

# ***Forest Management Plan and Operation Guidelines 2011 to 2015***

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## ***Sustainable timber Programme***

Programme for Belize

Summary  
August 2011

# Summary

## Sustainable Timber Programme, Rio Bravo Conservation & Management Area

The Programme for Belize (PFB) was established in 1988 as a not for profit organization limited by guarantee and incorporated under chapter 206 of the laws of Belize, Revised Edition (1980) for the conservation of biodiversity and the sustainable development of Belize through the proper management of the Rio Bravo Conservation and Management Area (RBCMA) and other lands entrusted to it.



The RBCMA was established in 1989 as a private reserve to conserve forested land in the Orange Walk District of north-western Belize threatened with fragmentation and clearance following the break-up of the Belize Estate and Produce Company (BEC) holdings in the area. It now covers 101,813 ha (251,585 acres) in the Orange Walk District of north-western Belize, secured through a series of transactions involving the original BEC property which also includes other properties namely, Yalbac, Gallon Jug and parts of the New Hope area.

PfB operates under the terms of a formal Memorandum of Understanding (MoU) with the Government of Belize (GOB). The MoU with GOB requires that the management regime must further national policy towards protected areas and proper resource use.

Therefore the management regime is based on ecosystem protection and sustainable use of forest resources, corresponding to an International Union for the Conservation of Nature) (IUCN) Category VI protected area. The area is also a very important component of the Belize National Protected Area System and a natural cross-border extension of the Maya Biosphere Reserve in Guatemala.

The RBCMA is unique in that it is the only officially recognized private protected area that integrates sustainable extractive forest resource management within a strong overarching biodiversity conservation goal in its management regime. Historically, the principal land use in the RBCMA after the demise of the ancient Mayan civilization has been extractive forest use including both non timber and timber forest products, namely Logwood dye, chicle, and Mahogany timber. In general, the forest structure has been modified by these extractive activities but removal of forest cover has remained fairly small during the colonial occupation and periodic hurricanes have had a more dramatic change on forest cover. The biological, physical, and cultural values on the RBCMA have been well documented and the protected area has been given a very high national protected area site score on biophysical characteristics. Therefore the area is recognized for its increasingly high conservation value both nationally and regionally.

The RBCMA is zoned following the United Nations Educational, Scientific and Cultural Organization (UNESCO) ‘Man and the Biosphere’ model – i.e. a protected core managed on national park precepts buffered by a ‘sustainable use’ zone managed as a functional forest reserve plus an outer area of engagement with peripheral communities.

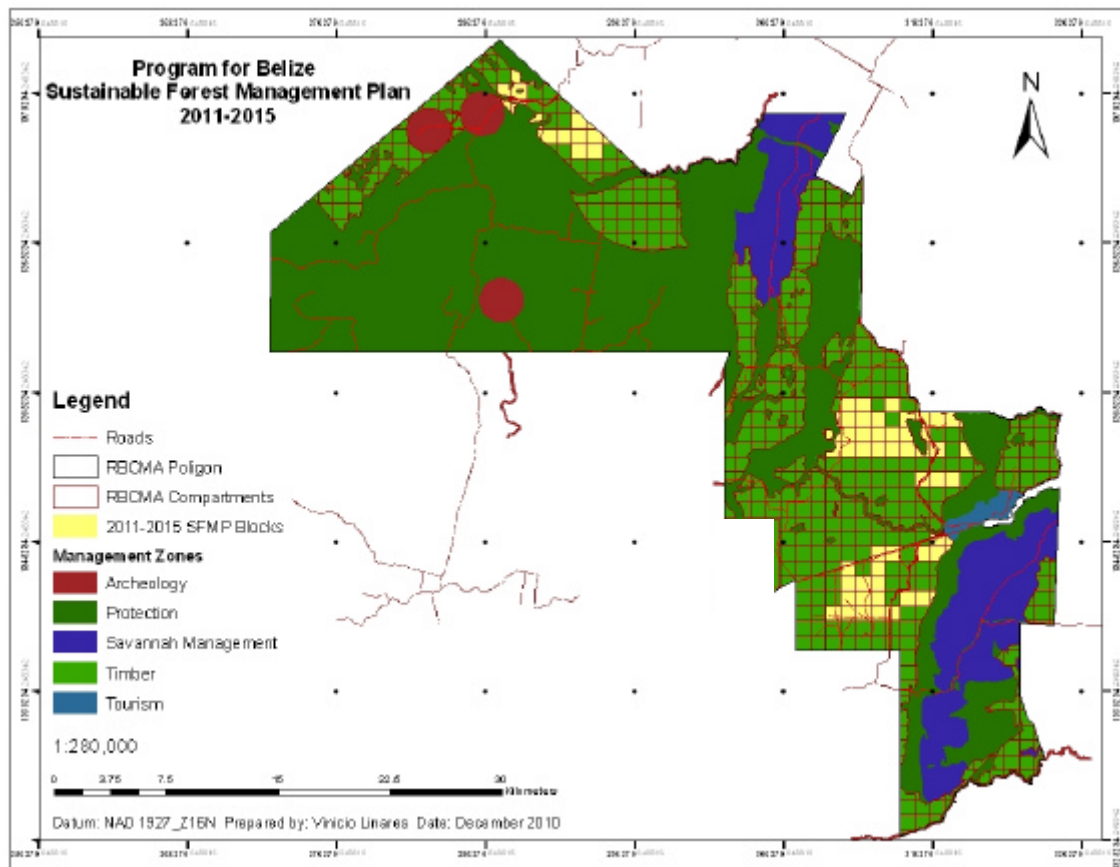
The RBCMA is divided into 5 zones:

- Protection zone – managed on national park precept
- Sustainable Timber Management zone – production forest under Sustainable Forest Management Programme (SFMP)
- Savannah Management zone – short grass savannah with pine where fire is an integral part of the ecology
- Infrastructure zones – roads, field stations, and gatehouses
- Tourism zones – area 3 km around each field station for cultural and nature interpretation

<b>Management Zone</b>	<b>Hectares</b>	<b>Acres</b>
Protection	50,358	124,385
Savannah Management	11,687	28,866
Sustainable Timber Management	37,086	91,601
Tourism/Infrastructure	2,683	6,626
<b>Grand Total</b>	<b>101,813</b>	<b>251,479</b>

While this SFMP provides a sustained forest management framework for all of the RBCMA, in reality the focus of on the ground sustained timber management activities is within the Sustainable Timber Management zone.

## RBCMA Management Zones



The goal of forest management on the RBCMA is:  
**“To demonstrate sustainable use of forest resources, generating revenues for re-investment in conservation management through activities that neither compromise the biodiversity of the area nor the future value of the resource”.**  
(Wilson J. R., 2006a, p. 3)

PfB has developed the strategies necessary to achieve this goal based on a cluster of premises and principles that address inherent or apparent conceptual conflicts. Included among these are:

- Natural forest management is one conservation strategy among several and is only appropriate in certain conditions (Frumhoff and Losos 1998). An analysis carried out by Brokaw in 1998 using the criteria set by Frumhoff and Losos

(1998) confirms that this approach is indeed appropriate within the overall management regime for the RBCMA.

- Management on the RBCMA must be maintained relatively strong and focused primarily towards biodiversity conservation for which timber revenues help pay.
- The concept of 'limits of acceptable change' must be applied to sustained forest management in the RBCMA by establishing acceptable thresholds based on adequate scientific knowledge of ecological processes. The aim is to allow for a level of extraction of timber from the forest that, while evidently impacting upon forest structure and relative species abundance, does so at a level that does not compromise ecological processes or biodiversity values.
- The application of the precautionary principle ensures that each step of management remains well within safety margins indicated by the existing levels of information, experience and institutional capacity. The more limited the last three elements, the greater must be the safety margin.
- Adaptive management is applied within the management regime to ensure that evolutionary changes in circumstances, knowledge base and institutional capacity are assimilated into change mechanisms that can positively influence initial or previous planning frameworks and assumptions at regular intervals.
- Certification of the forest management regime is an effective strategy to independently validate PFB's own forest stewardship standards while enhancing marketing opportunities. It has also stimulated other timber managers to seek certification.

The forest management design developed for the RBCMA is modeled on that developed by the Forest Management and Planning Project (FPMP) and being derived from experience in West Africa is innovative in the Mesoamerican context. The key point is that area control replaces volume control as the central principle for forest management. The production forest is divided into compartments or cutting coupes that are logged on a 40-year rotation. The annual cutting area therefore represents 1/40th of the entire production area and, once extraction has taken place, the harvesting coupes are closed for the next 39 years.

The FPMP approach emphasizes management at the scale of individual compartments rather than at the global forest-wide scale of the forest. Nevertheless, experience in the RBCMA has shown that a global forest wide scale inventory is necessary for long term planning over the 40 year cutting cycle. Given the cost of a forest wide Forest Management Unit (FMU) scale inventory, an intermediate approach has been taken with the implementation of an inventory for an area that can be sustainably harvested over the next quinquennial (5 years) in the cutting cycle. The concept of the Annual Allowable Cut (AAC) is applied only to the pre-established annual cutting coupe based on a stock survey and the calculation of cutting intensities for each commercial species or species group.

The basic management subdivision of the production forest in the RBCMA is the compartment which has been standardized into blocks of 100 ha based on the UTM

grid (although some blocks on the perimeter of the production forest zone may have less than 100 ha in extent).

The present quinquennial management area is comprised of various non contiguous clusters of compartments located in 6 different timber production zones. The average area of each annual coupe in the present quinquennial is 1,136 ha. Experience has shown that this area is adequate for working in a logging season.

The forest inventory for the next quinquennial management area was successfully implemented by PfB forestry personnel using a systematic stratified forest inventory. A set of one hundred 1-ha sample plots was distributed within the 5,679 ha of broadleaf forest, giving a sampling intensity of 1.8%, which is considered adequate for this forest type and size. The distance between the sampling plots was 600 m and 800 m between lines.

The inventory data was analyzed using SEMAFOR, a software package developed by the Petén based NGO, Fundación Naturaleza Para la Vida (NPV) in 2000. The general results are summarized in the table below.

Description	Unit	Value
Area	Hectare	5,679
Relative to total area of the FMU	%	14.6
Species (Trees & Regeneration)	Richness	133
Species $\geq$ 10 cm dbh	Richness	127
Species $\geq$ 25 cm dbh	Richness	111
Mean density $\geq$ 10 cm dbh	stems/ha	322.57
Mean Basal Area $\geq$ 10 cm dbh	m <sup>2</sup> /ha	16.25
Mean Volume $\geq$ 25 cm dbh	m <sup>3</sup> /ha	47.55
Seedlings	ind./ha	9,312.5
Saplings	ind./ha	642.75

Species inventoried were grouped according to their commercial potential and ecological characteristics. Highly commercial species (HIGHCOM) (1, i.e. mahogany) and actual commercial species (ACTCOM) (13) together represent 11% of total species inventoried. Nineteen percent (19%) of species (24) are considered potentially commercial (POTCOM) and 66% (84) are considered to be non commercial species (NONCOM). The remainder are palms and protected species.

The forest inventory and cutting intensity calculations show that the next quinquennial block has a high capacity for timber production. The total productive potential for the 2011-2015 block for all species is 18.47 m<sup>3</sup>/ha, formed by 19.86 trees/ha and 4.15 m<sup>2</sup>/ha of basal area. The productive potential of only the commercial species (HIGHCOM and ACTCOM) is 10.77 m<sup>3</sup>/ha, formed by 8.05 trees/ha and 2.014 m<sup>2</sup>/ha of basal area.

The commercial species of highest importance based on frequency and density are listed in the table below. The table also provides the minimum cutting diameter (MCD), for each species. The MCD is a very important feature of sustainable timber management.

### Species with commercial potential based on the 2010 five-year forest inventory

No	Common Name	Scientific Name	Commercial Group	MCD
1	Mahogany	<i>Swietenia macrophylla</i>	HighCom	50
2	Bastard Rose Wood	<i>Zwartzia cubensis</i>	ActCom	45
3	Billy Webb	<i>Sweetia panamensis</i>	ActCom	45
4	Black Cabbage Bark	<i>Lonchocarpus castilloi</i>	ActCom	45
5	Black Poison Wood	<i>Metopium brownei</i>	ActCom	45
6	Bullet Tree	<i>Bucida buceras</i>	ActCom	45
7	Chicle Macho	<i>Manilkara chicle</i>	ActCom	45
8	Jesmo	<i>Lysiloma acapulcense</i>	ActCom	45
9	Jobillo	<i>Astronium graveolens</i>	ActCom	45
10	Nargusta	<i>Terminalia amazonia</i>	ActCom	45
11	Red Mylady	<i>Aspidosperma cruentum</i>	ActCom	45
12	Salmwood	<i>Cordia alliodora</i>	ActCom	45
13	Santa Maria	<i>Calophyllum brasiliense</i>	ActCom	45
14	Silly Young	<i>Pouteria amygdalina</i>	ActCom	45

It must be emphasized that the actual species to be extracted is dictated by the result of the compartment stock survey.

In terms of regeneration, HIGHCOM species represent 0.16% of total seedlings but ACTCOM species represent 11.87%. However, in the transition from seedling to sapling the mortality for HIGHCOM species is high (98% for mahogany), 94% for ACTCOM species, 93% POTCOM and 94% NONCOM species. It is clear that the application of silvicultural treatments (primarily opening the higher canopy) that favor the survival and development of commercial species in their regeneration phase will be required in order to increase the economic potential of the forest.

At present even though there is a comprehensive knowledge base on major non timber forest products (NTFP's), the harvesting of NTFP's is not contemplated within this quinquennial.

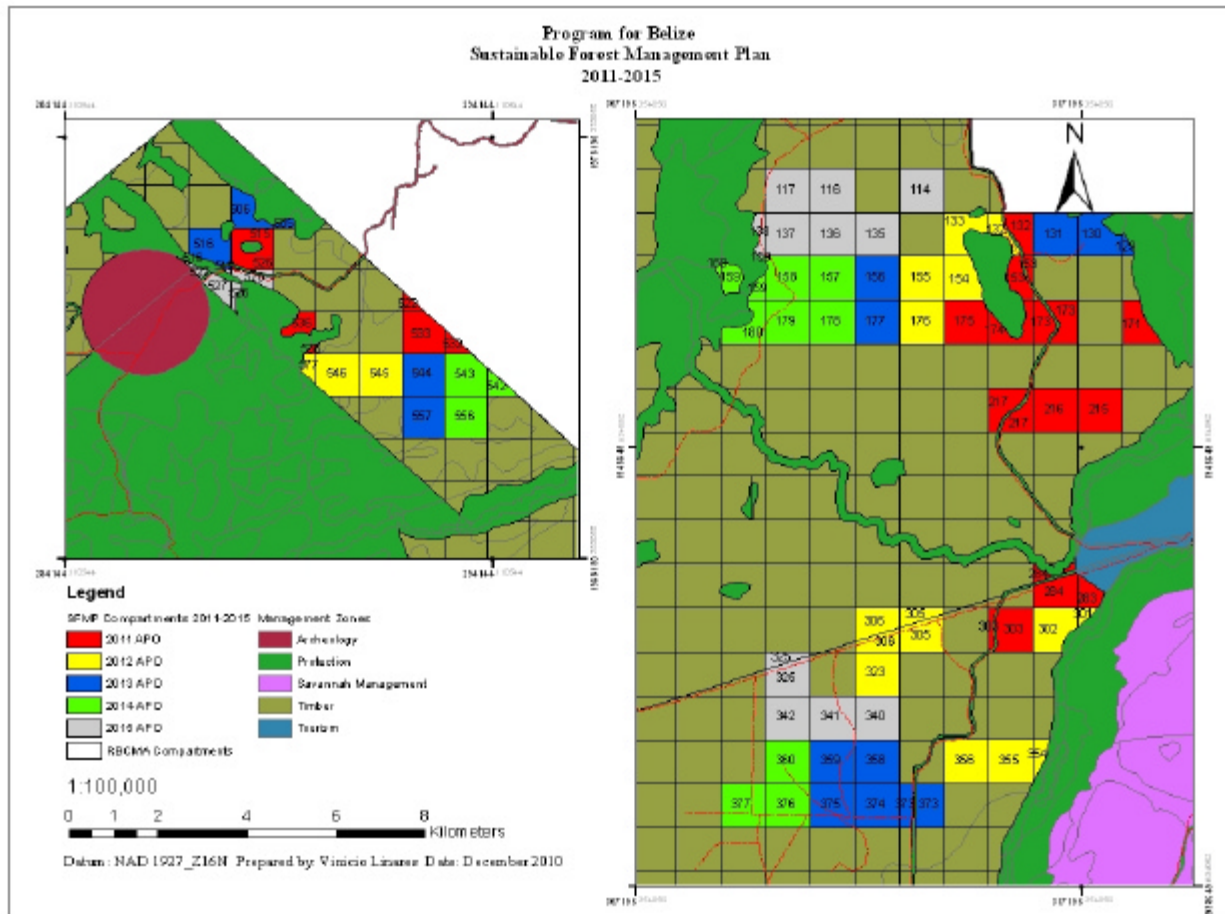
The stock survey which is required for each annual coupe provides a reliable stem and timber volume stocking estimate by commercial species. The annual allowable cut (AAC) for each coupe is determined based on the calculation of cutting intensity (CI) for each commercial species. The CI system refers to the percentage of trees, basal area and volume that it is possible to harvest without reducing the capacity of the



forest area harvested to reestablish its original conditions at the end of the cutting cycle.

The annual plan of operation (APO) provides the planning and baseline information for the implementation of all harvesting and management activities that will take place in the annual coupe normally for a one year period. SFM is predicated on the application of reduced impact logging practices to all timber harvesting operations. The areas destined for extraction in the next five years are presented in the map below. The actual implementation, based on adaptive management, may require the shifting of compartments as the quinquennial progresses.

### Annual harvesting blocks 2011 to 2015 (Plan)



Strategic safeguards such as the protection of high conservation value forests (rare or threatened species or ecosystems) to ensure biodiversity conservation and environmental conservation measures that must speak to operational standards that mitigate impacts on the forest capacity to provide essential environmental goods and services are described in the main document.



Although PFB sells its certified timber in the round, its marketing strategy is to promote value added use (and marketing) of a wider range species and to demonstrate that natural resource management is compatible with biodiversity conservation objectives.

The strategy also seeks to expand certified timber management. The SFMP addresses the requirements for timber tracking procedures and standards necessary to maintain chain of custody certification (Certification Code: **SW-FM/CoC-00031**).

The RBCMA has a good network of private roads critical to resource management. Most of these roads require minimal clearing to become usable. Standards for road construction and maintenance are discussed in the main document.

PFB has a relatively strong protection programme for the RBCMA supported on the ground by 8 rangers and three strategically placed manned guard houses.

An analysis is made of threats and the point is made that the effects of Hurricane Richard on the forest within the RBCMA and surrounding areas has elevated the fire risk considerably. Therefore fire management efforts will have to be escalated for the next three years especially focused on fire sensitive ecosystems.

Research has been a very important activity on the RBCMA for over 15 years and has contributed significantly to the development of the present management regime. Monitoring the effects of timber harvesting on biodiversity conservation is very important and relevant to achieving the SFM goals for the RBCMA. Permanent sample plots are crucial for understanding and monitoring forest growth dynamics over the long term. However, their establishment at an appropriate scale must be carefully planned and justified given the high cost of establishment and re-measurement. Changes in forest structure post Hurricane Richard provide a good opportunity for relevant research on successional ecology in the affected zone.

Monitoring of all forest management interventions is a crucial component of the resource management regime since it is essential to the successful application of important principles (e.g. adaptive management) and programmes (FSC certification).