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DELIVERABLE 1.1: DESIGN AND DRAFT STATUTORY INSTRUMENT (SI) FOR THE CONSOLIDATION OF MULTIPLE REPLENISHMENT ZONES IN PORT HONDURAS MARINE RESERVE AS PRESENTED TO THE BELIZE FISHERIES DEPARTMENT

January 2014

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Contract No. EPP-I-00-04-00020-00

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

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EXECUTIVE SUMMARY

The report describes a process of community consultation and participation in the formulation of the Statutory Instrument (SI) for the Consolidation of Multiple Replenishment Zones (RZ) in the Port Honduras Marine Reserve as presented to the Belize Fisheries department.

The Port Honduras Marine Reserve, PHMR (40,339ha), lies in the Toledo District of southern Belize. The reserve boundary follows the coast, including the Rio Grande, and Monkey River estuaries, and encompasses the Snake Cayes and their fringing reefs. The reserve constitutes a Marine Protected Area (MPA) and incorporates four distinct ecosystems; coastal and tidal wetlands, marine lagoonal habitats comprised of mangroves and seagrass beds, mangrove islands with associated shallow banks, and the Snake Cayes fringing reef system.

PHMR contributes important functionality to the Mesoamerican Reef System by providing nursery habitat for reef species, including what is believed to be one of the world's last three remaining major nursery grounds for the critically endangered goliath grouper (*Epinephelus itajara*)¹ Juveniles from PHMR are restocking populations as far away as Mexico and Honduras. PHMR also contains some of the least impacted reefs in the Mesoamerican Reef. The reef fringing East Snake Caye has 22% coral cover and only 6% macro-algal cover. It was the only coral reef site that had “very good” health in the 2010 Report Card on the Health of the Mesoamerican Reef.

Fisheries in PHMR provide livelihoods for 129 managed access licensees and food security to >100 subsistence fishers, their families and the local population, 59% of whom consume local seafood at least twice per week.⁷ These stakeholders live in Punta Gorda, Cattle Landing, Punta Negra, Monkey River, Forest Home and Eldridge (total population ~7,000). Managed Access to the Marine Park Area was implemented 2011, limiting the commercial fishing rights to the traditional users of the reserve and resulting in a reduction the total number of users from 300 to 129. A management effectiveness survey of PHMR was conducted in mid2009 in the buffer communities of Punta Gorda, Punta Negra and Money River, followed by Community meetings to present data and results from the biological monitoring program. This was followed in early 2013 by informal and formal meetings with the majority of the fishing population to discuss the proposed changes to the RZ and to assess their support for the consolidation and expansion of RZ. The end result of this process is a proposed Statutory Instrument for consideration and approval by the Belize Fisheries Department.

1. LIST OF ACRONYMS

BERDS	Biodiversity & Environmental Resource Data System
GOB	Government of Belize
MAREA	Management of Aquatic Resources and Economic Alternatives
MFFSD	Ministry of Forestry, Fisheries and Sustainable Development
MPA	Marine Protected Area
NGO	Non-Government Organization
PHMR	Port Honduras Marine Reserve
RZ	Replenishment Zone
SI	Statutory Instrument
TIDE	Toledo Institute for Development and Environment
TNC	The Nature Conservancy

2. SITE DESCRIPTION

The Port Honduras Marine Reserve, PHMR (40,339ha), lies in the Toledo District of southern Belize. The reserve boundary follows the coast, including the Rio Grande, and Monkey River estuaries, and encompasses the Snake Cayes and their fringing reefs. The MPA incorporates four distinct ecosystems; coastal and tidal wetlands, marine lagoonal habitats comprised of mangroves and seagrass beds, mangrove islands with associated shallow banks, and the Snake Cayes fringing reef system.

PHMR contributes important functionality to the Mesoamerican Reef System by providing nursery habitat for reef species, including what is believed to be one of the world's last three remaining major nursery grounds for the critically endangered goliath grouper (*Epinephelus itajara*)^{1,2} Juveniles from PHMR are restocking populations as far away as Mexico and Honduras.^{1,3}

PHMR also contains some of the least impacted reefs in the Mesoamerican Reef. The reef fringing East Snake Caye has 22% coral cover and only 6% macro-algal cover.⁴ It was the only coral reef site that had “very good” health in the 2010 Report Card on the Health of the Mesoamerican Reef.⁵ No lionfish (*Pterois volitans*) has yet been observed there despite scores of survey dives and there are high densities of *Acropora* spp. Near-shore fringing reefs surround at least six other cayes in PHMR and include mid-lagoonal reefs, unique in Belize. Patch reefs are scattered throughout the reserve. PHMR's reefs underwent extensive bleaching in 1998 but have since recovered. Mean live coral cover increased steadily from 7% in 2003 to 15% in 2008 and has remained stable since.⁵⁻⁶

Seven rivers empty into PHMR (Figure 1). During the rainy season, the water column becomes highly stratified, with fresh, often very turbid water at the surface, and freshwater plumes frequently extending as far as the Snake Cayes.

PHMR is co-managed by the Fisheries Department and TIDE, with the latter responsible for day-to-day management. MPA management methods include: i) replenishment zones; ii) Managed Access; iii) gear restrictions.

Replenishment zones: Presently, there are five RZ in PHMR, each extending half a mile radius from one caye (Figure 1). Four of the zones are open to tourism (conservation zones) while one is completely off limits except for research and emergency rescue (preservation zone). Together, these zones cover 1300ha, or 3.2% of the area of PHMR.

Managed Access: In July 2011, Port Honduras Marine Reserve and Glover's Reef Marine Reserve, became the first two MPA's in the Caribbean and Central America to implement

¹ Graham RT, Lewis JP, Gleiss AC, Scales K and Thompson S (2010) Annual report of research activities to the Department of Fisheries, the Department of Forestry and primary NGO partners from the Wildlife Conservation Society (WCS). December 2010.

²Dr. Rachael Graham, personal communication.

³Graham RT (2009) Annual report of research activities to the Department of Fisheries, the Department of Forestry and primary NGO partners from the Wildlife Conservation Society (WCS). March 2009.

⁴Foley, JR (2013) Preliminary results of MBRS surveys for the Port Honduras Marine Reserve, January 2013.

⁵Healthy Reefs Initiative (2010) Report Card for the Mesoamerican Reef.

⁶ PHMR Management Plan 2012-2017.

Managed Access. Under Managed Access, commercial fishing rights are limited to traditional users and, as a result, the number of commercial fishers using PHMR has decreased from around 300 to 129. Managed Access licensees report improved catches and initial data suggest positive impacts on stocks.

Gear restrictions: In PHMR, certain types of fishing gear are prohibited (e.g. fish traps, gill nets and long lines).

An MPA manager oversees a team of six rangers who patrol the reserve enforcing the regulations. The ranger team has its base at Abalone Caye in the center of the reserve. A science director oversees a marine biologist and five trained community researchers to conduct research and monitoring that informs an adaptive management approach.

Fisheries in PHMR provide livelihoods for 129 managed access licensees and food security to >100 subsistence fishers, their families and the local population, 59% of whom consume local seafood at least twice per week.⁷ These stakeholders live in Punta Gorda, Cattle Landing, Punta Negra, Monkey River, Forest Home and Eldridge (total population ~7,000).

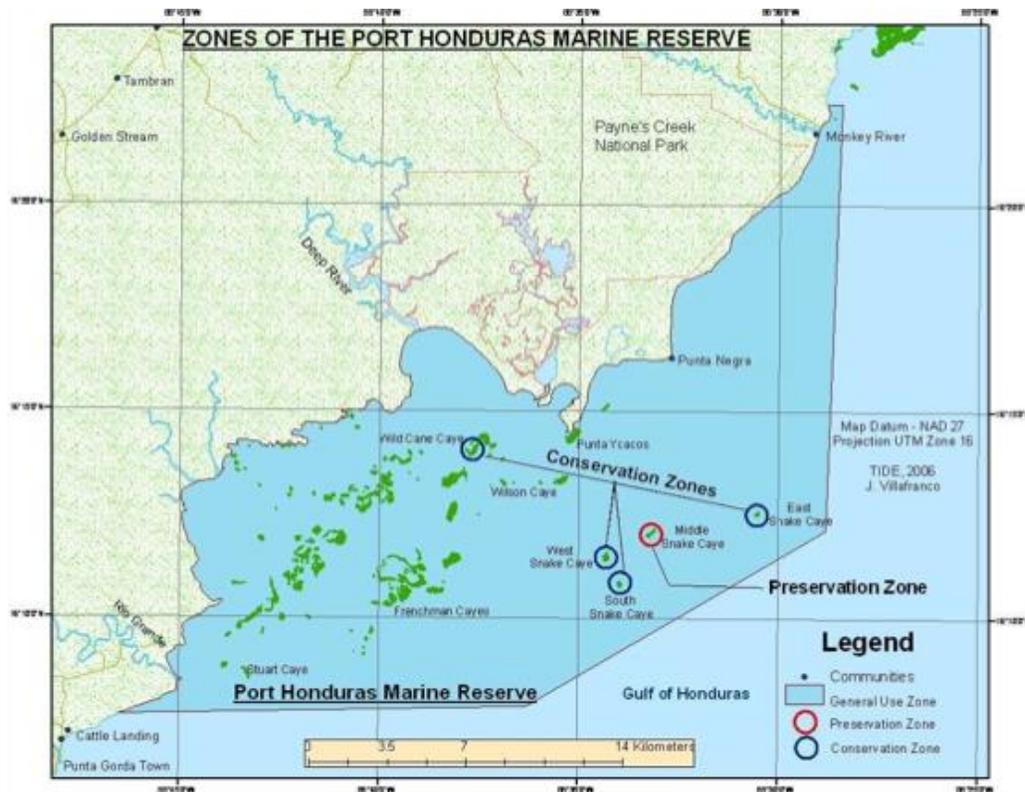


Figure 1: Existing No Take Zones (replenishment zones) in PHMR.

⁷ Padilla Plaza GM & Ferguson III RP (2010) A Longitudinal Assessment of the Socioeconomic Impacts of the Port Honduras Marine Reserve on the Coastal Communities of Southern Belize, Central America (1999-2009). Masters thesis. American University School of International Service.

3. SUMMARY OF PREVIOUS WORK DONE ON RZ EXPANSION IN PHMR

During July and August 2009, a management effectiveness survey of PHMR was conducted in the buffer communities of Punta Gorda, Punta Negra and Money River. A total of 88 randomly selected households were surveyed regarding their views about PHMR and its management. In addition, 27 fishers were surveyed from the three communities. During these surveys, participants were questioned on their views regarding the RZ.

During February and March 2010, five community meetings and presentations were held in Punta Gorda, Monkey River and Punta Negra. During these meetings attendees were presented with information from the biological monitoring program conducted within PHMR from 2003 to 2009. Data related to water quality, commercial species abundance (conch and lobster) and reef condition (coral health, reef fish abundance) were presented. Attendees were invited to share their thoughts and opinions regarding the success of PHMR as a whole, and of the RZ, in enhancing populations and ecosystems. Suggestions for improvements were requested from the attendees.

During the consultations, support was shown for an increase in the size of PHMR and an increase in the area of RZ. The majority of community members understood the need for a larger area of RZ within the reserve.

Dr. Nicola Foster, TIDE's previous science director, prepared three options for expanded RZ, based upon what is known of PHMR's habitats and recommendations for the design of RZ from the literature (Figure 2).

On 26th and 27th May 2010, suggested areas for expansion of RZ were presented to stakeholders in Monkey River and Punta Gorda for their feedback. Fisheries Department personnel were present. Stakeholders were presented with information on the benefits of a large RZ and the management implications for the area. The response from the majority of community members in Monkey River was positive, with support shown for the largest RZ. The response from Punta Gorda was mixed, some stakeholders preferring the largest expansion and others preferring the smallest. A number of community members were absent from the Punta Gorda meeting and it was evident that further consultation was required.

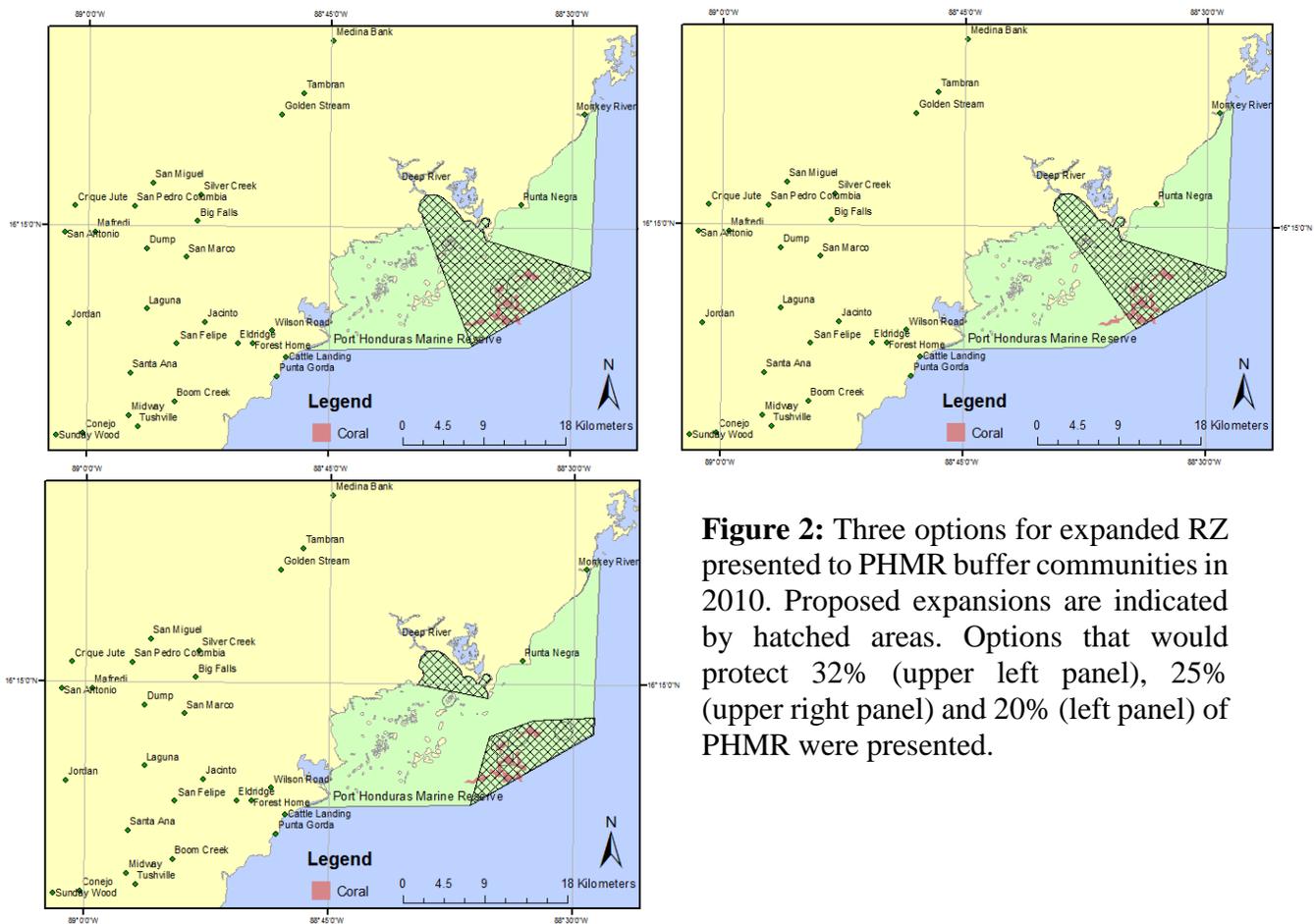


Figure 2: Three options for expanded RZ presented to PHMR buffer communities in 2010. Proposed expansions are indicated by hatched areas. Options that would protect 32% (upper left panel), 25% (upper right panel) and 20% (left panel) of PHMR were presented.

4. DESCRIPTION OF 2012 – 2013 CONSULTATION PROCESS

Five public consultation meetings were held with stakeholders in Monkey River, Punta Negra and Punta Gorda communities between 14th January and 21st March 2013. Seleem Chan, MPA manager, explained the purpose and benefits of RZ. James Foley, science director, presented results on the health of conch and lobster stocks in PHMR, which suggest current RZ are sub-optimal. He presented various options for RZ based on knowledge of habitat locations and the results of previous stakeholder consultations conducting in 2009-2010. He also showed how the current RZ design presents a challenge for enforcement since it can be difficult for rangers to tell whether or not fishers are within a RZ due to their circular boundaries and the presence of narrow gaps between some RZ (Figure 3).

Stakeholders were given space to voice their questions and concerns then draw their preferred designs for the expanded RZ on bathymetric maps of the marine reserve that show the location of underwater banks, important for fishing (Figure 4). Denise Garcia, Managed Access coordinator at that time, recorded minutes.

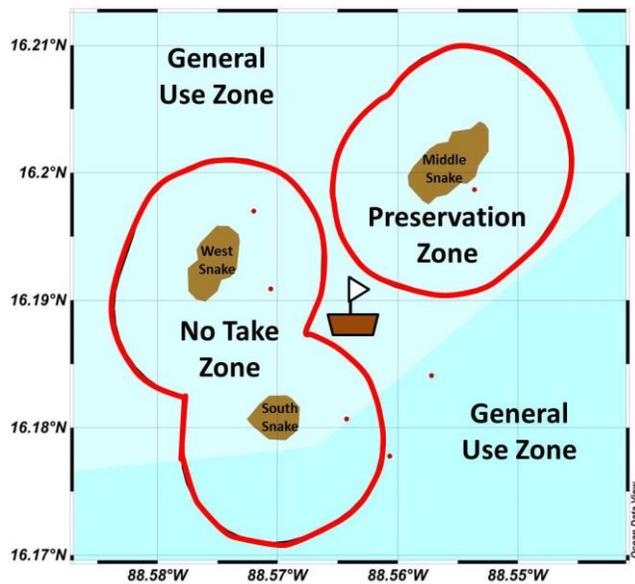


Figure 3: Map illustrating the difficulty of enforcing the current RZ around Middle, West and South Snake Caye – it is difficult for rangers to tell whether fishing vessels are within or outside of the RZ.

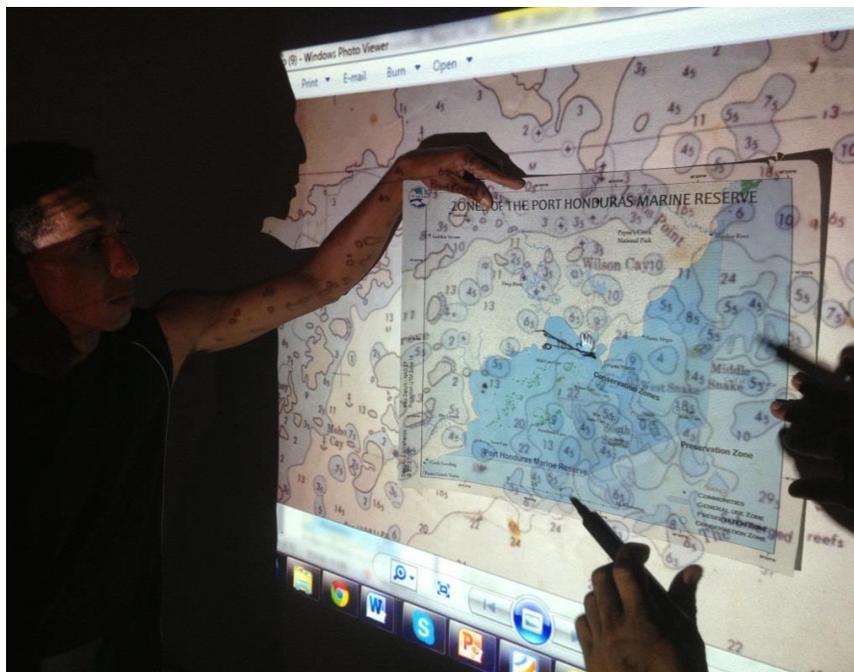


Figure 4: Fishers and tour guides debating the design of expanded RZ at a meeting in Punta Gorda.

In addition to public meetings, a number of targeted informal meetings took place with key opinion leaders to build support for extension of replenishment zones.

Since some stakeholders voiced that they were uncomfortable with drawing lines on maps and preferred to demarcate the new boundaries on the water, a field trip with key stakeholders was organized. On 22nd May, the fishers piloted a TIDE vessel along their suggested boundaries around

the Snake Cayes. TIDE personnel and stakeholders recorded GPS coordinates. Representatives of the Rio Grande Fishermen Cooperative, Toledo Fishermen Association, Toledo Tour Guide Association, Toledo Fishermen Alliance, Punta Negra Village, Belize Fisheries Department, The Nature Conservancy and TIDE were present on the vessel.

In total, ≥ 10 formal and informal meetings were conducted, involving a total of ≥ 100 fishers.

Once all the meetings had taken place, TIDE personnel reviewed the meeting minutes, stakeholders' maps and GPS coordinates, and developed a map of the newly expanded RZ. This map has been presented to the Fisheries Department together with proposed text for an amended statutory instrument for PHMR to reflect these proposed changes to the RZ.

Challenges encountered and lessons learned

The greatest difficulty was in securing the consent of fishers to encompass more fishing grounds within RZ. The banks around Middle, South and West Snake Cayes were the most contentious areas to demarcate and fishers who use the area on a daily basis were strongly opposed to large areas of extension.

An attempt was made to solve the issue of lack of buy-in for RZ by explaining the theory of RZ in a non-technical, highly visual way and by highlighting the benefits that RZ have brought in other Belizean MPA, such as Hol Chan Marine Reserve. Previous learning exchanges in which fishers saw effectively managed fisheries in Punta Allen, Mexico, and spoke to other fishers about the benefits of RZ certainly helped.

Efforts were at least partially successful. During consultation meetings, some fishers stated that they understood the benefits of RZ and many were able to accurately describe the theory - that RZ allow populations to build up and then spill over into adjacent areas.

Even so, most fishers were highly reluctant to give up fishing grounds. This may be because they are prioritizing short-term over long-term benefits. It may also be because they do not believe expanded RZ will benefit them. There are some perfectly valid reasons why fishers may understand the theory of RZ yet still not buy in to them as a management measure in PHMR at this time. The main concern voiced by several fishers was that foreign fishers would illegally exploit the RZ. They doubted TIDE's capacity to enforce the expanded zones and reported increased illegal night time incursions into these zones by foreign fishers since the introduction of Managed Access (Managed Access means that foreign fishers who have Belizean residency papers and fisherfolk licenses can no longer fish legitimately inside PHMR, driving them to fish illegally at night, targeting the areas where they know they can harvest the greatest amount of product in the shortest time). Many locals felt that by agreeing to an expansion of RZ, they would simply be saving resources for others without any benefit to biodiversity or themselves. The local fishers actually demanded stronger enforcement.

To solve this issue, the marine manager highlighted how the new RZ would be designed to make enforcement easier than it is now and informed the fishers of the fact that TIDE has responded to the increased level of night time incursions with increased night time patrols. This went some way to allaying the fishers concerns. Nevertheless, a key lesson is that the expanded RZ must be properly enforced if they are to achieve their desired effects on the biological resources and fishers' catches.

The newly proposed zones, described in figure 5 will encompass an estimated 15-20% (based on local knowledge) of coral reef habitat and lobster fishing grounds in PHMR. Crucially, the majority of fishers agreed to the new RZ. The consultation process was very healthy. It generated a lot of useful two-way communication and we believe that by taking fishers' concerns into account, we will build their trust and buy-in, increasing compliance and the effectiveness of the zones. If we can show the fishing community that the expanded RZ are benefitting them, we have a good chance of securing buy-in for further RZ expansion and other fisheries management measures.

5. DIGITAL MAP OF PROPOSED RZ CONSOLIDATION

The proposed RZ are shown in Figure 5 and described as follows:

South, West and Middle Snake Caye: The current no-take zone around South Snake Caye, West Snake Caye, and preservation zone around Middle Snake are proposed to be adjoined by a hexagon. This will encompass a bank north of Middle Snake Caye, portion of a bank found on the southeastern side of Middle Snake Caye and portion of a bank on the southeastern side of South Snake Caye. In addition, one bank on the west side of West Snake Caye was enclosed. Having the boundaries on a bank will aid the placement of demarcation buoys.

The area around Middle Snake Caye will remain a preservation zone. Again with the aim to aid demarcation, it is suggested that a straight line is used to separate the preservation from the no-take zone rather than using the old boundary of the preservation zone (currently a circle). This will increase the zone of the preservation zone marginally. The boundary is not arbitrary but encompasses areas thought to be critical conch and lobster nursery and spawning habitat in order to enhance the replenishment function of the RZ.

East Snake and Wild Cane Caye: Within the old SI a half mile radius around East and Wild Cane Caye is used to generate the boundary of the no-take zone, also scaling a set of 4 coordinates.

After investigation of the current enforced area it was found that the most accurate representation of the no-take zone at East Snake Caye was to use files from Belize Environmental Resource Data System (BERDS) opposed to the original Statutory Instrument (SI). In future proposals it is hoped that the boundary surrounding East Snake can be altered into a square to aid demarcation however this will require further consultation with fishers.

In the case of Wild Cane Caye it was also found that the BERDS border was being enforced as opposed to what is in the SI. Therefore it is proposed that the coordinates in the proposed SI are altered to match with this border. In addition it is suggested that the shape of the boundary is altered to a rectangle shape to aid demarcation. This alteration will have little influence over the area covered by the current enforced no-take zone however will result in some areas that were under protection no longer being protected, and other areas that were not under protection now being within the new shape.

Annex 1 Document the new coordinates to fit with these alterations:

Calculations (ha) for preservation expansion

	BERDS (old)	Proposed SI
Preservation Zone, West and Middle Snake Cayes	869	1308
East Snake Caye	287	287
Wild Cane Caye	143	163
TOTAL	1299	1758
PERCENTAGE COVER	3.2	4.4

The proposed expansion to encompass Middle, South and West Snake Cays as one area will increase the no-take zone of PHMR from 3.2% to 4.4%. An increase in no-take area of 1.1%.

NOTE: Terrestrial areas (cayes) are removed from calculations.

Proposed SI changes in the Snake Cayes - PHMR

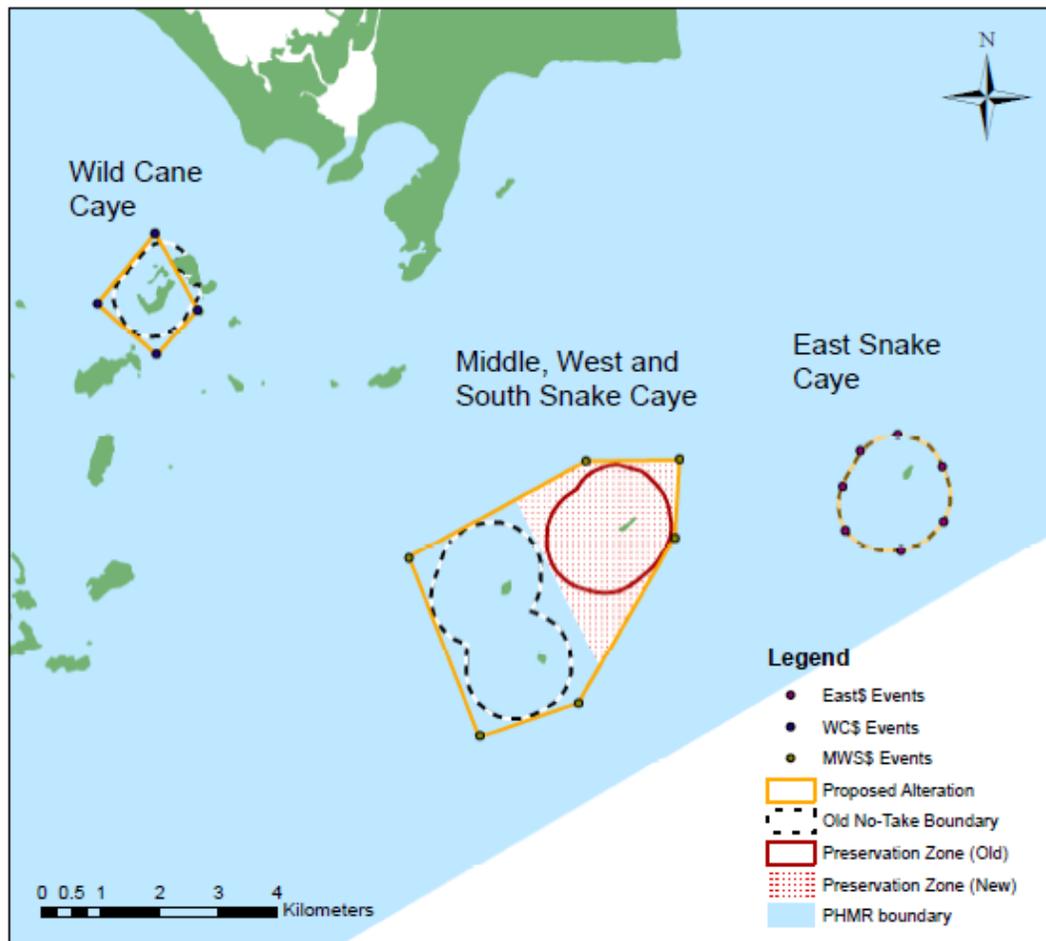


Figure 5: Proposed expansion of PHMR replenishment zone. The old boundary is represented by BERDS perceived boundary (<http://www.biodiversity.bz/mapping/warehouse/>). Proposed coordinates to mark the proposed boundaries are documented in Annex 1.

6. JUSTIFICATION / CRITERIA USED FOR THE CONSOLIDATION OF THREE OF PHMR'S EXISTING RZ INTO ONE AREA

The encapsulation of West, South and Middle Snake Caye into one area has been proposed for several reasons, as follows:

- i) The new boundary encompasses submerged banks thought to be critical nursery and spawning habitat for conch and lobster;
- ii) The underwater banks protected by the new design are contiguous with banks outside of the proposed RZ, theoretically resulting in spill over of adult lobster and conch.
- iii) The enforcement will be easier having straight boundaries and closing off a narrow gap between the existing RZ,

This is the primary area used by lobster and conch fishers in PHMR and is reported to be extremely productive. Hence, it was very difficult to secure fishers' consent for the expansion here. Nevertheless, fishers did agree to the expansion because they understand the benefits of the spillover effect and because they believe that TIDE can effectively enforce the proposed RZ. There was some skepticism regarding the ability to prevent illegal extraction by trans-boundary fishers in a larger RZ.

7. REFERENCES

Graham RT, Lewis JP, Gleiss AC, Scales K and Thompson S (2010) Annual report of research activities to the Department of Fisheries, the Department of Forestry and primary NGO partners from the Wildlife Conservation Society (WCS). December 2010.

Graham RT (2009) Annual report of research activities to the Department of Fisheries, the Department of Forestry and primary NGO partners from the Wildlife Conservation Society (WCS). March 2009.

Foley, JR (2013) Preliminary results of MBRS surveys for the Port Honduras Marine Reserve, January 2013.

Healthy Reefs Initiative (2010) Report Card for the Mesoamerican Reef.

PHMR Management Plan 2012-2017.

Padilla Plaza GM & Ferguson III RP (2010) A Longitudinal Assessment of the Socioeconomic Impacts of the Port Honduras Marine Reserve on the Coastal Communities of Southern Belize, Central America (1999-2009). Master's thesis. American University School of International Service

8. ANNEX 1 - DRAFT STATUTORY INSTRUMENT FOR REPLENISHMENT ZONES PRESENTED TO THE BELIZE FISHERIES DEPARTMENT

East Snake Caye Conservation Zone

Area scaling the following coordinates:

- 338625 East 1793306 North
- 339379 East 1792751 North
- 339406 East 1791825 North
- 338678 East 1791322 North
- 337739 East 1791679 North
- 337686 East 1792420 North
- 337990 East 1793015 North

Area: 287ha

Wild Cane Caye Conservation Zone

Area: 163 ha

Commencing at a **Point A** lying North of Wild Cane Caye having scaled UTM coordinates 326005 East and 1796701 North; thence in a general south-easterly direction 1473 Metersto a **Point B** having scaled UTM coordinates 326727 East 1795420 North; thence in a general south-westerly direction 1035 Meters miles to a **Point C** having scaled UTM coordinates 326026 East 1794659 North; thence in a general north-westernly direction 1326 Metersss to a **Point D** having scaled UTM coordinates 325026 East 1795529 North; thence in a general northern-easterly direction 1527 Meters back to the point of commencement.

West, South, and Middle Snake Caye

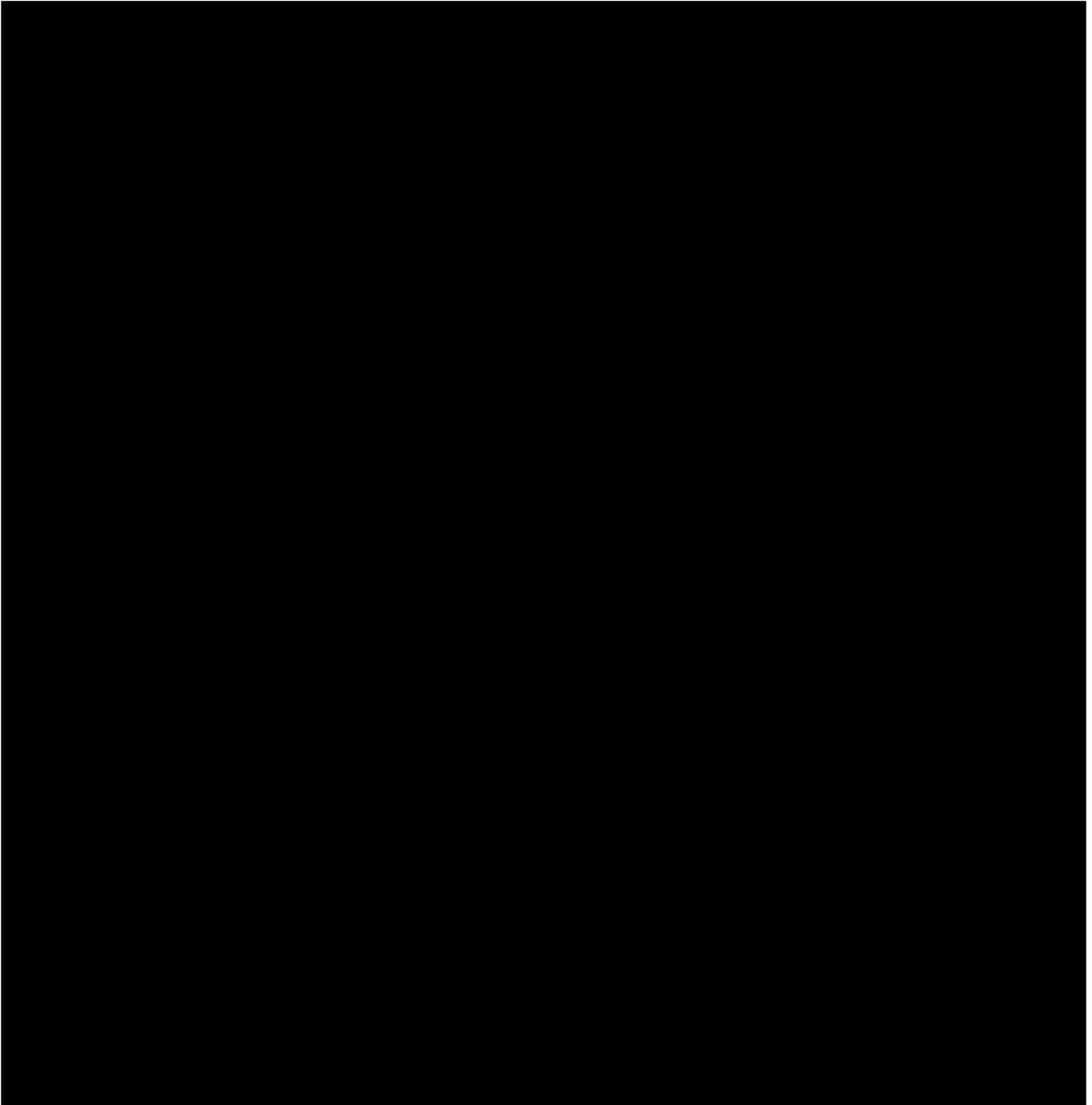
Area: 1308ha

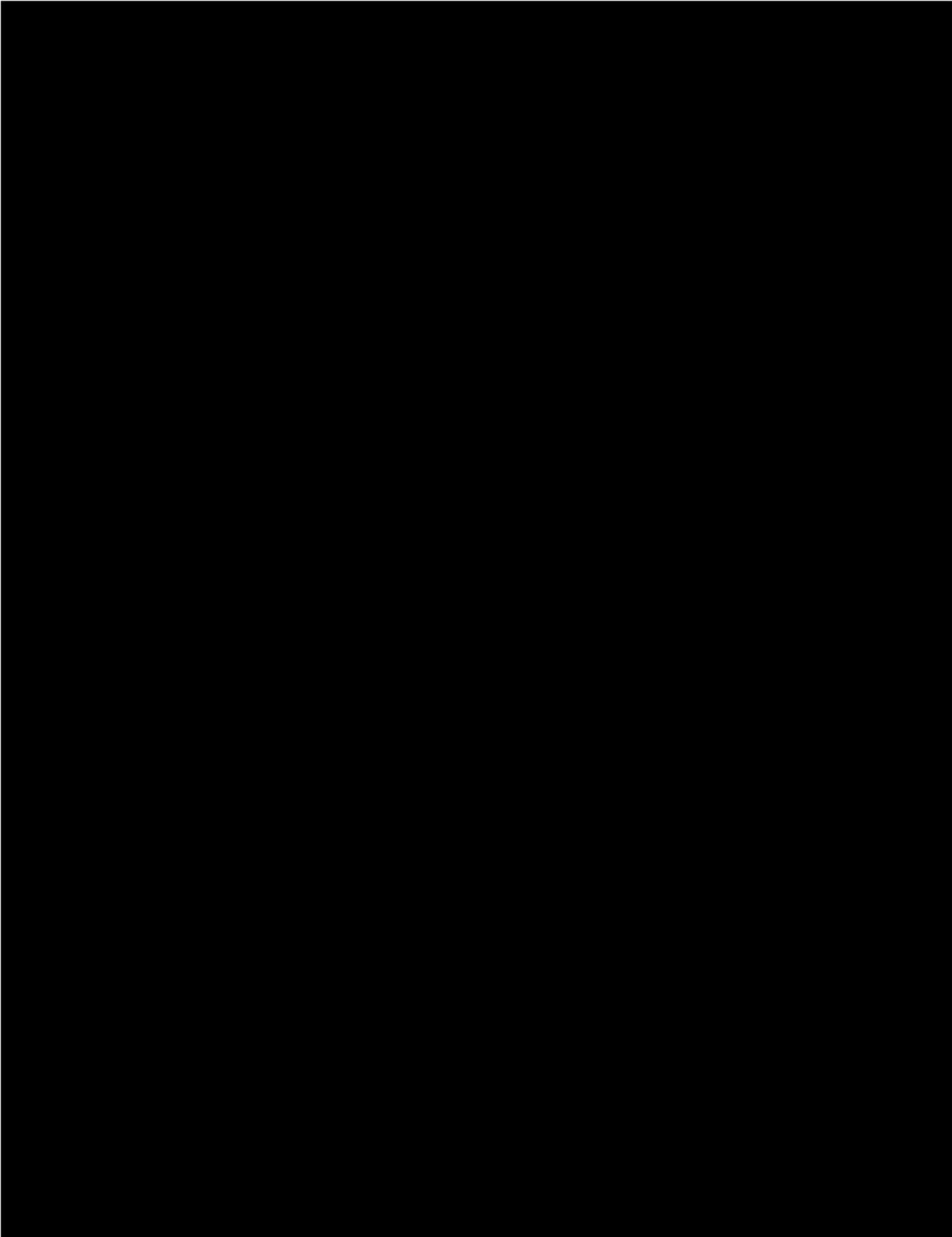
Commencing at a **Point A** lying West of West Snake Caye having scaled UTM coordinates 330322East 1791201North; thence in a general north- easterly direction 3441 Metersto a **Point B** having scaled UTM coordinates 333326East 1792840North; thence in a easterly direction 1587 Meters to a **Point C** having scaled UTM coordinates 334913 East1792872North; thence in a general south,south-westerly direction 1320 Meters to a **Point D** having scaled UTM coordinates 334839 East 1791554North; thence in a general south, south-westerly direction 3251 Meters to a **Point E** having scaled UTM coordinates 333204East 1788744North; thence in a generalwest-south-westerly direction 1769 Meters to a **Point F** having scaled UTM coordinates 331522East 1788197North; thence in a general north-westerly direction3235 Meters back to the point of commencement. The

line bisecting the area into the RHS Preservation Zone to LHS No-take zone will run from 332180 East 1792217 North in a southerly direction for 6336 Meters to intercept the boundary line at 332180 East 1792217 North.

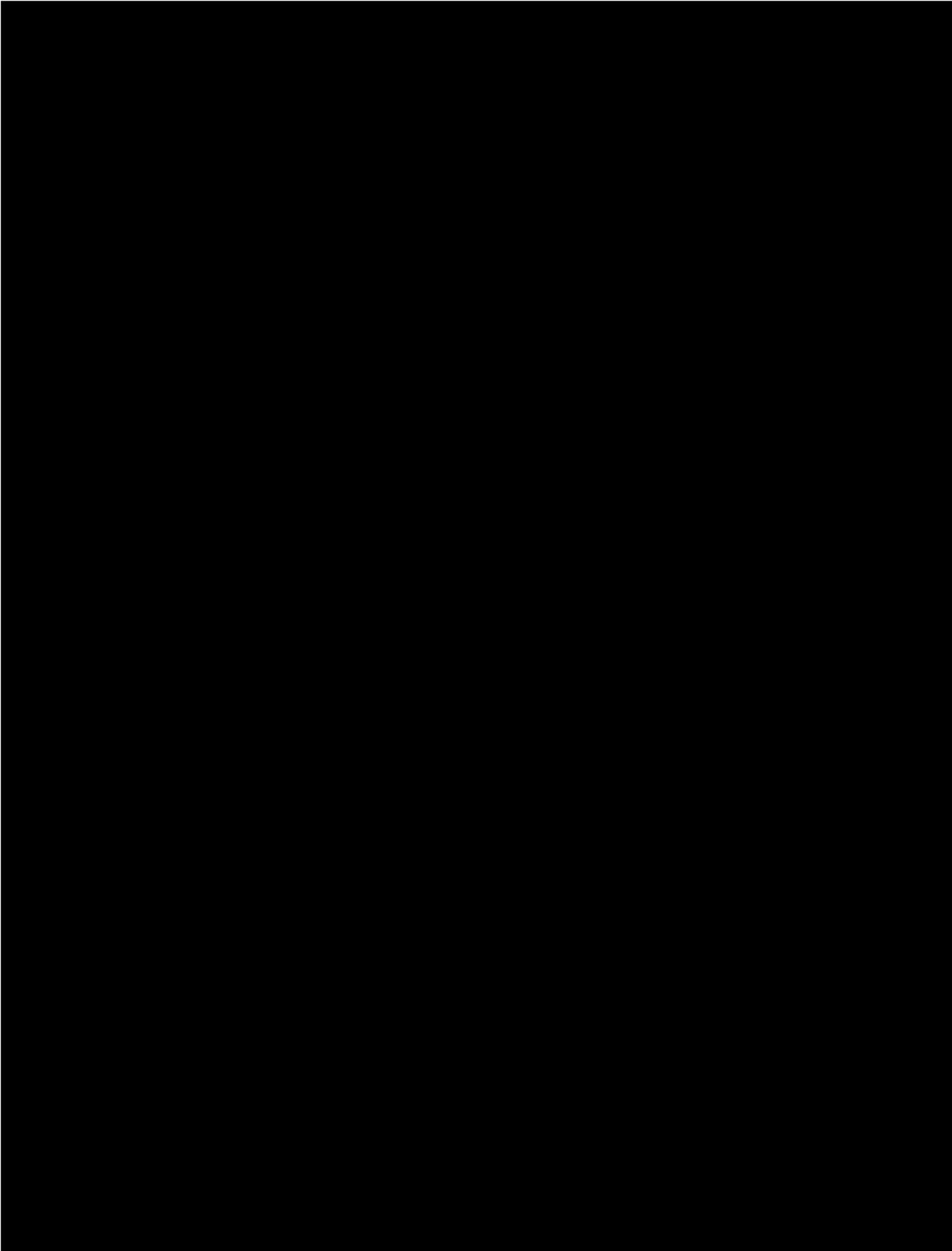
9. ANNEX 2

LIST OF FISHERS INVITED TO ATTEND CONSULTATIONS

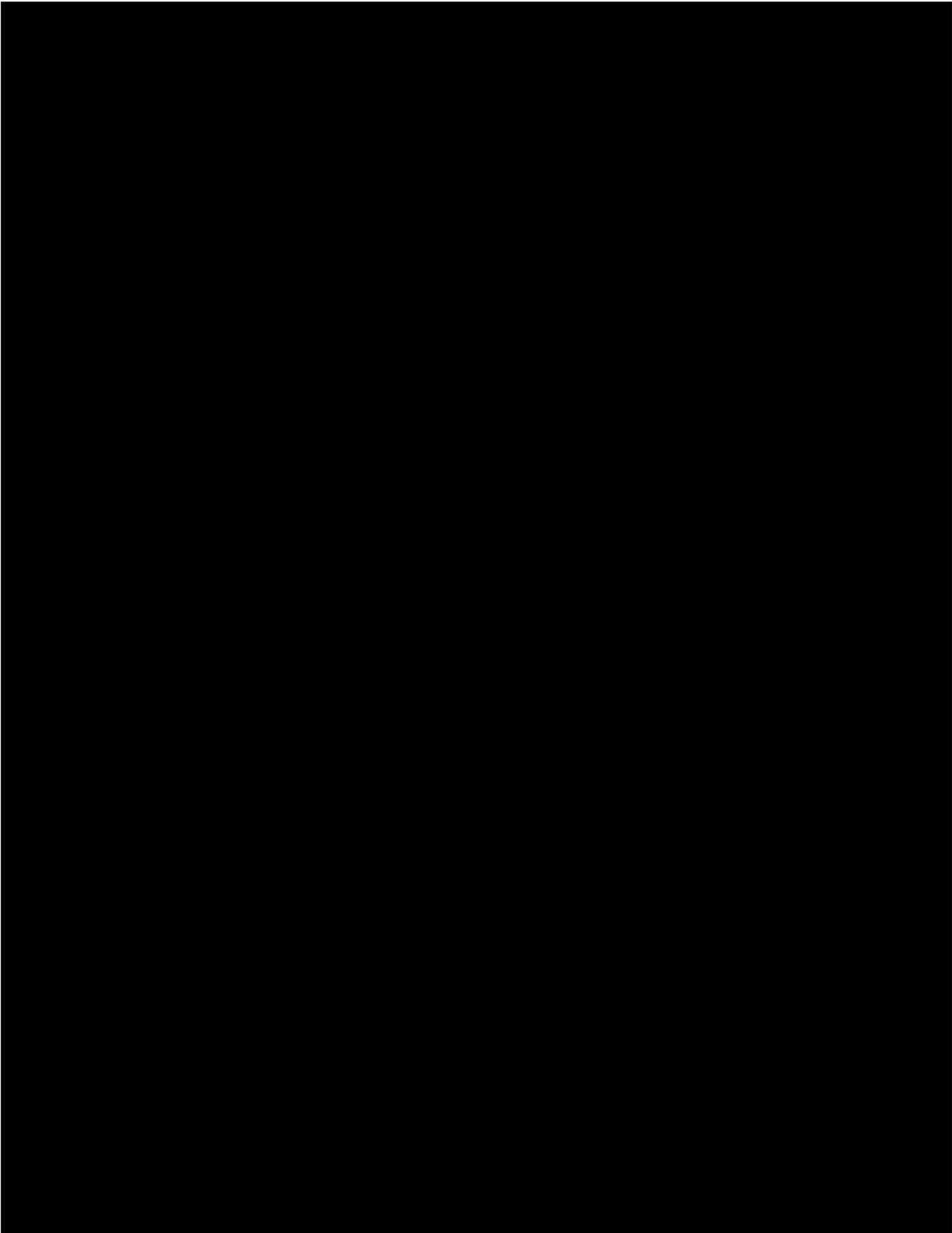




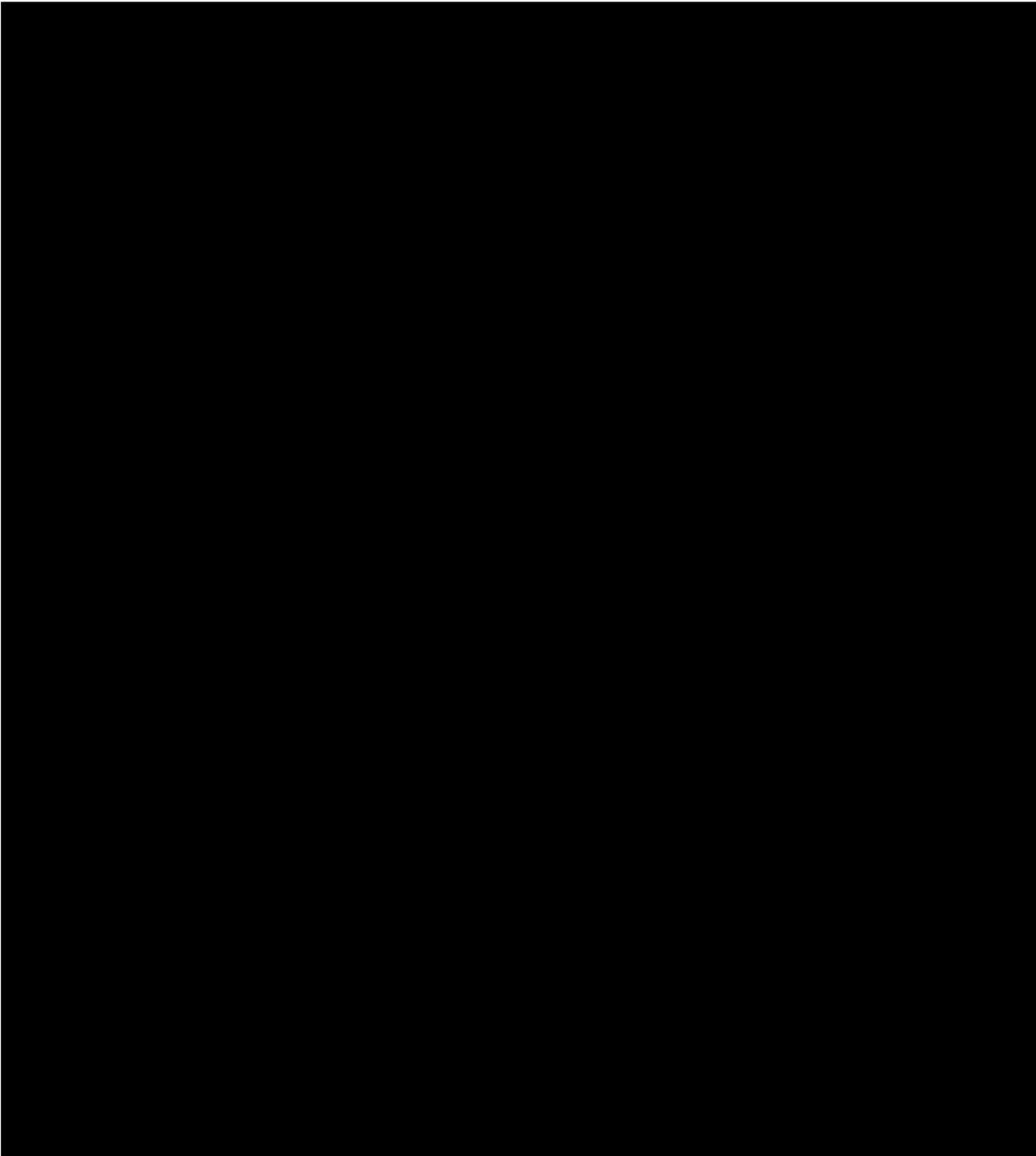
IMPROVED MANAGEMENT OF PORT HONDURAS MARINE RESERVE THROUGH THE CONSOLIDATION OF
MULTIPLE REPLENISHMENT ZONES.



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