

Darwin Initiative Main Project Annual Report

Important note: *To be completed with reference to the Reporting Guidance Notes for Project Leaders:*

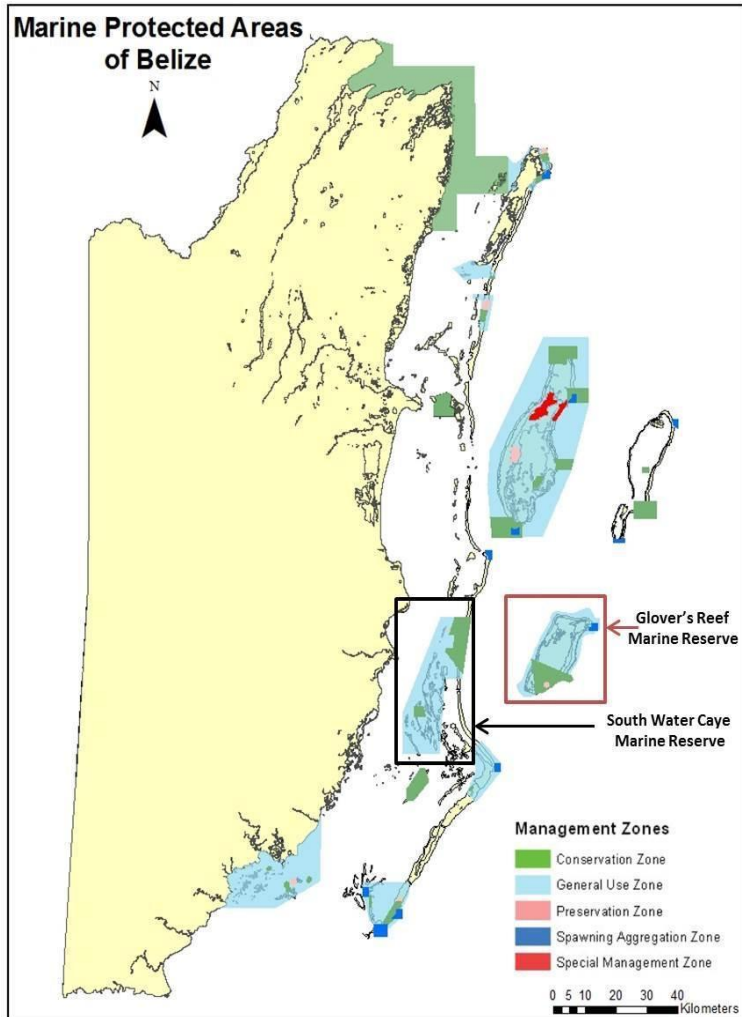
it is expected that this report will be no more than 10 pages in length, excluding annexes

Submission Deadline: 30th April 2017

Darwin Project Information

Project reference	22-014
Project title	Maximizing Benefits of Marine Reserves and Fisheries Management in Belize
Host country/ies	Belize
Contract holder institution	Wildlife Conservation Society
Partner institution(s)	Belize Fisheries Department, Environmental Defense Fund, The Nature Conservancy, University of Miami
Darwin grant value	£273,150
Start/end dates of project	1 April 2015 - 31 March 2018
Reporting period (e.g., Apr 2016 – Mar 2017) and number (e.g., Annual Report 1, 2, 3)	April 2016 to March 2017, Annual Report 2
Project Leader name	Nicole Auil Gomez
Project website/blog/Twitter	www.belizewcs.org

Report author(s) and date	Nicole Auil Gomez, Alexander Tewfik, Ralna Lewis, Julio Maaz. April 12, 2017
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1. Project rationale

The Belize Barrier Reef System supports an array of coastal, avian, and marine life within important habitat systems. Anthropogenic activities, however, have put increased pressure on the system, particularly overfishing. Although Belize is well known for its network of marine reserves, only 3.15% of its marine territory is legally protected from fishing (designated as “no-take”). This area is too small to ensure replenishment of resources, protection of biodiversity, and resilience to climate change. Outside of these no-take zones, fisheries such as lobster and conch, which provide food and income for local communities, are threatened by increasing numbers of fishers and illegal fishing. The former open-access system led to overfishing of species that are functionally critical to the health of coral reef ecosystems (such as parrotfish, an important grazer) and threatened the sustainability of local livelihoods. As a result, a rights-based management approach that ensures the sustainable use of marine resources was recommended and supported by both the conservation and fishing communities. WCS is founding partner in this initiative, and has demonstrated the success at the Glover’s Reef Marine Reserve (GRMR).

Belize is located on the Caribbean coast of northern Central America at 17°15’ north of the equator and 88°45’ west of the Prime Meridian on the Yucatán Peninsula. The two focal sites of this project are the GRMR and the South Water Caye Marine Reserve (SWCMR). These two marine protected areas are off the southern half of

Belize's coast, with the former being an atoll outside of the barrier reef (45 kilometers east of the mainland at UTM coordinates 415257 East, 1859219 North), and the latter being within the reef lagoon at UTM 337800 East, 1851500 North (Fig. 1).

Figure 1. Belize's Coastal and Marine Protected Areas Including Glover's Reef Marine Reserve and South Water Caye Marine Reserve.

2. Project partnerships

WCS's primary partner for this project is the Belize Fisheries Department. A majority of the outputs are aimed at supporting and strengthening the fisheries framework; therefore, the initiatives have required not only the support, but also the operationalization of the programs in conjunction with the Department. Additionally, the international and local non-governmental organizations' (NGO) team members have collaborated with WCS by bringing their expertise in mapping, modeling, protected areas management, data collection, conservation compliance, and community engagement. The international and local NGOs continue to come together under two working groups: the Managed Access Working Group (MAWG) and the National Replenishment Zone Expansion Steering Committee (NRZESC). The result has been a truly industry-led, participatory process of decision making – primarily through strong working groups.

The Managed Access Working Group, the Managed Access (MA) Technical Committee, and now the seven MA Committees meet throughout the year. Following the official implementation of MA in June 2016, the 2017 licensing process has been implemented successfully, with the technical and administrative efforts of the Fisheries Department with WCS. The Government has issued a Cabinet Paper on the Fishing Areas describing the Managed Access zones for Belize's territorial waters (February 2017.)

The key NGO project partners are the Environmental Defense Fund (EDF) and The Nature Conservancy (TNC). EDF works closely with our team on Managed Access and TNC works closely on replenishment zone expansion. Dr. Elizabeth Babcock of the University of Miami supports our science by conducting analyses and models of the commercial species and logbook data.

WCS and partners together plan and execute initiatives in this project, and it is through the working groups noted above that monitoring and decision making takes place. One challenge to implementation often relates to having sufficient funding, as not all partner agencies have dedicated funds for implementation, but through this project WCS has been able to support the science-based activities that underpin the management and engagement with stakeholders. Recently granted funding to our program through WCS's multi-donor MPA Fund will support additionally, related activities, such as ground truthing of the open sea areas, which is needed to prepare the legislative documents before confirming into law.

3. Project progress

3.1. Progress in carrying out project Activities

Output 1: For GRMR and SWCMR, sustainable fishing regulations are implemented through no-take zones and license-based MA programs that employ total allowable catch (TAC) quotas.

Activity 1.1 Assist authorities with data collection and analysis for development of TAC for conch and lobster for SWCMR.

The Belize Fisheries Department has yet to commence the collection of data through catch logs from SWCMR. Fishers from the area have been trained to collect logbook information, however the Fisheries Department is in the process of establishing a process to gather and store the data. WCS has supported the development of a national catch log database, which will be used to store and manage the data collected. Because data are not yet available, we have not yet been able to run the depletion models for SWCMR to determine whether catch levels of conch and lobster are sustainable. The eventual implementation of depletion models at SWCMR will allow an evaluation of fisheries sustainability without Total Allowable Catch (TACs) (i.e. quotas). In addition, the investigation of indices of maturity for both conch (e.g. shell lip thickness minimum in place of shell length) and lobster (e.g. revised carapace minimum) will also improve sustainability.

Activity 1.2 Monitor trends in number of MA licenses issued annually at GRMR and SWCMR to understand how licensing criteria impact the number of fishers in each reserve.

The number of fishing licenses issued for GRMR has increased slightly this year as a result of the national rollout of Managed Access (MA). As of March 31, 56 licenses were issued to for GRMR / MA Area 8, and its is anticipated that a total of 140 fishers will receive license before the cutoff point assigned by the Fisheries Department, of April 30. There is a total of 584 license issued for MA Area 3, which includes the SWCMR; this is a 18.5% decrease from what we reported to Darwin in the Year 1 report, measuring against 2016 licensing up to March 31st. An additional 273 licenses were given for SWCMR in the 2016 period, which gave a total of 976 for the year 2016. The new criteria for a fisher to be licenced for a particular MA Area is more rigorous and has to have the consensus of the MA Committee for that particular zone for approval. This is what we expected to see for a new MA Area and anticipate that fishing pressure will be reduced as a consequence.

Activity 1.3 Assist the Fisheries Department with entering catch data from fishers and monitor total catch per reserve, evaluating against established TACs.

The Glover's Reef logbook data have been entered and analyzed for the 2011 to 2016 fishing seasons at Glover's Reef (Annex 4.1), providing precise estimates of total catch. Although the Fisheries Department has not yet established a TAC, results of a depletion model analysis of lobster conch for these years show that catches in the lobster fishery are probably sustainable. For conch, catches are highly variable between years. Also, the estimated total abundance from the depletion model is low, and densities remain low, implying that the population is probably overfished and would benefit from lower catches. Again, the investigation of indices of maturity for both conch (e.g. shell lip thickness minimum in place of shell length) and lobster (e.g. revised carapace minimum) will also improve sustainability in conjunction with depletion models.

Activity 1.4 Collect independent sample of catch data monthly in both reserves to serve as benchmark for quality control, allowing for the evaluation of the accuracy of fisher logbook data.

We have the catch data at SWCMR and analyzed catch data from GRMR for the 2015 to 2016 season (Annex 4.2); the SWCMR data will be analyzed in the coming months. For GRMR, the catch-per-unit effort (CPUE, lobster/fisher-hour) varied substantially with no clear pattern and with an overall value of 1.6 (+/- 0.4 se) over the 8 month fishing season (see Fig. 3 in Annex 4.2). This is a substantial increase in CPUE from the previous season, 1.2 +/- 0.1. Carapace length data indicated that almost 13% of the 375 lobsters measured were at or below the legal minimum of 76 mm (3 inches) (see Fig. 4a in Annex 4.2). The seasonal mean CPUE based on total conch (N = 1802) and total hours fished (N = 210) is 8.6 conch/fisher-hour while monthly values varied widely and averaged 12.8 conch/fisher-hr for the season (Fig. 6). Almost 12% of all market clean conch meats are undersized (< 85 g, 3 oz). This information was presented at Gulf and Caribbean Fisheries Institute annual meeting in November 2016 (Annexes 4.3 & 4.4).

In addition to our monthly CPUE data collection at GRMR and SWCMR, WCS embarked on collection of lobster data at the National Fishermen Producers Cooperative Society, for the 2016-2017 lobster season. Between June 2016 and February 2017, approximately 800 whole lobster were individually measured and checked for indices of maturity. These data will be added to almost 2000 other lobster measured at GRMR and SWCMR for an unprecedented analysis of spiny lobster maturity in central Belize. These data will significantly inform our understanding of the morphological relationships (carapace length to tail mass), allowing for well-informed revisions to minimum size regulations for lobsters in Belize as well as to the seasonal closure period. A draft manuscript should be ready for submission in September 2017, and results will likely be presented me at the next GCFI conference.

Activity 1.5 *Conduct regular meetings of the MA Committees and Annual Fisher Forums to ensure that fishers are kept up-to-date on program progress and have an opportunity to discuss their concerns.*

The Managed Access Committee for GRMR continues to meet on a regular basis to review the progress of the licensing, management, and compliance. The GRMR committee is composed of representatives of Sarteneja, Belize City, Dangriga, Hopkins, WCS and the Belize Fisheries Department. The Area 3 Managed Access Committee (MAC) that includes SWCMR was officially appointed in November 2016 and have meet twice. Both Committees are charged with reviewing all licenses issued and making recommendation on new applications. They are also responsible for reviewing compliance with the various conditions for the licenses and ensuring that fair and transparent management of these.

Output 2: Spatial Monitoring and Reporting Tool (SMART) is implemented in order to improve targeted enforcement efforts aimed at reducing illegal, unreported, and unregulated fishing.

Activity 2.1 *Train Fisheries Department and NGO personnel who help co-manage marine reserves in the use of SMART software and procedures, including use of the new applet for tablet use, in order to record and track enforcement effort and illegal activities.*

WCS has trained conservation compliance staff at all marine protected areas in the use of SMART in Year 1 of the project. A total, of 75 Fisheries officers and/or Rangers (20 in year 1 & 55 in year 2) have been trained in the use of SMART, between Fisheries Department (FD) and NGO staff. In Year 2, a selected few (19 people) from the FD's Conservation Compliance Unit were trained on managing the data coming into the SMART database. These trainings taught them how to read and understand the patrol data, create plans for their patrols, create queries and reports, and how to make use of other advanced functions. Ongoing trainings are being conducted in order to commence the handing over of the system management to the Fisheries Department.

In December 2016, the new *SMART Connect* feature was added to the software. This new feature has allowed us to link the data gathered by the Fisheries Officers and MPA Rangers to a centralized online database. Uploads are done directly from the SMART android-based devices used to track their patrols via Wi-Fi or ISP data plans. This allows the Fisheries Department realtime transfer of patrol data from all the MPAs. This in turn allows the Department to quickly see overall occurrences of infractions and any other recorded encounters countrywide at the click of a button. SMART is being applied to monitor human activity, commercial and recreational fishing, as well as wildlife observations. SMART is now being implemented by the FD at six Marine Protected Areas Managed by the government, five of these using *SMART Connect* (see Annex 4.5 for an overview of SMART use in Belize): Bacalar Chico Marine Reserve, Glover's Reef Marine Reserve, Caye Caulker Marine Reserve, South

Water Caye Marine Reserve, Sapodilla Cayes Marine Reserve, and Hol Chan Marine Reserve. The Fisheries Department has adopted the use of SMART as part of its Conservation Compliance Units (2) in Belize City and Punta Gorda for all fisheries related enforcement. Staff of a range of NGOs who manage Belize's sanctuaries, parks, and reserves are in the implementation phase of SMART: The Sarteneja Alliance for Conservation and Development who manages the Corozal Bay Wildlife Sanctuary, the Belize Audubon Society who manage the Blue Hole Natural Monument and the Lighthouse Reef Natural Monuments, the Southern Environmental Association who manages Gladden Spit and Silk Caye Marine Reserve and the Laughing Bird National Park and the Toledo Institute for Development and Environment who manages Port Honduras Marine Reserve are in the implementation phase of SMART. The staff of the MPAs have received or invested in the hardware and software, however, the challenge has been to keep the stations equipped with running devices to be able to collect data year round. Additionally, the lack of full internet coverage across the seascape of Belize has limited the SMART Connect use at all sites.

Activity 2.2 Collaborate with reserve enforcement staff in developing SMART reports to determine infraction rates.


As of December 2016, six(6) patrol data queries and a general patrol report have been developed in collaboration with the Belize Fisheries Department (Figs. 2, 3, 4). The queries and patrol report are automatically generated from the recorded patrols data and can be sorted by preset- or custom-entered date ranges. This has made patrol briefing and report submissions much less time consuming and more efficient for the Fisheries Officers. The infraction rate information is detailed below, under Activity 2.3.

SMART: CCURZE - CCURZE Fisheries Enforcement Information Center

File Conservation Area Patrol Field Data Query Report Planning Connect Intelligence Help

CCU Patrol Report

PATROL REPORT



Patrol General Information

Date Patrol Start	Jan 2, 2017
Date Patrol End	Apr 20, 2017
Patrol ID	24022017CCURZE
Patrol Objective	Beach trap operation at Turneffe
Patrol Mandate	Day Patrol
Comments	
Transport Type	Boat

Team Members

Team Members	Number of Days
Hampton Gamboa	1
Mark Grenville	1
Michael Sabal	1
Rodney Cantillo	1
Sherwin Peters	1

All Observations Observation

Waypoint ID	Waypoint Time	Observation Type
X	Y	

Search On Private Establishments

Owners Name	Nationality	No. Persons	Type of Establishment	Action taken
X	Y			

Infractions encountered during search of establishments

X	Y	Type of Infraction	Name of Offender	Infraction Detail	Species
407827.474931906657.1594		Illegal Fishing	David Young	Beach Traps	
407827.474931906657.1594		Illegal Fishing	David Young	Beach Traps	

Figures 2 and 3. SMART Reports: Map with infraction coordinates

SMART: CCURZE - CCURZE Fisheries Enforcement Information Center

File Conservation Area Patrol Field Data Query Report Planning Connect Intelligence Help

CCU Patrol Report

All Observations Observation

Waypoint ID	Waypoint Time	Observation Type
X	Y	

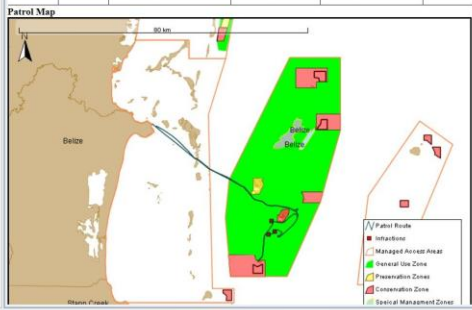
Search On Private Establishments

Owners Name	Nationality	No. Persons	Type of Establishment	Action taken
X	Y			

Infractions encountered during search of establishments

X	Y	Type of Infraction	Name of Offender	Infraction Detail	Species
407827.474931906657.1594		Illegal Fishing	David Young	Beach Traps	
407827.474931906657.1594		Illegal Fishing	David Young	Beach Traps	
407827.474931906657.1594		Illegal Fishing	Jamie Young	Beach Traps	

Patrol Map



SMART: CCURZE - CCURZE Fisheries Enforcement Information Center

File Conservation Area Patrol Field Data Query Report Planning Connect Intelligence Help

CCU Patrol Report

Query Name: All ObservationsCCURZE

Waypoint Date: All Dates

Number of Observations: 3 | Number of Incidents: 3

Patrol ID	Type	Patrol Start	Patrol End	Station	Team	Objective	Mandate	Armed	Patrol Leg ID	Leader	Pilot
24022017C	Water	Feb 24, 2017	Feb 24, 2017	CCU Belize	CCU Belize	Beach trap o...	Day Patrol	Yes	1	Hampton G.	Michael Sa...
24022017C	Water	Feb 24, 2017	Feb 24, 2017	CCU Belize	CCU Belize	Beach trap o...	Day Patrol	Yes	1	Hampton G.	Michael Sa...
24022017C	Water	Feb 24, 2017	Feb 24, 2017	CCU Belize	CCU Belize	Beach trap o...	Day Patrol	Yes	1	Hampton G.	Michael Sa...

SMART Query Definition

Filter Type: Incident Filter

Patrol ID equals 14022017CCURZE

Annual Report template with notes 2017

Figure 4. SMART Query

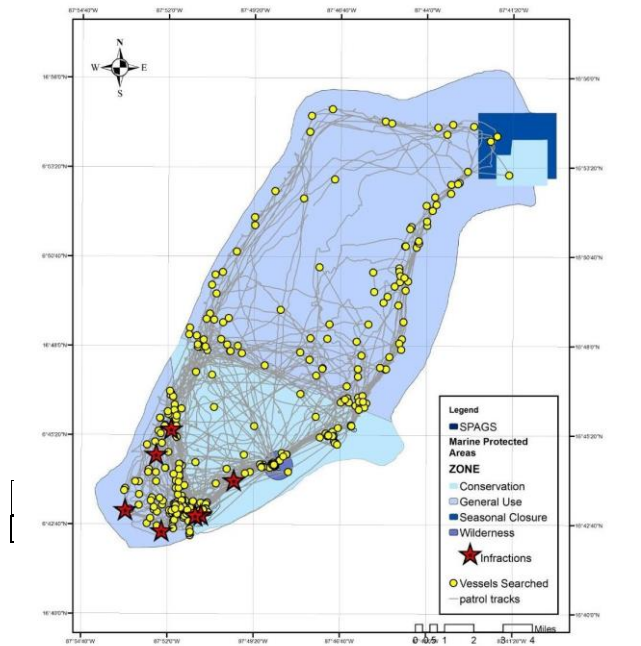
Activity 2.3 Use SMART results to identify types and hotspots of illegal activity in order to design more effective and efficient patrols that reduce distance travel and fuel used.

Review of the 2016 data gathered at GRMR using SMART shows that infractions are generally being encountered in the south of the reserve. However closer inspection of the map shows far less patrol tracks than in the south of the reserve. Hence infractions may be occurring in the northern part of the reserve but going unseen due to lack of enforcement presence.

WCS has responded to this by working with the Belize Coast Guard and the Belize Fisheries Department to have 4 Coast Guard Officers permanently posted at Middle Caye. As a result of this additional enforcement presence it was recorded that from January to March of 2017 there has been a total of 6 infractions encountered and prosecuted. These infractions included:

Figure 5. SMART Patrol Tracks for Glover’s Reef Marine Reserve

- possession of undersized conch
- possession of undersized lobster
- fishing without a valid fisherfolk license
- fishing within the conservation zone
- fishing lobster during its closed season



WCS has also met with the Belize Fisheries Department to assist with increasing the enforcement presence in the Northern part of GRMR. Which is a very important Spawning aggregation site the endangered Nassau Grouper. The Fisheries Department has since been sending additional patrols to the area as of January 2016

Activity 2.4 Use SMART to map fishing activity throughout the reserves in order to better understand fishing patterns.

During 2016 (January to December), there were 116 patrols carried out using SMART at

GRMR (Fig. 5). Rangers inspected fishing vessels 348 times (*yellow dots on map*), observing seven infractions. Much fishing activity occurred near the boundary of the Conservation Zone, a replenishment area that prohibits commercial fishing. Using this information, there are two considerations or theories held by the reserve managers:

1. Fishers are taking advantage of the “spillover effect” of fish. WCS’s ecosystem monitoring of the atoll supports this theory.
2. Fishers are fishing in the General Use area (fishing zone) along the Conservation Zone boundaries potentially sneak into the Conservation Zone when not being monitored.

To address theory 2, fishers are being closely monitored, particularly those who frequently fish more often close to the boundary, to ensure they are not fishing in the Conservation Zone. Areas noted as having very few patrols have now been identified as areas needing on-site monitoring.

Activity 2.5 Convene workshop to review implementation of national SMART rollout and conduct training in analysis of data.

On June 29 and 30 2017, WCS conducted a SMART training workshop with managers of all Marine Protected Areas in Belize. The objective of this workshop was train managers on how to use the data collected using SMART for the generation of queries and reports. Aa total of 19 officers participated in the training, and a standard reporting format was adopted.

Output 3: Benefits of no-take zones and MA programs on coral reef ecosystems and resource-based livelihoods are better understood, strengthening adaptive management and community support.

Activity 3.1 Analyze both logbook and independent sample datasets for conch and lobster, including mean size, population structure, and CPUE, and use results to update TAC models each season.

Using the total catch and CPUE data from the logbooks at Glover’s Reef, we have used depletion models to estimate the total abundance and fishery mortality rates of both conch and lobster for the 2011 to 2015 conch and lobster fishing seasons. These results are in a draft document (Annex 4.1) that will be finalized in the next few weeks.

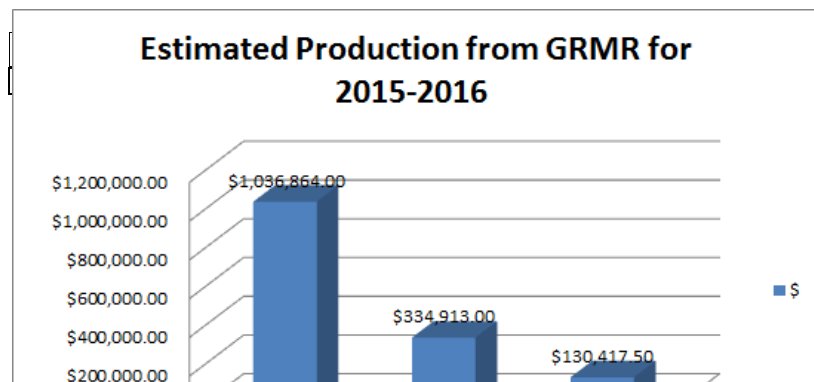
In February 2017 we submitted a publication to the journal Marine Ecology Progress Series (MEPS), analyzing the effect of the no-take zone at Glover’s Reef for conch, lobster, and focal finfish (e.g. Nassau grouper, hogfish, parrotfish) (draft publication Annex 4.6). Specifically, we examined changes in populations of an ecologically representative suite of focal species, including ones important to local small-scale fisheries, over a seven year period (2007 to 2013) using both independent visual surveys and fisheries-dependent data. Most small-scale fisheries targets (e.g. conch, lobster, hogfish) showed increases in density, biomass or size within the replenishment zone and increases in catch rates beyond

replenishment zone boundaries. Low trophic level, high recruiting species of more limited movement (such as parrotfish, conch and lobster) appeared to respond most clearly to protection while higher trophic level, late maturing and more widely dispersing fish (such as snappers and groupers) generally displayed more limited recovery. Patterns of mid-trophic level hogfish and queen triggerfish appeared to be linked to the availability of appropriate prey, conch, and urchins respectively, with increasing angelfish CPUE appearing to replace large parrotfish since the parrotfish ban in 2009. Patterns of triggerfish and angelfish population indices may also be linked to benthic cover given their preference for urchin and sponges, respectively. These results speak to the core management objectives for the Glover’s Reef Marine Reserve to ensure sustainability of its resources and enhance economic benefits from fisheries. Our study highlights the importance of using other fisheries conservation strategies (size limits, closed seasons) in conjunction with replenishment zones, as well as direct consultation with resource users in order to maximize benefits.

Activity 3.2 *Using well-established protocols, monitor and report on a suite of coral reef ecosystem health indicators (including several focusing on critical herbivores like parrotfish).*

As described in the submitted MEPS paper (in review; Annex 4.6), GRMR living benthic cover on replenishment (Conservation) zone (RZ) and general use zone (GUZ) patch reefs, collected in 2015, was dominated by fleshy macroalgae (RZ: 58%, range 23% to 85%, GUZ: 64%, range 26% to 96%) including high proportions of *Turbinaria* sp. and *Lobophora* sp. followed by sponge, soft coral, and hard coral (the LAMP II report, Annex 4.7). Despite the relatively small size of the replenishment zone – 22.7% of the total reserve area – we have observed positive results for a number of species. Some of the most dramatic changes involved both small and previously harvested large parrotfish, which have responded to conservation strategies that include spatial protection and a complete ban (2009) on the harvest of herbivorous fish in Belize. Trends for both queen conch and spiny lobster are very relevant given their ecological importance and status as the two most economically important species utilized by small-scale fishers at Glover’s atoll and throughout Belize. These invertebrate species are rarely included in broader, multi-species reef resource assessments within the region. The relatively small size of the replenishment zone (< 80 km²) may be considered insufficient to cause significant changes for some larger and higher trophic level predators given their longer life history, use of habitats beyond our study (e.g., fore-reef), and propensity for long-range movements across management boundaries to reproductive aggregation sites. Complete analysis of the LAMP II data collection at SWCMR (2016) will be completed this year and 2017 LAMP II data collections will be completed at GRMR for comparison to 2015.

Activity 3.3 *Conduct annual socioeconomic surveys of MA licensed fishers in*



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collaboration with the Fisheries Department.

A socioeconomic survey was only conducted for the Managed Access Fishers of Glover's Reef Marine Reserve / Managed Access Area 8 in 2016. A total of 56 fishers were surveyed, and their data were complemented with catch data from their catch logs and data submitted by them during the licensing process. A total of 135 fishers from the from over 24 communities throughout Belize utilized the Atoll. The number of fishers has remained stable despite the request from new fishers to get access to the area. The average (mean) age of fishers using the atoll is 42, which is a slight increase from 41 in 2015. This is a result of novice fishers not being easily allowed access to this Area. There was a slight decrease in the average number of years a person had used the atoll from 22.5 in 2015 to 19.4 in 2016. This is as a result of some older fishers retiring.

Figure 6. GRMR Fisheries Production Feb. 2015 - Feb. 2016 Fishing Season

The economic data is being consolidated for the 2016 - 2017 fishing season, and will be included in the final report.

Activity 3.4 *Monitor perceptions among fishers of the necessity and effectiveness of enforcement program.*

Fishers perception of the benefits of Managed Access to resource improvement is high, as 88% of the persons interviewed indicated that they agreed or strongly agree that the new system was beneficial. However, only 60% indicated that they had higher catches. Fishers indicated that enforcement had improved since the implementation of the program, however 48 % felt that illegal fishing had not declined. 96% of the fishers agreed that submission of data is important and 76% agreed that the log books were easy to fill in. We must note that 2016 was a difficult year as GRMR was undergoing management changes, which may have resulted in some loss in confidence on the management system.

Activity 3.5 *In collaboration with partners, prepare and disseminate information on results with participating fishers in order to foster dialogue and continued support*

This survey takes place during the licensing period (between December to April), so the data from the survey are still being collected and analyzed. The report will be disseminated in the coming months, following thorough data analysis, and report drafting, and review and approval by Fisheries Department and WCS.

Output 4: With the widespread support of fishing communities and the general public, new or expanded no-take zones are established in Belize's network of marine reserves.

Activity 4.1 Conduct national survey to evaluate level of understanding and support for no-take areas and their benefits.

The draft impact report (Annex 4.8) for Season 2 of the Punta Fuego/Talking Fuego radio and outreach program analyzed survey data collected for the periods 2015 and 2016, which includes the baseline, mid (season 1) and post (season 2) surveys. Surveys were conducted so as to: (1) detect a time trend by measuring any change from the baseline to post survey; and (2) detect any difference between Punta Fuego/Talking Fuego listeners and non-listeners. The aim of the assessment is to determine if there were any positive changes with respect to the relevant knowledge, attitude, interpersonal communication, and behaviors relating to responsible fishing, MPAs, and no-take zones. Results indicate that listenership for Punta Fuego among fishers increased from 41% (season 1) to 53% (season 2) of survey respondents. Listenership for Talking Fuego also showed an increase from 58% (season 1) to 66% (season 2). This is ideal since the shows are complementary; The drama is very entertaining and is used to engage listeners in the themes of the show and attract them to the informative talk show which follows. Fishers that listened to the entire program (i.e. Punta Fuego and Talking Fuego) showed increased knowledge regarding the benefits of joining a fishermen cooperative and fishing association, fisheries regulations, and of replenishment zones, among others. A positive change in attitudes regarding respecting fisheries regulations and the replenishment zones was observed in listeners of Talking Fuego when compared to non-listeners. Fishers who listened to Punta Fuego and Talking Fuego reported that they spoke with other fishers about topics relating to sustainable fishing. Sixty-five percent of the respondents reported talking with others, mostly fishers. Changes in behaviors were revealed in terms of becoming active at meetings and cooperatives. Results of the analyses suggests that listening to Punta Fuego was important in fishers adopting sustainable fishing behaviors such as becoming a member of a fishermen cooperative and fishing association, respecting the boundaries of no-take zones noted by a reduction in the number of fishers who reported receiving an infraction for fishing in a no-take zone, and an increase in the number of fishers who reported actively speaking at fisheries related meetings.

Overall positive changes have been observed over time in the variables, and differences are found between Punta Fuego/Talking Fuego listeners and non-listeners thereby indicating that the program has contributed to efforts to promote support sustainable fishing knowledge, attitudes and behaviors. However, as indicated by the impact report, these efforts will need to be sustained over time in order for them to become widespread and permanent. As such, plans are underway for a season 3 of Punta Fuego. The team plans to incorporate significant community mobilization activities in order to support the program goals.

Activity 4.2 Facilitate regular bi-monthly meetings of the Steering Committee for the National Replenishment Zones Expansion program, and its

associated Technical and Communications Sub Committees.

A total of 6 Steering Committee meetings were held for the National Replenishment Zones Expansion project. WCS has identified a consultant to conduct the ground-truthing exercise for the phase 1 expansion and is in the process of negotiating the process for implementing those activities. The consultant will also be responsible for drafting the boundary descriptions for the expansion which will be included in the statutory instrument (SI). The Fisheries Administrator has indicated that when this process is completed the SI will be taken to the Minister of Fisheries for presentation at the Cabinet.

Activity 4.3 *Conduct quarterly meetings of the Reserve Advisory Committees and discuss potential new expanded zones (proposed by WCS and TNC) with stakeholders at these forums.*

The advisory committees for Glover’s Reef and South Water Caye Marine Reserve held a total of 3 meetings each during this reporting period. Currently both reserves are in the process of updating their management plans. At the January 2017 GRMR and March 2017 SWCMR advisory committee meetings a session was held to garner input from members which will feed into the management of the reserves for the next 5 years. Furthermore, the Fisheries Department presented the proposed expansion map for SWCMR at the December 2016 advisory committee meeting. A validation session will be held with the fishing and NGO community in August 2017 to finalise the expansion boundary.

Activity 4.4 *Develop outreach material in coordination with TNC and the Fisheries Department to inform stakeholders of the biodiversity and fisheries benefits of no-take areas that incorporate results from GRMR analyses.*

The month of June was officially declared as *Fisherfolk Month* in Belize. WCS along with its partners the Fisheries Department and local NGOs, carried out an entire month of activities focused on recognizing and celebrating the hard-working fishers of Belize. Activities included an opening ceremony, church service, various fishers fora throughout the country, a blessing of the vessels ceremony, launch of Punta Fuego season 2, and the Fisher of the Year Award ceremony. The month of activities highlighted the importance of sustainable fishing practices and its effect on food security, conservation of biodiversity, and securing the livelihoods of fishers.

In March 2017, WCS participated in the *Reef Week* activities which was celebrated under the theme “Turn the Tide, Respect the Reef.” A mobile underwater photo competition was held in Punta Gorda Town, which highlighted the important role replenishment zones play in protecting biodiversity and how sound science informs policy and management decisions. Furthermore at the reef fair WCS presented several posters and ran games that highlighted the monitoring and research work being done at GRMR as well as the benefits of marine protected areas and replenishment zones as they relate to biodiversity conservation, fisheries, and income generation through tourism and fishing activities.

2. Progress towards project Outputs

Output 1: For GRMR and SWCMR, sustainable fishing regulations are implemented through no-take zones and license-based MA programs that employ total allowable catch (TAC) quotas.

The Managed Access (MA) system, the MA Committees, and upgraded licensing system for the Fisheries Department has led to benefits of detailed accountability and up-to-date information generation. For MA Area 8 / GRMR, has 96 licenses issued; even though there were 135 applications, the Committee did not approve the applicants, largely because they were unknown individuals or not traditional users of the MA Area. The amount is less than the Output Indicator of 130 fishers expected per year at GRMR.

The management committees have been meeting to discuss the national-level system, and area-specific functionality. There have been four meetings of the MAWG over the last year, and 2 MA Committee meetings have been held for Area 8 (in December and March) and one for Area 3 (in December). We were not able to organize a Fisher Forum until April 2017, and that will be reported on in the next annual report.

The 2016 and 2017 license holders were following data reporting requirements, as 93% of fishers submitted their logbook data, allowing our science team to calculate catches of lobster, conch and fish for Glover's Reef (see Annex 4.1). We expect to meet the Output Indicator of 95% of fishers providing their data by the end of the project. For SWCMR, comparing approved licenses to this time last year, we see a 18.5% decrease, surpassing the expected indicator. However, the system for logbook data collection has not been socialized and we therefore do not have these data to contribute towards catch calculations for SWCMR. Regarding the management system, the Fisheries Department has not established TAC. Updated assessment for conch and lobster at Glover's Reef show that the lobster catches are fairly sustainable, while conch are probably depleted (Annex 4.1).

Output 2: Spatial Monitoring and Reporting Tool (SMART) is implemented in order to improve targeted enforcement efforts aimed at reducing illegal, unreported, and unregulated fishing.

The SMART tool has been accepted and is utilized by the Fisheries Department, from the Conservation Compliance Unit to the rangers at the Marine Protected Areas; additionally, all NGO's that co-manage a marine protected area utilize SMART (see Annex 4.5). The data collected include human activity, as well as wildlife information (see section 3 above for details.) While only 40% of patrols in GRMR used SMART in 2016, with improved management in place since January 2017, and replaced hardware, we expect to reach the target of 100% of patrols for the last year of the project. WCS has been working with the new manager to improve the enforcement and compliance strategy and secure the protected

area from Illegal fishing. As part of the new strategy, WCS brokered an arrangement to have four coast guard officers permanently posted at GRMR to conduct patrols jointly with the reserve staff. The infraction rate is still at 4%. For SWCMR, only 10% of patrols used SMART, and infraction rate is still at 5%. Unfortunately, the ranger station conditions and availability of suitable vessels for patrols, and poor equipment have led to this challenge. Additionally, while WCS equipped SWCMR with Garmin Monterra GPS devices to collect patrol information, patrols occurred sporadically because of the constant change of staff and the availability of staff. WCS has highlighted the issue to the Belize Fisheries Department in an effort to improve the compliance management. We are expecting that the numbers will improve in 2017 as the reserve has recently gained additional staff, and the officers whom were not performing have been removed. In 2017, WCS will conduct monthly reviews of patrol data and report to the Fisheries Department the results of those checks in an effort to ensure enforcement is being done efficiently.

Output 3: Benefits of no-take zones and MA programs on coral reef ecosystems and resource-based livelihoods are better understood, strengthening adaptive management and community support.

Detailed above, WCS's science team has collected and analyzed GRMR CPUE and logbook data for the last year, and recently produced reports (Annex 4.1 and 4.2). Lobster CPUE increased from 1.2 (+/-0.1) lobster per fisher hour to 1.6 (+/-0.4) lobster per fisher hour, between the 2014-2015 lobster season and to the 2015-2016 lobster season. For conch, we see the same increase from 6.6 (+/- 0.4) conch per fisher hour to 8.6 conch per fisher hour. The data have also been used to fit depletion modes to estimate whether catches are sustainable, which we are seeing to be the case at GRMR. The data trends and information will be transformed into a suitable booklet for public distribution in Year 3 of the project. Given the absence of a TAC, which is a management tool that needs to be set by the Government, WCS is working on the finalization of fisheries management plans for lobster and conch, and seasons, minimum size limits and gear restrictions are key, to be incorporated within a functioning MPA system. With respect to the Output Indicator of two peer-reviewed publications, a paper on the effect of the no-take areas is in review at Marine Ecology Progress Series (Annex 6). Peer-reviewed papers are planned to be submitted on the depletion models in late 2017.

Based on the catch data and effort by users for the 2015-2016 fishing season, there was a total value of product of BZ\$1,502,195, with conch being the greatest income generator (Fig. 6).

Output 4: With the widespread support of fishing communities and the general public, new or expanded no-take zones are established in Belize's network of marine reserves.

The communications strategy developed by the NRZESC focused on the development, implementation, and evaluation of a national radio drama

and call in talk show, which provided messaging on sustainable fishing. The Impact Report for Season 2 (for draft see Annex 4.8) for *Punta Fuego* and *Talking Fuego* presented positive results. The preliminary analyses for season 2 indicates that there is an increase in respondents (fishers) knowledge and positive changes in attitudes and behaviors regarding the benefits of no-take zones and respecting the boundaries of no-take zones. This bodes well for fishers supporting the creation and expansion of no-take zones. WCS is scheduling a final season 3 to be aired in 2018. The NRZESC held 6 steering committee meetings within the reporting period, and minutes were drafted by WCS, meeting the Output Indicator. Additionally, three SWCMR and GRMR Advisory Committee meetings were held within the reporting period. These are on target with our indicator of meetings for these groups.

To finalize the recommendation of sites for open sea declaration as replenishment zones, the preparation of the legislative description will require ground-truthing and write up. WCS has pledged additional funds, which will contribute to this activity. A consultant has been identified as in the process of being contracted to carry out this exercise in order to draft the boundary description for the statutory instruments. Complementary funds are still needed for the field work, and our partner TNC is expected to assist financially, along with other support from Government entities. We do expect to reach our Output Indicator by 2018.

3. Progress towards the project Outcome

The anticipated Outcome of this project is that sustainable fisheries management leads to increases in catch-per-unit-effort and income, strengthens ecosystem health, and provides a model for expansion of no-take zones and managed access programs in marine reserves across Belize. We are well on our way to realizing this, with actions contributing to the increase in lobster and conch catch this last season, increased or stable numbers for independent fishers surveys, stability in fisher numbers, and stability in market price for products. The nation-wide Managed Access system, as a part of Belize's model for sustainable small-scale fisheries, has been successfully rolled out and is a priority for fisheries national management. These are detailed above with support Annexes.

The fishery dependent data is already showing a slight increase in CPUE from the baseline indicator for lobster and conch (Indicator 1). We do have improvements to make on the logbook system as a whole, including the reporting by fishers from SWCMR. WCS will work more closely with the managers of the SWCMR to achieve this for this coming year, but the 80% target (Indicator 5) may perhaps be too high, considering the third year of this project will be the first year of logbook data collection for SWCMR.

The MEPS paper (Annex 6) provides the strong baseline for the fishery-independent surveys at GRMR (Indicator 2). Replenishment zones are a key factor leading to increases in species observed per hectare. Additionally, the new research on conch mega-spawner refuges at GRMR show that habitats outside of replenishment zones that are important for conch (Annex 3 and 4). These are deep zones, therefore difficult for fishers to

access, but are still susceptible to fishing.

The socioeconomic surveys are showing a stability in catch, and income by the fairly stable number of small-scale fishers at GRMR. The average income by fisher was £4334 for the 2015-2016 season, above the baseline indicator of £3534 (Indicator 3).

Through the collaborative NRZESC, we are on the way to finalizing the expansion of replenishment zone area to include the open water zone. We will meet the baseline indicator of 10% replenishment zone by the end of this project (Indicator 4), however this might not reach the national goal of 10% per habitat type, which we will continue to work toward past 2018.

4. Monitoring of Assumptions

Assumption 1: The political will to establish additional replenishment zones exists. WCS is actively involved at the community level and the political level, and there is indication that Belizean's support further development and expansion of the activities currently piloted at GRMR and to be developed at SWCMR.

The Fisheries Administrator has indicated her commitment at ensuring the goal for the phase 1 expansion of the project is met. As indicated above, after the ground-truthing activity is completed and the Statutory Instruments are drafted the Fisheries Administrator will present it to the Minister who will then present it at Cabinet. Furthermore, the Belize National Coast Guard Admiral has indicated that the National Security Council fully supports this initiative and will offer their support when it is presented at Cabinet. In addition, the preliminary results of Punta Fuego season 2 indicates that fishers attitudes towards the benefits of marine protected areas and respecting for the replenishment zones have improved over the 2 seasons.

Assumption 2: The Fisheries Department continues to support the rights-based, or MA, program. WCS works in close collaboration with the Fisheries Department, which has supported the development of MA programs and plans to expand this approach as a national strategy for marine resource management.

Even though the Fisheries Department is commitment to rolling out the program nationally, they have been delaying the implementation of some components of the program, resulting in some delay in expected results. The implementation of the program has been done through a phased approached of its components.

Assumption 3: The fishers are willing to participate in the MA program and support the no-take expansion. Fishing communities have

expressed their desire for programs that reduce overfishing that has caused a decline in key marine species and has led to reduced income.

Fishers support is there but it's conditional on the Fisheries Department and Co-Managers in being fair and efficient in the managing of the zones. Fishers have been applying for their zones with very little resistance.

Assumption 4: *The export prices for lobster and conch remain at a stable level. The revenue from these two major fisheries is based to a large extent on exports by the fishing co-operatives, mainly to the US market. These prices will influence how much fisher income will change during the lifetime of the project.*

Export prices have remained stable however the fuel prices (cost of fishing) have increased.

Assumption 5: *There are no natural disasters, such as hurricanes and el Niños, during the project period that will affect the coral reefs and nearshore fisheries. Even in light of a major storm event, WCS is committed to working on managed access and no-take expansion in these geographies and Belize in the short- and long-term.*

During the last year of the project, Belize faced one hurricane in August 2016. This only temporarily halted our CPUE data collection and did not impact the other project work. However, the hurricane resulted in the Fisheries Department having to focus on hurricane damage assessment, which resulted in FD reducing the number of socioeconomic surveys they conducted.

3.5 Impact: achievement of positive impact on biodiversity and poverty alleviation

Based on the breadth and time series of research and monitoring conducted at GRMR, and expansion of these activities to SWCMR, WCS with Dr. Babcock have been able to collect meaningful data and conduct impactful analysis of data that is now being used for fishery management plans. Our constant support to the local fishing Associations in three main coastal communities has provide them with direct funding support for projects, such as a revival of pig rearing in the Sarteneja community and fishing gear investment in the Hopkins community. Indirectly, WCS helps these groups to prepare strong proposals for their capacity building or supplemental livelihoods, such as scuba diving and seaweed farm training of 15 person in Dangriga, and tour guide training in Sarteneja. WCS assisted the fishing associations in Sarteneja and Dangriga in the development of project proposal for economic alternatives, which they were successful in securing.

4. Contribution to the Global Goals for Sustainable Development (SDGs)

To achieve **Goal 14**, WCS has worked with the Fisheries Department to change the fishing paradigm to a rights-based system, which allows local small-scale fishers to choose fishing areas, vetted by a committee of their peers with the management authorities (Government with NGO managers), also known as the MA Committee. This year is the first with complete decision making overseen by the MA Committees. This also contributes to **Goal 4**, to reduce poverty of the fishing families—totaling about 15,000 people—as fishers from coastal communities are treated as stewards of the fishing system. Additionally, WCS continues to directly support formal fishing Associations from Sarteneja, Dangriga, and Hopkins to receive capacity building and/or supplemental livelihood grants to benefit the industry or community development.

5. Project support to the Conventions, Treaties or Agreements

This project helps to meet Belize’s obligations under the Convention on Biological Diversity. For Year 2 of this project, we have carried out activities to impact **Aichi Targets 1, 4, 6, and 10**. Specifically, our outreach activities in the form of the Punta Fuego radio drama and the corresponding Road Show demonstrated its success in that there was a change in attitudes and behavior by fishermen, and they more willing to conduct fishing within the legal framework, moving to what is a more sustainable and inclusive fishing system. The first year of compulsory licensing under the Managed Access system has been successful, with 77% of fishers registered for two assigned MA areas by March 31, 2017.

Additionally, the efforts made towards **Aichi Targets 11 and 14** in Year 1 to gain more protection of Belize’s territorial seas, in particular increasing replenishment zone coverage, is close to realization. The recommended zones based on habitat type, use, and economic impacts, and stakeholder validation have been provisionally accepted by the National Security Council, led by the Prime Minister. We expect to finalize this via legislation in the next few months, adding to reef system integrity for Belize. This has been done with participation and support from the fishing stakeholders. WCS is also working with the protected areas managers (Fisheries Department) for GRMR and SWCMR to update management plans, using a consultative process, with the aim of identifying the conservation targets and formalizing an action plan to reach the desired goals per marine reserve.

The Focal Point in Belize for the CBD is the Chief Forest Officer (CFO). This project does not directly engage with the Forest Department, however, as a courtesy, this final report shall be shared with the CFO, as the CBD Focal Point. WCS Belize does work closely with the CFO,

who is also the CITES Focal Point, on CITES related issues— primarily capacity development—for forest and wildlife products.

6. Project support to poverty alleviation

This project is working to alleviate poverty for fishing communities in Belize. Fishers at our project sites continue to be able to provide for their families and we have seen a stable to slightly increased production reported for GRMR. This is in addition our community work where they leverage WCS support to access further funds for economic alternatives and to improve access to education. Fishermen and their families from Sarteneja, Dangriga, Hopkins are the key targets in regards to poverty alleviation. This project engages local community members through formal fishing associations, with the support of Darwin Initiative. WCS has been able to leverage additional support to them for capacity building and project development, including a recent direct donation of US\$20,000 from the blue moon fund, who connected with the Sarteneja Fisher Association through our program. In 2015-2016, fishers association in Dangriga and Sarteneja were able to access \$US110,000.00, for economic diversification projects through the support of WCS in project development. The spillover events of this benefit the women’s group and a new youth group (see section 7 below).

7. Project support to gender equality issues

The Sarteneja Fishermen Association (SFA) has recently, in late 2016, assisted in the formation of a women’s group that is focused on the creation of jewelry made from the spines and fins of the invasive lionfish as a source of income. This is an indirect benefit from our support to the community focused on women, and came about as a part of our community development work. Furthermore, SFA has created a revolving development fund of US\$7,000 for this group of 11 women, for them to use for small business opportunities. Through the support of WCS, SFA also provided the women's group with equipment for them to do bake sales. Also, SFA is preparing a Tour Guide Training Course for 25 fishers, which should be completed by July of 2017, with funding from the GEF Small Grants Programme. WCS will be encouraging women from the community to participate. SFA has also bsecured funding for a project to create a youth environmental group, for which members will be trained



in marine conservation and stand to benefit from educational scholarships, book donations, and technical and leadership training.

Furthermore, WCS’s community meetings include fishers and their spouses. While we have only 69 female fishers nationally, with 2 using

GRMR and SCWMR, in Year 3 WCS and partners will be together organizing a Women in Fishing Forum in June during Fisherfolk Month. We hope to realize new opportunities requested by and designed for women, in a collaborative way.

8. Monitoring and evaluation

This year our project underwent a mid term review by LTS International, so we received an advantage of having the process of discussion time with each other, independent reviewers, and from our partners and stakeholders. We received the report in March, so will be incorporating recommendations as applicable, for Year 3 of the project.

9. Lessons learnt

Use of TACs to verify the indicator of increase in CPUR is no longer suitable. The description of the TAC is a management decision. We believe it is more effective to modify existing fisheries regulations with biologically relevant size limits and other harvest controls (seasons, replenishment zones, landing whole fish - no fillets) that can be easily monitored at limited landing sites nationally. WCS aims to achieve the same management benefit to the fisheries by proposing these other measures, keeping the managerial and enforcement systems simple, and in line with long-term management customs.

10. Actions taken in response to previous reviews (if applicable)

The Annual Report Review provided after the Year 1 Report was received in June, with good feedback and generally positive comments. This year, we included the income estimate for GRMR (section 3.1 above) and details on the alternative livelihoods work. Information on the SMART training was given in the Half Year Report submitted in November. Also, we contributed to the Darwin newsletter in August, and have provided additional details in reports and presentation as to our donors (section 13 below), including the Darwin Initiative. We still do have more to do in this latter component. WCS is currently in the process of updating the design of the WCS Belize Program website, which will enable us to acknowledge donors supporting our various initiatives.

11. Other comments on progress not covered elsewhere

Nothing to report.

12. Sustainability and legacy

Last year, our Country Director met twice with the British High Commission to discuss WCS's work in Belize, including the current Darwin

project. An invitation has been offered for their staff to join our staff at GRMR to learn more about marine conservation measures in Belize, and our work.

13. Darwin identity

In June 2016, the Punta Fuego Radio drama, through partner PCI-Media Impact, was recognized with the Millbank Award for Social Marketing for Innovation in the Environmental Field. Outside of the international exposure, through online posting by PCI-Media Impact via their website and FB page, Additionally, the story was part of WCS-Belize’s Facebook promotion, and received positive feedback through radio broadcast of the Talking Fuego segment of Punta Fuego Season 1. <http://mediainc.org/news/pci-media-impact-wins-the-millbank-social-marketing-award-for-the-belize-program-punta-fuego/>

Additionally, WCS’s Assistant Country Director, and Communications Coordinator, along with a representative from the Caribbean Network of Fisherfolk Organizations (CNFO), appeared on local radio and television stations to promote Fisherfolk month in June (when fisherfolks from all over the country are recognized for the positive contribution they make to the industry and ultimately the overall objective of the Darwin Initiative, as it relates to no-take zones.)

Furthermore, Doctor Babcock’s Seminar detailing the logbook data results from Glover’s Reef Marine Reserve on fishermen data collection highlighted and recognized the significance of the Darwin’s Initiative to WCS’s work in Belize. In addition to the social media promotion, Dr. Babcock’s presentation was also posted, via video upload, on WCS’s Facebook page for those who may have been unable to attend the live presentation in Belize City. https://www.facebook.com/pg/WCSBelize/videos/?ref=page_internal

The activities of the Darwin project form part of a larger programme that involves a few to several other stakeholders. For example, Fisherfolk Month, which is just one of the activities that highlight the fishing community and importance of protecting the no-take zones, is planned and executed by WCS as well as organizations such as the Belize Fisheries Department, Caribbean Regional Fisheries Management, CNFO and others.



The Darwin Initiative is well-understood within the environmental and conservation communities in Belize. To a large extent, implementing organizations such as WCS; and supporting governmental organizations like the Fisheries and Forest Departments, as well as some government representatives are knowledgeable of the program. A limited number of media representatives understand the initiative; however, part of WCS’s

role in the coming months, throughout communications strategies, is to ensure that information regarding Darwin Initiative activities and programs are well understood and promoted via the various medium.

Currently, WCS Belize operates only Facebook (FB) and Instagram accounts, as well as a YouTube Channel through the Global Conservation Program. The FB page has been the most effective of our social media platforms since we are able to boost posts to specific audiences. However, we have yet to ensure that the information shared on these pages are linked to the social media channels for the Darwin Initiative.

The Glover’s Reef Research Station has been integrated into a WCS Belize Program website. WCS is currently in the process of updating the design of the WCS Belize Program website which will enable us to acknowledge donors supporting our various initiatives. This should be completed by July 2017.

14. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2016 – 31 March 2017)

Project spend (indicative) since last annual report	2016/17 Grant (£)	2016/17 Total Darwin Costs (£)	Variance %
Staff costs (see below)			0%
Nicole Auil Gomez			-21%
Alex Tewfik			28%
Ralna Lewis			-8%
Julio Maaz			-67%
Virginia Burns			-19%
Sandra Zelaya			299%
Gianellie Mai			87%

Consultancy costs			0%
Overhead Costs			0%
Travel and subsistence			2%
Operating Costs			0%
Capital items (see below)	-	-	-
Others (see below)			-4%
Office Supplies(Stationeries, Toner, Hospitality Supplies)			71%
Supplies & Materials for Monitoring & Enforcement			-53%
Bank Charges & Fees			-94%
TOTAL			0%

Annex 1: Report of progress and achievements against Logical Framework for Financial Year 2016-2017

Project summary	Measurable Indicators	Progress and Achievements April 2016 - March 2017	Actions required/planned for next period
Output 1			

<p>For GRMR and SWCMR, sustainable fishing regulations are implemented through no-take zones and license-based MA programs that employ total allowable catch (TAC) quotas.</p>	<p>By 2018, fishery-dependent data from GRMR indicates an increase in CPUE to at least 7.5 conch/hour and 1.5 lobsters/hour, compared, compared to a current baseline of 6.5 conch/hour and 1.3 lobsters/hour.</p>	<p>The Managed Access system is fully implemented, nationally. Monitoring of licenses for GRMR and SWCMR continues. Expansion of no-take zones are in progress.</p>	
<p>Activity 1.1</p>	<p>Assist authorities with data collection and analysis for development of TAC for conch and lobster for SWCMR.</p>	<p>The Belize Fisheries Department has yet to commence the collection of catch logs from SWCMR, therefore depletion models are pending. There are no established TACs.</p>	<p>WCS will work at resolving the logbook use and data collection process for SWCMR.</p>
<p>Activity 1.2</p>	<p>Monitor trends in number of MA licenses issued annually at GRMR and SWCMR to understand how licensing criteria impact the number of fishers in each reserve.</p>	<p>135 licenses have been requested and 96 issued to date, for 2017 583 licenses have been issued to date, for 2017; this is a 18.5% decrease from this time in 2016</p>	<p>At the closure of the MA licensing period (expected at the end of April), we will prepare a complete licensing report for evaluation by FD and MA Committees.</p>
<p>Activity 1.3</p>	<p>Assist the Fisheries Department with entering catch data from fishers and monitor total catch per reserve, evaluating against established TACs.</p>	<p>WCS assists with entering logbook data for GRMR. SWCMR fishers have not commenced logbook data entry.</p>	<p>Work with SWCMR managers and FD to improve logbook data entry, for monthly reports</p>

Activity 1.4	Collect independent sample of catch data monthly in both reserves to serve as benchmark for quality control, allowing for the evaluation of the accuracy of fisher logbook data.	Updated assessment for conch and lobster at Glover's Reef show that the lobster catches are fairly sustainable, while conch are probably depleted.	The last season's sampling for SWCMR will be analyzed in Year 3.
Activity 1.5	Conduct regular meetings of the MA Committees and Annual Fisher Forums to ensure that fishers are kept up-to-date on program progress and have an opportunity to discuss their concerns.	There have been 4 meetings of the MAWG over the last year. 2 MAC Meeting for GRMR 2 MAC Meeting for Area 3	Fisher Forum is scheduled for April 2017 at GRMR
Output 2			
Spatial Monitoring and Reporting Tool (SMART) is implemented in order to improve targeted enforcement efforts aimed at reducing illegal, unreported, and unregulated fishing.		By 2018, fishery-independent surveys at GRMR of conch, lobster, selected species of finfish including parrotfish, <i>Diadema</i>, as well as coral cover, show improvement against established baselines:	Belize has begun using SMART Connect, for stations managed under the Fisheries Department, allowing real time information upload to the Fisheries database. The expanded long-term Atoll Monitoring Program (LAMP II) data for GRMR has been assessed (Annex 4.7)
Activity 2.1	Train Fisheries Department and NGO personnel who help co-manage marine reserves in the use of SMART software and procedures, including use of the new applet for tablet use, in order to record and track enforcement effort and illegal activities.	55 persons from NGOs and Fisheries Department have been trained over the last year in SMART.	NGOs not yet using SMART optimal will be targeted for training in Year 3.

Activity 2.2	Collaborate with reserve enforcement staff in developing SMART reports to determine infraction rates.	Reports for GRMR for 2016 have been download and preliminary results produced to inform future patrol focus (Annex 4.5)	Analysis and review of SWCMR SMART patrols will be assessed.
Activity 2.3	Use SMART results to identify types and hotspots of illegal activity in order to design more effective and efficient patrols that reduce distance travel and fuel used.	This has been done for GRMR (see Section 3 above, and Annex 4.5)	Monthly reports will be produced for the FD.
Activity 2.4	Use SMART to map fishing activity throughout the reserves in order to better understand fishing patterns.	This has been done for GRMR (see Section 3 above, and Annex 4.5)	Monthly reports will be produced for the FD.
Activity 2.5	Convene workshop to review implementation of national SMART rollout and conduct training in analysis of data.	One-on-one training has taken place to strengthen the skills of the FD staff in SMART use and data analysis / reporting.	Workshop will be done in Year 3.
Output 3			
Benefits of no-take zones and MA programs on coral reef ecosystems and resource-based livelihoods are better understood, strengthening adaptive management and community support.		By 2018, annual socioeconomic surveys of 135 fisher families around GRMR show a 3% increase in average fishing-related income from £3,234 to £3,534/fisher/year.	WCS data has been analyzed and in review for peer-reviewed publication (Annex 4.6), on the benefits of replenishment zones seen through trends in focal species at GRMR. Socioeconomic data has been collected and preliminarily analyzed for fishers at GRMR.

Activity 3.1	Analyze both logbook and independent sample datasets for conch and lobster, including mean size, population structure, and CPUE, and use results to update TAC models each season.	Logbook catch and CPUE data from GRMR have been used to fit depletion models to estimate whether catches are sustainable (Annex 4.1)	Final publication will be produced in Year 3.
Activity 3.2	Using well-established protocols, monitor and report on a suite of coral reef ecosystem health indicators (including several focusing on critical herbivores like parrotfish).	Data analysis and report preparation for GRMR LAMP II surveys carried out in 2015 was completed in summer 2016 (Annex 4.7). LAMP II was carried out at SWCMR in June 2016. This survey is conducted at each reserve biennially, alternating sites annually. The corresponding reports are produced the following summer.	Results of LAMP II Surveys will be compiled in Year 3. LAMP II for GRMR will be conducted in May & June 2017.
Activity 3.3	Conduct annual socioeconomic surveys of MA licensed fishers in collaboration with the Fisheries Department.	Socioeconomic data was collected during the 2017 licensing period at the Fisheries Department.	Comprehensive report will be prepared in Year 3.
Activity 3.4	Monitor perceptions among fishers of the necessity and effectiveness of enforcement program.	Data not assessed.	Comprehensive report will be prepared in Year 4. Fisher Forum scheduled for April 2017.

Activity 3.5	In collaboration with partners, prepare and disseminate information on results with participating fishers in order to foster dialogue and continued support.	Data produced from Year 1 is shared in varying fora, such as Reef Week and Fisherfolk Month (see above).	An booklet will be produced in Year 3 on sustainable fishing initiatives in Belize, for distribution to fishers and general population.
Output 4			
<p>With the widespread support of fishing communities and the general public, new or expanded no-take zones are established in Belize's network of marine reserves.</p>	<p>By 2018, the WCS-facilitated NRZE Steering Committee has successfully increased the designation of no-take areas from 3% to 7% of the territorial sea of Belize, achieving significant progress towards the national goal of 10% by the end of 2018.</p>	<p>The expansion of no-take or replenishment zones have not been finalized, but is expected to reach the 7% target by the end of this project.</p>	
Activity 4.1	Conduct national survey to evaluate level of understanding and support for no-take areas and their benefits.	<p>The national survey has been conducted for season 2. A draft impact report (Annex 4.8) presents the outcomes of the analyses conducted. Listenership increased from 41% at the midline survey to 53% at post survey. Change in attitudes regarding respecting RZs increased over time from 49% at baseline to 56% at post survey.</p>	<p>The results and recommendations of season 2 Impact Report will feed into the development of season 3.</p>

Activity 4.2	Facilitate regular bi-monthly meetings of the Steering Committee for the National Replenishment Zones Expansion program, and its associated Technical and Communications Sub Committees.	A total of 6 Steering committee meetings were conducted during this period. Given the advance state of the project—that is the development of the expansion maps—the technical committee does not met between the NRZESC meetings.	This will continue.
Activity 4.3	Conduct quarterly meetings of the Reserve Advisory Committees and discuss potential new expanded zones (proposed by WCS and TNC) with stakeholders at these forums.	A total of 3 advisory committee meetings each were held for the GRMR and SWCMR. The expansion for GRMR was presented at the December 2015 advisory committee meeting. The expansion for SWCMR was presented at the December 2016 advisory committee meeting.	These meetings will continue.
Activity 4.4	Develop outreach material in coordination with TNC and the Fisheries Department to inform stakeholders of the biodiversity and fisheries benefits of no-take areas that incorporate results from GRMR analyses.	WCS has developed materials and activities relating to benefits of no-take areas to inform stakeholders at various initiatives such as Fisherfolk month and Reef week.	This will continue.

Annex 2: Project’s full current logframe as presented in the application form (unless changes have been agreed)

	Measure Outcomes - Indicators		Verifying Outcomes		Assumptions		Outputs
Indicator 1	By 2018, fishery-dependent data from GRMR indicates an increase in CPUE to at least 7.5 conch/hour and 1.5 lobsters/hour, compared, compared to a current baseline of 6.5 conch/hour and 1.3 lobsters/hour.	Indicator 1	Reports on number of MA licenses issued, total lobster and conch catches in relation to total TAC, reports on CPUE and total catch and total value.	Assumption 1	The political will to establish additional replenishment zones exists. WCS is actively involved at the community level and the political level, and there is indication that Belizeans support further development and expansion of the activities currently piloted at GRMR and to be developed at SWCMR.	Output 1	For GRMR and SWCMR, sustainable fishing regulations are implemented through no-take zones and license-based MA programs that employ total allowable catch (TAC) quotas.

<p>Indicator 2</p>	<p>By 2018, fishery-independent surveys at GRMR of conch, lobster, selected species of finfish including parrotfish, <i>Diadema</i>, as well as coral cover, show improvement against established baselines: a. Mean conch density of 70 conch/ha against a baseline of 60 conch/ha. b. Mean lobster density of 32 lobster/ha against a baseline of 28 lobster/ha. c. Mean biomass of parrotfish of 12kg/ha against a baseline of 10kg/ha. d. Mean <i>Diadema</i> density of 0.08 urchins/m² against a baseline of 0.06 urchins/m².</p>	<p>Indicator 2</p>	<p>WCS survey reports on densities of conch, lobster, selected species of finfish including parrotfish, <i>Diadema</i>, and percentage cover of coral and algae.</p>	<p>Assumption 2</p>	<p>The Fisheries Department continues to support the rights-based, or MA, program. WCS works in close collaboration with the Fisheries Department, which has supported the development of MA programs and plans to expand this approach as a national strategy for marine resource management.</p>	<p>Output 2</p>	<p>The combination of increased stewardship among fishers and improved enforcement efforts have led to reduced illegal, unreported and unregulated fishing over the life of the project, as documented through the use of the Spatial Monitoring and Reporting Tool (SMART).</p>
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Indicator 3	By 2018, annual socioeconomic surveys of 135 fisher families around GRMR show a 3% increase in average fishing-related income from £3,234 to £3,534/fisher/year.	Indicator 3	Annual socioeconomic survey reports tracking trends in quality of life of fishers.	Assumption 3	The fishers are willing to participate in the MA program and support the no-take expansion. Fishing communities have expressed their desire for programs that reduce overfishing that has caused a decline in key marine species and has led to reduced income.	Output 3	Benefits of no-take zones and MA programs on coral reef ecosystems and resource-based livelihoods are better understood, strengthening adaptive management and community support.
Indicator 4	By 2018, the WCS-facilitated NRZE Steering Committee has successfully increased the designation of no-take areas from 3% to 7% of the territorial sea of Belize, achieving significant progress towards the national goal of 10% by the end of 2018.	Indicator 4	National working group minutes, reports and communiqués.	Assumption 4	The export prices for lobster and conch remain at a stable level. The revenue from these two major fisheries is based to a large extent on exports by the fishing co-operatives, mainly to the US market. These prices will influence how much fisher income will change during the lifetime of the project.	Output 4	With the widespread support of fishing communities and the general public, new or expanded no-take zones are established in Belize's network of marine reserves.

<p>Indicator 5</p>	<p>By the end of the project, the SWCMR MA program will be in year 3 of licensing with 80% of fishers submitting their catch data logbooks.</p>	<p>Indicator 5</p>	<p>Reports on number of MA licenses issued, logbook data.</p>	<p>Assumption 5</p>	<p>There are no natural disasters, such as hurricanes and el Niños, during the project period that will affect the coral reefs and near-shore fisheries. Even in light of a major storm event, WCS is committed to working on managed access and no-take expansion in these geographies and Belize in the short- and long-term.</p>		
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Annex 3: Standard Measures

Table 1 Project Standard Output Measures

Code No.	Description	Gender of people (if relevant)	Nationality of people (if relevant)	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
6A	Spatial Monitoring and Reporting Tool (SMART) Training (Beginners to Advanced)	Male & Female	Belizean	20	55		75	100
11A	Peer reviewed publications	Male & Female		0	3		3	3
12B	Fisher Licensing Database		Belizean	0	2		2	1

Table 2 Publications

Title	Type (e.g. journals, manual, CDs)	Detail (authors, year)	Gender of Lead Author	Nationality of Lead Author	Publishers (name, city)	Available from (e.g. weblink or publisher if not available online)
An indicator-based adaptive management framework and its development for data-limited fisheries in Belize	Journal of Marine Policy	Gavin McDonald Bill Harford Alejandro Arrivillaga Elizabeth A. Babcock Ramon Carcamo James Foley Rod Fujita Todd Gedamke Janet Gibson Kendra Karr Julie Robinson Jono Wilson, 2017	Male	American	Elsevier	Available from lead author (gmcdonald@bren.ucsb.edu)
Management strategy evaluation of a multi-indicator adaptive framework for data-limited fisheries management	Bulletin of Marine Science	Harford, W. J. T. Gedamke E.A. Babcock R. Carcamo G. McDonald J.R. Wilson, 2017	Male	Canadian	University of Miami	Available from lead author (wharford@rsmas.miami.edu)

The existence of queen conch mega-spawner refuges at Glover's Reef Atoll, Belize		Alex Tewfik 2016	Male	Canadian	Gulf and Caribbean Fisheries Institute	Annex 4.3 Available from lead author (atewfik@wcs.org) or GCFI website http://www.gcfi.org/Conferences/69th/Book_of_Abstracts_en/index.html
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Annex 4 Onwards – supplementary material (optional but encouraged as evidence of project achievement)

The support documentation are in the Annex 4 folder attached. Summaries are included in the report above. Documents list include:

- Annex 4.1 Logbook report DRAFT
- Annex 4.2 Fisheries Data Report for GRMR
- Annex 4.3 GCFI publication on queen conch mega-spawner refuges at GRMR
- Annex 4.4 GCFI presentation on queen conch mega-spawners at GRMR
- Annex 4.5 SMART Belize Implementation Booklet DRAFT
- Annex 4.6 MEPS publication - "Benefits of a replenishment zone revealed through trends in focal species at Glover's Atoll, Belize"
- Annex 4.7 LAMP II Report for GRMR
- Annex 4.8 Punta Fuego Impact Report DRAFT
- Annex 4.9 Press release for Millbank Award for Punta Fuego

Checklist for submission

	Check
Is the report less than 10MB? If so, please email to Darwin-Projects@ltsi.co.uk putting the project number in the Subject line.	X
Is your report more than 10MB? If so, please discuss with Darwin-Projects@ltsi.co.uk about the best way to deliver the report, putting the project number in the Subject line.	
Have you included means of verification? You need not submit every project document, but the main outputs and a selection of the others would strengthen the report.	X
Do you have hard copies of material you want to submit with the report? If so, please make this clear in the covering email and ensure all material is marked with the project number.	
Have you involved your partners in preparation of the report and named the main contributors	X
Have you completed the Project Expenditure table fully?	X
Do not include claim forms or other communications with this report.	