



BARBUDA BLUE HALO

ENFORCEMENT BLUEPRINT

ASSESSMENT METHODOLOGY

This assessment represents the work of a multi-national team and was carried out in Barbuda over a 1-week period in November 2014. Research methods were developed and applied by WildAid in cooperation with the Waitt Institute. Interviews were carried out with the following actors: Barbuda Council, Codrington Lagoon National Park, Fisheries, the Police, Coast Guard, Port Authority and the National Park Authority. The ELI publication “Sustainable Fisheries & Coastal Zoning in Barbuda: Legal & Institutional Assessment of Authorities & Approaches” proved extremely helpful. We are especially thankful for the support of Ayana Johnson, Stephanie Roach and Andy Estep.

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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.

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ACRONYMS

BC	Barbuda Council
CG	Coast Guard
CLNP	Codrington Lagoon National Park
CAPEX	Capital Expenses
C&V	Control and Vigilance
HP	Horse Power
MPA	Marine Protected Area
NM	Nautical Miles
NGO	Non Governmental Organization
NPA	National Port Authority
NTZ	No-take Zone
IMO	International Maritime Organization
OEM	Original Equipment Manufacturer
OPEX	Operating Expenses
SOP	Standard Operating Protocols
VHF	Very High Frequency

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EXECUTIVE SUMMARY

The Barbuda Blue Halo Initiative (BBHI) aims to develop sustainable ocean policy and local management capacity for the enforcement of fishery regulations within the Codrington Lagoon National Park (CLNP) and throughout Barbuda's near shore jurisdictional waters (3NM). The BBHI represents a collaborative effort among the Barbuda Council, the Government of Antigua & Barbuda, and the Waitt Institute. Already, the BBHI has made considerable progress in the design of a management system that builds on the existing legal framework and that is grounded in community consultations. Key ecological assessments, habitat mapping and legal analysis have enabled the drafting and approval of new regulations supporting a comprehensive coastal zoning system. The BBHI has also mapped out the national legal framework and created a strong foundation for an effective regulatory system, and is working to raise the dollar value of fines, and establish a special fund for revenue generation and the compounding of infractions: all critical elements for success. Barbuda waters include important habitats of coral reef systems, sea grass, mangroves, nesting beaches; and offer spawning and aggregation sites for a number of fish species and breeding areas for seabirds among other species. Given the decline in fisheries, the Barbuda Council desires to establish a marine law enforcement program to reverse trends and protect its near shore territorial waters (3NM).

We are confident that the enforcement program designed for Barbuda is practical, affordable and feasible to implement over a three-year timeframe. While it is the responsibility of each agency 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 coverage of key fishing areas, sanctuaries and access ways. The strategy combines the use of vigilance posts, a robust VHF marine radio network with the strategic placement of buoys, and patrol vessels to provide a constant presence and fast response

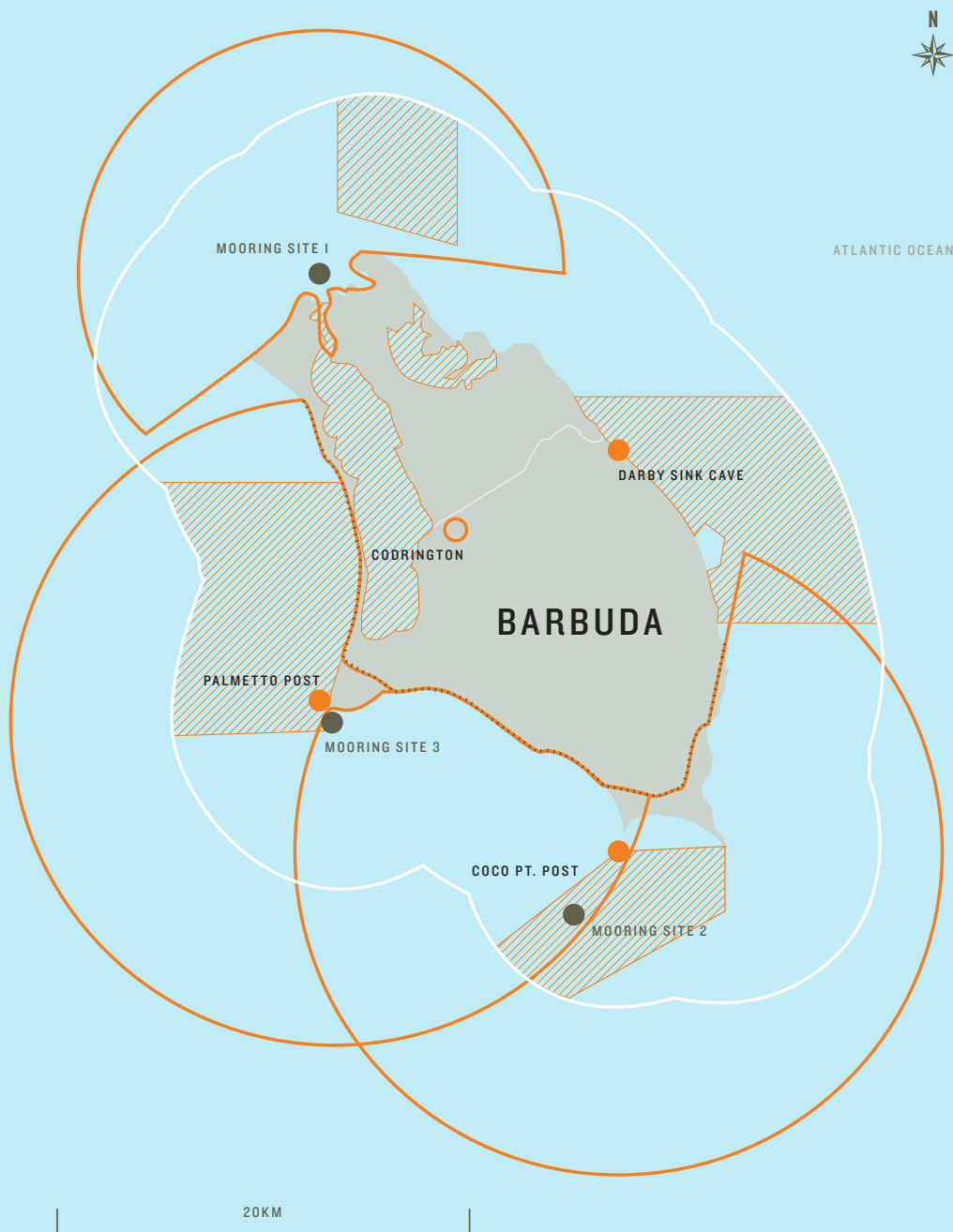
capacity throughout Barbuda's near shore waters. All capital expenses (CAPEX) and operating expenses (OPEX) decisions were made in consideration of a highly limited budget. More importantly, we have defined a blueprint of critical steps for the capacity building and professionalization of the officers, who truly are the core component of the Barbuda enforcement program.

CAPITAL EXPENSES (US\$)	CLNP	FISHERIES
Outlook Posts & Shelters/Offices	\$0	\$41,000
Electrical Works, Protection, Emergency Supply	\$0	\$7,700
Civil Works	\$0	\$2,000
Telecommunications	\$4,770	\$5,890
Maritime Surveillance Display & Control System	\$3,000	\$3,000
Mooring Buoy System (for boats of up to 45 ft length)	\$13,350	\$28,950
BOATS & ACCESSORIES		
28" Fiber Glass boat w/Canopy and command panel/seat	\$0	\$24,500
Accessories	\$700	\$29,300
SUBTOTAL	\$21,820	\$142,340
ANNUAL OPERATING EXPENSES (US\$)	CLNP	FISHERIES
Maintenance and Repair	\$0	\$0
Expendables for Boats (spare parts for motors)	\$12,758	\$18,167
Staffing	\$119,500	\$213,500
Fuel	\$17,529	\$32,866
Utilities (electricity, telephone)	\$1,000	\$2,000
Stationary, copies, office supplies	\$500	\$1,000
Insurance (1.5% assets value)	\$607	\$4,222
SUBTOTAL	\$151,894	\$271,756
TOTAL	\$173,714	\$414,096

Table No. 01. Summary Enforcement Budget

BARBUDA SURVEILLANCE COVERAGE

- MARINE SANCTUARIES
- VIGILANCE POST
- MOORING SITES
- SURVEILLANCE COVERAGE
- 3NM COASTAL ZONE
- URBAN AREA - CODRINGTON



ASSESSMENT OBJECTIVES

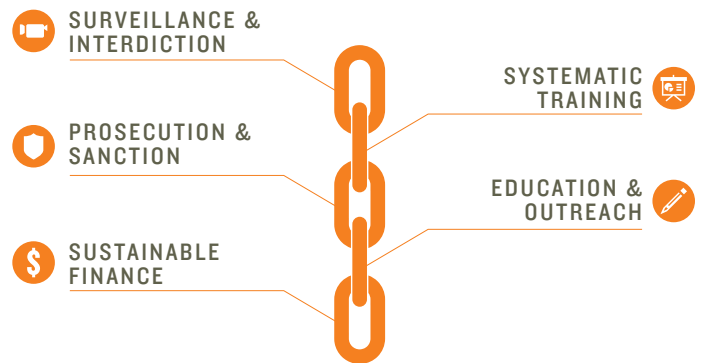
The main objective of this assessment is to design a cost effective control and vigilance system for Barbuda, placing special emphasis on protecting no-take zones and fisheries. The specific objectives are:

1. Develop a practical control and vigilance strategy for Barbuda based on interviews of local enforcement actors, fishers, the 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 and interdiction efficacy. The final report will include a surveillance system design including potential technologies, vigilance post locations, vessels, human resource requirements, and overall cost estimate (initial CAPEX and OPEX over a five year period.)

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.



CONTEXT ANALYSIS

BARBUDA BLUE HALO INITIATIVE

The Barbuda Blue Halo Initiative (BBHI) aims to develop sustainable ocean policy and local management capacity for the enforcement of key fishery regulations within the Codrington Lagoon and throughout Barbuda's near shore jurisdictional waters (3NM). The BBHI represents a collaborative effort among the Barbuda Council, the Government of Antigua & Barbuda, and the Waitt Institute. Already, the BBHI has made considerable progress in the design of a management system that builds on the existing legal framework and that is grounded in community consultations. Key ecological assessments, habitat mapping and legal analysis has

enabled the drafting and approval of new regulations supporting a comprehensive coastal zoning system. The BBHI has also mapped out the national legal framework and created a strong foundation for an effective regulatory system, and is working to raise the dollar value of fines, and establish a special fund for revenue generation and the compounding of infractions: all critical elements for success.

SUMMARY OF RELEVANT ENFORCEMENT ACTORS & CURRENT CAPACITY

GOVERNMENT AGENCY	COMPETENCY	PHYSICAL PRESENCE	SCOPE OF ACTIVITIES	BUDGET, PERSONNEL & INFRASTRUCTURE	OBSERVATIONS
Barbuda Council (BC)	Local authority that manages day-to-day internal affairs of Barbuda in conformity with Cabinet directives. Jurisdiction: Shore to 3NM.	Codrington	Administers and regulates agriculture, fisheries, public health, public utilities and roads. Also raises and collects revenue. The Fisheries Act of 2006 provides for management by local authorities. In addition, the National Parks Authority delegates management of the CLNP to the BC.	11 member council: (National House of Representatives, national senator from Barbuda and 9 elected members) / 70-90% of Island residents employed via the BC.	The Barbuda Council should retain an employee/staff to follow up on Council meeting action items. In addition, the BC should appoint a champion for the cause to work both locally and with Antigua authorities.
Coast Guard (CG)	Anti - Narcotics/ Fishery Enforcement / Immigration & Customs / Deep Sea Search and Rescue/ Officers bear firearms and possess power of arrest. Jurisdiction: Entire EEZ; shore to 200 NM.	Antigua	Daily patrols and multi objective missions that include drug enforcement, maritime law enforcement, immigration, and fisheries.	No fixed annual budget (depend on Dept. of Defense)/ 62 officers / 24 hour operating capacity / Two 35 ft. Safeboats with twin 300HP /2 additional 33 ft. vessels are being acquired / private VHF marine network / no coastal radar equipment / no formal training program nor Standard Operating Procedures (SOPs). There is no CG presence in Barbuda.	Coastguard currently limits operations to 12NM given type of vessels. Patrol priorities are for anti-narcotics to the South. There is interest to collaborate with Fisheries and a historical average of 15 fishing violations per year. Lack of consolidated vessel registry limits CG ability for vessel identification.
Police	Enforce law, protect property and limit civil disorder. Officers bear firearms and possess power of arrest.	Codrington	Daily patrols and occasional collaboration with Fisheries & the Codrington Lagoon National Park Authority for interdictions.	19 officers / 1 vehicle / no vessels / private VHF radio network.	The Police force is staffed with nationals as well as 7 Dominicans. There is sufficient staff.
Fisheries Authority	Enforce fishery laws. Officers do not bear firearms nor have power of arrest. Jurisdiction: Shore to 3NM for Barbuda regulations and entire EEZ for national laws.	Codrington	Fisheries monitoring, fisher and fishing vessel registry, provision of compressed air and ice to fishers. Revenue generation from fisheries and services: \$.40/lb. for conch / \$.75 for lobster / \$10 per 50 lbs. of ice & \$7/tank. Vessel registration: 25 vessels x \$400-\$500 per year.	EC\$1M Budget / Excellent facilities / 10 Fishery officers, 5 clerks, Department Head, Senior Fisheries Officer, 7 cleaners, 8 security and 4 sea wardens. No patrol vessel /VHF marine network / No uniforms / No formal induction course nor SOPs.	Fishery patrols according to office hours (8:30AM – 4:30PM), however, majority of fishing takes place at dusk/dawn. Fishery data collected not processed for management purposes. Sufficient staff, however, organization reengineering required. Very limited number of registered infractions. No visible boat registration license on vessels.
Codrington Lagoon National Park Authority (CLNP)	Fish and wildlife resources enforcement. Officers do not bear firearms nor possess power of arrest. Jurisdiction: Within the CLNP, which encompasses 3,600 HA. of wetlands and other areas, and can support Fisheries staff in areas outside CLNP.	Codrington	1 patrol per week	No budget / 4 staff / New office / 1 Toyota pickup / 25 foot patrol vessel with two 40HP Yamaha 2-strokes / Fuel: 50 gallon per week / Personal cellular phones are used for communication / 2 VHF marine base radio not installed & 3 binoculars / No uniforms / No formal induction course nor SOPs.	Park assets are in good condition, however, few staff and operating budget limits coverage and enforcement. Infractions by year: 2014 (0) / 2013 (1) / 2012 (1).

Table No. 02. Summary of Relevant Enforcement Actors and Current Capacity

Upon completion of a brief analysis of the legal framework and interviews with key officers, it is clear that fisheries management will be the responsibility of both the Barbuda Fisheries and the CLNP. While the CG has the mandate to patrol Barbuda territorial waters, they have no physical presence in Barbuda and their budget limits patrols to Antigua. Both Fisheries and the CLNP have clear jurisdictions and competencies, however, given resource constraints, their effectiveness is limited. Currently, Fisheries possesses sufficient staff, but no patrol vessel while the CLNP possesses a patrol vessel, but is limited to weekly patrols and only has four staff. Neither agency possesses formal operating protocols,

uniforms nor formal training modules. Both agencies coordinate with the Police when necessary given their power of arrest and firearms; however, no formal inter-institutional agreements exist among the three agencies. Currently, most illegal activities either go undetected due to lack of presence of enforcement officers or simply because local laws are not enforced by the respective agency. The implementation of the new fisheries and park regulations will require a substantial investment in capacity building, institutionalization of processes, inter-institutional coordination, outreach and education and a fundamental cultural change.

RELEVANT SITE INFORMATION FOR BARBUDA

BARBUDA LOCATION & SIZE

Barbuda is located 23 NM north of Antigua and to the south are the islands of Montserrat and Guadeloupe at 29NM & 57NM, respectively. 59 NM to the west and northwest are Nevis, St. Kitts, St. Barts, and St. Martin. The total land area is 160.56 km², possesses little topographical variation and the highest point is 38 meters above sea level. The total marine area is 428 km².

KEY MANAGEMENT AUTHORITY

The Barbuda Local Government Act, in harmony with the Fisheries Act of 2006 and the Shooting and Fishing By-Law of 1959, designates the Barbuda Council as the local fisheries management authority for near shore waters (3NM). While ultimately the BC is responsible for the implementation of the management plan, both

Fisheries and the CLNP are responsible for the daily administration, enforcement, planning, and reporting on behalf of the BC.

ZONIFICATION

ZONES	USE CATEGORY
Marine Sanctuaries	Permanently Closed to Fishing
Anchoring /Mooring Zones	
No Net Zones	No use of nets
No-Net Reef Buffer	
Shipping	No fishing, swimming or anchoring

Table No. 03. Zonification

LICENSED ACTIVITIES

- Local commercial fishing & vessel registration
- Education and Research

FISHER CHARACTERISTICS

- Most fishing is for local consumption, although there is a growing export of lobster and conch to Antigua as well as to Guadeloupe. Historically, local fishers targeted lobster, conch and roughly 20% target whitefish, however; recently two Barbuda exporters are driving fishing pressures to unsustainable levels. Limited catch data.
- 60 Barbuda fishers: 30-40 full-time and 20 recreational/subsistence fishers distributed over 30 vessels of 20-30 ft. length with 40-100HP outboard motors. Roughly 10 fishers are recurring violators.
- 12 Antiguan vessels regularly fish in Barbuda: five 35-45 ft. vessels with 100HP outboard motors with up to five divers per vessel. Antiguan use camps at the Northern and Southern areas of the Island and target parrotfish using up to 1,000 ft. gillnets. They also target lobster, conch and snapper. Some Antiguan receive ice and compressed air from locals.
- 2 vessels from Guadeloupe with 250-300HP outboard motors also encroach upon Barbuda.
- Target species: Parrotfish, Queen conch, lobster, snapper, sea turtles, grouper, among others.
- Fishing gear: Hand lines, spear guns, pots, rod and reel, harpoons and reef fishing with nets.

COMMUNITY, ISLAND INFRASTRUCTURE AND EQUIPMENT:

- 1,800 residents. The Barbuda Council employs 90% of the Island, hence fishing is not a primary source of income.
- Logistics: A cargo vessel services Island two days a week: Wednesday and Friday.

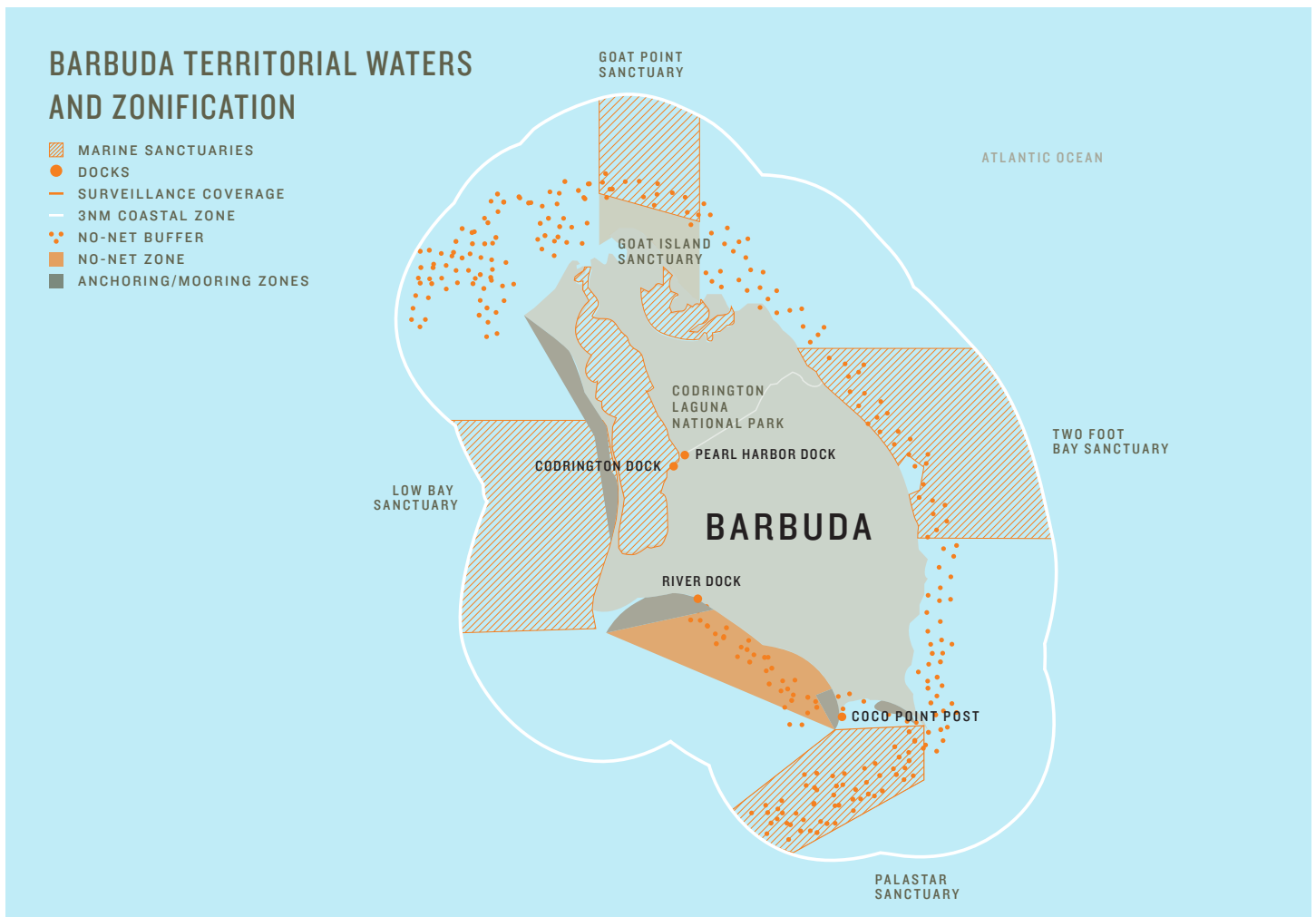
- Energy: One large government generator.
- Radio Network: Fisheries possesses a VHF marine network and the Police, a private radio network.
- Cellular: Digicel service is limited to land and approximately 5NM offshore coverage.
- Fisher Camps: There are an estimated 6 intermittent, informal camp areas in the North, West and South.
- Tourism Lodges: Coco Point Lodge, Barbuda Cottages, North Beach & Light House Bay Resort.
- 5 ports: Codrington Pier, Pearl Harbor, River Dock, Coco Point & Spanish Point.
- Two airstrips.

NATURE OF THREATS AND MANAGEMENT CONCERNS

Illegal Fishing	<ul style="list-style-type: none"> • Overfishing by local fishers • Overfishing by Antigua and Guadeloupe fishers 	<ul style="list-style-type: none"> • Targeting of parrotfish, undersized and out of season marine species (chicken lobster and conch) • Use of gillnets on reefs with high levels of bycatch
Tourism:	<ul style="list-style-type: none"> • Limited zonification for dive and visitor sites • Anchoring in sensitive areas and coral destruction 	<ul style="list-style-type: none"> • No site capacity management
Climate Change:	<ul style="list-style-type: none"> • Shoreline erosion 	
Development:	<ul style="list-style-type: none"> • Codrington Village is located within the limits of the CLNP 	<ul style="list-style-type: none"> • Unpermitted hotel construction within the CLNP
Pollution/Contamination:	<ul style="list-style-type: none"> • Lack of grey and black water treatment • Poor fuel management 	<ul style="list-style-type: none"> • Trash at fisher camps and along shoreline
Invasive Species	<ul style="list-style-type: none"> • Lionfish 	<ul style="list-style-type: none"> • Donkeys and goats

Table No. 04. Nature of Threats and Management Concerns

Figure No. 02. Barbuda Territorial Waters and Zonification



CONTROL AND VIGILANCE SYSTEM DESIGN SUMMARY

WildAid carried out a physical site inspection to determine the best possible combination of potential surveillance technology, location of vigilance posts and interdiction equipment given site characteristics, the profile of stakeholders, use patterns, CAPEX and OPEX. In this section, we will briefly explain the logic behind our recommendations.

First off, it is worth noting the following positive factors:

1. Given the relatively small size of the marine area (3NM) and clear zonification of areas, the strategic placement of vigilance posts combined with the use of binoculars and/or telescopes can be extremely cost effective in detection.
2. There are few geographical and topographical complexities, which allows for fluid radio communication and visual surveillance.
3. Management of local fishers is feasible as there are roughly 30 vessels and limited passageways.
4. The identification of external fishers is not too complicated as most vessels travel from the South and South-West as illustrated in Figure 03.
5. There is political will and a precedent of inter-institutional collaboration among Fisheries, the CLNP and the Police.
6. The Barbuda Council possesses relative autonomy to create and amend by-laws as well as to fund personnel for both enforcement agencies.

With respect to immediate recommendations, we have outlined the following:

1. The high price of fuel at US\$6+ per gallon requires a strategy that limits “active” patrolling and requires the use of more fuel-efficient outboard motors. Naturally, less powerful motors will limit interdiction ability of better-equipped foreign fishers, however, we must strike a pragmatic balance.

2. Both Fisheries and the CLNP are relatively new institutions that will require significant capacity building investment.
3. Community buy-in and local fisher compliance is critical for biomass recovery and to help prevent foreign incursion.
4. There are currently too many docks (five) and recommend limiting local catch unloading to two: Codrington Dock and River Dock.
5. Foreign fishers are exerting the greatest amount of pressure on fisheries, are well funded, and have made inroads with Barbudans for supplies and assistance.

In the following table, we provide a list of recommendations by agency. We first begin by outlining the necessary capital expenditures required to ensure surveillance of the Island and its implications on staffing, human resource development and finally, strategic operations. In principle there should be mutual support and cooperation in surveillance and interdiction activities among Fisheries and the CLNP.

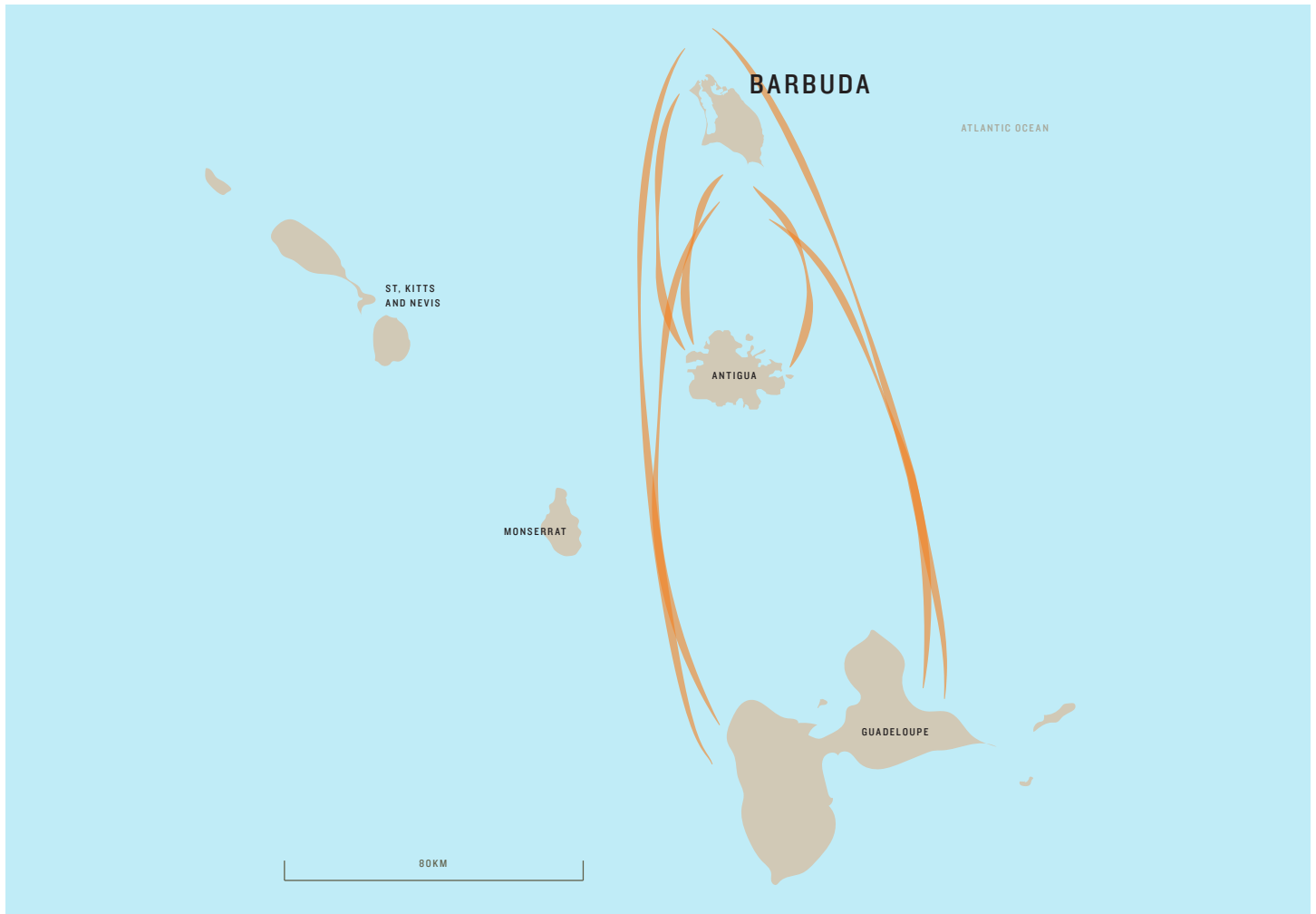


Image No. 01. Local Barbuda Fisher

COMPONENT	RECOMMENDATIONS	
	CLNP	FISHERIES
SURVEILLANCE	<ol style="list-style-type: none"> 1. Vigilance Post Selection & Surveillance Coverage 2. Vessels and Mooring Buoys 3. Staffing 4. Training/SOPs 5. Basic Surveillance and Safety Equipment 6. Rules, Regulations & Fees: <ul style="list-style-type: none"> • Develop Outreach and Education Campaign to Stakeholders 7. One (1) fully equipped shared control center at Fisheries and upgrade of Marine VHF Radio Network 8. Development of inter-institutional agreement and SOPs with Fisheries and Police for joint operations. 	<ol style="list-style-type: none"> 1. Vigilance Post Selection & Surveillance Coverage 2. Vessels and Mooring Buoys 3. Staffing 4. Training/SOPs 5. Basic Surveillance and Safety Equipment 6. Rules, Regulations & Fees: <ul style="list-style-type: none"> • Develop Outreach and Education Campaign to Stakeholders • Implement a Simple Registration and Visual Detection Program for Barbuda Vessels 7. One (1) Fully Equipped Shared Control Center at Fisheries and VHF Radio Network Upgrade 8. Development of inter-institutional agreement and SOPs with CLNP and Police for joint operations. 9. Development of inter-institutional agreement with CG to carry out joint patrols, training and interdiction.
INTERDICTION	<ol style="list-style-type: none"> 1. Elaboration of control center, patrolling and boarding SOPs. 2. Establish reporting formats. 3. Establishment of a critical spare parts inventory, a series of 2-stroke maintenance workshops and Maintenance SOPs. 	<ol style="list-style-type: none"> 1. Elaboration of control center, patrolling and boarding SOPs. 2. Establish reporting formats. 3. Establishment of a critical spare parts inventory, a series of 4-stroke maintenance workshops and Maintenance SOPs.
PROSECUTION	<ol style="list-style-type: none"> 1. Establish a practical database that allows for case monitoring and the recording of repeat offenders. 	<ol style="list-style-type: none"> 1. Establish a practical database that allows for case monitoring and the recording of repeat offenders.

Table No. 05. Barbuda Control and Vigilance System Design Summary

Figure No. 03. Pathways of External Threats to Barbuda



SURVEILLANCE

VIGILANCE POST LOCATION AND SURVEILLANCE COVERAGE

The first step in establishing the Barbuda enforcement system requires selecting strategic vigilance posts where both surveillance coverage is guaranteed as well as the timely interdiction of fishers. As we illustrate in Figure 04, we propose the erection of at least two vigilance posts and the installation of three buoys for the mooring of the patrol vessels. The proposed vigilance posts and surveillance equipment provide coverage of Barbuda's near shore waters with a high degree of overlap, which allows surveillance of critical zones with more than one post/sensor at a time.

We highly recommend the placement of a vigilance post at Coco point given its coverage of the southern sanctuary and key access way from Antigua & Guadeloupe. A simple wooden structure will suffice that measures 5 meters in height with a 3x3 meter square platform. In order to prevent theft or vandalism, we do not recommend equipping the structure, however, a small portable battery system with hand rank may be useful to run any portable

electronics and perhaps jump start a dead boat battery. The structure should be permanently staffed with at least one officer with handheld radio, portable telescope (20X optical zoom) and perhaps a night vision device (NVD) if budget permits. The officer at the vigilance post will have 6NM visual coverage of the surroundings and can coordinate with a patrol vessel moored outside the southern reef.

We recommend erecting a second vigilance post at Palmeto given its coverage of the western sanctuary and key access ways. In the event of detection, the officer can coordinate with either the patrol vessel moored at either Palmeto or near Coco point. The structure and equipment should be similar to that of the Coco point vigilance post. A third vigilance post may be necessary for the eastern side of the Island, however, this should only be considered if there is a change in approach patterns and evaluated at a later date.

SITE	LAT	LONG	TARGET HEIGHT	SITE HEIGHT (M)	OBSERVER/TOWER HEIGHT (M)
Mooring Buoy No. 1 (North)	17°43'21.26"N	61°51'50.27"W	1	1.5	0
Mooring Buoy No. 2 (South-Coco Pt.)	17°31'25.28"N	61°46'54.55"W	1	1.5	0
Mooring Buoy No. 3 (South-Palmetto)	17°35'25.00"N	61°51'51.00"W	1	1.5	0
Palmetto Point (Vigilance Post)	17°35'0.70"N	61°51'35.60"W	1	3	5
Coco Point (Vigilance Post)	17°32'37.90"N	61°45'59.45"W	1	3	5
Darby Sink Cove (Vigilance Post)	17°40'1.09"N	61°46'00.50"W	1	36	5

Table No. 06. Location and Height of Vigilance Posts and Moorings

SITE	OBSERVER TOTAL HEIGHT (FT)	TARGET HEIGHT (FT)	VISUAL HORIZON (NM)
Mooring Buoy No. 1 (North)	6.15	4.1	4.8
Mooring Buoy No. 2 (South-Coco Pt.)	6.15	4.1	4.8
Mooring Buoy No. 3 (South-Palmetto)	6.15	4.1	4.8
Palmetto Point (Vigilance Post)	32.8	4.1	8.2
Coco Point (Vigilance Post)	32.8	4.1	8.2
Darby Sink Cove (Vigilance Post)	168.1	4.1	15.9

Table No. 07. Maximum Visual Horizon Calculation

VESSELS AND MOORING BUOYS

Once identified by the surveillance system, a rapid response time for interdiction is critical. Consideration must be made for detection ranges, target speed/size of outboard motors, and fuel consumption. We suggest that patrol vessels and motors should vary

according to the patrolling strategy and targets, which are two in Barbuda: local and foreign fishers. The existing CLNP patrol vessel with twin 2-stroke 40HP outboard motors is sufficient for routine patrols within the Codrington Lagoon and northern region of the



Figure No. 04. Location of Vigilance Posts for Surveillance Coverage and Moorings

Island as well as for the interdiction of local fishers. With respect to foreign fishers, we recommend the use of a 28 ft. Eduardono with twin 4-stroke 100HP out board motors. While better equipped foreign fishers may be able to escape the Eduardono, the 100HP are more economical and guarantee sufficient muscle for the majority of fishing vessels that target near shore coastal waters. High-powered motors are not that important of an issue as a vessel

with divers down, deployed nets, etc isn't going to run away from anybody without abandoning people or gear. The Eduardono should be moored at either Coco point or Palmeto and be used primarily for the interdiction of foreign fishers. Assuming a 18–25Kt interception speed and target travel speed of 20Kt (total relative interception speed), a patrol vessel will intercept a suspicious vessel within 8 minutes.

SITE	TARGET COURSE	SPOTTED DISTANCE (NM)	TGT SPEED KT	OWN BOAT SPEED KT.	RELATIVE SPEED	INTERCEPT TIME (MIN)
Mooring Buoy No. 1 (North)	040° (approaches from SW)	4.5	20	18	38	7.11
Mooring Buoy No. 1 (North)	230° to 240° (approaches from E)	4.5	20	18	38	7.11
Mooring Buoy No. 2 (South-Coco Pt.)	350° to 345° (approaches from S)	6	20	25	45	8
Mooring Buoy No. 2 (South-Coco Pt.)	050° to 040° (approaches from SW)	6	20	25	45	8
Mooring Buoy No. 3 (South-Palmetto)	310° to 320° (approaches from SE)	6	20	25	45	8
Mooring Buoy No. 3 (South-Palmetto)	350° to 000° (approaches from S)	6	20	25	45	8

Table No. 08. Calculations for Interception Time from Moorings

Given the high cost of fuel, we recommend the installation of mooring buoys near sanctuaries, key access ways, and vigilance posts. By law, the National Port Authority (NPA) is the agency responsible for the installation and maintenance of buoys (mooring, demarcation and anchoring sites). As such, we recommend coordinating with the NPA. Instead of carrying out constant patrols, the vessel officers should remain in close radio communication with the vigilance post officer to respond only when a

suspicious vessel approaches a specific area. 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. Often times, physical presence of an authority is sufficient to deter fishers from entering a marine sanctuary or committing an infraction. Buoys are subject to vandalism, movement, storm surge, etc. and thus need to be regularly checked for placement, visibility, etc.

MINIMUM STAFFING, TRAINING REQUIREMENTS & BASIC VIGILANCE/SAFETY EQUIPMENT

We cannot estimate the total number of administrative employees required for each agency, however, we can provide an estimate of staff need for maritime operations. While we do not expect agencies to operate 24 hours/7 days a week, we do recommend they begin planning enforcement schedules according to fishing patterns and seasons, i.e. carrying out monitoring and patrol activities at dusk and dawn. Generally speaking, there should be two shifts per day: 5AM–1PM and 1PM–9PM with an occasional adjustment as to prevent routine. Given their power of arrest and possession of firearms, the Police should be incorporated into patrols as well.

Each patrol vessel should be staffed with at least three officers: the Boat Captain and two officers responsible for interdiction and boarding activities. The patrol vessel and vigilance post officers should be in contact with the control center officer every hour to report location and situation. In addition, key landing docks should be monitored daily by at least one officer. The control center must always be staffed with at least one officer and officers should be trained to operate both vessels and control center activ-

ities thereby allowing greater flexibility in scheduling. As some illegal foreign fishers camp on the island at night, we highly recommend scheduling night patrols and the monitoring of key docks.

PERSONNEL	CLNP	FISHERIES
Senior Fisheries Officer /CNLP Park Director	1	1
Control Center Operations	2	2
Vigilance Posts (Coco Point & Palmetto)	0	4
Crew for Vessels	2	4
Inspectors at Docks	2	4
Outreach and Education	1	1
TOTAL	8	16

Table No. 09. Staffing Requirements for Control and Vigilance

TRAINING REQUIREMENTS

A comprehensive training program is required to strengthen the professional capacity of each management and enforcement team. Below please find the minimum suggested courses for the Fisheries and CLNP enforcement staff. Management should also focus on professionalizing the officers by obligating the use of uniforms that are appropriate for marine operations. As a maritime authority, officers 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
Basic IMO Training	<ul style="list-style-type: none"> • First Aid • Survival at Sea • Fire fighting
Surveillance, Detection, Interdiction and Boarding	<ul style="list-style-type: none"> • Environmental and Fisheries Regulations Review • Operations planning and preparation • Use of visuals in marine patrolling • VHF & GPS operation • Boarding procedures • Inter-institutional procedures • 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>
Operations Planning and Control Center Management	<ul style="list-style-type: none"> • Control Center functions including asset use, reporting, communications procedures, surveillance procedures, and documentation (logs). • Telecommunications lines and coordination procedures • Situation escalation procedures and real time reporting • Terrestrial charts interpretation and navigation • Nautical charts interpretation and navigation • Search and rescue • Personal safety issues for patrolling and boarding
Yamaha Basic Service Training Course	<ul style="list-style-type: none"> • All officers must participate in an original equipment manufacturer (OEM) basic outboard motor maintenance certification course • Two fisheries and one CLNP officer should be trained in second level maintenance: computerized diagnostic, critical spares replacement and motor tuning.
Standard Operating Protocols	<ul style="list-style-type: none"> • Control Center • Patrolling • Boarding Teams • Maintenance

Table No. 10. Training Course Content

LIST OF VIGILANCE AND SAFETY EQUIPMENT FOR EACH AGENCY

A list and referential budget can be found on page 28.

OUTREACH AND EDUCATION

Now that the new fishery regulations are in effect, both agency enforcement teams must develop a simple education and outreach plan directed towards local fishers, foreign fishers and the community alike. The BBHI has already developed a simple fact sheet outlining zonification, regulations, restrictions, and fines that should be widely distributed to all stakeholders in both Barbuda and Antigua. The agency Directors should lead outreach activities, however, enforcement officers too must do their part in dissemination. We also highly recommend involving both the Barbuda Council 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 over a 6–12 month trial period, but over time, officers should gradually impose “hard enforcement” sanctions. Authorities may consider first applying hard measures to Antiguan fishers to set precedent and gain local fisher buy-in. As most of the illegal fishers entering Barbuda are from Antigua, the Barbuda Council and its respective enforcement agencies should develop an Antigua campaign component to inform foreign fishers of upcoming changes and the gradual application of sanctions.

15

VISUAL DETECTION SYSTEM FOR BARBUDA VESSELS

Currently Fisheries is responsible for vessel registry on an annual basis. We observed the registration of 19 vessels for 2014. We recommend piloting a practical visual detection program during the registration process whereby all Barbuda registered fisher vessels are painted with an additional symbol, which must correlate with its registration number. From an enforcement perspective, this

will help all stakeholders in easily differentiating between local and foreign vessels operating in territorial waters. As enforcement evolves in Barbuda over time, we recommend incorporating fishers and tourism operators as sensors for detecting and reporting suspicious activities.

CONTROL CENTER AND VHF RADIO NETWORK UPGRADE

In order to foster joint patrolling and the optimization of finite resources, we recommend setting up a control center at Fisheries. The control center does 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 officers 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 officers at ports and vigilance posts, but also holds potential for linking tourism operators and fishers into the control and vigilance system over time.

Given the height of the Fisheries office 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 center and patrol vessels. Individual officers should be equipped with handheld marine radios. As illustrated in Figure 05, the Marine 25W VHF-DSC base stations provide 25NM coverage, which allows for communication between the control center and officers throughout territorial waters and beyond. The base stations also allow communication between Fisheries and CLNP staff to coordinate joint operations and share intelligence.

POST	MARINE VHF-DSC BASE STATION	MARINE VHF HANDHELD RADIOS
Fisheries Control Center	1	
Fisheries Patrol Vessel	1	
Fisheries Field Officers		4
CLNP Director	1	
CLNP Patrol Vessel	1	
CLNP Field Officers		2
TOTAL	16	8

Table No. 11. Radio Equipment Requirements

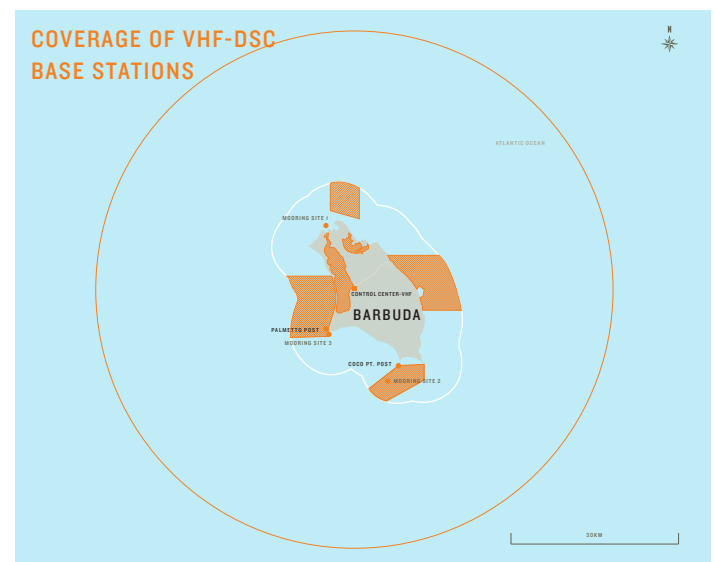


Figure No. 05. Range of 25W VHF-DSC base station radios



FISHERY MANAGEMENT CONSIDERATIONS

It is important to note that a physical presence of officers is vital in order to ensure that conch and lobster caught meet minimum catch size. Only visual inspection by a law enforcement officer can guarantee compliance of key Barbuda fisheries. This can be achieved by only two means: inspection of vessels at sea or at key docks.

FISHERIES MANAGEMENT CONSIDERATIONS FOR BARBUDA ENFORCEMENT OFFICERS

1. **Size limits:** The enforcement of size limits requires presence of officers 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 a vessel enters the area.
3. **Gear Restriction:** The enforcement of gear restrictions requires inspection at ports and sea.
4. **Season closure (i.e. spawning periods.)** The enforcement of season closure requires presence of officers at ports and inspection at sea.
5. **Permits:** Implement permit system according to new regulations.
6. **Fisheries enforcement and data collection** should not be mutually exclusive activities.

DEVELOPMENT OF INTER-INSTITUTIONAL AGREEMENT AMONG FISHERIES, CLNP AND THE POLICE FOR JOINT OPERATIONS.

The aforementioned agencies should sign a cooperative agreement for sustainable fisheries management. The agencies must develop a work plan and identify roles, responsibilities and funding for joint activities. There are currently a number of concrete opportunities that would benefit both agencies, which include:

- Both enforcement teams are at a similar stage in development and professionalization, thus they could divide training costs and co-develop SOPs;
- The control center, patrol vessels and vigilance posts are assets that should be shared by both agencies;
- The VHF radio network would allow for improved communication and coordination in surveillance and interdiction;

- The education and outreach activities of each agency can complement and reinforce the work of the other and should be presented as a cohesive campaign;
- The Police is interested in the enforcement of fishery regulations, however, a formal agreement is required.

DEVELOPMENT OF INTER-INSTITUTIONAL AGREEMENT AND SOPS WITH COAST GUARD

While the CG has a limited budget and personnel, we recommend approaching them to gauge interest in drafting an inter-institutional agreement as they are the maritime authority and have a fisheries mandate. Concrete opportunities include:

- The CG could place officers in Barbuda to accompany Fisheries and the CLNP officers on patrols;

- The CG could provide some specialized training to Fisheries and CLNP officers;
- Finally, as many illegal fishers are from Antigua, Barbuda agencies could coordinate interdictions with the CG as Antiguan return to their respective ports.

INTERDICTION

STANDARD OPERATING PROTOCOLS

In order to institutionalize training sessions and raise the professional standards of officers, agencies must draft and implement SOPs for control center operation, patrolling and boarding. SOPs are vital for the smooth operation of enforcement activities and officer safety. We have highlighted several key considerations for inclusion into SOPs:

Document 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 SOPs. The SOPs provide agency staff 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 agency Directors and that they are understood and used by the all staff. 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.* Patrol officers, control center operators, 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 agency 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. The Yamaha supplier is the primary source of information for the maintenance of outboard motors.

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.

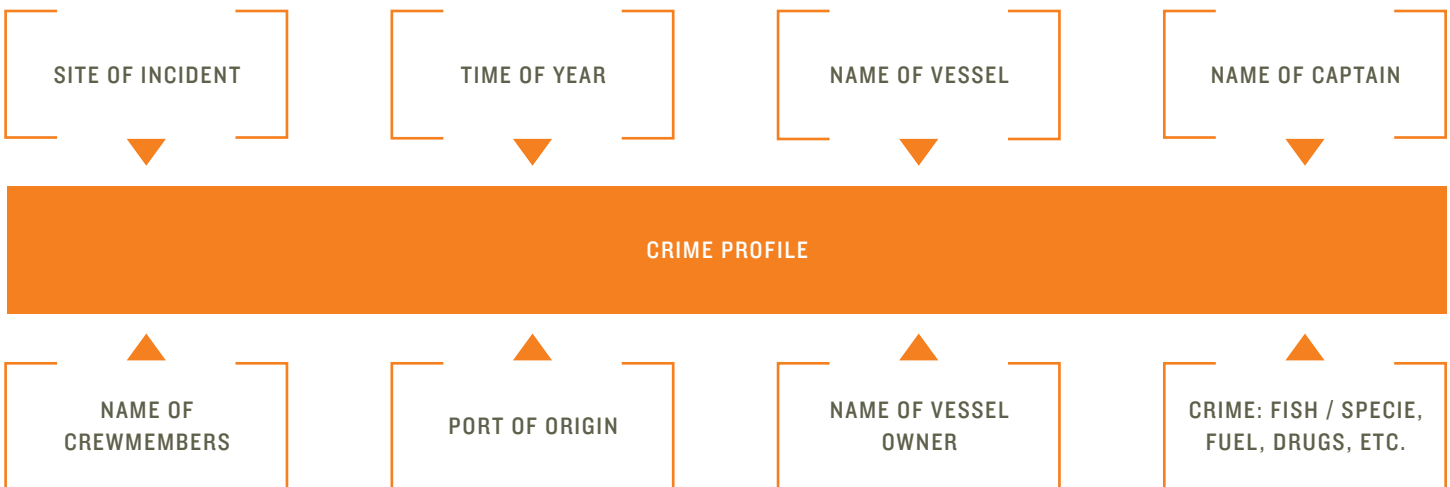
1. All at sea patrol vessels and vigilance posts should regularly report to the control center. These reports should be at least hourly for small boat operations (i.e., routine patrolling) and event driven (during boarding operations). Operational reports should include current position or references 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 Barbuda Council to ensure that officers develop and implement enforcement activity that has a high confidence of standing up in court.
4. Issue and use personal protective equipment (PPE).

PROSECUTION & SANCTIONS



DATABASE WITH RECORD OF VIOLATORS

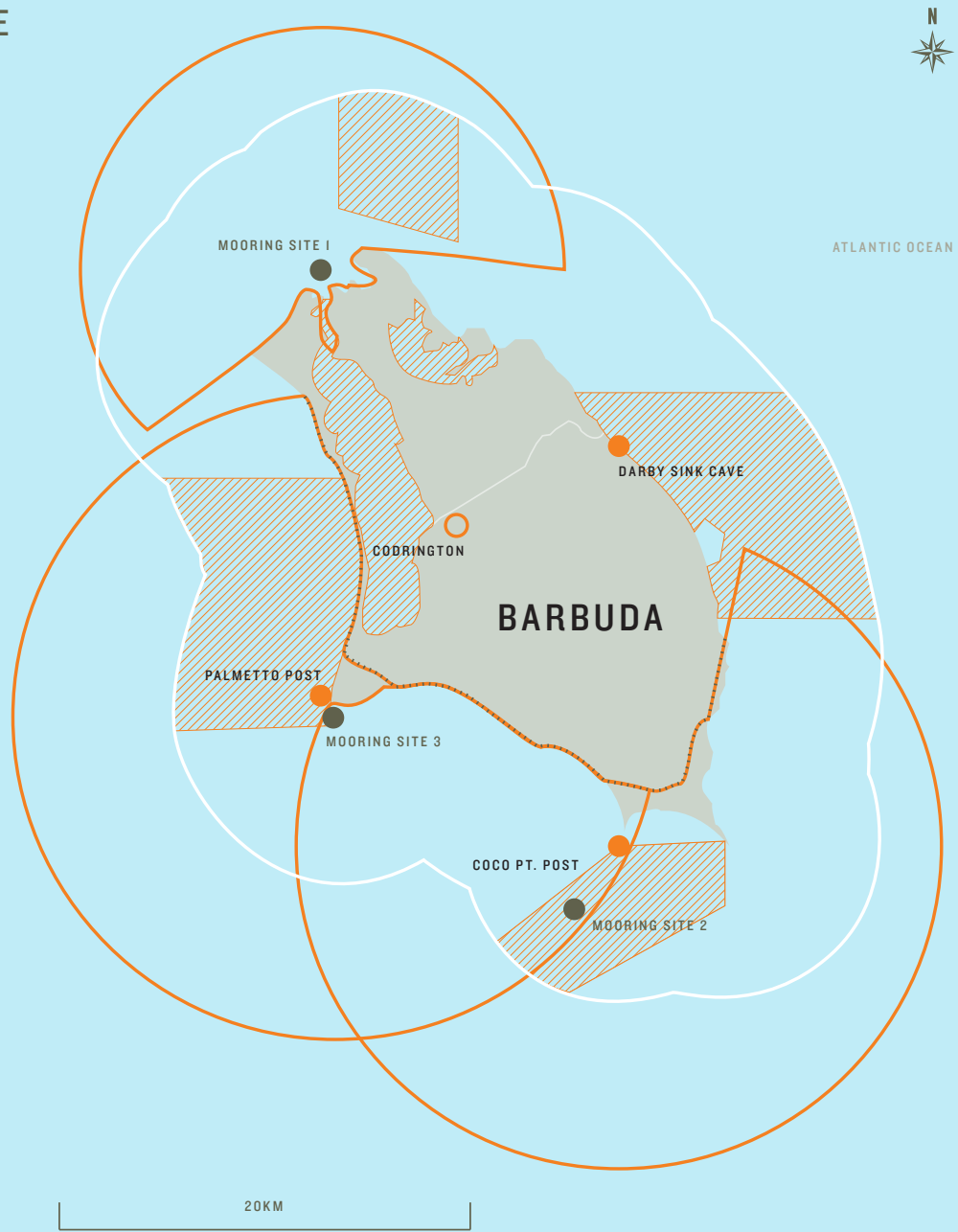
We highly recommend the creation of a simple database for recording and crosschecking information tied to violations. Normally, when basic background information exists on past incidents, important conclusions can be drawn with a recent incident as well as the motivation behind the crime. We have provided a list of the most common information required for the creation of a database, illustrated below. The system should be accessible to other law enforcement entities and also permit the input of their records in order to provide a more comprehensive profile of

violators. The more information recorded, the clearer the sketch of the violator. Additionally, the database could provide useful information for Managers when scheduling and planning patrols thereby enabling a more efficient and low cost strategy.



BARBUDA SURVEILLANCE COVERAGE

-  MARINE SANCTUARIES
-  VIGILANCE POST
-  MOORING SITES
-  SURVEILLANCE COVERAGE
-  3NM COASTAL ZONE
-  URBAN AREA - CODRINGTON



FINAL SURVEILLANCE COVERAGE

In closing, we are confident that the enforcement program designed for Barbuda is practical, affordable and feasible to implement over a three-year timeframe. While it is the responsibility of each agency 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 06, the final enforcement system design provides strategic sensor coverage to key fishing areas, sanctuaries and access ways. Our strategy combines the use of vigilance post, a robust VHF marine radio network with the strategic placement of buoys, and patrol vessels to provide a constant presence and fast response capacity throughout Barbuda’s near shore waters. 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 officers, who truly are the core component of the Barbuda enforcement program.

Figure No. 06. Final Surveillance Coverage with Zonification

ANNEXES

CASH FLOW SUMMARY - CODRINGTON LAGOON NATIONAL PARK

CAPEX: CLNP

CONCEPT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
A. OUTLOOK POSTS & SHELTERS/OFFICES	\$0	\$0	\$0	\$0	\$0
B. Electrical Works, Protection, Emergency Supply	\$0	\$0	\$0	\$0	\$0
C. Civil Works	\$0	\$0	\$0	\$0	\$0
D. Telecommunications	\$4,770	\$0	\$0	\$0	\$0
E. Maritime Surveillance Display & Control System	\$3,000	\$0	\$0	\$0	\$0
F. Mooring Buoy System (for boats of up to 45 ft length)	\$13,350	\$0	\$0	\$0	\$0
G. Boats & Accessories					
28" Fiber Glass boat w/Canopy and command panel/seat	\$0	\$0	\$0	\$0	\$0
Accessories	\$700	\$0	\$0	\$0	\$0
SUBTOTAL	\$21,820	\$0	\$0	\$0	\$0

OPEX: CLNP

Fixed Asstes Maintenance & Repair	\$0	\$1,091	\$1,124	\$1,157	\$1,192
Expendable Expenses	\$12,758	\$5,912	\$5,912	\$12,758	\$5,912
Staffing	\$119,500	\$123,085	\$126,778	\$130,581	\$134,498
Fuel Costs	\$17,529	\$18,055	\$18,596	\$19,154	\$19,729
Utilities (electricity, telephone)	\$1,000	\$1,030	\$1,061	\$1,093	\$1,126
Stationary, copies, office supplies	\$500	\$515	\$530	\$546	\$563
Insurance (3% assets value)	\$655	\$674	\$694	\$715	\$737
SUBTOTAL	\$151,942	\$150,362	\$154,695	\$166,005	\$163,756

CASH FLOW SUMMARY - FISHERIES

CAPEX: FISHERIES

CONCEPT	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
A. Outlook Posts & Shelters/Offices	\$41,000	\$0	\$0	\$0	\$0
B. Electrical Works, Protection, Emergency Supply	\$7,700	\$0	\$0	\$0	\$0
C. Civil Works	\$2,000	\$0	\$0	\$0	\$0
D. Telecommunications	\$5,890	\$0	\$0	\$0	\$0
E. Maritime Surveillance Display & Control System	\$3,000	\$0	\$0	\$0	\$0
F. Mooring Buoy System (for boats of up to 45 ft length)	\$28,950	\$0	\$0	\$0	\$0
G. Boats & Accessories					
28" Fiber Glass boat w/Canopy and command panel/seat	\$24,500	\$0	\$0	\$0	\$0
Accessories	\$29,300	\$0	\$0	\$0	\$0
SUBTOTAL	\$142,340	\$0	\$0	\$0	\$0

OPEX: FISHERIES

Fixed Asstes Maintenance & Repair	\$0	\$2,749	\$2,832	\$2,917	\$3,004
Expendable Expenses	\$18,167	\$6,096	\$6,096	\$18,167	\$6,096
Staffing	\$213,500	\$219,905	\$226,502	\$233,297	\$240,296
Fuel Costs	\$32,866	\$33,852	\$34,868	\$35,914	\$36,992
Utilities (electricity, telephone)	\$2,000	\$2,060	\$2,122	\$2,185	\$2,251
Stationary, copies, office supplies	\$1,000	\$1,030	\$1,061	\$1,093	\$1,126
Insurance (3% assets value)	\$4,270	\$4,398	\$4,530	\$4,666	\$4,806
SUBTOTAL	\$271,804	\$270,091	\$278,011	\$298,240	\$294,570

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TOTAL CASH FLOW CAPEX & OPEX - CODRINGTON LAGOON NATIONAL PARK & FISHERIES

EXPENSES TOTAL	\$587,906	\$420,453	\$432,706	\$464,245	\$458,327
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SURVEILLANCE SYSTEM CAPITAL EXPENSES (CAPEX)

ITEM	COMPONENTS	COST (INSTALLED)	CLNP	FISHERIES	TOTAL	CLNP	FISHERIES	TOTAL
A. OUTLOOK POSTS & SHELTERS/OFFICES						\$0	\$41,000	\$41,000
1.	Self sustained/squared base Tower, 5m (wooden structure w/canopy)	\$7,500	0	3	\$22,500	\$0	\$22,500	
1.1	Shelter (transportable/fabricated office w/toilette) for docks control	\$7,000	0	2	\$14,000	\$0	\$14,000	
2.	Tower area arrangements and foundings	\$1,500	0	3	\$4,500	\$0	\$4,500	
B. ELECTRICAL WORKS, PROTECTION, EMERGENCY SUPPLY						\$0	\$7,700	\$7,700
3.	Direct Current (DC) Power Supply							
3.1	2KVA Deep cycle battery bank w/4h supply capacity: 4x12V 100AH batteries	\$3,600	0	1	\$3,600	\$0	\$3,600	
3.2	48VDC power supply with charge control/battery charger	\$1,800	0	1	\$1,800	\$0	\$1,800	
3.3	Battery shelter (fiber glass)	\$800	0	1	\$800	\$0	\$800	
3.4	Inverter (2KVA). Supplies AC at control center computers	\$1,500	0	1	\$1,500	\$0	\$1,500	
C. CIVIL WORKS						\$0	\$2,000	\$2,000
4.	Control center modification and refurbishings (workstations, electric outlets, lights)	\$2,000	0	1	\$2,000	\$0	\$2,000	
D. TELECOMMUNICATIONS						\$4,770	\$5,890	\$10,660
5.	25W Marine VHF/DSC Base Stations Radio w/3dB Antenna installed on boats	\$1,600	2	2	\$6,400	\$3,200	\$3,200	
6.	Marine VHF Base Radio power supply	\$450	1	1	\$900	\$450	\$450	
7.	1W5W Waterproof/Floatable IPX7 portable Marine VHF/DSC D	\$400	2	4	\$2,400	\$800	\$1,600	
8.	Portable radios additional batteries (long life). Includes antenna and belt clip/hanger	\$85	2	4	\$510	\$170	\$340	
9.	Portable radios battery charger	\$75	2	4	\$450	\$150	\$300	
E. MARITIME SURVEILLANCE DISPLAY & CONTROL SYSTEM						\$3,000	\$3,000	\$6,000
10.	Desktop Server	\$2,200	1	1	\$4,400	\$2,200	\$2,200	
11.	23" monitors	\$400	2	2	\$1,600	\$800	\$800	
F. MOORING BUOY SYSTEM (FOR BOATS OF UP TO 45 FT LENGTH)						\$13,350	\$28,950	\$42,300
12.	Site Survey and selection. Search and marking of final points	\$3,250	1	2	\$9,750	\$3,250	\$6,500	

ITEM	COMPONENTS	COST (INSTALLED)	CLNP	FISHERIES	TOTAL	CLNP	FISHERIES	TOTAL
13.	Mooring Anchor: Helix (12'), Halas or Manta (depends on type of bottom)	\$750	1	2	\$2,250	\$750	\$1,500	
14.	DELTEX (De Lama) Cable. Diam. 22mm, 100m.	\$2,250	0	1	\$2,250	\$0	\$2,250	
15.	Connectors, Swivels, shackles (includes 1 spare pair for each MPA)	\$450	4	8	\$5,400	\$1,800	\$3,600	
16.	Mooring Buoys	\$750	1	2	\$2,250	\$750	\$1,500	
17.	Installation	\$5,000	1	2	\$15,000	\$5,000	\$10,000	
18.	Drilling equipment & Installation (Helix, Manta or Halas). Rented	\$1,800	1	2	\$5,400	\$1,800	\$3,600	
G. BOATS & ACCESSORIES						\$700	\$53,800	\$54,500
19.	28" Fiber Glass boat w/ Canopy and command panel/seat	\$24,500	0	1	\$24,500	\$0	\$24,500	
20.	100 HP 4 Stroke O/B motor	\$11,500	0	2	\$23,000	\$0	\$23,000	
21.	Twin Remote Control	\$1,700	0	1	\$1,700	\$0	\$1,700	
22.	Panel Switch	\$800	0	1	\$800	\$0	\$800	
23.	Yamaha/Mercury Diagnostic Computer Set with PC	\$2,800	0	1	\$2,800	\$0	\$2,800	
24.	Yamaha compression testers	\$500	1	1	\$1,000	\$500	\$500	
25.	Anchor	\$200	1	1	\$400	\$200	\$200	
26.	5 Gal. Plastic Gas Tanks	\$150	0	2	\$300	\$0	\$300	
						\$21,820	\$142,340	\$164,160



ITEMIZED CASH FLOW - CODRINGTON LAGOON NATIONAL PARK

I. CAPITAL EXPENSE

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
A. Outlook Posts & Shelters/Offices	\$0	\$0	\$0.00	\$0	\$0	\$0	\$0
B. Electrical Works, Protection, Emergency Supply	\$0	\$0	\$0.00	\$0	\$0	\$0	\$0
C. Civil Works	\$0	\$0	\$0.00	\$0	\$0	\$0	\$0
D. Telecommunications	\$4,770	\$0	\$4,770.00	\$0	\$0	\$0	\$0
E. Maritime Surveillance Display & Control System	\$3,000	\$0	\$3,000.00	\$0	\$0	\$0	\$0
F. Mooring Buoy System (for boats of up to 45 ft length)	\$13,350	\$0	\$13,350.00	\$0	\$0	\$0	\$0
G. Boats & Accessories		\$0	\$0.00	\$0	\$0	\$0	\$0
28" Fiber Glass boat w/Canopy and command panel/seat	\$0	\$0	\$0.00	\$0	\$0	\$0	\$0
Accessories	\$700	\$0	\$700	\$0	\$0	\$0	\$0

2. MAINTENANCE & REPAIR: 5% EST. RATE FOR FIXED ASSETS & 3% INFLATION RATE

ITEM		Y0	Y1	Y2	Y3	Y4	Y5
FIXED ASSETS MAINTENANCE & REPAIR	%		\$0	\$1,091	\$1,124	\$1,157	\$1,192
A. Outlook Posts & Shelters/Offices		\$0	\$0	\$0	\$0	\$0	\$0
B. Electrical Works, Protection, Emergency Supply		\$0	\$0	\$0	\$0	\$0	\$0
C. Civil Works		\$0	\$0	\$0	\$0	\$0	\$0
D. Telecommunications		\$0	\$0	\$239	\$246	\$253	\$261
E. Maritime Surveillance Display & Control System		\$0	\$0	\$150	\$155	\$159	\$164
F. Mooring Buoy System (for boats of up to 45 ft length)		\$0	\$0	\$668	\$688	\$708	\$729
G. Boats & Accessories							
28" Fiber Glass boat w/Canopy and command panel/seat		\$0	\$0	\$0	\$0	\$0	\$0
Accessories		\$0	\$0	\$35	\$36	\$37	\$38
EXPENDABLE EXPENSES			\$12,758	\$5,912	\$5,912	\$12,758	\$5,912
Boats Critical Spare Parts List		\$0	\$5,912	\$5,912	\$5,912	\$5,912	\$5,912
Boats Surveillance and Safety Equipment		\$0	\$6,846	\$0	\$0	\$6,846	\$0

3. STAFFING

STAFFING	STAFFING NEEDS	Y0	Y1	Y2	Y3	Y4	Y5
TOTAL ANNUAL Staffing Expenses	8	\$0	\$119,500	\$123,085	\$126,778	\$130,581	\$134,498
			\$119,500	\$123,085	\$126,778	\$130,581	\$134,498

4. FUEL SUPPLY

FUEL COSTS	GALLONS/YR	Y0	Y1	Y2	Y3	Y4	Y5
Provision for 2x40HP 2-stroke O/B motors	2,864	\$0	\$17,529	\$18,055	\$18,596	\$19,154	\$19,729

ITEMIZED CASHFLOW - FISHERIES

I. CAPITAL EXPENSE FLOW

ITEM	CAPEX TOTAL	Y0	Y1	Y2	Y3	Y4	Y5
A. Outlook Posts & Shelters/Offices	\$41,000	\$0	\$41,000	\$0	\$0	\$0	\$0
B. Electrical Works, Protection, Emergency Supply	\$7,700	\$0	\$7,700	\$0	\$0	\$0	\$0
C. Civil Works	\$2,000	\$0	\$2,000	\$0	\$0	\$0	\$0
D. Telecommunications	\$5,890	\$0	\$5,890	\$0	\$0	\$0	\$0
E. Maritime Surveillance Display & Control System	\$3,000	\$0	\$3,000	\$0	\$0	\$0	\$0
F. Mooring Buoy System (for boats of up to 45 ft length)	\$28,950	\$0	\$28,950	\$0	\$0	\$0	\$0
G. Boats & Accessories							
28" Fiber Glass boat w/Canopy and command panel/seat	\$24,500	\$0	\$24,500	\$0	\$0	\$0	\$0
Accessories	\$29,300	\$0	\$29,300	\$0	\$0	\$0	\$0

2. MAINTENANCE & REPAIR: 5% EST. RATE FOR FIXED ASSETS & 3% INFLATION RATE

ITEM		Y0	Y1	Y2	Y3	Y4	Y5
Fixed Asstes Maintenance & Repair		\$0	\$0	\$2,749	\$2,832	\$2,917	\$3,004
A. Outlook Posts & Shelters/Offices		\$0	\$0	\$0	\$0	\$0	\$0
B. Electrical Works, Protection, Emergency Supply		\$0	\$0	\$0	\$0	\$0	\$0
C. Civil Works		\$0	\$0	\$0	\$0	\$0	\$0
D. Telecommunications		\$0	\$0	\$176.70	\$182	\$187	\$193
E. Maritime Surveillance Display & Control System		\$0	\$0	\$90.00	\$93	\$95	\$98
F. Mooring Buoy System (for boats of up to 45 ft length)		\$0	\$0	\$868.50	\$895	\$921	\$949
G. Boats & Accessories		\$0	\$0	\$0.00	\$0	\$0	\$0
28" Fiber Glass boat w/Canopy and command panel/seat		\$0	\$0	\$735.00	\$757	\$780	\$803
Accessories		\$0	\$0	\$879.00	\$905	\$933	\$961
Expendable Expenses			\$18,167	\$6,096	\$6,096	\$18,167	\$6,096
Boats Critical Spare Parts List			\$6,096	\$6,096	\$6,096	\$6,096	\$6,096
Boats Surveillance and Safety Equipment			\$12,071	\$0	\$0	\$12,071	\$0

3. STAFFING

ITEM	STAFFING NEEDS	Y0	Y1	Y2	Y3	Y4	Y5
Staffing	16	0	\$213,500	\$219,905	\$226,502	\$233,297	\$240,296
			\$213,500	\$219,905	\$226,502	\$233,297	\$240,296

4. FUEL SUPPLY

ITEM	GALLONS/YR	Y0	Y1	Y2	Y3	Y4	Y5
Provision for 2x100HP 4-stroke O/B motors	5,370	\$0	\$32,866	\$33,852	\$34,868	\$35,914	\$36,992

STAFFING

HUMAN RESOURCES

POSITION	YEARLY PAY US\$	CLNP	FISHERIES
Director	\$21,500	1	1
Fisheries Officer / Environmental Officer (perform also as Control Ctr Operators)	\$18,000	1	1
Fisheries Assistants: Inspectors	\$12,500	2	4
Boat Crew (fisheries assistants and park assistants)	\$12,500	2	4
Fisheries Assistants: Outlooks	\$11,000	0	4
Control Center Operators (Fisheries Officer and Envmt Officer)	\$14,000	1	1
Outreach specialists	\$16,000	1	1
TOTAL ANNUAL STAFFING EXPENSES		\$119,500	\$213,500

TRAINING

CONCEPT	DIRECTOR	CONTROL CTR. OPERATORS	PARK WARDENS	FISHERIES OFFICERS
Environmental/Fisheries basic course/training				
Environmental and Fisheries regulations review - Duties of Park rangers & Fisheries officers	X	X	X	X
Basic IMO safety course: First Aid, fire fighting, survival at sea	X	X	X	X
Marine Coastal Enforcement Operations:				
MPA Eco System description	X	X	X	X
Nautical Chart reading and pilotage (coastal navigation)	X	X	X	X
VHF radio operation	X	X	X	X
GPS operation	X	X	X	X
Surveillance: Binoculars and night vision devices. Concepts & practice	X		X	X
Operations planning procedures	X	X		
Operations execution procedures (Control center/boats/posts): reporting, log books, formats (patrol accomplished, detention, etc.)	X	X	X	X
Boarding procedures & CSI	X		X	X
Inter-Agencies Operational Procedures	X	X		
Outboard motors basic maintenance			X	X
Legal Procedures				
Offences & Penalties review (Park and Fisheries)	X	X	X	X
Delivering notice of offences and violations	X		X	X
Report writing: Reporting fomats, related procedures	X		X	X
Enforcement logs: Daily records, monthly reports	X	X	X	X
Legal Proceedings: a.) State Attorney b.) Attorney General	X	X	X	X

FUEL CONSUMPTION

4 stroke O/B demand	0.443	pounds/h/HP W.O.T (WOT = Wide Open Throttle). From YAMAHA web site
Specific Gravity	0.713	(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	\$6.12
Diesel	\$6.45

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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	NUMBER OF MOTORS	TOTAL FUEL CONSUMPTION P. MO.
40	\$7,500	\$8,000	2.98	50%	80	119.34	2	238.68
100	\$9,000	\$10,000	7.46	50%	60	223.76	2	447.53

CHARACTERISTICS	PARK BOAT	FISHERIES BOAT
Length	7.5 m.	8.5 m.
Minimum Crew	3 h.	3 h.
Economical Speed	10-12 Kt	10-12 Kt
Maximum Speed (WOT)	>22 Kt	>30 Kt
Endurance	4-5 h	7-8h
Propulsion	2 x 40 HP	2 x 100 HP

	PARK BOAT		FISHERIES BOAT
HOURS/MONTH (RUNNING OPERATION)	140	80	60
TOTAL GAL/MONTH OF FUEL	686.21 Gal	238.68	447.53
TOTAL FUEL COST/MONTH (USD)	\$4,199.61	\$1,460.73	\$2,738.87
TOTAL GAL/YEAR OF FUEL	8,234.52 Gal	2,864.18	5,370.34
TOTAL FUEL COST/YEAR (USD)	\$50,395.26	\$17,528.79	\$32,866.47

CRITICAL SPARE PARTS

ITEM	QTY	UNITS	SPARES AND MAINTENANCE EQUIPMENT
1.	2	U.	Propellers for 100HP
2.	2	U.	Propellers for 40HP
3.	4	Box	Spark Plugs for 100HP and 40HP
4.	10	U.	Gas Fliters for 100HP O/B
5.	10	U.	Gas filters for 40HP O/B
6.	2	U.	Batteries 12V 105Ah for 200HP and 85HP
7.	2	U.	Remote Command Cables (Moorse)
8.	2	U.	Panel Switch
9.	2	U.	Fuel rubber pumps
10.	10	Tubes	Grease
11.	2	U.	Yamaha Tool Set
12.	2	Set	Critical Spare parts set (Per manufacturer) : Fuel pump Assembly, filter assembly, propeller shaft, ignition 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			

SAFETY EQUIPMENT (NOT FIXED ASSETS & REPLACED EVERY 3 YEARS)

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.	16	U.	PFD, Life saving Jacket (floatation) Yellow or Orange
5.	5	U.	Marine waterproof Binoculars 12X50 or up to 16X50
6.	3	U.	Marine waterproof portable night vision binoculars 5X Zoom
7.	3	U.	LED Spot Lights. Portable, waterproof & w/Rechargeable batteries
8.	6	U.	14 MPixel Shockproof/Waterproof Digital Camera with Optical 5x Zoom and built in GPS
9.	6	U.	Extra Batteries for Digital camera
10.	6	U.	Digital Camera storage bag
11.	6	U.	32 GB SDHC Flash Memory Cards for cameras
12.	24	U.	Leatherman Multi Tool pliers
13.	6	U.	Rechargeable, waterproof, floatable flashlights with battery backup
14.	10	U.	Inflatable Vinyl Boat Fender (8" x 24", White)
15.	0	U.	Inflatable Vinyl Boat Fender (12" x 36"), White)
16.	6	U.	Coastal Locator Flares Kit
17.	8	U.	Vernier Caliber - meter
18.	4	U.	Pelican Case 1620. In flight suitcase size
19.	2	U.	Police lights
SUB - TOTAL			

ESTIMATED LOCAL PRICE	CLNP	FISHERIES	TOTAL	CLNP	FISHERIES
\$ 222.00	0	2	\$ 444.00	\$0.00	\$444.00
\$ 130.00	2	0	\$ 260.00	\$260.00	\$0.00
\$ 116.00	2	2	\$ 464.00	\$232.00	\$232.00
\$ 15.00	0	10	\$ 150.00	\$0.00	\$150.00
\$ 15.00	10	0	\$ 150.00	\$150.00	\$0.00
\$ 225.00	1	1	\$ 450.00	\$225.00	\$225.00
\$ 180.00	1	1	\$ 360.00	\$180.00	\$180.00
\$ 120.00	1	1	\$ 240.00	\$120.00	\$120.00
\$ 15.00	1	1	\$ 30.00	\$15.00	\$15.00
\$ 18.00	5	5	\$ 180.00	\$90.00	\$90.00
\$ 140.00	1	1	\$ 280.00	\$140.00	\$140.00
\$ 4,500.00	1	1	\$ 9,000.00	\$4,500.00	\$4,500.00
			\$ 12,008.0	\$5,912.00	\$6,096.00

ESTIMATED LOCAL PRICE	CLNP	FISHERIES	TOTAL	CLNP	FISHERIES
\$ 60.35	1	1	\$ 120.69	\$60.35	\$60.35
\$ 525.00	0	1	\$ 525.00	\$0.00	\$525.00
\$ 25.00	2	2	\$ 100.00	\$50.00	\$50.00
\$ 114.75	8	8	\$ 1,836.00	\$918.00	\$918.00
\$ 300.00	1	4	\$ 1,500.00	\$300.00	\$1,200.00
\$ 1,400.00	1	2	\$ 4,200.00	\$1,400.00	\$2,800.00
\$ 190.00	1	2	\$ 570.00	\$190.00	\$380.00
\$ 450.00	2	4	\$ 2,700.00	\$900.00	\$1,800.00
\$ 23.00	2	4	\$ 138.00	\$46.00	\$92.00
\$ 35.00	2	4	\$ 210.00	\$70.00	\$140.00
\$ 52.00	2	4	\$ 312.00	\$104.00	\$208.00
\$ 115.00	8	16	\$ 2,760.00	\$920.00	\$1,840.00
\$ 35.00	2	4	\$ 210.00	\$70.00	\$140.00
\$ 105.00	5	5	\$ 1,050.00	\$525.00	\$525.00
\$ 135.00	0	0	\$ 0.00	\$0.00	\$0.00
\$ 81.00	3	3	\$ 486.00	\$243.00	\$243.00
\$ 25.00	2	6	\$ 200.00	\$50.00	\$150.00
\$ 325.00	2	2	\$ 1,300.00	\$650.00	\$650.00
\$ 350.00	1	1	\$ 700.00	\$350.00	\$350.00
			\$ 18,917.7	\$6,846.3	\$12,071.3

VHF RADIO SPECIFICATIONS

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





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