforcement framework as Surveillance Agents Refit of floating base and installation of onboard radar. Deployment of floating base in Northern Reef waters. A patrol vessel will be required to be stationed at floating base for logistics and interdiction. Development of inter-institutional agreement and SOPs with Kayangel to operate floating base in both territories. 	
<i>Interdiction</i>	<ol style="list-style-type: none"> Deputize State Rangers in order to delegate power of arrest, bear firearms, deliver citations and enforce national laws. 	<ol style="list-style-type: none"> Deputize State Rangers in order to delegate power of arrest, bear firearms, deliver citations and enforce national laws. 	

PHASE I

SURVEILLANCE

MINIMUM STAFFING AND TRAINING NEEDS

A minimum of 7 staff will be needed to operate the enforcement system at each state assuming there are two shifts per day. In summary, a minimum of 3 Rangers must be on duty at any given moment. Each patrol vessel should be staffed with at least 2 Rangers: the Boat Captain and one Ranger who is responsible to perform interdiction and boarding activities. The patrol vessel should be in contact with the control center officer every hour to

report location and situation. The Marine Enforcement Director should spend a minimum of 75% on site and be responsible for strategic planning, coordination and overall management activities. The Rangers should be trained to operate both vessels and control center activities thereby allowing greater flexibility in scheduling. As most illegal fishing takes place at night, we highly recommend scheduling night patrols and the monitoring of key ports.

PERSONNEL	KAYANGEL	NGARCHELONG
Marine Enforcement Director	1	1
Conservation Rangers	6	6
<i>Total</i>	<i>7</i>	<i>7</i>

TRAINING REQUIREMENTS

A comprehensive training program is required to strengthen the professional capacity of each management and enforcement team. Please find below the minimum suggested courses for the Kayangel and Ngarchelong enforcement staff. Management should also focus on professionalizing the Rangers by obligating the use of uniforms that are appropriate for marine operations. As a maritime authority, Rangers should also be prohibited

from fishing while on duty. With respect to trainings, we highly recommend a combination of theory and practical exercises for improved retention of information and swift adoption of newly developed skills. We also recommend complementing workshops with the elaboration of Standard Operating Protocols (SOPs) in order to institutionalize processes and prevent informal interpretation of rules and regulations.

COURSE TOPIC	COURSE DESCRIPTION
<i>Basic IMO Training</i>	<ul style="list-style-type: none"> • First Aid • Fire fighting • Survival at Sea
<i>Surveillance, Detection, Interdiction and Boarding</i>	<ul style="list-style-type: none"> • Operations planning and preparation • Use of visual and electronic sensors in marine patrolling • Boarding procedures: Performing Inspections, documentation to request, what to look for, and documenting your inspection. Training must be coordinated with state attorneys. • Interviewing the suspect's boat crew • Crime Scene Key practices. Evidence collection and handling. • Operations/Felony Reports. <i>Information and items that are typically in a "good" report.</i>
<i>Operations Planning and Control Center Management</i>	<ul style="list-style-type: none"> • Control Center functions including risk assessment (GAR model), asset use, reporting, communications procedures, surveillance procedures, and documentation. • Telecommunications lines and coordination procedures with the Coast Guard • Situation escalation procedures and real time reporting • Terrestrial Charts interpretation and navigation • Nautical Charts interpretation and navigation • Search and rescue • First aid provided in the field • Personal safety issues for patrolling and boarding
<i>Yamaha Basic and Advanced O/B Service Training Course</i>	<ul style="list-style-type: none"> • All wardens must participate in an OEM basic outboard motor maintenance certification course • Two of the wardens will be trained in second level maintenance: computerized diagnostic, critical spares replacement and motor tuning. • Overhauls are carried out in Koror
<i>Standard Operating Protocols (SOPs)</i>	<ul style="list-style-type: none"> • Control Center • Boarding Teams • Patrolling • Maintenance

RULES, REGULATIONS & FEES

1. Hire a lawyer to draft regulations for both states in cooperation with the Palau Conservation Society (PCS). Traditional leaders should be involved in the process in order to incorporate but considerations as Rangers cannot enforce traditional laws and we must attempt to codify key traditions into constitutional law if at all possible. In addition, one must involve the co-management advisory group established within the Cooperative Agreement Between the States of Kayangel and Ngarchelong on Sustainable Fisheries Management and PAN Sites Management (signed and dated November 22, 2013);
2. Fines should be set as high as possible to ensure compliance. The lawyers should utilize existing national and PAN legislation as a point of reference. The legal fees or costs of prosecution should be taken into account when setting the fines for violations within the Northern Reefs;
3. Design a simple citation format with checklists that requires minimal open-ended writing; and
4. Provide laws to clerk of courts (log book).

OUTREACH AND EDUCATION

Once the regulations are finalized, both state Ranger enforcement teams must develop a simple education and outreach plan directed towards local fishers, out-of-state fishers and the community alike. A simple fact sheet outlining zonification, regulations, restrictions, and fines should be widely distributed to all stakeholders. The enforcement Director should lead outreach activities, however, patrol Rangers too must do their part in dissemination. We highly recommend involving both the Governor and tribal leaders to

reinforce the acceptance of the new regulations. A phased approach to enforcement of laws should be implemented whereby violators are first warned about infractions, but over time, Rangers should gradually impose "hard enforcement" sanctions. As many of the illegal fishers entering the Northern Reefs are from Koror state, Kayangel and Ngarchelong Rangers should develop a Koror component to inform out-of-state fishers of upcoming changes and the gradual application of sanctions.

VESSEL REGISTRATION

As the BMM does not mandate vessel registration, both Kayangel and Ngarchelong should implement a simple vessel registration for a nominal fee. Registration is straightforward as there are roughly 15 and 47 vessels operating in Kayangel and Ngarchelong, respectively. The process is important as it will enable the state to exercise regulatory control over the vessel and will help determine which state’s laws

govern the operation of the vessel. We recommend piloting a practical visual detection system during the registration process whereby all Kayangel and Ngarchelong registered fisher vessels are painted with the state flag on the hull or the installation of a pole with respective state flag, which must correlate with its registration number. From an enforcement perspective, this will help all stakeholders in easily differentiating between local and out-of-state

vessels operating in territorial waters. As enforcement evolves in the Northern Reefs over time, we recommend incorporating fishers and tourism operators as sensors for detecting illegal activities (This will be discussed in Phase II).

LIST OF VIGILANCE & SAFETY EQUIPMENT FOR EACH STATE

A list and referential budget can be found in Annex 12.

CONTROL CENTER & INSTALLATION OF VHF RADIO NETWORK

A critical first step will entail setting up a control center for each state enforcement authority: one at Kayangel and one at Todai. The control centers do not require substantial CAPEX, but as a minimum should include a desktop computer, monitors, digital storage, lock and key filing cabinets, and a safe among basic office furniture. It is important the control center allow Rangers to carry out their operations and planning with privacy.

The core of enforcement operations is the VHF marine radio network. The network will not only link the control center with patrol vessels and Ranger at ports, but also holds potential for linking tourism operators and fishers into the control and vigilance system over time. Given the height of Todai and the existing tower at Kayangel and lack of geographic obstructions, no repeater station is needed in order to extend the communications range of all the stations on shore and at sea. Marine 25W VHF-DSC base stations are needed at the control centers and patrol vessels. Individual Rangers should be equipped with handheld marine radios. As illustrated in Figure 04, the Marine 25W VHF-DSC base stations provide 25NM coverage, which allows for communication between the control center and Rangers throughout their respective territorial waters. The base stations also allow communication for both Kayangel and Ngarchelong control centers to coordinate joint operations and share intelligence. A referential budget can be found in Annex 03.

Coverage of VHF-DSC Base Stations

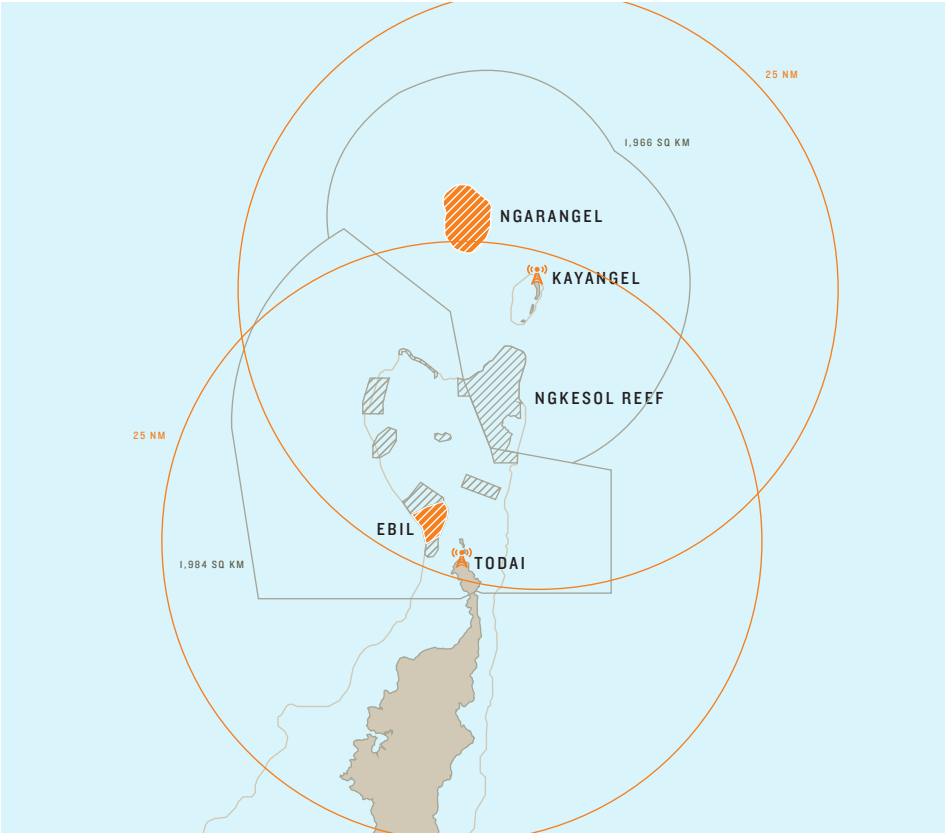


FIGURE NO. 04
Range of 25W VHF-DSC base station radios

POST	MARINE VHF -DSC BASE STATION	MARINE VHF HANDHELD RADIOS
Kayangel Base Station	1	
Kayangel Patrol Vessel	1	
Kayangel Patrol Vessel #2	1	
Ngarchelong Base State	1	
Ngarchelong Patrol Vessel	1	
Ngarchelong Patrol Vessel #2	1	
Kayangel and Ngarchelong Rangers		4

TECHNOLOGY OPTIONS FOR SURVEILLANCE & INTERDICTION

WildAid carried out a physical site inspection to determine the best possible combination of potential surveillance technology given site characteristics, the profile of stakeholders, use patterns, CAPEX and OPEX. In this section, we will briefly explain the logic for recommended surveillance technology options. In theory, each surveillance system should cover the total area of the KMMA and NMMA at 1,996Km² and 1,984Km², respectfully, as well as a small buffer area beyond their boundaries. In terms of extension, this is a confined system, however, the Northern Reefs could be incorporated into a nationwide monitoring and control network of MPAs in the future. From a maritime point of view, this is a relatively “small” area.

Collaborative monitoring systems require location transceivers on-board vessels and require that the location device is active. Location messages include information such as: Vessel name, latitude, longitude, course and speed. A specific regulatory law must be promulgated to obligate vessel owners to purchase and activate on-board transceivers. If the location device is disconnected, the shore stations and control centers will not see the vessel’s position. As law violators tend to deactivate transceivers, regulations must consider stiff penalties for opportunistic tampering by stakeholders. A major drawback of these systems is that they will not detect fishers from other areas or countries who do not

employ transceivers. With respect to the application of collaborative systems in the Northern Reef area, we do not recommend the use of either VMS or AIS. Given the small size and quickness of target vessels combined with long interval times for vessel location, VMS is not appropriate for near shore coastal management. AIS could theoretically be employed to monitor target vessels, however, there are the following considerations: 1) the regulatory framework would need reforming in order to mandate their use at a national level; and 2) solar powered transceivers cost US\$900 to \$1,200 and a financing scheme would be required.

Non-collaborative monitoring systems are the best equipment option when detecting vessels that are intentionally carrying out illegal activities in specific geographic areas or in the absence of collaborative systems. Often we layer systems to make up for the deficiencies of one particular technology with the strengths of another. For example, radar systems often complement AIS systems in order to detect foreign vessels or vessels that have intentionally deactivated their transceivers. In the Northern Reef area, we believe radar is not a cost-effective option. Given the small size of vessels and boat materials (wood and fiberglass), the detection performance of radar at Todai and Kayangel is extremely limited as target echoes are masked among the sea surface

clutter. There is radar technology that could detect very small wooden or fiberglass targets, but it would cost between US\$250–500K. UAVs could also theoretically be employed for near shore coastal surveillance, however, an endurance of 12NM in a marine environment would require a unit that goes far beyond the CAPEX budget for both state agencies.

Given the relatively small size of territorial waters and clear zonification of areas, the strategic placement of mooring buoys/ observation posts combined with the use of binoculars can be extremely cost effective in detection. From field evaluations performed during the assessment, a patrol boat crewmember has a visual horizon of 4.5–5 miles. When lookout height is raised to 12–15 meters, visual horizon reaches 9–9.5 nautical miles. While visual horizon does not guarantee that small vessels will be detected at those same maximum ranges, maximum visual range data allows planning the observation post distribution throughout the KMMA and NMMA in order to maximize coverage over the most valuable areas and pathways. In addition, visual detection can be enormously improved by the use of fixed cameras as they can perform automatic surveillance by using digital processing imaging algorithms and is highly recommended when staffing is an issue. Specifications and performance parameters will be detailed in the next section.



IMAGE NO. 04

View of Northern Reef from Todai



INSTALLATION OF HIGH-POWER VIDEO CAMERA & MOORINGS AT KAYANGEL

As 70% of enforcement expenses are typically related to personnel and fuel, we aim to design a system that can reduce these fixed costs while ensuring coverage of a specific area. In the case of the Northern Reefs, we cannot limit personnel expenses as they are already operating with the minimum number of staff. We can, however, design a system that combines the use of a high-power video camera to provide 10NM coverage of key access ways and protected areas with the strategic placement of buoys for the mooring of a patrol vessel. Instead of carrying out constant patrols, the vessel remains in close radio communication with the control center officer to respond only when a potential violation occurs. Granted this does not eliminate the need for patrols, but it does reduce the amount of fuel used as the vessels can sit idle at moorings for extended periods of time. As illustrated in Figure 05, the placement of a high-power video camera at Kayangel would provide coverage of Ngkesol Reef and Ngarangel (the two most important Kayangel conservation areas) and allow for coordination with a patrol vessel moored at Ngarangel. A referential budget can be found in Annex 05.

FIGURE NO. 05
Range of High Power Video Camera and Buoy Location

ENFORCEMENT CHALLENGES FOR DESIGN CONSIDERATION

1. *Remoteness of Kayangel proves hard to attract personnel*
2. *Prevalent poaching (Both States)*
3. *Extreme weather conditions (Both States)*
4. *Most illegal fishing takes place at night with small fiberglass vessels*
5. *Limited fuel supply and operating budget*
6. *Monsoon season (November to April) limits patrols, as does the entry of out-of-state fishers*
7. *Prevalent Easterlies from May through October cause out-of-state fishers to enter Northern Reefs on western side of Island*
8. *Westerlies from November to April cause out-of-state fishers to enter the Northern Reefs on eastern side of Island*

23



IMAGE NO. 05
Kayangel Patrol Vessel



INSTALLATION OF HIGH-POWER CAMERA & MOORINGS AT NGARCHELONG

Similar to Kayangel, we propose the installation of a high-power video camera at Todai to provide 10NM coverage as illustrated in Figure 06. The video camera provides coverage of key access waterways for vessels traveling into Northern Reef territorial waters. Once a vessel is detected, the control center can inform Rangers that are moored at any one of the four proposed buoys throughout the NMMA for interdiction. Ideally, the patrol vessel can intercept the vessels without having to travel a long distance from the buoy. Four moorings were chosen based on bathymetry and the strategic location of Ebiil, SPAGs and territorial boundaries. The Todai video camera can also serve as a tool for Kayangel as Ngarchelong Rangers could inform Kayangel Rangers of vessel traffic heading north. A referential budget can be found in Annex 05.

FIGURE NO. 06
Range of High Power Video Camera and
Buoy Location

FISHERIES MANAGEMENT CONSIDERATIONS FOR KAYANGEL & NGARCHELONG

1. **Size limits:** The enforcement of size limits requires presence of Rangers at ports and inspection at sea.
2. **Reef/fishing ground closure:** The enforcement of closed areas can be managed from a distance and does not require constant physical presence unless the vessel enters the area.
3. **Quota:** Currently not an option as it requires better management systems.
4. **Gear Restriction:** The enforcement of gear restrictions requires inspection at ports and sea.
5. **Improving fishing regulation (i.e. fishing permit):** Currently only commercial fishers and foreigners require the purchase of fishing permits. All permits should be checked at sea. In-state fishers are not required to purchase permits, however, this should change over time, as it could be a potential source of revenue for state enforcement operations.
6. **Season closure (i.e. spawning periods.)** The enforcement of season closure requires presence of Rangers at ports and inspection at sea.



IMAGE NO. 06
Ngarchelong Ranger on Patrol

DEVELOPMENT OF INTER-STATE AGREEMENT & SOPS FOR JOINT OPERATIONS

On November 22, 2013, the states of Kayangel and Ngarchelong signed a cooperative agreement for sustainable fisheries and PAN site management. The states must now establish a work plan and identify roles, responsibilities and funding for joint activities. There are currently a number of concrete opportunities that would benefit both states, which include:

- Drafting of regulations and litigation via the contracting of a shared state attorney;
- Both enforcement teams are at a similar stage in development and professionalization, thus they could divide training costs and co-develop SOPs;
- The VHF radio network would allow for improved communication and coordination in surveillance and interdiction;
- The education and outreach activities of each state can complement and reinforce the work of the other and could be presented as a cohesive “Northern Reef Enforcement Campaign.”
- While still under territorial dispute, Ngkesol Reef could actually serve as a point of cooperation for joint patrols.

DEVELOPMENT OF INTER-INSTITUTIONAL AGREEMENT & SOPS WITH DFWP & DMLE

While most national Bureaus possess limited budgets and personnel, there are possibilities to collaborate with state authorities. In the case of DFWP, an inter-institutional agreement could be drafted whereby DFWP officers join Ngarchelong Rangers on patrols and assist in the apprehension of problematic poachers given their power of arrest and focus on enforcing near shore regulations. A similar agreement could be crafted for Kayangel. In addition, the DMLE could work with both states by providing more specialized training and directly coordinate with Kayangel Rangers to patrol Velasco Strait given the high incidence of foreign vessels entering that particular area. In our meetings with the Directors of the DFWP and DMLE, they both expressed interest in working with states to improve patrolling and management of their territorial waters. We recommend states first negotiate an inter-institutional agreement amongst themselves, and then approach the national authorities in a unified fashion.

INTERDICTION

STANDARD OPERATING PROTOCOLS

In order to institutionalize training sessions and raise the professional standards of Rangers, states must draft and implement SOPs for control center operation, patrolling and boarding. SOPs are vital for the smooth operation of enforcement activities and the safety of Rangers. In cooperation with Harkcon, we have highlighted several key considerations for inclusion in SOPs:

Document State Policies and Procedures. We recommend capturing desired and correct policy, process, guidelines and required actions within an institutional framework that supports immediate access, definition, and fidelity. These documents should be generated in the form of individual standard operating procedures (SOPs). The SOPs provide Rangers with a ready source of information and guidance related to patrol management, evidence collection, case file generation requirements, use of force policy, report submission and information requirements, equipment checklists, maintenance procedures, and other key tasks. Creating the SOPs can be an iterative process with initial focus on SOPs that are likely to yield immediate performance support and field enhancements. SOPs should be collected into a Mission Readiness Manual (MRM) or similar document. Each SOP should be reviewed at least annually to ensure the procedures and content are current, that they reflect the direction and goals of the organization’s leaders and that they are understood and used by the Rangers. SOPs should cover at least the following areas:

1. *Document all Reporting Requirements.*

Document all required reports including their required submission period (i.e., monthly, yearly, as occurs), sample reports that are correctly completed, guidance about any areas that typically require improvement and submission information (i.e., who submits, where the report is sent). The SOP should emphasize operational and safety reporting best practices and principles as noted in the operations section and as delivered in the training program.

2. *Institute a Risk Assessment Process.*

Rangers, Control Center officers, and senior leaders should institute the operational risk assessment model provided in the training course within a specific risk assessment and management SOP. The Green, Amber, Red (GAR) model provides a uniform basis for assessing and mitigating risk. Implementing it across the state operations will support more effective operations. Implementing the system will also promote more honest and open communications and discussion regarding risks encountered while conducting patrol and enforcement operations. The SOP should include who completes the assessments, when they are conducted, and how they are reported.

3. *Create and Document Operations Procedures.*

Document guidance, policy, and process regarding planning and conducting patrols, operational tasks (i.e., when to conduct a boarding, when to conduct a seizure, authority levels), preplanned actions (i.e., what to do if a vessel is overdue), use of force policies and examples, key points of contact and their designated responsibilities within an Operational Guidance SOP or SOPs.

4. *Identify and Document Maintenance Procedures.*

This SOP series should include general maintenance process and policy to support systematic maintenance and support including supply sources, job aides and systems. This SOP may be broken into a separate Maintenance Support Manual as all aspects of the maintenance program are documented and institutionalized. A list of critical spare parts can be found in Annex 12.

5. *Create Initial and Recurrent Training Plans.*

The Training SOP should include all required training events, required delivery frequency, evaluation and review procedures, and exercises and drills for basic survival, lifesaving, and enforcement. The SOP should also include specific training programs and materials for each piece of major equipment/equipment systems including tasks and steps needed to perform routine operations, maintenance, and repair.

6. *Create Job and Task Specific Job Aides and Checklists.*

Capture Job and Task specific guidance, steps, and processes within standardized job aides and checklists. Incorporate these job aides and checklists into their respective SOPs and place them into ready reference guides that can be kept in a cargo pants or shirt pocket for use in the field. Examples of typical boarding job aides include vessel measurement, search and seizure steps and reporting tasks, synopses of laws and their enforcement requirements, equipment operating steps for key equipment tasks, etc.

Operations. Operational recommendations are mainly focused on enacting and then putting into practice the preceding recommendations regarding training, equipment and policy.

1. All at sea patrol vessels should regularly report to the control center. These reports should be at least hourly for small boat operations (i.e., routine patrolling), event driven (during boarding operations), and at least every four hours for larger vessels and major transits. Operational reports should include current position or references from predetermined points if using unsecure communications, intentions, and key operational factors when they exist (e.g., sea state, fatigue, GAR model risk assessment, fuel state, departures/changes from arranged patrol plan movements).
2. Establish and maintain a live presence/watch in the control center whenever at-sea and boarding operations are ongoing. Include normal operations reporting, lost

communications reporting/actions, in brief and debrief checks as part of their routine operations.

3. Create sample case files, case debriefs and regular liaison sessions with the state attorneys to ensure that Rangers develop and implement enforcement activity that has a high confidence of standing up in court.
4. Issue and use personal protective equipment (PPE). This includes the safety items described in the equipment recommendations section.

PROSECUTION AND SANCTION

As we have discussed regulations and the citation process in prior sections, we must only highlight the need to establish a MOU with the state attorney to establish roles and responsibilities as they relate to prosecution. The Enforcement Director must develop reporting formats in cooperation with the state attorney and create a practical database for case monitoring. As mentioned earlier, it will be very important to have attorneys participate in the drafting of an SOP and train Rangers in report writing on a periodic basis.

PHASE II

STAKEHOLDER SURVEILLANCE OF ILLEGAL FISHING AND ILLEGAL TOURISM

Given the high costs associated with patrolling, we recommend incorporating key stakeholders into the surveillance system. The KMMA and NMMA are only accessible to an exclusive number of fishers, two tourism operators and few registered commercial fishing vessels. As the VHF radio network will be operational, select fishers and tourism operators could receive a marine VHF handheld radio and alert state authorities about any unusual activity or unidentified boats entering territorial waters. The “participatory surveillance program” should be rolled out gradually and perhaps initially limited to only 1-3 contacts per state. The Surveillance Agents would require minimum training and equipment at first, yet their inclusion may be cheaper than hiring additional state Rangers or paying for fuel over the long term. Radio property and responsibilities for their use must be clearly stated and resolved in advance. The VHF radio network will also allow better coordination between stakeholders and authorities in the event of a contingency (lost fishermen, wreckage, oil spill, etc.)

DEPLOYMENT OF FLOATING BARGE AS A DETERRENT AT BOTH KAYANGEL AND NGARCHELONG

As a Phase II initiative, we recommend the refit of the vessel located in Photo 07, which is currently the property of Ngarchelong. The refit and deployment of a floating barge could significantly increase the presence of Rangers in high seasons at MPAs or areas where there is a high incidence of illegal activities. The floating barge would possess autonomy of 2 weeks, a crew of 2–4 Rangers, small radar (6.5NM coverage) and a patrol vessel for interdiction. Given significant CAPEX and OPEX for the refit and operations (Please find referential budget in Annex 13), the floating barge initiative could potentially serve as strategic joint collaborative effort among Ngarchelong, Kayangel, the DMLE and DFWP as all institutions would need to support its operation via the provision of funds and/or personnel. In addition, tourism companies, such as IMPAC, could potentially underwrite expenses given their interest in developing sport fishing in the Northern Reefs.

As illustrated in Figure 07, the floating barge could be moored at Ngarangel to serve as a deterrent in an area with a high incidence of illegal fishing. Clearly an inter-institutional agreement is vital to the smooth operation of the floating barge, however, the barge holds great potential for providing surveillance to a historically isolated area. With respect to Ngarchelong, we propose the mooring of the floating barge in the northern limits of the NMMA outside of Todai camera coverage as illustrated in Figure 08. The floating barge could serve both states in the surveillance of Ngeksol Reef to the east and other key fishing areas to the west.



IMAGE NO. 07
Potential Floating Base

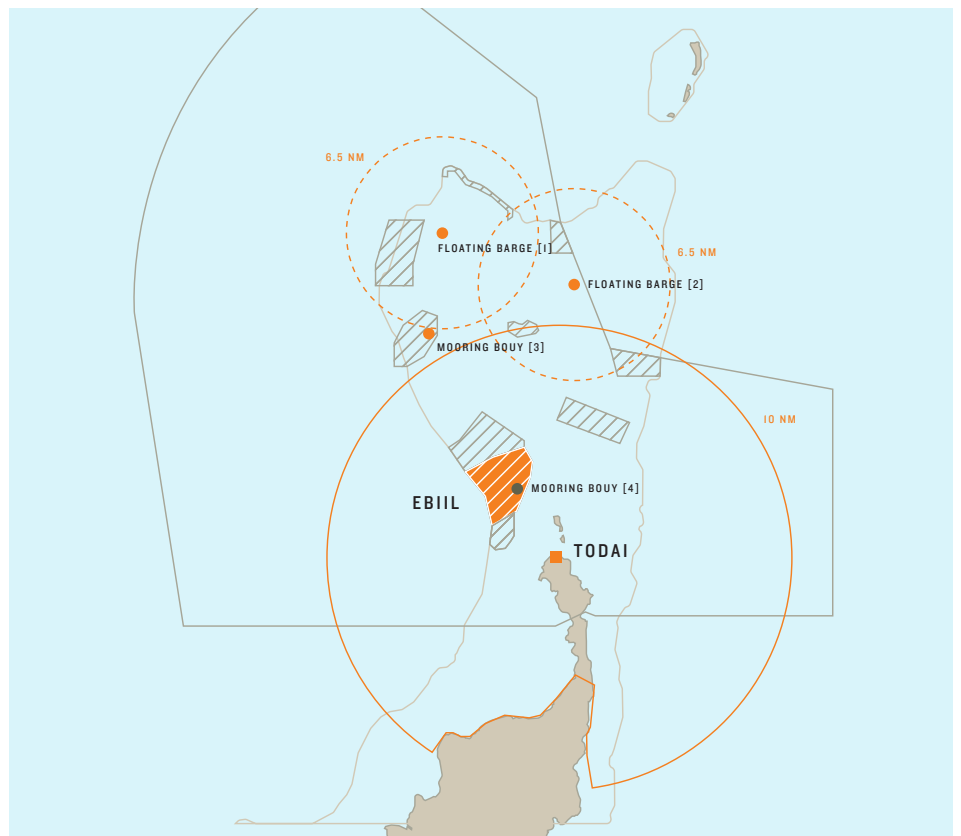
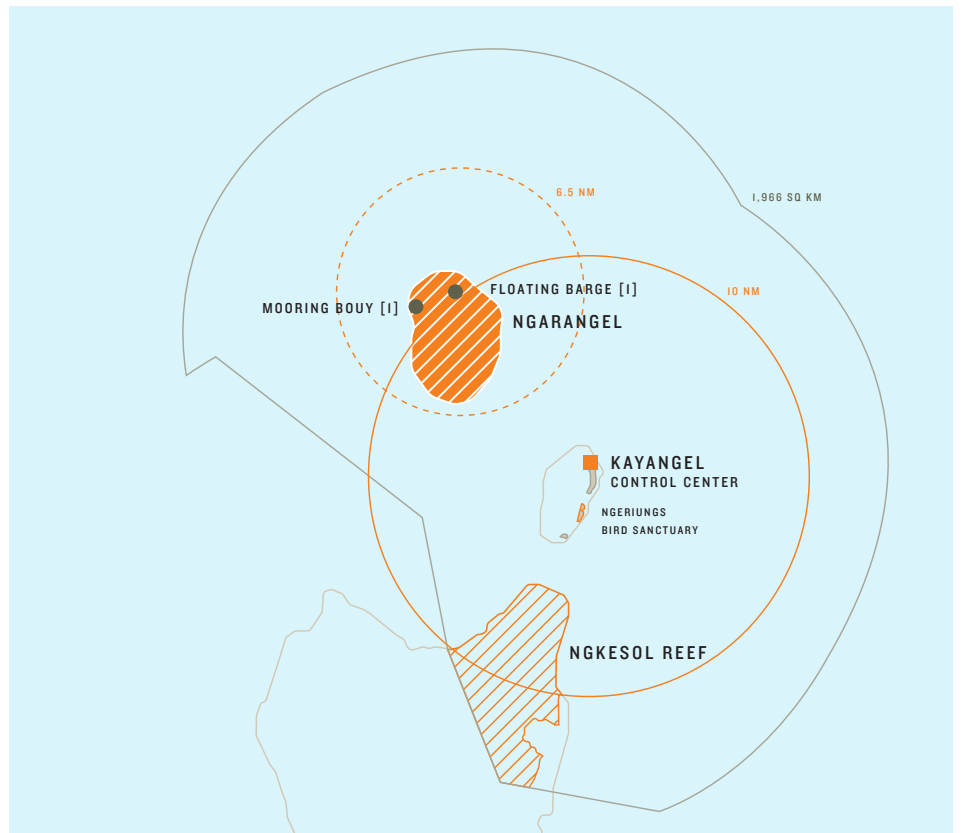


FIGURE NO. 07
Kayangel Zonification and Territorial Waters

FIGURE NO. 08
Ngarchelong Zonification and Territorial Waters

FINAL SURVEILLANCE COVERAGE UPON COMPLETION OF PHASES I & II

In closing, we are confident that the enforcement program designed for the Northern Reef project is practical, affordable and feasible to implement over a four-year timeframe. While it is the responsibility of each state to implement activities according to their respective timelines, it would behoove them to develop their programs in tandem given their similar stage in development and the synergies afforded through cooperation. As illustrated in Figure 09, the final enforcement system design provides strategic sensor coverage to key fishing areas, MPAs and access ways. Our strategy combines high-power video cameras and a robust VHF marine radio network with the strategic placement of buoys, patrol vessels and a floating barge to provide a constant presence and fast response capacity throughout both MMAs. All CAPEX and OPEX decisions were made in consideration of a highly limited budget. More importantly, we have defined a blueprint of critical steps for the capacity building and professionalization of the Rangers, who truly are the core component of the Northern Reef enforcement program.

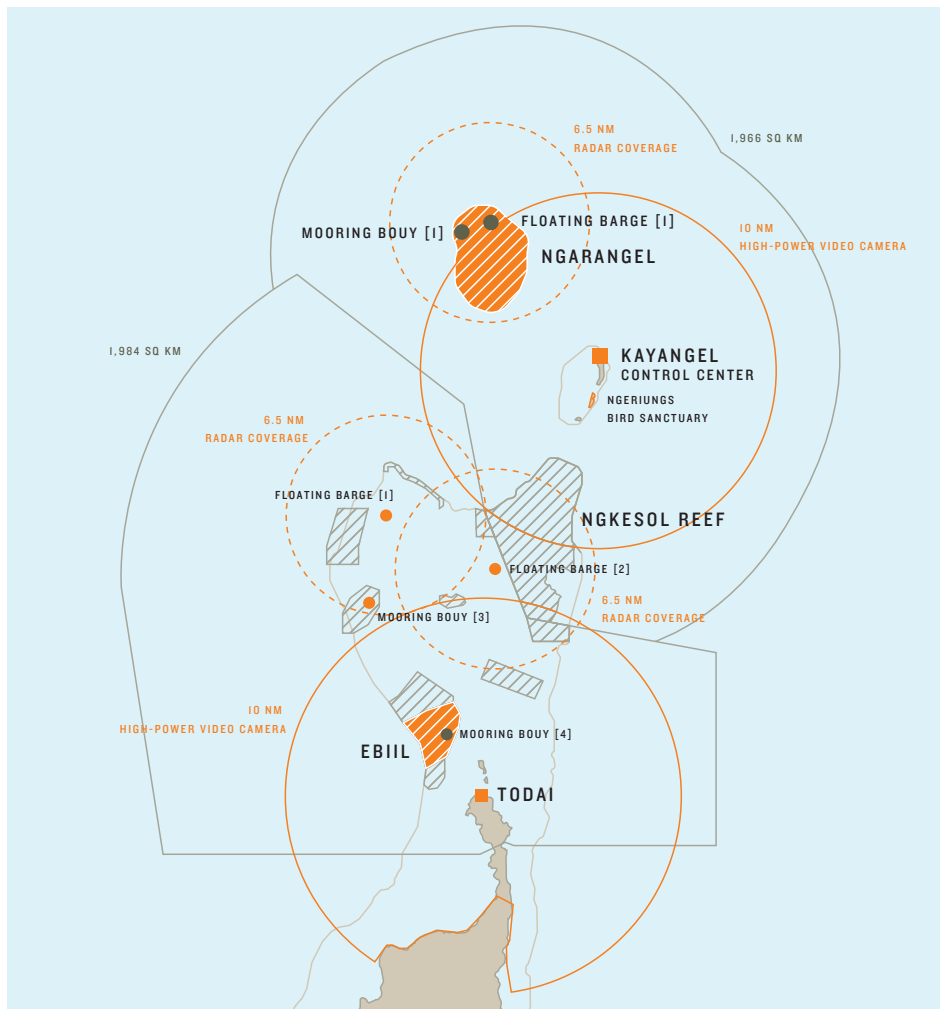


FIGURE NO. 09
Final Surveillance Coverage after Phase I & II with Zonification



IMAGE NO. 08
Ngarchelong MMA



TIMELINE

KAYANGEL: PHASE I (YEARS 1 & 2) ANNEX NO. 01

ITEM	RECOMMENDATION	RESPONSIBLE	ESTIMATED COST	
	SURVEILLANCE			
1	Staffing 7 Full time officers			
2	Training / SOPs			
	Basic IMO Safety Courses and Boat Captain's Course.			
	Marine Coastal Enforcement Operations			
	Strategic Planning and Use of Available Assets			
3	State vessels Registry definition and registration process (in coordination with DMLE)			
4	Rules, Regulations & Fees: Develop Outreach and Education Campaign to Stakeholders & Implement Small Vessel Registration.			
5	Provision of basic surveillance and safety equipment			
6	One (1) fully equipped control center at Kayangel and installation of Marine VHF Radio Network: 1 base radio at Kayangel, 1 base radio per patrol vessel (2 radios) and 2 handhelds for on-duty Wardens.			
7	Installation of high-power camera at Kayangel and installation of 2 mooring buoys throughout State waters that are "strategic" for deployment of patrol vessels and floating barge			
8	Development of inter-institutional agreement and SOPs with Ngarchelong for joint operations			
9	Development of inter-institutional agreement and SOPs with DFWP and DMLE to carry out joint patrols in territorial waters			
	INTERDICTION			
10	Elaboration of control center, patrolling and boarding SOPs			
11	Establish reporting formats			
12	Establishment of a critical spare parts inventory, a series of 2-stroke maintenance workshops and Maintenance SOPs			
	PROSECUTION & SANCTION			
13	Establish a practical database that allows for case monitoring and the recording of repeat offenders.			
14	Establish an inter-institutional agreement between the State Rangers and the State Attorney to ensure correct report writing and timely processing of both illegal fishing and tourism violations. (Look into hiring attorney)			

KAYANGEL: PHASE II (YEARS 3 & 4)

	SURVEILLANCE			
15	Incorporate fishers into enforcement framework as Surveillance Agents			
	INTERDICTION			
16	Deputize State Rangers in order to delegate power of arrest, bear firearms and enforce national laws			
	PROSECUTION & SANCTION			
17	Delegate sanction authority to Conservation Marine Law Enforcement Director to issue citations, hold/confiscate vessels, fishing gear and catch			

[illegible]

TIMELINE

NGARCHELONG: PHASE I (YEARS 1 & 2) ANNEX NO. 02

ITEM	RECOMMENDATION	RESPONSIBLE	ESTIMATED COST	
	SURVEILLANCE			
1	Staffing 7 Full time officers			
2	Training / SOPs			
	Basic IMO Safety Courses and Boat Captain's Course.			
	Marine Coastal Enforcement Operations			
	Strategic Planning and Use of Available Assets			
3	State vessels Registry definition and registration process (in coordination with DMLE)			
4	Rules, Regulations & Fees: Develop Outreach and Education Campaign to Stakeholders & Implement Small Vessel Registration.			
5	Provision of basic surveillance and safety equipment			
6	One (1) fully equipped control center at Todai and installation of Marine VHF Radio Network: 1 base radio at Todai, 1 base radio per patrol vessel (2 radios) and 2 handhelds for on-duty Wardens.			
7	Installation of high power camera at Todai and installation of 4 mooring buoys throughout State waters that are "strategic" for deployment of patrol vessels and floating barge			
8	Development of inter-institutional agreement and SOPs with Ngarchelong for joint operations			
9	Development of inter-institutional agreement and SOPs with DFWP and DMLE to carry out joint patrols in territorial waters			
	INTERDICTION			
10	Elaboration of control center, patrolling and boarding SOPs			
11	Establish reporting formats			
12	Establishment of a critical spare parts inventory, a series of 4-stroke maintenance workshops and Maintenance SOPs			
	PROSECUTION & SANCTION			
13	Establish a practical database that allows for case monitoring and the recording of repeat offenders.			
14	Establish an inter-institutional agreement between the State Rangers and the State Attorney to ensure correct report writing and timely processing of both illegal fishing and tourism violations.			

NGARCHELONG: PHASE II (YEARS 3 & 4)

	SURVEILLANCE			
15	Incorporate fishers into enforcement framework as Surveillance Agents			
16	Refit of floating base and installation of onboard radar			
17	Deployment of floating base in Northern Waters. A patrol vessel will be required to be stationed at floating base for logistics and interdiction			
18	Development of inter-institutional agreement and SOPs with Kayangel to operate floating base in both maritime territories			
	INTERDICTION			
19	Deputize State Rangers in order to delegate power of arrest, bear firearms and enforce national laws			
	PROSECUTION & SANCTION			
20	Delegate sanction authority to Conservation Marine Law Enforcement Director to issue citations, hold/confiscate vessels, fishing gear and catch			

BUDGET

KAYANGEL OPEX ESTIMATION ANNEX NO. 03

1. Capital Expense

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Larger boat	\$20,000	\$20,000	\$0	\$0	\$0	\$0	\$0
Smaller boat	\$15,000	\$15,000	\$0	\$0	\$0	\$0	\$0
O/B Motor 225 HP	\$24,000	\$24,000	\$0	\$0	\$0	\$0	\$0
O/B Motor 85 HP	\$11,500	\$11,500	\$0	\$0	\$0	\$0	\$0
Surveillance System Cost & Control Center	\$28,300	\$0	\$28,300	\$0	\$0	\$0	\$0
Tower: Metal-Mechanical, Electrical protection and foundation	\$12,500	\$0	\$12,500	\$0	\$0	\$0	\$0
Emergency Power Supply	\$13,700	\$0	\$13,700	\$0	\$0	\$0	\$0
Telecommunications Equipment	\$8,940	\$0	\$8,940	\$0	\$0	\$0	\$0
Mooring System	\$15,110	\$0	\$15,110	\$0	\$0	\$0	\$0
Control Center Modification & Furniture	\$8,500	\$0	\$8,500	\$0	\$0	\$0	\$0

2. Maintenance & Repair

3% Est. Rate for Fixed Assets

3% Inflation Rate

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Fixed Assets Maintenance & Repair			\$2,115	\$4,790	\$4,934	\$5,082	\$5,234
Larger boat	\$0	\$600	\$600	\$618	\$637	\$656	\$675
Smaller boat	\$0	\$450	\$450	\$464	\$477	\$492	\$506
O/B Motor 225 HP	\$0	\$720	\$720	\$742	\$764	\$787	\$810
O/B Motor 85 HP	\$0	\$345	\$345	\$355	\$366	\$377	\$388
Surveillance System Cost & Control Center	\$0	\$0	\$0	\$849	\$874	\$901	\$928
Tower: Metal-Mechanical, Electrical protection and foundation	\$0	\$0	\$0	\$375	\$386	\$398	\$410
Emergency Power Supply	\$0	\$0	\$0	\$411	\$423	\$436	\$449
Telecommunications Equipment	\$0	\$0	\$0	\$268	\$276	\$285	\$293
Mooring System	\$0	\$0	\$0	\$453	\$467	\$481	\$495
Control Center Modification & Furniture	\$0	\$0	\$0	\$255	\$263	\$271	\$279
Expendables Expenses (for O/B motors)	\$0	\$0	\$17,234	\$13,067	\$6,579	\$6,776	\$6,980
Boats Critical Spare Parts List	\$0	\$0	\$7,081	\$9,621	\$6,579	\$6,776	\$6,980
Boats Surveillance and Safety Equipment	\$0	\$0	\$10,153	\$3,446	\$0	\$0	\$0

3. Staffing

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Marine Law Enforcement	1	\$0	\$18,000	\$18,540	\$19,096	\$19,669	\$20,259
Conservation Officers / Control Center Operators	6	\$0	\$57,600	\$59,328	\$61,108	\$62,941	\$64,829
			\$75,600	\$77,868	\$80,204	\$82,610	\$85,088

4. Fuel Supply

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Provision for 2 motors: 1x225HPx30h + 1x85HPx90h	7,129 Gal/Year		\$40,841	\$42,067	\$43,329	\$44,629	\$45,967

BUDGET

NGARCHELONG OPEX ESTIMATION ANNEX NO. 04

1. Capital Expense

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Floating Barge	\$54,400	\$0	\$0	\$0	\$54,400	\$0	\$0
Larger boat	\$20,000	\$20,000	\$0	\$0	\$0	\$0	\$0
Smaller boat	\$15,000	\$15,000	\$0	\$0	\$0	\$0	\$0
O/B Motor 225 HP	\$24,000	\$24,000	\$0	\$0	\$0	\$0	\$0
O/B Motor 85 HP	\$11,500	\$11,500	\$0	\$0	\$0	\$0	\$0
Surveillance System Cost & Control Center	\$28,300	\$0	\$28,300	\$0	\$0	\$0	\$0
Tower: Metal-Mechanical, Electrical protection and foundation	\$12,500	\$0	\$62,000	\$0	\$0	\$0	\$0
Emergency Power Supply	\$13,700	\$0	\$13,700	\$0	\$0	\$0	\$0
Telecommunications Equipment	\$8,940	\$0	\$8,940	\$0	\$0	\$0	\$0
Mooring System	\$15,110	\$0	\$20,600	\$0	\$0	\$0	\$0
Control Center Modification & Furniture	\$8,500	\$0	\$8,500	\$0	\$0	\$0	\$0

2. Maintenance & Repair

3% Est. Rate for Fixed Assets

3% Inflation Rate

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Fixed Asttes Maintenance & Repair		\$2,115	\$2,178	\$6,505	\$8,332	\$8,582	\$8,840
Floating Barge	\$0	\$0	\$0	\$0	\$1,632	\$1,681	\$1,731
Larger boat	\$0	\$600	\$618	\$637	\$656	\$675	\$696
Smaller boat	\$0	\$450	\$464	\$477	\$492	\$506	\$522
O/B Motor 225 HP	\$0	\$720	\$742	\$764	\$787	\$810	\$835
O/B Motor 85 HP	\$0	\$345	\$355	\$366	\$377	\$388	\$400
Surveillance System Cost & Control Center	\$0	\$0	\$0	\$849	\$874	\$901	\$928
Tower: Metal-Mechanical, Electrical protection and foundation	\$0	\$0	\$0	\$1,860	\$1,916	\$1,973	\$2,032
Emergency Power Supply	\$0	\$0	\$0	\$411	\$423	\$436	\$449
Telecommunications Equipment	\$0	\$0	\$0	\$268.20	\$276	\$285	\$293
Mooring System	\$0	\$0	\$0	\$618	\$637	\$656	\$675
Control Center Modification & Furniture	\$0	\$0	\$0	\$255	\$263	\$271	\$279
Expendables Expenses (for O/B motors)	\$0	\$0	\$17,234	\$17,751	\$7,512	\$17,730	\$15,158
Floating Barge Critical Spare Parts List	\$0	\$0	\$0	\$0	\$0	\$5,556	\$5,376
Floating Barge On Buard Surveillance and Safety Equipment	\$0	\$0	\$0	\$0	\$0	\$4,436	\$1,812
Boats Critical Spare Parts List	\$0	\$0	\$7,081	\$7,293	\$7,512	\$7,738	\$7,970
Boats Surveillance and Safety Equipment	\$0	\$0	\$10,153	\$10,457	\$0	\$0	\$0

3. Staffing

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Marine Law Enforcement	1	\$0	\$18,000	\$18,540	\$19,096	\$19,669	\$20,259
Conservation Officers / Control Center Operators	6	\$0	\$57,600	\$59,328	\$61,108	\$62,941	\$64,829
			\$75,600	\$77,868	\$80,204	\$82,610	\$85,088

4. Fuel Supply

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
Provision for 2 motors: 1x225HPx30h + 1x85HPx90h	7,129 Gal/Year		\$40,841	\$42,067	\$43,329	\$44,629	\$45,967

CAPEX SURVEILLANCE SYSTEM ANNEX NO. 05

ITEM	COMPONENTS	COST (INSTALLED)	KAYANGEL MPA	NGARCHE- LONG MPA	TOTAL
A. MARITIME SURVEILLANCE SENSORS					
1.0	Video Camera	\$12,000	1	1	\$24,000
1.1	Daylight/lowlight Camera >300X zoom	\$7,500	1	1	\$15,000
1.2	Laser Illuminator				
B. METAL-MECHANICAL WORKS					
2.0	Self sustained/squared base Tower, 18m (galvanized steel w/marine coatings)	\$30,500	0	1	\$30,500
3.0	Maintenance of Self sustained/Triangular Tower, 48m (Kayangel)	\$12,000	1	0	\$12,000
C. ELECTRICAL WORKS, PROTECTION, EMERGENCY SUPPLY					
4.0	Electrical line from public grid (900mts)				
4.1	Posts (1 each 50m: 18 x US\$2,000)	\$36,000	0	0	\$0
4.2	Transformer 15KVA (installed)	\$4,500	0	0	\$0
4.3	Electric cable single phase (900m * US\$12)	\$10,800	0	0	\$0
4.4	Lightning rod (for tower)	\$6,000	1	1	\$12,000
4.5	Grounding mesh Kit (7 bronze rods, grounding gel (thor gel), ground mesh & installation). Tower and Control Center	\$8,000	0	1	\$8,000
4.6	Distribution panel w/8 breaker slots (Initially 4 will be used: 2x20A, 2x10A)	\$1,500	1	1	\$3,000
4.7	Red light beacon for Tower (for Ngarchelong tower)	\$500	0	1	\$500
5	Direct Current (DC) Power Supply				
5.1	Deep cycle battery bank w/4h supply capacity: 12x12V 200AH batteries	\$7,200	1	1	\$14,400
5.2	48VDC power supply with charge control/battery charger	\$4,000	1	1	\$8,000
5.3	Battery shelter (fiber glass)	\$1,000	1	1	\$2,000
5.4	Inverter (2KVA). Supplies AC at control center computers	\$1,500	1	1	\$3,000
D. SITES SECURIT					
6.0	Security system at Control Centers (Smoke, fire, energy supply)	\$5,000	1	1	\$10,000
E. CIVIL WORKS					
7.0	Control center modification and refurbishings (workstations, electric outlets, lights)	\$8,500	1	1	\$17,000
8.0	Tower area arrangements and foundings	\$10,500	0	1	\$10,500
F. TELECOMMUNICATIONS					
9.0	25W Marine VHF-DSC-A Base Station Radio w/6dB Antenna installed on tower	\$3,300	1	1	\$6,600
10.0	25W Marine VHF-DSC-D Base Stations Radio w/3dB Antenna installed on boats	\$1,500	2	2	\$6,000
11.0	Marine VHF Base Radio power supply	\$450	3	3	\$2,700
12.0	1W-5W Waterproof/Floatable IP-X7 portable Marine VHF-DSC D	\$400	2	2	\$1,600
13.0	Portable radios additional batteries (long life). Includes antenna and belt clip/hanger	\$85	4	4	\$680
14.0	Portable radios battery charger	\$75	2	2	\$300
G. MARITIME SURVEILLANCE DISPLAY & CONTROL SYSTEM					
15.0	Desktop Server	\$3,000	1	1	\$6,000
16.0	Maritime monitoring & control software (AIS info display w/alerts & zoning)	\$15,000	0	0	\$0
17.0	Video surveillance software	\$3,500	1	1	\$7,500
18.0	23" monitors	\$400	2	2	\$1,600
19.0	Mass storage disk (5TB) - Video recording	\$1,500	1	1	\$3,000
H. LOGISTICS, ENGINEERING, INTEGRATION					
20.0	Design, engineering estimations/calculations, operational testings and commissioning	\$10,000	1	1	\$20,000

ITEM	COMPONENTS	COST (INSTALLED)	KAYANGEL MPA	NGARCHE- LONG MPA	TOTAL
J. MOORING BUOY SYSTEM (FOR BOATS OF UP TO 45 FT LENGTH)					
21.0	Site Survey and selection. Search and marking of final points	\$3,000	1	1	\$6,000
22.0	Moorings Anchor: Helix (12'), Halas or Manta (depends on type of bottom)	\$550	3	5	\$4,400
23.0	DELTEX (De Lama) Cable. Diam. 22mm, 100m.	\$2,250	1	2	\$6,750
24.0	Connectors, Swivels, shackels (includes 1 spare pair for each MPA)	\$360	6	10	\$5,760
25.0	24" Spherical Buoys	\$350	3	5	\$2,800
26.0	Installation	\$5,000	1	1	\$10,000
27.0	Drilling equipment & Installation (Helix & Halas). ASK STEVE	\$5,500	0	0	\$0

CAPEX SUMMARY

ITEM	KAYANGEL	NGARCHELONG
Surveillance System Cost & Control Center	\$28,000	\$28,300
Tower: Metal-Mechanical, electrical protection and foundation	\$12,500	\$62,000
Emergency Power Supply	\$13,700	\$13,700
Telecommunications Equipment	\$8,940	\$8,940
Moorings System	\$15,110	\$20,600
Control Center modifications & Furniture	\$8,500	\$8,500

FUEL CONSUMPTION COST ESTIMATION ANNEX NO. 06

4 stroke O/B demand	0.443	Pounds/h/HP W.O.T (WOT = Wide Open Throttle). From YAMAHA web site
Specific Gravity	0.443	(Unleaded Gasoline)
Pounds/Gal	8.33	Pounds p. Galón (referential value)
Fuel Pounds/Gal	5.94	Pounds per Gallon of fuel (given by specific gravity)

TYPE OF FUEL	PVP/GAL \$
Gasoline	\$5.20
Diesel	\$5.45

O/B MOTOR TYPE (HP)	MOTOR LOCAL COST (MIN.)	MOTOR LOCAL COST (MAX.	WOT DEMAND GAL/H.	WOT %	MONTHLY HOURS OF OPERATION	CONSUMPTION: GAL/MONTH
225	\$22,500	\$25,000	16.78	50%	30	251.73
150	\$10,500	\$12,000	11.19	60%	60	402.78

CHARACTER- ISTICS	TYPE A	TYPE B		
Length	7.5–8 m	9–12 m	Hours/Month (running Operation)	90 (Mostly Using the 85 HP)
Minimum Crew	3 h	3 h	TOTAL Gal/Month of Fuel	645.51 Gal
Economic Speed	8–10 Kt	8–10 Kt	TOTAL Fuel cost/month (USD)	\$3,403.45
Maximum Speed (WOT)	>28 Kt	>32 Kt	TOTAL Gal/Year of Fuel	7,854.12 Gal
Endurance	6–8 h	8–10 h	TOTAL Fuel cost/Year (USD)	\$40,841.43
Propulsion	1 x 85 HP	1 x 225 HP		

CASH FLOW : KAYANGEL ANNEX NO. 07

ITEM	REMARKS	Y1	Y2	Y3	Y4	Y5
CAPITAL EXPENSES						
Surveillance System Cost & Control Center		\$28,300	\$0	\$0	\$0	\$0
Tower: Metal-Mechanical, Electrical protection and foundation		\$12,500	\$0	\$0	\$0	\$0
Emergency Power Supply		\$13,700	\$0	\$0	\$0	\$0
Telecommunications Equipment		\$8,940	\$0	\$0	\$0	\$0
Mooring System		\$15,110	\$0	\$0	\$0	\$0
Control Center Modification & Furniture		\$8,500	\$0	\$0	\$0	\$0
		<i>\$87,050</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>
OPERATIONAL EXPENSES						
Maintenance and Repair		\$2,115	\$4,790	\$4,934	\$5,082	\$5,234
Expendables for Boats (spare parts for motors)		\$17,234	\$13,067	\$6,579	\$6,776	\$6,980
Staffing		\$75,600	\$77,868	\$80,204	\$82,610	\$85,088
Fuel		\$40,841	\$42,067	\$43,329	\$44,629	\$45,967
Utilities (electricity, telephone)		\$1,000	\$1,030	\$1,061	\$1,093	\$1,126
Stationary, copies, office supplies		\$500	\$515	\$530	\$546	\$563
Insurance (1.5% assets value)		\$2,363	\$2,434	\$2,507	\$2,582	\$2,660
		<i>\$139,653</i>	<i>\$141,771</i>	<i>\$139,144</i>	<i>\$143,318</i>	<i>\$147,618</i>

CASH FLOW : NGARCHELONG ANNEX NO. 08

ITEM	REMARKS	Y1	Y2	Y3	Y4	Y5
CAPITAL EXPENSES						
Surveillance System Cost & Control Center		\$28,300	\$0	\$0	\$0	\$0
Tower: Metal-Mechanical, Electrical protection and foundation		\$62,00	\$0	\$0	\$0	\$0
Emergency Power Supply		\$13,700	\$0	\$0	\$0	\$0
Telecommunications Equipment		\$8,940	\$0	\$0	\$0	\$0
Mooring System		\$20,600	\$0	\$0	\$0	\$0
Control Center Modification & Furniture		\$8,500	\$0	\$0	\$0	\$0
		<i>\$142,040</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>	<i>\$0</i>
OPERATIONAL EXPENSES						
Maintenance and Repair		\$2,178	\$6,505	\$8,332	\$8,582	\$8,840
Expendables for Boats (spare parts for motors)		\$17,234	\$17,751	\$7,512	\$17,730	\$15,158
Staffing		\$75,600	\$77,868	\$80,204	\$82,610	\$85,088
Fuel		\$40,841	\$42,067	\$43,329	\$44,629	\$45,967
Utilities (electricity, telephone)		\$1,000	\$1,030	\$1,061	\$1,093	\$1,126
Stationary, copies, office supplies		\$500	\$515	\$530	\$546	\$563
Insurance (1.5% assets value)		\$2,363	\$2,434	\$2,507	\$2,582	\$2,660
		<i>\$139,717</i>	<i>\$148,170</i>	<i>\$143,476</i>	<i>\$157,772</i>	<i>\$159,401</i>

I. CREW			
POSITION	QTY.	YEARLY PAY	TOTAL
Marine Law Enforcement Director	1	\$18,000	\$18,000
Conservation Officers / Control Center Operators	6	\$9,600	\$57,600
			\$75,600

2. CONSERVATION OFFICERS / CONTROL CENTER OPERATORS			
CONCEPT	DIRECTOR	CC OPERATORS	CONSERVATION RANGERS
Police Academy basic course/training	X	X	X
Basic IMO safety course: First Aid, fire fighting, survival at sea	X	X	X
Marine Coastal Enforcement Operations:			
Maritime and Environmental applicable regulations	X	X	X
Basic Marine Ecology and MPA Marine Eco System description	X	X	X
Nautical Chart reading and pilotage	X	X	X
VHF radio operation	X	X	X
GPS operation	X	X	X
Surveillance: Binoculars and night vision/Thermal devices. Concepts & practice	X	X	X
Operations planning procedures	X		
Operations execution procedures	X		
Boarding procedures	X	X	X
Radar Surveillance: Basic theory and operation	X	X	X
Inter-Agencies Operational Procedures	X		
Outboard motors basic maintenance	X	X	X
Strategic Planning and Use of Available Assets	X		
Control Center Operator & Video Surveillance	X	X	X
Legal Procedures			
CSI	X	X	X
Reporting fomats. And related procedures. Report writing	X	X	X
Legal Proceedings: a.) State Attorney b.) Attorney General	X	X	X

FUNCTIONS

Conservation Law Enforcement Director

I. GENERAL MARITIME AND MPA MANAGEMENT

- Yearly operations planning and budgeting
- Intelligence gathering
- Training program for wardens execution
- Weekly operations planning
- Weekly boat's operational status report evaluation
- MPA sub-zoning definitions & maintenance: mooring buoys, marks, pathways, etc.
- Update boats' Registry
- Safety rules requirements for small boats
- Boats inspection: Registry obligations and Safety requirements
- Marine Pollution rules and control
- Prepare outgoing infractions/felonies/crime reports
- Follow up of legal proceedings

2. CONTROL CENTER OPERATIONS MANAGEMENT:

- Visiting sites use (boats, passengers, activity)
- MPA scenario controlă
 - Boats in transit, routes, mooring sites, speeds, distress calls
 - Surveillance detection & Identification of all traffic
 - Dispatch interdiction/verification actions
 - Support information for boarding party

3. LOGISTIC MATTERS:

- Budgeting issues
- Prepare and Submit Yearly Boats' Maintenance Program: Hull, Motor, electronics
- Monitor Maintenance program
 - O/B motors hours of operation control
 - Maintenance/Repair program execution
 - Hull maintenance
 - Electric and Electronic equipment maintenance
- Fuel procurement
- Maintain critical spare parts and supplies stock

Conservation Officers (Rangers)

I. GENERAL MARITIME AND MPA MANAGEMENT

- Daily operational status inspection of patrol boats
- Weekly operational status report
- MPA sub-zoning inspections: mooring buoys, marks, aids to navigation condition

2. PATROLLING TASKS

- Buoys, marks, trails and aids to navigation condition (report to Director)
- Monitor: Boats in transit, routes, mooring buoys use, speeds, general safety
- Boats inspection: Registry/Safety requirements, permits, pollution control, turistic fees
- Interdiction operations and boarding tasks
- CSI and incidents reporting
- Respond to distress or SAR calls

3. BOATS MAINTENANCE

- Boat captain: Responsible for condition of all assets assigned to his boat
- Comply with maintenance program (hull, O/B motor, electronic equipment)
- Prepare & Monitor O/B maintenance program
 - O/B motors hours of operation control
 - Maintenance/Repair program execution
- Fuel requests (format)
- Spare parts request (format)

I. OPERATIONAL REQUIREMENTS

Two fixed coastal surveillance daylight/lowlight long range video cameras for monitoring the entrance of small fiber glass boats into MPAs/NTZs, one for each MPA.

Expected Performance: a.) Man detection over water: Mild weather and sea conditions for western Pacific equatorial zone. Beaufort scale <3, absence of fog, no rain, winds

≤50Km/h and wave height 1.5< m <2.0. Minimum detection range: 3NM. b.) Small fiber glass boat (7.5m with 1 85HP motor): Detection range to exceed 8NM under similar weather conditions.

2. TECHNICAL SPECS

ITEM	PARAMETER / SPECIFICATIONS	DESCRIPTION
1	Azimuth Range	360° Continuous
2	Elevation Range	from -45° to +45° or better
3	Focus	Automatic
4	Horizontal Field of View	Variable and Continuous
5	Wide Angle	≥ 45°
6	Narrow Angle	≤ 2°
7	Digital Resolution	640 x 480 (optional minimum) 1280 X 720 - HDTV (optional) 1920 X 1080 - HDTV (must comply with this resolution)
8	Frames per second	≥30 @ HDTV 1920x1080
9	Zooming capacity	≥300 (combined optical + digital)
	Digital Zoom	≥10X
	Optical Zoom	≥30X
10	Image enhancing	Digitally processed. Image enhancing algorithms
11	Residual light	<0.0001 lux in B&W mode, <0.3 lux in Color mode
12	Video Output format	NTSC, PAL
13	Video Compression	H.264, Motion JPEG
14	Video Output connectors	BNC, RS-232, RS-485
15	Image capture format	TIFF or JPEG
16	Programmable search	YES
17	Activity/Motion detection (multiple simultaneous targets on screen)	YES
18	Video Tracking	YES - Automatic
19	Laser illuminator (10nm range)	YES
20	Data interface	RS-232 and/or RS-422
21	Digital Magnetic compass	YES
22	Time-stamping, target azimuth on video screen and stored video	YES
23	Environmental Standards	-
	Operational temperature range	0°C to 55°C
	Ingress protection rate	IP-66 (resists water jets)
	Sand and Vibration	Mil Std 810-E (minimum)
24	Power Supply	12/24/48 VDC
25	Energy Consumption	<50 W
26	Desktop server	Reference: HP DL360e Gen8 E5-2403 w/video card and HDD 2TB internal
27	Video Recording	-
	Storage	4 Tbytes external
	Stored video FPS	same as live ideo
	Time stamp / Azimuth on stored video	YES
28	Monitor	23" Screen
29	Networking	IP v4/v6, QoS
30	MTBF	MTBF Better than 12000 hours

3. ADDITIONAL REQUIREMENTS

Consider following activities as additional costs:

- Installation, testing and commissioning costs
- Operators training (on final implementation sites): 14 operators 7x4 training sessions.
- Critical spare parts and consumables for initial 2 years of operation

VHF RADIO NETWORK SPECIFICATIONS ANNEX NO. II

I. VHF RADIO NETWORK EQUIPMENT

ITEM	PARAMETER / SPECIFICATIONS	DESCRIPTION
1	Frequency Band	Mobile Marine: 156.000 MHz - 162.025 MHz
2	Tx Power	25 W
3	DSC capacity	DSC Class A
4	Channel bandwidth	12.5 kHz over all MM channels
5	GMDSS compliant	According to Palauan region. Audio/Visual alarm required
6	Microphone/Loudspeaker	Hand microphone with PPT button type. External speaker (Wall/desk mounted loudspeaker)
7	Operational Temperature Range	0°C to +55°C
8	Power supply	12VDC
9	Ingress protection rating	IP-X6 or better
10	Antenna:	
	Type	Dipole, omnidirectional.
	Frequency Range	Mobile maritime range preferred. If not, maximum range would be 146.0 to 162.5 MHz
	Nominal Impedance	50Ω
	Maximum input power rating	>100W
	Gain	6 dB
	Material	Fiber glass or polyurethane lacque coated. Specific for open marine environments
	Quantity	Two (2). One for VHF communications and the second for simultaneous DSC reception

2. FIXED MARINE VHF BASE RADIOS (ON BOATS)

ITEM	PARAMETER / SPECIFICATIONS	DESCRIPTION
1	Frequency Band	Mobile Marine: 156.000 MHz - 162.025 MHz
2	Tx Power	25 W
3	DSC capacity	DSC Class D
4	Channel bandwidth	12.5 kHz and 25kHz over all MM channels
5	Microphone/Loudspeaker	Hand microphone with PPT button type. Internal speaker
6	Operational Temperature Range	0°C to +55°C
7	Power supply	12VDC
8	Ingress protection rating	IP-X6 or better
9	Antenna:	-
-	Type	Dipole, omnidirectional.
-	Frequency Range	Mobile maritime range preferred. If not, maximum range would be 146.0 to 162.5 MHz
-	Nominal Impedance	50Ω
-	Maximum input power rating	>100W
-	Gain	3 dB
-	Material	Fiber glass or polyurethane lacque coated. Specific for open marine environments
	Quantity	One

3. HANDHELD MARINE VHF RADIOS

ITEM	PARAMETER / SPECIFICATIONS	DESCRIPTION
1	Frequency Band	Mobile Marine: 156.025 MHz - 162.025 MHz
2	Tx Power	High and Low positions with maximum 5W output
3	Battery life	≥ 8 hours operation at low power
4	DSC capacity	DSC Class D
5	Channel bandwidth	12.5 kHz and 25kHz over all MM channels
6	Microphone/Loudspeaker	Both internal
7	Operational Temperature Range	0°C to +55°C
8	Power supply	Internal long life Battery
9	Ingress protection rating	IP-X7 with floating capacity
10	GPS	YES, internal. Better than 24 channels



SAFETY & VIGILANCE EQUIPMENT REQUIREMENTS FOR BOATS ANNEX NO. 12

1. Critical Spare Parts Needs

ITEM	QTY	UNITS	SPARES AND MAINTENANCE EQUIPMENT	
1	1	U.	Propellers for 225HP	
2	2	U.	Propellers for 85HP	
3	4	Box	Spark Plugs for 225HP and 85HP	
4	20	U.	Gas Fliters for 200HP and 85HP	
5	2	U.	Batteries 12V 105Ah for 200HP and 85HP	
6	2	U.	Remote Command Cables (Moorse)	
7	1	U.	Panel Switch	
8	3	U.	Fuel rubber pumps	
9	10	tubes	Grease	
10	2	U.	Yamaha/Mercury Tool Set	
11	1	U.	Yamaha/Mercury compression testers	
12	1	U.	Yamaha/Mercury Diagnostic Computer Set with PC	
13	1	Set	Critical Spare parts set (As manufacturer recommendation) Fuel pump Assembly, filter assembly, propeller shaft, ingnition coil, pulser coil, carburator set, pistons set, ring set, crankshaft bearings, gasket kit, cross joints	Carburator repair kit, starting motor assembly, ignition coil assembly, bearing set, starter relay assembly, gear reverse, gear fwd, pinion gear, bearing reverse gear, bearing fwd gear, etc
Sub - Total				

2. On-Board Surveillance and Safety Equipment Needs - (not fixed assets)

ITEM	QTY	UNITS	SPARES AND MAINTENANCE EQUIPMENT	
1	2	U.	Marine Megaphone 25W with rechargeable batteries	
2	1	U.	Waterproof/Shockproof/Portable GPS	
3	4	U.	First Aid Kit	
4	12	U.	PFD, Life saving Jacket (floatation) Yellow or Orange	
5	1	U.	15HP Emergency Outboard Motor for patrol vessel	
6	3	U.	Marine waterproof Binoculars 12X50 or up to 16X50	
7	1	U.	Marine waterproof portable night vision binoculars 5X Zoom	
8	3	U.	LED Spot Lights. Portable, waterproof & w/Rechargeable batteries	
9	1	U.	14 MPixel Shockproof/Waterproof Digital Camera with Optical 5x Zoom and built in GPS	
10	2	U.	Extra Batteries for Digital camera	
11	2	U.	Digital Camera storage bag	
12	2	U.	32 GB SDHC Flash Memory Cards for cameras	
13	6	U.	Leatherman Multi Tool pliers	
14	6	U.	Rechargeable, waterproof, floatable flashlights with battery backup	
15	8	U.	Inflatable Vinyl Boat Fender (8" x 24", White)	
16	6	U.	Inflatable Vinyl Boat Fender (12" x 36"), White)	
17	6	U.	Coastal Locator Flares Kit	
18	2	U.	Vernier Caliber - meter	
19	4	U.	Pelican Case 1620. In flight suitcase size	
20	2	U.	Police lights	
Sub - Total				

	ESTIMATED LOCAL PRICE PALAU	TOTAL	REMARKS	Y1	Y2	Y3
	\$ 222.00	\$ 222.00	-	\$ 222.00	\$ 222.00	\$ 222.00
	\$ 130.00	\$ 260.00	-	\$ 260.00	\$ 260.00	\$ 260.00
	\$ 116.00	\$ 464.00	-	\$ 464.00	\$ 464.00	\$ 464.00
	\$ 10.00	\$ 200.00	-	\$ 200.00	\$ 200.00	\$ 200.00
	\$ 225.00	\$ 450.00	-	\$ 450.00	\$ 450.00	\$ 450.00
	\$ 180.00	\$ 360.00	-	\$ 360.00	-	\$ 360.00
	\$ 120.00	\$ 120.00	-	\$ 120.00	-	\$ 120.00
	\$ 15.00	\$ 45.00	-	\$ 45.00	\$ 45.00	\$ 45.00
	\$ 18.00	\$ 180.00	-	\$ 180.00	\$ 180.00	\$ 180.00
	\$ 140.00	\$ 280.00	-	\$ 280.00	-	-
	\$ 500.00	\$ 500.00	-	-	\$ 500.00	-
	\$ 2,800.00	\$ 2,800.00	-	-	\$ 2,800.00	-
	\$ 4,500.00	\$ 4,500.00	-	\$ 4,500.00	\$ 4,500.00	\$ 4,500.00
		\$ 10,381.00		\$ 7,081.00	\$ 9,621.00	\$ 6,579.00

	ESTIMATED LOCAL PRICE PALAU	TOTAL	REMARKS	Y1	Y2	Y3
	\$ 60.35	\$ 120.69	One for each boat	\$ 120.69	-	-
	\$ 525.00	\$ 525.00	One for the boat that is on patrol. Patrol tracks should be downloaded after every patrol	\$ 525.00	-	-
	\$ 25.00	\$ 100.00	1 for each boat. 2 for control center	\$ 100.00	-	-
	\$ 114.75	\$ 1,377.00	6 per boat	\$ 1,377.00	-	-
	\$ 3,000.00	\$ 3,000.00	1 for the patrol boat that is on patrol.	\$ 3,000.00	-	-
	\$ 250.00	\$ 750.00	1 for each boat. 1 for control center	-	\$ 750.00	-
	\$ 1,400.00	\$ 1,400.00	For night patrols	-	\$ 1,400.00	-
	\$ 190.00	\$ 570.00	1 per boat and 1 at Control Center. Suggested: Streamlight 44911	\$ 570.00	-	-
	\$ 450.00	\$ 450.00	One camera per boat	\$ 450.00	-	-
	\$ 23.00	\$ 46.00	-	\$ 46.00	-	-
	\$ 35.00	\$ 70.00	-	\$ 70.00	-	-
	\$ 52.00	\$ 104.00	For the cameras. Quote by Amazon	\$ 104.00	-	-
	\$ 115.00	\$ 690.00	1 for each Ranger	\$ 690.00	-	-
	\$ 35.00	\$ 210.00	1 for each Ranger. Dorcy 41-4750 190-Lumen High Flux LED	\$ 210.00	-	-
	\$ 105.00	\$ 840.00	For the larger boat.	\$ 840.00	-	-
	\$ 135.00	\$ 810.00	For the smaller boat	-	\$ 810.00	-
	\$ 81.00	\$ 486.00	2 for ea/boat, 2 for main base and 2 spares	-	\$ 486.00	-
	\$ 25.00	\$ 50.00	For measuring species size	\$ 50.00	-	-
	\$ 325.00	\$ 1,300.00	2 for each boat to house surveillance & inspection equipment & on board logs/formats	\$ 1,300.00	-	-
	\$ 350.00	\$ 700.00	Marine wheatherized	\$ 700.00	-	-
		\$ 13,598.70		\$ 10,152.70	\$ 3,446.00	\$ 0.00

FLOATING BARGE REFIT REQUIREMENTS ANNEX NO. 13

1. Hull Refit (Fixed Assets)

ITEM	QTY	UNITS	SPARES AND MAINTENANCE EQUIPMENT	ESTIMATED LOCAL PRICE PALAU	TOTAL	
1	1	U.	Removal of current motor, piping, electrical circuits, and bulks.	\$ 3,000.00	\$ 3,000.00	
2	2	U.	Stern reinforcement for installation of outboard motors	\$ 1,500.00	\$ 3,000.00	
3	1	U.	85HP four stroke O/B motor. Include in-board tank.	\$ 11,500.00	\$ 11,500.00	
4	1	U.	Refit of state room area 4 bunks - 1 toilet	\$ 3,500.00	\$ 3,500.00	
5	1	U.	Galley, fridge, messroom	\$ 2,000.00	\$ 2,000.00	
6	1	U.	Hull modifications, reinforcement, superstructure, bridge and mast (3m height)	\$ 7,500.00	\$ 7,500.00	
7	1	U.	Installation of Radar (available at Kayangel)	\$ 4,000.00	\$ 4,000.00	
8	1	U.	Marine VHF-DSC C Base Radio (25W), IP-X6 with Antenna	\$ 1,500.00	\$ 1,500.00	
9	1	U.	Marine VHF-DSC C Handheld Radio, IP-X7, floatable (1-5W)	\$ 400.00	\$ 400.00	
10	1	U.	Solar generation: 8x300W panels, 12x300AH deep cycle batteries, charger, inverter (120VAC-60Hz)	\$ 18,000.00	\$ 18,000.00	
Sub - Total					\$ 54,400.0	

1. Hull Refit (Fixed Assets)

ITEM	QTY	UNITS	SPARES AND MAINTENANCE EQUIPMENT		ESTIMATED LOCAL PRICE PALAU	TOTAL	
11	1	U.	Propellers for 85HP		\$ 130.00	\$ 130.00	
12	1	Box	Spark Plugs for 85HP		\$ 116.00	\$ 116.00	
13	5	U.	Gas Fliters for 200HP and 85HP		\$ 10.00	\$50.00	
14	1	U.	Battery 12V 105Ah for 85HP		\$ 225.00	\$ 225.00	
15	1	U.	Remote Command Cables (Moorse)		\$ 180.00	\$ 180.00	
16	1	U.	Panel Switch		\$ 120.00	\$ 120.00	
17	3	U.	Fuel rubber pumps		\$ 15.00	\$ 45.00	
18	5	Tubes	Grease		\$ 18.00	\$90.00	
19	1	Set	Critical Spare parts set (As manufacturer recommendation) Fuel pump Assembly, filter assembly, propeller shaft, ingnition coil, pulser coil, carburator set, pistons set, ring set, crankshaft bearings, gasket kit, cross joints	Carburator repair kit, starting motor assembly, ignition coil assembly, bearing set, starter relay assembly, gear reverse, gear fwd, pinion gear, bearing reverse gear, bearing fwd gear, etc	\$ 4,600.00	\$ 4,600.00	
Sub - Total						\$ 5,556.00	

3. On-Board Surveillance and Safety Equipment Needs

ITEM	QTY	UNITS	ON BOARD EQUIPMENT		ESTIMATED LOCAL PRICE PALAU	TOTAL	
20	1	U.	Marine Megaphone 25W with rechargeable batteries		\$ 60.35	\$ 60.35	
21	1	U.	Waterproof/Shockproof/Portable GPS		\$ 525.00	\$ 525.00	
22	2	U.	First Aid Kit		\$ 25.00	\$50.00	
23	4	U.	PFD, Life saving Jacket (floatation) Yellow or Orange		\$ 114.75	\$459.00	
24	1	U.	Marine waterproof Binoculars 12X50 or up to 16X50		\$ 250.00	\$ 250.00	
25	1	U.	Marine waterproof portable night vision binoculars 5X Zoom		\$ 1,400.00	\$ 1,400.00	
26	1	U.	LED Spot Lights. Portable, waterproof & w/Rechargeable batteries		\$ 190.00	\$ 190.00	
27	1	U.	14 MPixel Shockproof/Waterproof Digital Camera with Optical 5x Zoom and built in GPS		\$ 450.00	\$ 450.00	

REMARKS	Y1	Y2	Y3	Y4	Y5
-	-	-	\$ 3,000.00	-	-
-	-	-	\$ 3,000.00	-	-
-	-	-	\$ 11,500.00	-	-
-	-	-	\$ 3,500.00	-	-
-	-	-	\$ 2,000.00	-	-
-	-	-	\$ 7,500.00	-	-
-	-	-	\$ 4,000.00	-	-
-	-	-	\$ 1,500.00	-	-
-	-	-	\$ 400.00	-	-
-	-	-	\$ 18,000.00	-	-
	\$ 0.0	\$ 0.0	\$ 54,400.0	\$ 0.0	\$ 0.0

49

REMARKS	Y1	Y2	Y3	Y4	Y5
-	-	-	\$ 130.00	\$ 130.00	\$ 130.00
-	-	-	\$ 116.00	\$ 116.00	\$ 116.00
-	-	-	\$50.00	\$50.00	\$50.00
-	-	-	\$ 225.00	\$ 225.00	\$ 225.00
-	-	-	\$ 180.00	-	\$ 180.00
-	-	-	\$ 120.00	\$ 120.00	\$ 120.00
-	-	-	\$ 45.00	\$ 45.00	\$ 45.00
-	-	-	\$90.00	\$90.00	\$90.00
-	-	-	\$ 4,600.00	\$ 4,600.00	\$ 4,600.00
	\$ 0.0	\$ 0.0	\$ 5,556.00	\$5,376.00	\$ 5,556.00

REMARKS	Y1	Y2	Y3	Y4	Y5
-	-	-	\$ 60.35	-	-
-	-	-	\$ 525.00	-	-
1 for the boat and 1 for external support.	-	-	\$50.00	-	-
4 per boat	-	-	\$459.00	-	-
1 for each boat. 01 for main base	-	-	-	\$ 250.00	-
For night patrols	-	-	-	\$ 1,400.00	-
1 per boat and 1 at Control Center. Suggested: Streamlight 44911	-	-	\$ 190.00	-	-
-	-	-	\$ 450.00	-	-

3. On-Board Surveillance and Safety Equipment Needs

ITEM	QTY	UNITS	ON BOARD EQUIPMENT	ESTIMATED LOCAL PRICE PALAU	TOTAL	
28	1	U.	Extra Batteries for Digital camera	\$ 23.00	\$ 23.00	
29	1	U.	Digital Camera storage bag	\$ 35.00	\$ 35.00	
30	2	U.	32 GB SDHC Flash Memory Cards for cameras	\$ 52.00	\$ 104.00	
31	3	U.	Leatherman Multi Tool pliers	\$ 115.00	\$ 345.00	
32	3	U.	Rechargeable, waterproof, floatable flashlights with battery backup	\$ 35.00	\$ 105.00	
33	8	U.	Inflatable Vinyl Boat Fender (8" x 24", White)	\$ 105.00	\$ 840.00	
34	2	U.	Coastal Locator Flares Kit	\$ 81.00	\$ 162.00	
35	2	U.	Vernier Caliber - meter & scale	\$ 125.00	\$ 250.00	
36	2	U.	Pelican Case 1620. In flight suitcase size	\$ 325.00	\$ 650.00	
37	1	U.	Police lights	\$ 350.00	\$ 350.00	
Sub - Total					\$ 6,248.3	

REMARKS	Y1	Y2	Y3	Y4	Y5
-	-	-	\$ 23.00	-	-
-	-	-	\$ 35.00	-	-
For the cameras. Quote by Amazon	-	-	\$ 104.00	-	-
1 for each warden on board	-	-	\$ 345.00	-	-
1 for each warden on board. Dorcy 41-4750 190-Lumen High Flux LED	-	-	\$ 105.00	-	-
-	-	-	\$ 840.00	-	-
For night alert	-	-	-	\$ 162.00	-
For measuring species size	-	-	\$ 250.00	-	-
For housing surveillance & inspection equipment & on board logs/formats	-	-	\$ 650.00	-	-
Marine wheatherized	-	-	\$ 350.00	-	-
	\$ 0.0	\$ 0.0	\$ 4,436.3	\$ 1,812.0	\$ 0.0

1. <http://palaugov.org/population-census/2005>
2. Article 1, Section 1(a) of the Republic of Palau Constitution
3. Article XII, Section 6 (a) of the Constitution
4. Ministry of Natural Resources, Environment, and Tourism
5. Bureau of Marine Resources
6. Environmental Quality Protection Board
7. Bureau of Public Safety
8. It is important to note that Koror State has an annual budget of \$9m given the revenue generated from Rock Island and Jellyfish Lake permits, which help underwrite two full-time attorneys. Kayangel and Ngarchelong must seek a strategy where they can share expenses, as their budget is limited. They have yet to generate substantial revenue from tourism fees.
9. Republic of Palau, Marine Resources Profile - Paul V. Nichols. August 1991.
10. The Ngarchelong Protected Area Management Plan.
11. Ibid.
12. The Kayangel Protected Areas Network 2013 – 2018 Management Plan.
13. Ibid.

WILDAID

