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OF AQUATIC RESOURCES AND ECONOMIC ALTERNATIVES

IMPLEMENTATION OF SPECIAL LICENSES AND LIMITED ACCESS AT GLOVERS REEF

FRAMEWORK AND DESIGN FOR MANAGED ACCESS

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PREFACE

The Management of Aquatic Resources and Economic Alternatives (MAREA) program, financed by the United States Agency for International Development (USAID) and implemented by Chemonics International, with the Wildlife Conservation Society as a subcontractor, builds on previous projects in Central America to support and promote marine and coastal conservation through rights-based access and market-driven mechanisms in concert with local partners from both the private and public sectors. The MAREA program will achieve these goals with a focus on four key trans-boundary watershed areas and seven key focal species. The four trans-boundary regions are the Gulf of Honduras, the Moskitia Coast, Cahuita-Gandoca-Bocas del Toro, and the Gulf of Fonseca. The focal species for the MAREA program are divided into species with commercial importance: mangrove cockles, queen conch, grouper, snapper, and spiny lobsters; as well as two groups of endangered species: sharks and sea turtles.

The MAREA program will employ multiple strategies to positively affect its target species within its regional points of focus including the promotion of rights-based legislation and programs, establishment of managed protected areas and no-take reserves, promoting specific protections and management regimes for threatened species and by providing economic alternatives to local communities where resource extraction threatens marine and coastal natural resources.

This document is the result of over one hundred meetings and workshops with fishermen, fishermen cooperatives and associations, University of Belize, research scientists, international fisheries management experts, marine protected areas (MPA) managers, MPA rangers, and government and non-governmental agencies in an effort to implement limited access rights based fisheries in Belize. These meetings have provided the basis for the management and implementation design for managed access at Glovers Reef and Port Honduras Marine Reserves, as well as a national catch shares policy in Belize. We are especially grateful for the valuable guidance and contributions made by the Ministry of Agriculture, Fisheries, and Cooperative, Belize Fisheries Department, Catch Shares Task Force, the Fisheries Advisory Board, and Belize Fisherman's Cooperatives Association.

This document has been compiled and edited by Beverly Wade, Janet Gibson, Celia Mahung, Larry Epstein, Adriel Castaneda, Julio Maaz, Nicanor Requena, and with the contributions of many others from Belize Fisheries Department, Environmental Defense Fund, Toledo Institute for Development and Environment, and Wildlife Conservation Society.

EXECUTIVE SUMMARY

Belize's fisheries are managed as open access fisheries. Any Belizean age 16 or older is eligible for a fishing license and can fish nearly anywhere in Belize's territorial waters. With the exception of conch, none of the species targeted for commercial or recreational fishing are managed through a quota system. Belize uses a number of necessary tools to manage its fisheries including controls on gear and seasonal closure; and Belize has a world-renowned system of marine reserves. As a result Belize's fisheries have not experienced the same catastrophic collapse as many of the fishery stocks it shares with its regional neighbors. Nevertheless because of open access management, Belize's commercial and recreational fisheries are fully-exploited and possibly experiencing a worrying decline. Therefore the Government of Belize in partnership with a range of NGO and fishermen partners has committed to ending open access management, and introducing a system of managed access and catch shares.

Under open access commercial fishermen are driven to race to fish. They catch as much as possible in order to maximize profit in a fishing derby at the opening of lobster and conch seasons. This system encourages illegal fishing because management under open access does not provide fishermen with the individual incentives to be good stewards and sustain the fisheries. Moreover, it is harder and harder for fishermen to make a living because there has been a steady increase of licensed commercial fishermen targeting two fully exploited fish species, conch and lobster. Increasing numbers of fishermen targeting the fisheries translates to unsecure livelihoods for fishermen, including unstable income and a diminishing local, sustainable source of protein.

A successful system of fisheries management would ensure that individual fishermen or tightly organized groups of fishermen benefit from actions to conserve and protect the resources – as the status of the resource improves, so would the livelihoods of fishermen. Managed access and catch shares can accomplish this goal. As a first step to end open access, managed access is a system that will end the unsustainable growth in the number of fishermen by balancing the number of fishermen with the carrying capacity of the resource. It will also control the number of fishermen in Belize's system of marine reserves so that these ecological jewels will have abundant fisheries that will benefit the entire fishermen population. Catch shares will establish a system of quotas for the key commercial species in Belize in order to ensure that the important fishing industry continues to thrive and grow into the future.

Managed access and catch shares has a proven record of restoring fisheries and improving fishermen livelihoods in 35 countries for approximately 800 species. In Belize, as a first step to end open access, managed access will provide traditional fishermen a secure, dedicated access to a fishing area. Managed access will encourage fishermen and local communities to become stewards of the resources, by ensuring that they benefit by conserving the resources. With support from NGOs, MAREA, and other government partners, managed access will also strengthen and improve community-based

management, monitoring, and enforcement of fisheries. Fishermen will be partners in the decision-making process for fisheries.

Building up on previous research done by other MAREA projects, two marine reserves have been selected as initial sites for the implementation of managed access and catch shares - Glover's Reef and Port Honduras Marine Reserves. Implementing managed access in these two marine reserves is an initial step to developing a comprehensive national fisheries management plan for Belize under a managed access and catch shares system. These innovative, progressive management tools will create a climate where fishermen can commit to better management of their fishery, leading to improved resource sustainability, more secure livelihoods, and a robust fisheries industry for Belize. Implementing these policies will also confirm Belize's position as the regional leader in innovative and successful fisheries management.

INTRODUCTION

Managed access will end open access fishing in Belize's marine reserves, and ensure that traditional fishermen who rely on the reserves for their livelihoods are better able to make a living. It is a first, critical step towards fisheries sustainability in Belize. Managed access will reduce fishing capacity, prevent the uncontrolled growth in the number of fishermen, and protect both the important fishing industry and Belize's precious marine reserves. It is a necessary step, but not sufficient to ensure the sustainability of the fisheries. In the year to come, Belize Fisheries Department and its partners will work with the fishermen, scientists, technical experts and other stakeholders to design a comprehensive catch shares governance system, possibly including an individual quota system for lobster.

According to the Belize Fisheries Department and independent research from international scientists and Belizean NGOs, there are several indicators that Belize's fisheries are mature or overexploited:

- The number of licensed fishermen increased from 1,731 in 2004 to 2,267 in 2008, representing a cumulative increase of 30% and an increase of more than 7% in comparison to 2007 when 2,110 fishermen were licensed to fish.
- The number of boats also increased from 621 to 643 during the same period showing an overall increase of over 8%.
- Despite the increase in fishing effort however, catches increased by only 2.42% when compared to 2007.
- Lobster landings declined 24% from 277 tons in 1999 to 211 tons in 2009

A form of managed access is already in use at Gladden Spit Marine Reserve as a means of ensuring that traditional fishermen are able to fish for Nassau Groupers and Mutton Snapper. Managed access scaled to entire marine reserves will guarantee that traditional commercial fishermen with a history of relying on the reserve area for their livelihoods benefit from marine reserves. Access for commercial fishing in the marine reserves will be determined using specific criteria that have been developed in broad consultation with fishermen and other stakeholders; and with the assistance of community managed access committees. Managed access confers both a "right" to fishing in marine reserves, but also requires significant responsibility for fishermen with a managed access license.

The Fisheries Department and its partners have developed this framework and initial design for managed access at Glover's Reef Marine Reserve and Port Honduras Marine Reserve. However the policy will be applied to the entire network of marine reserves. These reserves were selected for the initial project after months of consultation and analysis among government, NGOs and stakeholders. The framework and design for managed access are the result of an extensive and methodical series of community workshops with fishermen, cooperatives, BFCA and other stakeholders.¹ The decision by

¹ The full results of this consultation process are presented in the document, "Managed Access for Glovers Reef & Port Honduras Marine Reserves: Summary of Community Meetings and Workshops" (May 2010).

fishermen to support the implementation of managed access licenses is based on their reliance on the fishery for livelihoods, the changes they have seen, and the anticipated benefits including long-term fisheries sustainability, increased security of livelihoods, improved enforcement, and reduced illegal fishing. Consultation with fishermen must and shall continue throughout the design, implementation, and operations of managed access.

Belize Fisheries Department and its partners are also considering how catch shares can be integrated into fisheries policy and management on a national scale. Through a careful and comprehensive evaluation process, fishery managers, fishermen, experts, and stakeholders will be able to use lessons learned from the initial projects to implement a national vision for catch shares in Belize.

This document presents a framework and preliminary design for managed access of marine reserves in Belize. The Belize Fisheries Department is the government agency with the mandate to manage the aquatic resources of Belize.² The Department uses traditional management tools such as closed seasons, size limits and gear restrictions, as well as the establishment of a network of marine reserves with an ecosystems-based approach to fisheries management. Along with a network of NGO and stakeholder partners, the Fisheries Department is now embarking on the implementation of a fisheries management tool called catch shares to strengthen sustainable management of Belize's fisheries. Belize is implementing managed access for Belize's marine reserve system as a precursor to catch shares.

² The legal framework through which the Department manages these resources is the Fisheries Act Chapter 210 of the Laws of Belize Revised Edition 2003 and its enabling regulations.

CONSULTATION PROCESS

In an effort to obtain as much feedback and suggestions from the stakeholders as possible, the project partners have been holding a series of consultations. The process was highly participatory, lengthy and exhaustive; it is felt that the design will be guided by well thought-out ideas coming from a broad audience and comprehensive discussions ranging from a general introduction to catch shares, to in-depth discussions on the design of managed access.

From the various consultations, consensus was achieved that key commercial fisheries are fully exploited or in decline, and that the current recession is making the situation even more strenuous for fishermen. Fishermen agreed that there are too many fishermen on the fishing grounds. It was agreed that new management measures need to be taken to protect the industry – fishermen said that their participation in monitoring and enforcement, plus alternative livelihoods, could go a long way in improving management.

The Belize Fisheries Department and its partners met with representatives of the Executive Boards from National and Northern Fisherman Cooperatives, and representatives of the Belize Fisherman's Cooperative Association (BFCA). Through these consultations we learned that the cooperatives agree that something must be done to stop the uncontrolled growth in the number of fishermen, and reforms aimed at strengthening the fishing industry are essential. They therefore have an open mind to managed access and catch shares, but want to be an integral part of the design process and continuously consulted. Belize Fisheries Department and its partners have made such a commitment to the cooperatives.

The consultation processes for Port Honduras and Glover's Reef have been extensive efforts aimed at introducing the concept of catch shares and providing an overview of managed access to fishermen and other stakeholders. Based on a series of one-on-one meetings, coupled with many small group sessions and general workshops, there is strong support for the implementation of managed access and the further development of an adaptive form of catch shares for the fisheries in the areas. Fishermen for the most part are of the impression that managed access and catch shares can help create tangible solutions to most of the issues they are currently facing, from lack of proper enforcement to improved livelihoods.

A significant number of fishermen see the issues of illegal fishing and overfishing as the two most important threats to their livelihoods. They recognize that there is lack of organization and poor collaboration among fishermen, and this in their opinion has been one of the main factors that both directly and indirectly continue to affect the declining fisheries resources. As a managed access and catch share policy is implemented, it is a priority to ensure the design encourages capacity-building and institutional strengthening for community-based fishermen associations.

JUSTIFICATION FOR MANAGED ACCESS

Fishing is critically important to the Belizean economy and lobster is the most important component of the capture fishery sector.

- In 2008, the capture fisheries sector contributed US\$10.25 million to the national economy. Lobster constituted 67% of that.
- The sector is socially and economically important to Belize. In 2008, the capture fisheries sector provided employment for 2267 registered fishermen. In addition to these direct jobs it is estimated that some 15,000 citizens are indirectly employed by the fisheries sector, including the processing staff at the fishing cooperatives.

Under traditional open access fisheries management, fishermen are driven to take as much as possible in order to maximize profit, while on the other hand managers focus on sustainability by controlling fishing effort. This open access structure presents a threat to the long term survival of the fishing industry. Open access systems compound the problem of fisheries management since it induces a race-to-fish mentality, leading to overexploitation of fisheries, economic collapse of the fishery sector, and unstable livelihoods for fisheries. Catch shares are used in approximately 35 countries for over 800 species in over 200 catch shares programs. There is now a proven record that when designed properly catch shares can prevent fisheries collapse, restore depleted fisheries, provide more secure livelihoods for fishermen, and improve collaboration between fishery managers and fishermen.

Catch shares³ is a fishery management system that uses market-based incentives to align fishermen economic interests with conservation outcomes. Typically, catch shares divides up and allocates quota percentages of a total allowable catch, or fishing areas, to individual fishermen or fishing groups. The most common forms of catch shares include individual transferable quota (ITQ) and spatial property rights, also called territorial user right fisheries (TURFs). A key part of catch shares is managing access to the fishery. Managing access provides fishermen with a secure, dedicated fishing area or quota. If properly implemented, managed access will create a climate where fishermen can commit to better management and responsibility for their fishery and cooperation with managers because they can expect to reap the benefits of their stewardship.

Belize has achieved notable successes and innovations in the management of its marine resources, including a robust system of marine reserves, and protection for spawning aggregation sites and certain fish species. However, the status quo for fisheries management is unsustainable. According to the Belize Fisheries Department, the number of fishermen in Belize increased over 20% from 2000 to 2010, with continued pressure from international fleets. The result – too many fishermen are chasing too few fish in fisheries that are fully exploited or possibly in decline.

³ When properly designed, catch shares have a track record of success around the world (please see <http://www.edf.org/page.cfm?tagID=79> for more information about catch shares).

Figure one demonstrates that the number of fishermen has increased over 20% while the revenue of the fishing industry has declined by approximate 30%. On average, each fisherman is making less money.

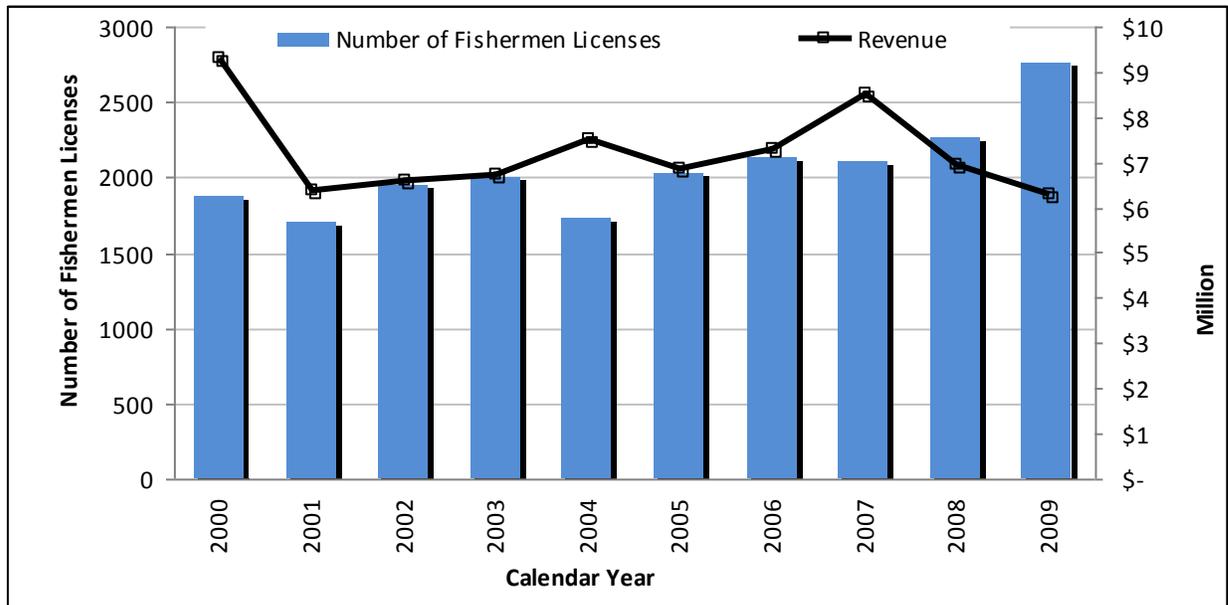


Figure 1: Number of fishermen and revenue reported by fishermen cooperatives, 2000-2009 (Source: Belize Fisheries Department)

MANAGED ACCESS FRAMEWORK

The framework described below outlines the preliminary design of a managed access policy for the entire network of marine reserves in Belize, including the rules and regulations for managed access, granting of licenses, implementation of managed access systems, and governance of a managed access system. This framework is tailored to the social, economic, ecological and biological conditions in Belize.

Characteristics of the Managed Access License

- Managed access refers to a license that authorizes fishing in the general use zones of marine reserves.
- Managed access will cover commercial fishermen; however at the same time Fisheries Department would implement a license and bag limit regime for recreational fishermen as currently authorized by the law governing marine reserves.
- After the initial granting of the license, the assumption would be that fishermen have the license for life if they comply with rules and regulations, and pay the annual license fee. There would be a required annual renewal of the license. Licenses can be revoked in the event of gross violations. Violations and penalties will be specifically defined by Belize Fisheries Department.
- Once the program is fully implemented, including a transition time, fishermen will not be able to hold both a managed access license and a license to fish outside the marine reserves. However a fisherman could hold multiple managed access licenses for multiple reserves. This is consistent with the fact that fishermen tend to use several areas.
- Fishermen will have a central role in the management and responsibility for fisheries through community managed access committees. Fishermen would have the authority and flexibility to coordinate amongst themselves, and work with managers to recommend management measures; this would empower fishermen to make desired voluntary efforts in sustainable fisheries management.

Initial Granting of Managed Access Licenses

Communities, the Fisheries Department and local partners are developing community managed access committees that will initially evaluate applications for managed access licenses for area and make recommendations to Fisheries Department. The specific criteria for managed access licenses that define traditional fishermen, and the terms of reference and operations for the Community Managed Access Committees are contained in Appendix A.

Community Managed Access Committees will operate under agreements with Fisheries Department, and potentially under legal agreements in the future.

Community Managed Access Committees and Fisheries Department will have the opportunity to do a background check on fishermen to verify important information such as residency, and history of landing catch in Belize.

Fisheries Administrator will have ultimate authority to determine granting of licenses, including considering any appeals from fishermen on whether they meet the criteria. As per existing regulations, Fisheries Administrator will consider appeals and respond within a maximum of 14 days.

Past infractions should not be considered in the initial granting of licenses. The Fisheries Department does not presently have a complete history of infractions. It would thus be unfair.

A traditional commercial fisherman is someone that has fished a minimum of six times each year for the three-year period. Fisherman must be a Belizean with proof of residency in Belize over that three-year period. Community Managed Access Committees will have the authority to conduct verification of criteria, and that fishermen have history of landing their catch in Belize.

Recreational fishermen must also be incorporated into a license regime; otherwise it would not be fair. Recreational fishing would refer to any non-commercial fishing that results in fishing mortality, and would include resort owners. There should be a per day license, including a fee, and per day bag limit for recreational fishermen based on carrying capacity for the reserves. The recreational fishing license fee would be an additional stream of revenue for government that could be reinvested in management of catch shares.

Implementation

There should be a transition period of two years to help fishermen and managers adjust, and allow some recovery of lobster stocks.

During the transition period, the managed access license should be free, but after that a fee will be charged as authorized by law. Fishermen are willing to pay the fee if they feel it is being reinvested in the marine reserves.

If the resource can sustain it, new fishermen should be allowed to replace a fisherman who has ceased fishing. The first option should be given to an offspring. If there are no offspring or the offspring choose not to fish, the Fisheries Department could then decide whether to reserve the license to reduce pressure on the resource, or redistribute the license. Decisions should be based on science and management priorities.

Partners will work with fishers to identify alternative or complementary activities that could assist some of the fishers to depend less on the fishery resource in case of bad weather or to assist voluntary displaced fishers

Governance – Monitoring and Enforcement

- Good data are essential. Fisheries Department, fishermen, and other partners will develop strong monitoring of catch and biomass to have a good understanding of status of resource. Data collected can be used to help fishermen improve their business by understanding their costs and income. Reporting is a requirement of the managed access license.
- If fishermen do not provide required data, they may lose their eligibility for license renewal. A full public awareness and education campaign is required to ensure that fishermen understand that providing data is required and a condition for renewing managed access license.
- As a condition of the license fishermen will be required to stop at dedicated monitoring sites to provide managers catch data log books. Managers will have the authorization to conduct audits of catch based on their discretion. A robust monitoring system will ensure fisheries gets the right data, and will be used to demonstrate to fishermen and cooperatives the benefits of such proper data collection.
- Fisheries Department will keep records of all fishing infractions/violations, including documenting warnings. Fisheries Administrator can revoke the license if conditions of the license are not adhered to within the managed access system. Violations of fisheries regulations shall be dealt with in accordance with the national fisheries enforcement policy guidelines.⁴
- An effective and strong sanctions regime will work. Violations of fisheries regulations shall be dealt with in accordance with fisheries enforcement guidelines. Fishermen who follow the regulations will appreciate and support enforcement of managed access because they will directly benefit from improvements in the management of marine reserves. Sanctions can be scaled to the number and/or severity of infractions. Fisheries Department will have discretion based on severity and frequency of infractions.
- Fishermen with a managed access license will be required to provide receipts of sales for all products.

Education and Public Outreach

This consultation process will continue throughout the entire implementation and operations of the managed access and catch shares systems. Following approval of managed access for marine reserves, the Fisheries Department and its partners will consult with fishermen, cooperatives, and other stakeholders on finalizing the specifics of the policy – the design for managed access. The policy shall be introduced to

⁴ Section 14 and 15 of the Fisheries Regulations, Chapter 210s of the Laws of Belize

communities and fishermen through an intensive public education and awareness campaign. Changes and developments in policy related to managed access, including the introduction of quotas for lobster, shall move forward only with consultations, education, and outreach to the fishermen and other stakeholders. These efforts will be combined with an education campaign on managed access and catch shares for the general public using the media in Belize, in particular radio.

Community Managed Access Committees, fisherman associations, and fisherman cooperatives will be part of a capacity building process so that they are able to fully participate in managed access in marine reserves, and eventually catch shares. This includes comprehensive, well-resourced efforts to:

- Develop and strengthen the operations, leadership, and institutional capacity of the Community Managed Access Committees so they are able to participate in the granting of managed access licenses and represent the interests of fishermen in policy decision.
- Work with fisherman associations on organizational and financial management; and in particular continue to support their alternate livelihood projects.
- Create higher-value markets for sustainable Belizean seafood in collaboration with fisherman cooperatives

Adaptive Management

Performance of the managed access and catch shares programs will be assessed after five years with respect to program goals, including the reduction of fishing capacity and overcrowding, improvement of stock status, reduction in illegal fishing, etc. If goals are not being met, revisions to regulations will be considered.

MANAGED ACCESS DESIGN

This section of the document is an initial design for licensing, monitoring, enforcement, and data management for managed access at Port Honduras and Glover's Reef.

Wherever possible the goal is to design systems and procedures applicable not only to these two sites, but the entire network of marine reserves in Belize.

Port Honduras Marine Reserve (PHMR)

Port Honduras Marine Reserve (PHMR), established in 2000, lies off the coast of Southern Belize covering an area of 414 Km². The reserve incorporates extensive coastline, 138 mangrove cayes, submerged banks, seagrass beds, patch reefs and several fringing reefs. There are three major rivers that directly flow in the reserve seasonally changing water conditions. These ecosystems are of critical importance to the local communities of Monkey River, Punta Negra, the Cayes and Punta Gorda and to Belize as a country. Fishers from these communities depend on the marine reserve for extraction of conch, lobster, finfish species and most recently sea cucumber species as a source of local protein and for family revenue. There are growing numbers of fishermen who have transitioned into recreational fishing activities (for example as guides for fly fishing) that use areas within the reserve as prime destination for the tourism sector. There are three zones established within PHMR for the regulation and control of the reserve. These include a general use zone which allow opportunities for established uses and activities such as fishing for conch, lobster and finfish under a monitoring scheme, a Conservation zone which is an area free from commercial fishing activity providing an undisturbed area for recruitment of species and helps enhance the value of the area for recreational activities, and a preservation zone which provides areas within the reserve that are preserved in an its natural state. Only 5% of the marine reserve is no-take.

Glover's Reef Marine Reserve (GRMR)

Glover's Reef is Belize's most southern offshore atoll measuring 32 Km long and 12 Km wide covering an area of approximately 260 Km². Dahl *et al.* (1974) describe the atoll as "the prototypic atoll of the Caribbean, which is not only the best developed biologically, but also possesses the greatest diversity of reef types." It was officially designated a Marine Reserve in 1993. The atoll is divided into four zones. The General Use Zone allows for extractive activities. These include commercial fishing within the context of Belize Fisheries Regulations, however, no traps, long line, or nets are permitted. The Conservation Zone encompasses all cayes of the atoll. This area is designated as a non-extractive activity zone, with the intention to protect a representative sample of the atoll's habitats, to provide an area for recreational activities, and to provide a relatively undisturbed area for applied research. The Wilderness Zone is located off the southern tip of Middle Caye and only scientific activity is permitted. The Special Protected Zone is a bank located at the northeastern point of the atoll where the spawning aggregation site for Nassau grouper is monitored. The bank is closed all year to fishing.

GRANTING OF LICENSES

A managed access refers ending open access fishing in marine reserves. The objective is to limit access in marine reserves for fishermen with a documented history of fishing in these areas. The benefits of a managed access policy is that by limiting access it will reduce pressure on the resource, helping the fisheries to recover, and improving the stability of fishermen livelihoods. Implementing a quota system for lobster in marine reserves and nationally will be a necessary step to further ensure that the commercial lobster fishing industry in Belize is able to survive and thrive. Fishermen who fall under the managed access system must meet certain criteria that indicate they are legal Belizean fishermen, have a history of fishing and relying on the area, and land their product in Belize.

- A traditional commercial fisherman is someone that has fished a minimum of six times each year for the three-year period.
- Fisherman must be a Belizean with proof of residency in Belize over that three-year period

Fishermen will be a central part of the process to determine which fishermen meet those criteria. Community Managed Access Committees shall be established for each marine reserve under managed access, with a majority of the committees consisting of fishermen. They will operate under agreement with the Belize Fisheries Department and evaluate applicants for managed access to make recommendations to the Fisheries Administrator. Fisheries Administrator will have ultimate authority to determine granting of licenses, including considering any appeals from fishermen on whether they meet the criteria. Fisheries Administrator will consider appeals and respond within a maximum of 14 days as per existing regulations.

In addition the committees will be consulted in the development of management policy for the marine reserves and play a role in monitoring and evaluation. Community managed access committees and Fisheries Department will have the opportunity to do a background check on fishermen to verify important information such as residency. Past infractions shall not be considered in the initial granting of licenses because the Fisheries Department does not presently have a complete history of infractions. The specific criteria for managed access licenses that define traditional fishermen, and the terms of reference and operations for the community managed access committees are contained in Appendix A and B respectively.

After the initial granting of the license, the assumption would be that fishermen have the license for life if they comply with rules and regulations, and pay the annual license fee. There would be a required annual renewal of the license. Licenses can be revoked in the event of gross violations. Violations and penalties will be specifically defined by Belize Fisheries Department. If the resource can sustain it, new fishermen should be allowed to replace a fisherman who has ceased fishing. The first option should be given to an offspring. If there are no offspring or the offspring choose not to fish, the Fisheries Department could then decide whether to reserve the license to reduce pressure on the

resource, or redistribute the license. Decisions should be based on science and management priorities.

There will be a two-year transition time during which fishermen who are under the managed access system can still fish outside the designated marine reserve. The transition time will allow fishermen to adjust and better understand the system, and build in some time for the resource to recover in the managed access areas. It will also provide time for the Fisheries Department to collect and evaluate data necessary for determining catch limits and quota for lobster. During the transition period licenses will be free. After the transition time, fishermen will not be able to hold both a managed access license and a license to fish outside the marine reserves. Managed access licenses will have a fee to be determined by the Fisheries Department after the transition period. A fisherman could hold multiple managed access licenses for multiple reserves. This is consistent with the fact that some fishermen tend to traditionally use several areas.

Licenses should be designed to be tamper-proof. Using a PVC protective cover is recommended to replace the existing lamination system. A comprehensive revamping of current infrastructure and software is necessary to ensure transparency and accountability of the process.

Managed access will cover commercial fishermen; however at the same time Fisheries Department would implement a license and bag limit regime for recreational fishermen as currently authorized by the law governing marine reserves. Recreational fishing would refer to any non-commercial fishing that result in fishing mortality, and would include resort owners and subsistence fishermen. There should be a per day license, including a fee, and per day bag limit for recreational fishermen based on carrying capacity for the reserves. The recreational fishing license fee would be an additional stream of revenue for government that could be reinvested in management of catch shares.

Criteria and process for granting of managed access licenses are described in detail in Appendix B.

MONITORING AND DATA

Monitoring is one of the key components of the managed access systems. The data collected will help manage the TURFs, evaluate the success of the managed access mechanisms, and make necessary adjustments. Data collected through managed access and catch shares programs will help fishermen understand the state of the resource, plan their fishing season, and improve their businesses. Monitoring and data collection should also provide the necessary information for the implementation of TAC and quota systems to manage specific fishery stocks.

Existing Monitoring

National Fisheries Monitoring Programs

Belize uses surveys focused primarily on the main commercial species – lobster, conch and finfish. On a national scale, managers conduct a lobster survey using the Field Protocol for Monitoring Coral Reef Fisheries Resources in Belize (ed. 2003). While carrying out this survey different parameters are collected: average temperature, average conductivity, average salinity, average visibility and the depths at the different sites. The time that the survey is carried out is usually between 9:30am to around 5:30pm. The survey is carried out by snorkeling in cross patterns across the whole reef structure and all rock crevices are searched for lobsters (*Panulirus argus*). Each patch reef takes approximately one hour to search depending on the number of individuals assisting in the survey.

Lobsters found are sexed and checked for the presence of egg masses preferably without capturing the animal. The size length is also measured by placing a marked tickle stick over the dorsal surface of the carapace and estimated to the nearest mm. The sex is determined by checking for the presence of a third pair of walking leg that is much longer than all other legs in adult males, while the adult female lobsters have swimmerets with frilly tips under the ventral side of the abdomen. An additional method to determine sex is to check for the pincers on the last leg of a female lobster regardless of maturity. This method is recommended by some stock assessment experts, including in the Fisheries Department, but is not currently used. In addition to monitoring for lobsters, a thorough observation for Nassau grouper, black grouper, hog fish, and mutton snapper species is recorded to keep track of their status on the patch reefs classified as lobster sites.

Fisheries-dependent catch monitoring occurs mostly at the fishing cooperatives where lobster and conch are landed. The Belize Fisheries Department and marine reserve co-managers also have programs to monitor catch at marine reserves.

Glover's Reef

The Fisheries Catch Data Collection Program is a fishery-dependent monitoring program designed to determine trends in landings and fishing pressure at Glover's Reef Atoll. The data are used to provide baseline Catch per Unit Effort (CPUE) data in order to determine

if there are any positive benefits (e.g. spillover effects) of the marine reserve's 'no take' zones on fisheries production.

At Glover's Reef, the main fishery independent data collection program is the long term monitoring program (LAMP). LAMP is used only at Glover's Reef Marine Reserve, though TIDE is now initiating a similar comprehensive fisheries independent evaluation program. The protocol used in the LAMP survey involves two different methods: a) a line transect on seagrass and sand flats areas to record the number of conch found within a two meter range span on either side of the line transect; b) searching around the patch reefs and recording data of specific marine species such as conch, lobsters, and some commercial fish species as well. For all lobster data collected a tickle stick is used to get a more accurate measurement of their carapace length. As for finfish, an estimate of their sizes is noted in centimeters. For conch, shell length, shell width and lip thickness are collected. Special care should be taken to observe the presence of eggs.

For the survey at Glover's Reef a total of 33 sites were surveyed, fourteen in the conservation zone and nineteen in the general use zone. Sampling sites have recently been increased to fifty – with 36 sites in the general use zone including sites much further away from the boundary of the conservation zone. This produces a much more representative assessment of the atoll.

Fishery-dependent monitoring involves sampling the catch from fishers and aims to determine the amount of fish harvested, size, and species composition of fish products harvested etc. in the General Use Zone. The program was developed based on information gathered from a Glover's Reef Marine Reserve boat census in 2004 which looked at fishing patterns, gear use, landing patterns, number of boats and fishers utilizing the GRMR. The majority of fishers originate from Sarteneja, Dangriga, Hopkins with a small number of fishers from Belize City. The sampling program is divided into two sections: (1) Skiffs operated by fishers from Hopkins and Dangriga; and (2) Sailboats operated mainly by fishers from Sarteneja. Data collection from Hopkins and Dangriga fishers is based on landings data gathered in Hopkins and Dangriga. Data are collected at sea from the Sarteneja fishers.

Port Honduras Marine Reserve

PHMR catch landings survey are conducted once a week at Monkey River, Punta Gorda local fish market, and Rio Grande Fishermen Cooperative facility in Punta Gorda. This is complemented by catch landings gathered via surveys of foreign vessels within PHMR on four consecutive days each month. These surveys are conducted on the boats in an effort to obtain an estimate of the amount of catch being extracted from PHMR by Guatemalan and Honduran fishermen. In addition, TIDE is initiating a fisheries independent survey for lobster, conch, and key finfish species in Port Honduras Marine Reserve.

PHMR is introducing a fisheries-independent survey similar to the LAMP program in use at Glover's Reef.

Design Options and Recommendations for Monitoring

Data and monitoring is one of the key components of the managed access systems since the data collected will help to evaluate the success of the managed access mechanisms, make necessary adjustments, and gather the required information to establish TACs and quotas. Managing TURFs and quotas will require a much more robust fishery monitoring program than currently exists. The goal should be to determine total fishing mortality, including commercial, recreational and subsistence fishing. Fishery-dependent and fishery-independent data sets are both important for assessments and management decisions. Fisheries Department personnel and co-managers should be extensively trained in monitoring and data collection for managed access.

Fishery Dependent Data Collection: Log Books and Dedicated Monitoring Sites

For the collection of fishery-dependent data, log books or trip records, combined with audits from managers, are the most viable and manageable option for Belize. All fishermen would be required to keep their own records as a condition of the managed access license. Fishermen would be required to submit their log books to Fisheries officers or co-managers at monitoring sites before leaving the managed access areas or upon landing their catch at dedicated monitoring sites. Data from landing records and onboard observers are generally considered more reliable than log books in terms of estimating landed total weight and numbers. Nevertheless, the log books can be incredibly valuable for determining total catch, spatial distribution, and amount of effort in the fishery.

Fishermen shall be provided the necessary materials and training to fulfill these monitoring responsibilities including communications equipment, log books, writing tools, and measurement tool.

In PHMR dedicated monitoring sites will be established in Monkey River Village near the river side dock, at TIDE's ranger station (Abalone Caye), and at the Punta Gorda Town fish market. There is also consideration for designating the Rio Grande Fishermen Cooperative and the PG Fishing Company processing facilities as monitoring sites. At Glovers Reef Marine Reserve a dedicated monitoring site will be Middle Caye WCS/Fisheries Department dock facility. At all monitoring sites fishermen will provide log books reflecting catch, and Fisheries or co-manager personnel will verify the data. A robust monitoring system will ensure Fisheries Department gets comprehensive data that will be used to demonstrate to fishermen, cooperatives, managers and policy makers the benefits of such proper data collection.

Recommended Fishery Dependent Data

Fishery-dependent data are derived from the fishing process itself and are collected through such avenues as self-reporting, onboard observers, portside surveys or vessel-monitoring systems. Estimates of catch typically make up the bulk of the data that is applied to a stock assessment model. But most stock assessment models also require

some kind of index of abundance. The index of abundance is a value that indicates the trend in relative abundance over time.

The majority of indices of abundance used in stock assessments are derived from estimates of catch-per-unit effort (CPUE), the number or biomass of fish caught as a function of effort. CPUE estimates may come from either fishery-dependent or fishery-independent data. Caution should be taken when using fishery dependent CPUE estimates because fishermen will actively seek out areas with greater fish concentrations. As a result the CPUE could remain stable in the face of a declining stock. Fishery independent CPUE could compliment these efforts.

Data collection originating with fishermen logbooks shall include:

- Total catch and fishing areas from logbooks for estimating total fishing mortality
- Fishing effort from logbooks for estimating CPUE

Data collection to be conducted by managers, co-managers, cooperatives and other researchers shall include:

- Morphometric measurements from random sample audits of catch. A minimum of 10% of catch is required; the optimum is 30% of catch subjected to a random sampling audit.
- Landings and ex-vessel prices from surveys for economic yield calculations
- Spawner abundance, recruit abundance, plus physical factors (temperature, nutrients, salinity, etc.) from fishery independent surveys for stock assessments
- Size data from logbooks and landings surveys for stock assessments
- All undersize data obtained through seizure of illegal product shall be incorporated into the data set

One of the key components of any fishery is the status of the stock. This is determined by evaluations known as stock assessments. It is also recommended that a bio/socio-economic survey and analysis be carried out at least once every year to determine whether the fishermen are receiving the social and economic benefits that are expected with the managed access program and whether it is biologically functional and sustainable.

Fishery-Independent Data

Measuring fishery independent and dependent density or CPUE inside and outside no-take zones on comparable habitat may provide a rapid and cheap way of assessing the stock. The ratio of density outside versus inside the no take zone (NTZ) can be compared to a target density ratio, and the total allowable catches (TAC) can be adjusted depending on whether the ratio is above or below the target. This method is especially suited to situations where there is a paucity of catch history (short time series, or unreliable catch data in the past). In general, it is recommended to develop assessment methods and desired reference points first (e.g., maximum economic yield) and then develop monitoring programs to assess performance relative to fishery goals/objectives.

NTZ-based assessment for setting MPA-specific is recommended for lower data fisheries. Using this method it will be possible to get a TAC estimate the first year and then improve it over time as data become available, supplemented by larger-scale MSY or MEY-based assessment. NTZ-based assessment has been simulation-tested on nearshore rockfish that respond well to NTZ management (i.e., their density increases inside NTZs relative to fishing grounds). Because lobster also increase in density within NTZ's, they may be a good candidate for NTZ-based managed, provided that the NTZ is well enforced and has been in place long enough to accumulate large abundance of lobsters, and the data are collected far enough from the management zone boundary to avoid spillover effects.

The NTZ-based assessment seems especially appropriate in this case because there seems to be no other way to estimate unfished biomass levels (no historical catch or abundance data), or spawner-recruit relationship (no data on number of spawners vs. number of recruits). Another benefit would be acquiring information on NTZ performance as a bonus. Moreover, the data necessary for creating a density ratio is available through the LAMP program that will be continuously operated at Glover's Reef, and should be extended to other marine reserves.

For NTZ-based assessment⁵ the following data would be required:

- Number of lobster/unit area inside and outside the NTZ, in similar habitats (to control for habitat effects). Can be estimated with random dive transects and calibrated with fishery-independent CPUE surveys inside and outside
- Calibration study to compare fishery-independent and fishery-dependent CPUE trends and results (to correct for targeting)
- Size trend data (applied later to refine the initial TAC estimate; longer CPUE time series are also used to refine the TAC later)
- Assessments should also be made comparing abundance inside and outside of the marine reserves where applicable for habitat and depth

For a TAC and quota system for the entire lobster stock, including MSY or MEY benchmarks, managers in Belize would need:

- Long time series (more than 10 years) of catch and CPUE data
- Spawner abundance and recruitment time series
- Total abundance fishery-independent estimate (synoptic fishing surveys, dive surveys, or mark-recapture surveys)

Longer term, researchers should look at environmental and habitat controls on lobster abundance and productivity and use that information for assessment

⁵Beth Babcock at University of Miami [ebabcock@rsmas.miami.edu] and Jono Wilson at the Bren School [jonowilson@bren.ucsb.edu] are experts in the NTZ decision tree approach.

Data Collection

It is of vital importance that all personnel doing the data collection follow the same procedures. A standard protocol will be necessary. All the equipment used must provide the same unit of measurement. Moreover, it is important that the personnel be well aware of the importance of accurate data collection and of the value of the results. WCS, with the support of MAREA, and TIDE host many researchers at their ranger stations. Research should be complementary to ongoing research and not be isolated and sporadic.

Major constraints of these additional data requirements for the managed access program involve the need for:

- Additional personnel
- Vessels and engines
- Gear and equipment (calipers, measuring tape, etc.)
- Training (data collection, safety, navigation, data analysis, diving)
- Fuel
- Medical supplies

Fishermen will be trained and provided with all equipment required to comply with data and monitoring requirements including communications and measurement equipment (scales, rulers) necessary for them to fully participate in the data collection for the managed access areas.

COMPLIANCE, ENFORCEMENT, AND SURVEILLANCE

The benefit of a well-designed managed access and catch share system is that participants should have the incentives to comply with regulations, as they will personally or collectively benefit. Managers should be able to focus their efforts of enforcing illegal fishing from non-license holders and illegal transboundary fishermen. Enforcement could therefore be focused on protecting the boundaries of the marine reserves.

The implementation of managed access will require the restructuring of current enforcement efforts at marine reserves including strengthening existing programs and introducing new protocols. Strengthening enforcement was a key issue raised by stakeholders in various consultations over 18 months; as such it is a priority issue that needs addressing.

Education of fishermen should be the first-step for successful enforcement, in particular, so they understand their rights and responsibilities. Officers and co-managers should be trained to educate people about the new regulations and hand out materials at sea, a program that was quite successful in early days of the Florida Keys National Marine Sanctuary. Based on recommendations from fishermen, one component of training for Fisheries Department staff and co-managers should be in public engagement techniques. Education will be especially useful during the transition period so that robust enforcement can begin once the transition period is over.

Current Equipment and Infrastructure

At GRMR the enforcement and surveillance efforts are executed by a four member team based at Middle Caye. The reserve currently has a manager, a biologist and two rangers, but all the staff is involved in enforcement. Their housing facility is a small wooden structure in dire need of repairs and can only accommodate the current staff. The staff has the use of a lookout tower which gives them a good view of the areas around them especially the conservation zone. They are equipped with one binocular, one GPS, radar, night-vision goggles, digital camera, and spotlight and one 23-foot patrol vessels with a 40 hp two-stroke engine and a 25-foot vessel with two 60 hp engines. In addition they have a set of tools for minor repairs to their vessels and are equipped with a set of rulers, tapes and scales used to verify weight and size of product inspected. GRMR has no working radios but are in the process of acquiring a set. They currently use a fixed cellular phone. The reserve staff has 2 firearms (9mm pistols) that are used for patrols.

PHMR is currently operating with a staff of five, which includes a manager, and four rangers. The ranger station is located at Abalone Caye, which is being rapidly eroded. TIDE and Fisheries management has not made a decision on how to manage this situation. They currently are operating with two vessels: one 23-foot vessel with an HP four-stroke engines, and a 25-foot vessel with an HP four-stroke engine. They have one GPS, and tools for verifying weight and size of product. The staff has two 12-gauge shot guns used during patrols. There are two lookout towers used for surveillance. There is radio communication between the rangers and the main office in PG.

Equipment and Protocols Needed for Managed Access

Vessel Identification and Licensing

In order to facilitate the identification of the vessels authorized within the managed access areas, skiffs should be required to be registered with the Marine Reserve and photographed. A record of all vessels used in the area should be kept. It should be noted that the managed access program is not targeted toward specific vessels and that one owner can utilize more than one vessel in a managed access area. All fishing vessels captains authorized to fish within a managed access area should be given a digital radio which will assist in tracking the specific location of the fishing vessel.

Demarcations of the Managed Access Areas

There will be the need to increase the current demarcation of the Marine Reserves when the managed access regime is implemented. This will help to better identify the managed access areas by any fishers. In addition some signage informing the users of the regulation of the managed access area is important to have at key areas such as the fishing cooperatives and inspection sites. Brochures with maps and rules for the managed access areas should be given to each fisher when applying for license.

Engines and Boats

The GRMR station would need to improve their current equipment for patrols to increase their effectiveness and maximize their current resources. Their 23-foot vessel should be equipped with a 50 HP outboard four-stroke engine and the 25-foot vessel should be equipped with twin 50 HP four-stroke engines. This change will help reduce fuel cost and increase the area covered. It is imperative to have two functional vessels since the small one can be utilized for patrolling on the atoll during calm days, and the larger vessel can be used for patrolling during rough weather in deep waters adjacent to the reserve and for coming to and from the mainland.

The engines for PHMR should be replaced with a 50 HP four-stroke on the 23-foot and twin 50 HP four-stroke on the 25-foot vessel.

The boats all need to be repainted and marked for easy identification as patrol vessels.

Fuel

Fuel allocation should be increased to at least 10 gallons of fuel a day for patrols for a minimum of patrol days. This should be a total of 300 gallons of fuel per reserve per month. This will increase patrols as needed for managed access and requested by the stakeholders. Fuel should be readily available.

Communication

Currently the reserves rely on short range frequency radio communications and cellular phones for communication. This poses a challenge for the enforcement staff. Currently the Fisheries Department is purchasing a modern repeater system and a set of radios. Each reserve will get a set of base radios and mobile radios. All patrol vessels and ranger's stations should be equipped with two-way radios. This will facilitate the verification of information for fishermen license, improve security, reduce patrol cost, and improve patrol coordination. The Fisheries Department is implementing a new digital communication system to improve battery life, communication security, and quality of calls. It will also allow for texting, GPS tracking of vessels, and would also allow for communication from one user to another without the entire network listening to the conversation. This same system of communication can be used for fishermen to inform of illegal fishing, abuses by the authorities, or emergencies.

Evidence and Product Sampling Tools

There is a need for all patrol vessels to have on board a waterproof kit that houses all equipment such as forms, knives, scales, rulers, calipers, cameras and GPS. All this equipment is of great importance for documenting patrols, infractions and collecting evidence to be used in court. In addition all the vessels should be equipped with navigational lights and spot lights for night patrols. All staff should be equipped with personal flashlights and raingear. Night patrols are essential for reducing the illegal activity occurring in marine reserves, especially from foreign nationals, and will improve the integrity of the managed access system.

Personal Security

All staff should be trained in personal defense and weapon handling. All enforcement personnel should be issued with a firearm and a life vest during patrols. Working in such remote areas and the current climate of violence calls for increase in personal security of the enforcement officers.

Patrolling Procedures

Patrols should be done on a daily basis when weather permits. In order to ensure successful patrols the patrol leader should ensure that the vessel is well equipped prior to leaving the station's docks. Patrols should also be coordinated with other monitoring activities when possible so as to maximize the limited resources available. Prior to patrols it is also imperative that monitoring of the activities be done from the watch tower, since this can assist in identifying vessels in the reserves which would be difficult to spot during the patrol. This practice can eliminate the needless expenditures of fuel and time to seek out users within the reserve. Glovers Reef has a working radar system which should help complement the patrols. Patrols should be planned and officers should avoid making patrol schedules routine as changes in patrol approaches can help to catch offenders.

All offenders should be brought in to enforcement stations for processing and photographed utilizing the guidelines of the National Fisheries Enforcement Policy (NFEP)⁶. Night patrols should be conducted when possible. There is also the need for coordination of patrols with other marine parks and enforcement agencies since this can help to curb the illegal fishers and start reducing violations. Fishermen who have a notable record of compliance and cooperation could be rewarded with some form of incentive and highlighted to the community of marine reserve users.

A surge of enforcement is recommended during critical times in the fishing year, including early January when licenses are distributed and immediately prior to and during the first weeks of the lobster and conch seasons.

Data Management for Compliance and Enforcement

Data from patrols are very important to evaluate the success of the program and make adjustments to ensure its success. Managed access requires a user-friendly, high-volume database to which data can be uploaded from remote locations by authorized users. The best option is a web-based system that can be supported by a server. This database will seek to incorporate both monitoring and enforcement data from fishers and managers.

As such officers should ensure that they keep proper records of all their patrols utilizing the boarding forms stipulated in the NFEP. These data should be entered as soon as possible into a database. All information on infractions should be entered into a database. The reserve's staff should keep records of all authorized users and vessels including a photograph of the persons and vessels. This information should be kept in a web-based database to facilitate the verification of information very rapidly and avoid wasting time and resources of the staff and fishers. In addition all patrols should be equipped with GPS via the radio communication system. The data from the GPS resulting from patrols should be entered into a database (map source) that can be utilized to determine patrol area covered, areas of high incidence, and areas of low patrols in order to assist in improving patrol routes.

The use of daily log books should be instituted on board all fishing vessels. The captains should be held responsible to document all the crew's catch information on a prescribed form. The data should be collected every time the vessel exits the marine reserve or lands their catch.

The database should be housed with the Fisheries Department. The Fisheries Department would need the data base to be linked to licensing software that would be used to print all managed access licenses. This license should have a special code that indicate the

⁶ The adoption of a National Fisheries Enforcement Policy (NFEP) that seeks to standardize the enforcement procedures throughout the country among Law Enforcement Officers is important in ensuring that the work is done properly once managed access and catch shares is implemented nationwide. All officers should have a copy of the NFEP and utilize the guidelines when conducting their work. The NFEP is a guideline to conduct patrols, search, arrests, investigations, court procedures, and general officers conduct.

manage access areas. The fisher's license should be printed in PVC material to ensure its durability in water and minimize the possibility of forging documents.

It is recommended that the Fisheries Department publicize compliance and enforcement information in order to show fishermen that government is enforcing the rules.

Training Needs

In order to standardize all the enforcement and monitoring being done within the managed access areas, training is required for all persons involved. There is the need for training of enforcement officers, prosecutors, and all administrative staff on the managed access concepts and policies since this can help eliminate conflict between user and managers. Items that need to be covered in this type of training are the following:

- Overview of managed access and catch shares
- Goals
- Criteria of eligibility
- Conditions of licenses
- Aspects and security features of license
- Penalties and Fines
- NFEP and other Fisheries regulations
- Use of radio communication and GIS
- Navigation and small engines troubleshooting.

In addition, a workshop will need to be held with fishermen on all aspects of monitoring and enforcement for managed access. This training should focus on benefits for fishermen from use of log books and data collection, and solicit feedback from fishermen on their data needs. Fishermen and reserve staff would also benefit from joint training in conflict resolution, leadership, communications skills, and project management.

Personnel expected to be stationed at the reserve or monitoring sites should be provided the basic space for them to feel satisfied and contented. This involves a decent and safe accommodation amongst other needs. Being out on the field is a tough job. A staff that is not content will not perform well, but rather will do only the least required.

Financial and Technical Support for the implementation of Catch Shares

Catch Shares will be implemented through the support of all partner agencies with the guidance of the Fisheries Department. The EDF, WCS, with the backing of MAREMA, and TIDE will complement government current infrastructure to ensure the successful implementation of managed access.

Alternative Livelihoods

The implementation of managed access will lead to limiting the number of days at sea in the very short term of fishers due to natural attrition or weather conditions. Fishers at the end of the two year transition period will be limited to fish within the managed access areas. Currently fishers utilize areas close to shore when there is bad weather that prevents them from reaching their fishing grounds. Losing that option they will have to start looking at options inland that could provide them and their families with their livelihood. It is imperative to begin the work on alternative livelihoods parallel to implementation to ensure that at the end of the transition period fishers have tangible economic alternatives and therefore not have the need to engage in illegal activities elsewhere. Through alternative livelihoods one must contemplate the value added of seafood and other fishery diversification as viable options to increase the economic yield of the managed access areas. The identification of new markets with better prices should also be worked on.

There are already projects underway to build capacity with the stakeholders and some stakeholder communities are already implementing alternative livelihood initiatives such as the pig farms in Sarteneja by SFA, and Honey Production in Punta Gorda. There is a need to make synergies with local and international donors to assist fishers with the development of alternative livelihoods project.

RECREATIONAL FISHING

The ideal system incorporates commercial and recreational fishermen under a singular system. By incorporating recreational fishing, managers will have more information about the state of the fishery, capture data on all fishing mortality, and prevent the perception that commercial fishermen are being unfairly singled-out for a limited access program.

The experience of having different systems for commercial and recreational fishermen is that dual systems are notoriously challenging to manage, can be viewed as unfair, and cause conflicts between the sectors. This is perhaps best exemplified in the U.S. Gulf of Mexico snapper/grouper fisheries where commercial fishermen, but not recreational fishermen, are under an ITQ system. However, it is the perspective of the Belize Fisheries Department that a managed access system for the recreational sector is not politically viable at this time in Belize.

As a first-step recreational fishermen will be incorporated into the management system under a license and bag-limit system. Recreation fishing will refer to all fishing that induces mortality for any fish, regardless of the intent or fishermen. Recreational fishermen will be required to have a license and comply with a bag limit to be established by the Belize Fisheries Department.

The benefits of this system are that the Fisheries Department will be able to have 100% data collection from the recreational sector to determine their impact and take management decisions. Moreover revenue from recreational fishermen can be used to help management for commercial fishermen.

Once a TAC and quota system for lobster are established, it is strongly advised that both recreational and commercial fishermen **MUST** fall under a single TAC and quota system in order to have full accountability for lobster sustainability.

ANNEX A: TERMS OF REFERENCE – COMMUNITY MANAGED ACCESS COMMITTEE

Title of the Post: Member of the Community Managed Access Committee

Project

The Belize Fisheries Department under the Sustainable Fisheries Initiative (SFI) in Belize is implementing managed access license for fishers operating at the Port Honduras and Glover's Reef Marine Reserves as a first step of the implementation of catch shares in Belize. Catch shares is management of fisheries under incentive-based mechanisms such as territory-use rights and fishing quotas.

Participating Institutions

Belize Fisheries Department, Environmental Defense Fund (EDF), Toledo Institute for Development and Environment (TIDE), Wildlife Conservation Society (WCS)

Justification

The fishermen of Belize depend on the waters of Belize's Mesoamerican Reef region for a means of income and a source of food. This unique reef ecosystem parallels Belize's Caribbean shore for nearly 200 miles and harbors some 500 fish species. Today, this rich marine biodiversity and the livelihoods of fishermen are threatened by illegal fishing and overfishing.

In 2009, Environmental Defense Fund launched its Mesoamerican Sustainable Fisheries Initiative in Belize in response to these threats. Now, the Government of Belize under the Belize Fisheries Department is leading an alliance of NGOs including EDF, WCS, and TIDE to implement catch shares in Belize. This partnership works with fishermen to restore Belize's fisheries and renew its fishing communities through an innovative tool that fosters better fisheries management – catch shares. Catch shares have been proven to rebuild fish stocks and provide economic benefits to fishermen.

The Government of Belize, EDF, WCS, and TIDE are working with fishermen to design a catch share program at Glover's Reef Marine Reserve and Port Honduras Marine Reserve, sites which provide a livelihood to several coastal communities. In order to implement managed access licenses with participation and support from stakeholders, it is vital that a community managed access committee be appointed to represent fishers from all the stakeholder communities. This committee will screen fishers wanting to obtain a managed access license and make necessary recommendations to the Belize Fisheries Department. Hence, in order to represent fishers and provide transparency in the issuing of licenses and managing its performance, it is of importance to appoint capable individuals that will represent the interest of the fishers at the respective marine reserves.

Objective:

Establish the conditions for the nomination and appointment of the community managed access committee member that meets the requirements as a community leader who will adequately represent his/her fishing community without bias or personal benefit.

Functions:

- Have knowledge of the area being represented PHMR/Glovers Reef in order to adequately make practical recommendations to the community managed access committee during the licensing process.
- Review a list of members of his/her community that actively participate in the fishery
- Ensure that all member of his/her community are given equal opportunities to participate
- Inform anomalies to the community managed access committee or leading institutions heading the project
- Ensure transparency in making recommendation for the issuance of managed access license
- In coordination with Belize Fisheries Department and NGO partners, develop the norms of governance for the catch share, including enforcement and monitoring
- Collaborate with partners in implementation of governance of catch share
- Ensure participation of community members during workshops or seminars related to managed access
- Promote compliance of regulations by members of respective community
- Disseminate necessary information to his/her community stakeholders when required to ensure that all fishers remain inform through information from committee meetings
- Attend all meetings or send an appointed alternate in the event of difficulties in participation
- Attend meetings, workshops, and training seminars related to the planning and/or implementation of managed access and catch shares for PHMR and Glovers.

Qualifications and experience:

- Good knowledge of the marine reserve
- Experience in community activism
- Knowledge of Spanish and English would be an asset
- Be able to provide leadership
- Have good personal qualities and be able to communicate properly to large audience.
- Capable of basic reporting orally or written.
- Be Belizean

Period of Appointment

The Member of the Community Managed Access Committee will be appointed for a period of two year with the possibility of renewal based on performance.

Selection Process

The member should be nominated by the fishing community or members/group they represent and must provide proof of such approval by providing a letter of nomination signed by fishers approving his/her appointment

Other Matters

- The member shall conduct all activities with a high level of responsibility, professionalism and honesty.
- If members knowingly breach responsibilities expulsion from the committee will be recommended by the committee.
- Members are required to not be absent for more than two consecutive meetings

ANNEX B: CRITERIA FOR THE ISSUING OF MANAGED ACCESS LICENSES

Managed Access License Criteria

- Must possess a commercial fisherman license as stated by the new Fisheries Regulations.
- Will be based on information at Fisheries Department, WCS, TIDE, fisherman cooperatives and within the marine reserves logs for the last 5 years. Shall only apply for the first issuance.
- Must be at least 18 years old.
- A cap on the number of special licensed issued is determined initially by traditional information and later indicated by fish stocks available.
- All previous convictions for infractions won't be considered when addressing new infractions after the managed access license comes into effect.
- A rigorous system of penalties for infractions will apply, with discretion based on the severity and frequency of the infraction. Violations of fisheries regulations shall be dealt with in accordance with fisheries enforcement guidelines.
- Holder must reside in Belize for a specified period of time and provide proof of sales of marine products in Belize as per Fisheries Licensing Regulations.
- Holder of special license will initially be allowed to fish in other areas for a determined period of two-year transition time.
- A fee of \$25/per annum for the special license will be payable after the transition time

Managed Access Issuance Conditions

- A community managed access committee shall evaluate all special license application and agree for recommendation to the Fisheries Administrator.
- The Fisheries Administrator or officer duly appointed by her shall issue the special license upon vetting by said committee and payment of prescribed fee.
- All special license holders must report to reserve staff all marine products captured under that license before leaving the designated area on every trip.
- Failure to comply with any criteria/ condition or Fisheries Regulation will result in management action taken against the license holder as recommended by the Fisheries Administrator.
- A person may have more than one managed access license for marine reserves.
- Special license may be transferable to immediate offspring

ANNEX C: GLOVERS REEF MARINE RESERVE FISHERS MEETING AGENDA



1. Welcome – Mr. Isaias Majil
2. Introduction of Design- Adriel Castaneda/ Julio Maaz
 - Transferability
 - Monitoring
 - Enforcement
 - Penalties
 - Transition period
 - Alternative Livelihoods
3. Selection of Representatives for managed access committee.

ANNEX D: PROPOSED APPOINTMENT OF THE GLOVERS REEF MARINE RESERVE MANAGED ACCESS COMMITTEE ⁷

Appointment: Final appointment will be done by the Belize Fisheries Department

Objective:

The objective is to establish a committee that is fully representative of the stakeholders that depend on the fisheries resources of Glovers Marine Reserve and will help guide (advice) the effective implementation, monitoring and evaluation of the managed access program. Members will at every committee meeting represent his/her fishing community with the purpose of improving fisheries management in the marine reserve.

Justification for the formation of Committee:

Over the past two years the Belize Fisheries Department in partnership with Wildlife Conservation Society (WCS), Environmental Defense Fund and fishermen of Glovers Reef Marine Reserve has continuously engaged the fishermen who utilize Glovers Reef Marine Reserve, the Fishermen Associations and the Fishing Cooperatives to develop the concept of implementing a managed access program within the Glovers Reef Marine Reserve. The main objective of this program is to establish a licensing regime that will ensure that traditional Belizean fishermen have access to the fisheries resources. One of the main recommendations coming out of the community consultations is the establishment of a committee that will help guide the process of implementing managed access in the marine reserve. The process of nomination of members to this committee has been open and transparent done over a series of public community meetings in each community where the proposed roles and function of the committee, the commitment required by members and the importance of having a member that fully represents the interests of the local community have been explained to fishermen.

Nomination:

The nomination of committee members has been done based on the knowledge, experience and dependence on Glovers Reef Marine Reserve which enables the representative to make adequate and practical recommendations to the advisory committee for ultimate consideration by the Belize Fisheries Department.

Proposed composition of the Glovers Reef Marine Reserve:

The composition of the committee discussed and endorsed by fishermen present at the meetings is as follows: one member from Sarteneja, one member from BFCA, one member from Belize City, one member from Dangriga⁸, one member from Hopkins, one member from the Glover's Reef Advisory Committee, one member from Belize Fisheries Department and one member from WCS.

⁷ The proposed members of the Committee have been approved verbally by the Fisheries Administrator and they are expected to be formally appointed by the end of March 2011.

⁸ As the Dangriga and Belize City communities have not yet agreed which member to nominate, the Fisheries Dept. has decided to appoint these members at a later date.

Belize Fisheries Department
WCS- Janet Gibson
BFCA- Allan Bevans
Glovers Reef Advisory Committee- Norlan Lamb
Glovers Fishermen from Sarteneja- Cesar Munoz
Glovers Fishermen from Hopkins- Luke Nunez

Functions of the Committee:

- Provide advice on the managed access design for Glovers Reef Marine Reserve.
- Review the list of applicants for Glovers Reef Marine Reserve managed access license that will participate in the fishery
- Ensure that all member of his/her community are given equal opportunities to participate
- Inform anomalies to the advisory committee and the Belize Fisheries Department
- Ensure fairness and transparency in making recommendation for the issuance of managed access license
- Ensure participation of community members during workshops or seminars related to managed access
- Promote compliance of regulations by members of respective community
- Disseminate necessary information to his/her community members when required to ensure that all fishermen remain informed.
- Attend all meetings or ensure that appointed alternate is present in the event of difficulties in participation.
- Help develop recommendations to the Belize Fisheries Department that will ensure effective implementation, monitoring and evaluation of managed access program at Glovers Reef Marine Reserve.
- Attend meetings, workshops, and training seminars related to the implementation, monitoring and evaluation of the managed access program for Glovers Reef Marine Reserve.

Proposed Period of Appointment:

The Member of the Managed Access Advisory Committee will be appointed for a period of two year with the possibility of renewal based on performance.

Other Matters:

The member shall conduct all activities with a high level of responsibility, professionalism and honesty.

If members knowingly breach responsibilities expulsion from the committee will be recommended by the Committee to the Belize Fisheries Department.

Members are required to not be absent for more than two consecutive meetings

ANNEX E

Belize Fisheries Department Socio Economic Data Collection Form

Data Collector:		Date (D/M/Y):		Place:	
Fisher: Name:		Age:	Gender: M	<input type="checkbox"/>	F <input type="checkbox"/>
Vessel:		Do you own a boat? Y <input type="checkbox"/> N <input type="checkbox"/>			
Type:		Skiff <input type="checkbox"/>	Sailing sloop <input type="checkbox"/>	Size (keel): <input type="text"/> ft	
Engine: Type:		2 stroke <input type="checkbox"/>	4-stroke <input type="checkbox"/>	HP	<input type="text"/>
Socio Economics associated to the fishing trip					
How many people live and eat in your house hold?					
How many of you participate in Fishing (crew)?					
How much time per year do you dedicate to fishing?					
Which Areas do you fish: Mangrove <input type="checkbox"/> Patch Reef <input type="checkbox"/> Barrier Reef <input type="checkbox"/> Fore Reef <input type="checkbox"/> Open Ocean <input type="checkbox"/>					
How often do you fish these areas?					
Which Fishing Method do you use?					
Do you combine methods?					
Source of Income:					
Fishing Fin Fish <input type="checkbox"/> Lobster <input type="checkbox"/> Conch <input type="checkbox"/> Other <input type="text"/>					
What Percentage of your income comes from fishing?					
10% <input type="checkbox"/> 20% <input type="checkbox"/> 30% <input type="checkbox"/> 40% <input type="checkbox"/> 50% <input type="checkbox"/> 60% <input type="checkbox"/> 70% <input type="checkbox"/> 80% <input type="checkbox"/> 90% <input type="checkbox"/> 100% <input type="checkbox"/>					
What percentage of your catch do you use as a source of food?					
10% <input type="checkbox"/> 20% <input type="checkbox"/> 30% <input type="checkbox"/> 40% <input type="checkbox"/> 50% <input type="checkbox"/> 60% <input type="checkbox"/> 70% <input type="checkbox"/> 80% <input type="checkbox"/> 90% <input type="checkbox"/> 100% <input type="checkbox"/>					
Do you sell your fish? Y <input type="checkbox"/> N <input type="checkbox"/>					
To whom do you sell your product? Coop <input type="checkbox"/> Restaurant <input type="checkbox"/> Hotel <input type="checkbox"/> Agent <input type="checkbox"/> Individuals <input type="checkbox"/>					
What other source of income do you have?					
What is the average income from this other job?					
On a normal fishing trip what species do you catch (fill in the lists below)					
Species	Quantity (lbs)	Quantity (numbers)	Price		
What are your expenses per trip? (List Items in the spaces below)					
Item	Amount	Unit Price			
Comments:					

ANNEX F

Belize Fisheries Department Daily Log Form

Date (D/M/Y):		Name:		License #:	
Boat Name:			Start Time:		End Time:
Product	State	Specie(s)	Quantity (numbers)	Fishing Method	Lbs

State: W=Whole; F=Fillet; T=Tail; HM= Head Meat; MC= Market Clean;

TO BE FILLED OUT ONE PER DAY PER FISHER IN DUPLICATE

ANNEX H



BELIZE FISHERIES DEPARTMENT

Princess Margaret Drive, Belize City Belize
PHONE: (501) 223-2187, 224-45-52
Email: fisheries_administration@fisheries.gov.bz



PATROL BOARDING FORMS (one per vessel inspected)

Time: _____ Date: _____ Area: _____

UTM Coordinates: (northing): _____ (easting): _____ UTM 27 Central D.M.S. 27 Central

Colour of Vessel: _____ Length and Width: _____ Skiff Dory Sailboat

Vessel Name: _____ Vessel No.: _____ Brand & HP of Engine: _____

Engine SIN: _____ Engine Colour: _____ Capitan Name: _____

POB: _____ Weather Conditions: _____ Sea State: _____

VESSEL LICENSE

Date of Issue: _____ Exp.: _____ Owner's Name: _____

FISHERFOLK LICENSE

Name	DOB	Lic No.	Reg No.	Address	Iss:	Exp:	Code:	Nationality
								<input type="checkbox"/> Belizean <input type="checkbox"/> Belizean Resident <input type="checkbox"/> Non-National
								<input type="checkbox"/> Belizean <input type="checkbox"/> Belizean Resident <input type="checkbox"/> Non-National
								<input type="checkbox"/> Belizean <input type="checkbox"/> Belizean Resident <input type="checkbox"/> Non-National
								<input type="checkbox"/> Belizean <input type="checkbox"/> Belizean Resident <input type="checkbox"/> Non-National
								<input type="checkbox"/> Belizean <input type="checkbox"/> Belizean Resident <input type="checkbox"/> Non-National
								<input type="checkbox"/> Belizean <input type="checkbox"/> Belizean Resident <input type="checkbox"/> Non-National

FISHING ITEMS ON BOARD VESSEL

Gear	Amount	Size & Length
Mask and Snorkel / Fins		
Gill Nets		
Spear Guns / Hawaiian Slings		
Fuel Tanks: (no., type of fuel, colour)		
Fuel Lines & Prime Pumps		
Paddles		
Anchor		

Types (Species) of Fish & Marine Products	Amount (no.)

Signature of Vessel Capitan

Signature of Boarding / Arresting Officer

ANNEX I

Preliminary List of Traditional User of GRMR										
	Belize	Cayo	Chunox	Copper Bank	Corozal	Dangriga	Hopkins	Orange Walk	Sarteneja	Others
1	Adolfo Coleman	Hermojenes G. Reina	Christian Ramirez	Anasztacio Rejon	Alfonso B. Moreno	Cedric Casimiro	Alfonso Nunez	Carlos Mancia	Alberto D. Palmero	Llyod G. Andrewin
2	Anastacio Castillo	Ranhel F. Caballeros	Ediberto Patt	Carlos O. Lucero	Bernabel B. Verde	Clare J. Santino	Anthony J. Nunez	Collin Jones	Ardufo Rivero Sr.	Juan Baki
3	Angel E. Alvarez	ValentinA. Cano	Idar R. Reyes	Demy M. Nah	Jose A. Rodriguez	Dennis Alvarez	Diostenes Saldana	Edward B. Meighan	Armin Patt	
4	Antonio Hernandez	Josue Cruz	Jose M. Reyes	Jose A. Tzul	Manolo Rodriguez	Edwin Castillo	Dudley Maximo	Esdwin A. Buezo	Arnulfo Verde	
5	David E. Bahadur		Julius I. Forman	Deiny N. De La Cruz	Ugiliberto Rosales	Eugenio P. Villafranco	Edward M. Ortega	Hector H. Aguilar Jr.	Basilo Lopez	
6	Denes G. Myers		Randy A. Patt		Joe Leal	Henry M. McKenzie	Elroy Nasario	Jesus A. Pena	Byron O.C. Duran	
7	Diogenes Murillo		Roneldy A. Patt			James Logan	Esther Ryan Roachez	Negabi F. Pena	Cesar N. Munoz	
8	Edilberto J. Rivero					Marco A. Blanco	Floyd A. Arana	Obidio Pana	Crispino B. Verde Jr.	
9	Felix C. Flores					Maurice H.D Reynolds	Lennox E. Maximo	Ronald E. Escobar	Cristobal A. Verde	
10	Francis E. Foreman					Michael A. Jackson	Luke D. C. Nunez	Saul Mai	Duel Z. Verde	
11	Francisco Gomez					Omar C Parchue	Martin Alvarez	Jorge G. May	Eddy P. Garcia	
12	Glenford Young					Rafael D. J. Castellanos	Martin Carr		Eddy Rivero	
13	Isabel Villanueva					Akewin Noralez	Mavin S. Ventura		Edi A. Tamai	
14	Jacubo D. Castillo					Carlos Sabal	Nickford Miranda		Edward Cruz	
15	James Hyde					Keron Rosa	Paul Nunez		Eliodora Jimenez	
16	Jose L. Cauich					Maxwell D. Nunez	Rodney A. Castillo		Elmer E. Cruz	
17	Jose Peraza					Michael J. Ramirez Jr.	Darrel Castillo		Elmer O. Cruz	
18	Marlon S. Aranda						Cliford Caballero		Ernando Rivero	
19	Martin N. Alvarez						Dominic L. Williams		Francisco Lopez	
20	Norby B. Sedacy						Kirk Smith		Francisco Pena	
21	Odair S. Arzu								Harrim O. Gongora	
22	Osman J. Hercules								Hernando T. Rivero	
23	Pablo Castillo								Jacinto B. Verde	
24	Pablo Martinez Herrera								Jair D Canul	
25	Ruben Genus								Jose A. Alfaro	
26	Santos V. Alvarez								Jose F. Alamilla	
27	Semion Castillo								Jose R. Lopez	
28	Steve Young								Juan C. Munoz	
29	Wilmer E. Limas								Juan M. Munoz	
30	Ciriaco A. Lopez								Lemul O. Cruz	
31	Oscar O. Mena								Leobihildo S. Tamai	
32	Conrad W. Daniels								Marvin A. Tuyub	
33	Baltazar Soltero								Mauricio J. Cordoba	

Preliminary List of Traditional User of GRMR										
	Belize	Cayo	Chunox	Copper Bank	Corozal	Dangriga	Hopkins	Orange Walk	Sarteneja	Others
34	Joseph Nunez								Moises Jimenez	
35	Calvin S. Robinson								Moises Verde	
36	Leroy S. Ruiz								Oved M. Rivero	
									Randolph Aragon	
									Rigoberto C.R. Garcia	
									Sergio M. Flores	
									Taulfo C. Rivero Jr.	
									Taulfo Rivero Jr.	
									Thomas Montejo	
									Tirso Aragon	
									Udalberto Munoz	
									Victoriano F. Reed	
									Yorjelino A. Palmero	
									Luciano Canul	
									Mateo U. Rivero	
									Agustine D. Rivero	
									Bernabel Lopez	
									Cipriano V. Flores	
									Francisco Garcia	
									Dewayne Andrews	
									Edwin Coleman	
									Jason R. Kelly	
									Lenard Gabourel	
									Solomon W. Andrews	
	36	4	7	5	6	17	20	11	57	2
										165