

2022

MONKEY BAY WILDLIFE SANCTUARY

MANAGEMENT PLAN (2022 – 2027)



PREPARED BY: PRAXIS ADVISORY GROUP LTD. | Belmopan, Belize

Protected Area Data Sheet	
Date	July 2022
Name of Protected Area	Monkey Bay Wildlife Sanctuary
Location of Protected Area	Belize District
Date of establishment	1990
Size of Protected Area	Total Area: 1,065 acres (431 ha)
Land Tenure	Private Land
Management Authority	Monkey Bay Wildlife Sanctuary
Affiliations/ Partnerships with other organizations	Maya Forest Corridor Coalition
Number of Staff	Permanent: 2 Temporary:
Annual Budget (BZ\$) for management of protected area	See Section 5.9 (Indicative Financing)
Designation	Private Reserve: IUCN Category IV (Habitat/Species Management Area)
Reasons for Designation	To afford special protection to the threatened species, savanna, and riparian forest through management and conservation within and around Monkey Bay Wildlife Sanctuary.
Brief Details of Past Funding	Monkey Bay Study Abroad Program
Brief Details of Present Funding	As above
Brief Details of Future Funding	Self-generated income supplemented by the Monkey Bay Study Abroad Program and domestic tourism of day and night visitation.
List the primary protected area objectives:	
1.	Protect the MBWS conservation targets (Threatened Species, Savanna Ecosystem, and Riparian Ecosystem).
2.	Protect and conserve landscape connectivity within the MFC.
3.	Provide socioeconomic opportunities to the neighbouring communities.
List the top three or four most important threats to the protected area:	
1.	Habitat Conversion/ Fragmentation
2.	Poaching for Pet Trade and NTFPs
3.	Pollution (i.e., agricultural run-off, garbage)
4.	Stream Gravel Mining
List the top three or four critical management activities:	

1. Develop and maintain an effective surveillance and enforcement program for the purpose of resource management within MBWS.
2. Develop and establish a monitoring and research program within and around MBWS to aid in managing and identifying changes of habitat and species population.
3. Develop and maintain an effective education and outreach program within and around MBWS to improve communication and the understanding of sustainable development among stakeholders.
4. Expand the resource mobilization from the education and ecotourism activities within MBWS to ensure financial stability for MBWS's management.

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- Kayla Hartwell, Foundation for Wildlife Conservation
- Emma Sanchez, Panthera
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- Luis Castellanos, La Democracia
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Executing Agency: Funded by the Belize Nature Conservation Foundation and administered by PACT.

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gave feedback on deliverables that contributed to the development of the management plan.

Special mention goes to the MBWS staff for providing technical support, supporting the familiarization field trip, and facilitating lunch during the field trip and the management planning workshop. All the behind-the-scenes activities that contributed to a seamless work experience are owed to you.

We extend our appreciation to the various MBWS stakeholders – non-governmental organization representatives, government representatives, community leaders from La Democracia and Mahogany Heights, and scientific researchers – who contributed their valuable time to share ideas, views, concerns, and suggestions pertaining to the management of MBWS. Your participation at the various meetings was invaluable to the planning effort and resulted in the development of the first MBWS management plan for the next five years.



Last but certainly not least, we extend our gratitude to the Belize Nature Conservation Foundation for its financial support, and to PACT for administering the funding.

Thank you,

praxi5 Advisory Group Ltd.

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Acronyms and Abbreviations

BDF	Belize Defense Force
Beltraide-SBDC	Belize Trade and Investment Development Service – Small Business Development Center
BMFT	Belize Maya Forest Trust
BNCF	Belize Nature Conservation Foundation
BTB	Belize Tourism Board
CAP	Conservation Action Planning
CBO	Community-Based Organization
CDB	Caribbean Development Bank
CSFI	Corozal Sustainable Future Initiative
DOE	Department of Environment
ECD	Early Childhood Development
FD	Forest Department
FWC	Foundation for Wildlife Conservation
GIS	Geographic Information System
GDP	Gross Domestic Product
GOB	Government of Belize
IDB	Inter-American Development Bank
IMF	International Monetary Fund
LFS	Labor Force Survey
MAFFESD	Ministry of Agriculture Forestry Fisheries Environment and Sustainable Development
MFC	Maya Forest Corridor
MBNP	Monkey Bay National Park
MBWS	Monkey Bay Wildlife Sanctuary
NBIO	National Biodiversity Office of Belize
NPAS	National Protected Areas System
NGO	Non-Government Organization
NTFPs	Non-Timber Forest Products
PfB	Programme for Belize
PPA	Private Protected Area
RBCMA	Rio Bravo Conservation Management Area
SEP	Stakeholder Engagement Plan
SIB	Statistical Institute of Belize
SMART	Spatial Monitoring and Reporting Tool
TIDE	Toldeo Institute for Development and Environment
TSB	Tiger Sandy Bay

UB-ERI	University of Belize Environmental Research Institute
WCS	Wildlife Conservation Society
WTTC	The World Travel and Tourism Council
YCT	Ya'axché Conservation Trust

Executive Summary

Monkey Bay Wildlife Sanctuary (MBWS) was recognized by the Minister of Tourism and the Environment, Hon. Glen Godfrey, as a Private Protected Area (PPA) on Earth Day, April 22, 1990. A PPA's purpose is "*to complement the national lands through provision of connectivity, priority species protection, and improved ecosystem representation*" with permitted activities such as research, education, tourism, and sustainable extraction (GOB, 2005; revised 2015). MBWS is one of eight PPAs listed under the National Protected Areas System (NPAS) that is recognized by the Forest Department.

After the PPA recognition, MBWS developed a Belize Study Abroad program catered to environmental education and training and host local and international student groups. In 2015, MBWS became registered as a non-government organization (NGO) with a primary mission to provide environmental education field programs to generate revenue needed to support and manage the Sanctuary. Before the Maya Forest Corridor (MFC) was recognized by the Government of Belize (GOB) in 2019, MBWS partnered with local and international organizations and authorities to form the MFC Coalition. The MFC Coalition aims to secure and conserve the MFC in perpetuity through habitat protection. Therefore, in 2020, MBWS's mission changed to reflect an emphasis on the management and conservation priorities of the Sanctuary and the surrounding landscape, aligning their mission with those of the MFC Coalition.

This document is the first management plan for MBWS with an implementation period from 2022 to 2027. The management plan framework used follows the Guidelines for Developing a Management Plan – Level Two (for conservation and NGOs) prepared by Wildtracks (2005b) for the National Protected Areas Policy and System Plan. The management plan is guiding document for conservation management, climate change adaption, and stakeholder engagement.

The management plan includes input from the planning committee, which was comprised of MBWS stakeholders – NGO representatives, government representatives, community leaders from La Democracia and Mahogany Heights, and scientific researchers – and the Managing Director of MBWS. The planning committee, through various workshops, identified the conservation targets and threats, as well as the conservation strategies to combat those threats and management actions. The monitoring and review of the management plan implementation will involve only MBWS's managerial efficiency in implementing the planned activities and achieving overall effectiveness of the management regime and success of the conservation strategies.

Three conservation targets were selected to represent and encompass the biodiversity values of MBWS, and to provide a basis for setting goals, developing strategies and actions, and monitoring success: 1) Threatened Species, 2) Savanna Ecosystem, and 3) Riparian Ecosystem. The threats which ranked as the highest priority of active threats to these conservation targets include habitat conversion/ fragmentation, poaching for pet trade and NTFPs, pollution (i.e., agricultural run-off, garbage), and stream gravel mining. Conservation strategies were identified to address these threats and were integrated into the MBWS Management Programs. The strategies aim to reduce anthropogenic threats which may also exacerbate the impacts of climate change.

MBWS's purpose, as a PPA under Belize's National Protected Areas System Plan (NPASP) is "to complement the national lands through provision of connectivity, priority species protection, and improved ecosystem representation" with permitted activities such as research, education, tourism, and sustainable extraction. This is to be achieved through following the MBWS's management goal:

Monkey Bay Wildlife Sanctuary is a model Private Protected Area that supports and safeguards landscape connectivity, ecosystem services, and socioeconomic benefits for present and future generations.

The management goal in turn will be achieved through the following core objectives:

1. Protect the MBWS conservation targets (Threatened Species, Savanna Ecosystem, and Riparian Ecosystem).
2. Protect and conserve landscape connectivity within the MFC.
3. Provide socioeconomic opportunities to the neighbouring communities.

The five Management Program for MBWS are: 1) Natural Resources Management Program, 2) Research and Monitoring Program, 3) Community Engagement Program, 4) Tourism and Recreation Management Program, and 5) Administration and Infrastructure Program.

Specific strategic objectives under these programmes include:

1. Develop and maintain an effective surveillance and enforcement program for the purpose of resource management within MBWS.
2. Improve the structure of the pine savanna ecosystem to ensure its functionality and protection.
3. Develop a restoration program to support landscape connectivity for biodiversity.

4. Conduct a carbon feasibility assessment for MBWS to explore carbon market opportunities.
5. Develop and establish a monitoring and research program within and around MBWS to guide management and identify changes of the habitat and species population.
6. Develop a restoration program for the socioeconomic benefits of the buffer communities.
7. Develop and maintain an effective education and outreach program within and around MBWS to improve the communication and understanding of sustainable development among stakeholders.
8. Develop and establish an entrepreneur-mentorship program for key community stakeholders, i.e., Mahogany Heights and La Democracia, to improve their livelihoods and reduce the extractive pressures within and around MBWS.
9. In partnership with neighbouring landowners, support the implementation of a comprehensive disaster relief plan for MBWS and the surrounding communities/farms.
10. Expand the resource mobilization from the education and ecotourism activities within MBWS to ensure financial stability for their management activities.
11. Develop and implement a sustainable tourism strategy for MBWS compatible with the Maya Forest Corridor landscape to ensure financial sustainability.
12. Manage and enhance the human resources of MBWS to optimize employee performance in service of MBWS's conservation objectives.
13. Conduct annual reviews of management activities to ensure compliance with the management plan and make adjustments as necessary.

Each of the thirteen strategic objective includes a set of management actions to be completed by or before 2027. The management actions are to be implemented to achieve the strategic objectives which in turn accomplish the management goal of MBWS.

The implementation plan for the Management Programs sets out the management actions ("what will be done?"), rationale ("why is it being done?"), responsibility ("who will do it?"), and timeline ("by when?"). The timeline lists the activities for the next five years and serves as a monitoring tool to assist MBWS staff on keeping track with the implementation of the management plan. If target dates are not met, adjustments may be made as necessary.

The current day-to-day activities of MBWS is performed by the Conservation Ranger and the Protected Areas Manager. Presently, the Protected Areas Manager also wears the hat of Managing Director, whose responsibility is to also oversee the activities of the Campus and business. The Managing Director also reports to the Board of Directors (BOD), whose

responsibility include reviewing finances and budgets and to support activities or projects that they deem necessary.

There is need of a full-time Protected Areas Manager and a Senior Conservation Ranger is to accomplish all the management actions within the implementation period of the management plan. All staff working within MBWS should be fully dedicated to the tasks of the Sanctuary and their tasks should not be conflated with the business portion of Monkey Bay. However, overlapping of activities may occur between the Sanctuary and the business, as both benefit from each other.

1. Introduction

1.1 Background and Context

Monkey Bay Wildlife Sanctuary (MBWS)¹ was recognized by the Minister of Tourism and the Environment, Hon. Glen Godfrey, as a Private Protected Area (PPA) on Earth Day, April 22, 1990. According to Belize's National Protected Areas System Plan (NPASP) (GOB, 2005; revised 2015), a PPA's purpose is "to complement the national lands through provision of connectivity, priority species protection, and improved ecosystem representation" with permitted activities such as research, education, tourism, and sustainable extraction. Since the PPA recognition, MBWS has developed a Belize Study Abroad program catered to environmental education and training. The educational campus is situated on lease property adjacent to the PPA (Figure 1) to host local and international student groups.

In 2015, MBWS became registered as a non-government organization (NGO) with a primary mission to provide environmental education field programs to generate revenue needed to support and manage the Sanctuary. However, MBWS's mission changed in 2020 to reflect an emphasis on the management and conservation priorities of the Sanctuary and the surrounding landscape. Before the recognition of the Maya Forest Corridor (MFC) by the Government of Belize (GOB) in 2019, MBWS had joined forces with local and international organizations and authorities to form the MFC Coalition. The MFC Coalition aims to secure and conserve the MFC in perpetuity through habitat protection. MBWS's efforts now aims to align their mission with those of the MFC Coalition.

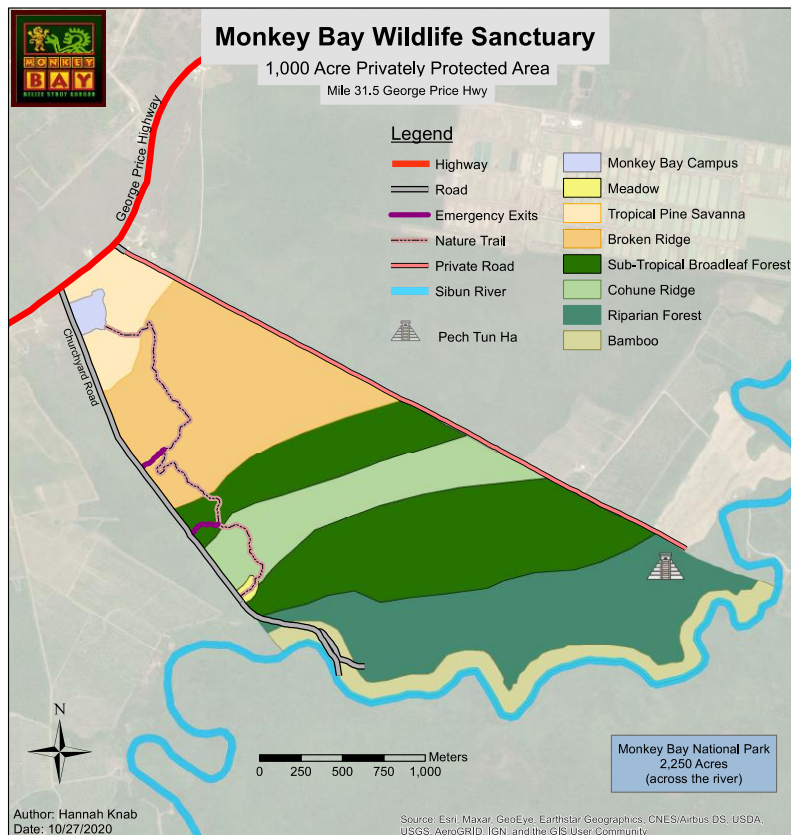


Figure 1: Map of Monkey Bay Wildlife Sanctuary

¹ Monkey Bay Wildlife Sanctuary may also be referred to as the "Sanctuary" in this document.

1.2 Purpose and Scope of Plan

The primary purpose of the MBWS Management Plan is to develop the first management plan over a five-year period from 2022-2027 in accordance with the National Protected Areas System Act. The management plan will encompass a comprehensive and well-integrated assessment of the ecological and socio-economic status of MBWS, as well as the potential impacts and contribution to the National Protected Areas System (NPAS). The management plan framework used follows the Guidelines for Developing a Management Plan – Level Two (for conservation and NGOs) prepared by Wildtracks (2005b) for the National Protected Areas Policy and System Plan.

The management plan is a guiding document that sets out the main directions for MBWS over the planning period while providing a framework that promotes and supports sustainable use, operational guidelines, stakeholder engagement, climate change adaptation, and conservation. The management plan consists of six main sections: introduction, current status, analysis of conservation targets and threats, planning for climate change, and management planning. These sections are developed to support one another and to better inform and strengthen the overall management of the area. The raw results, tools used, and species found in MBWS are found in the appendices at the end of the management plan.

The management plan was prepared with input from a core planning team made up of key stakeholders of the MBWS through virtual and in-person meetings. The core planning team comprised representative from MBWS, Wildlife Conservation Society (WCS), Foundation for Wildlife Conservation (FWC), Panthera, University of Belize Environmental Research Institute (UB-ERI), Belize Maya Forest Trust (BMFT), Forest Department (FD), National Biodiversity Office (NBIO), La Democracia Village, and Mahogany Heights Village. The effective use of the management plan will require managerial efficiency in implementing the planned activities for the overall success of the conservation, climate adaptation, and management strategies.

2. Current Status

2.1 Location

MBWS (17.3187° N, 88.5680° W) is a PPA located in Central Belize within the MFC (Figure 2). The Sanctuary consists of 1,065 acres (431 ha) of land, of which about 10% is savanna and 90% is broadleaf ecosystem (see Section 2.5.1 for the ecosystem breakdown). MBWS is bordered by the George Price Highway to the northwest, Tiger Sandy Bay Farm to the north and northeast, the Sibun River and Monkey Bay National Park (MBNP) to the south and southeast, and privately owned undeveloped land to the west (Figure 3).

MBWS has one main entrance gate, and it is accessed by the Churchyard Road, which is a unpaved road that separates MBWS and the private undeveloped land to the west of MBWS, from the George Price Highway on Mile 31.5. The Churchyard Road runs from the George Price Highway to the Sibun River, and it is frequented by locals in their pursuit of the Sibun River Beach for recreation (Figure 4). Monkey Bay's Belize Study Abroad program is also a frequent user of the Sibun River Beach, where students/guests disembark their canoes from the beach and are taken on an educational ecotour of the Riparian Forest and Sibun River. MBWS also has one main nature trail that exits along the Churchyard Road on three different locations, allowing students/guests to continue their hike down the Sibun River Beach.

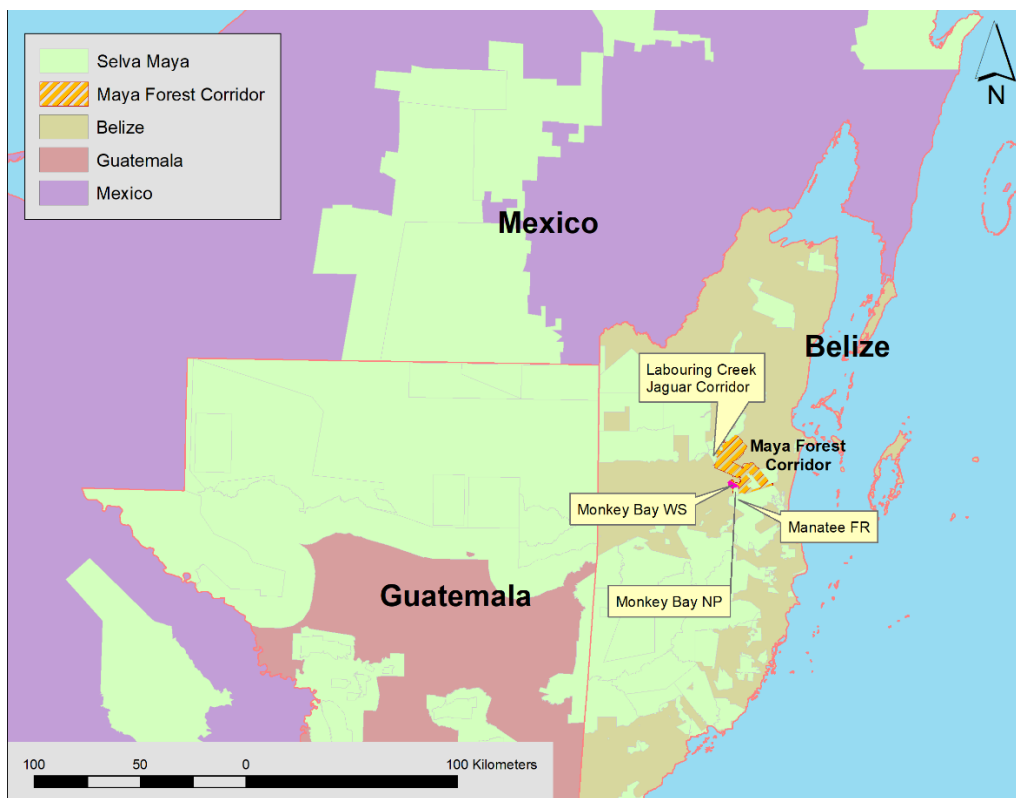


Figure 2: Maya Forest Corridor within the Selva Maya

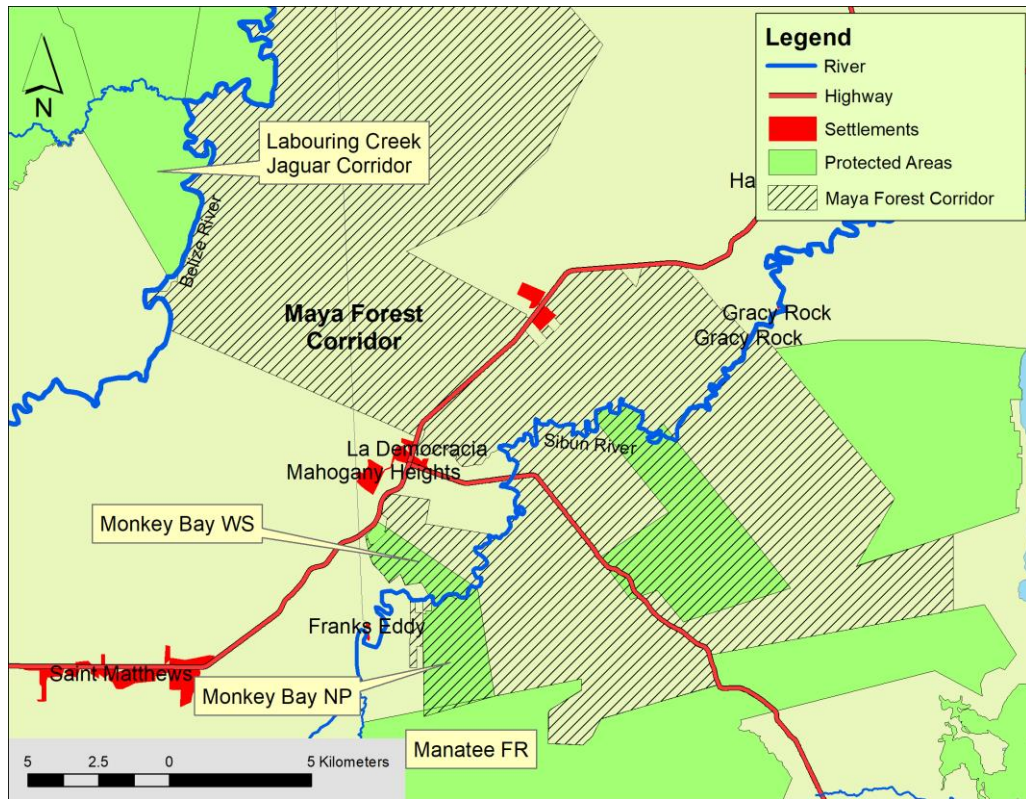


Figure 3: Monkey Bay Wildlife Sanctuary within the Maya Forest Corridor



Figure 4: Churchyard Road (left) and Sibun River Beach with MBWS' canoes (Right)

2.2 Regional Context

MBWS makes up a significant portion of the MFC, making it vital to the integrity and viability of the corridor. MBWS has joined forces with local and international organizations and authorities, including Foundation for Wildlife Conservation (FWC), University of Belize Environment Research Institute (UB-ERI), The Belize Zoo and Tropical Education Center, and Wildlife Conservation Society, to form the MFC Coalition. The MFC Coalition aims to secure and conserve the MFC in perpetuity through habitat protection, along with the participation of local communities and stakeholders. In June 2019, GOB officially endorsed the MFC as an area of natural significance and enacted legislation for its long-term protection.

The MFC now contributes to the protection of the Selva Maya - a tropical forest region extending over 9.8 million acres (4 million hectares) of protected areas that extends over Belize, northern Guatemala, and south-eastern Mexico. The MFC links two of largest areas of unbroken protected habitat in Mesoamerica – the greater northern portion of the Selva Maya (including the RBCMA) and the Maya Mountain Massif in southern Belize, which forms the lower south-eastern portion of the Selva Maya (Figure 5). Altogether, the Selva Maya boasts the largest contiguous area of tropical rainforest in the Americas north of the Amazon (Selva Maya, 2022). The Selva Maya is a major component of the Mesoamerican Biological Corridor and contains an array of ecosystems that harbor an extraordinary biodiversity, including many endangered and endemic species such as the Scarlet Macaw (*Ara macao*), Jaguar (*Panthera onca*), Baird's Tapir (*Tapirus bairdii*), White-lipped Peccary (*Tayassu pecari*), Yucatan Black Howler Monkey (*Alouatta pigra*) and the Ocellated Turkey (*Meleagris ocellata*).



Figure 5: The Selva Maya Region²

² Source: Selva Maya (<https://selvamaya.info/en/offices/>)

Additionally, the Selva Maya safeguards the integrity of watersheds and provides landscape connectivity among Belize, Guatemala, and Mexico. The greater Selva Maya provides ecosystem services, such as clean water, biodiversity habitat, and soil stability, that many Belizeans depend on for their livelihoods. However, illegal logging, exploitation of flora and fauna, forest fires, and land use change and land degradation caused by agricultural activities and excessive use of pesticides all threaten this very important forest system (Selva Maya, 2022).

Since MBWS is listed as a private protected area under Belize’s NPAS, it therefore promotes the fulfilment of Belize’s international commitments under the Convention on Biological Diversity and other international conventions (Table 1). The protection of MBWS aligns with the Central American Commission for Environment and Development (CCAD) mission of developing a regional system of cooperation and environmental integration to improve the quality of life of people from member states. The Government of Belize ratified their membership with CCAD in 1989 and became a signatory of the Central American Alliance for Sustainable Development (ALIDES) in 1994. One of the projects supported by ALIDES is the establishment of the Mesoamerican Biological Corridor (MBC), a wildlife corridor of natural vegetation linking the protected areas throughout Central America. The MBC project was launched in 1997 with an objective to maintain and improve the biological diversity, reduce fragmentation, and improve landscape connectivity. By 1999, CCAD also developed an Environment Plan for Central America (PARCA) to aid in facilitating a development and conservation strategy, therefore putting ALIDES’ plans into operation (López & Jiménez, 2007).

Table 1: International Conventions & Agreements relevant to Monkey Bay Wildlife Sanctuary³

Convention	Ratified	Objective
Central American Alliance for the Sustainable Development (ALIDES), 1994	1994	To promote peace, consolidate democracy, and protect the environment.
The United Nations Convention to Combat Desertification, 1992	1998	To improve the living conditions for people in drylands, to maintain and restore land and soil productivity, and to mitigate the effects of drought.
United Nations Convention on Biological Diversity, 1992	1994	To conserve biological diversity, promote sustainable use of its components, and encourage fair and equitable sharing of benefits

³ In the context of MBWS being part of the greater MFC area, the private protected area contributes to the conventions listed.

		arising from the utilization of genetic resources.
United Nations Framework Convention on Climate Change (UNFCCC), 1992	1994	To stabilize greenhouse gas concentrations at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system.
Central American Commission for Environment and Development (CCAD), 1989	2000	To develop a regional system of cooperation and environmental integration to help improve the quality of life of people of its member states through economic development, coordination of efforts and by increasing the potential of available resources.
The Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), 1973	1986	To ensure that international trade in specimens of wild animals and plants is legal, sustainable, and traceable and does not threaten their survival in the wild.

2.3 National Context

2.3.1 Legal and Policy Framework

As aforementioned, a PPA's purpose is "*to complement the national lands through provision of connectivity, priority species protection, and improved ecosystem representation*" with permitted activities such as research, education, tourism, and sustainable extraction. There are currently eight PPAs, including MBWS, listed under the NPAS that is recognized by the Forest Department (Table 2). However, only three PPA (Rio Bravo Conservation and Management Area, Shipstern Conservation and Management Area, and Block 127) are legally embedded in the national framework with effective legal instruments ensuring permanence of conservation management (NPASP, 2015). Since PPAs are crucial to the national forest network in creating functional biological corridors, it is important that the PPAs make a significant and permanent contribution to the NPAS by working towards formal recognition with the GOB.

The following are qualifications for PPAs to have recognition within the NPAS (NPASP, 2015):

- Significantly contributes to the coherence and comprehensiveness of the system in terms of ecosystem coverage, biological connectivity, and 'conservation targets' according to the PA Rationalization process.
- Management activities conform to standards required for sites within the NPAS.
- Legally binding agreement with the GOB and the landowner to assure the permanence of conservation management.

Table 2: Belize's Private Protected Areas listed under the National Protected Areas System⁴

Name	IUCN Category	Established	Management Body	Area (ac)
Shipstern Conservation and Management Area	IV ⁵	1989	Corozal Sustainable Future Initiative (CSFI)	27,181
Rio Bravo Conservation and Management Area	VI ⁶	1989	Programme for Belize (Pfb)	260,000
Community Baboon Sanctuary	IV	1985	Private	12,980
Aguacate Lagoon Reserve	IV	1987	Spanish Lookout	284
Monkey Bay Wildlife Sanctuary	IV	1990	Private	1,060
Runaway Creek Nature Reserve	IV	1999	FWC	6,000
Golden Stream Corridor Preserve	IV	1998	Ya'axché Conservation Trust (YCT)	15,441
Block 127	IV	2001	Toledo Institute for Development and the Environment (TIDE)	9,232

As a PPA under NPAS, the PPA may implement the national policy for the protection and sustainable management of natural and cultural resources. The National Forest Policy of 2015, for example, endeavors to establish and manage protected natural forest areas for the protection of biodiversity and wildlife habitats, and to preserve their core ecological functions. As for the Laws of Belize, Section 20 of the National Protected Areas System Act (Chapter 215, Revised Edition 2020) makes the declaration of PPAs, in which the Minister⁷ ensures that the PPA meets adequate and long-term protection, and that the landowner has consented in writing to such a declaration. Once the PPA has been declared and registered, it is then eligible for taxation allowances or benefits. The National Protected Areas System Act also states the following:

- Once the PPA is declared, it remains a protected area regardless of any subsequent arrangement of the property (Section 22);
- All activities must be consistent with the classification given to the PPA (including the same technical and procedural requirements of a public protected area) and

⁴ Adapted from Wildtracks (2009)

⁵ IUCN Category IV – Habitat or species management area

⁶ IUCN Category VI – Protected area with sustainable use of natural resources

⁷ Minister responsible for the National Protected Areas System

that any change of ownership shall not affect the protected status (Section 23); and

- If the managing body fails to uphold proper management and take corrective measures, the Minister may deregister the area as a PPA (Section 32).

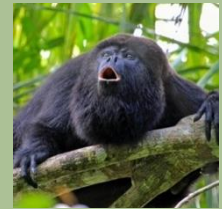
Several laws exist in Belize that are relevant to protection and sustainable use of the MBWS and its natural resources:

- Belize Tourism Board (Tour Guide) Regulations of 2003 addresses academic qualifications and the duty and functions of licensed tour guides. These Regulations support the Forest Act and the National Forest Policy, and in addition, compel tour guides to take all necessary steps to safeguard the environmental integrity of Belize.
- Environmental Protection Act (Chapter 328, Revised Edition 2020) and the Environmental Impact Assessment Regulations of 2007 address the regulations and penalties for the dumping of wastes and the process and guidelines for the development of the Environmental Impact Assessment, respectively.
- Forest Fire Protection Act (Chapter 212, Revised Edition 2020) addresses the regulations for the declaration of fire protection areas.
- Fire (Negligent Use Of) Act (Chapter 117, Revised Edition 2020) addresses the regulations for proper use and management of fire.
- Private Forests (Conservation) Act (Chapter 217, Revised Edition 2020) addresses restrictions on the removal of trees (felling) and permit requirements.
- Wildlife Protection Act (Chapter 220, Revised Edition 2020) prohibits hunting or molestation of the wildlife found within the PPA.

2.3.2 Monkey Bay Wildlife Sanctuary: A History

1859

The British Honduras Company, previous owners of the property, adopted the name "Monkey Bay". It is thought that the name came about since a troop of Black Howler Monkeys could be found near the Sibun River Beach.



1975

The Belize Estate Company sold the property to Joshua Brown, a cattle rancher from Arkansas, for 21, 400 USD. Brown (pictured in red) established a 200 head cattle ranch.



1985

Brown terminated his cattle ranch business due to financial losses (cattle rustling, inadequate local management, and loss of half his cattle due to a Sibun River flood).



1989

Matthew Miller, a former Peace Corp volunteer, becomes co-owner of Monkey Bay by purchasing half of the property from Joshua Brown. Brown (pictured on right) and Miller (pictured on left) agreed by handshake to establish Monkey Bay as a self-sustaining wildlife sanctuary.



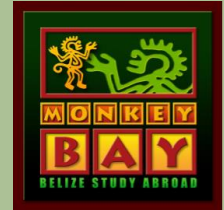
1990

Hon. Glen Godfrey, Minister of Tourism and the Environment, dedicated the Monkey Bay Wildlife Sanctuary to the people and wildlife of Belize. He also recognized the Sanctuary as a Private Protected Area during the Earth Day (April 22) celebrations held at Monkey Bay.



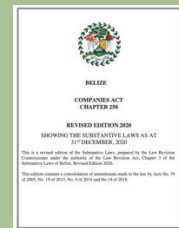
1992

Miller leased property adjacent to the Sanctuary for an environmental education and training hosting campus⁸ to host local and international student groups to study in Belize. Monkey Bay's first college semester abroad program was a school from Brattleboro, Vermont.



1994

Monkey Bay Wildlife Sanctuary officially became registered and incorporated as a private company under the Companies Act (Chapter 206, Revised Edition 1980) to be managed by a Board of Directors. The Memorandum of Association included activities centered around the establishment of an education center for Tropical Ecology.



2012

A Deed of Covenant was issued between Joshua Brown and Matthew Miller. The Covenant places certain restrictions to the property (MBWS), including that the property remains in its natural and scenic state.



2015

Monkey Bay Wildlife Sanctuary became registered as a non-government organization (NGO).



⁸ The establishment and operation of the MBWS field research station as an educational institution was approved under Education Act, Revised in 1991 (now the Education and Training Act, Chapter 36:01, Revised Edition 2020). Approval is reissued periodically.

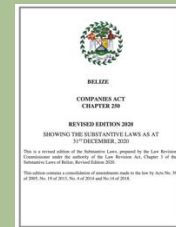
2019

Monkey Bay Wildlife Sanctuary joined the Maya Forest Corridor Coalition to secure and conserve the Corridor in perpetuity through habitat protection.



2020

Monkey Bay Wildlife Sanctuary amended the Memorandum of Association under the Companies Act (Chapter 250, Revised 2020) to reflect their focus on establishing and supporting conservation management within and around the Sanctuary, including the Maya Forest Corridor.



2022

The Monkey Bay Wildlife Sanctuary developed its first management plan for the next 5 years (2022-2027).



2.3.3 Evaluation of Protected Area

Local and National Importance

As aforementioned, MBWS is found within the MFC and contributes to landscape connectivity and provides several ecological services. Although MBWS contributes to only a portion of the greater MFC, MBWS has different ecosystem types (see Section 2.5), with about 10% of it being comprised of savanna. Belize has about 10% of pine savanna occupying the entire land area, but only 22-27% of the savanna are located within protected areas. The remaining pine savanna are highly threatened by a combination of human pressures and climate change (Bridgewater et al., 2012). Apart from providing ecological and economic value, such as providing habitat for an array of plants and wildlife and contributing to flood mitigation, savannas have a high number of endemic plant species and are also the primary habitat for the endangered Yellow-headed Parrot (Bridgewater et al., 2012). With more development encroaching on savannas, PPA such as MBWS are ever more crucial for the long-term protection of these species.

Tourism activities

MBWS has been most known for educational tourism, with international and local students visiting the Sanctuary for an immersive tropical ecology experience. MBWS is a great source for scenic beauty and for savanna ecosystem appreciation. The natural resource conservation, eco-education, and biodiversity and ecosystem research that MBWS offers have attracted many schools to visit the area. However, other tourists that are only seeking adventure are also welcomed to experience MBWS, as the main tourism activities in the Sanctuary include hiking, canoeing the Sibun River, and birdwatching.

International Importance

The MFC is comprised of private lands and protected areas, including the MBWS, with a purpose of connecting two major protected areas: The Manatee Forest Reserve (MFR) to the south and the RBCMA to the north (Dasgupta, 2019). The MFR is contiguous with the larger Maya Mountain Block within Central/Southern Belize, while RBCMA is contiguous with the lowland tropical forests shared between Belize, Guatemala, and Mexico, known as the Selva Maya. Once the MFC is officially recognized as a protected area⁹, it would consolidate the Selva Maya, resulting in the largest contiguous protected area in Central America. Additionally, the MFC would consolidate 93% of Belize's terrestrial protected areas and position Belize as a global leader in protected area management (Wynne, 2021).

MBWS and the greater MFC is home to some of the most iconic and endangered species in Central America. Many of these species have international conservation concern and are listed under IUCN's Red List; they include the Yellow-headed Parrot, White-lipped Peccary, Jaguar, Puma, Baird's Tapir, Geoffroy's Spider Monkey, and the Central American River Turtle. Although some of these species' range may not fall within MBWS, such as the White-lipped Peccary and Central American River Turtle, they all range within the MFC.

Environmental Services of MBWS

The MBWS functions as a watershed for the Sibun River, which empties out directly into the Caribbean Sea. Therefore, the MBWS plays an integral part in the watershed protection and water security of its neighbouring and buffer communities. MBWS and the MFC also provides refuge and habitat for many species (mentioned above), which also cater to keeping the ecosystems balanced and healthy.

Table 3 provides a list of the ecosystem services and their products that are present in the Sanctuary.

⁹ MFC was recognized by the GOB as an area of significance in 2019 but has yet to gain official legal protection.

Table 3: Ecosystem Services of Monkey Bay Wildlife Sanctuary¹⁰

Ecosystem Services	Products
Provisioning	<ul style="list-style-type: none"> • Freshwater: Freshwater availability from aquifers and from the Sibun River
Regulation	<ul style="list-style-type: none"> • Climate Regulation: Intact forests sequester carbon, assist in the reduction of greenhouse gas emissions, and regulate local and global climate (temperature and precipitation) • Water Regulation: Runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover • Water Purification: Ecosystems filter out water and decompose organic wastes entering inland bodies of water • Erosion Regulation: Intact standing forests retains soil and prevents erosion and land degradation • Pollination: Habitat for pollinators
Recruitment	<ul style="list-style-type: none"> • Species Recruitment: Healthy ecosystems attracts biodiversity
Cultural and Socio-Economic	<ul style="list-style-type: none"> • Recreation and Ecotourism: MBWS offers a scenic landscape, rich biodiversity, and fun activities (hiking and canoeing) • Education: MBWS provides formal and informal education and training pertaining to the environmental field
Support	<ul style="list-style-type: none"> • Habitat Support: MBWS' ecosystems shelter and provides refuge for various species • Soil Formation: Intact ecosystems accumulates and decomposes organic matter that improves the soil • Nutrient Cycling: Essential nutrients cycle through the ecosystem and are maintained

2.3.4 Socio-Economic Context

The Economy

Belize has a small multi-faceted economy with tourism as its number one foreign exchange earner, followed by exports of sugar, bananas, citrus, marine products, and crude oil. The Country's economy grew slowly during the last decade, with GDP increasing by 2.2% annually and average per capita income declining by 0.4% per year. Although Belize has the third-highest per capita income in Central America, the average income figure masks a huge income disparity between rich and poor. The poverty rate rose from 41% in 2009 to 52% in 2018, and the Gini coefficient increased from 0.38 in 2009 to 0.49 in 2018. A key government objective remains to reduce poverty and inequality. High

¹⁰ Adapted from Millennium Ecosystem Assessment (2005).

unemployment, a growing trade deficit, and a heavy foreign debt burden remain significant concerns (Moody's, 2020).

According to the World Bank (2016), Belize's small size is an important exogenous factor that makes the Country vulnerable to terms of trade shocks and creates output volatility which can affect long-term growth negatively. As the Country needs to import most of what it consumes and relies on a few sources of foreign exchange, it remains quite vulnerable to the fluctuations of commodity prices and the performance of its few trade partners. In addition, the Country is vulnerable to climate change and natural disasters, which profoundly impact its economy, especially in the agriculture and tourism sectors.

Further, the Country was one of the world's most highly impacted economies by COVID-19. The GDP contracted by 16.7% in 2020, as unemployment and labor force participation deteriorated from 7.7% to 13.7% and 70.1% to 55.1% in 2020 and 2021, respectively (IDB, 2020¹; IMF, 2021; SIB, 2021a; SIB, 2021b). The recovery has been strong since the pandemic's start, with GDP growth for 2021 estimated at 12.5% and forecasted at 6.5% for 2022 (IMF, 2022). Unemployment and labor force participation also showed improvements to 9.2% and 62.4%, respectively, largely owing to the gradual recovery of the tourism industry. During the pandemic, the drop in revenues coupled with an increase in emergency expenditures led to a GDP deficit of -10.2% and a debt level of 133% of GDP in 2020, but fiscal consolidation efforts and other expenditure cuts contributed to a deficit reduction in 2021 to -0.7% of GDP. A significant reduction in external debt was also achieved following Belize's Debt for Nature Swap, reducing overall public debt to 108% of GDP. Nevertheless, uncertainties and risks remain, including the ongoing health crisis, the occurrence of natural disasters, and heightened inflationary pressures.

Belize's economy is highly concentrated in two sectors, tourism and agriculture. With 1.7 million international arrivals in 2019, Belize could be considered an emerging tourism destination in Central America and the Caribbean. Based on 2020 WTTC data, the total contribution of the Travel and Tourism industry to the Belizean GDP, including direct, indirect, and induced impacts, was almost US\$ 700 million in 2019. However, due to the Covid-19 pandemic, it has decreased to US\$ 255 million in 2020 (-63.7%). In 2019, tourism GDP represented 37.3% of the total GDP produced in Belize, while in 2020, it decreased to 16.2% of the total national GDP. Regarding employment, the tourism industry generated around 64,400 jobs in 2019, representing 38.6% of total employees in the Country.

Based on the Belize Tourism Board (BTB) data, in 2019, there were 3,166 active tourism businesses in Belize. Food & beverage businesses are represented most, with 39% of total

businesses, followed by accommodation (31.2%) and tour operators and travel agencies (19.1%). In addition to these tourism businesses, in 2019, 2,032 individual tour guides were registered and working in the tourism industry in Belize.

BTB data shows the general size of tourism enterprises is relatively small. Considering all tourism businesses in the Country and its corresponding number of insured employees, there were an average of only 7 employees per tourism business in Belize in 2019. Air and water transport companies have the highest number of employees (86 and 29 respectively), followed by sports and recreational companies (20 employees). In addition, the number of employees has decreased compared to 2018, as the sector did not generate enough revenues to maintain or increase the workforce. This situation has worsened due to the restrictions caused by Covid-19. Surprisingly, accommodation, which generates almost 10,000 jobs and represents 42.2% of the total direct workforce in the tourism industry in Belize, is relatively small, with an average of 10 employees per business (IDB).

The Country's agricultural sector accounts for more than 10 percent of GDP and 15 percent of employment. Around 28,000 individuals (18 percent of the working population) are directly engaged in primary sector employment, which accounts for one-quarter to one-third of all jobs in four of Belize's six Districts (SIB, 2018). Moreover, agriculture is the Country's primary source of merchandise export revenue, with food and live animals accounting for 93 percent of merchandise exports in 2019¹¹. Sugar, bananas, and orange concentrate were the primary merchandise exports, accounting for 65 percent of all exports by value in 2019. The agricultural sector is also critical for the Country's nutrition security in a context where 14 percent of Belizean children under 5 years of age are affected by stunting¹².

Agriculture remains one of the central pillars of Belize's economy and is the foundation of the productive sector and rural areas (IDB, 2017). However, the sector faces several competitiveness challenges, including: (i) *low productivity per hectare of cultivated land*, compared to LAC average for most of agricultural products; (ii) *high post-harvest losses* (sometimes up to 35-40% of production), especially due to lack of planting/harvesting planning and crop diversification which leads to overproduction of certain crops; lack of storage facilities as only 2% of harvested production is stored; and lack of processing strategies to increase value-added, as only 1.7% of farmers are engaged in agro-processing; (iii) *high production costs*, due to, among other factors, overconsumption of

¹¹ The Statistical Institute of Belize's GDP, trade and employment data are available at <http://sib.org.bz/statistics/>

¹² World Bank data available at <https://data.worldbank.org/country/belize>.

costly synthetic inputs; (iv) *low export diversification*, limited to a set of commodities produced by the biggest farmers, with low value-added, and increasingly vulnerable to price fluctuations; and (v) *low levels of market standards*, as farmers face increasing difficulties to meet a more sophisticated demand, including from the tourism industry where most of the food is imported (IDB, 2022). In addition to the competitive challenges, the sector also faces barriers to investing that include government policies and the weakness of support agencies (e.g., sanitary and phytosanitary inspection services). Credit is also expensive and restricted, and port facilities are costly and in poor shape, in addition to a lack of secure market and profitable new farming options (IDB, 2017).

The agricultural sector also faces significant climate and environmental challenges. In 2018, farmers faced estimated agricultural losses of US\$1.9 million due to flooding, while in 2019, a severe drought caused an estimated US\$38.5 million in losses (MAFSE, 2019). In 2020, the economic damages of Hurricane Nana caused significant damages to the sector, estimated at US\$6-10 million, while hurricanes Eta and Iota also caused significant flooding damages (IDB, 2020). Climate change projection models suggest that suitable areas and yields of beans, corn and vegetables, sugarcane, tropical fruits, rice, and cacao, will be significantly reduced. Corn production may become unfeasible without irrigation (IFPRI, 2015). Because of the negative Climate Change impacts on agriculture, it is estimated that Belize will be the most affected Country of LAC in terms of poverty (+1.28%), crop imports (+13.5%), and decrease in GDP (-1.8%) (Banerjee et al., 2021). Furthermore, the sector is a key driver of environmental damage. With a low 21,5/100 score¹¹ (regional average: 32.7/100), Belize ranks 147 of 180 countries in the Agriculture category (combination of Sustainable Nitrogen Management Index" and "Sustainable pesticide use") of the Yale Environment Performance Index 2022, which measures efforts to support healthy populations while minimizing the threats of agriculture to the environment. And according to Global Forest Watch, from 2001 to 2021, Belize lost 57% of its tree cover, almost exclusively because of shifting agriculture and the expansion of commodities (IDB, 2020).

Socio-Cultural Baseline

Belize is located on the Central American mainland, forming part of the Yucatan Peninsula and lying between 15°45' and 18°30' north latitude and 87°30' and 89°15' west longitude. It is bounded to the north by Mexico, west and south by Guatemala, and east by the Caribbean Sea. It is the only Country in Central America where English is the official language due culturally and historically to its linkages to the Caribbean. The total land area is 22,960 sq. km. (8,867 square miles), of which 95% is located on the mainland, and five percent is distributed over more than 1,060 islands. The total national territory (including territorial sea) is 46,620 sq. km. (approximately 18,000 square miles).

The Country had an estimated 2022 Mid-Year Population of 441,471, with approximately 51% under the age of 30 years. Of the total population, 220,739 were males, and 220,732 were females (SIB, 2022). The ethnic composition of the population is diverse, as shown in the last population census of 2010. 52.9% of the population identified themselves as Hispanic; 26% identified as Creole; 11.3% as Maya; 6.1% as Garifuna; and the remainder were a diverse group of Asians, Caucasians, Mennonites, East Indians, and Others.

Demography

The MBWS is located in the Belize District and straddles the Cayo District border with stakeholder communities in both areas. Belize District is the most populous district in Belize and home to 30.6% of the total country population, while the Cayo district is the second most populous with 24.5% of the population (SIB 2022). The districts are multi-ethnic, of which the Creole ethnic group is the majority, followed by Hispanics in the Belize District. In contrast, the Hispanic ethnic group is the majority in the Cayo District, followed by Creoles. Table 4 shows a breakdown of the Country’s ethnicities by the district.

Table 4: Percentage of Population in each Ethnic Group by District, Belize 2010¹³

Ethnic Groups	Percentage of Population in District Claiming Ethnic Group					
	Corozal	Orange Walk	Belize	Cayo	Stann Creek	Toledo
Asian (Japanese, Chinese, Taiwanese)	0.8	0.8	1.5	1	0.9	0.3
Caucasian/White	1	0.3	1.7	1.3	1.7	1
Creole	8	7.2	56.5	18.5	22	5
East Indian	4.3	0.7	5.4	2.1	5	6.3
Garifuna	0.9	0.8	6.4	2	27.5	6.1
Maya	2.8	1.7	2.4	8	16.9	66.5
Mennonite	6.7	11.1	0.2	4.2	0.2	0.8
Hispanic	79.3	79.7	34.5	67.5	33.9	19.9
Other	0.9	0.5	2.4	0.9	1	0.5

While official data on ethnicity is not officially available, stakeholder communities of the MBWS are likely to include populations from the Belize and Cayo Districts, thus lending to a dominant Hispanic and Creole ethnic presence in the area.

¹³ Column percentages will not sum to 100, as some persons claim more than one ethnic group. Source: Statistical Institute of Belize, Population and Housing Census 2010

Education

Basic education in Belize consists of the following: two years of pre-primary (3-5 years), which is optional; eight years of primary (5-13 years), which is mandatory; and four years of secondary enrolment (13-17 years). At this stage, education in Belize is characterized by a structure in which the church is the majority provider. Public institutions represent only 19% of all institutions at this level, but 87% of all institutions are supported by public funding¹⁴. Despite the significant public support, churches and the private sector often operate according to their mandates, which may sometimes conflict with state policies, creating issues that impact access, quality and relevance, and governance of the sector (CDB, 2016).

Table 5 shows the total school enrollment for the period 2018-19¹⁵. Overall, there were 107,591 persons enrolled in the Belizean education system, of which 51% were females and 49% were males. While the ratio of males to females overall is similar, at the tertiary level, females outnumber males by 19% at the Junior College level and 30% at the University level. The trend differs in primary and vocational schools, where males outnumber females.

Table 5: Total Enrollment between 2018 to 2019¹⁶

Gender	Preschool	Primary School	Secondary	ACE17	Vocational	Junior College	University
Male	3,726	34,079	10,631	522	595	1,800	1,868
Female	3,759	31,914	11,682	695	158	2,647	3,515
Total	7,485	65,993	22,313	1,217	753	4,447	5,383

Educational opportunities are far from being evenly distributed among population groups. Most workers have a low level of formal education. Approximately 60% of the population 14 years and older has some secondary schooling; only 17% have some higher

¹⁴ Schools are classified into four types based on ownership and funding. Government schools are owned and funded by the GOBZ. Government aided schools are owned by private entities (including denominations) or community groups but receive a substantial portion of their funding from the GOBZ. Specially assisted schools are owned by private entities but receive small grants towards their expenses. Private schools are owned and funded entirely by private entities.

¹⁵ Post COVID figures are lower as student enrolment as of January 2021 up to the secondary level is showing a decrease of 7,293 (7.6%).

¹⁶ Source: Ministry of Education Abstract of Education Statistics 2018/19

¹⁷ Adult and Continuing Education.

education (SIB, 2018). Female workers have higher levels of education than their male peers, and almost 60% of the population with some university education are women. As a result, the share of the female labor force with some higher education is markedly higher (29%) than the corresponding share of the male labor force (16%). This follows a similar trend as noted in the previous section on school enrolment.

Gender and age matter for labor-market success. Education increases labor-market participation for both men and women. Individuals with higher education are about 25% age points more likely to participate in the labor market than individuals with less than a complete secondary education. Women's participation rates are lower than men's at all levels of educational attainment. As women achieve higher levels of education, the gender gap in labor-market participation closes. The gender gap is 34%age points for workers who did not complete secondary school but drops to 20%age points among workers who did. Among workers with higher education, the gender gap in labor-force participation narrows to less than 5 %age points (IDB, 2020).

Although there has been progress in Belize's education sector, issues with access at the Early Childhood Development (ECD) and secondary levels remain a significant development challenge. Lack of ECD access means many students are not adequately prepared for the transition to formal education. At the same time, limited places at the secondary level reduce throughput to higher education, a necessary precursor for the social and economic development of the country. In addition, attempts to enhance quality have been hindered by the significant number of teachers in basic education without pedagogical training. Parallel to this, a dearth of appropriately trained instructors inhibits the delivery of advanced-level programming in Technical and Vocational Education and Training (TVET), contributing to the escalation of skills deficits in the economy. Additionally, there is the issue of skills mismatches between education and training provision and the economy's needs.

The Belize and Cayo Districts have the highest share of the working population with post-secondary and university-level education (Naslund-Hadley et al., 2020) (Table 6). Furthermore, the Belize and Cayo Districts also have the highest high school completion rate. The high level of formal education completion in the Belize District would likely lend to the existence of a reasonable level of skilled workers living around the MBWS. No area-specific data exists for the MBWS, but the service providers in this area are more likely to have completed at least primary level education.

Table 6: Level of Education of Workers by District and Category¹⁸

District	Share of Total Population %	Incomplete Secondary or Less %	Complete Secondary %	Junior College %	University %
National Average	-----	59	23	12	6
Belize	32	44	31	17	8
Cayo	24	56	26	9	9
Corozal	12	67	16	12	5
Orange Walk	13	77	12	9	2
Stann Creek	11	70	19	7	4
Toledo	8	72	17	8	3

Employment

The labour force in Belize comprises all persons aged 14 years and older who were engaged in any form of economic activity, for at least one hour, during the reference week or who were willing and able to be involved in producing economic goods and services. The average Belizean worker is male, low-skilled, Hispanic, employed in the tertiary sector, and earns 610 USD per month (Naslund-Hadley et. al., 2020). Based on the statistics on Belize’s labour force from September 2021, 71.7% of the population was of working age; however, the labour force participation rate was at 61.9%, with males participating at a significantly higher rate than females (76.1% males, and 48.2% females). The national unemployment rate declined from 13.7 percent in September 2020 to 9.2 percent in September 2021 as major industries such as ‘Tourism’, gradually recovered from the adverse effects of the COVID-19 pandemic. Nationally, there is a steady move toward employment in the services sector, including the tourism industry. In 1999, 45% of all workers were employed in the primary and secondary sectors but that has now declined to 35% with the majority of new jobs created in the tertiary sector (Naslund-Hadley et. al., 2020). Table 7 below provides Belize’s main Labour Force Indicators as a point of reference.

¹⁸ IDB, 2020

Table 7: Belize Main Labour Force Indicators for September 2021¹⁹

CATEGORY	TOTAL	Male	Female
Total Population	432,516	216,257	216,259
Population 14 years and over	121,758	63,949	57,809
Under 14 years population	310,758	152,308	158,449
Employed	174,237	107,891	66,346
Unemployed	17,644	7,734	9,910
Persons Not in the Labour Force	118,161	36,228	81,932
Don't Know/Not Stated	716	455	262
Working Age Population (14 and older)	71.7%	70.2%	73.1%
Unemployment Rate	9.2%	6.7%	13.0%
Underemployment Rate	18.9%	18.4%	19.8%
Labour Force Participation Rate	61.9%	76.1%	48.2%

Additionally, the Labor Force Survey (LFS, 2021) recorded that as of September 2021, the Belize District registered the highest labor force participation rate at 65.9%, with the Cayo District ranking third at 62.5%. This LFS also showed that half of all employed persons had jobs in 'Services and Sales' or 'Elementary Occupations'. Across the entire Country, there was an overall increase of 8,800 jobs in the tourism sector in September 2021, which points to notable growth compared to September 2020 (Ibid). In the absence of disaggregated labour force data for the MBWS communities, it could also be concluded that since the Belize and Cayo districts ranked at the top in the increase in employment in this period, those newly employed could have gotten jobs mainly in the tourism sector, in areas around the community, particularly the Jaguar Paw area.

Belize's small open economy is supported primarily by the tertiary industries, which include wholesale and retail, tourism, and government services. Collectively, they contribute 62% of Belize's Gross Domestic Product (GDP). The secondary industries, which includes manufacturing, construction, and generation of electricity and water, contributes 14% to the GDP and the primary industries, such as agriculture, fisheries, and forestry, contributes 10% of the GDP. The remaining 14% is attributed the taxes and subsidies (BNN, 2020; SIB 2021).

¹⁹ Statistical Institute of Belize (<https://sib.org.bz>)

Tourism

Prior to the COVID-19 pandemic, tourism was one of the major sectors of the Belizean economy and the principal source of foreign exchange. Since the early 1970s, tourism began to profit the local and commercial sectors of Belize (BTB, 2022). Since then, Belize has enjoyed exponential growth in the industry in both the overnight and cruise tourism arrivals (see Figure 6 for total arrivals from 2001 to 2021). About half a million overnight and over one million cruise visitors came to Belize in 2019 (Central Bank of Belize, 2022). In September 2019, the Labour Force Survey (LFS) found that 17.2% of the employed labor force works in the tourism industry but fell to 8.1% in 2020 during the height of the pandemic (BTB, 2020). As aforementioned, the employment rate has since been on the rise.

Before the pandemic, cruise tourism had become an important feature of the overall industry. Overnight tourism also shows a distinct seasonality, with most visitors traditionally arriving in the first quarter of the year. The lowest months are September and October, which also coincide with the main tropical storm months.

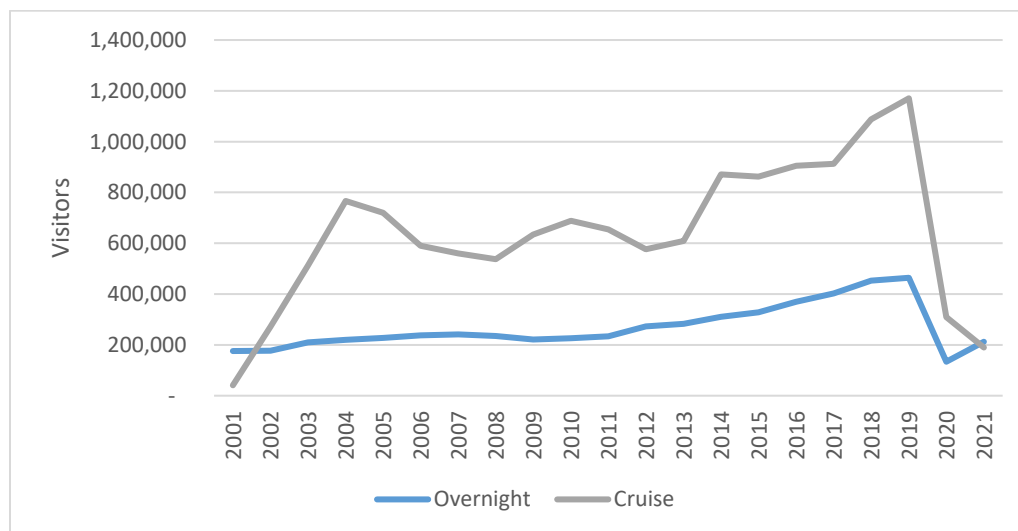


Figure 6: National Tourism Growth from 2001-2021²⁰

Gender

Belizean women have persistently experienced lower engagement in the formal economy. This is in part reflective of the primary pillars of the Belizean economy, namely: tourism, agriculture, fisheries, and construction which are traditionally male-dominated. CDB's Belize 2015 Country Gender Assessment shows that gender inequality persists in Belize, hindering social and economic progress and poverty reduction. Unemployment is two times higher for women (13%) than for men (6.7%), with 56% of all unemployed being

²⁰ Source: Central Bank of Belize (2020)

female. Occupational segregation in the labour market impedes women's entry into better-paid sectors and positions. Women are highly concentrated in domestic services-related roles, front-line work, travel planning, and other poorly paid service jobs. In contrast, men own and manage resorts, maintain buildings and grounds, and operate as tour guides and taxi drivers. The gendered nature of the Belize workforce means that women are less likely to be employed, or they may be confined to jobs that are still considered socially acceptable.

Gender roles in Belize are typically traditional, with significant value placed on marriage and childbearing for women. Belizean women are often expected to stay home and look after the children, while men are the primary breadwinners. In families living in poverty, women often depend on men for economic stability (*Utsey, 2021*). According to the CDB (2015), patriarchy is deeply embedded in key and influential social institutions in Belize, despite the diverse belief systems and practices. The 2010 CPA indicates that in Belize, more men consider themselves heads of a household than women. Subsequently, more women consider themselves to be the spouses or partners of male heads of household. The differential declaration of a head of household status by women and men is attributed to the Country's patriarchal social organization and the traditional consideration of male order in leadership and decision-making. The CPA further indicates that of the 79,492 households in Belize, 27.6 percent (21,939) were headed by females, compared to 24.0 percent identified in the 2000 Census. Women's burden of care is greater in these instances, as many female heads are solely responsible for the care, with no partner or robust family safety net. Combined with limited and unequal labour market opportunities, women's vulnerability to poverty is significantly greater due to their propensity as single-parent heads of households (UN Women, 2014). The CPA further indicates that among these households, more than a third (29,061) consists of five or more persons, revealing a high dependency ratio.

2.3.5 Stakeholders

Table 8 is a stakeholder registry. It shows a list of the project stakeholders, the stakeholder type, description, their relationship to MBWS, and contact information.

Table 8: Project Stakeholders

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
Forest Department	Public	The Department serves as the regulatory agency responsible for the management of terrestrial protected areas/ sustainably managing Belize's forests.	Any work in protected areas requires Forest Department's involvement.	Name: Wilbur Sabido Position: Chief Forest Officer Email: cfo@forest.gov.bz Phone: 822-1524 Name: Minerva Gonzalez Position: Restoration Desk Email: GonzalezMI@gobmail.gov.bz Phone: 822-1524
National Biodiversity Office of Belize	Public	The National Biodiversity Office is responsible for implementing Belize's agenda related to biodiversity and protected areas, particularly national parks, nature reserves, wildlife sanctuaries, natural monuments, biological corridors and private protected areas, in partnership with the Protected Areas Conservation Trust. The Unit will also be charged with regulatory roles in relation to biodiversity, protected areas, and trade in endangered species.	Any work in protected areas requires NBIO's involvement.	Name: Hannah St Luce Position: Director Email: director.nbio@environment.gov.bz Phone: 828-9056
Department of the Environment	Public	The Department's major tasks are to recommend national policies which promote improvements in environmental quality, to recommend priorities among environmental programs and to assist in achieving international cooperation in dealing with environmental problems.	Provides environmental clearance for development/infrastructure work within natural spaces.	Name: Anthony Mai Position: Chief Environmental Officer Email: doe.ceo@environment.gov.bz Phone: 822-2548 / 2819

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
Ministry of Infrastructure Development & Housing	Public	Has the substantive responsibility for managing, constructing, upgrading, and maintaining the primary and secondary road networks in Belize. Their responsibility includes the highways, feeder roads, distribution roads and village streets, including the sections that cross the Towns (even where there is a bypass available). Municipal roads are Town/City Council's responsibility and Forest Roads are the responsibility of the Forest Department.	Decision maker in the management of the public road that borders MBWS and provides access to the Sibun River.	Name: Victor Espat Position: CEO Email: ceo@midh.gov.bz Phone: 828-5005, 822-0959
Mining Unit of Ministry of Natural Resources	Public	Department's focus is to develop the mineral industry of Belize in accordance with the mining legislation, acceptable international standards, and sound environmental practices for the benefit of all Belizeans.	Has influence on and legal authority to grant license for mining activities in and around the Sibun River.	Name: Michelle Alvarez Position: Inspector of Mining Email: michelle.alvarez@mnra.gov info@naturalresources.gov.bz Phone: 828-5177 / 78
Institute of Archaeology (NICH) Belize	Public	Has mandate for managing all archaeological reserves in Belize. The institute is dedicated to research, protection, preservation, and sustainable management of Belize's cultural and archaeological resources.	Has influence on and legal authority to determine management of archaeological site in MBWS and surrounding areas.	Name: Dr. Melissa Badillo Position: Interim Director Email: ia@nichbelize.org Phone: 822-2106
Protected Areas Conservation Trust	Public	Belize's national conservation trust with the general function "to contribute to the sustainable management and development of Belize's natural and cultural assets for the benefit of Belizeans and the global community, both now and for future generations".	PA donor that can contribute towards MBWS achieving its mission.	Name: Nayari Diaz-Perez Position: Executive Director Email: ed@pactbelize.org Phone: 822-3637
Fisheries Department	Public	Responsible for conservation and sustainable use of fishery resources, registration and licenses, fisheries research, education, liaise	Support, Law Enforcement, permit approval for research	Name: Rigoberto Quintana Position: Senior Fisheries Officer

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
		with fishing cooperatives, management of marine reserves, fisheries law enforcement, export and research permits. Its mission is to provide the country and people of Belize with the best possible management of its aquatic and fisheries resources, with a view to optimize the present and future benefits through efficient and sustainable management.	permits (aquatic), Law enforcement Mandate & Policy	Email: seniorfisheriesofficer@fisheries.gov.bz fisheries_department@fisheries.gov.bz Phone: 224-4552
Belize Network of NGOs	NGO	The Belize Network of NGOs seeks to be the unified voice of Non-Governmental Organizations in Belize advocating for good governance to achieve sustainable human development.	Direct link to the NGO community.	Name: Janelle Chanona Position: NGO Senator Email: belize13thsenator@gmail.com Phone: 636-9425
The Belize Zoo and Tropical Education Center	NGO	Focuses on educating visitors about the wildlife of Belize through encountering the animals in their natural habitat. The aim is to instill appreciation and pride, and a desire to protect and conserve Belize's natural resources. Exhibits over 200 animals, representing over 45 native species. The Zoo keeps animals that were orphaned, rescued, born at the zoo, rehabilitated animals, or sent to The Belize Zoo as donations from other zoological institutions.	Partner in environmental education and research. Member of the Maya Forest Corridor Coalition and Trust.	Name: Celso Poot Position: Director Email: celso@belizezoo.org Phone: 613-4966
Community Baboon Sanctuary Women's Conservation Group	CBO	A CBO that was established in 1998 and is the managing authority for the Community Baboon Sanctuary (CBS). The group has a membership of 240 landowners from the seven (7) villages/communities that make up the CBS.	Partner in environmental education and research.	Name: Conway Young Position: Administrative and Programs Officer Email: cbsbelize@gmail.com Phone: 633-1748 / 622-9624
Belize Maya Forest Trust	NGO	The Belize Maya Forest Trust is a Belizean non-profit organization established in 2020 for the conservation and management of the Belize	Partner in environmental	Name: Elma Kay, Ph.D. Position: Managing Director Email: ekay@bmf.org.bz

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
		Maya Forest Trust lands comprised of 271,816 acres tropical moist forest formerly known as the Yalbac and Laguna Seca Lands. The Belize Maya Forest Trust lands are home to a wide diversity of flora and fauna including neotropical migrant birds and all five central American wild cats, species of conservation concern.	education and research. Member of the Maya Forest Corridor Coalition.	Phone: 610-3982
Programme for Belize (PFB)	NGO	PfB was established in 1988, is a Belizean non-profit organization dedicated to conserving Belize's natural heritage and promoting the sustainable use of its natural resources. Since its inception in 1988, Programme for Belize has acquired the Rio Bravo Conservation and Management Area (Rio Bravo or RBCMA), 250,000 acres (>100,000 hectares) of tropical moist forest in northwestern Belize which was destined to be logged.	Partner in environmental education and research.	Name: Edilberto Romero Position: Executive Director Email: execdirector@pfbelize.org Phone: 227-5616
Foundation for Wildlife Conservation	NGO	Manages and owns Runaway Creek Nature Reserve which is an area of immeasurable ecological value, historical significance and aesthetic beauty, tucked deep in the limestone karst hills of Belize. Over 6,000 acres of untouched savanna and dense rainforest harbor more than 128 species of animals, 315 species of birds, 4 species of large cats, and various other fauna. Innumerable plants, two rivers, and over 40 caves also call the idyllic reserve home.	Partner in environmental education, fire management outreach and research. Member of the Maya Forest Corridor Coalition and Trust.	Name: Kayla Hartwell, Ph.D. Position: Research Director Email: kaylahartwell@gmail.com Phone: 610-2929 Name: Cindy Law Position: President Email: cindy@runawaycreekbelize.org
Wildlife Conservation Society	NGO	WCS is a non-governmental organization headquartered at the Bronx Zoo in New York City, that aims to conserve the	Partner in environmental education, fire	Name: Nicole Auil-Gomez Position: Country Director Email: nauilgomez@wcs.org

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
		world's largest wild places in 14 priority regions.	management outreach, research, and capacity development. Member of the Maya Forest Corridor Coalition and Trust.	Phone: 610-3377 Name: Yahaira Urbina- Position: MFC Site Manager Email: yurbina@wcs.org Phone: 613-7953
Pantera	NGO	Panthera's Belize pioneered jaguar study in the Cockscomb Basin, leading the establishment of the first protected area for jaguars. Panthera is committed to research and monitoring in the park and has trained staff of other NGOs in camera trap monitoring, working towards the creation of national monitoring.	Partner for support and research (large cats and prey species), and Human-wildlife conflict. Member of the Maya Forest Corridor Coalition.	Name: Emma E. Sanchez Position: Belize Country Coordinator Email: esanchez@panthera.org Phone: 638-3447
Re:wild	Nonprofit	Re:wild and its partners work with communities and local partners to acquire the land needed to safeguard the Maya Forest Corridor.	Member of the Maya Forest Corridor Coalition and Trust.	Name: Chris Jordan Position: Latin America Director Email: cjordan@rewild.org
Belize Hotel Association	NGO	Represents the interests of its private sector tourism business organizations that include hotels, resorts, lodges, condominiums, educational facilities and home-stays and allied members including tour operators and ancillary businesses that service the hospitality industry.	Potential partner in promoting accommodation facility at MBWS.	Name: Reynaldo Malik Email: president@belizehotels.org Phone: 223-0669 Cell: 632-0398
Belize Tourism Industry Association	NGO	Broad-based tourism umbrella organization, with over 600 members, that seeks to bring together tourism related interests to meet the challenges of a dynamic and growing tourism industry in Belize.	Potential partner in promoting MBWS as tourism product.	Name: Linette A. Canto Email: ed@btia.org Phone: 227-1144

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
Belize Tourism Board	Public	Regulates the tourism industry and is responsible for licensing, revenue collection, marketing, destination planning, and quality assurance of the local tourism industries.	Potential partner in promoting MBWS as tourism product.	Name: Josue Carballo Position: Director, Industry Development Email: Josue.carballo@belizetourismboard.org Phone: 227-2420
St. Mathews Village	Community	Is a small settlement location at mile 48 on the George Price Highway (Western Highway). Estimated population 1155.	MBWS work impacts on stakeholder communities.	Name: Esperanza Arriaza Position: Chairperson Phone: 662-2978/663-5546
Frank's Eddy Village	Community	A village located at mile 38 on the George Price Highway (Western Highway). Estimated population 440.	MBWS work impacts on stakeholder communities.	Name: Alfredo Reyes Position: Chairperson Phone: 662-7090
La Democracia Village	Community	A village located at mile 31 on the George Price Highway (Western Highway). Estimated population 335.	MBWS work impacts on stakeholder communities.	Name: Crispin Lewis Position: Chairperson Phone: 665-3470
Mahogany Heights Community	Community	A village located at mile 31.5 on the George Price Highway (Western Highway). Estimated population 1290.	MBWS work impacts on stakeholder communities.	Name: Jermaine Sanchez Position: Chairperson Phone: 610-9462
Gracie Rock Village	Community	A village located at mile 21 on the George Price Highway (Western Highway). Estimated population 255.	MBWS work impacts on stakeholder communities.	Name: Wayne Pollard Position: Chairperson Phone: 623-2127
Harmonyville Community	Community	A village located at mile 41 on the George Price Highway (Western Highway). Estimated population 300.	MBWS work impacts on stakeholder communities.	Name: David Barnett Position: Director, BGYEA Phone: 621-2228
Cotton Tree Village	Community	A village located at mile 42 on the George Price Highway (Western Highway). Estimated population 500.	MBWS work impacts on stakeholder communities.	Name: Oscar Otero Position: Chairman Phone: 629-7837
Amigos Family Diner	Private Sector	Private restaurant located 31 & 2/3 on the George Price Highway (Western Highway).	Dining option for MBWS Guests.	
Cheers Restaurant and Cabanas Belize	Private Sector	Private restaurant and cabanas located 31 & 1/4 on the George Price Highway (Western Highway).	Dining option for MBWS Guests.	Name: Ms Anita Tupper Position: Owner Email: cheersbelize@gmail.com

Stakeholder	Stakeholder Type	Description	Relationship to MBWS	Contact
				Phone: 608-9252
Sue Hufford	Private Sector	Private owner of farmland adjacent to MBWS.	Activities on land impact on MBWS.	Name: Mike Hufford Position: Farm Manager Email: N/A Phone: 671-4105
Tiger Sandy Bay	Private Sector	Private 6,000-acre farm adjacent to MBWS.	Activities on land impact on MBWS.	Name: Harry Letkeman Position: Farm Manager Email: Hletkeman@spanishlookout.bz Phone: 615-7007
University of Belize, Environmental Research Institute (UB ERI)	Academia	A semi-autonomous department of the University of Belize created primarily to address the large gap in local capacity for research and monitoring that exists within Belize. The work of the Institute is focused on producing results that are directly relevant and applicable to the sustainable management of Belize's natural resources and building local capacity for this.	Partner for education outreach and research.	Name: Dr. Jake Snaddon Position: Director, ERI Email: jsnaddon@ub.edu.bz Phone: 822-2701
Study Abroad Universities	Academia	Various universities primarily from the United States that conducts study abroad programs.	MBWS has strong education component and relies of study abroad program for sustainability.	Name: Muthusami Kumaran, PhD Position: Associate Professor of Non-Profit Management & Community Organizations, University of Florida Email: kumaran7@gmail.com Phone: 352-273-3524
Domestic Vectors	Public	Residents of Belize.	Users of Sibun River and potential guests of MBWS.	N/A

2.3.6 Stakeholder Analysis

Stakeholder Analysis Matrix

Table 9 is the result of a basic stakeholder analysis. It highlights the needs or interests of each stakeholder grouping²¹ with the aim of developing a strategic view of the institutional landscape, the relationship between the stakeholders and the MBWS, issues that might prohibit full support of the sanctuary, the risks faced if the stakeholders are not engaged, and strategy for managing the stakeholders.

Table 9: Stakeholder Analysis Matrix

Stakeholder	Needs/Interests	What do we need from them?	Perceived attitudes/Problems	Risks if they are not engaged	Stakeholder Management Strategy
1. Forest Department	Maintaining integrity of NPAS. Reports on illegal activities in PAs.	Support in terms of enforcement (training, special constable). Support for conducting biological research. Endorsement for funding interventions.	MBWS irrelevant in terms of size and biodiversity.	Lack of support for enforcement activities. Reduce possibility of donor funding. Not getting co-management of Monkey Bay National Park.	<ul style="list-style-type: none"> • Keep Involved • Keep Satisfied
2. National Biodiversity Office of Belize	Maintaining integrity of NPAS. Reports on illegal activities in PAs.	Support for conducting biological research. Endorsement for funding interventions.	MBWS irrelevant in terms of size and biodiversity.	Reduce possibility of donor funding.	<ul style="list-style-type: none"> • Keep Involved • Keep Satisfied
3. Department of the Environment	Compliance with environmental laws. Reports on illegal activities in and around the sanctuary.	Compliance approval to continue business (Hosting). Support and collaboration on investigation into reports on illegal activities in and around the sanctuary. Support for signage and responding to calls on illegal	Issues/pollution are insignificant.	Illegal activities not addressed. Hosting license not renewed.	<ul style="list-style-type: none"> • Keep Involved • Keep Informed

²¹ The MBWS stakeholders as shown in Table 8 were categorized, where applicable, based on their service type prior to being analyzed.

Stakeholder	Needs/Interests	What do we need from them?	Perceived attitudes/Problems	Risks if they are not engaged	Stakeholder Management Strategy
		activities around the sanctuary. Collaboration on community education outreach.			
4. PACT	Successful implementation of MBWS management plan. Result of management of MBWS. Funding of NPAS.	Financial/donor support.	MBWS is not a prioritized PA.	No or limited donor support.	<ul style="list-style-type: none"> • Keep Involved • Keep Informed
5. Other GOB Ministries (MIDH, MNR, Fisheries Archaeology,)	Maintaining integrity of the public assets (roads, archaeological sites, ecosystem services).	Support and endorsement for co-management agreement and collaboration for studies.	MBWS wants to control public assets. Irrelevant national public assets.	Deterioration of public assets	<ul style="list-style-type: none"> • Keep Involved • Keep Informed
6. Environmental Organizations (BNN, MFCC, BZTEC, CBS WCG, BMFT, PfB, FWC, WCS, re:wild, Pantera)	Achieving the goals of the Maya Forest Corridor. Diversified revenue sources (MBWS guests is a source).	Collaboration on education outreach, enforcement, community outreach, and resource sharing.	Not doing enough in terms of conservation (research, surveillance, and enforcement).	Lose destination options for marketing activities at respective properties i.e. reduced revenues. Lose access to research data. Impact on revenues of the Maya Forest Corridor and communities.	<ul style="list-style-type: none"> • Keep Involved • Keep Satisfied
7. Tourism Org. (BTB, BHA, BTIA)	Increase and quality tourism product. Job creation.	Certification/Permit for operating. Capacity building training in tourism. Marketing support.	Less profitable niche market. Does not cater to domestic tourism.	Hotel license not renewed. No marketing and training support.	<ul style="list-style-type: none"> • Keep Informed • Monitor (Min. Effort)

Stakeholder	Needs/Interests	What do we need from them?	Perceived attitudes/Problems	Risks if they are not engaged	Stakeholder Management Strategy
8. Communities	Access for recreation. Capacity Development/ Training. Economic activities in the community. Resource extraction. Social benefits (community infrastructure, health care etc.).	Participation and engagement in management activities. Stake in MBWS and surrounding environment. Sustainable use of the natural resources. Respond to calls for employment in the MBWS.	Taking away or restricted traditional/customary resources. Profiteering off community resources. Discriminatory hiring practices (favoring one community over others).	Increase illegal activities. Difficulty in hiring workers. Less desirable tourism product.	<ul style="list-style-type: none"> • Keep Involved • Keep Satisfied
9. Private Sector (Amigos, Cheers, TSB, Sue)	Increase business activities. Maintenance of status quo (restaurants). Farmers not being demonized as unsustainable practitioners.	Business continuity (restaurants). Continued access to adjoining properties. Good communication on land management (land clearing and fire management) and illegal activities.	Competing interest (food). Demonization of farming activities.	Reduced dining options for guests. Unsustainable land management practices. Lack of reporting of illegal activities.	<ul style="list-style-type: none"> • Keep Involved • Keep Informed
10. Academia	Destination for quality study abroad experience. Maintenance of the PA. Engagement with local communities.	Continued support and purchase of product. Good communication. Collaboration on research. Fundraising partner.	Inadequate community engagement.	Collapse of business model.	<ul style="list-style-type: none"> • Keep Involved • Keep Satisfied
11. Domestic Visitors	Access for recreation. Capacity Development/Training. Environmental Education.	Support and purchase of product. Marketing (word of mouth). Stake and sustainable use of the natural resources.	High product cost. Exclusively caters for foreigners.	Reduction in reach of environmental outreach. Loss of revenue. Loss of local support.	<ul style="list-style-type: none"> • Keep Informed • Monitor (Min. Effort)

Stakeholder Interest-Influence Analysis

Further analysis of the key stakeholders for MBWS was done based on their power positions in respect to interest and influence. Table 10 captures the interest and influence dynamic that pertains to the development of the management plan and its execution in the MBWS. This analysis is indicative of the stakeholders’ interests in the MBWS and the magnitude of their influence on decision-making and the work of the organization²².

Table 10: Monkey Bay Wildlife Sanctuary Stakeholder Interest-Influence Analysis

Influence ↑ HIGH LOW ↓	High Influence – Low Interest <ul style="list-style-type: none"> • Forest Department • National Biodiversity Office of Belize • Department of the Environment • Tourism Organizations • Communities 	High Interest-High Influence <ul style="list-style-type: none"> • Environmental Organizations • Academia
	Low Influence – Low Interest <ul style="list-style-type: none"> • PACT • Other GOB Ministries • Domestic Visitors 	High Interest-Low Influence <ul style="list-style-type: none"> • Private Sector
	LOW	HIGH
	Interest →	

²² The level of influence can be derived by asking, “How strongly can each stakeholder affect the management plan outcome?” Determining interests can be derived by asking, “What are the positions of stakeholders regarding the issue?”

2.4 Physical Environment of Management Area

2.4.1 Rainfall

Belize has a subtropical moist climate with two seasons: a wet and a dry season. The wet season runs during the months of June to November, which are also the months that categorize the Atlantic Hurricane Season. Belize’s mean annual rainfall ranges from 1,524mm in northern Belize to 4,064mm in southern Belize²³ (National Meteorological Service of Belize, 2022). Belize has a rainfall gradient of being drier in the north and becoming progressively wetter south (Figure 7). Therefore, since MBWS is located in Central Belize, the average annual rainfall for the region is about 1,930mm²⁴, a higher average annual rainfall than the north. Figure 8 shows the average monthly rainfall for Belmopan, Belize²⁵, with peak rainfall occurring in June and November.

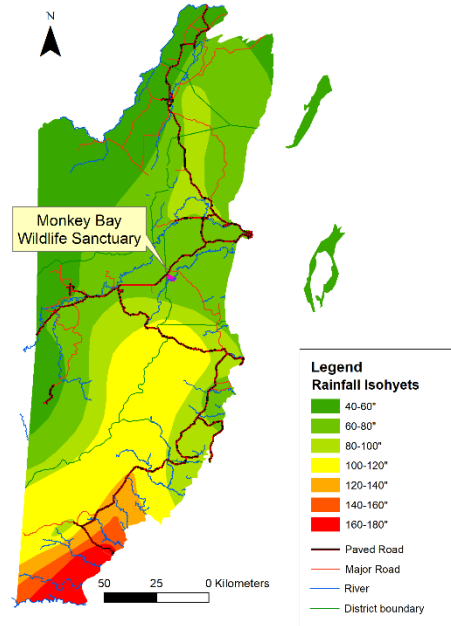


Figure 7: Rainfall Distribution across Belize

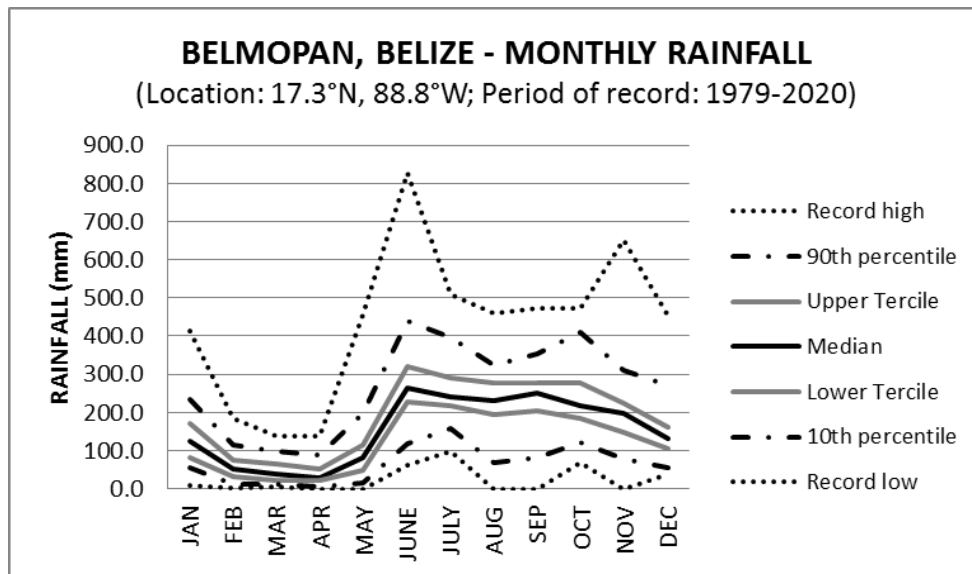


Figure 8: Monthly Rainfall for Belmopan, Belize²⁶

²³ Data collected between 1979-2020.

²⁴ Data collected from the Belmopan Meteorological Station between 1991-2020.

²⁵ Climate data referenced for MBWS is data collected from the Belmopan Meteorological Station, which is the closest meteorological station to MBWS.

²⁶ Source: National Meteorological Service of Belize, 2022

2.4.2 Temperature

The annual mean temperature for the MBWS region is 26.5°C (79.7°F), with fluctuations throughout the year (Figure 9). The monthly average temperature goes as low as 19.1°C (66.4°F) in January and as high as 34.1°C (93.4°F) in May. During the months of October through April, cold fronts are likely to affect Belize. However, cold fronts are most common in December, January, and February (National Meteorological Service of Belize, 2022). Although March and April may have cold front occurrences, the mean monthly temperature start to rise in March, peaks in May, and stabilizes between June and September. MBWS and the region also become susceptible to fire when temperatures are high and rainfall is low.

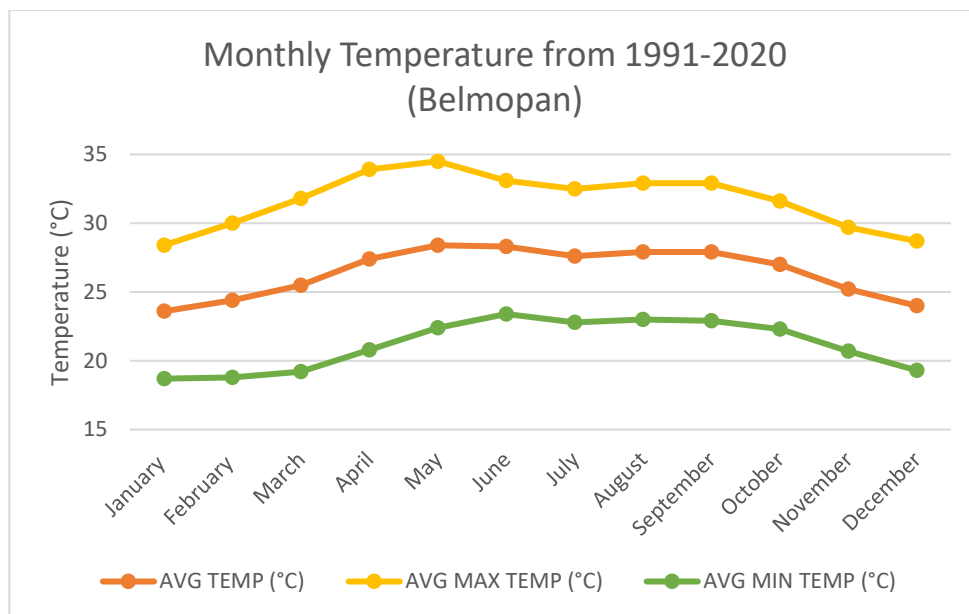


Figure 9: Average monthly temperature from the Belmopan Meteorological Station²⁷

2.4.3 Tropical Storms and Extreme Weather Events

During June to November, tropical waves, tropical storms, and hurricanes move westward through the Atlantic Ocean where it gathers its strength from the warm tropical water until it hits land. The Caribbean and Central American coastline, including Belize, is often subjected to these storms with varying intensities. The lesser of these storms is the tropical wave (wind speeds between 23 - 39 mph), which can be either active or inactive systems with peak activity during June and July. Tropical storms (wind speeds between 40 - 73 mph) and hurricanes (Wind speeds > 74 mph) are the most destructive and tend to peak during September and October, which is also evident for Belize as most of the tropical storms and hurricanes frequent the area during this time (Figure 10).

²⁷ National Meteorological Station of Belize, 2022

Even if tropical storms or hurricanes do not make landfall in Belize, their effects are wide ranging and may still significantly affect Belize if the storm is in its proximity. Figure 10 shows the number of tropical storms and hurricanes that have affected Belize, including those that did not make landfall.

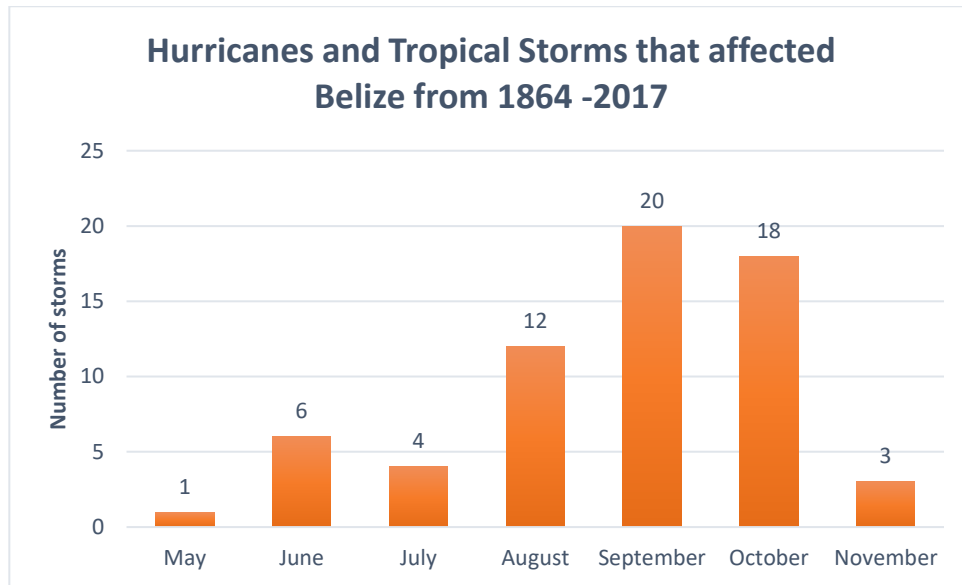


Figure 10: Hurricanes and tropical storms that affected Belize between 1864 - 2017²⁸

The two most recent hurricanes that made landfall in Belize and went through MBWS are Hurricane Richard and Hurricane Earl in October 2010 and August 2016, respectively (Figure 11). Strong winds associated with these storms would normally cause structural damage to the savanna and riparian ecosystem in MBWS, which affects the habitat quality for wildlife for months or years. Additionally, increased rainfall is another product of these storms, creating risks of floods and erosion along the Sibun Riverbank.

²⁸ National Meteorological Service of Belize, 2022

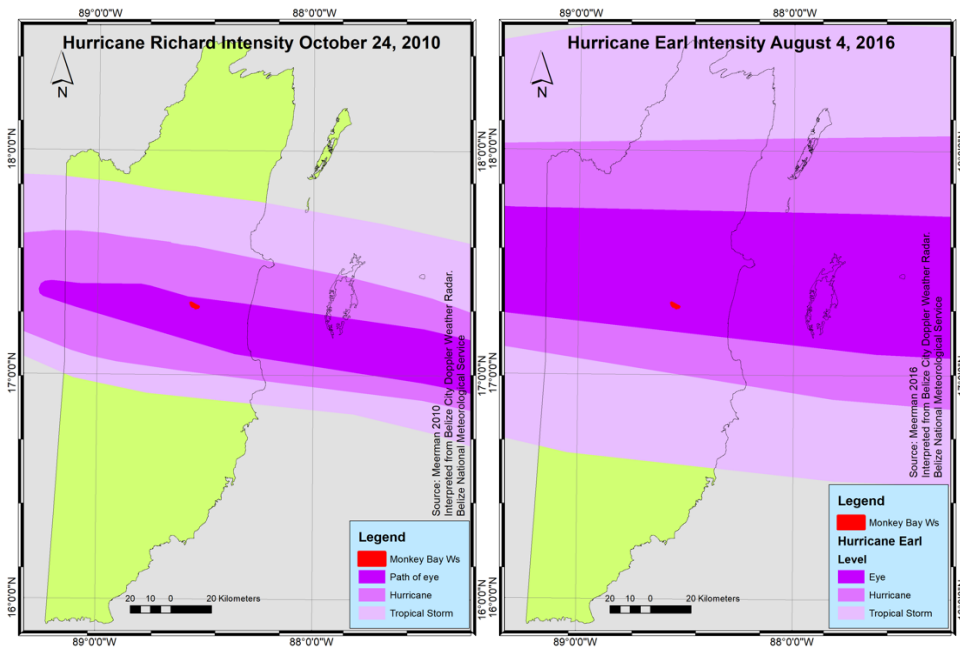


Figure 11: Hurricane Richard (2010) and Earl (2016)

2.4.4 Geology

Belize’s geology is largely limestone, except for the Maya Mountains that are a large upfaulted block of intrusive rock. The country’s geology is divided into three geologic provinces: Yucatan Platform, Maya Mountains, and the Sierra Madre de Chiapas-Peten Foldbelt (Figure 13). MBWS rests at or near the La Libertad Arch fault system, which sits between the Yucatan Platform to the north and the Maya Mountains Block to the south (Hartshorn et al., 1986). Based on the French & Schenk (2000) map adaptation shown in Figure 13 and Kather’s (1992) interpretation of Jenkin et al. (1976), the MBWS region is composed of three sedimentary rock deposits from different geologic ages: Pleistocene (from the Quaternary Period)²⁹, Eocene (from the Tertiary Period), and Cretaceous.

Era	Period	Epoch	Age
Cenozoic	Quaternary	Holocene	0.01 Ma
		Pleistocene	
	Tertiary	Pliocene	1.8 Ma
		Miocene	5 Ma
		Oligocene	24 Ma
		Eocene	34 Ma
		Paleocene	55 Ma
Mesozoic	Cretaceous	Late	99 Ma
		Early	
	Jurassic	Late	144 Ma
		Middle	159 Ma
		Early	180 Ma
			206 Ma

Ma: Million years before present

Figure 12: Time Period for the Mesozoic and Cenozoic Era⁹

²⁹ Kather (1992) refers to the Pleistocene, which is an epoch under the Quaternary Period. Although Pleistocene is not shown in Figure 14, Quaternary is labelled. Refer to Figure 13 to see the geologic time and how the epochs and periods are divided.

The Cretaceous and Eocene limestones form topography that is characterized by caves, sink holes, and intermittent drainage lines. As for the Pleistocene epoch, the sea level was about 55 meters (180 feet) higher than present day (Jenkin et al., 1976). Therefore, Pleistocene sedimentary rock are coastal plain deposits that have a sandy, gravely, and rocky texture. Based on the texture, these deposits correspond primarily to savanna vegetation, which occurs on a significant portion of MBWS.

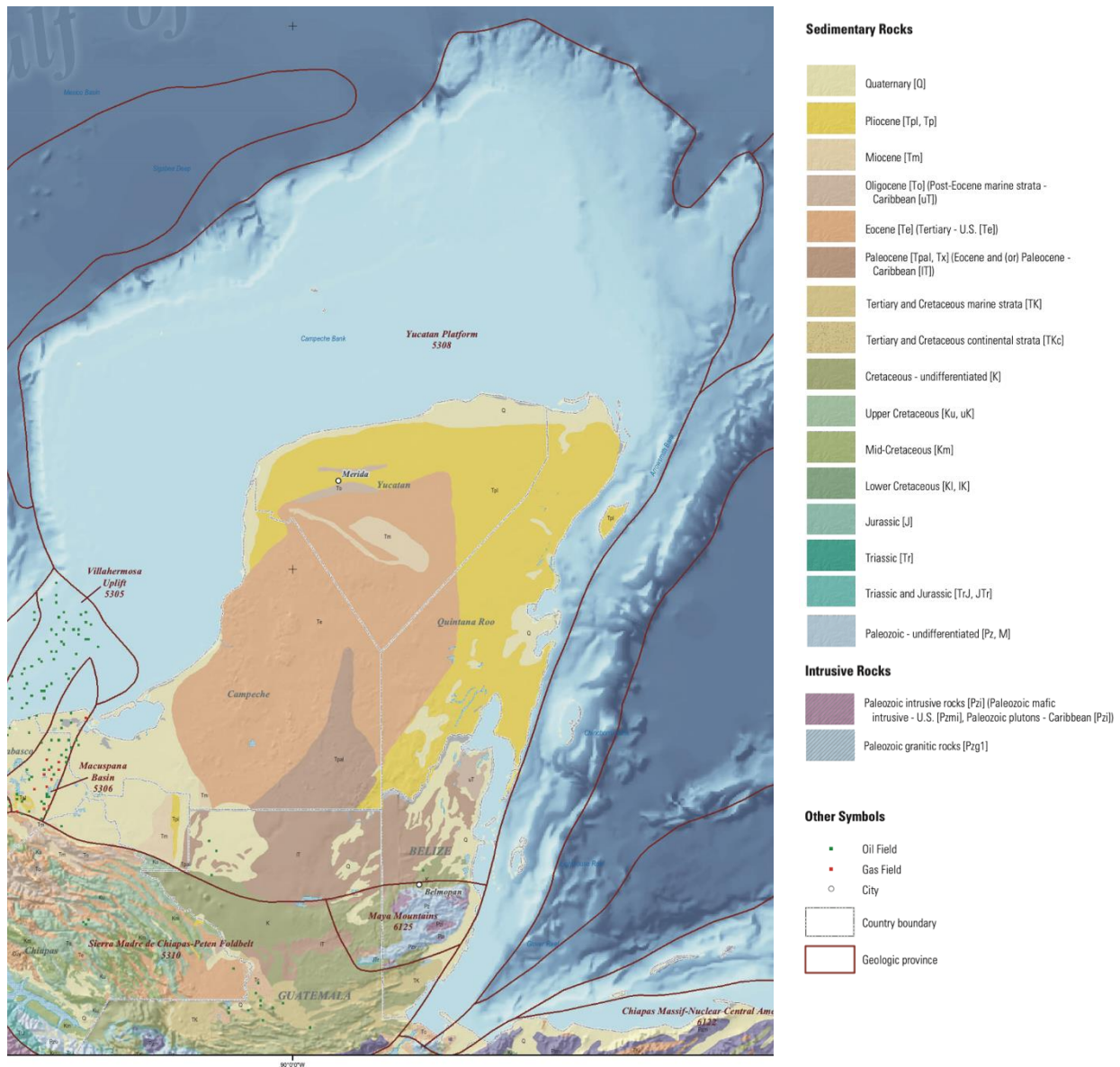


Figure 13: Geology of Belize and the region³⁰

³⁰ Source: French & Schenk, 2000. Map is an adaption of the original.

Landsystems for Monkey Bay Wildlife Sanctuary

The landsystems as defined by King et al. (1992) are useful for interpreting the landscape and are grouped according to a combination of geology, soils, slope and hydrology.

While the landsystems refer to soils, the nomenclature and description of the soils is complex and decidedly arcane to the average user. In our case, it is more important to know the source and geological history of the soils and their implications for the land use. For this reason, this report describes the overall landsystems rather than just the soils. Soils have also been classified by Baillie et al. (1993); where Baillie et al. had updated King et al., their terminology is used.

Similarly to the ecosystems, the landsystems within MBWS show a transition from northwest to southeast, with the land elevation ranging from about 45 meters (147.6 feet) above sea level at the George Price Highway to about 30 meters (98.4 feet) at the Sibun River (Jenkin et al., 1976). Following King et al. (1992), only three landsystems are found within MBWS (Figure 14), some of which can be refined to land subsystems as discussed below:

BP: Belize Plain (Undulating Plain): This land subsystem is situated on old alluvium and characterized by open savanna. The soils are Puletan soils, which formed in deep old siliceous alluvium that has been deposited on the coastal plain. There is a pale -coloured and coarse textured topsoil sharply overlying a compact red and white mottled finer textured subsoil. The soils are acidic and very deficient in nutrients.

The natural vegetation has a low biomass diversity and productivity, and agricultural potential is low with limitations of poor drainage, droughtiness, and multiple nutrient deficiencies. Within the MBWS, the correlating ecosystem is "Short-grass savanna with scattered trees and/or shrubs" and "Tropical evergreen seasonal broad-leaved lowland forest on poor or sandy soils".

Most of the land subsystem is unsuitable for agriculture but some cashew and pasture could be grown on the deeper sand.

BK: Beaver Dam Plain (Lower Slope): Found on internally drained and seasonally flooded depressions in the undulating limestone (Sascab – limestone marl) plain of Northern Belize and therefore has an alkaline influence. The soil (Alkalche/Chucum) profile consists of grey clay becoming lighter in colour at depth. In the wet season, the clay is massive, plastic, and sticky on the surface. In the dry season, the soil dries out to great depth with deep cracks.

Typically, this land subsystem has low forest and within MBWS it is correlated with “Deciduous broad-leaved lowland shrubland, poorly drained” and “Tropical evergreen seasonal broad-leaved lowland forest on poor or sandy soils”.

Imperfect drainage renders most of the land subsystem only suitable for pasture. However, there is some suitability for sugarcane.

BF: Lower Belize Floodplain (Alluvial Wash, High Floodplain Bench, and Low Floodplain Bench Levee): Found on alluvium. The “Melinda” soils are well- and moderately drained siliceous soils formed in riverine alluvium.

The fertile soils allow for a cover with high broadleaf forest.

King et al. (1992) recognises three subtypes in the area:

- 1) Alluvial Wash: Associated with “Tropical evergreen seasonal broad-leaved alluvial forest, occasionally inundated” within MBWS.
- 2) High Floodplain Bench: Associated with “Deciduous broad-leaved lowland riparian shrubland of the plains” within MBWS.
- 3) Low Floodplain Bench Levee: Associated with “Deciduous broad-leaved lowland riparian shrubland of the plains”. This area is found immediately along the Sibun River characterized by Bamboo (*Bambusa vulgaris*) and Bri-Bri (*Inga affinis*).

Although these soils have development potential due to their fertility, there is a risk of frequent flooding by the river.

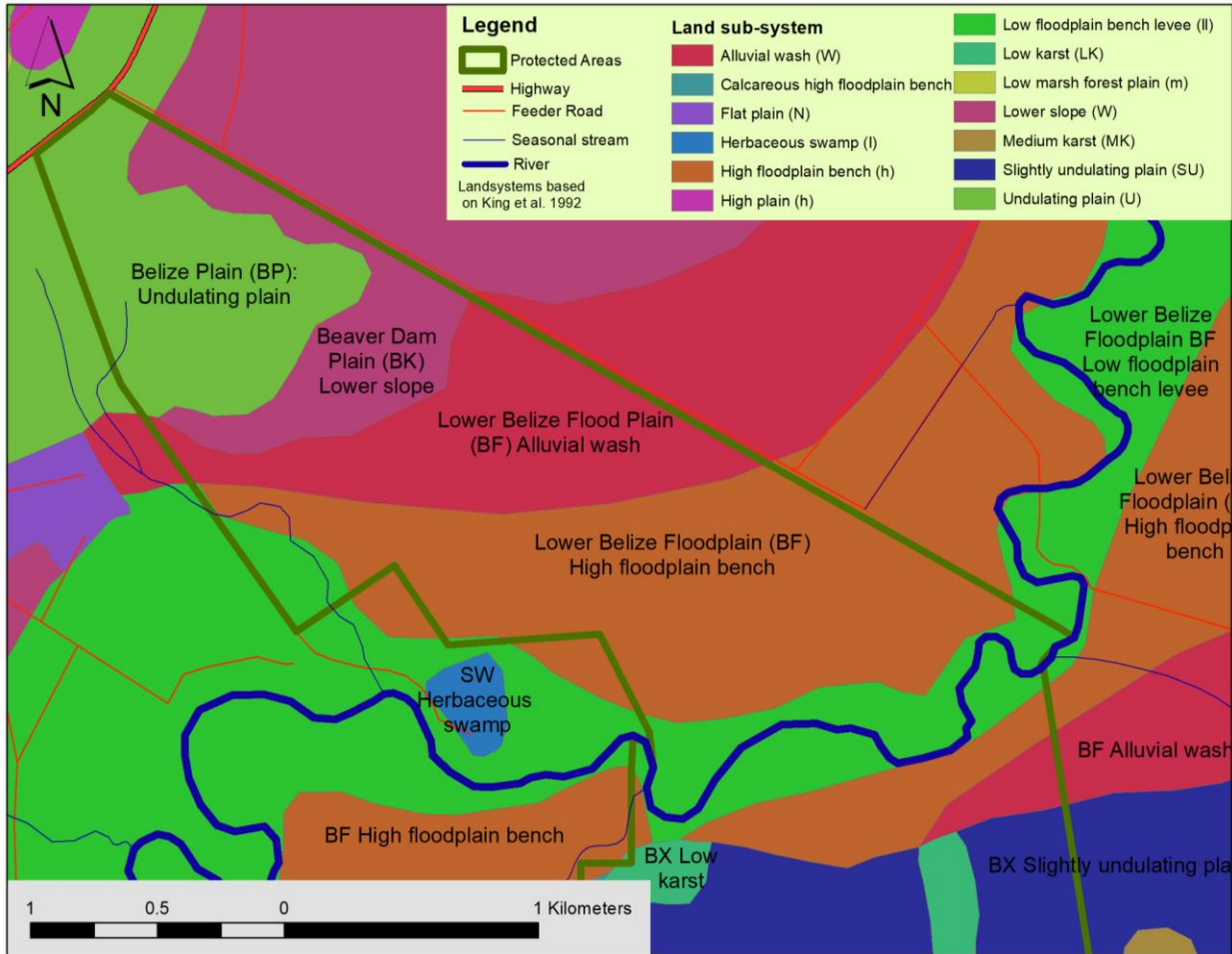


Figure 14: Landsystems of Monkey Bay Wildlife Sanctuary

2.4.5 Hydrology

MBWS lies within the center of the Sibun River watershed, which encompasses about 759 square miles (1,222 square kilometers) of land (Hartshorn et al., 1984) and is one of the larger watersheds within Belize. The Sibun River headwaters originate from the Mountain Pine Ridge and the Northern portion of the Maya Mountains and empties out into the Caribbean Sea just south of Belize City (Figure 15). From the source to the mouth, the river travels in an easterly direction of about 50 miles (80.4 kilometers), however, the actual length of the river, which includes all the meanders, is about 100 miles (160.9 kilometers) (Belizean Journeys, n.d.). The fairly large headwaters of the Sibun River, as it relates to the location of the MBWS, implies that heavy rainfall in the Mountain Pine Ridge and the adjacent Maya Mountains quickly result in a rapid increase in the amount of flow and increased flood risk.

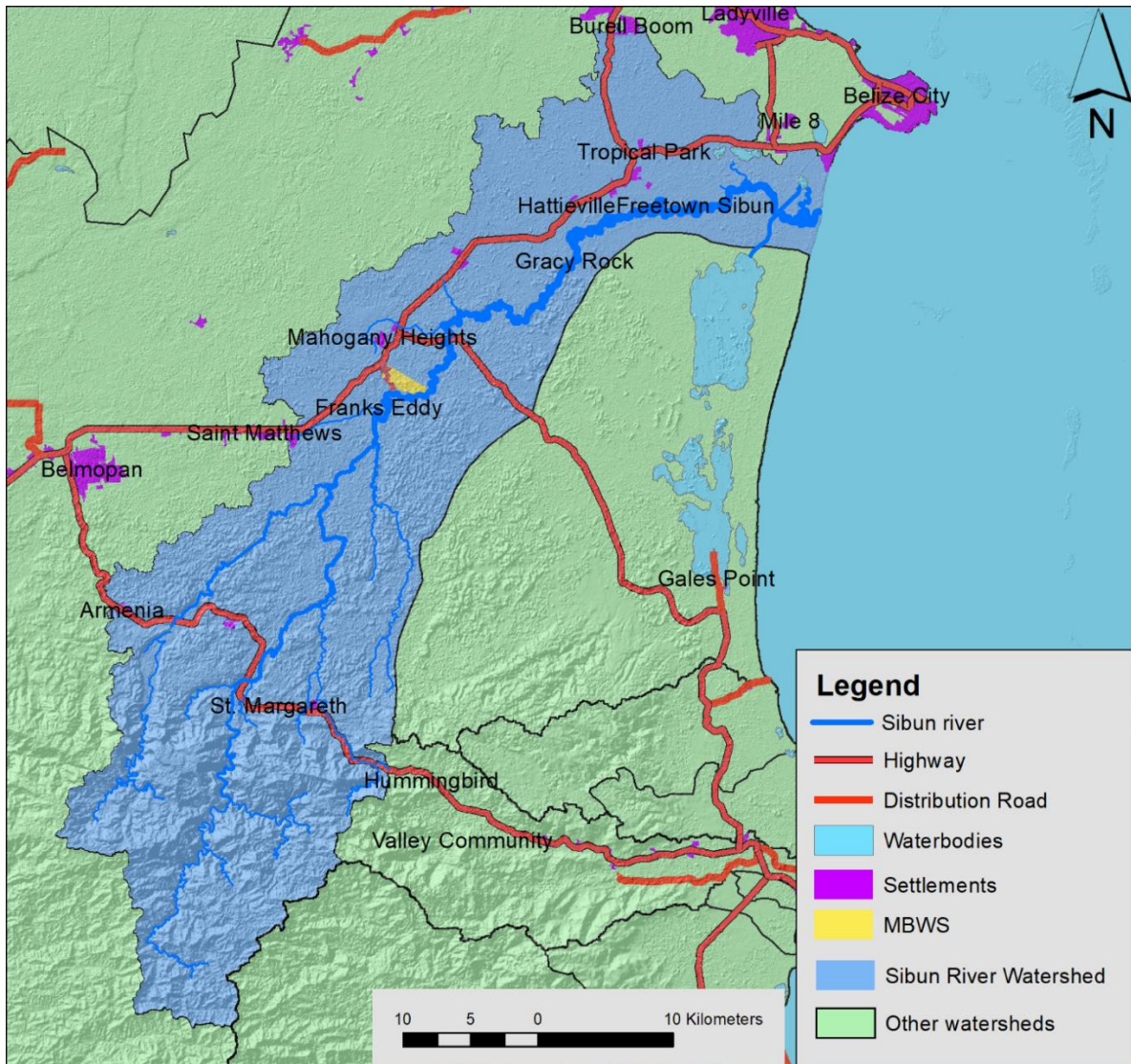


Figure 15: Hydrology of the Monkey Bay Wildlife Sanctuary

2.5 Biodiversity of Management Area

2.5.1 Ecosystems

The current ecosystem classifications within the MBWS (Figure 16) were identified using the 2001 Ecosystem Mapping for Belize (Meerman & Sabido, 2001), which is continuously being updated and refined. More particularly, the classification is based on a 2022 re-interpretation of recent (April 2020) Landsat 8 satellite imagery (30 m resolution) augmented with a mosaic high resolution (4.7 m) PlanetScope imagery of 2019 and high-resolution imagery provided by ESRI ArcGIS (July 2022).

MBWS is situated on the coastal alluvial plain and in the Sibun River Watershed. It catches a representative series of ecosystems from the top of the watershed (where the George Price Highway runs) towards the bottom (Sibun River). On the top we find:

Short-grass savanna with scattered trees and/or shrubs (106 acres, 43 ha) is a common ecosystem on the coastal plains. These savannas are extremely varied, from open grassy or sedge plains to a woodland type with much Caribbean pine (*Pinus caribaea*) and Live Oak (*Quercus oleoides*). Seasonal wetness as well as seasonal drought are characteristic. While this ecosystem visually dominates MBWS, it is not the largest!

Deciduous Broad-leaved lowland shrubland: poorly drained (25 acres, 10 ha) is an accompanying ecosystem to the savanna ecosystem. This occurs where the soils are somewhat less dense, allowing for better vertical water movements. Nevertheless, seasonal inundation is still a common feature. The vegetation is typically consisting of very dense woody shrubs and small trees.

Tropical evergreen seasonal broadleaf lowland forest over poor or sandy soils (262 acres, 106 ha) is the next ecosystem in this transition. Locally this ecosystem is known as "Broken Ridge". This ecosystem is a true forest, but Caribbean Pine can still be an important component.

Tropical evergreen seasonal broadleaf alluvial forest, occasionally inundated, (190 acres, 77 ha) is not a true swamp forest, as it is only occasionally affected by flooding from the Sibun River. As a result, this it contains a lot of "swamp" species. This ecosystem grades into:

Deciduous broadleaf lowland riparian shrubland of the plains (448 acres, 181 ha) is the largest ecosystem within the MBWS and characterized by frequent flooding from the river whereby the floodwaters have sufficient force to uproot trees and disturb vegetation in general. As a result, the vegetation is a mix of dense secondary woody and herbaceous shrub, interspersed with isolated fast-growing trees. This ecosystem tends to be very patchy with stands of trees interspersed with expanses of herbaceous and/or shrubby vegetation. Towards the river itself Bri-bri (*Inga affinis*), Spiny Bamboo (*Guadua longifolia*) and Bamboo (*Bambusa vulgaris*) are typical components.

All these ecosystems tend to grade into each other, and it is often impossible to draw distinct boundaries between them.

A full description of these ecosystems based on Meerman & Sabido (2001) is presented in Appendix 5.

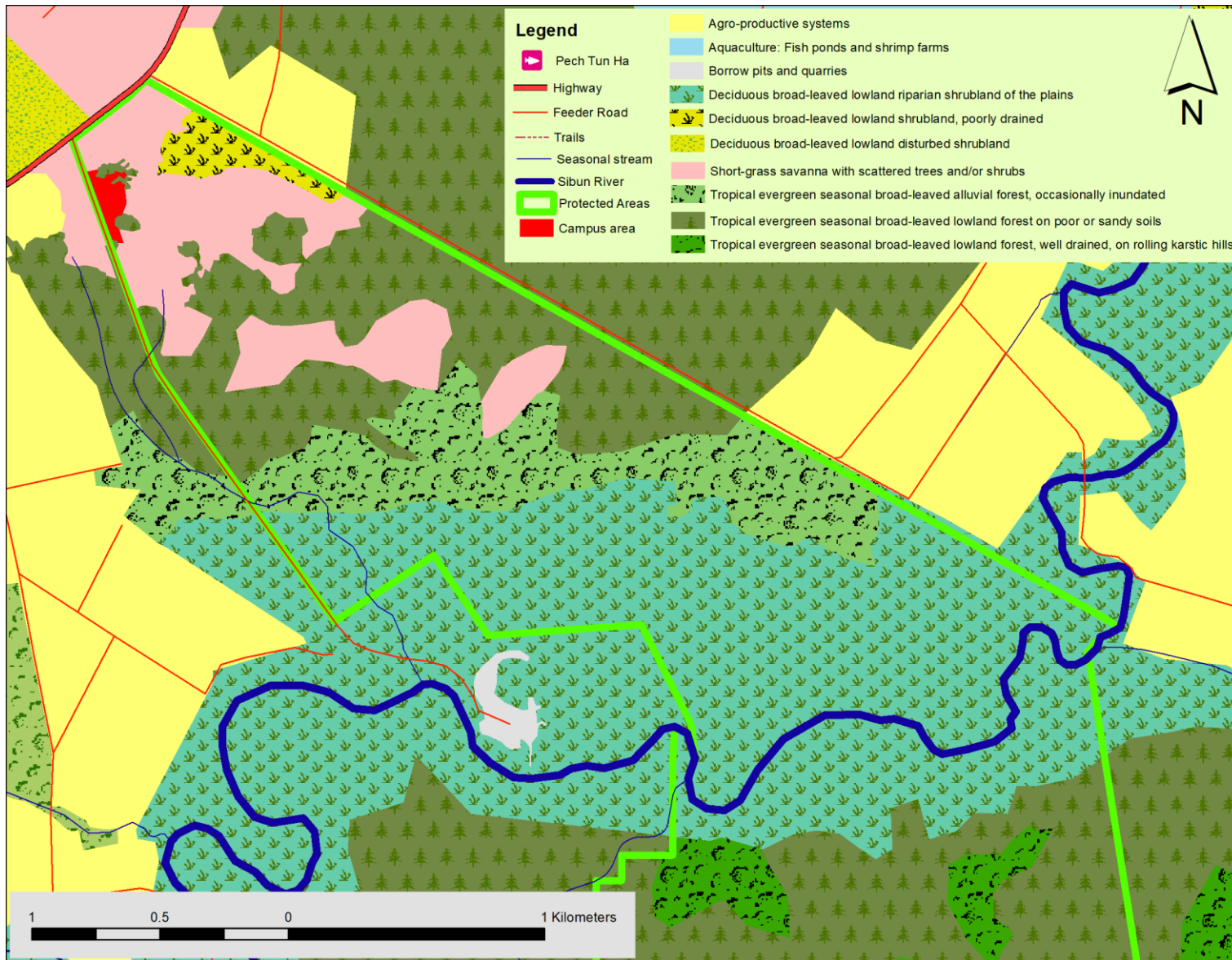


Figure 16: Ecosystems within Monkey Bay Wildlife Sanctuary

2.5.2 Biodiversity

The biodiversity of the MBWS is relatively well understood. A few research papers deal with aspects of the MBWS biodiversity (see References). In addition to those literature resources, there are number of databases containing MBWS biodiversity data: Environmental Resource Data System of Belize (BERDS), iNaturalist, and eBird.

BERDS is no longer being supported and as such there are no data newer than 2012. This database that is being curated by the consultant, includes the data in the reports of Laughlin (2002) on the flora of the Pine Savanna at Monkey Bay Wildlife Sanctuary Belize. And Turvey et al. (1997) on a Herpetological Survey of Monkey Bay Wildlife Sanctuary. In total the BERDS dataset contains 138 species records pertaining to the MBWS.

iNaturalist (<https://www.inaturalist.org>) is a joint citizen science initiative of the California Academy of Sciences and the National Geographic Society and has been active since 2008. Its popularity in Belize is slowly growing and at June 2020, data for the MPR in iNaturalist stands at 204 taxa (Appendix 6). These taxa include everything from fungi, plants, and invertebrates to vertebrates.

eBird (<https://ebird.org/home>) is a great resource for bird records worldwide. eBird is among the world's largest biodiversity-related science projects, with more than 100 million bird sightings contributed annually by eBirders around the world. A collaborative enterprise with hundreds of partner organizations, thousands of regional experts, and hundreds of thousands of users, eBird is managed by the Cornell Lab of Ornithology.

There exists a "hotspot" for MBWS which allows for an overview of all species reported from the area + phenological data. By indicating records by month, it will be easy to determine whether a species is migratory, rare or commonly observed.

There exists the possibility that some species have been recorded within the MBWS but not been reported for the "hotspot". Such records will not be reflected here.

According to eBird, 334 bird species have been recorded for the MBWS and this list can be expected to be largely complete.

Finally, MBWS started a wildlife camera trapping effort in 2022, and the available data have been included here.

2.5.3 Vegetation

The vegetation of the MBWS has already been partly addressed in the ecosystem section.

While the Savanna ecosystem is not the most extensive ecosystem within the MBWS, it has received the most floristic attention (Goodwin et al, 2011, Holst et al., 2019, Laughlin 2002). The savanna has a composition typical to the Belize savanna's with palms such as

Acoelorrhaphie wrightii and *Schippia concolor*, Pines (*Pinus caribbea*), Oaks (*Quercus oleoides*), Yahaa (*Curatela americana*), many grasses and sedges, and epiphytes such as Bromeliads and Orchids in the trees. What the species in the savanna have in common, is that they are capable of surviving frequent fires. The savanna is a fire-adapted ecosystem. While the Belize Savanna's don't appear to harbour species that actually need fires for their reproduction, a number to respond to fires by flowering soon after a fire event. The sedge (*Bulbostylis paradoxa*) is an interesting example of a fire resistant species; fire will destroy the leaves, but not the main core, leaves will resprout from the tip of the core and after a number of fire events, the species will exhibit a tuft of leaves on top of a short blackened stem (Figure 17).



Figure 17: *Bulbostylis paradoxa* (Picture Jan Meerman)

Wetter parts of the savanna also harbour a number of carnivorous species. Most of these are tiny and easily overlooked. The Sundew (*Drosera capilaris*) is the best known example (Figure 18).



Figure 18: *Drosera capilaris* (Picture Jan Meerman)

The savanna is also home to a number of plant species endemic to Belize. The most visible is the Passionflower (*Passiflora urbaniana*) (Figure 19). This species is very common and has spectacular flowers. Species of conservation concern found here include the Schippia Palm (*Schippia concolor*) which is listed as Vulnerable and also of interest as an endemic species. Also the Oak (*Quercus oleoides*), is listed by IUCN as Near Threatened.

Where the drainage is better, trees and shrubs get an opportunity to develop and frequently we get **Deciduous Broad-leaved lowland shrubland: poorly drained.** Commonly encountered species include the palm (*Acoelorrhaphe wrightii*), *Aspidosperma cruenta*, Bullet Tree (*Bucida buceras*), Calyptranthes sp., Hicaca (*Chrysobalanus icaco*) *Clidemia* sp., Logwood (*Haematoxylon campechianum*), *Miconia* spp. and Cowich (*Mimosa hemendieta*).



Figure 19: The endemic *Passiflora urbaniana* (Picture Jan Meerman)

The next step in the transition from Savanna to “true” forest is **Tropical evergreen seasonal broadleaf lowland forest over poor or sandy soils.** This forest type is commonly referred to as “Broken Ridge” due to its uneven canopy. Typical species here include low Cohune (*Attalea cohune*), Santa Maria (*Calophyllum brasiliense*), White Maya (*Miconia* spp.), Nargusta (*Terminalia amazonia*), and Polewood (*Xylopia frutescens*). The passage through this vegetation type is often difficult due to the presence of cut-grass (*Scleria bracteata*). Pines (*Pinus caribaea*) are often still present.

Ultimately, the influence of the poor, acidic soils wanes and the influence of the Sibun River becomes noticeable. Flooding frequently occurs and nutrient rich sediment is deposited. The forest type found here is **Tropical evergreen seasonal broadleaf alluvial forest, occasionally inundated.** This is a “high forest” and is often referred to as “Cohune Ridge”. While Cohune (*Attalea cohune*) can be common it is by no means evenly distributed. As a result of disturbances such as fire, cohune can become dominant and outcompete other trees. Such cohune patches tend to be low in species diversity. Common other species include Bullet Tree (*Bucida buceras*), Pokenoboy (*Bactris major*,

Bactris Mexicana), Figs (*Ficus* spp.), *Licania platypus*, *Lonchocarpus guatemalensis*, *Trophis racemosa* and *Zygia peckii*. Spiny Bamboo (*Guadua longifolia*) can form dense patches.

This type of forest potentially harbors two tree species of conservation concern: Spanish Cedar (*Cedrela odorata*) and Big Leaf Mahogany (*Swietenia macrophylla*). Both are listed as vulnerable by IUCN. However Spanish Cedar tends to prefer drier hilly terrain and Mahogany is probably reduced to economically unviable densities.

Even closer to the Sibun River, the influence of annual flooding becomes much stronger and the high forest make place for **Deciduous broadleaf lowland riparian shrubland of the plains**. Floods are strong enough here to topple trees and therefore the trees found here are usually fast growing and short-lived species such as Rubber (*Castilia elastica*) Trumpet (*Cecropia obtusifolia*), Salmwood (*Cordia alliodora*), Amate (*Ficus insipida*), *Lonchocarpus guatemalensis* and others. There is always a strong herbaceous component that includes *Heliconia latispatha*, *Ipomoea* spp., *Maranta arundinaceae*, *Mucuna* sp., *Tripsacum latifolium* and others.

2.5.4 Invertebrates

Appendix 6 shows the various invertebrates reported from the MBWS. Most of the recorded species are butterflies with a total of 46 species. This is only 4% of the species known in the whole of Belize, so clearly a lot of work can be done to record the invertebrates as a whole and the butterflies in particular.

An interesting species recorded from MBWS is the Jumping Spider (*Bagheera kiplingi*) (Figure 20). This small spider that occurs throughout Mesoamerica has gained some notoriety due to its partly herbivorous diet. The species tends to inhabit Spiny Acacias of the Genus *Vachellia* where it supplements its normal carnivorous diet with the Beltian bodies (ant-bread) that the plant produces for the benefit of ants.



Figure 20: *Bagheera kiplingi* as depicted in iNaturalist by Robb Navarro

2.5.5 Fish

There are no data on the fish fauna of the MBWS. However, the BERDS dataset contains data from elsewhere along the Sibun River. By taking an arbitrary stretch of river 30 km upstream and 30 km downstream, one comes to a species list of 37 species. Most, if not all, of these species can be expected to occur in the stretch of the Sibun River bordering the MBWS. The list of species can be found in Appendix 6. It will be noticed that there is a fair number of “marine” species on this list. This is not unusual as many marine fishes are known to travel long distances upriver.

2.5.6 Amphibians

The MBWS has not attracted much research into amphibians. See Appendix 6 for species lists which is restricted to 8 species. Mostly “common” lowland species have been recorded such as the Central American Gulf Coast Toad (*Incilius valliceps*), the Giant Toad (*Rhinella horribilis*) and the Common Mexican Tree Frog (*Smilisca baudini*). The small Staufer’s Tree Frog (*Scinax staufferi*) is a species that is typical for savannas (Figure 21). More research will undoubtedly reveal more species.



Figure 21: *Scinax staufferi* is common in Savanna habitats (Picture: Jan Meerman)

2.5.7 Reptiles

The reptiles of MBWS are again poorly documented. Appendix 6 shows the lists of recorded species. These species are typical lowland species with geckos, anoles, iguanas, turtles, and snakes. The Morelet's Crocodile (*Crocodylus moreletii*) undoubtedly occurs as well. The critically endangered Hicatee (*Dermatemys mawii*) occurs in the Sibun River, but the current status is unclear.

Other reptiles listed in the IUCN Red List as "near threatened" include:

- Tabasco Mud Turtle (*Kinosternon acutum*)
- Furrowed Wood Turtle (*Rhinoclemmys areolata*)
- Narrow-bridged Musk Turtle (*Claudius angustatus*)

While none of these have actually been reported from the MBWS, they are certainly candidate species. However, MBWS does not constitute critical habitat for any of these endangered species.



Figure 22: The Old Man Lizard (*Corytophanes cristatus*) (Picture: Jan Meerman)³¹

2.5.8 Birds

Birds are the best recorded group of organisms of the MBWS. Since the launch of eBird (<https://ebird.org>) in 2002, the popularity of this Citizen Science Platform has increased tremendously and Belize quickly became the biggest contributor of Bird data worldwide on a per capita basis. Within eBird, there exists a “hotspot” for MBWS which allows for an overview of all species reported from the area + phenological data. By indicating records by month, it will be easy to determine whether a species is migratory, rare or commonly observed. And in total 333 bird species (Appendix 6) have been recorded for the MBWS and this list can be expected to be largely complete³².

A number of IUCN listed species of conservation concern have been recorded from the MBWS. These species are:

- Yellow-headed Parrot (*Amazona oratrix*), Endangered

³¹ The Old Man Lizard has been reported on MBWS.

³² But note that the Yellow-headed Parrot, *Amazona oratrix* has been “hidden” being a sensitive species.

- Olive-sided Flycatcher (*Contopus cooperi*), Near Threatened
- Crested Guan (*Penelope purpurascens*), Near Threatened
- Northern Mealy Amazon (*Amazona farinosa guatemalae*), Near Threatened
- Agami Heron (*Agamia agami*), Vulnerable
- Golden-winged Warbler (*Vermivora chrysoptera*), Near Threatened
- Keel-billed Toucan (*Ramphastos sulfuratus*), Near Threatened
- Eastern Meadowlark (*Sturnella magna*), Near Threatened
- Black Catbird (*Melanoptila glabrirostris*), Near Threatened
- Great Curassow (*Crax rubra*), Vulnerable (Figure 23)

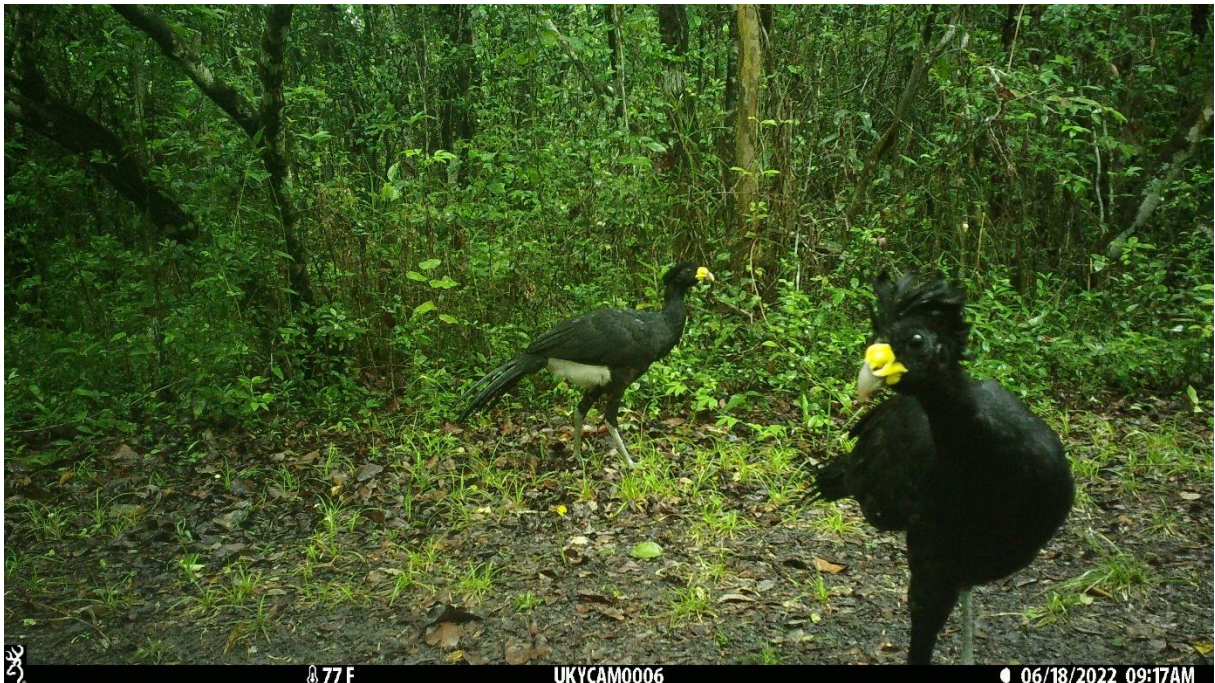


Figure 23: Great Curassows (male) recorded on a MBWS wildlife camera

For none of these species, MBWS constitutes sufficient critical habitat. However, the status of the Yellow-headed Parrot is critical, and both the Great Curassow and Crested Guan are threatened by hunting. Conservation efforts for these species and in particular the Yellow-headed Parrot are therefore warranted.

2.5.9 Mammals

Monkey Bay Wildlife Sanctuary, despite its name, does not (any longer) harbor any “Monkeys” (Spider Monkeys – *Ateles geoffroy*) and the MBWS habitats are not really favorable for this species that seems to prefer forest on hilly terrain. Additionally, Black Howler Monkeys (*Alouatta pigra*) are infrequently reported on MBWS along the Sibun River as they migrate through the property.

Another absent species is the White-lipped Peccary (*Tayassu pecari*). This increasingly threatened species needs vast undisturbed areas and still occurs north of the Western Highway but with the increasing developments along the highway it can no longer be expected within MBWS.

Otherwise, MBWS has a mammal composition as can be expected for the Belize Lowlands. See Appendix 6 for a listing of the species according to the various sources. The knowledge of the MBWS mammal fauna has been greatly augmented by the Wildlife Camera project started by MBWS in 2022. Wildlife cameras give a good impression of the local wildlife, although the placement of the cameras can create a certain bias and some animals may be easier recorded than others. Due to the limited sensitivity of the cameras only larger animals are recorded. Typically, anything smaller than a Ground Dove is not or only rarely detected.

Based on these records the White-nosed Coati (*Nasua narica*) and the Central American Agouti (*Dasyprocta punctata*) are the most common species. While the White-nosed Coati is technically a carnivore but is possibly better listed as an omnivore. In that case, the Ocelot (*Leopardus pardalis*) is the most common mid-sized predator (Figure 24).

The Jaguar (*Panthera onca*) as the most emblematic large predator has been recorded surprisingly numerous as well. This frequent occurrence would indicate that the prey base within the MBWS area is still sufficient. Pumas (*Puma concolor*) have not been recorded as yet but should be expected to on occasion move through the area as well. The increasing development of properties adjacent to the MBWS however, does not bode well for the residency of these large carnivores. The corridor function of the MBWS for these species will however remain.



Figure 24: Ocelot image captured as part of the MBWS wildlife camera effort.

IUCN lists a number of species occurring within the MBWS. These include:

- Jaguar (*Panthera onca*), Near Threatened
- Yucatán Black Howler Monkey (*Alouatta pigra*), Endangered
- Margay (*Leopardus wiedii*), Near Threatened
- Spectral Bat (*Vampyrum spectrum*), Near Threatened
- Eastern Pipistrelle (*Perimyotis subflavus*), Vulnerable
- Thomas's Sac-winged Bat (*Balantiopteryx io*), Vulnerable
- Baird's Tapir (*Tapirus bairdii*), Endangered
- Neotropical Otter (*Lontra longicaudis*), Near Threatened
- Van Gelder's Bat (*Bauerus dubiaquercus*), Near Threatened

Note that not all of these species have actually been recorded from the MBWS, but they are included here for comprehensiveness. Also, MBWS itself is not sufficiently in size to harbor sustainable populations for most of these species, instead the importance of the MBWS as a biological corridor enabling the movement of these species needs to be emphasized.

2.6 Cultural and Socio-Economic Values of Management Area

2.6.1 Community and Stakeholder Use

There are five stakeholder communities of the MBWS. In the Belize District there are Mahogany Heights Village and La Democracia Village while in the Cayo District there are Franks Eddy Village, St. Mathews Village, and Cotton Tree Village (see Appendix 7 for Stakeholder Community Profiles). The history of the MBWS stakeholder communities dates back to 1940, when the first community, La Democracia, was formed due to the migration of workers from Belize City. Unlike La Democracia, the origin of the other communities resulted from the relocation of residents from one area of the country where land availability was limited or as part of a government-led initiative to move people inland as a mitigation effort against natural disasters, in particular hurricanes. In Franks Eddy's case, it was an area targeted for settlement by undocumented migrants from Central America. All communities are registered villages under the Village Councils Act, Chapter 88, Revised Edition 2020.

The five MBWS stakeholder communities have an integrated community structure with multi-interest development organizations and groups. A common feature of all the communities is their governance structure administered through a village council. The council's mandate is stipulated under the Village Council Act, which provides for a seven-member elected council (Chairperson, Vice Chair, and Five Counsellors). The councils are tasked with the responsibility of governing and improving the villages. They manage the public assets of the communities and conduct cleaning and upkeep of the community, including drainage and sewage, among other duties.

Another common feature of the two stakeholder communities with rural water systems is the water boards. The water boards are appointed through the Minister as per the Village Councils Act, Chapter 88 Revised Edition, 2020. As per the act, water boards are appointed for three-year terms that coincide with village council elections. The members consist of the village chairperson, a nominee from the village council, and three appointees by the Minister. The water boards are independent of the village councils and are tasked with operating and maintaining activities necessary for the uninterrupted water service in respect of its village or community.

The stakeholder communities have a few other organized groups outside the two legislated groups. Multiple faith-based groups (churches) operate in the communities. In general, these groups focus on the spiritual development of the community. However, some faith-based groups are also involved in feeding and educational programs in the communities and have active associated youth groups. The groups' membership is representative of the communities, and there are no known conflicts among them.

Several factors influence the daily lives of residents in the communities. The top-ranked issue is the availability of land. Community informants indicated that while their communities' population continues to increase, no lands are available for further residential development. This is the same for the few communities that conduct some level of farming. The second-ranked factor that weights on the communities is employment. In all the communities, except Franks Eddy, employment opportunities are limited, and most workers are employed outside their respective communities. Nevertheless, having to seek employment outside the communities, unemployment is generally high. This may be the result of several factors, including low skill levels, low education levels, and high costs (transportation) to seek and engage in employment outside the community. Finally, safety in two of the communities is a growing concern. Despite these factors, most residents have remained in the stakeholder communities. An observation is that these communities are not receiving new residents. This may be because there is no available land, limited economic opportunities, and poor community infrastructure within the communities.

Regarding community services and infrastructure, the stakeholder communities all have access to water, electricity, telephone, internet, and cable television. Each of the communities has access to a preschool and primary school. In the case of La Democracia and Mahogany Heights, they have a split system school structure³³ that is shared between the two communities. Transportation from the communities to the central municipalities is through regional bus systems; however, many communities have local bus runs that move within the neighbouring villages. Only Mahogany Heights has a police substation that also services La Democracia. The Roaring Creek Police substation located near Belmopan services the other communities in the Cayo District. Healthcare is an ongoing issue in all the communities as there is no community clinic. In addition, emergencies and basic healthcare is accessed through the Western Regional Hospital in Belmopan. Burning of waste is common within the communities. There is a paid garbage disposal service; however, it is unreliable. Concerning solid waste, most homes have septic systems. Finally, the houses in the stakeholder communities are a mix of cement and wooden houses with zinc roofs. The houses are raised above the ground in areas where flooding is prevalent.

Cotton Tree and Mahogany Heights villages are the most populous stakeholder communities, with La Democracia having the lowest population. On average, household sizes number five individuals. Like the Belize and Cayo districts, the stakeholder communities are multi-ethnic. Hispanics are the majority ethnic group in the three Cayo

³³ Mahogany Heights hosts the pre-school and infant 1 through standard 3 while La Democracia hosts the remaining standards through 6.

district communities and have a significant population in the two Belize district communities. Nonetheless, other ethnicities are found in all the communities except Franks Eddy, which is almost entirely Hispanic with less than twenty Creole and Maya residents. Spanish and Creole are the major languages spoken in the communities. In terms of education, most community residents have completed primary school, with a few secondary school completions. Further education completion is minimal within the communities.

The MBWS stakeholder communities are low-income communities. There are limited employment opportunities in the communities except in Franks Eddy, where unemployment is low. This is due to the Nohoch Che'en Archaeological Reserve in the community, which is one of the top visited cruise tourism sites in the country and has numerous affiliated tourism businesses that provide service to visitors. The businesses serve as significant employers for residents of Franks Eddy Village. Most employed persons from other communities must seek employment outside their communities. In most cases, the type of employment is low-skilled and labor-intensive work. While both males and females work, most older females tend to be homemakers.

The communities do not have many resources. Most of the communities have a community center. However, these centers need repairs and/or need to be completed. Multiple churches are in the communities and the communities all have primary schools, at least one sporting field, and several small grocery shops. Land in the community is used solely for residential purposes. For those families that practice farming, it's done on lands outside the immediate vicinity of the community. Except for Franks Eddy, there is no known archaeological site or historical artifacts in the communities.

Finally, there are residents from all the communities that conduct hunting in the areas around MBWS and beyond. There is also evidence of illegal lumber extraction that takes place. This is observed in the type of lumber used in many of the wooden structures in the communities; hard wood of various types that is rough cut. Both these activities are threats to the sustainability of the Sanctuary.

2.6.2 Archaeological Sites

According to Kather (1992), the Sibun River was likely used as a trading and transportation route by the Ancient Maya. Agricultural fields and settlements were also established by the Maya along the Sibun River due to its deep, rich alluvial soils. Evidence of Maya settlement within MBWS was confirmed when Patricia McAnany, an Associate Professor of Archeology, and her team from Boston University discovered Pech Tun Ha ("Tick Stone Water") in 1997 (McAnany & Thomas, 1998). At the time of its discovery, most of the

ancient platform construction of Pech Tun Ha was earthen, but one stone-covered platform and two stone monuments were exposed. Excavations revealed that the pottery at the site dated back to the Late Classic Period (A.D. 650-850), and that obsidian prismatic blades found suggested that the Maya residing along the Sibun River practiced the long-distance trade of obsidian.

2.6.3 Recreation and Tourism Use

To access MBWS, an entrance fee is required, and it allows tourists to hike the main trail of the Sanctuary. Tourists are also allowed to stay overnight at the dorms, dine at the cafeteria, and use the campus facilities at the given rate. Guided tours offered by Monkey Bay include bird watching, canoeing, and natural history hikes of the Sanctuary. As for the public, they have open access to the Sibun River and Sibun River Beach that buffers MBWS for their recreational purposes.

As aforementioned in Section 2.3.4, the months with the lowest number of tourists that visit Belize is September and October. Similarly, MBWS experiences lower visitor numbers during September and October (Figure 25). As for the months with the highest number of visitors at MBWS, it falls during the first half of the year from January through July. Considering that most visitors are students, the peak months coincide with winter, spring, and summer break. These are the months when students typically have their field trips.

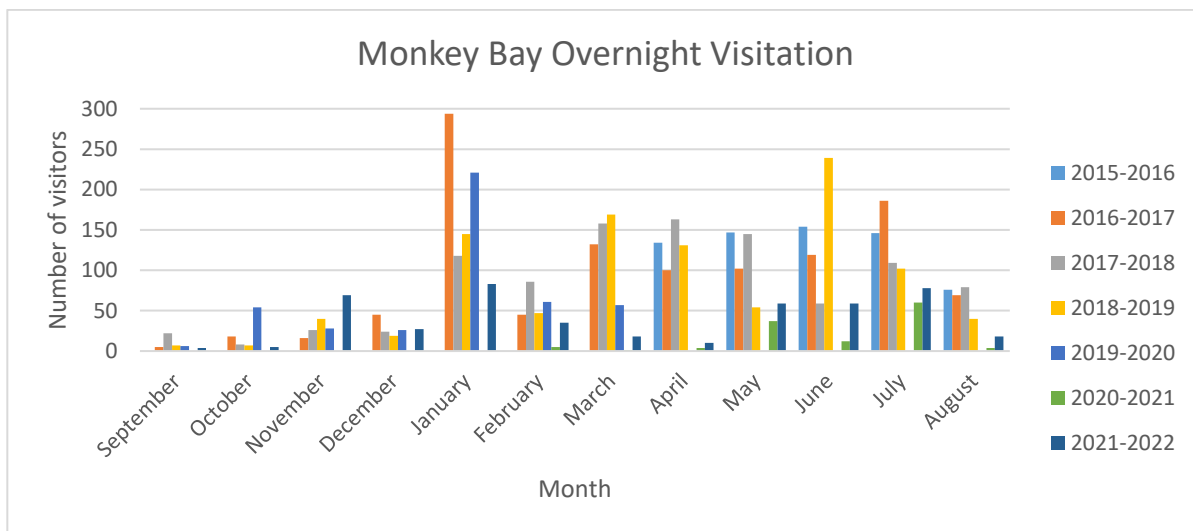


Figure 25: Overnight Visitation for Monkey Bay

2.6.4 Other Economic Use

Currently, no other economic use has been identified for the PPA.

2.6.5 Education Use

MBWS provides the ideal immersive experience of a savanna ecosystem, broadleaf forests, riparian ecosystem, and their ecotones. Students and tourists looking for educational ecoadventures can hike the main trail of MBWS or canoe a part of the Sibun River on guided tours. Areas and trails that are not accessible to tourists are often subject to experiments and research. For example, the pine savanna is being managed for both pine regeneration via prescribed burns and parrot nesting habitat via nesting box installation and monitoring.

Although considerable research has been conducted within MBWS, not all work is easily accessible. Several institutions abroad have conducted research, but the work may not have been shared with MBWS. Additionally, a lot of independent researchers that stay at Monkey Bay conduct their research in other parts of the region and is not specific to MBWS.

3. Analysis of Conservation Targets and Threats

3.1 Conservation Targets

Conservation action planning (CAP) is a structured process that identifies and assesses the species and ecosystems of concern, the threats that impact them, and the strategies that can be used within the management of the area to mitigate these threats. This section is based on the findings of the conservation action planning workshop conducted as part of the MBWS management planning process.

3.1.1 Identification of Conservation Targets

Conservation targets are species, species assemblages or ecosystems that have been selected as representing the biodiversity of a protected area. The strategic actions will ensure their continued viability and reduce the pressures impacting them, and it will adequately address the needs of the system as a whole. Three conservation targets were selected along with their nested targets (Table 11) to represent and encompass the biodiversity values of the MBWS, and to provide a basis for setting goals, developing strategies and actions, and monitoring success. Table 12 lists the validated MBWS Conservation Targets and the justification for selecting the targets.

Table 11: Monkey Bay Wildlife Sanctuary Conservation Targets and Nested Targets

Conservation Target	Nested Targets
Threatened Species	White-lipped Peccary, Yellow-headed Parrot, Jaguar, Puma, Baird's Tapir, Black Howler Monkey, Morelet's Crocodile, Neotropical River Otter, Northern Tamandua
Savanna Ecosystem	Yellow-headed Parrot, associated vegetation (several endemic plants), other threatened species

Riparian Ecosystem	Associated vegetation, avian species, threatened species (Black Howler Monkey, Morelet’s Crocodile, Neotropical River Otter)
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Table 12: Monkey Bay Wildlife Sanctuary Conservation Targets and their Justification

Conservation Target	Justification for Target
1. Threatened Species	Threatened and charismatic species such as the Jaguar, Puma, Yellow-headed Parrot, Baird’s Tapir, Black Howler Monkey, and White-lipped Peccary are appreciated by locals and foreigners. Some of the species, such as the Jaguar and Puma, are also considered keystone species. All species are listed under IUCN’s Red List, with the Yellow-headed Parrot, Black Howler Monkey, and Baird’s Tapir listed as Endangered.
2. Savanna Ecosystem	Most accessible and visible, and is the “visitor’s card” of MBWS. The savanna ecosystem has a high degree of endemism among plants, and provides connectivity within the MFC landscape. Additionally, the savanna provides habitat for multiple species, namely the Yellow-headed Parrot.
3. Riparian Ecosystem	The riparian ecosystem is important for stabilizing the riverbank and preventing erosion and sediment accumulation. The riparian forest also provides connectivity within the MFC landscape. The riparian ecosystem is dynamic, nutrient rich, and has a high bird density; thus, the forest along the Sibun River creates an attractive environment for tourism (canoeing and birding activities).

3.2 Threats to Biodiversity

The threats affecting the conservation targets as identified by the CAP process³⁴ are presented in Table 13:

Table 13: Threats to Conservation Targets of Monkey Bay Wildlife Sanctuary

Conservation Target	Threats
Threatened Species	<ul style="list-style-type: none"> ▪ Anthropogenic and natural fires ▪ Climate Change (increased frequency, severity, and intensity of storms and hurricanes; temperature rise; changes in rainfall patterns) ▪ Illegal and legal logging within the surrounding areas of MBWS ▪ Habitat Conversion/ Fragmentation within the surrounding areas of MBWS, mostly from agricultural development ▪ Hunting within MBWS and the surrounding areas ▪ Lack of food/prey within MBWS ▪ Poaching for pet trade and NTFPs within MBWS ▪ Tourism impacts on wildlife from poorly designed trails and/or unsupervised visitation, e.g., interfering with nests, loud music, large groups, etc. ▪ Increased number of visitors in the Sibun River Beach disturbs wildlife, e.g., loud music, large groups, etc.

³⁴ The CAP process is reflective of the virtual consultations supplemented by the authors’ research.

	<ul style="list-style-type: none"> ▪ Road Expansion along the George Price Highway, specifically expansion to the road shoulders, resulting in increased and faster traffic ▪ Squatting within the surrounding areas; trespassing within MBWS to cross to the adjacent properties
Savanna Ecosystem	<ul style="list-style-type: none"> ▪ Anthropogenic and natural fires ▪ Climate Change (increased frequency, severity, and intensity of storms and hurricanes; temperature rise; changes in rainfall patterns) ▪ Illegal and legal logging within the surrounding areas of MBWS ▪ Habitat Conversion/ Fragmentation within the surrounding areas of MBWS, mostly from agricultural development ▪ Poaching for pet trade and NTFPs within MBWS ▪ Tourism impacts on wildlife, vegetation, and soil resulting from poorly designed trails and/or unsupervised visitation, e.g., interfering with nests, loud music, large groups, etc. ▪ Pollution (i.e., agricultural run-off, garbage) ▪ Road Expansion along the George Price Highway, specifically expansion to the road shoulders, resulting in increased and faster traffic
Riparian Ecosystem	<ul style="list-style-type: none"> ▪ Anthropogenic and natural fires ▪ Climate Change (increased frequency, severity, and intensity of storms and hurricanes; temperature rise; changes in rainfall patterns) ▪ Illegal and legal logging within the surrounding areas of MBWS ▪ Habitat Conversion/ Fragmentation within the surrounding areas of MBWS, mostly from agricultural development ▪ Overfishing in the Sibun River running along MBWS and MBNP ▪ Poaching for pet trade and NTFPs within MBWS ▪ Tourism impacts on wildlife, vegetation, and soil resulting from poorly designed trails and/or unsupervised visitation, e.g., interfering with nests, loud music, large groups, etc. ▪ Increased number of visitors in the Sibun River Beach disturbs wildlife and ecosystem, e.g., loud music, large groups, garbage, etc. ▪ Stream gravel mining within the Sibun River upstream of MBWS ▪ Pollution (i.e., agricultural run-off, garbage) ▪ Squatting within the surrounding areas; trespassing within MBWS to cross to the adjacent properties.

Rating Critical Threats

Threats were then prioritized using three criteria to direct resources toward mitigation of the most critical threats. The threats were assessed by Area, Severity and Urgency, using the following criteria (Table 14):

Table 14: Critical Threats Rating Criteria³⁵

Area: How much of the conservation target it affects.

Proportion of Area Affected		
Criteria	Score	
Area	4	Will affect throughout >50% of the area
	3	Widespread impact, affecting 26 – 50% of the area
	2	Localized impact, affecting 11 – 25% of the area
	1	Very localized impact, affecting 1 – 10% of the area

Severity: How intense or great the impact is.

Severity Ranking		
Criteria	Score	
Severity	3	Local eradication of target possible
	2	Substantial effect but local eradication unlikely
	1	Measurable effect on density or distribution
	0	None or positive

Urgency: The likelihood of the threat occurring over the next 10 years.

Urgency Ranking		
Criteria	Score	
Urgency	3	The threat is occurring now and requires action
	2	The threat could or will happen between 1 – 3 years
	1	The threat could happen between 3 – 10 years
	0	Will not happen in > 10 years

Tables 15, 16, and 17 presents the rated threats for each conservation target of MBWS. The threat is considered **very high** (color coded in red) if the percentage is 86 - 100%, **high** (color coded in orange) if the percentage is 70 - 85%, **medium** (color coded in yellow) if the percentage is 51 – 69%, or **low** (color coded in green) if the percentage is 0 - 50%.

³⁵ Adapted from WCS.

Table 15: Rating Threats of the Threatened Species of Monkey Bay Wildlife Sanctuary

Threatened Species (RATING RESULT)					
Includes the following nested targets: White-lipped peccary, Yellow-headed Parrot, Jaguar, Puma, Baird's Tapir, Black Howler Monkey, Morelet's Crocodile, Neotropical River Otter, Northern Tamandua					
Threat	Area	Severity	Urgency	Total (A+S+U)	Total (%)
Fires (natural and anthropogenic)	3	2	3	8	80.0%
Illegal and legal logging	2	1	3	6	60.0%
Habitat Conversion/ Fragmentation	4	2	3	9	90.0%
Hunting	2	1	3	6	60.0%
Lack of food/prey	3	1	2	6	60.0%
Poaching for pet trade and NTFPs	3	1	3	7	70.0%
Tourism impacts	1	1	3	5	50.0%
Increased number of visitors (Sibun River Beach)	1	2	3	6	60.0%
Road Expansion (George Price Highway)	2	2	2	6	60.0%
Squatting within the surrounding area	1	2	3	6	60.0%
Climate Change Impacts*	4	2	3	9	90.0%

Table 16: Rating Threats of the Savanna Ecosystem of Monkey Bay Wildlife Sanctuary

Savanna Ecosystem (RATING RESULT)					
Includes the following nested targets: Yellow-headed Parrot, associated vegetation (several endemic plants), other threatened species					
Threat	Area	Severity	Urgency	Total (A+S+U)	Total (%)
Fires (natural and anthropogenic)	4	1.5	3	9	85.0%
Illegal and legal logging	1	1	1	3	30.0%
Habitat Conversion/ Fragmentation	3	2	3	8	80.0%
Poaching for pet trade and NTFPs	2	3	3	8	80.0%
Tourism impacts	2	1	3	6	60.0%
Pollution (e.g., agricultural run-off, garbage)	2	1	3	6	60.0%
Road Expansion (George Price Highway)	2	2	2	6	60.0%
Climate Change Impacts*	4	2	3	9	90.0%

Table 17: Rating Threats of the Riparian Ecosystem of Monkey Bay Wildlife Sanctuary

Riparian Ecosystem (RATING RESULT) Includes the following nested targets: Associated vegetation, avian species, threatened species (Black Howler Monkey, Morelet's Crocodile, Neotropical River Otter)					
Threat	Area	Severity	Urgency	Total (A+S+U)	Total (%)
Fires (natural and anthropogenic)	1	1	2	4	40.0%
Illegal and legal logging	2	2	2	6	60.0%
Habitat Conversion/ Fragmentation	3	2	3	8	80.0%
Overfishing	3	2	3	8	80.0%
Poaching for pet trade and NTFPs	2	1	3	6	60.0%
Tourism impacts	2	1	3	6	60.0%
Increased number of visitors (Sibun River Beach)	2	2	3	7	70.0%
Stream Gravel Mining	4	3	1	8	80.0%
Pollution (i.e., agricultural run-off, garbage)	3	2	3	8	80.0%
Squatting within the surrounding area	2	2	3	7	70.0%
Climate Change Impacts*	4	2	3	9	90.0%

The threat rating for each critical threat per conservation target and its summary threat rating for each critical threat is shown on Table 18.

Table 18: Threat Rating for Each Conservation Target and Summary Rating

THREATS	Conservation Targets			Summary Threat Rating
	Threatened Species	Savanna Ecosystem	Riparian Ecosystem	
Fires (natural and anthropogenic)	High	High	Low	Medium
Illegal and legal logging	Medium	Low	Medium	Low
Habitat Conversion/ Fragmentation	Very High	High	High	High
Hunting	Medium			Medium
Overfishing			High	High
Lack of food/prey	Medium			Medium
Poaching for pet trade and NTFPs	High	High	Medium	High
Tourism impacts	Low	Medium	Medium	Medium
Increased number of visitors (Sibun River Beach)	Medium		High	Medium
Stream Gravel Mining			High	High
Pollution (i.e., agricultural run-off, garbage)		Medium	High	High
Road Expansion (George Price Highway)	Medium	Medium		Medium
Squatting within the surrounding area	Medium		High	Medium
Climate Change Impacts*	Very High	Very High	Very High	Very High
Threats Status for Targets and MBWS	Medium	Medium	High	

3.3 Conservation Strategies to Address Threats

The following are preliminary conservation strategies identified for each threat affecting the conservation targets. The Climate Change Impacts target is the only target without strategic actions identified. The Climate Change Analysis workshop will cover Climate Change as a threat in more detail.

Conservation Strategies:

1. Anthropogenic and natural fires
 - Develop and implement a fire management plan for MBWS that is specific to the different ecosystems.
 - Implement the MFC Fire Management Plan and participate in cross training activities with the MFC Fire Working Group.
 - Develop a relationship with neighbours to address the fire management needs

- and concerns.
- Equip staff and personnel on fire management tools and skills.
 - Develop an education and outreach program with the MFC Fire Working Group on the responsible use of fire and where and how to apply for fire permits.
 - Implement control burns with the MFC Fire Working Group to reduce destructive forest fires outbreaks within the MFC landscape.
2. Illegal and legal logging within the surrounding areas of MBWS
 - Implement the spatial monitoring and reporting tool (SMART) to track threats and incursions for illegal logging.
 - Develop a relationship with the Forest Department to support patrols in intercepting loggers and to enforce sustainable logging.
 - Install informative signs to demarcate the boundary lines of MBWS.
 3. Habitat Conversion/ Fragmentation, mostly from agricultural development, within the surrounding areas of MBWS
 - Identify parcels that are essential to the MFC connectivity for purchase or to be pledged in Trust for protection in perpetuity.
 - Develop an educational outreach program for neighbouring property owners and local communities on the importance of forest connectivity.
 - Implement a restoration program, in collaboration with the Forest Department and MFC Coalition, (i.e., plant nursery, education outreach, planting activities) catered for the rehabilitation of the MFC landscape, which includes the riparian and savanna ecosystems.
 - Implement the spatial monitoring and reporting tool (SMART) to track threats and to monitor land use activities along with the MFC Coalition; report activities to the Department of Environment (DOE) so they enforce the proper use of the EIAs.
 4. Hunting within MBWS and the surrounding areas
 - Install informative signs to demarcate the boundary lines of MBWS.
 - Install “No Hunting” signs along the boundary lines.
 - Conduct patrols and install camera traps to monitor hunting (WCS constable training program to take place in Summer 2022).
 - Develop an education and outreach program for the neighbouring local communities on the importance of sustainable hunting.
 5. Overfishing in the Sibun River running along MBWS and MBNP
 - Approach the Fisheries Department to address the protection of the Sibun River

- that runs along MBWS and MBNP.
- Monitor the fishing activities within the surrounding local communities (e.g. conduct surveys on the types of fish and quantity fished).
 - Develop an education and outreach program for the neighbouring local communities on the importance of sustainable fishing.
6. Lack of food/prey within MBWS
- Plant fruit trees that cater to herbivores/omnivores (prey) to promote the increase of their population.
 - Address the hunting and overfishing threat to combat the lack of food/prey.
7. Poaching for pet trade and NTFPs within MBWS
- Install “No Poaching” signs within MBWS and along the boundary lines.
 - Conduct patrols and install camera traps to monitor poaching (WCS constable training program to take place in Summer 2022).
 - Guard threatened nests with the available resources. An alternative option is to contact the Belize Bird Rescue to address the threatened nest.
 - Develop an education and outreach program for the neighbouring local communities on the importance of protecting endangered species, such as the Yellow-headed Parrot.
8. Tourism impacts on wildlife from poorly designed trails and/or unsupervised visitation, e.g., interfering with nests, loud music, large groups, etc.
- Maintain and ensure proper usage of MBWS facilities and infrastructures.
 - Install informative signs about MBWS trails, directions, and habitats.
 - Install informative signs to demarcate the boundary lines of MBWS.
 - Monitor nests that might be too close to active trails (e.g., close trails for a particular season if it may affect a nesting site).
 - Reduce frequency and quantity of tourists depending on the location and area (i.e., define the carrying capacity of the area).
9. Increased number of visitors in the Sibun River Beach disturbs wildlife, e.g., loud music, large groups, etc.
- Address the Churchyard Road with the Ministry of Infrastructure Development & Housing (i.e., install a gate, construct road bumps, etc.).
 - Conduct a carrying capacity study of the Sibun River Beach.
 - Develop an education and outreach program for the neighbouring local communities on the proper use and maintenance of public river beaches.
 - Install garbage drums and “No Littering” signs.

- Install educational signs about the protected areas (MBWS & MBNP) and the importance of maintaining the area clean.
 - Conduct water quality assessments to monitor the tourism impacts.
10. Stream gravel mining within the Sibun River upstream of MBWS
- Monitor stream gravel mining activities and report to DOE so they enforce the proper use of the EIAs.
 - Conduct water quality assessments to monitor the gravel mining impacts.
11. Pollution (e.g., agricultural run-off, garbage)
- Conduct water quality assessments to monitor the impacts of agricultural run-off.
 - Install “No Littering” signs along the Sibun River boundary of MBWS.
 - Develop an education and outreach program for the neighbouring local communities on the effects of pollution.
 - Develop a relationship with DOE so they enforce laws against pollution.
12. Road Expansion along the George Price Highway, specifically expansion to the road shoulders, resulting in increased and faster traffic
- Construct wildlife crossings and bridges over the George Price Highway.
 - Monitor the construction activities, and report to the Ministry of Infrastructure Development & Housing if the compliance plan is not being followed.
13. Squatting within the surrounding areas; trespassing within MBWS to cross to the adjacent properties
- Conduct joint patrols with the police department and BDF.
 - Communicate with the squatters to address the impacts that they are causing.
 - Check with the Lands Department on the squatter’s land and if there is evidence of ownership.

4. Climate Change Adaptation Planning

Protected areas are essential for safeguarding biodiversity and ecological processes, but they face many human-caused stresses such as pollution, habitat fragmentation, poaching, and hunting. These existing pressures are now being exacerbated by the effects of climate change. The anthropogenic and climate change pressures may lead to the loss of ecosystems and their services, creating long-term and cascading consequences on communities supported by climate sensitive livelihoods. For protected areas to effectively safeguard biodiversity and life-giving ecosystem services into the future, their vulnerability to climate change must be evaluated as a basis for conservation planning. A Climate Change Analysis Workshop was held with stakeholders to assess how climate change can impact MBWS. The results of the Climate Change Analysis reflect potential climate change impacts and the management strategies to address those impacts for MBWS. The methodology for identifying the climate change related management strategies is based on the “Guidelines for Integrating Climate Change Adaptation Strategies into Protected Areas Management Plans”, which is an addendum to National Management Plan Framework under the National Protected Areas Policy and System Plan (Wildtracks, 2005a).

Situational Analysis

According to the IPCC 2007, Belize and the other Caribbean States contribute less than 0.1% of the global greenhouse gas (GHGs) emissions. However, they are most likely to be adversely affected by climate change and are least likely to develop mitigation efforts. Some of the climate change impacts include sea level rise, frequent and intense weather events, changes in precipitation, air temperature rise, ocean acidification, coral bleaching, and coastal erosion (NCCPSAP, 2014). Belize, as most of the Caribbean, is vulnerable to the climate change impacts, and projections indicate that the climatic conditions will worsen. Although MBWS is not near the coast, there is risks of damage from tropical storms and hurricanes, and effects of temperature rise and decrease in precipitation on the flora and fauna. Table 19 summarizes the predicted climate change impacts for Belize that would most affect MBWS.

Table 19: Predicated Climate Change Impacts for Belize

Predicted Climate Change Impacts	Current Status	25 - 50 years	100 years
Increased air temperature	<ul style="list-style-type: none"> • Mean annual temperature has increased in Belize by 0.45°C since 1960, an average rate of 0.10°C per decade • Average number of 'hot' days per year in Belize (days exceeding 10% of current average temperature) has increased by 18.3% between 1960 and 2003 (NCSP/UNDP). • Mean surface air temperature is 22.92°C (RCP2.6) (NCCO, 2021) 	<ul style="list-style-type: none"> • Mean surface air temperature estimated at 23.17 and 23.20°C in 25 and 50 years (RCP2.6) (NCCO, 2021) 	<ul style="list-style-type: none"> • Predicted mean annual temperature increase ranges from 2° C – 4° C by 2100 (NCCPSAP, 2014) • Mean surface air temperature estimated at 23.40 and 23.61°C in 75 and 100 years (RCP2.6) (NCCO, 2021)
Decreased Precipitation	<ul style="list-style-type: none"> • Mean annual rainfall over Belize has decreased at an average rate of 3.1mm per month per decade since 1960 (NCSP/UNDP) • Annual total rainfall is 107.4mm (NCCO, 2021) 	<ul style="list-style-type: none"> • Predicted ecological shifts up the altitudinal gradient of the Maya Mountains Massif may remove the cloud forest and the catchment functionality important for maintaining rivers in dry season in the south of Belize and providing nutrients to the reef environment • Increased concentration and seasonality of agrochemical delivery • Overall decrease in the mean average annual rainfall throughout Belize. • Annual total rainfall for the next 25 and 50 years are 89.9mm and 74.7mm (NCCO, 2021) 	<ul style="list-style-type: none"> • Predicted decrease in precipitation of 10% by 2100 (NCCPSAP, 2014), with significant fluctuations attributed to El Niño • Some models predict a decrease of as much as 22% (IPCC, 2007) • Annual total rainfall for the next 100 years is 50.5mm (NCCO, 2021)
Increased intensity of storms (Hurricanes & Tropical Storms)	<ul style="list-style-type: none"> • Increased storms from 1999 onwards, with annual fluctuations. • More storms during La Nina, fewer El Nino. • Stronger storms >Cat 4 / 5 	<ul style="list-style-type: none"> • Escalating current trends 	<ul style="list-style-type: none"> • Escalating current trends

4.1 Priority Climate Change Adaptation Planning Targets

A series of focal targets were identified to base climate change adaptation planning and prioritize adaptation strategies. The focal targets were based on:

- Priority conservation targets
- Key environmental services
- Priority stakeholder communities
- Key socio-economic activities

4.1.1 Priority Conservation Targets

Of the three conservation targets identified (see Section 3.1.1), two were selected as priority conservation targets that would be severely affected by climate change. The priority conservation targets are:

- Savanna Ecosystem
- Riparian Ecosystem

The priority conservation targets were selected based on the predicated climate change elements for Belize and through a prioritization process that uses a rating criterion of low to very high (scale of 1 to 4, respectively) (Table 20 and 21). A score of 3 (high) was given for all three climate change elements on both the savanna and riparian ecosystem, since it is likely that an increase in air temperature and a decrease in precipitation may exacerbate wildfires, and an increase in the intensity of storms will contribute to the loss of standing trees within the ecosystems.

Table 20: Rating Criterion for Prioritizing Conservation Targets

RATING		DESCRIPTION
Very High	4	The climate change element is (or is predicted to be) the major contributing factor to the reduced viability, or possible local extinction, of the target over the majority of its extent within the project area over the next 50 years, and cannot be reversed
High	3	The climate change element is (or is predicted to be) a significant contributing factor to the reduced viability of the target over a significant part of its extent within the project area over the next 50 years, but can be reversed at high cost or over a long time period
Medium	2	The climate change element is (or is predicted to be) a moderate contributing factor to the reduced viability of the target over part of its extent within the project area over the next 50 years, and can be reversed at moderate cost
Low	1	The climate change element is (or is predicted to be) a minor contributing factor to the reduced viability of the target in localized areas within the project area over the next 50 years, and will reverse naturally or at limited cost

Table 21: Prioritized Conservation Targets

Predicted Climate Change Elements	Threatened Species	Savanna Ecosystem	Riparian Ecosystem
Increased Air Temperature	2	3	3
Decreased precipitation	2	3	3
Increased Intensity of Hurricanes and Tropical Storms	3	3	3
Average Score	2.33	3 <i>Selected</i>	3 <i>Selected</i>

4.1.2 Key Environmental Services

Through expert advice and group consensus, two priority environmental services considered to be at greatest risk from climate change were selected:

- Habitat Support
- Climate regulation

As implied in the name, MBWS provides habitat support to the various threatened and endemic species found in MBWS. For example, the distinctiveness of lowland savannas is characterized by a high level of species endemism, and this implies a high conservation value (Goodwin et al., 2013). Additionally, habitat support as an environmental service also supports game species, palmetto, and pine provisioning (Wells et al., 2018). As for climate regulation as an environmental service, it provides benefits to atmospheric chemical composition, air and water quality, moderation of temperature, and removal of pollutants from air and water.

4.1.3 Priority Stakeholder Communities

Priority stakeholder communities were selected from those identified in the MBWS stakeholder analysis. They were chosen based on their significant dependence on the natural resources and ecosystem services of MBWS and its surrounding areas, and its lowest capacity for adaptation. Three vulnerability factors were examined:

1. Exposure: The extent to which a community comes into contact with climate events or specific climate impacts;
2. Sensitivity: The degree to which a community is negatively affected by changes in climate; and
3. Adaptive Capacity: The potential or capability of a community to adjust to impacts of changing climate, and to minimize, cope with, and recover from the consequences of changes.

The priority stakeholder communities in MBWS stakeholder analysis are:

- La Democracia

- Mahogany Heights

La Democracia and Mahogany Heights are two village stakeholders and traditional users of the surrounding areas of MBWS for recreation and subsistence hunting. They are also the most exposed and sensitive to climate change and have a low potential or capability to adjust to and recover from climate change impacts due to its perceived lower economy.

4.1.4 Socio-economic Activities

The main socio-economic activities identified for the MBWS area:

- Tourism
- Farming

Tourism and small- and large-scale farming were selected as the key socio-economic activity based on its dependence on the natural resources of MBWS and the surrounding area and that will be the most affected by climate change. MBWS is highly dependent on tourism, specifically from international tourists. Therefore, climate change impacts on tourism would directly affect the MBWS business model. As for farming, small- and large-scale farming is the main socio-economic activity conducted outside of MBWS, with large scaling farming directly bordering MBWS to the East and West. The climate change elements could have significant impacts on crop yields, with heat stress affecting the growth rate, and decreased precipitation reducing crop production.

4.2 Hypothesis of Change

Using the predicted climate change impacts for Belize information, a “Hypothesis of Change” was developed to identify threats to the climate change adaptation targets considered important for MBWS. The threats for each target were assessed using a rating criterion (Table 22). See Tables 23 to 29 for the assessment of climate change adaptation threats for each target.

Table 22: Rating Criteria for Assessing Climate Change Adaptation Threats Per Target (TNC, 2007)

Ranking Criteria	Rating	Rating Definitions
<i>Certainty:</i> The certainty that the effect of Climate Change will occur, or the cause of the described impact will affect the target	Very High	4 Confirmed
	High	3 Considered very probable but not confirmed
	Medium	2 Considered probable
	Low	1 Considered a limited probability, much debate
<i>Severity:</i> Level or damage to this key element, which can destroy it in 50 years	Very High	4 Destroys the ecosystem or its production activities
	High	3 Seriously degrades the target
	Medium	2 Moderately degrades the target
	Low	1 Slightly impairs the target
<i>Scope:</i> Geographical coverage of the target that will be impacted in 50 years	Very High	4 75% - 100% of the geographic coverage
	High	3 50% - 75% of the geographic coverage
	Medium	2 25% - 50% of the geographic coverage
	Low	1 <25% of the geographic coverage
<i>Irreversibility:</i> The impact is permanent or cannot be reversed naturally or through human action	Very High	4 Not reversible, even with human intervention
	High	3 Reversible but at high cost or very long term (>100 years)
	Medium	2 Reversible with human intervention
	Low	1 Naturally reversible or with little human intervention and/or little cost

Table 23: Assessment of Climate Change Adaptation Threats for Savanna Ecosystem

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Increased frequency and intensity of fires	4	3	3	3	3.25
	Reduced growth rate (and flowering and fruiting patterns)	4	2	4	4	3.5
	Changes of water availability affecting the seasonal wetlands; Increased intensity of drought	2	3	4	4	3.25
	Changes in species composition (flora and fauna)	3	2	3	3	2.75
Decreased Precipitation	Increased frequency and intensity of fires	3	3	2	2	2.5
	Changes of water availability affecting the seasonal wetlands; Increased intensity of drought	3	3	4	3	3.25
	Reduced growth rate (and flowering and fruiting patterns)	4	3	4	4	3.75
	Changes in species composition (flora and fauna)	3	2	3	3	2.75
Increased Intensity of Storms	Loss of standing trees (increase of fuel wood)	4	2	1	2	2.25
	Changes in species composition (flora and fauna)	3	2	4	3	3
	Loss of bird nests and nesting trees	3	2	2	3	2.5
	Loss of species functionality (plant and animal)	3	3	2	4	3
	Loss of nutrients (washed away by flood waters after fires)	3	2	2	3	2.5
	Destruction of habitat	4	3	2	2	2.75

Table 24: Assessment of Climate Change Adaptation Threats for Riparian Ecosystem

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Reduced growth rate (and flowering and fruiting patterns)	4	2	4	4	3.5
	Increased probability of wildfires	3	3	3	3	3
	Decreased dissolved oxygen	4	3	4	3	3.50
	Changes in species composition (flora and fauna)	4	3	4	4	3.75
Decreased Precipitation	Decreased water volume available to recharge aquifers and ground water	3	2	4	4	3.25
	Reduced growth rate (and flowering and fruiting patterns)	4	2	4	4	3.5
	Changes in species composition (flora and fauna)	4	3	4	4	3.75
Increased Intensity of Storms	Increased flooding	3	3	4	4	3.5
	Loss of nutrients (washed away by flood waters after fires)	2	2	2	3	2.25
	Changes in species composition (flora and fauna)	4	3	4	4	3.75
	Loss of bird nests and nesting trees	3	2	2	3	2.5
	Soil erosion	3	3	2	3	2.75
	Loss of standing trees (increase of fuel wood)	3	3	2	4	3
	Loss of species functionality (plant and animal)	3	3	2	4	3
	Destruction of habitat	3	3	2	4	3

Table 25: Assessment of Climate Change Adaptation Threats for Habitat Support

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Changes in species composition (flora and fauna)	4	3	3	4	3.5
	Increased probability of wildfires	4	3	3	3	3.25
	Changes of water availability affecting the seasonal wetlands; Increased intensity of drought	4	3	4	4	3.75
	Decreased Dissolved Oxygen	4	3	4	4	3.50
	Reduced growth rate (and flowering and fruiting patterns)	4	2	4	4	3.5
Decreased Precipitation	Changes in species composition (flora and fauna)	4	3	3	4	3.5
	Changes of water availability affecting the seasonal wetlands; Increased intensity of drought	4	2	4	3	3.25
	Reduced growth rate (and flowering and fruiting patterns)	4	2	4	4	3.5
	Decreased food production capacity	3	2	2	2	2.25
Increased Intensity of Storms	Destruction of habitat	4	3	2	2	2.75
	Increased flooding	3	3	4	4	3.5
	Changes in species composition (flora and fauna)	4	3	4	4	3.75
	Loss of bird nests and nesting trees	3	2	2	3	2.5
	Loss of standing trees (increase of fuel wood)	3	3	2	4	3
	Loss of species functionality (plant and animal)	3	3	2	4	3

Table 26: Assessment of Climate Change Adaptation Threats for Climate Regulation

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Increased evapotranspiration cycles	4	2	4	4	3.5
	Increased frequency and intensity of fires (therefore releasing more carbon)	4	3	3	3	3.25
Decreased Precipitation	Increased intensity of drought	4	3	4	4	3.75
	Reduced growth rate (and flowering and fruiting patterns) [therefore reducing carbon sequestration]	4	2	4	4	3.5
Increased Intensity of Storms	Disruption of evapotranspiration cycles	4	2	4	4	3.5
	Loss of standing trees (increased fuel wood)	4	3	3	4	3.5

Table 27: Assessment of Climate Change Adaptation Threats for La Democracia/ Mahogany Heights

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Increased health problems (respiratory and infectious diseases)	3	3	2	3	2.75
	Increased cost of living (non-food items, health, energy, etc.)	3	2	3	3	2.75
	Increased frequency and intensity of fires (destruction of property)	3	3	2	3	2.75
Decreased Precipitation	Decreased food production capacity	4	2	3	3	3
	Increased intensity of droughts	4	2	4	4	3.5
	Increased poverty rates	3	3	3	3	3
	Decreased availability of drinking water	3	3	4	4	3.5
Increased Intensity of Storms	Damage to infrastructure (i.e., housing and farm) caused by flooding/ wind	4	3	3	3	3.25
	Increased cost of living (non-food items, health, energy, etc.)	3	3	4	3	3.25
	Increased poverty rates	2	3	3	3	2.75

Increased health problems (water contamination)	2	3	2	3	2.5
Increased housing insurance	4	2	4	3	3.25
Increased cost of crop insurance	4	2	2	3	2.75

Table 28: Assessment of Climate Change Adaptation Threats for Tourism

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Declining tourism attraction due to drier/hotter ecosystems and changes in the species composition (flora and fauna)	2	3	4	3	3
	Increased overhead expenses (ice, water, shade, insurance)	3	2	4	4	3.25
	Increased energy consumption	3	2	4	3	3
	Increased health problems (e.g., respiratory and infectious diseases, water contamination, heat stroke)	3	3	2	3	2.75
Decreased Precipitation	Users experience harsher and hotter conditions while using the area	3	2	3	4	3
	Declining tourism attraction due to drier/hotter ecosystems and changes in the species composition (flora and fauna)	2	3	4	4	3.25
	Decreased water supply from rooftop catchments.	4	2	4	3	3.25
Increased Intensity of Storms	Declining tourism attraction due to damaged ecosystems	3	2	2	3	2.5
	Increased housing insurance	3	2	4	3	3
	Damage to infrastructure caused by flooding/wind	3	2	3	3	2.75

Table 29: Assessment of Climate Change Adaptation Threats for Farming

Impact	Hypothesis of Change/Threats	Certainty	Severity	Scope	Irreversibility	Average Score
Increased Air Temperature	Reduced growth rate (and flowering and fruiting patterns)	4	3	4	4	3.75
	Increased crop pests and diseases	3	3	4	3	3.25
Decreased Precipitation	Decreased food production capacity	3	3	4	3	3.25
	Increased crop pests and diseases	3	3	4	3	3.25
	Reduced growth rate (and flowering and fruiting patterns)	4	3	4	4	3.75
	Increased intensity of droughts	4	3	4	4	3.75
	Decrease in river volume due to an increase in irrigation	3	3	4	4	3.5
Increased Intensity of Storms	Damage to infrastructure (i.e., housing and farm) caused by flooding/ wind	4	3	3	3	3.25
	Soil erosion	3	3	2	3	2.75
	Increased cost of crop insurance	4	2	4	3	3.25
	Loss of nutrients (washed away by flood waters after fires)	2	2	2	3	2.25

Ranked outputs

The assessment for each focal target provides a prioritization for threats that occur as a result of changes in climate based on different levels of impact (Tables 23 to 29). A total of 32 threats were identified, with each threat affecting one or more focal targets. The average impact scores for each focal target per threat was averaged again to give the overall average score for each threat (Table 30).

Table 30: Average Scoring of Each Focal Target Per Threat

Hypothesis of Change/Threats	Focal Targets	Score	Average Score
Changes in species composition (flora and fauna)	Savanna Ecosystem	2.83	3.39
	Riparian Ecosystem	3.75	
	Habitat Support	3.58	
Damage to infrastructure (e.g., housing and farm) caused by flooding/ wind	La Democracia/ Mahogany Heights	3.25	3.08
	Tourism	2.75	
	Farming	3.25	
Declining tourism attraction due to damaged ecosystems	Tourism	2.50	2.50
Declining tourism attraction due to drier/hotter ecosystems and changes in the species composition (flora and fauna)	Tourism	3.13	3.13
Decrease in river volume due to an increase in irrigation	Farming	3.50	3.50
Decreased availability of drinking water	La Democracia/ Mahogany Heights	3.50	3.50
Decreased dissolved oxygen	Riparian Ecosystem	3.50	3.50
	Habitat Support	3.50	
Decreased food production capacity	Habitat Support	2.25	2.83
	La Democracia/ Mahogany Heights	3.00	
	Farming	3.25	
Decreased water supply from rooftop catchments	Tourism	3.25	3.25
Decreased water volume available to recharge aquifers and ground water	Riparian Ecosystem	3.25	3.25
Destruction of habitat	Savanna Ecosystem	2.75	2.83
	Riparian Ecosystem	3.00	
	Habitat Support	2.75	
Disruption of evapotranspiration cycles	Climate Regulation	3.50	3.50
Increased cost of crop insurance	La Democracia/ Mahogany Heights	2.75	3.00

	Farming	3.25	
Increased cost of living (non-food items, health, energy, etc.)	La Democracia/ Mahogany Heights	3.00	3.00
Increased crop pests and diseases	Farming	3.25	3.25
Increased energy consumption	Tourism	3.00	3.00
Increased evapotranspiration cycles	Climate Regulation	3.50	3.50
Increased flooding	Riparian Ecosystem	3.50	3.50
	Habitat Support	3.50	
Increased frequency and intensity of fires	Savanna Ecosystem	3.13	3.04
	Climate Regulation	3.25	
	La Democracia/ Mahogany Heights	2.75	
Increased health problems (e.g., respiratory and infectious diseases, water contamination, heat stroke)	La Democracia/ Mahogany Heights	2.63	2.69
	Tourism	2.75	
Increased housing insurance	La Democracia/ Mahogany Heights	3.25	3.13
	Tourism	3.00	
Increased intensity of drought (e.g., Changes of water availability affecting the seasonal wetlands)	Savanna Ecosystem	3.25	3.55
	Habitat Support	3.50	
	Climate Regulation	3.75	
	La Democracia/ Mahogany Heights	3.50	
	Farming	3.75	
Increased overhead expenses (ice, water, shade, insurance)	Tourism	3.25	3.25
Increased poverty rates	La Democracia/ Mahogany Heights	2.88	2.88
Increased probability of wildfires	Riparian Ecosystem	3.00	3.13
	Habitat Support	3.25	
Loss of bird nests and nesting trees	Savanna Ecosystem	2.50	2.50
	Riparian Ecosystem	2.50	
	Habitat Support	2.50	
Loss of nutrients (washed away by flood waters after fires)	Savanna Ecosystem	2.50	2.33
	Riparian Ecosystem	2.25	
	Farming	2.25	
Loss of species functionality (plant and animal)	Savanna Ecosystem	3.00	3.00
	Riparian Ecosystem	3.00	
	Habitat Support	3.00	
	Savanna Ecosystem	2.25	2.94

Loss of standing trees (increase of fuel wood)	Riparian Ecosystem	3.00	
	Habitat Support	3.00	
	Climate Regulation	3.50	
Reduced growth rate (and flowering and fruiting patterns)	Savanna Ecosystem	3.63	3.58
	Riparian Ecosystem	3.50	
	Habitat Support	3.50	
	Climate Regulation	3.50	
	Farming	3.75	
Soil erosion	Riparian Ecosystem	2.75	2.75
	Farming	2.75	
Users experience harsher and hotter conditions while using the area	Tourism	3.00	3.00

4.3 Prioritizing Identified Threats

The high-priority threats from the “Hypothesis of Change” were selected based on the highest scores and/or how well the threats cuts across the focal targets (Table 31). For example, although destruction of habitat ranked relatively low with a score of 2.83, it cuts across three focal targets, making it fall under the priority list.

Table 31: Cross Cutting of Threats on the Climate Change Focal Targets

CROSS CUTTING PRIORITY THREATS	Climate Change Focal Targets						
	Conservation Targets		Key Environmental Services		Priority Stakeholder Communities	Key Socio-Economic Activities	
	Savanna	Riparian	Habitat Support	Climate Regulation	La Democracia/ Mahogany Heights	Tourism	Farming
Changes in species composition (flora and fauna)							
Damage to infrastructure (e.g., housing and farm) caused by flooding/ wind							
Decreased dissolved oxygen							
Decreased food production capacity							
Destruction of habitat							
Increased frequency and intensity of fires							
Increased intensity of drought (e.g., Changes of water availability affecting the seasonal wetlands)							
Loss of species functionality (plant and animal)							
Loss of standing trees (increase of fuel wood)							
Reduced growth rate (and flowering and fruiting patterns)							

4.3.1 Objectives and Strategies towards Climate Change Adaptation

Climate change-related objectives and key strategies were identified based on the high-priority threats identified for each climate change focal target for integration into the MBWS management programs (Table 32). Destruction of habitat, loss of standing trees (increase of fuel wood), and reduced growth rate (and flowering and fruiting patterns) were all lumped into one threat to form two objectives due to similarities of their impact.

Table 32: Objectives and Strategies for Climate Change Adaptation

Threats	Objective	Strategy
Changes in species composition (flora and fauna)	By 2024, establish a comprehensive research and monitoring program for birds and savanna and riparian vegetation (with a particular focus on endemic and threatened species).	<ol style="list-style-type: none"> 1. Determine the species composition of MBWS. 2. Utilize the SMART system to collect wildlife and plant data. 3. Monitor changes in species composition. 4. Identify monitoring strategies and adopt methods that are comparable with efforts of partner organizations.
Damage to infrastructure (e.g., housing and farm) caused by flooding/wind	By 2024, in partnership with neighboring landowners, support the implementation of a comprehensive disaster relief plan for MBWS and the surrounding communities/farms.	<ol style="list-style-type: none"> 1. Provide disaster relief assistance (rent boats, etc.). 2. Provide logistics support for disaster response operations. 3. Maintain disaster response equipment in working order. 4. Serve as a staging area for disaster response operations.
Decreased dissolved oxygen	By 2024, support the implementation of a monitoring program for the water quality (specifically on DO) of the Sibun River in partnership with the MFC Coalition.	<ol style="list-style-type: none"> 1. Liaise with University of Belize water quality monitoring program to identify the best protocol for MBWS to use. 2. Obtain equipment needed to perform monitoring. 3. Train MBWS staff to conduct water quality monitoring. 4. Establish where the data will be stored, organized, managed.
Decreased food production capacity	<p>By 2027, conduct a baseline study of the fruit trees within MBWS to determine the current status to inform potential interventions.</p> <hr/> <p>By 2027, support at least four activities/projects that address developing alternative livelihood opportunities for La Democracia and Mahogany Heights.</p>	<ol style="list-style-type: none"> 1. Identify a botanist to design monitoring protocol and assist with monitoring efforts. 2. Train MBWS staff to perform the monitoring efforts. 3. Collect baseline data using established protocols. <hr/> <ol style="list-style-type: none"> 1. Identify capacity building training programs for local communities and entrepreneurs to help broaden livelihood and income generation opportunities (eg. best practices, new skills, specialization). 2. Establish partnerships with agriculture research institutions to address agriculture and climate change issues.

		<ol style="list-style-type: none"> 3. Create linkages to micro-financing, agro-processing, and marketing opportunities. 4. Explore financing opportunities to help support the development of alternative livelihood projects (e.g. financing for tools, equipment, and training for local community members). 5. Conduct an assessment within the local community to determine if there is grassroots interest in a specific alternative livelihood opportunity and then brainstorm on ways MBWS can assist in making those projects a reality.
<p>Destruction of habitat</p> <p>Loss of standing trees (increase of fuel wood)</p>	<p>By 2025, determine the baseline of the vegetation found within the savanna and riparian ecosystem.</p>	<ol style="list-style-type: none"> 1. Conduct vegetation inventories within the savanna ecosystem. 2. Conduct inventories within the riparian ecosystem. 3. Implement the SMART system during Ranger Patrols. 4. Establish PSPs within the savanna ecosystem for long-term monitoring. 5. Conduct annual or bi-annual Rapid Ecological Assessments of the riparian ecosystem.
<p>Reduced growth rate (and flowering and fruiting patterns)</p>	<p>By 2027, support the Nationally Determined Contributions (NDCs) restoration goals by establishing a habitat rehabilitation/restoration program for the savanna and riparian ecosystem and the adjacent areas.</p>	<ol style="list-style-type: none"> 1. Develop a partnership with the Forest Department Restoration Desk along with the MFC Coalition. 2. Develop the restoration program in accordance with the National Landscape Restoration Strategy and referencing the vegetation inventories. 3. Participate in developing and implementing the MFC rehabilitation/restoration program.
<p>Increased frequency and intensity of fires</p>	<p>By 2025, ensure that the MBWS fire management plan is integrated within the MFC landscape fire management plan.</p>	<ol style="list-style-type: none"> 1. Implement prescribed burns of savanna as needed. 2. Implement the SMART system to monitor fire incidents. 3. Train MBWS staff and neighboring communities in fire management systems in partnership with the MFC Coalition. 4. Assist in fostering and training community firefighting brigades (rapid response team).

		<ol style="list-style-type: none"> 5. Maintain adequate equipment for fire management (tractor, swatters, fire gauges, etc.). 6. Conduct and support fire ecology research.
<p>Increased intensity of drought (e.g., Changes of water availability affecting the seasonal wetlands)</p>	<p>By 2025, develop and implement a drought mitigation plan for the savanna ecosystem.</p>	<ol style="list-style-type: none"> 1. Conduct an assessment on how drought affects the savanna ecosystem. 2. Develop a mitigation plan in partnership with the MFC Coalition. 3. Secure resources for implementation.
<p>Loss of species functionality (plant and animal)</p>	<p>By 2027, determine the baseline for wildlife (i.e. Yellow-Headed Parrot) and endemic species of MBWS.</p>	<ol style="list-style-type: none"> 1. Conduct wildlife surveys within riparian and savanna ecosystems. <ul style="list-style-type: none"> • Implement the SMART system to monitor poaching and to record opportunistic sightings of wildlife. • Install camera traps (for wildcats and their prey) in partnership with Panthera. • Conduct Yellow-headed Parrot surveys. 2. Conduct rapid endemic vegetation studies.

5 Management Planning

5.1 Management and Organizational Background

MBWS and campus currently employs 12 full time staff and 12 contract/part-time workers. However, only three staff are presently employed for the Sanctuary, and they also work in different capacities within the campus. The first employee for the Sanctuary is the Protected Area Manager, and they also hold the position of Managing Director, who oversees the Accounts Manager and Business Manager. The second and third employees are Conservation Rangers, who also serve as tour guides and aid with facility maintenance. The other personnel are responsible for the operations of the campus, which include the educational and tourism activities, and the day-to-day maintenance of the campus (see Section 5.6, Figure 27 for the operational chart).

Within the Sanctuary, the Protected Area Manager and the Conservation Rangers work together in conducting activities such as wildlife monitoring using camera traps, implementing the SMART system, conducting bird surveys using transects, installing and monitoring parrot boxes, developing and maintaining trails, and setting up fire regeneration monitoring plots. The Conservation Rangers may monitor camera traps and parrot boxes alone and report back to the Protected Area Manager.

The Managing Director/Protected Area Manager is also one of five members that sit on the Board of Directors (BOD) of Monkey Bay. Members meet quarterly to review the finances and budget, vision and mission tasks, NGO reports of the previous year, the Managing Director's reports, and much more. Additionally, the BOD may assist in conducting tasks if appropriate or necessary; for example, members of the BOD have volunteered to set up permanent sampling plots (PSP) and bird transects and to aid in drafting the co-management application for the Monkey Bay National Park with the Forest Department.

5.2 Review of Previous Management Programs

Not applicable. This is the first management plan for MBWS.

5.3 Management Goal and Objectives

MBWS was recognized by the Minister of Tourism and the Environment, Hon. Glen Godfrey, as a PPA on Earth Day, April 22, 1990. Belize's National Protected Areas System Plan (NPASP) (GOB, 2005; revised 2015) states that the purpose of a PPA's purpose is "*to complement the national lands through provision of connectivity, priority species protection, and improved ecosystem representation*" with permitted activities such as research, education, tourism, and sustainable extraction.

The overall management goal of MBWS is “Monkey Bay Wildlife Sanctuary is a model Private Protected Area that supports and safeguards landscape connectivity, ecosystem services, and socioeconomic benefits for present and future generations”, to be achieved through the following core objectives:

1. Protect the MBWS conservation targets (Threatened Species, Savanna Ecosystem, and Riparian Ecosystem).
2. Protect and conserve landscape connectivity within the MFC.
3. Provide socioeconomic opportunities to the neighbouring communities.

The management goal of MBWS is aligned with the MFC Conservation Action Plan goal, which is “A functioning Maya Forest Corridor through actions that balance our social, cultural, and economic well-being” (Revised MFC CAP, *in progress*).

5.4 Management Strategies

5.4.1 Management Zones

MBWS is currently divided into four zones (Figure 26):

1. **Campus and Infrastructure zone:** This area encompasses all the facilities, including the restrooms, showers, dining hall, staff housing, dorms, conference room, offices, a garage, and private residences/properties. The main entrance and parking area are also located within this zone. Allowed activities include overnight housing, permanent housing, creation of infrastructure, as well as its maintenance, conferences, and parking.
2. **Tourism and Recreation zone:** This area encompasses the area used by both tourists and student groups. It contains trails and areas intended for education, study by tourist groups and related non-invasive activities. Permitted activities include the construction and usage of trails, nature watching, outdoor classes/education and research. There is one main nature trail that for safety reasons exits unto three different locations along Churchyard Road, and it is only to be used by students and tourists on guided tours. Entrance into those exits should be closed off to prevent access by unauthorized members of the general public. Any other trails within this zone are only used for research or conservation management. Invasive activities such as the building of infrastructure, excavations and overnight camping are not allowed in this zone.
3. **Agroforestry zone:** This area will be used as a farm to produce fruits and vegetables to the kitchen of the MBWS campus and as a nursery for the restoration program.

Invasive activities such as the building of infrastructure, excavations and overnight camping are not allowed in this zone.

4. Strict Protection zone: Limited activities, such as ranger patrols and monitoring, non-invasive research, and fire prevention/fighting activities, are allowed within this zone. Invasive activities such as the building of infrastructure, excavations and overnight camping are not allowed in this zone. An exception for such activities can be made for research into the Pech Tun Ha archaeological site should that opportunity arise.

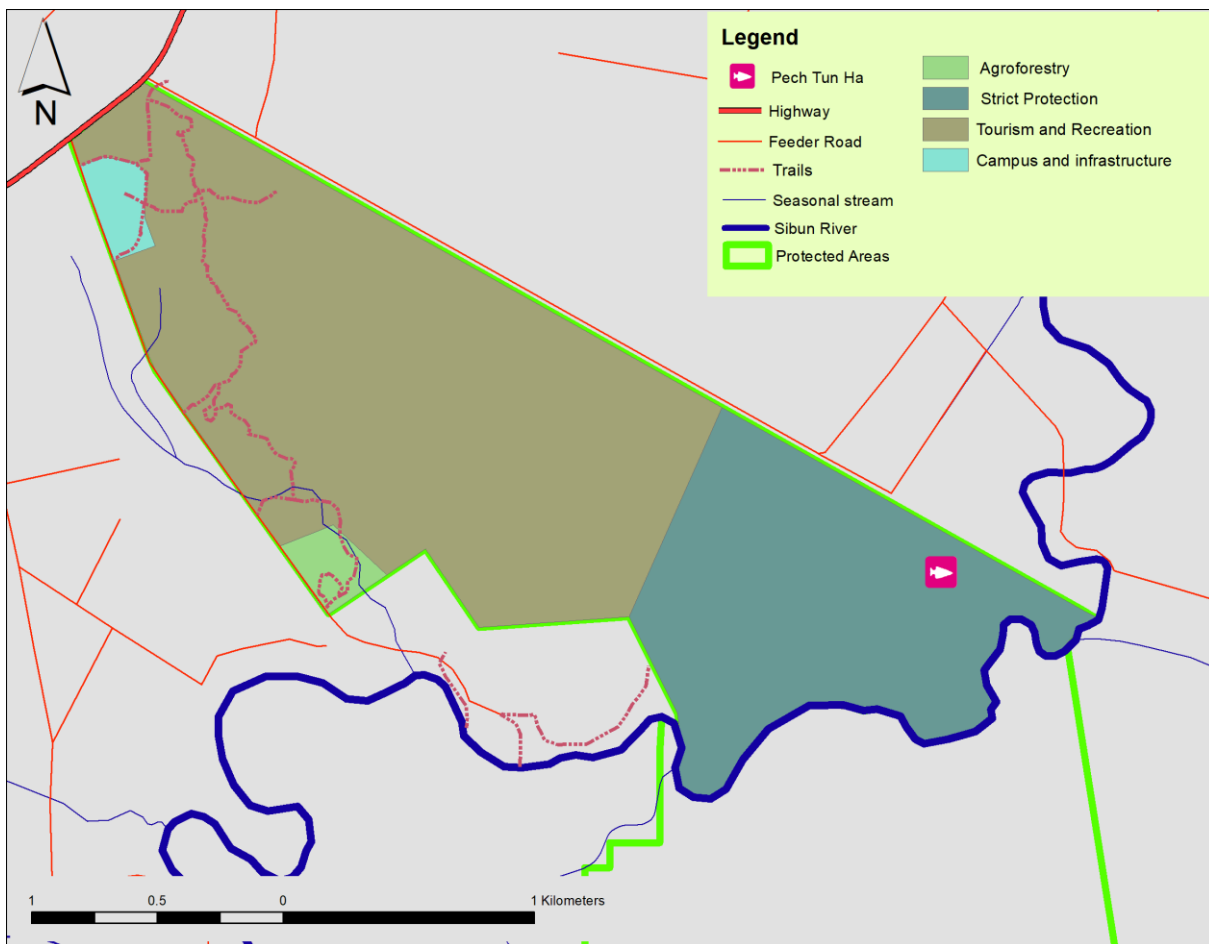


Figure 26: Management Zones of Monkey Bay Wildlife Sanctuary

5.4.2 Limits of Acceptable Change/Carrying Capacity

Limits of acceptable change are the amount of change within the protected area that is considered acceptable as a result of human use. Any amount of human activity will have an impact on the protected area and therefore management should be based on constant monitoring of the site as well as the objectives established for it. It is advisable that within the limits of acceptable change framework, a visitor limit should be established.

Given the small size of the MBWS and the limited space available for tourism and recreation use, visitor use capacity and guidelines need to be established. A visitor capacity study for the MBWS should be developed via a separate study as new or more information becomes available in the post-Covid times. This visitor carrying capacity study should be carried out as part of a comprehensive Visitor Management Plan for Sanctuary (see Section 5.5.4).

The carrying capacity study should be carried out through a collaborative planning process that includes the following:

- An assessment of the various activities that occur within the MBWS to determine the level of use,
- A survey of the activities with a view to determining projections for unsustainable activity levels,
- Recommendations for visitor resource use capacity indicators to be considered by the Managing Director,
- Findings from the assessment and survey to develop sound recommendations for the various tourism and recreation activities carried out at the site,
- Guidelines of the various activities carried out at the site, and
- A literature review of any existing studies, reports and other documents that will provide information and aid in the development of the Visitor Management Plan.

Exceeding or not meeting limits of acceptable change for any component of the site may not necessarily indicate that there has been a change in MBWS's ecosystem components, processes, benefits, and services. However, an investigation may have to be conducted to determine whether there has indeed been a change in MBWS's ecological character.

5.4.3 Management Constraints and Limitations

Key management constraints for MBWS primarily include the weak ability to cover operating costs, low revenue generation, and lack of human resources. The inherent uncertainty that accompanies such management circumstances also further hinders site planning and evaluation. The critical barriers to successful protected area management of the MBWS revolve mainly around insufficient financial resources to invest in the site's infrastructure and amenities. MBWS must increase its revenue by expanding the current services catered to tourists, especially domestic tourists, to be able to generate enough resources to maintain its conservation operations and finance any improvements.

5.5 Management Programs and Objectives

Management programs are a means of grouping management objectives within related areas – for example, grouping objectives related to research and monitoring, or to visitor use. The strength of the combined objectives within a program is greater than individual objectives. However, some management programs may only have one objective. Within a program, an objective may support the other objectives over space and time with areas of overlap that strengthen the overall management of the protected area. Under each objective, strategic actions were included to improve the management effectiveness.

Five general management programs are identified under the National Protected Area Management Plan Framework (NPAMPF), which are recognized by the Updated National Protected Areas System Plan (GOB, 2015).

5.5.1 Natural Resources Management Program

The four major objectives under the Natural Resource Management Program are to:

1. Develop and maintain an effective surveillance and enforcement program for the purpose of resource management within MBWS.
2. Improve the structure of the pine savanna ecosystem.
3. Develop a restoration program to support landscape connectivity.
4. Conduct a carbon feasibility assessment for MBWS to explore carbon market opportunities.

The first objective aims to conserve and enhance the condition of the natural resources of MBWS through a collection of actions that involves MBWS's human resources and the participation of the surrounding communities. To maintain effective surveillance and enforcement for resource management, MBWS must first increase its number of staff and equip them with the necessary tools and instruments. MBWS must also implement the Spatial Monitoring and Reporting Tool (SMART)³⁶ and other technology, such as GPS and drones, to keep track of any suspicious or developing activities that may impede conservation and protection of wildlife or of the savanna and riparian ecosystems. Training staff in the use of these technologies, as well as in the Protected Areas (PA) legislation and regulations, will allow them to become well versed in how and why MBWS as a PPA must be protected. Once fully trained, the MBWS staff will be able to engage the surrounding communities and educate them on the relevant laws and regulations to foster voluntary compliance.

³⁶ SMART consists of a software and analysis tools, such as training materials and patrolling standards, to help in conservationists monitor wildlife and ecosystem activity, identify threats, and make patrols effective.

Additionally, MBWS should collaborate with the MFC Coalition and any other relevant authorities, such as the Police and Forest Department, for effective enforcement of the landscape. Surveillance and enforcement are also not only effective through collaborations and proper technology usage, but by developing and maintaining systems that facilitate monitoring and patrolling. For example, trails and observation points should be developed at strategic locations for effective surveillance and MBWS boundaries should be properly demarcated to reduce any intrusions or illegal activity. The easy accessibility of MBWS poses on-going security risks for MBWS staff and visitors. The Churchyard Road that borders MBWS is a public access road, allowing anyone to potentially infringe onto the Sanctuary. Frequent patrols may reduce this security risk and any form of environmental degradation.

The second objective aims to ensure savanna ecosystem functionality and protection by taking the precautionary measures of conducting prescribed burns on the savannas where necessary. Before conducting prescribed burns, it is important to first develop a fire management plan based on the ecological objectives of MBWS, and to develop a drought mitigation plan for the savanna. The fire management plan would include implementing tools, such as the SMART system, to monitoring any fire incidents, and it would list the necessary steps needed to train and equip staff. MBWS staff must be well trained in fire management and rapid response, so that they could also train community members to form fire rapid response teams. As for the drought mitigation plan, it would aid in preventing fire activity, since dryness perpetuates fire. Ultimately, the fire management plan for MBWS should also be integrated into the Integrated Fire Management Plan for the Maya Forest Corridor, since MBWS makes up a portion of the MFC.

The third objective aims to ensure landscape connectivity for biodiversity through a restoration program in collaboration with the Forest Department and the MFC Coalition. MBWS would need to develop the restoration program in accordance with the National Landscape Restoration Strategy for Belize, as it serves as a guide on how to structure the restoration activities and the lists the priority restoration objectives for the country. However, MBWS may have niche priorities; therefore, restoration locations and their restoration type must also be identified. Identifying the restoration type and location will be useful when applying for grants or awards to fund these projects. Once funding is secured, MBWS should ensure that the staff are well educated on the types of restoration activities and their associated preparations. The staff will be responsible for establishing a tree nursery of hardwoods and native fruit trees and will perform the restoration activities at the identified locations. The staff will also partake in developing and implementing the MFC rehabilitation/restoration program, which may include developing

a public education campaign to maintain the integrity of the riparian forest along the Sibun River, in partnership with the MFC Coalition.

The final objective of the Natural Resources Management Program aims to ensure if a carbon sequestration project for carbon credits is feasible in MBWS. Firstly, it is recommended that MBWS liaises with UB-ERI, since they conducted a carbon feasibility assessment for the MFC to determine if forested property within the MFC was eligible for a carbon sequestration project under the Verified Carbon Standard (VCS) Program in 2020. The VCS Program is managed by Verra, an organization that develops and manages standards that help the private sector, countries, and civil society achieve sustainable development and climate action goals. The VCS Program certifies projects to convert greenhouse gas (GHG) emission reductions and removals into tradable carbon credits.

One of the first tasks in conducting the feasibility assessment is to conduct a study on the VCS projects in Belize to become familiarized on the process of capitalizing forested property. Several private sector organizations in Belize, most notably the RBCMA, have become verified under the VCS Program. Apart from developing a carbon feasibility assessment for MBWS, it may also be beneficial to collaborate with the MFC Coalition to determine VCS eligibility for the entire MFC landscape. To determine VCS eligibility, MBWS must submit the following deliverables to Verra:

- a) Detailed information about the project area and their appropriate VCS REDD+ typologies and sizes.
- b) Documentation showing that the project meets “activities that reduce GHG emissions by stopping deforestation on forest lands that are legally authorized and documented to be converted to non-forest land”.
- c) Detailed information about parcels that share similar ownership and biophysical characteristics as the project area properties.
- d) Rate of deforestation and risk of abandonment assessment.

MBWS stakeholders whose participation is required for the success of the Natural Resources Management Program are to be informed via phone, email, text, formal meetings, and/or workshops. Some stakeholders, such as the domestic visitors, may be informed via social media and/or blogs and news articles. The expected results of engaging the stakeholders include effective enforcement of the MBWS landscape, reduction of intrusions and/or illegal activities, and reduction of damages from wildfires. For a detailed breakdown of the Stakeholder Engagement Plan, see Appendix 9, Program 1.

5.5.2 Research and Monitoring Program

Research and monitoring activities are essential to ensure informed management, and to assess the management effectiveness of MBWS in achieving its objective. The only management objective for the Research and Monitoring Program is to develop and establish a monitoring and research program within and around MBWS. The objective aims to guide management and to identify habitat and species population changes through the actions of MBWS and partnerships with other research institutions. Some of these actions include conducting wildlife and vegetation surveys/inventories, such as:

- Install camera traps (for wildcats and their prey).
- Conduct vegetation inventories within the savanna and riparian ecosystem.
- Integrate biodiversity and habitat data with SMART for holistic biodiversity monitoring.
- Establish PSPs within the savanna ecosystem for long-term monitoring.
- Conduct Yellow-headed Parrot surveys.
- Conduct rapid endemic vegetation studies.
- Conduct annual or bi-annual Rapid Ecological Assessments of the riparian ecosystem.

Before any surveys or inventories are conducted, it is important to first establish a baseline for any species or habitat of concern, and to develop site-specific guidelines for long-term biodiversity monitoring. The monitoring guidelines should also follow and support the National Biodiversity Monitoring Program for Belize. Monitoring strategies and methods should be made to be comparable with those from other partner organizations to allow report or research findings sharing amongst each other. Additionally, all the monitoring and research activities could not be achieved without sourcing funds, hiring staff, and obtaining the necessary equipment to support such activities.

MBWS stakeholders whose participation is required for the success of the Research and Monitoring Program are to be informed via phone, email, text, and formal meetings. The expected result of engaging the stakeholders is the identification of habitat and species population changes. For a detailed breakdown of the Stakeholder Engagement Plan, see Appendix 9, Program 2.

5.5.3 Community Engagement Program

One of MBWS's core management objectives is to provide socioeconomic opportunities to the stakeholder communities (i.e., Mahogany Heights and La Democracia). To achieve this core objective, the Community Engagement Program must be implemented. The four major objectives under the Community Engagement are to:

1. Develop a restoration program for the socioeconomic benefits of the buffer communities.

2. Develop and maintain an effective education and outreach program within and around MBWS.
3. Develop and establish an entrepreneur-mentorship program for key community stakeholders, i.e., Mahogany Heights and La Democracia.
4. Partner with neighbouring landowners to support the implementation of a comprehensive disaster relief plan for MBWS and the surround communities/farms.

The first objective aims to ensure education and economic opportunities in the buffer communities of MBWS through developing a restoration program. One of the first activities to develop the restoration program is sourcing funds to support the program, which would include establishing a tree nursery and training staff in maintaining the tree nursery and performing restoration activities. The tree nursery should include hardwoods and fruit trees, with the goal of it supporting community livelihoods and concomitantly supporting the ecosystem services. Before the restoration activities are performed within the communities, the communities and locations must first be identified based on need and urgency. The community members should then undergo a series of workshops pertaining to restoration methods and best practices with the idea that they will participate in the active restoration activities themselves. The workshops would be facilitated by MBWS and relevant government departments, such as the Forest Department and Agriculture Department. If there are any grassroot organizations who are currently engaged in similar restoration activities, MBWS should also consider collaborating for increased efficiency. Once the restoration program is established, MBWS should continue to be support system for the communities, and should aid in providing the necessary resources, such as seedlings and saplings, information, and tools, for the restoration activities.

The second objective aims to improve the communication and understanding of sustainable development among stakeholders, specifically within Mahogany Heights and La Democracia³⁷, through an education and outreach program. The education and outreach program includes developing a communication strategy for MBWS to disseminate any important advisories or invitations to the surrounding communities. To effectively deliver these messages, MBWS should also identify key stakeholders within the communities so that they may relay any relevant information or deliver the community presentations during community meetings and/or church gatherings. Additionally, MBWS should also establish an advisory committee consisting of the identified key stakeholders so that they could be updated by MBWS on ongoing and upcoming activities. The advisory committee may also make recommendations to MBWS management on how to

³⁷ Mahogany Heights and La Democracia are the two key stakeholder communities identified for MBWS.

improve the biological, physical, and social environment of the area, as well as monitor and report on the effectiveness of the management interventions in the area.

Sourcing funds for the education and outreach program is vital, as most of the activities will entail providing food, shelter, and supplies. Some of the outreach activities include hosting summer camps and field trips for the community youths and celebrating Earth Day along with the surrounding communities. The more educational approach to the program includes establishing an environmental youth club and conducting environmental education workshops for community members of all ages. Most of these activities should also involve the participation local primary school teachers. Their participation would in turn promote a stronger environmental education program within the primary schools and education system.

The third objective aims to improve livelihoods among stakeholder communities (i.e., Mahogany Heights and La Democracia) to reduce the extractive pressures within and around MBWS by establishing an entrepreneur-mentorship program. The program should entail assessing and identifying stakeholder's interests of alternative livelihoods. After assessing the feasibility of implementing the alternative livelihoods, it would be beneficial to identify in country and international partners to aid as potential co-mentors. This would expand the knowledge resource and may open opportunities for stakeholders.

A mentorship plan would then be developed and should include capacity building training programs that will broaden livelihood and income generation opportunities for the stakeholder communities. The stakeholder communities will then be able to learn best practices, new skills, and could specialize in their field of interest. The entrepreneur-mentorship program activities would also include creating linkages, along with government agencies such as the Agriculture Department and Beltraide-SBDC, to micro-financing, agro-processing, and market opportunities for small scale farmers and entrepreneurs. Along with Beltraide-SBDC, financing opportunities would also be explored to support the alternative livelihood projects developed by the stakeholder communities. The financial support would aid in financing tools, equipment, and any necessary training.

The final objective under the Community Engagement Program aims to ensure that MBWS and the surrounding communities/farm are resilient to the impacts from natural events. This objective would only be met if in partnership with the neighbouring landowners to support the implementation of a comprehensive disaster relief plan. As a part of the disaster relief plan, MBWS would assist in providing disaster relief assistance, such as providing shelter and boats for rescue. Any additional logistical support would

also be provided by MBWS, including the maintenance of disaster response equipment. Since MBWS has large open area, it may also serve as a staging area for immediate disaster response operations for the surrounding communities and farms.

MBWS stakeholders whose participation is required for the success of the Community Engagement Management Program are to be informed via phone, email, text, formal meetings, and workshops. The expected results of engaging the stakeholders include improved communication and understanding of sustainable development among stakeholders, reduction of extractive pressures within and around MBWS, and a functioning advisory committee. For a detailed breakdown of the Stakeholder Engagement Plan, see Appendix 9, Program 3.

5.5.4 Tourism and Recreation Management Program

MBWS heavily relies on tourism income, specifically from the Study Abroad Program. This foreign income, although substantial, should not be the only source of income for MBWS. Therefore, the first objective is to expand the resource mobilization from the education and ecotourism activities within MBWS. This objective aims to ensure financial stability for the management of MBWS. This could be achieved by developing a suite of ecotourism products catered to the local population, which will also assist in improving and expanding the current services offered. One of the new services includes constructing a visitor's center, which would attract several day tourists. Additionally, MBWS should engage key tourism companies/operators to increase visitation within MBWS. Highlighting MBWS as a tourist destination among the tour companies will increase visitation rates. Furthermore, MBWS should collaborate with MFC partner organizations that may want to expand their tourism product. All organizations would develop common branding and tour packages within the corridor. Visiting multiple destinations within the MFC may be more attractive to tourists than just visiting one location. The MFC is becoming internationally recognized, therefore it is important for MBWS to also be marketed as being a part of the MFC in relation to their tourism activities.

The second objective seeks to develop and implement a sustainable tourism strategy for MBWS compatible with the Maya Forest Corridor landscape. This objective aims to ensure financial sustainability of the MBWS by conducting studies and implementing guides to maintain sustainable tourism products within and around MBWS. To develop sustainable tourism activities, a feasibility study of the potential tourism activities that are suitable for the landscape should be conducted. Concomitantly with the feasibility study, a Visitor Use Management Plan for MBWS should also be developed and implemented. The Visitor Use Management Plan would address the carrying capacity for MBWS and recommend the implementation of activities or facilities.

For a more integrated landscape approach in sustainable tourism development, MBWS should advocate for the development of a MFC tourism and business plan that would also integrate MBWS and the other MFC Coalition members. As aforementioned in the first objective of the Tourism and Recreation Management Program, each MFC partner organization would then have a common brand and tourism goals. In addition to the tourism and business plan, MBWS and the MFC Coalition should develop a monitoring system to gauge the environmental impacts of tourism activities within MBWS and the MFC landscape.

MBWS stakeholders whose participation is required for the success of the Tourism and Recreation Management Program are to be informed via phone, email, text, and formal meetings. The expected result of engaging the stakeholders is increased visitors for MBWS. For a detailed breakdown of the Stakeholder Engagement Plan, see Appendix 9, Program 4.

5.5.5 Administration and Infrastructure Program

The first main objective under the Administration and Infrastructure Program is to manage and enhance the human resources of MBWS. The objective aims to optimize employee performance in service of MBWS's conservation objectives. The activities that should be undertaken to achieve the objectives include increasing the human resources for the field and technical work, such as data analysis, grant writing, and report writing; developing a robust volunteer program to strengthen any human resources gaps; ensuring that staff and volunteers have sufficient administrative training for effective general management, fundamental accounting, budget, and proposal/work plan preparation and implementation; and implementing a training program for all on-site and operational staff for different work activities, such as operation and maintenance of reserve equipment, patrols, monitoring, conflict resolution, first aid, etc. All current and new employees should also be familiar with the MBWS's policies and procedures so that there is never any confusion or conflict. To keep employees accountable and motivated and to assess their effectiveness and to identify any human resource skills gap, an evaluation of staff performance should be conducted bi-annually.

The second and last objective is to conduct annual reviews of management activities to ensure compliance with the management plan and adjust as necessary. These management reviews consist of management effectiveness self-assessments³⁸ and

³⁸ The Management Effectiveness Tacking Tool (METT) assessment will accomplish the following objectives: 1) Assess how well the MBWS is being managed – primarily the extent to which management is protecting values and achieving goals and objectives; and 2) Highlight the degree of management implementation and effect on management actions. The METT template can be found in Appendix 3.

“Measures of Success” monitoring to be conducted on a biennial basis. The annual workplans and operational budgets are to be prepared before the end of each fiscal year and are to be reviewed annually to monitor progress. Finally, the management plan for MBWS should be reviewed after five years. This review will show what all objectives have been accomplished within those five years. The subsequent management plan should then include the objectives that were not accomplished or are in progress, including any updates, concerns, or new objectives and developments.

MBWS stakeholders whose participation is required for the success of the Administration and Infrastructure Program are to be informed via phone, email, text, workshops, surveys, blogs, and news articles. The expected results of engaging the stakeholders is their participation in management effectiveness activities. For a detailed breakdown of the Stakeholder Engagement Plan, see Appendix 9, Program 5.

5.6 Proposed Management Structure

Currently, MBWS employs three staff catered to the day-to-day conservation and protection of the Sanctuary: The Protected Area Manager and two Conservation Rangers. At its present capacity, the MBWS staff would not be able to implement all management actions and objectives since they also work in different capacities and are not fully employed for one position. As an example, the current Protected Area Manager also wears the hat of Managing Director. To cease the conflation of job positions, MBWS should hire a full-time Protected Area Manager. The current Protected Area Manager would then take on the full position of being the Managing Director. As for the current Conservation Rangers, their position should be focused only on the Sanctuary. All other positions related to the education and tourism business of Monkey Bay should be considered as a separate department with its own employees.

The proposed operational chart for MBWS is shown in Figure 27, with the Sanctuary management chart represented in green and the Campus management chart represented in orange. Although the Managing Director is also represented in green, for the sake of the management plan for the Sanctuary, they also supervise the business and accounts managers. The ideal management structure is where at least one staff fills each position without overlapping into another position. Overlapping of activities may occur, however, between the Sanctuary and the business, as both benefit from each other.

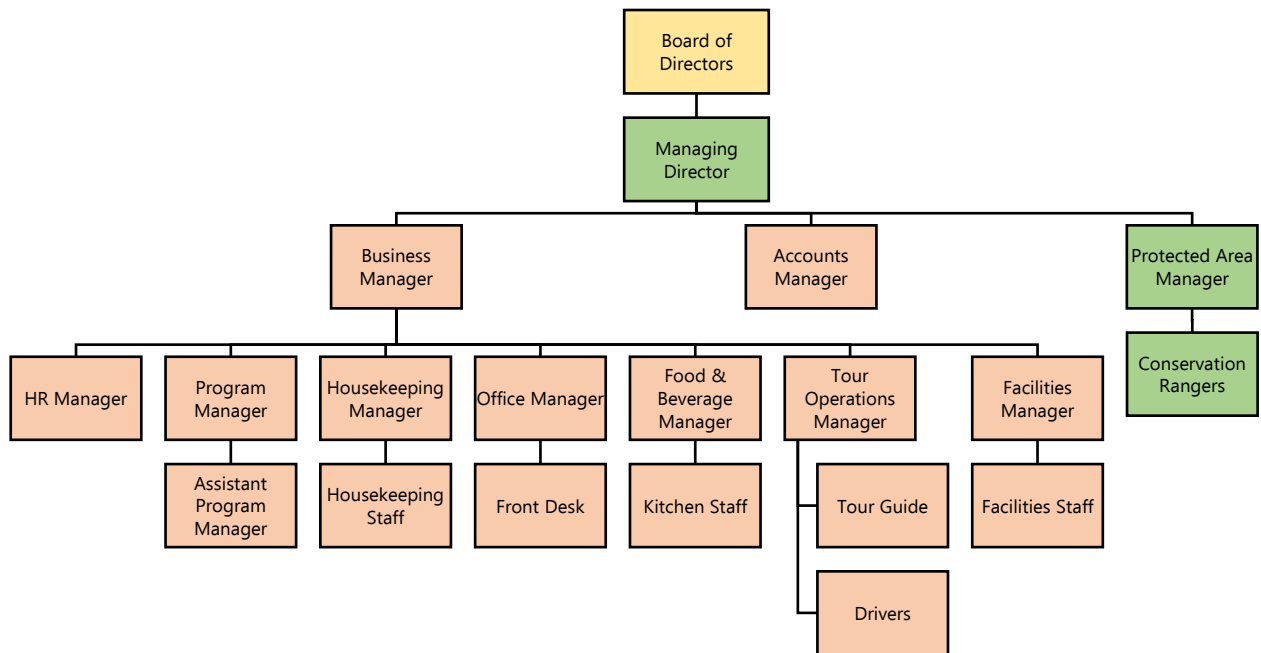


Figure 27: Organizational Chart of Monkey Bay Wildlife Sanctuary (green) and the Campus (orange)

5.7 Management Actions and Timeline

Table 33 provides a timeline of the objectives and their management actions for each management program that should be accomplished between 2022 to 2027. Each management action is to be completed by MBWS and/or the recommended stakeholder.

Table 33: Management Actions and Timeline

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
A. Natural Resources Management Program							
Objective #1: By 2025, develop and maintain an effective surveillance and enforcement program for the purpose of resource management within MBWS.							
<i>Rationale: To conserve and enhance the condition of the natural resources of MBWS.</i>							
1. Improve the demarcation of the boundaries of the MBWS to accepted standards particularly in critical or hot spot areas.	MBWS						
2. Develop trails and observation points along and at strategic locations for the purpose of patrolling.	MBWS						
3. Implement SMART and other technology (e.g., GPS and drones) to monitor poaching and to record opportunistic sightings of wildlife.	MBWS; WCS						
4. Train staff in the use of SMART and other technology and related tools.	MBWS; WCS						
5. Ensure that all relevant staff receive adequate training in PA legislation and regulations to support compliance and enforcement.	MBWS; FD						
6. Establish collaborative arrangements for surveillance and enforcement among the MFC Coalition members.	MBWS; MFC Coalition						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
7. Increase number of well-equipped staff.	MBWS						
8. Engage the community to foster voluntary compliance to relevant laws and regulations.	MBWS						
9. Engage the relevant authorities for response and communication necessary for effective enforcement.	MBWS; FD; Police Department; NBIO; DOE						
Objective #2: By 2027, improve the structure of the pine savanna ecosystem.							
<i>Rationale: To ensure savanna ecosystem functionality and protection.</i>							
1. Develop a fire management plan for MBWS based on their ecological objectives.	MBWS						
2. Implement prescribed burns of savanna as needed.	MBWS						
3. Implement the SMART system to monitor fire incidents.	MBWS						
4. Integrate the MBWS Fire Management Plan into the Integrated Fire Management Plan for the Maya Forest Corridor, Belize.	MBWS; MFC Coalition						
5. Train and equip staff in fire management and rapid response.	MBWS; FD						
6. Train community members in fire management skills and techniques to form fire rapid response teams.	MBWS; FD						
7. Develop and implement a savanna drought mitigation plan.	MBWS; MFC Coalition; FD						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
Objective #3: By 2026, develop a restoration program to support landscape connectivity.							
<i>Rationale: To ensure continued landscape connectivity for biodiversity.</i>							
1. Develop a partnership with the Forest Department Restoration Desk along with the MFC Coalition.	MBWS; FD						
2. Develop the restoration program in accordance with the National Landscape Restoration Strategy.	MBWS						
3. Establish a tree nursery of hardwoods and native fruit trees.	MBWS; FD						
4. Build capacity of staff to maintain the nursery and to perform restoration activities.	MBWS						
5. Identify restoration locations within MBWS and the type of restoration activities.	MBWS						
6. Participate in developing and implementing the MFC rehabilitation/ restoration program.	MBWS; MFC Coalition						
7. Encourage Sibun River Valley communities to maintain the integrity of the riparian forest via public education campaigns.	MBWS; MFC Coalition						
8. Source funding to support restoration activities.	MBWS						
Objective #4: By 2027, conduct a carbon feasibility assessment for MBWS to explore carbon market opportunities.							
<i>Rationale: To ensure if a carbon sequestration project for carbon credits is feasible in MBWS.</i>							
2. Liaise with UB ERI for assistance in the carbon feasibility assessment ³⁹ .	MBWS; UB ERI						

³⁹ UB ERI has conducted a carbon feasibility assessment for the MFC.

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
3. Conduct a study on the Verified Carbon Standard (VCS) ⁴⁰ projects in Belize ⁴¹ to become familiarized on the process of capitalizing forested property.	MBWS						
4. Collaborate with the MFC Coalition to implement a landscape carbon sequestration project for carbon credits.	MBWS; MFC Coalition						
5. Determine VCS eligibility by submitting the following deliverables to Verra: <ul style="list-style-type: none"> a) Detailed information about the project area and their appropriate VCS REDD+ typologies and sizes. b) Documentation showing that the project meets "activities that reduce GHG emissions by stopping deforestation on forest lands that are legally authorized and documented to be converted to non-forest land". c) Detailed information about parcels that share similar ownership and biophysical characteristics as the project area properties. d) Rate of deforestation and risk of abandonment assessment. 	MBWS; Lands Department						

⁴⁰ The VCS Program is managed by Verra (<https://verra.org>) and allows certified projects to turn their greenhouse gas (GHG) emission reductions and removals into tradable carbon credits.

⁴¹ The Rio Bravo Conservation and Management Area, for example, has successfully underwent verification to the VCS, which resulted in the creation of 1,660,260 carbon credits that could be sold to the voluntary market (Salas, et al., 2014).

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
B. Research and Monitoring Program							
Objective #5: By 2023, develop and establish a monitoring and research program within and around MBWS.							
<i>Rationale: To guide management and identify changes of the habitat and species population.</i>							
1. Source funding to support monitoring and research activities.	MBWS						
2. Build a cadre of staff that support research and monitoring activities.	MBWS						
3. Obtain equipment needed to perform monitoring.	MBWS						
4. Establish a baseline for mammal, birds, reptiles, amphibians, and fish populations and describe their respective habitats.	MBWS						
5. Develop site-specific guidelines for long-term monitoring of biodiversity.	MBWS						
6. Support the implementation of the National Biodiversity Monitoring Program.	MBWS						
7. Develop and implement a water quality assessment program for the segment of the Sibun River that traverses the MFC.	MBWS; MFC Coalition; UB						
8. Identify monitoring strategies and adopt methods that are comparable with efforts of partner organizations.	MBWS						
9. Conduct wildlife and vegetation surveys/inventories. Activities include: • Install camera traps (for wildcats and their prey) in partnership with Panthera.	MBWS; Panthera; WCS						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
<ul style="list-style-type: none"> • Conduct vegetation inventories within the savanna and riparian ecosystem. • Integrate biodiversity and habitat data with SMART for holistic biodiversity monitoring. • Establish PSPs within the savanna ecosystem for long-term monitoring. • Conduct Yellow-headed Parrot surveys. • Conduct rapid endemic vegetation studies. • Conduct annual or bi-annual Rapid Ecological Assessments of the riparian ecosystem. 							
10. Establish partnerships with research/education institutions to conduct relevant studies within MBWS.	MBWS						
C. Community Engagement Program							
Objective #6: By 2027, develop a restoration program for the socioeconomic benefits of the buffer communities.							
<i>Rationale: To ensure education and economic opportunities in the buffer communities of MBWS.</i>							
1. Source funding to support community landscape restoration actions.	MBWS						
2. Establish a tree nursery of hardwoods and fruit trees.	MBWS; FD						
3. Build capacity of staff to maintain the nursery and to perform restoration activities.	MBWS						
4. Identify the communities and locations for the restoration program.	MBWS, FD						
5. Conduct restoration and best practices workshops for the communities.	MBWS; FD; Agriculture Department						
6. Collaborate with grassroot organizations who are currently engaged in similar activities.	MBWS						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
Objective #7: By 2025, develop and maintain an effective education and outreach program within and around MBWS.							
<i>Rationale: To improve the communication and understanding of sustainable development among stakeholders.</i>							
1. Develop a communication strategy for MBWS.	MBWS						
2. Identify key stakeholders/champions to effectively communicate with interest groups around MBWS.	MBWS						
3. Establish an advisory committee consisting of the stakeholder champions for annual updates.	MBWS						
4. Establish community outreach activities, which may include summer camps, field trips, and Earth Day celebrations.	MBWS						
5. Develop an education program ⁴² for the two stakeholder communities, i.e., Mahogany Heights and La Democracia.	MBWS						
6. Partner with local primary school teachers on education and outreach activities.	MBWS						
7. Source funding to support education and outreach.	MBWS						
Objective #8: By 2025, develop and establish an entrepreneur-mentorship program for key community stakeholders, i.e., Mahogany Heights and La Democracia.							
<i>Rationale: To improve livelihoods among stakeholder communities to reduce the extractive pressures within and around MBWS.</i>							
1. Assess and identify stakeholders' interests of alternative livelihoods.	MBWS						

⁴² The education program may entail establishing an environmental youth club and conducting environmental education workshops.

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
2. Identify partners as potential mentors, both in country (e.g., Agriculture Department) and international partners.	MBWS						
3. Develop the mentorship plan.	MBWS; Agriculture Department						
4. Identify capacity building training programs for local communities and entrepreneurs to help broaden livelihood and income generation opportunities (e.g., best practices, new skills, specialization).	MBWS						
5. Create linkages to micro-financing, agro-processing, and marketing opportunities.	MBWS; Agriculture Department, Beltraide-SBDC						
6. Explore financing opportunities to help support the development of alternative livelihood projects (e.g., financing for tools, equipment, and training for local community members).	MBWS; Beltraide-SBDC						
Objective #9: By 2024, in partnership with neighbouring landowners, support the implementation of a comprehensive disaster relief plan for MBWS and the surrounding communities/farms.							
Rationale: To ensure that MBWS and the surrounding communities/farms are resilient to the impacts from natural events.							
1. Provide disaster relief assistance (provide shelter, boats, etc.).	MBWS; Neighbouring landowners						
2. Provide logistics support for disaster response operations.	MBWS; Neighbouring landowners						
3. Maintain disaster response equipment in working order.	MBWS						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
4. Serve as a staging area for disaster response operations.	MBWS						
D. Tourism and Recreation Management Program							
Objective #10: By 2026, expand the resource mobilization from the education and ecotourism activities within MBWS.							
<i>Rationale: To ensure financial stability for the management of MBWS.</i>							
1. Develop a suite of ecotourism products catered to locals.	MBWS						
2. Improve and expand the current services offered.	MBWS						
3. Construct a visitor center.	MBWS						
4. Engage key tourism companies/operators to increase visitation with MBWS.	MBWS						
5. Collaborate with the MFC partner organizations to develop common branding and tour packages within the corridor.	MBWS; MFC Coalition						
Objective #11: By 2027, develop and implement a sustainable tourism strategy for MBWS compatible with the Maya Forest Corridor landscape.							
<i>Rationale: To ensure the financial sustainability of the MBWS.</i>							
1. Conduct a feasibility study of the potential tourism activities in and around MBWS.	MBWS						
2. Advocate for the development of a MFC tourism and business plan that would integrate MBWS.	MBWS						
3. Develop and implement a visitor use management plan for MBWS.	MBWS						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
4. Develop a monitoring system to gauge the environmental impacts of tourism activities within and around MBWS.	MBWS; MFC Coalition						
E. Administration and Infrastructure Program							
Objective #12: By 2023, manage and enhance the human resources of MBWS.							
<i>Rationale: To optimize employee performance in service of MBWS's conservation objectives.</i>							
1. Increase the human resources for the field and technical work (data analysis, grant writing, report writing).	MBWS						
2. Ensure all current and new employees are familiar with organizational policies and procedures of MBWS.	MBWS						
3. Develop a robust Volunteer Program.	MBWS						
4. Ensure staff and volunteers have sufficient administrative training for effective general management, fundamental accounting, budget and proposal/work plan preparation and implementation.	MBWS						
5. Conduct bi-annual evaluation of staff performance and identify human resource skills gaps.	MBWS						
6. Implement training program for all on-site and operational staff members (operation and maintenance of reserve equipment, patrols, monitoring, conflict resolution, first aid, etc.).	MBWS						
Objective #13: Conduct annual reviews of management activities.							
<i>Rationale: To ensure compliance with the management plan and make adjustments as necessary (adaptive management).</i>							
1. Prepare annual work plan and operational budget before the end of each fiscal year.	MBWS						

Management Actions	Responsibility	Year					
		2022	2023	2024	2025	2026	2027
2. Conduct management effectiveness self-assessments ⁴³ twice during the management plan implementation.	MBWS						
3. Conduct "Measures of Success" monitoring on a biennial basis.	MBWS						
4. Review annual work plans.	MBWS						
5. Review management plan after 5 years.	MBWS						

⁴³ METT tool is used to conduct assessments.

5.8 Monitoring and Evaluation

Monitoring and evaluation will operate at three levels:

- Managerial efficiency in implementing planned activities – Are planned activities under each Program carried out?
- Overall effectiveness of the management regime as organized under the management plan – Do these activities add up to a better managed site?
- Success of conservation strategies in containing or reducing levels of threat acting on conservation targets – Are the strategies properly targeted, with management improvement leading to improvement in conservation status?

5.8.1 Evaluating managerial efficiency

The following coordination and monitoring process will serve as the mechanism for tracking progress of the Management Plan's implementation and ensuring compliance with assigned responsibilities within the Management Plan. The process includes the following steps:

- The Managing Director shall collect monthly updated management objective summary/status reports (see Appendix 1) from the Protected Area Manager, who compiles such reports based on input from the Conservation Rangers, volunteers, and/or consultants.
- The Managing Director, in consultation with the Protected Area Manager, ensures that all objectives have been accounted for.
- Monitoring of management plan implementation shall be included as a recurrent agenda item for MBWS staff meetings; reporting of the results of such meetings can be done via the Managing Director's quarterly reports to the BOD.
- The Managing Director, based on consultation and in coordination with the Protected Area Manager, makes note of unfinished objectives (shortfalls), needs for readjustments of outcomes and target dates (re-forecasts), meetings to be called, etc., on a bi-monthly basis. This is recorded using the Objectives, Responsibilities and Targets (ORT) form (see Appendix 2). Reporting can be done via the Managing Director's quarterly reports to the BOD.

5.8.2 Assessing managerial effectiveness

The management plan is only a guiding document, setting out a framework for the different actions. Actual implementation is affected by a range of factors that cannot be foreseen up to five years ahead. These factors are mainly funding availability and the need to modify detailed actions to the terms of financing agreements while maintaining the overall policy thrust.

The principal working documents are the annual plans covering the budget for the organization and for individual programs. These are then supported by periodic reports, submitted to the Managing Director and usually also required by the funding agency concerned. Cross-checking is a key monitoring mechanism for management efficiency, allowing timely remedial action as and when necessary.

The primary means of assessing overall managerial effectiveness is by using the Management Effectiveness Tracking Tool (METT) Self-Assessment Framework. This exercise should be conducted twice during the management plan implementation period: mid-point (2.5 years) and after the end of the fifth year.

The first assessment is a mid-term review allowing for re-orientation as required. The third assessment represents the final assessment of management performance over the planning period.

5.8.3 Monitoring management effectiveness

The METT Self-Assessment Framework reports progress on management effectiveness via a simple and rapid site assessment system.

The assessment focuses on six elements:

- Context - Assessment of importance, threats, and policy environment
- Planning - Assessment of MBWS design and planning
- Inputs - Assessment of resources needed to carry out management
- Processes - Assessment of the way in which management is conducted
- Outputs - Assessment of the implementation of management programs and actions, and delivery of products and services
- Outcomes - Assessment of the outcomes and the extent to which they achieved objectives

The METT Self-Assessment therefore provides an overview of progress in improving the effectiveness of management in MBWS, and helps to identify trends and patterns in the management of MBWS over time.

A comprehensive management effectiveness evaluation (MEE) was conducted for MBWS in 2019 by Wildtracks, and a METT self-assessment was conducted during the primary stages of this management planning process (see Appendix 10 for the METT results). The management plan will use the average of the 2019 MEE and 2022 METT scores as the baseline management effectiveness evaluation score, as it would reflect the feedback from MBWS management (Table 34).

Table 34: MEE Scores (2019 and 2022)

2019 MEE Score⁴⁴	2022 METT Self-Assessment Score	Average MEE Score
52.52%	66.67%	59.60%

The MBWS's goal should be to raise the average MEE score from 59.60% to over 70% by the end of the management plan implementation period.

The METT Self-Assessment is to be conducted twice during the management plan implementation period: mid-point (2.5 years) and after the end of the fifth year in preparation for the subsequent plan. See Appendix 3 for the METT Self-Assessment Tool.

5.8.4 Reviewing management success

The Evaluation of Management Success (see tool in Appendix 4) reviews the management actions set out in this Management Plan and assesses the degree to which the management actions have been implemented, to what effect, and what gaps remain. The tool was adapted from the Guidelines for Developing a Management Plan: Level Two (Wildtracks, 2005b) and is used to guide management actions for the upcoming period. The review should be repeated at the end of the first and third years of the lifetime of the plan, and again in the fifth in preparation for the subsequent plan.

5.9 Indicative Financing

The budget presented here are only indicative and reflect budgetary needs over the duration of this management plan. Where a budgetary figure is shown as "Included in Salaries", this suggests that salaries expenditure covers the cost of the activity. Where the costs of projects or consultancies are not yet known, these are indicated as "Project Funding" meaning that the costs are to be determined and are not covered by salaries expenditure.

It must be noted also that the "Project Funding" is specified as "non-staff" or "investments". The non-staff budget refers to operations, training, materials and equipment, travel and per diem, and contracting and consulting fees. The investment budget denotes budgetary requirements for capital investments in infrastructure, vehicles, major equipment, and such.

Please refer to Section 5.9.1 for the summary of the non-staff and investments indicative budget.

⁴⁴ Wildtracks, 2019

Finally, the staff budget is shown separately (Section 5.9.2) and is based on the Administrative Structure presented in Section 5.1.

5.9.1 Indicative Budget – Non-Staff & Investments (Summary)

Table 35: Indicative Budget

Management Actions	Indicative Budget
A. Natural Resources Management Program	
Objective #1: By 2025, develop and maintain an effective surveillance and enforcement program for the purpose of resource management within MBWS.	
<i>Rationale: To conserve and enhance the condition of the natural resources of MBWS.</i>	
1. Improve the demarcation of the boundaries of the MBWS to accepted standards particularly in critical or hot spot areas.	Investments = Project Funding
2. Develop trails and observation points along and at strategic locations for the purpose of patrolling.	Included in Salaries
3. Implement SMART and other technology (e.g., GPS and drones) to monitor poaching and to record opportunistic sightings of wildlife.	Non-Staff = Project Funding
4. Train staff in the use of SMART and other technology and related tools.	Non-Staff = Project Funding
5. Ensure that all relevant staff receive adequate training in PA legislation and regulations to support compliance and enforcement.	Non-Staff = Project Funding
6. Establish collaborative arrangements for surveillance and enforcement among the MFC Coalition members.	Included in Salaries
7. Increase number of well-equipped staff.	Investments = Project Funding
8. Engage the community to foster voluntary compliance to relevant laws and regulations.	Included in Salaries
9. Engage the relevant authorities for response and communication necessary for effective enforcement.	Included in Salaries
Objective #2: By 2027, improve the structure of the pine savanna ecosystem.	
<i>Rationale: To ensure savanna ecosystem functionality and protection.</i>	
1. Develop a fire management plan for MBWS based on their ecological objectives.	Non-Staff (consultancy) = Project Funding
2. Implement prescribed burns of savanna as needed.	Included in Salaries

Management Actions	Indicative Budget
3. Implement the SMART system to monitor fire incidents.	Included in Salaries
4. Integrate the MBWS Fire Management Plan into the Integrated Fire Management Plan for the Maya Forest Corridor, Belize.	Included in Salaries
5. Train and equip staff in fire management and rapid response.	Non-Staff and Investments = Project Funding
6. Train community members in fire management skills and techniques to form fire rapid response teams.	Included in Salaries
7. Develop and implement a savanna drought mitigation plan.	Non-Staff (consultancy) = Project Funding
Objective #3: By 2026, develop a restoration program to support landscape connectivity.	
<i>Rationale: To ensure continued landscape connectivity for biodiversity.</i>	
1. Develop a partnership with the Forest Department Restoration Desk along with the MFC Coalition.	Included in Salaries
2. Develop the restoration program in accordance with the National Landscape Restoration Strategy.	Included in Salaries
3. Establish a tree nursery of hardwoods and native fruit trees.	Included in Salaries
4. Build capacity of staff to maintain the nursery and to perform restoration activities.	Non-Staff = Project Funding
5. Identify restoration locations within MBWS and the type of restoration activities.	Included in Salaries
6. Participate in developing and implementing the MFC rehabilitation/ restoration program.	Included in Salaries
7. Encourage Sibun River Valley communities to maintain the integrity of the riparian forest via public education campaigns.	Included in Salaries
8. Source funding to support restoration activities.	Included in Salaries
Objective #4: By 2027, conduct a carbon feasibility assessment for MBWS to explore carbon market opportunities.	
<i>Rationale: To ensure if a carbon sequestration project for carbon credits is feasible in MBWS.</i>	

Management Actions	Indicative Budget
1. Liaise with UB ERI for assistance in the carbon feasibility assessment ⁴⁵ .	Included in Salaries
2. Conduct a study on the Verified Carbon Standard (VCS) ⁴⁶ projects in Belize ⁴⁷ to become familiarized on the process of capitalizing forested property.	Included in Salaries
3. Collaborate with the MFC Coalition to implement a landscape carbon sequestration project for carbon credits.	Included in Salaries
6. Determine VCS eligibility by submitting the following deliverables to Verra: <ul style="list-style-type: none"> a) Detailed information about the project area and their appropriate VCS REDD+ typologies and sizes. b) Documentation showing that the project meets “activities that reduce GHG emissions by stopping deforestation on forest lands that are legally authorized and documented to be converted to non-forest land”. c) Detailed information about parcels that share similar ownership and biophysical characteristics as the project area properties. d) Rate of deforestation and risk of abandonment assessment. 	Included in Salaries
B. Research and Monitoring Program	
Objective #5: By 2023, develop and establish a monitoring and research program within and around MBWS.	
<i>Rationale: To guide management and identify changes of the habitat and species population.</i>	
1. Source funding to support monitoring and research activities.	Included in Salaries
2. Build a cadre of staff that support research and monitoring activities.	Non-Staff = Project Funding
3. Obtain equipment needed to perform monitoring.	Non-Staff = Project Funding

⁴⁵ UB ERI has conducted a carbon feasibility assessment for the MFC.

⁴⁶ The VCS Program is managed by Verra (<https://verra.org>) and allows certified projects to turn their greenhouse gas (GHG) emission reductions and removals into tradable carbon credits.

⁴⁷ The Rio Bravo Conservation and Management Area, for example, has successfully underwent verification to the VCS, which resulted in the creation of 1,660,260 carbon credits that could be sold to the voluntary market (Salas, et al., 2014).

Management Actions	Indicative Budget
4. Establish a baseline for mammal, birds, reptiles, amphibians, and fish populations and describe their respective habitats.	Included in Salaries
5. Develop site-specific guidelines for long-term monitoring of biodiversity.	Included in Salaries
6. Support the implementation of the National Biodiversity Monitoring Program.	Included in Salaries
7. Develop and implement a water quality assessment program for the segment of the Sibun River that traverses the MFC.	Included in Salaries
8. Identify monitoring strategies and adopt methods that are comparable with efforts of partner organizations.	Included in Salaries
9. Conduct wildlife and vegetation surveys/inventories. Activities include: <ul style="list-style-type: none"> • Install camera traps (for wildcats and their prey) in partnership with Panthera. • Conduct vegetation inventories within the savanna and riparian ecosystem. • Integrate biodiversity and habitat data with SMART for holistic biodiversity monitoring. • Establish PSPs within the savanna ecosystem for long-term monitoring. • Conduct Yellow-headed Parrot surveys. • Conduct rapid endemic vegetation studies. • Conduct annual or bi-annual Rapid Ecological Assessments of the riparian ecosystem. 	Included in Salaries
10. Establish partnerships with research/education institutions to conduct relevant studies within MBWS.	Included in Salaries
C. Community Engagement Program	
Objective #6: By 2027, develop a restoration program for the socioeconomic benefits of the buffer communities.	
Rationale: To ensure education and economic opportunities in the buffer communities of MBWS.	
1. Source funding to support community landscape restoration actions.	Included in Salaries
2. Establish a tree nursery of hardwoods and fruit trees.	Included in Salaries
3. Build capacity of staff to maintain the nursery and to perform restoration activities.	Non-Staff = Project Funding
4. Identify the communities and locations for the restoration program.	Included in Salaries

Management Actions	Indicative Budget
5. Conduct restoration and best practices workshops for the communities.	Included in Salaries
6. Collaborate with grassroots organizations who are currently engaged in similar activities.	Included in Salaries
Objective #7: By 2025, develop and maintain an effective education and outreach program within and around MBWS.	
<i>Rationale: To improve the communication and understanding of sustainable development among stakeholders.</i>	
1. Develop a communication strategy for MBWS.	Included in Salaries
2. Identify key stakeholders/champions to effectively communicate with interest groups around MBWS.	Included in Salaries
3. Establish an advisory committee consisting of the stakeholder champions for annual updates.	Included in Salaries
4. Establish community outreach activities, which may include summer camps, field trips, and Earth Day celebrations.	Included in Salaries
5. Develop an education program ⁴⁸ for the two stakeholder communities, i.e., Mahogany Heights and La Democracia.	Included in Salaries
6. Partner with local primary school teachers on education and outreach activities.	Included in Salaries
7. Source funding to support education and outreach.	Included in Salaries
Objective #8: By 2025, develop and establish an entrepreneur-mentorship program for key community stakeholders, i.e., Mahogany Heights and La Democracia.	
<i>Rationale: To improve livelihoods among stakeholder communities to reduce the extractive pressures within and around MBWS.</i>	
1. Assess and identify stakeholders' interests of alternative livelihoods.	Included in Salaries
2. Identify partners as potential mentors, both in country (e.g., Agriculture Department) and international partners.	Included in Salaries
3. Develop the mentorship plan.	Included in Salaries

⁴⁸ The education program may entail establishing an environmental youth club and conducting environmental education workshops.

Management Actions	Indicative Budget
4. Identify capacity building training programs for local communities and entrepreneurs to help broaden livelihood and income generation opportunities (e.g., best practices, new skills, specialization).	Included in Salaries
5. Create linkages to micro-financing, agro-processing, and marketing opportunities.	Included in Salaries
6. Explore financing opportunities to help support the development of alternative livelihood projects (e.g., financing for tools, equipment, and training for local community members).	Included in Salaries
Objective #9: By 2024, in partnership with neighbouring landowners, support the implementation of a comprehensive disaster relief plan for MBWS and the surrounding communities/farms.	
<i>Rationale: To ensure that MBWS and the surrounding communities/farms are resilient to the impacts from natural events.</i>	
1. Provide disaster relief assistance (provide shelter, boats, etc.).	Included in Salaries
2. Provide logistics support for disaster response operations.	Included in Salaries
3. Maintain disaster response equipment in working order.	Included in Salaries
4. Serve as a staging area for disaster response operations.	Included in Salaries
D. Tourism and Recreation Management Program	
Objective #10: By 2026, expand the resource mobilization from the education and ecotourism activities within MBWS.	
<i>Rationale: To ensure financial stability for the management of MBWS.</i>	
1. Develop a suite of ecotourism products catered to locals.	Non-Staff = Project Funding
2. Improve and expand the current services offered.	Investments = Project Funding
3. Construct a visitor center.	Investments = Project Funding
4. Engage key tourism companies/operators to increase visitation with MBWS.	Included in Salaries
5. Collaborate with the MFC partner organizations to develop common branding and tour packages within the corridor.	Included in Salaries
Objective #11: By 2027, develop and implement a sustainable tourism strategy for MBWS compatible with the Maya Forest Corridor landscape.	
<i>Rationale: To ensure the financial sustainability of the MBWS.</i>	
1. Conduct a feasibility study of the potential tourism activities in and around MBWS.	Included in Salaries

Management Actions	Indicative Budget
2. Advocate for the development of a MFC tourism and business plan that would integrate MBWS.	Included in Salaries
3. Develop and implement a visitor use management plan for MBWS.	Non-Staff (consultancy) = Project Funding
4. Develop a monitoring system to gauge the environmental impacts of tourism activities within and around MBWS.	Included in Salaries
E. Administration and Infrastructure Program	
Objective #12: By 2023, manage and enhance the human resources of MBWS.	
<i>Rationale: To optimize employee performance in service of MBWS's conservation objectives.</i>	
1. Increase the human resources for the field and technical work (data analysis, grant writing, report writing).	Non-Staff = Project Funding
2. Ensure all current and new employees are familiar with organizational policies and procedures of MBWS.	Non-Staff = Project Funding
3. Develop a robust Volunteer Program.	Included in Salaries
4. Ensure staff and volunteers have sufficient administrative training for effective general management, fundamental accounting, budget and proposal/work plan preparation and implementation.	Non-Staff = Project Funding
5. Conduct bi-annual evaluation of staff performance and identify human resource skills gaps.	Included in Salaries
6. Implement training program for all on-site and operational staff members (operation and maintenance of reserve equipment, patrols, monitoring, conflict resolution, first aid, etc.).	Non-Staff = Project Funding
Objective #13: Conduct annual review of management activities.	
<i>Rationale: To ensure compliance with the management plan and adjust as necessary (adaptive management).</i>	
1. Prepare annual work plan and operational budget before the end of each fiscal year.	Included in Salaries
2. Conduct management effectiveness self-assessments twice during the management plan implementation.	Included in Salaries
3. Conduct "Measures of Success" monitoring on a biennial basis.	Included in Salaries
4. Review annual work plans.	Included in Salaries

Management Actions	Indicative Budget
5. Review management plan after 5 years.	Non-Staff (consultancy) = Project Funding

5.9.2 Indicative Budget – Staff Salaries

Table 36: Staff Pay Range

Staff Post	Indicative Annual Budget (Pay Range)
Managing Director	\$650 - \$800 / week
Protected Area Manager	\$400 - \$550 / week
Senior Conservation Ranger	\$350 - \$420 / week
Conservation Ranger	\$320 - \$375 / week

Salaries are before Social Security and Tax deductions.

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Appendix 3 – METT Self-Assessment Tool⁴⁹



METT Self-Assessment Tool Form
Monkey Bay Wildlife Sanctuary

Year: _____

Form: MBWS-0003

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
1. Legal status Does MBWS have legal status (or in the case of private reserves is covered by a covenant or similar)? <i>Context</i>	MBWS is not gazetted/covenanted	0			
	There is agreement that MBWS should be gazetted/covenanted but the process has not yet begun	1			
	MBWS is in the process of being gazetted/covenanted but the process is still incomplete (includes sites designated under international conventions, such as Ramsar, or local/traditional law such as community conserved areas, which do not yet have national legal status or covenant)	2			
	MBWS has been formally gazetted/covenanted	3			
2. Protected area regulations	There are no regulations for controlling land use and activities in MBWS	0			
	Some regulations for controlling land use and activities in MBWS exist but there are major weaknesses	1			

⁴⁹ This Self-Assessment Tool is adapted from a METT (which was originally developed by the World Bank/WWF Alliance for Forest Conservation and Sustainable Use) to be utilized by MBWS without the need for an independent consultant. The tool has since been updated into a comprehensive 2020 version (IUCN).

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
Are appropriate regulations in place to control land use and activities (e.g., hunting)? <i>Planning</i>	Regulations for controlling land use and activities in MBWS exist but there are some weaknesses or gaps	2			
	Regulations for controlling inappropriate land use and activities in MBWS exist and provide an excellent basis for management	3			
3. Law enforcement Can staff (i.e., those with responsibility for managing the site) enforce protected area rules well enough? <i>Input</i>	The staff have no effective capacity/resources to enforce protected area legislation and regulations	0			
	There are major deficiencies in staff capacity/resources to enforce protected area legislation and regulations (e.g., lack of skills, no patrol budget, lack of institutional support)	1			
	The staff have acceptable capacity/resources to enforce protected area legislation and regulations, but some deficiencies remain	2			
	The staff have excellent capacity/resources to enforce protected area legislation and regulations	3			
4. Protected area objectives Is management undertaken	No firm objectives have been agreed for MBWS	0			
	MBWS has agreed objectives, but is not managed according to these objectives	1			
	MBWS has agreed objectives, but is only partially managed according to these objectives	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
according to agreed objectives? <i>Planning</i>	MBWS has agreed objectives and is managed to meet these objectives	3			
5. Protected area design Is MBWS the right size and shape to protect species, habitats, ecological processes, and water catchments of key conservation concern? <i>Planning</i>	Inadequacies in protected area design mean achieving the major objectives of MBWS is very difficult	0			
	Inadequacies in protected area design mean that achievement of major objectives is difficult, but some mitigating actions are being taken (e.g., agreements with adjacent landowners for wildlife corridors or introduction of appropriate catchment management)	1			
	Protected area design is not significantly constraining achievement of objectives, but could be improved (e.g., with respect to larger scale ecological processes)	2			
	Protected area design helps achievement of objectives; it is appropriate for species and habitat conservation; and maintains ecological processes such as surface and groundwater flows at a catchment scale, natural disturbance patterns etc.	3			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<p>6. PROTECTED AREA BOUNDARY DEMARCATION</p> <p>Is the boundary known and demarcated?</p> <p><i>Process</i></p>	The boundary of MBWS is not known by the management authority or local residents/neighbouring land users	0			
	The boundary of MBWS is known by the management authority but is not known by local residents/neighbouring land users	1			
	The boundary of MBWS is known by both the management authority and local residents/neighbouring land users but is not appropriately demarcated	2			
	The boundary of MBWS is known by the management authority and local residents/neighbouring land users and is appropriately demarcated	3			
<p>7. Management plan</p> <p>Is there a management plan and is it being implemented?</p> <p><i>Planning</i></p>	There is no management plan for MBWS	0			
	A management plan is being prepared or has been prepared but is not being implemented	1			
	A management plan exists but it is only being partially implemented because of funding constraints or other problems	2			
	A management plan exists and is being implemented	3			
Additional points: <i>Planning</i>					
7a. Planning process	The planning process allows adequate opportunity for key stakeholders to influence the management plan	+1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
7b. Planning process	There is an established schedule and process for periodic review and updating of the management plan	+1			
7c. Planning process	The results of monitoring, research and evaluation are routinely incorporated into planning	+1			
8. Regular work plan Is there a regular work plan and is it being implemented? <i>Planning/Outputs</i>	No regular work plan exists	0			
	A regular work plan exists but few of the activities are implemented	1			
	A regular work plan exists, and many activities are implemented	2			
	A regular work plan exists, and all activities are implemented	3			
9. Resource inventory Do you have enough information to manage the area?	There is little or no information available on the critical habitats, species, and cultural values of MBWS	0			
	Information on the critical habitats, species, ecological processes, and cultural values of MBWS is not sufficient to support planning and decision making	1			
	Information on the critical habitats, species, ecological processes, and cultural values of MBWS is sufficient for most key areas of planning and decision making	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<i>Input</i>	Information on the critical habitats, species, ecological processes, and cultural values of MBWS is sufficient to support all areas of planning and decision making	3			
10. Protection systems	Protection systems (patrols, permits, etc.) do not exist or are not effective in controlling access/resource use	0			
Are systems in place to control access/resource use in MBWS?	Protection systems are only partially effective in controlling access/resource use	1			
	Protection systems are moderately effective in controlling access/resource use	2			
	<i>Process/Outcome</i> Protection systems are largely or wholly effective in controlling access/ resource use	3			
11. Research	There is no survey or research work taking place in MBWS	0			
Is there a program of management-oriented survey and research work?	There is a small amount of survey and research work, but it is not directed towards the needs of protected area management	1			
	There is considerable survey and research work, but it is not directed towards the needs of protected area management	2			
	<i>Process</i> There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3			
	Active resource management is not being undertaken	0			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
12. Resource management Is active resource management being undertaken? <i>Process</i>	Very few of the requirements for active management of critical habitats, species, ecological processes, and cultural values are being implemented	1			
	Many of the requirements for active management of critical habitats, species, ecological processes, and cultural values are being implemented but some key issues are not being addressed	2			
	Requirements for active management of critical habitats, species, ecological processes, and cultural values are being substantially or fully implemented	3			
13. Staff numbers Are there enough people employed to manage MBWS? <i>Inputs</i>	There are no staff	0			
	Staff numbers are inadequate for critical management activities	1			
	Staff numbers are below optimum level for critical management activities	2			
	Staff numbers are adequate for the management needs of MBWS	3			
14. Staff training Are staff adequately trained to fulfil management objectives?	Staff lack the skills needed for protected area management	0			
	Staff training and skills are low relative to the needs of MBWS	1			
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<i>Inputs/Process</i>	Staff training and skills are aligned with the management needs of MBWS	3			
15. Current budget	There is no budget for management of MBWS	0			
Is the current budget sufficient?	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1			
	The available budget is acceptable but could be further improved to fully achieve effective management	2			
<i>Inputs</i>	The available budget is sufficient and meets the full management needs of MBWS	3			
16. Security of budget	There is no secure budget for MBWS, and management is wholly reliant on outside or highly variable funding	0			
Is the budget secure?	There is very little secure budget and MBWS could not function adequately without outside funding	1			
	There is a reasonably secure core budget for regular operation of MBWS, but many innovations and initiatives are reliant on outside funding	2			
<i>Inputs</i>	There is a secure budget for MBWS and its management needs	3			
17. Management of budget	Budget management is very poor and significantly undermines effectiveness (e.g., late release of budget in financial year)	0			
Is the budget managed to meet critical	Budget management is poor and constrains effectiveness	1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
management needs? <i>Process</i>	Budget management is adequate but could be improved	2			
	Budget management is excellent and meets management needs	3			
18. Equipment Is equipment sufficient for management needs? <i>Input</i>	There is little or no equipment and facilities for management needs	0			
	There are some equipment and facilities, but these are inadequate for most management needs	1			
	There are equipment and facilities, but still some gaps that constrain management	2			
	There are adequate equipment and facilities	3			
19. Maintenance of equipment Is equipment adequately maintained? <i>Process</i>	There is little or no maintenance of equipment and facilities	0			
	There is some <i>ad hoc</i> maintenance of equipment and facilities	1			
	There is basic maintenance of equipment and facilities	2			
	Equipment and facilities are well maintained	3			
20. Education and awareness	There is no education and awareness program	0			
	There is a limited and <i>ad hoc</i> education and awareness program	1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
Is there a planned education program linked to the objectives and needs? <i>Process</i>	There is an education and awareness program, but it only partly meets needs and could be improved	2			
	There is an appropriate and fully implemented education and awareness program	3			
21. Planning for land and water use Does land and water use planning recognise MBWS and aid the achievement of objectives? <i>Planning</i>	Adjacent land and water use planning does not take into account the needs of MBWS and activities/policies are detrimental to the survival of the area	0			
	Adjacent land and water use planning does not take into account the long term needs of MBWS, but activities are not detrimental the area	1			
	Adjacent land and water use planning partially takes into account the long term needs of MBWS	2			
	Adjacent land and water use planning fully takes into account the long term needs of MBWS	3			
Additional points: Land and water planning					
21a: Land and water planning for habitat conservation	Planning and management in the catchment or landscape containing MBWS incorporates provision for adequate environmental conditions (e.g., volume, quality and timing of water flow, air pollution levels, etc.) to sustain relevant habitats.	+1			
21b: Land and water planning for connectivity	Management of corridors linking MBWS provides for wildlife passage to key habitats outside MBWS (e.g., to allow migratory fish to travel between freshwater	+1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
	spawning sites and the sea, or to allow animal migration).				
21c: Land and water planning for ecosystem services & species conservation	Planning addresses ecosystem-specific needs and/or the needs of particular species of concern at an ecosystem scale (e.g., volume, quality and timing of freshwater flow to sustain particular species, fire management to maintain savannah habitats etc.)	+1			
22. State and commercial neighbours Is there co-operation with adjacent land and water users? <i>Process</i>	There is no contact between managers and neighbouring official or corporate land and water users	0			
	There is contact between managers and neighbouring official or corporate land and water users but little or no cooperation	1			
	There is contact between managers and neighbouring official or corporate land and water users, but only some cooperation	2			
	There is regular contact between managers and neighbouring official or corporate land and water users, and substantial cooperation on management	3			
23. Local communities Do local community residents or residents near MBWS have input	Local communities have no input in decisions relating to the management of MBWS	0			
	Local communities have some input in discussions relating to management but no direct role in management	1			
	Local communities directly contribute to some relevant decisions relating to management, but their involvement could be improved	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
to management decisions? <i>Process</i>	Local communities directly participate in all relevant decisions relating to management, e.g., co-management	3			
Additional points Local communities					
23 a. Impact on communities	There is open communication and trust between local people, stakeholders, and protected area managers	+1			
23b. Impact on communities	Programmes to enhance community welfare, while conserving protected area resources, are being implemented	+1			
23c. Impact on communities	Local people/stakeholders actively support MBWS	+1			
24. Economic benefit	MBWS does not deliver any economic benefits to local communities	0			
Is MBWS providing economic benefits to local communities, e.g., income, employment, payment for environmental services? <i>Outcomes</i>	Potential economic benefits are recognised and plans to realise these are being developed	1			
	There is some flow of economic benefits to local communities	2			
	There is a major flow of economic benefits to local communities from activities associated with MBWS	3			
	There is no monitoring and evaluation in MBWS	0			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
25. Monitoring and evaluation Are management activities monitored against performance? <i>Planning/Process</i>					
	There is some <i>ad hoc</i> monitoring and evaluation, but no overall strategy and/or no regular collection of results	1			
	There is an agreed and implemented monitoring and evaluation system, but results do not feed back into management	2			
	A good monitoring and evaluation system exists, is well implemented, and used in adaptive management	3			
26. Visitor facilities Are visitor facilities adequate? <i>Outputs</i>	There are no visitor facilities and services despite an identified need	0			
	Visitor facilities and services are inappropriate for current levels of visitation	1			
	Visitor facilities and services are adequate for current levels of visitation but could be improved	2			
	Visitor facilities and services are excellent for current levels of visitation	3			
27. Commercial tourism operators Do commercial tour operators contribute to protected area management?	There is little or no contact between managers and tourism operators using MBWS	0			
	There is contact between managers and tourism operators, but this is largely confined to administrative or regulatory matters	1			
	There is limited cooperation between managers and tourism operators to enhance visitor experiences and maintain protected area values	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<i>Process</i>	There is good cooperation between managers and tourism operators to enhance visitor experiences, and maintain protected area values	3			
28. Fees If fees (i.e., entry fees or fines) are applied, do they help protected area management? <i>Inputs/Process</i>	Although fees are theoretically applied, they are not collected	0			
	Fees are collected, but make no contribution to MBWS or its environs	1			
	Fees are collected, and make some contribution to MBWS and its environs	2			
	Fees are collected and make a substantial contribution to MBWS and its environs	3			
29. CONDITION OF VALUES What is the condition of the important values of MBWS as compared to when it was first designated? <i>Outcomes</i>	Many important biodiversity, ecological or cultural values are being severely degraded	0			
	Some biodiversity, ecological or cultural values are being severely degraded	1			
	Some biodiversity, ecological and cultural values are being partially degraded but the most important values have not been significantly impacted	2			
	Biodiversity, ecological and cultural values are predominantly intact	3			
Additional Points: Condition of values					
29a: Condition of values	The assessment of the condition of values is based on research and/or monitoring	+1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
29b: Condition of values	Specific management programmes are being implemented to address threats to biodiversity, ecological and cultural values	+1			
29c: Condition of values	Activities to maintain key biodiversity, ecological and cultural values are a routine part of MBWS management	+1			
TOTAL SCORE					
PERCENTAGE					

Appendix 4 – Management Success Review Tool



Management Success Review Tool Form Monkey Bay Wildlife Sanctuary

Year: _____

Form: MBWS-0004

The review takes the management actions set out in the 2022-2027 management plan and assesses the degree to which they have been implemented, and to what effect. The tool was adapted from the Guidelines for Developing a Management Plan: Level Two (Wildtracks, 2005b) and is used to guide management actions for the upcoming period.



Ratings are awarded as follows:


Score	Rating	Criteria
A	Succeeded	Successfully met
B	Improved	Not completely met but situation improved
C	No change	No change in status
D	Worse	Not met, situation worsened

+ and – are assigned to the score where it is judged that actions are more or less effective within a given rating.


Management Action	Score	Notes	Action
Program:			


Appendix 5 – Ecosystems of MBWS based on Meerman & Sabido (2001)

Legend Code	63
UNESCO Classification code	V.A.2.a.(1)(2).
Name	Short-grass savanna with scattered trees and/or shrubs
Altitude	< 50 m.
Geology and soil	The soils all have in common that they have a pale colored, coarse textured topsoil sharply overlying a compact, brightly red and white mottled finer textured subsoil. The soils are all acid and very deficient in nutrients (King et al. 1992).
Water regime	The very dense subsoil prevents vertical water movements causing the landscape to be partially inundated during the wet season and extremely dry in the dry season.
Rainfall	Average rainfall generally less than 2500 mm per year with a pronounced dry season from February through May.
Fire exposure	The extreme drought in the dry season caused by the soil conditions makes this ecosystem extremely vulnerable for fires. Some areas burn more than once a year. The wetter conditions in most of the Toledo district do not favor extensive fires and although favorable soil conditions exist, savannas in the Toledo district are extremely limited in extend. Documentation of lowland broadleaf forest fires started by lightning is rare (Middleton et al., 1997). Consequently, fire in tropical lowland forests has traditionally been considered as human induced (Janzen, 1986; Koonce & Gonzalez-Caban, 1990).
Description	 <p>Typical Belizean lowland savannas are found on gently sloping alluvial deposits in the coastal plain. The combination of poor nutrient availability, extremes in water availability and recurring fire regime has resulted in a species poor but highly specialized ecosystem. The aspect of this community is quite variable. Moss (1998) classified 12 different savanna land classes from cutting grass marsh through to pine woodland. The scrublands generally appear as islands of small, densely packed trees and shrubs in a grassland area; in some areas the islands are large and merging, in others they are quite separate.</p>
Frequent plant species	 <p>The graminoid vegetation is usually being dominated by sedges. Frequent woody species are <i>Acoelorrhaphes wrightii</i>, <i>Calyptanthus</i> sp., <i>Cameraria latifolia</i>, <i>Chrysobalanus icaco</i>, <i>Clidemia</i> sp., <i>Crescentia cujete</i>, <i>Curatela americana</i>, <i>Erythroxylum guatemalense</i>, <i>Gliricidia sepium</i>, <i>Hippocratea excelsa</i>, <i>Metopium brownei</i>, <i>Miconia</i> sp., <i>Mimosa albicans</i>, <i>Pinus caribaea</i>, <i>Quercus oleoides</i> and <i>Roupala montana</i>. There is a strong herbaceous component with typically: <i>Bletia purpurea</i>, <i>Borreria</i> sp., <i>Casytha filliformis</i>, <i>Chamaecrista</i> spp., <i>Cipura campanulata</i>, <i>Coutoubea spicata</i>, <i>Drosera cappularis</i>, <i>Eriocaulon</i> sp., <i>Passiflora urbaniana</i>, <i>Xyris</i> sp. and <i>Zamia polymorpha</i>. Grasses reported from this ecosystem include: <i>Aristida appressa</i>, <i>Axonopus poiophyllus</i>, <i>Eragrostis maypurensis</i>, <i>E. acutifolia</i>, <i>E. elliottii</i>, <i>Gymnopogon spicatus</i>, <i>Leptocoryphium lanatum</i>, <i>Mesosetum filifolium</i>, <i>Panicum rudgei</i>, <i>Paspalum peckii</i>, <i>P. pulchellum</i>, <i>Sporobolus cubensis</i> and <i>Trachypogon plumosus</i>. Sedges include mostly <i>Rhynchospora</i> spp., but also <i>Bulbostylis paradoxa</i> and <i>Fimbristylis vahlii</i>. Wet places usually have <i>Eleocharis</i> spp. and <i>Cyperus ligularis</i>. The latter mostly near the coast.</p>
Faunistic comments	The short-grass savannas are characteristic habitat for a number of bird species such as the Fork-tailed Flycatcher <i>Tyrannus savanna</i> , the Grasshopper Sparrow <i>Ammodramus savannarum</i> and the Aplomado falcon <i>Falco femoralis</i> .
References	Meerman 1999a, Wright et al. 1959: 19, 19a, 19b, Iremonger & Brokaw II.1.1.2.3. Picture top: Western Highway, Cayo district. J. Meerman Bottom: <i>Passiflora urbaniana</i> . Belize district. J. Meerman

Legend Code	56
UNESCO Classification code	<u>III.A.1.b.(a).</u>
Name	<u>Deciduous Broad-leaved lowland shrubland: poorly drained</u>
Altitude	< 100 m.
Geology and soil	Soil has a "hog-wallow" micro-relief, and is gray sandy clay, fairly well mottled below.
Water regime	Ill drained, frequently inundated.
Rainfall	Average rainfall less than 2500 mm per year with a pronounced dry season from February through May.
Fire exposure	Where Karst limestone hills occur in association with savannas, this ecosystem acts as a buffer, protecting the vegetation on the hills from being affected by the frequent savanna fires.
Description	This is a swampy stand of thin-stemmed trees and shrubs 3-4 m high with no emergents, often associated with savannas. Where Karst limestone hills occur in association with savannas, this ecosystem is often found at the base of these hills,
	
Frequent plant species	Frequently encountered species include <i>Acoelorrhaphe wrightii</i> , <i>Aspidosperma cruenta</i> , <i>Bucida buceras</i> , <i>Calyptanthes</i> sp., <i>Chrysobalanus icaco</i> , <i>Clidemia</i> sp., <i>Haematoxylon campechianum</i> , <i>Miconia</i> spp., <i>Mimosa hemendieta</i> , <i>Rinorea</i> sp., <i>Tetragastis stevensonii</i> , and <i>Xylopia frutescens</i> .
Faunistic comments	
References	Meerman 1999c, Wright et al. 1959: 15, Iremonger and Brokaw 1995: II.1.1.2.2. Picture: Runaway Creek, Belize District. J. Meerman

Legend Code	29
UNESCO Classification code	<u>I.A.2.a.(1).(b).S</u>
Name	<u>Tropical evergreen seasonal broadleaf lowland forest over poor or sandy soils</u>
Altitude	< 100 m.
Geology and soil	Nutrient poor, acidic soils
Water regime	Moderately well drained
Rainfall	Average rainfall less than 2500 mm per year with a pronounced dry season from February through May.

Fire exposure	Fire is of at least occasional occurrence in this ecosystem
Description	Medium high forests
Frequent plant species	 <p>Characterized by low <i>Attalea cohune</i>, <i>Acosmium panamense</i> <i>Calophyllum brasiliense</i>, <i>Miconia</i> spp., <i>Terminalia amazonia</i>, <i>Virola koschnyi</i>, <i>Vochysia hondurensis</i> and <i>Xylopiia frutescens</i>. Other, frequently encountered species include: <i>Aspidosperma</i> sp., <i>Bactris major</i>, <i>Bactris mexicana</i>, <i>Belotia campbellii</i>, <i>Bucida buceras</i>, <i>Byrsonima crassifolia</i>, <i>Chrysobalanus icaco</i>, <i>Chrysophyllum mexicanum</i>, <i>Clidemia</i> sp., <i>Coccoloba</i> sp., <i>Desmoncus orthacanthos</i>, <i>Guettarda combsii</i>, <i>Hampea trilobata</i>, <i>Hirtella racemosa</i>, <i>Licania hypoleuca</i>, <i>Luhea speciosa</i>, <i>Metopium brownei</i>, <i>Miconia</i> spp., <i>Mouriri exilis</i>, <i>Ouratea</i> sp., <i>Pachira aquatica</i>, <i>Pinus caribaea</i>, <i>Pouteria</i> sp., <i>Psychotria poeppigiana</i>, <i>Roupala montana</i>, <i>Scleria bracteata</i>, <i>Simarouba glauca</i>, <i>Spondias mombin</i>, <i>Tabernaemontana arborea</i>, <i>Tetracera volubilis</i> and <i>Trichospermum campbellii</i>.</p>
Faunistic comments	
References	<p>Meerman 1999c, Wright et al. 1959: 1, 11a, 11c, 11d, 11e, 11g, Iremonger and Brokaw 1995: I.2.2.4.</p> <p>Picture: <i>Xylopiia frutescens</i>. Toledo district. J. Meerman</p>

Legend Code	41
UNESCO Classification code	<u>I.A.2.f.(1).(a).</u>
Name	Tropical evergreen seasonal broadleaf alluvial forest, occasionally inundated
Altitude	< 200 m.
Geology and soil	Soils are fairly heavy in texture and mainly gray. A broad but shallow hog-wallow micro-relief develops in some places.
Water regime	River flooding occurs almost every year
Rainfall	Average rainfall less than 2500 mm per year with a pronounced dry season from February through May.
Fire exposure	Limited to areas with slash and burn cultivation.
Description	Seasonally flooded forests along riverbanks and lagoons, about 20-25 m high.
Frequent plant species	 <p>Characterized locally by <i>Aristolochia grandiflora</i>, <i>Bactris major</i>, <i>Bactris mexicana</i>, <i>Belotia campbellii</i>, <i>Bucida buceras</i>, <i>Cassia grandis</i>, <i>Cecropia peltata</i>, <i>Cordia gerescanthus</i>, <i>Balizia leucocalyx</i>, <i>Costus pulverulentus</i>, <i>Enterolobium cyclocarpum</i>, <i>Ficus insipida</i>, <i>Guazuma ulmifolia</i>, <i>Heliconia latispatha</i>, <i>Inga vera</i>, <i>Licania platypus</i>, <i>Lonchocarpus guatemalensis</i>, <i>Mutingia calabura</i>, <i>Ouratea nitida</i>, <i>Pachira aquatica</i>, <i>Pterocarpus officinalis</i>, <i>Pterocarpus rohrii</i>, <i>Rinorea</i> sp., <i>Roystonea regia</i>, <i>Samanea saman</i>, <i>Schizolobium parahybum</i>, <i>Tabebuia rosea</i>, <i>Trophis racemosa</i> and <i>Zygia peckii</i>. <i>Attalea cohune</i>, <i>Guadua longifolia</i> and the introduced <i>Bambusa vulgaris</i> form dense patches while <i>Inga affinis</i> frequently dominates the vegetation at the high-water mark. The large aroid <i>Montrichardia</i></p>

	<i>arborescens</i> is locally abundant. Towards the sea riparian forest gives way to mangrove vegetation, including <i>Avicennia germinans</i> and <i>Rhizophora mangle</i> .
Faunistic comments	
References	Brokaw and Mallory 1993, Meerman 1999a, 1999c, Wright et al. 1959: 20, Iremonger and Brokaw 1995: I.1.1.1.3.; Cabrera and Sanchez, 1994. Picture: <i>Pterocarpus officinalis</i> . Stann Creek District. J. Meerman
Legend Code	58
UNESCO Classification code	<u>III.B.1.b.(a).2.</u>
Name	<u>Deciduous broad-leaved lowland disturbed shrubland, poorly drained</u>
Altitude	< 500 m.
Geology and soil	
Water regime	Mostly well drained
Rainfall	NA
Fire exposure	Frequently exposed to human induced fires.
Description	This community varies much according to its topographic position and. Disturbance may be natural, such as the displacement by a river after flooding, or it may be anthropogenic as when land is cleared and left fallow or disturbed by fire.
Frequent plant species	Variable. Mostly "weedy" species
Faunistic comments	
References	Iremonger and Brokaw 1995: II.2.3.

Legend Code	60
UNESCO Classification code	<u>III.B.1.b.(f).P</u>
Name	<u>Deciduous broadleaf lowland riparian shrubland of the plains</u>
Altitude	< 50 m.
Geology and soil	On alluvial deposits. Outcrops of calcareous rock occur, but generally the alluvial deposits are deep and there is no bedrock visible.
Water regime	Mostly well drained
Rainfall	NA
Fire exposure	Frequently exposed to human induced fires.

Description	<p>Found along riversides where disturbance may be natural, such as the displacement by a river after flooding, or it may be anthropogenic as when land is cleared and left fallow.</p> <p>Typically the vegetation is a mixture of vines, graminoid, herbaceous and shrubby species adapted to annual disturbance caused by sudden flash floods. Tree species have difficulty to get established in this highly dynamic habitat but isolated trees occur.</p>
Frequent plant species	<p>The trees are usually fast growing and short-lived species, Characteristic species include: <i>Acalypha</i> spp., <i>Bambusa vulgaris</i>, <i>Byttneria</i> sp., <i>Calathea</i> sp., <i>Calliandra emarginata</i>, <i>Canna indica</i>, <i>Casearia</i> sp., <i>Castilia elastica</i>, <i>Cecropia obtusifolia</i>, <i>Cordia alliodora</i>, <i>Critonia morifolia</i>, <i>Croton</i> sp., <i>Crysophila stauracantha</i>, <i>Ficus insipida</i>, <i>Gouania</i> sp., <i>Guazuma ulmifolia</i>, <i>Hamelia patens</i>, <i>Heliconia latispatha</i>, <i>Helicteres guazumifolia</i>, <i>Inga affinis</i>, <i>Ipomoea</i> spp., <i>Lonchocarpus guatemalensis</i>, <i>Maranta arundinaceae</i>, <i>Mimosa hondurana</i>, <i>Mucuna</i> sp., <i>Tripsacum latifolium</i>, <i>Waltheria indica</i> and <i>Xanthosoma</i> sp.</p>
Faunistic comments	<p>This habitat type appears to be a favored habitat for the endangered Central American Tapir <i>Tapirus bairdii</i></p>
References	<p>Iremonger and Brokaw 1995: II.2.3.</p>

Appendix 6 – Species Recorded in MBWS

There are a number of resources from which species lists for the MBWS can be obtained. Apart from various literature resources, four databases exist:

1. Biodiversity and Environmental Resource Database for Belize (BERDS)
2. iNaturalist
3. MBWS wildlife camera monitoring data
4. eBird

These four resources differ in infrastructure and may differ in taxonomic views. For these reasons, the four will be discussed separately here.

1) BERDS

Species recorded for MBWS in the Biodiversity and Environmental Resource Database for Belize (BERDS) are from before 2012. BERDS is no longer being supported and as such there are no data newer than 2012. This database was curated by the consultant, and it includes data from Laughlin (2002) on the flora of the Pine Savanna at Monkey Bay Wildlife Sanctuary, Belize, and from Turvey et al. (1997) on a Herpetological Survey of Monkey Bay Wildlife Sanctuary.

Note: The data presented below is as found on BERDS and the aforementioned literature. No attempt has been made to verify the validity of the identifications.

Flora – Primitive plants

Family	Genus	Species
Spike-Moss Family	<i>Selaginella</i>	<i>huehuetenangensis</i>
Cycads	<i>Zamia</i>	<i>prasina</i>
Pine Family	<i>Pinus</i>	<i>caribaea</i>
Bracken Fern Family	<i>Pteridium</i>	<i>caudatum</i>
Curly Grass Family	<i>Lygodium</i>	<i>venustum</i>

Flora-Monocots

Family	Genus	Species
Palms	<i>Acoelorrhaphe</i>	<i>wrightii</i>
Palms	<i>Schippia</i>	<i>concolor</i>
Bromeliads	<i>Ananas</i>	<i>comosus</i>
Bromeliads	<i>Tillandsia</i>	<i>bulbosa</i>
Bromeliads	<i>Tillandsia</i>	<i>streptophylla</i>
Bromeliads	<i>Tillandsia</i>	<i>utriculata</i>
Burmannia Family	<i>Burmannia</i>	<i>capitata</i>
Yellow-eyed Grass Family	<i>Xyris</i>	<i>ambigua</i>

Yellow-eyed Grass Family	<i>Xyris</i>	<i>jupicai</i>
Sedge Family	<i>Bulbostylis</i>	<i>juncoides</i>
Sedge Family	<i>Cyperus</i>	<i>haspan</i>
Sedge Family	<i>Cyperus</i>	<i>luzulae</i>
Sedge Family	<i>Rhynchospora</i>	<i>barbata</i>
Sedge Family	<i>Rhynchospora</i>	<i>colorata</i>
Sedge Family	<i>Rhynchospora</i>	<i>curvula</i>
Sedge Family	<i>Rhynchospora</i>	<i>globularis</i>
Sedge Family	<i>Rhynchospora</i>	<i>holoschoenoides</i>
Sedge Family	<i>Rhynchospora</i>	<i>trispicata</i>
Sedge Family	<i>Scleria</i>	<i>bracteata</i>
Sedge Family	<i>Scleria</i>	<i>ciliata</i>
Sedge Family	<i>Scleria</i>	<i>hirtella</i>
Sedge Family	<i>Scleria</i>	<i>interrupta</i>
Yam Family	<i>Dioscorea</i>	<i>densiflora</i>
Iris Family	<i>Cipura</i>	<i>campanulata</i>
Orchid Family	<i>Bletia</i>	<i>purpurea</i>
Orchid Family	<i>Catasetum</i>	<i>integerrimum</i>
Orchid Family	<i>Cyrtopodium</i>	<i>macrobulbon</i>
Orchid Family	<i>Encyclia</i>	<i>alata</i>
Orchid Family	<i>Spiranthes</i>	<i>torta</i>
Grass Family	<i>Andropogon</i>	<i>bicornis</i>
Grass Family	<i>Andropogon</i>	<i>leucostachyus</i>
Grass Family	<i>Aristida</i>	<i>appressa</i>
Grass Family	<i>Aristida</i>	<i>purpurascens</i>
Grass Family	<i>Axonopus</i>	<i>compressus</i>
Grass Family	<i>Axonopus</i>	<i>poiophyllus</i>
Grass Family	<i>Digitaria</i>	<i>horizontalis</i>
Grass Family	<i>Eragrostis</i>	<i>maypurensis</i>
Grass Family	<i>Hypogynium</i>	<i>virgatum</i>
Grass Family	<i>Ischaemum</i>	<i>latifolium</i>
Grass Family	<i>Mesosetum</i>	<i>blakei</i>
Grass Family	<i>Mesosetum</i>	<i>filifolium</i>
Grass Family	<i>Panicum</i>	<i>hirsutum</i>
Grass Family	<i>Panicum</i>	<i>pilosum</i>
Grass Family	<i>Paspalum</i>	<i>conjugatum</i>
Grass Family	<i>Paspalum</i>	<i>serpentinum</i>
Grass Family	<i>Paspalum</i>	<i>virgatum</i>
Grass Family	<i>Schizachyrium</i>	<i>microstachyum</i>
Grass Family	<i>Sporobolus</i>	<i>cubensis</i>
Grass Family	<i>Tripsacum</i>	<i>latifolium</i>

Flora - Dicots

Family	Genus	Species
Daisy Family	<i>Ageratum</i>	<i>radicans</i>
Daisy Family	<i>Emilia</i>	<i>sonchifolia</i>
Daisy Family	<i>Koanophyllon</i>	<i>albicaule</i>
Daisy Family	<i>Melanthera</i>	<i>nivea</i>
Daisy Family	<i>Otopappus</i>	<i>guatemalensis</i>
Daisy Family	<i>Pluchea</i>	<i>odorata</i>
Dillenia Family	<i>Curatella</i>	<i>americana</i>
Sapote Family	<i>Chrysophyllum</i>	<i>mexicanum</i>
Euphorb Family	<i>Acalypha</i>	<i>arvensis</i>
Euphorb Family	<i>Chamaesyce</i>	<i>hypericifolia</i>
Legume Family	<i>Chamaecrista</i>	<i>diphylla</i>
Legume Family	<i>Chamaecrista</i>	<i>flexuosa</i>
Legume Family	<i>Chamaecrista</i>	<i>kunthiana</i>
Mimosa Family	<i>Acacia</i>	<i>cookii</i>
Mimosa Family	<i>Calliandra</i>	<i>houstoniana</i>
Mimosa Family	<i>Mimosa</i>	<i>pudica</i>
Mimosa Family	<i>Pithecellobium</i>	<i>johansenii</i>
Legume Family	<i>Desmodium</i>	<i>barbatum</i>
Legume Family	<i>Desmodium</i>	<i>incanum</i>
Legume Family	<i>Gliricidia</i>	<i>sepium</i>
Legume Family	<i>Mucuna</i>	<i>argyrophylla</i>
Chesnut and Oak Family	<i>Quercus</i>	<i>oleoides</i>
Dogbane Family	<i>Cameraria</i>	<i>latifolia</i>
Dogbane Family	<i>Mandevilla</i>	<i>subsagittata</i>
Gentian Family	<i>Coutoubea</i>	<i>spicata</i>
Gentian Family	<i>Lisianthus</i>	<i>axillaris</i>
Gentian Family	<i>Schultesia</i>	<i>guianensis</i>
Mint Family	<i>Hyptis</i>	<i>conferta</i>
Mint Family	<i>Marsypianthes</i>	<i>chamaedrys</i>
Laurel Family	<i>Nectandra</i>	<i>salicifolia</i>
Hibiscus family	<i>Lopimia</i>	<i>malacophylla</i>
Hibiscus family	<i>Sida</i>	<i>acuta</i>
Hibiscus family	<i>Sida</i>	<i>linifolia</i>
Cacao Family	<i>Waltheria</i>	<i>indica</i>
Wax-myrtle Family	<i>Myrica</i>	<i>cerifera</i>
Loosestrife Family	<i>Cuphea</i>	<i>calophylla</i>
Melastoma Family	<i>Clidemia</i>	<i>sericea</i>

Melastoma Family	<i>Miconia</i>	<i>albicans</i>
Melastoma Family	<i>Miconia</i>	<i>ciliata</i>
Eucalyptus, Guava Family	<i>Chamguava</i>	<i>gentlei</i>
Sundew Family	<i>Drosera</i>	<i>capillaris</i>
Barbados cherry Family	<i>Byrsonima</i>	<i>crassifolia</i>
Milkwort Family	<i>Polygala</i>	<i>longicaulis</i>
Milkwort Family	<i>Polygala</i>	<i>paniculata</i>
Milkwort Family	<i>Polygala</i>	<i>variabilis</i>
Buckthorn Family	<i>Gouania</i>	<i>polygama</i>
Red Mangrove Family	<i>Cassipourea</i>	<i>guianensis</i>
Cocoa-plum Family	<i>Chrysobalanus</i>	<i>icaco</i>
Coffee family	<i>Coccocypselum</i>	<i>guianense</i>
Coffee family	<i>Diodia</i>	<i>apiculata</i>
Catkin-mistletoe Family	<i>Psittacanthus</i>	<i>pinicola</i>
Mistletoe Family	<i>Arceuthobium</i>	<i>hawksworthii</i>
Sumac Family	<i>Metopium</i>	<i>brownei</i>
Frankincense family	<i>Bursera</i>	<i>simaruba</i>
Soapberry family	<i>Cupania</i>	<i>belizensis</i>
Soapberry family	<i>Talisia</i>	<i>oliviformis</i>
Bignonia Family	<i>Crescentia</i>	<i>cujete</i>
Bladderwort Family	<i>Utricularia</i>	<i>hispida</i>
Bladderwort Family	<i>Utricularia</i>	<i>juncea</i>
Bladderwort Family	<i>Utricularia</i>	<i>simulans</i>
Figwort Family	<i>Buchnera</i>	<i>pusilla</i>
Morning Glory Family	<i>Merremia</i>	<i>aturensis</i>
Dodder Family	<i>Cuscuta</i>	<i>indecora</i>
St John's Wort Family	<i>Calophyllum</i>	<i>brasiliense</i>
St John's Wort Family	<i>Hypericum</i>	<i>terrae-firmae</i>
Ochna family	<i>Sauvagesia</i>	<i>erecta</i>
Cecropia Family	<i>Cecropia</i>	<i>peltata</i>
Fig, Mulberry Family	<i>Ficus</i>	<i>insipida</i>
Gourds	<i>Momordica</i>	<i>charantia</i>
Passionflowers	<i>Passiflora</i>	<i>urbaniana</i>

Amphibians

Type	Genus	Species	Common Name
Frogs and Toads	<i>Incilius</i>	<i>valliceps</i>	Gulf Coast Toad
Frogs and Toads	<i>Smilisca</i>	<i>baudini</i>	Common Mexican Treefrog

Frogs and Toads	<i>Gastrophryne</i>	<i>elegans</i>	Elegant Narrowmouth Toad
Frogs and Toads	<i>Rhinophrynus</i>	<i>dorsalis</i>	Burrowing Toad(Woa)

Reptiles

Type	Genus	Species	Common Name
Snakes	<i>Ninia</i>	<i>sebae</i>	Redback Coffee Snake
Casque-headed Lizards	<i>Corytophanes</i>	<i>cristatus</i>	Old man lizard
Geckos	<i>Sphaerodactylus</i>	<i>millepunctatus</i>	Spotted Gecko
Anoles	<i>Norops</i>	<i>lemurinus</i>	Ghost Anole
Anoles	<i>Norops</i>	<i>rodriguezii</i>	Smooth Anole
Anoles	<i>Norops</i>	<i>uniformis</i>	Lesser Scaly Anole
Skinks	<i>Sphenomorphus</i>	<i>cherriei</i>	Brown Forest Skink
Whip-Tailed Lizards	<i>Ameiva</i>	<i>undulata</i>	Rainbow Ameiva
Night Lizards	<i>Lepidophyma</i>	<i>flavimaculatum</i>	Yellow-spotted Night Lizard
Mud and Musk Turtles	<i>Kinosternon</i>	<i>acutum</i>	Tabasco Mud Turtle

Fishes

Type	Family	Scientific Name
American Soles	Achiridae	<i>Trinectes paulistanus</i>
Silversides	Antherinidae	<i>Antherinella sp.</i>
Jacks and Pompanos	Carangidae	<i>Caranx latus</i>
Characids/Tetra Fishes	Characidae	<i>Astyanax fasciatus</i>
Characids/Tetra Fishes	Characidae	<i>Hyphessobrycon compressus</i>
Cichlids	Cichlidae	<i>Amphilophus robertsoni</i>
Cichlids	Cichlidae	<i>Archocentrus spilurus</i>
Cichlids	Cichlidae	<i>Cichlasoma octofasciatum</i>
Cichlids	Cichlidae	<i>Cichlasoma salvini</i>
Cichlids	Cichlidae	<i>Oreochromis niloticus</i>
Cichlids	Cichlidae	<i>Parachromis friedrichsthalii</i>
Cichlids	Cichlidae	<i>Petenia splendida</i>
Cichlids	Cichlidae	<i>Thorichthys meeki</i>
Cichlids	Cichlidae	<i>Vieja intermedia</i>
Cichlids	Cichlidae	<i>Vieja synspila</i>
Herrings and Shads	Clupeidae	<i>Dorosoma anale</i>
Herrings and Shads	Clupeidae	<i>Dorosoma petenense</i>
Sleepers	Eleotridae	<i>Eleotris pisonis</i>

Sleepers	Eleotridae	<i>Gobiomorus dormitor</i>
Anchovies	Engraulidae	<i>Anchoa cayorum</i>
Mojarras	Gerreidae	<i>Eugerres plumieri</i>
Gobies and True Gobies	Gobiidae	<i>Awaous banana</i>
Grunts	Haemulidae	<i>Pomadasys crocro</i>
Heptapterid Catfishes	Heptapteridae	<i>Rhamdia guatemalensis</i>
Heotapterid Catfishes	Heptapteridae	<i>Rhamdia laticauda</i>
Snappers	Lutjanidae	<i>Lutjanus griseus</i>
Tarpons	Megalopidae	<i>Megalops atlanticus</i>
Mulletts	Mugilidae	<i>Agonostomus monticola</i>
Live Bearers	Poeciliidae	<i>Belonesox belizanus</i>
Live Bearers	Poeciliidae	<i>Gambusia luma</i>
Live Bearers	Poeciliidae	<i>Gambusia sexradiata</i>
Live Bearers	Poeciliidae	<i>Gambusia yucatana</i>
Live Bearers	Poeciliidae	<i>Heterandria bimaculata</i>
Live Bearers	Poeciliidae	<i>Poecilia mexicana</i>
Live Bearers	Poeciliidae	<i>Xiphophorus hellerii</i>
Live Bearers	Poeciliidae	<i>Xiphophorus maculatus</i>
Swamp Eels	Synbranchidae	<i>Ophisternon aenigmaticum</i>

2) iNaturalist

An important resource for flora and fauna records is iNaturalist (inaturalist.org). One of the world's most popular nature apps, iNaturalist helps people to identify the plants and animals around them and encourages them to get connected with a community of over a million scientists and naturalists who can help you learn more about nature. What's more, by recording and sharing observations, research quality data is created for scientists working to better understand and protect nature. iNaturalist is a joint initiative by the [California Academy of Sciences](#) and the [National Geographic Society](#). iNaturalist is a resource that should be more intensively used, especially by the student base visiting the MBWS.

Note: The data presented below is as found on iNaturalist. No attempt has been made to verify the validity of the identifications.

Fungi

Scientific Name	Common Name
<i>Amanita muscaria</i>	Fly Agaric
<i>Boletus variipes</i>	
<i>Cookeina tricholoma</i>	Bristly Tropical Cup
<i>Lactarius indigo</i>	Indigo Milk Cap
<i>Pleurocybella porrigens</i>	Angel's Wings
<i>Xerocomus belizensis</i>	

Plants - Mosses:

Scientific Name	Common Name
<i>Selaginella doederleinii</i>	Doederlein's Spikemoss

Plants - Monocots:

Scientific Name	Common Name
<i>Acoelorrhaphe wrightii</i>	Everglades Palm
<i>Aechmea bracteata</i>	
<i>Alophia silvestris</i>	
<i>Anthurium schlechtendalii</i>	Pheasants Tail
<i>Astrocaryum mexicanum</i>	
<i>Attalea cohune</i>	Cohune Palm
<i>Cipura campanulata</i>	
<i>Epidendrum stamfordianum</i>	Stamford's Epidendrum
<i>Guadua longifolia</i>	
<i>Heliconia latispatha</i>	Expanded Lobsterclaw

<i>Heliconia psittacorum</i>	Parrot's Beak
<i>Hellenia speciosa</i>	Crêpe Ginger
<i>Pinus caribaea</i>	Caribbean Pine
<i>Rhynchospora colorata</i>	Whitetop Sedge
<i>Tillandsia brachycaulos</i>	
<i>Tillandsia bulbosa</i>	Bulbous Airplant
<i>Tillandsia streptophylla</i>	
<i>Tradescantia pallida</i>	Purple Heart
<i>Tradescantia spathacea</i>	Moses-in-the-Cradle
<i>Zamia prasina</i>	

Plants – Dicots:

Scientific Name	Common Name
<i>Allamanda cathartica</i>	Golden Trumpet
<i>Annona muricata</i>	Soursop
<i>Aphelandra scabra</i>	Red Aphelandra
<i>Aristolochia grandiflora</i>	
<i>Arthrostemma ciliatum</i>	Pinkfringe
<i>Asclepias curassavica</i>	Tropical Milkweed
<i>Biophytum dendroides</i>	
<i>Byrsonima crassifolia</i>	Craboo
<i>Centrosema pubescens</i>	Sentro
<i>Chamaecrista kunthiana</i>	
<i>Clitoria ternatea</i>	Blue Pea
<i>Coccocypselum hirsutum</i>	Yerba de Guava
<i>Coccoloba belizensis</i>	
<i>Cordia dodecandra</i>	Ziricote
<i>Crescentia cujete</i>	Calabash Tree
<i>Deamia testudo</i>	Dog-tail Cactus
<i>Diospyros nigra</i>	Black Sapote
<i>Drosera capillaris</i>	Pink Sundew
<i>Emilia sonchifolia</i>	Lilac Tasselflower
<i>Eugenia uniflora</i>	Surinam Cherry
<i>Euphorbia hyssopifolia</i>	Hyssop Spurge
<i>Euphorbia tithymaloides</i>	Devil's Backbone
<i>Gomphrena globosa</i>	Globe Amaranth
<i>Hexasepalum teres</i>	Rough Buttonweed
<i>Hibiscus rosa-sinensis</i>	Chinese Hibiscus
<i>Hypericum nitidum</i>	Carolina St. Johnswort
<i>Ipomoea batatas</i>	Sweet Potato

<i>Ixora coccinea</i>	Jungle Flame
<i>Lagerstroemia indica</i>	Crape-myrtle
<i>Lisianthus axillaris</i>	
<i>Ludwigia octovalvis</i>	Mexican Primrose-willow
<i>Maripa nicaraguensis</i>	
<i>Mimosa pudica</i>	Sensitive Plant
<i>Oxalis corniculata</i>	Creeping Woodsorrel
<i>Palicourea tomentosa</i>	Sore-mouth Bush
<i>Palicourea triphylla</i>	
<i>Passiflora biflora</i>	Twoflower Passionflower
<i>Passiflora ciliata</i>	Fringed Passionflower
<i>Passiflora urbaniana</i>	
<i>Pithecellobium lanceolatum</i>	
<i>Polygala incarnata</i>	Pink Milkwort
<i>Psidium guajava</i>	Common Guava
<i>Psittacanthus pinicola</i>	
<i>Sida acuta</i>	Spinyhead Sida
<i>Syzygium jambos</i>	Rose-apple
<i>Terminalia catappa</i>	Sea Almond
<i>Thevetia ahouai</i>	
<i>Trichospermum grewiifolium</i>	
<i>Vachellia cornigera</i>	Bullhorn Acacia

Insects – Lepidoptera (Butterflies and Moths):

Scientific Name	Common Name
<i>Adelpha basiloides</i>	Spot-celled Sister
<i>Adelpha cytherea marcia</i>	
<i>Adelpha paraena massilia</i>	Massilia Sister
<i>Agrius cingulata</i>	Pink-spotted Hawkmoth
<i>Anartia fatima</i>	Banded Peacock
<i>Anartia jatrophae</i>	White Peacock
<i>Anteos maerula</i>	Yellow Angled-Sulphur
<i>Arawacus togarna</i>	
<i>Astrartes phalaecus</i>	
<i>Calephelis velutina</i>	
<i>Caligo telamonius</i>	Pale Owl-Butterfly
<i>Catonephele numilia</i>	Blue-frosted Banner
<i>Chlosyne erodyle</i>	Erodyle Checkerspot
<i>Chlosyne theona</i>	Theona Checkerspot
<i>Dione vanillae</i>	Gulf Fritillary

<i>Diphthera festiva</i>	Hieroglyphic Moth
<i>Dryas iulia</i>	Julia Heliconian
<i>Dynamine postverta</i>	Four-spotted Sailor
<i>Eumaeus toxea</i>	Mexican Cycadian
<i>Eunica alcmena</i>	
<i>Euptoieta hegesia</i>	Mexican Fritillary
<i>Eurema दौरa</i>	Barred Yellow
<i>Gorgythion begga</i>	Variiegated Skipper
<i>Hamadryas feronia</i>	Variable Cracker
<i>Heliconius ismenius</i>	Ismenius Tiger
<i>Heliopetes arsalte</i>	Veined White-Skipper
<i>Hermeuptychia hermes</i>	Hermes Satyr
<i>Juditha caucana</i>	
<i>Latebraria amphipyroides</i>	
<i>Lento hermione</i>	
<i>Metron zimra</i>	
<i>Microcentrini</i>	
<i>Nica flavilla</i>	Mandarin Nica
<i>Noctuana stator</i>	Red-studded Skipper
<i>Norape ovina</i>	
<i>Paches loxus</i>	
<i>Pachylis nervosus</i>	
<i>Papilio androgeus</i>	Androgeus Swallowtail
<i>Parides erithalion</i>	Variable Cattleheart
<i>Periphoba arcaei</i>	
<i>Phaeochlaena gyon</i>	
<i>Phobetron hipparchia</i>	Monkey Slug Moth
<i>Polites vibex</i>	Whirlabout
<i>Polygonus savigny</i>	Manuel's Skipper
<i>Pyrrhogyra neaerea</i>	Leading Red-ring
<i>Rekoa meton</i>	Meton Hairstreak
<i>Spathilepia clonius</i>	Falcate Skipper
<i>Spicauda procne</i>	Brown Longtail
<i>Strymon ziba</i>	Ziba Scrub-Hairstreak
<i>Tegosa guatemalena</i>	Guatemalan Crescent

Insects - Coleoptera (Beetles):

Scientific Name

Coelosis biloba

Insects - Acrididea (Grashoppers):

Scientific Name

Chromacris colorata

Insects – Odonata (Dragonflies and Damselflies):

Scientific Name

Dythemis nigra

Orthemis ferruginea

Common Name

Blue-eyed Setwing

Roseate Skimmer

Insects - Formicidae (Ants):

Scientific Name

Eciton burchellii parvispinum

Insects – Blattidae (Cockroaches):

Scientific Name

Periplaneta australasiae

Common Name

Australian Cockroach

Arachnida (Spiders):

Scientific Name

Bagheera kiplingi

Centruroides gracilis

Eriophora ravilla

Common Name

Acacia Jumping Spider

Slender Brown Scorpion

Tropical Orbweaver

Mollusca (Snails , Slugs and Mussels):

Scientific Name

Pachychilus glaphyrus

Amphibia (Amphibians):

Scientific Name

Incilius valliceps

Rhinella horribilis

Scinax staufferi

Trachycephalus vermiculatus

Common Name

Central American Gulf Coast Toad

Giant Toad

Stauffer's Tree Frog

Vermiculated Tree Frog

Reptilia (Reptiles):

Scientific Name

Anolis lemurinus
Basiliscus vittatus
Coleonyx elegans
Ctenosaura similis
Iguana iguana
Hemidactylus frenata
Leptophis ahaetulla
Leptophis mexicanus
Micrurus diastema
Senticolis triaspis triaspis
Xenodon rabdocephalus

Common Name

Ghost Anole
Brown Basilisk
Yucatan Banded Gecko
Black Spiny-tailed Iguana
Green Iguana
Tjiktjak Gecko
Giant Parrot Snake
Mexican Parrot Snake
Variable Coralsnake
Yucatan Green Ratsnake
False Fer-de-lance

Aves (Birds) (Note: The eBird list discussed later will be more complete):

Scientific Name

Amazilia tzacatl
Amazilia yucatanensis
Amazona autumnalis
Archilochus colubris
Buteo brachyurus
Caryothraustes poliogaster
Columbina talpacoti
Contopus cinereus
Coragyps atratus
Crotophaga sulcirostris
Cyanerpes cyaneus
Elaenia flavogaster
Galbula ruficauda
Geranospiza caerulescens
Glaucidium brasilianum
Icterus mesomelas
Icterus prothemelas
Melanerpes aurifrons
Mimus gilvus
Myiarchus tuberculifer
Myiozetetes similis
Ortalis vetula
Patagioenas cayennensis

Common Name

Rufous-tailed Hummingbird
Buff-bellied Hummingbird
Red-lored Parrot
Ruby-throated Hummingbird
Short-tailed Hawk
Black-faced Grosbeak
Ruddy Ground Dove
Tropical Pewee
Black Vulture
Groove-billed Ani
Red-legged Honeycreeper
Yellow-bellied Elaenia
Rufous-tailed Jacamar
Crane Hawk
Ferruginous Pygmy-Owl
Yellow-tailed Oriole
Black-cowled Oriole
Golden-fronted Woodpecker
Tropical Mockingbird
Dusky-capped Flycatcher
Social Flycatcher
Plain Chachalaca
Pale-vented Pigeon

<i>Phaeochroa cuvierii</i>	Scaly-breasted Hummingbird
<i>Piranga rubra</i>	Summer Tanager
<i>Pitangus sulphuratus</i>	Great Kiskadee
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher
<i>Pseudastur albicollis</i>	White Hawk
<i>Psilorhinus morio</i>	Brown Jay
<i>Pyrocephalus rubinus</i>	Vermilion Flycatcher
<i>Quiscalus mexicanus</i>	Great-tailed Grackle
<i>Rupornis magnirostris</i>	Roadside Hawk
<i>Sarcoramphus papa</i>	King Vulture
<i>Setophaga coronata</i>	Yellow-rumped Warbler
<i>Sporophila funerea</i>	Thick-billed Seed-Finch
<i>Sporophila moreletii</i>	Morelet's Seedeater
<i>Sturnella magna</i>	Eastern Meadowlark
<i>Synallaxis erythrothorax</i>	Rufous-breasted Spinetail
<i>Thamnophilus doliatus</i>	Barred Antshrike
<i>Troglodytes aedon</i>	House Wren
<i>Trogon melanocephalus</i>	Black-headed Trogon
<i>Turdus grayi</i>	Clay-colored Thrush
<i>Tyrannus melancholicus</i>	Tropical Kingbird
<i>Tyrannus savana</i>	Fork-tailed Flycatcher
<i>Xiphorhynchus flavigaster</i>	Ivory-billed Woodcreeper

Mammalia (Mammals):

Scientific Name

Nasua narica
Saccopteryx bilineata
Sciurus yucatanensis
Urocyon cinereoargenteus

Common Name

White-nosed Coati
Greater Sac-winged Bat
Yucatan Squirrel
Gray Fox

3) Mammals based on the 2022 MBWS Wildlife Camera Results:

Scientific Name	Common Name
<i>Nasua narica</i>	White-nosed Coati
<i>Dasyprocta punctata</i>	Central American Agouti
<i>Leopardus pardalis</i>	Ocelot
<i>Dicotyles tajacu</i>	White-collared Peccary
<i>Urocyon cinereoargenteus</i>	Gray Fox
<i>Dasybus novemcinctus</i>	Nine-banded Armadillo
<i>Panthera onca</i>	Jaguar

<i>Cuniculus paca</i>	Paca
<i>Tapirus Bairdii</i>	Central American Tapir
<i>Didelphis spp.</i>	Opossum (Common or Virginia)
<i>Tamandua mexicana</i>	Northern Tamandua
<i>Conepatus semistriatus</i>	Striped Hog-nosed Skunk
<i>Philander opossum</i>	Gray Four-eyed Opossum
<i>Sciurus deppei</i>	Deppei's Squirrel
<i>Odocoileus virginianus</i>	White-tailed Deer

4) eBird - Birds

eBird (eBird.org) is a great resource for bird records worldwide. eBird is among the world's largest biodiversity-related science projects, with more than 100 million bird sightings contributed annually by eBirders around the world. A collaborative enterprise with hundreds of partner organizations, thousands of regional experts, and hundreds of thousands of users, eBird is managed by the Cornell Lab of Ornithology.

There exists a "hotspot" for MBWS which allows for an overview of all species reported from the area, plus phenological data. By indicating records by month, it will be easy to determine whether a species is migratory, rare, or commonly observed. There exists the possibility that some species have been recorded within the MBWS but not been reported for the "hotspot". Such records will not be reflected here.

In total, 333 bird species have been recorded for the MBWS and this list can be expected to be largely complete.

Note: The Yellow-headed Parrot (*Amazona oratrix*), an endangered species, has been "hidden" by eBird and does not show in the list.

Bird Observations

▼ Date Range:

Jan-Dec, 1900-2022

Monkey Bay Wildlife Sanctuary

Updated ~14 hr(s) ago.

333 species (+26 other taxa)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Great Tinamou (<i>Tinamus major</i>)		■	■	■		■		■	■			■
Little Tinamou (<i>Crypturellus soui</i>)	■	■	■	■	■	■		■	■	■	■	■
Thicket Tinamou (<i>Crypturellus cinnamomeus</i>)				■	■	■						
Black-bellied Whistling-Duck (<i>Dendrocygna autumnalis</i>)			■	■		■	■	■	■		■	
Muscovy Duck (<i>Cairina moschata</i>)					■			■				
Muscovy Duck (Domestic type) (<i>Cairina moschata</i> (Domestic type))			■									
Blue-winged Teal (<i>Spatula discors</i>)	■											
Plain Chachalaca (<i>Ortalis vetula</i>)	■	■	■	■	■	■	■	■	■	■	■	■
Crested Guan (<i>Penelope purpurascens</i>)		■			■		■					■
Great Curassow (<i>Crax rubra</i>)		■	■	■	■							
Black-throated Bobwhite (<i>Colinus nigrogularis</i>)	■				■	■						
Least Grebe (<i>Tachybaptus dominicus</i>)			■									
Pied-billed Grebe (<i>Podilymbus podiceps</i>)	■											
Rock Pigeon (<i>Columba livia</i>)			■		■	■						■
Pale-vented Pigeon (<i>Patagioenas cayennensis</i>)	■	■	■	■	■	■	■	■	■	■	■	■

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Scaled Pigeon (<i>Patagioenas speciosa</i>)												
Red-billed Pigeon (<i>Patagioenas flavirostris</i>)												
Short-billed Pigeon (<i>Patagioenas nigrirostris</i>)												
Patagioenas sp. (<i>Patagioenas sp.</i>)												
Eurasian Collared-Dove (<i>Streptopelia decaocto</i>)												
Common Ground Dove (<i>Columbina passerina</i>)												
Plain-breasted Ground Dove (<i>Columbina minuta</i>)												
Ruddy Ground Dove (<i>Columbina talpacoti</i>)												
Blue Ground Dove (<i>Claravis pretiosa</i>)												
Ruddy Quail-Dove (<i>Geotrygon montana</i>)												
White-tipped Dove (<i>Leptotila verreauxi</i>)												
Gray-chested Dove (<i>Leptotila cassinii</i>)												
Gray-headed Dove (<i>Leptotila plumbeiceps</i>)												
Leptotila sp. (<i>Leptotila sp.</i>)												
White-winged Dove (<i>Zenaida asiatica</i>)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Groove-billed Ani (<i>Crotophaga sulcirostris</i>)												
Striped Cuckoo (<i>Tapera naevia</i>)												
Squirrel Cuckoo (<i>Piaya cayana</i>)												
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)												
Lesser Nighthawk (<i>Chordeiles acutipennis</i>)												
Common Nighthawk (<i>Chordeiles minor</i>)												
Common Pauraque (<i>Nyctidromus albigollis</i>)												
White-collared Swift (<i>Streptoprocne zonaris</i>)												
Vaux's Swift (<i>Chaetura vauxi</i>)												
Chimney/Vaux's Swift (<i>Chaetura pelagica/vauxi</i>)												
Lesser Swallow-tailed Swift (<i>Panyptila cayennensis</i>)												
swift sp. (<i>Apodidae sp.</i>)												

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
White-necked Jacobin (<i>Florisuga mellivora</i>)														
Long-billed Hermit (<i>Phaethornis longirostris</i>)														
Stripe-throated Hermit (<i>Phaethornis striigularis</i>)														
Green-breasted Mango (<i>Anthracothorax prevostii</i>)														
Ruby-throated Hummingbird (<i>Archilochus colubris</i>)														
Canivet's Emerald (<i>Cynanthus canivetii</i>)														
Wedge-tailed Sabrewing (<i>Pampa curvipennis</i>)														
Scaly-breasted Hummingbird (<i>Phaechroa cuvierii</i>)														
Azure-crowned Hummingbird (<i>Saucerottia cyanocephala</i>)														
Cinnamon Hummingbird (<i>Amazilia rutila</i>)														
Buff-bellied Hummingbird (<i>Amazilia yucatanensis</i>)														
Rufous-tailed Hummingbird (<i>Amazilia tzacati</i>)														
White-bellied Emerald (<i>Chlorestes candida</i>)														
hummingbird sp. (<i>Trochilidae sp.</i>)														
Russet-naped Wood-Rail (<i>Aramides albiventris</i>)														
Ruddy Crake (<i>Laterallus ruber</i>)														
Sungrebe (<i>Heliornis fulica</i>)														
Limpkin (<i>Aramus guarauna</i>)														
Killdeer (<i>Charadrius vociferus</i>)														
Northern Jacana (<i>Jacana spinosa</i>)														
Least Sandpiper (<i>Calidris minutilla</i>)														
Spotted Sandpiper (<i>Actitis macularius</i>)														
Solitary Sandpiper (<i>Tringa solitaria</i>)														
Greater Yellowlegs (<i>Tringa melanoleuca</i>)														
Jabiru (<i>Jabiru mycteria</i>)														
Wood Stork (<i>Mycteria americana</i>)														

			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Magnificent Frigatebird (<i>Fregata magnificens</i>)								■			■					
Anhinga (<i>Anhinga anhinga</i>)			■			■		■				■	■			
Double-crested Cormorant (<i>Nannopterum auritum</i>)								■								
Neotropic Cormorant (<i>Nannopterum brasilianum</i>)				■		■		■								■
Bare-throated Tiger-Heron (<i>Tigrisoma mexicanum</i>)			■	-	■	-		■	■	■			■	-		■
Great Blue Heron (<i>Ardea herodias</i>)			■			■		-								
Great Egret (<i>Ardea alba</i>)			■	■	■	■	■	-		■	■	■	■	■	■	■
Snowy Egret (<i>Egretta thula</i>)			■	■		■	■	■					■		■	
Little Blue Heron (<i>Egretta caerulea</i>)			■	■	-		■	■			■	■	■		■	
Tricolored Heron (<i>Egretta tricolor</i>)			■			■		-								
Cattle Egret (<i>Bubulcus ibis</i>)			■	■	■	■	■		■	■				■	■	■
Green Heron (<i>Butorides virescens</i>)				■	-	■		■	■		■				■	■
Agami Heron (<i>Agamia agami</i>)								■								
Black-crowned Night-Heron (<i>Nycticorax nycticorax</i>)								■								
Yellow-crowned Night-Heron (<i>Nyctanassa violacea</i>)						■		-								
Boat-billed Heron (<i>Cochlearius cochlearius</i>)						■		■								
White Ibis (<i>Eudocimus albus</i>)								■		■						
Roseate Spoonbill (<i>Platalea ajaja</i>)										■				■		■
King Vulture (<i>Sarcoramphus papa</i>)			-	■	■	■	■	■		-	-	-	■	■		
Black Vulture (<i>Coragyps atratus</i>)			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Turkey Vulture (<i>Cathartes aura</i>)			■	■	■	■	■	■	■	■	■	■	■	■	■	■
Lesser Yellow-headed Vulture (<i>Cathartes burrovianus</i>)			■	■	■	■	■	■	■	■			■	■		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
new world vulture sp. (<i>Cathartidae sp.</i>)				■												
Osprey (<i>Pandion haliaetus</i>)			■	■	■	■	■	■	■	■		■	■	■	■	■
White-tailed Kite (<i>Elanus leucurus</i>)			■	■		■	■	■	■	■						■
Hook-billed Kite (<i>Chondrohierax uncinatus</i>)				■				■	■		■					■
Gray-headed Kite (<i>Leptodon cayanensis</i>)			■	■	■	■		■	■		■		■			

Swallow-tailed Kite (<i>Elanoides forficatus</i>)	📍	📏																						
Black Hawk-Eagle (<i>Spizaetus tyrannus</i>)	📍	📏																						
Ornate Hawk-Eagle (<i>Spizaetus ornatus</i>)	📍	📏																						
Black-collared Hawk (<i>Busearellus nigricollis</i>)	📍	📏																						
Snail Kite (<i>Rostrhamus sociabilis</i>)	📍	📏																						
Double-toothed Kite (<i>Harpagus bidentatus</i>)	📍	📏																						
Plumbeous Kite (<i>Ictinia plumbea</i>)	📍	📏																						
Crane Hawk (<i>Geranoospiza caerulescens</i>)	📍	📏																						
Common Black Hawk (<i>Buteogallus anthracinus</i>)	📍	📏																						
Great Black Hawk (<i>Buteogallus urubitinga</i>)	📍	📏																						
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec										
Roadside Hawk (<i>Rupornis magnirostris</i>)	📍	📏																						
White-tailed Hawk (<i>Geranoaetus albicaudatus</i>)	📍	📏																						
White Hawk (<i>Pseudastur albicollis</i>)	📍	📏																						
Gray Hawk (<i>Buteo plagiatus</i>)	📍	📏																						
Short-tailed Hawk (<i>Buteo brachyurus</i>)	📍	📏																						
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	📍	📏																						
Buteo sp. (<i>Buteo sp.</i>)	📍	📏																						
Barn Owl (<i>Tyto alba</i>)	📍	📏																						
Middle American Screech-Owl (<i>Megascops guatemalae</i>)	📍	📏																						
Ferruginous Pygmy-Owl (<i>Glaucidium brasilianum</i>)	📍	📏																						
Mottled Owl (<i>Ciccaba virgata</i>)	📍	📏																						
Slaty-tailed Trogon (<i>Trogon massena</i>)	📍	📏																						
Black-headed Trogon (<i>Trogon melanocephalus</i>)	📍	📏																						
Gartered Trogon (<i>Trogon caligatus</i>)	📍	📏																						
Lesson's Motmot (<i>Momotus lessonii</i>)	📍	📏																						
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec										
Ringed Kingfisher (<i>Megasceryle torquata</i>)	📍	📏																						

Belted Kingfisher (<i>Megasceryle alcyon</i>)			
Amazon Kingfisher (<i>Chloroceryle amazona</i>)			
American Pygmy Kingfisher (<i>Chloroceryle aenea</i>)			
Green Kingfisher (<i>Chloroceryle americana</i>)			
White-necked Puffbird (<i>Notharchus hyper-rhynchus</i>)			
White-whiskered Puffbird (<i>Malacoptila panamensis</i>)			
Rufous-tailed Jacamar (<i>Galbula ruficauda</i>)			
Collared Aracari (<i>Pteroglossus torquatus</i>)			
Keel-billed Toucan (<i>Ramphastos sulfuratus</i>)			
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)			
Acorn Woodpecker (<i>Melanerpes formicivorus</i>)			
Black-cheeked Woodpecker (<i>Melanerpes pucherani</i>)			
Yucatan Woodpecker (<i>Melanerpes pygmaeus</i>)			
Golden-fronted Woodpecker (<i>Melanerpes aurifrons</i>)			
			Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Ladder-backed Woodpecker (<i>Dryobates scalaris</i>)			
Smoky-brown Woodpecker (<i>Dryobates fumigatus</i>)			
Pale-billed Woodpecker (<i>Campephilus guatemalensis</i>)			
Lineated Woodpecker (<i>Dryocopus lineatus</i>)			
Chestnut-colored Woodpecker (<i>Celeus castaneus</i>)			
Golden-olive Woodpecker (<i>Colaptes rubiginosus</i>)			
Barred Forest-Falcon (<i>Micrastur ruficollis</i>)			
Collared Forest-Falcon (<i>Micrastur semitorquatus</i>)			
Laughing Falcon (<i>Herpetotheres cachinnans</i>)			
American Kestrel (<i>Falco sparverius</i>)			
Merlin (<i>Falco columbarius</i>)			
Aplomado Falcon (<i>Falco femoralis</i>)			

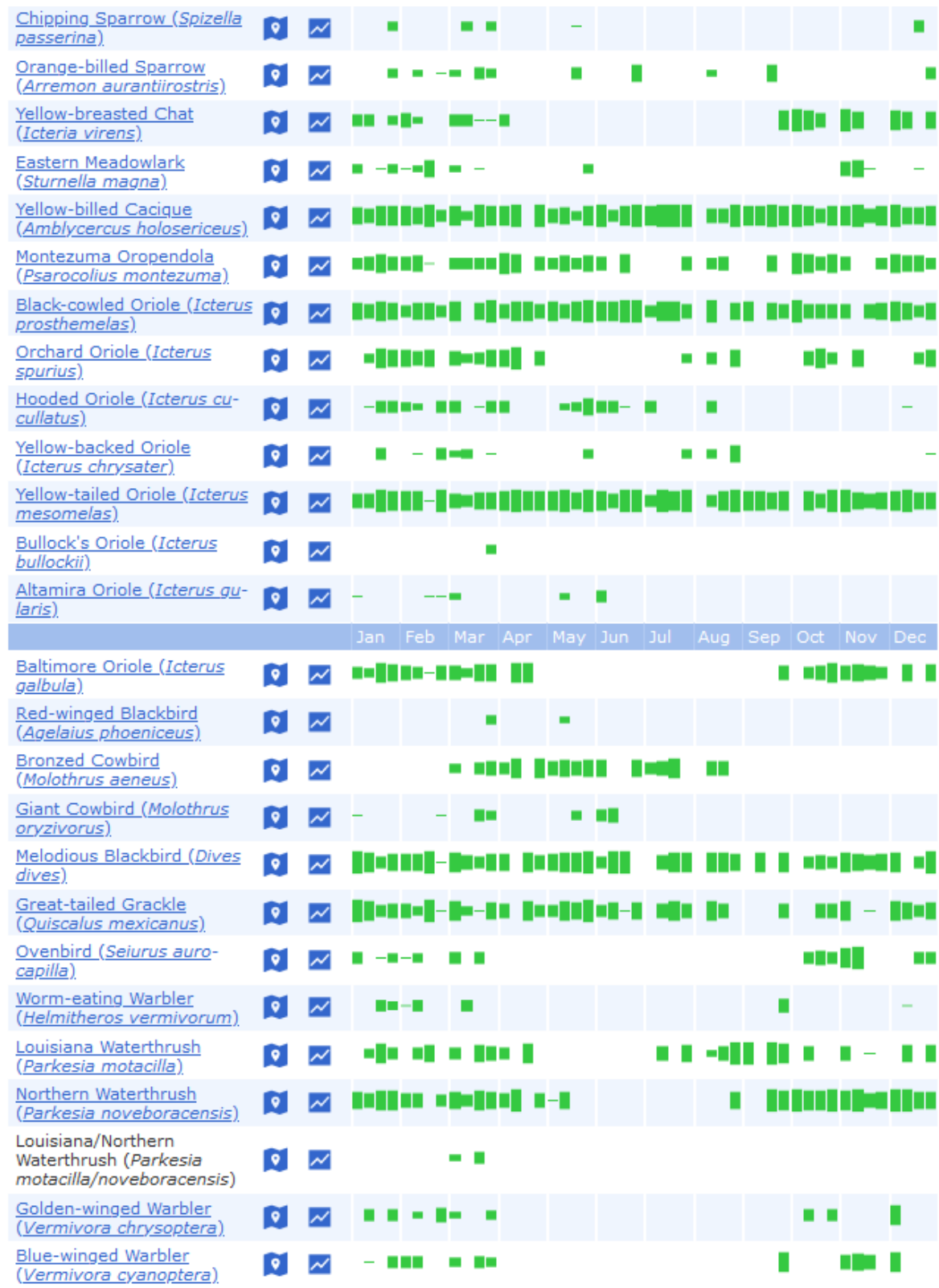
Bat Falcon (<i>Falco ruficularis</i>)			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Peregrine Falcon (<i>Falco peregrinus</i>)														
falcon sp. (<i>Falco sp.</i>)														
Brown-hooded Parrot (<i>Pyrrhula haematotis</i>)														
White-crowned Parrot (<i>Pionus senilis</i>)														
Red-lored Parrot (<i>Amazona autumnalis</i>)														
White-fronted Parrot (<i>Amazona albifrons</i>)														
Yellow-lored Parrot (<i>Amazona xantholora</i>)														
Mealy Parrot (<i>Amazona farinosa</i>)														
Amazona sp. (<i>Amazona sp.</i>)														
Olive-throated Parakeet (<i>Eupsittula nana</i>)														
parrot sp. (<i>Psittaciformes sp.</i> (parrot sp.))														
Great Antshrike (<i>Taraba major</i>)														
Barred Antshrike (<i>Thamnophilus doliatus</i>)														
Dot-winged Antwren (<i>Microrhoptias quixensis</i>)														
Dusky Antbird (<i>Cercomacroides tyrannina</i>)														
Mayan Antthrush (<i>Formicarius moniliger</i>)														
Olivaceous Woodcreeper (<i>Sittasomus griseicapillus</i>)														
Ruddy Woodcreeper (<i>Dendrocincla homochroa</i>)														
Tawny-winged Woodcreeper (<i>Dendrocincla anabatina</i>)														
Wedge-billed Woodcreeper (<i>Glyphorhynchus spirurus</i>)														
Northern Barred-Woodcreeper (<i>Dendrocolaptes sanctithomae</i>)														
Ivory-billed Woodcreeper (<i>Xiphorhynchus flavigaster</i>)														
Streak-headed Woodcreeper (<i>Lepidocolaptes souleyetii</i>)														

Plain Xenops (<i>Xenops minutus</i>)														
Rufous-breasted Spinetail (<i>Synallaxis erythrothorax</i>)														
White-collared Manakin (<i>Manacus candei</i>)														
Red-capped Manakin (<i>Ceratopira mentalis</i>)														
Black-crowned Tityra (<i>Tityra inquisitor</i>)														
Masked Tityra (<i>Tityra semifasciata</i>)														
tityra sp. (<i>Tityra sp.</i>)														
Northern Schiffornis (<i>Schiffornis veraepacis</i>)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cinnamon Becard (<i>Pachyramphus cinnamomeus</i>)														
White-winged Becard (<i>Pachyramphus polychopterus</i>)														
Gray-collared Becard (<i>Pachyramphus major</i>)														
Rose-throated Becard (<i>Pachyramphus aglaiae</i>)														
Royal Flycatcher (<i>Onychorhynchus coronatus</i>)														
Sulphur-rumped Flycatcher (<i>Myiobius sulphureipygius</i>)														
Stub-tailed Spadebill (<i>Platyrinchus cancrominus</i>)														
Ochre-bellied Flycatcher (<i>Mionectes oleagineus</i>)														
Northern Bentbill (<i>Oncostoma cinereigulare</i>)														
Slate-headed Tody-Flycatcher (<i>Poecilotriccus sylvia</i>)														
Common Tody-Flycatcher (<i>Todirostrum cinereum</i>)														
Eye-ringed Flatbill (<i>Rhynchocyclus brevirostris</i>)														
Yellow-olive Flycatcher (<i>Tolmomyias sulphurens</i>)														
Yellow-bellied Tyrannulet (<i>Ornithion semiflavum</i>)														
Northern Beardless-Tyrannulet (<i>Camptostoma imberbe</i>)														

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Greenish Elaenia (<i>Myiopagis viridicata</i>)												
Yellow-bellied Elaenia (<i>Elaenia flavogaster</i>)												
Olive-sided Flycatcher (<i>Contopus cooperi</i>)												
Eastern Wood-Pewee (<i>Contopus virens</i>)												
Tropical Pewee (<i>Contopus cinereus</i>)												
pewee sp. (<i>Contopus</i> sp.) (<i>Contopus</i> sp.)												
Yellow-bellied Flycatcher (<i>Empidonax flaviventris</i>)												
Acadian Flycatcher (<i>Empidonax virescens</i>)												
Alder/Willow Flycatcher (Traill's Flycatcher) (<i>Empidonax alnorum/traillii</i>)												
Least Flycatcher (<i>Empidonax minimus</i>)												
Empidonax sp. (<i>Empidonax</i> sp.)												
Black Phoebe (<i>Sayornis nigricans</i>)												
Vermilion Flycatcher (<i>Pyrocephalus rubinus</i>)												
Bright-rumped Attila (<i>Attila spadiceus</i>)												
Rufous Mourner (<i>Rhytipterna holerythra</i>)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Yucatan Flycatcher (<i>Myiarchus yucatanensis</i>)												
Dusky-capped Flycatcher (<i>Myiarchus tuberculifer</i>)												
Great Crested Flycatcher (<i>Myiarchus crinitus</i>)												
Brown-crested Flycatcher (<i>Myiarchus tyrannulus</i>)												
Myiarchus sp. (<i>Myiarchus</i> sp.)												
Great Kiskadee (<i>Pitangus sulphuratus</i>)												
Boat-billed Flycatcher (<i>Megarynchus pitangua</i>)												
Social Flycatcher (<i>Myiozetetes similis</i>)												
Streaked Flycatcher (<i>Myiodynastes maculatus</i>)												
Sulphur-bellied Flycatcher (<i>Myiodynastes luteiventris</i>)												
Piratic Flycatcher (<i>Legatus leucophaeus</i>)												

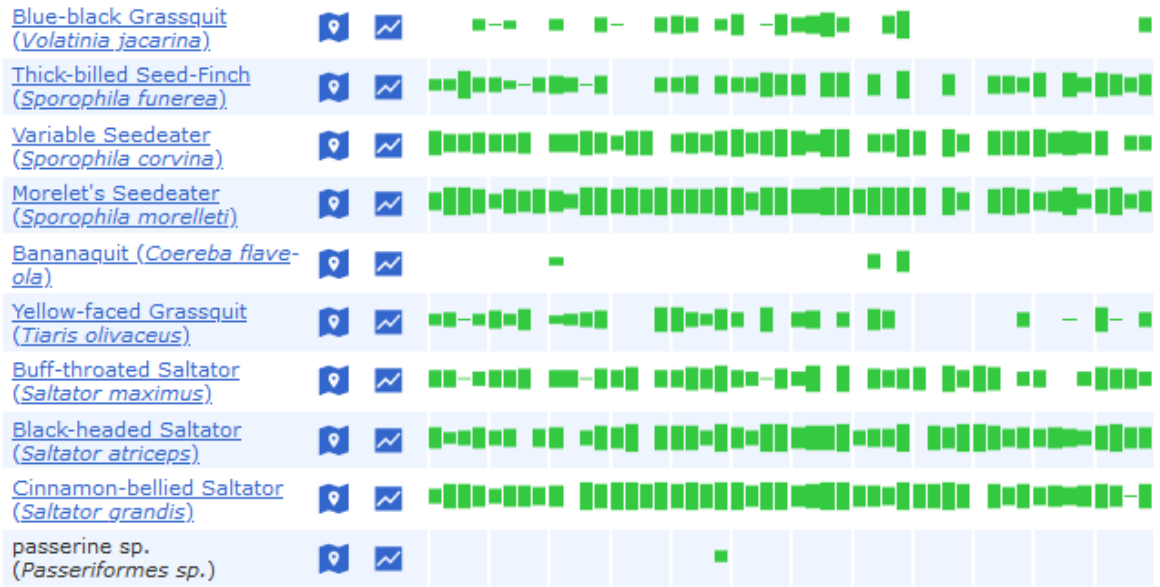
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Tropical Kingbird (<i>Tyrannus melancholicus</i>)														
Couch's Kingbird (<i>Tyrannus couchii</i>)														
Tropical/Couch's Kingbird (<i>Tyrannus melancholicus/couchii</i>)														
Eastern Kingbird (<i>Tyrannus tyrannus</i>)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Scissor-tailed Flycatcher (<i>Tyrannus forficatus</i>)														
Fork-tailed Flycatcher (<i>Tyrannus savana</i>)														
Rufous-browed Peppershrike (<i>Cyclarhis gujanensis</i>)														
Tawny-crowned Greenlet (<i>Tunchiornis ochraceiceps</i>)														
Lesser Greenlet (<i>Pachysylvia decurtata</i>)														
White-eyed Vireo (<i>Vireo griseus</i>)														
Mangrove Vireo (<i>Vireo pallens</i>)														
Yellow-throated Vireo (<i>Vireo flavifrons</i>)														
Philadelphia Vireo (<i>Vireo philadelphicus</i>)														
Red-eyed Vireo (<i>Vireo olivaceus</i>)														
Yellow-green Vireo (<i>Vireo flavoviridis</i>)														
vireo sp. (<i>Vireo sp.</i>)														
Brown Jay (<i>Psalorhinus morio</i>)														
Green Jay (<i>Cyanocorax yncas</i>)														
Northern Rough-winged Swallow (<i>Stelgidopteryx serripennis</i>)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Purple Martin (<i>Progne subis</i>)														
Gray-breasted Martin (<i>Progne chalybea</i>)														
new world martin sp. (<i>Progne sp.</i>) (<i>Progne sp.</i>)														
Tree Swallow (<i>Tachycineta bicolor</i>)														
Mangrove Swallow (<i>Tachycineta albilinea</i>)														
Bank Swallow (<i>Riparia riparia</i>)														





			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lawrence's Warbler (hybrid) (<i>Vermivora chrysoptera</i> x <i>cyanoptera</i> (F2 backcross))														
Black-and-white Warbler (<i>Mniotilta varia</i>)														
Prothonotary Warbler (<i>Protonotaria citrea</i>)														
Swainson's Warbler (<i>Limnothlypis swainsonii</i>)														
Tennessee Warbler (<i>Leiothlypis peregrina</i>)														
Gray-crowned Yellowthroat (<i>Geothlypis poliocephala</i>)														
Mourning Warbler (<i>Geothlypis philadelphia</i>)														
Kentucky Warbler (<i>Geothlypis formosa</i>)														
Common Yellowthroat (<i>Geothlypis trichas</i>)														
Hooded Warbler (<i>Setophaga citrina</i>)														
American Redstart (<i>Setophaga ruticilla</i>)														
Northern Parula (<i>Setophaga americana</i>)														
Magnolia Warbler (<i>Setophaga magnolia</i>)														
Bay-breasted Warbler (<i>Setophaga castanea</i>)														
Blackburnian Warbler (<i>Setophaga fusca</i>)														
Yellow Warbler (<i>Setophaga petechia</i>)														
Chestnut-sided Warbler (<i>Setophaga pennsylvanica</i>)														
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Black-throated Blue Warbler (<i>Setophaga caeruleascens</i>)														
Palm Warbler (<i>Setophaga palmarum</i>)														
Yellow-rumped Warbler (<i>Setophaga coronata</i>)														
Yellow-throated Warbler (<i>Setophaga dominica</i>)														
Grace's Warbler (<i>Setophaga graciae</i>)														
Black-throated Green Warbler (<i>Setophaga virens</i>)														
Wilson's Warbler (<i>Cardellina pusilla</i>)														
warbler sp. (Parulidae sp.) (<i>Parulidae</i> sp.)														
Rose-throated Tanager (<i>Piranga roseogularis</i>)														

Hepatic Tanager (<i>Piranga flava</i>)			
Summer Tanager (<i>Piranga rubra</i>)			
Scarlet Tanager (<i>Piranga olivacea</i>)			
Red-crowned Ant-Tanager (<i>Habia rubica</i>)			
Red-throated Ant-Tanager (<i>Habia fuscicauda</i>)			
Black-faced Grosbeak (<i>Caryothraustes polio-gaster</i>)			
			Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Northern Cardinal (<i>Cardinalis cardinalis</i>)			
Rose-breasted Grosbeak (<i>Pheucticus ludovicianus</i>)			
Gray-throated Chat (<i>Granatellus sallaei</i>)			
Blue Seedeater (<i>Amaurospiza concolor</i>)			
Blue-black Grosbeak (<i>Cyanoloxia cyanoides</i>)			
Blue Bunting (<i>Cyanocompsa parellina</i>)			
Blue Grosbeak (<i>Passerina caerulea</i>)			
Indigo Bunting (<i>Passerina cyanea</i>)			
Dickcissel (<i>Spiza americana</i>)			
Gray-headed Tanager (<i>Eucometis penicillata</i>)			
Black-throated Shrike-Tanager (<i>Lanio aurantius</i>)			
Crimson-collared Tanager (<i>Ramphocelus sanguinolentus</i>)			
Scarlet-rumped Tanager (<i>Ramphocelus passerinii</i>)			
Blue-gray Tanager (<i>Thraupis episcopus</i>)			
Yellow-winged Tanager (<i>Thraupis abbas</i>)			
			Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Golden-hooded Tanager (<i>Stelpnia larvata</i>)			
Shining Honeycreeper (<i>Cyanerpes lucidus</i>)			
Red-legged Honeycreeper (<i>Cyanerpes cyaneus</i>)			
Green Honeycreeper (<i>Chlorophanes spiza</i>)			



KEY: [location pin icon] = insufficient data | [green triangle icon] = rare to widespread

[Download Histogram Data](#)

Appendix 7 – Community Profile

Appendix 7.1: La Democracia Village

Questions	Responses		
HISTORY			
<ul style="list-style-type: none"> • Founded in 1940 when Homack Leslie established a sawmill and employed people from Belize City. First settlers in the community were Marshall Salazar, Philip Jones, Carlos Balardes who used to work for Mr. Leslie. • The name of the Village was given by Louse Sylvestre, then Area Representative, and Carlos Balardes. • First village counsel established in 1970. • After receiving damage from the 1961 Hurricane Hattie, some residents of Gracie Rock migrated to La Democracia. • Located at mile thirty on the George Price Highway. 			
COMMUNITY STRUCTURE, INSTITUTION, and INFRASTRUCTURE			
1. How is your community organized in terms of leadership/structure?	Group	Characteristics	Role/Function
	1. Village Council	<ul style="list-style-type: none"> • Members elected every 3 years • One Chairperson • One Vice Chairperson • 5 Counsellors 	<ul style="list-style-type: none"> • Governing body of the community • Works closely with local government
	2. Water Board	<ul style="list-style-type: none"> • Members appointed every 3 years after village council elections • 5 members: <ul style="list-style-type: none"> – One Chairperson – One Chairperson appointee – Two Area Rep appointees – One Village council appointee • Board currently not active 	<ul style="list-style-type: none"> • Water system management • Billing and maintenance of system • Maintenance person currently managing the water system
	3. Two Churches	<ul style="list-style-type: none"> • Baptist • Adventist 	<ul style="list-style-type: none"> • Focuses on spiritual development • Sunday and Saturday services
	4. Youth Group	<ul style="list-style-type: none"> • Group in development 	<ul style="list-style-type: none"> • Organizes sporting events

Questions	Responses	
2. Are there any existing economic, social, or cultural differences among the groups?	<ul style="list-style-type: none"> • None 	
3. What factors influence the daily lives of residents of your community?	<ul style="list-style-type: none"> • Employment – not much jobs available; some people working in the citrus industry. • Land – no opportunity for expansion, but building in existing lots. • Flooding – area is low lying. 	
4. Do people in different groups feel that they currently have a satisfying way of life?	<ul style="list-style-type: none"> • Not satisfied. Their lack of employment is a major factor that affects the perception of a satisfying way of life. 	
5. How stable is the pattern of residence?	<ul style="list-style-type: none"> • Most of people/families are the same. No room for village expansion. 	
6. How available are community services and infrastructure?	Services/Infrastructure	Availability
	1. Water	<ul style="list-style-type: none"> • Rural water system
	2. Electricity	<ul style="list-style-type: none"> • National grid
	3. Telephone/Internet	<ul style="list-style-type: none"> • Access to phone, internet, and cable TV services
	4. Education	<ul style="list-style-type: none"> • One preschool • One partial primary school – Infant 1 to Standard 3
	5. Transportation	<ul style="list-style-type: none"> • No bus service within the village. • Bus availability via the George Price Highway coming from Cayo or Belize City.
	6. Law Enforcement	<ul style="list-style-type: none"> • None
	7. Healthcare	<ul style="list-style-type: none"> • One Community Health Worker (Nurse's Aide)
	8. Waste Disposal	<ul style="list-style-type: none"> • Most people burn or bury their waste. • There is a truck that comes from Cotton Tree Village. Only a few residents use the service as it is a paid service.
	9. Housing	<ul style="list-style-type: none"> • Majority wooden houses on stilts with zinc roof. • Some concrete houses with zinc roof.

Questions	Responses	
DEMOGRAPHIC CONDITIONS		
7. What are the demographic characteristics of the community?	Characteristic	Response
	1. Population Size	<ul style="list-style-type: none"> • 357 - Total
	2. Household	<ul style="list-style-type: none"> • 89 households • Average household size - 4
	3. Ethnicity	<ul style="list-style-type: none"> • Mainly Creole and some Hispanics
	4. Gender	<ul style="list-style-type: none"> • Male – 178 • Female – 179
	5. Language	<ul style="list-style-type: none"> • Mainly Creole • Some Spanish
	6. Age	<ul style="list-style-type: none"> • Adult male – 102 • Adult female – 99 • Male children – 76 • Female children - 80
	7. Education Level	<ul style="list-style-type: none"> • Majority of the villagers finished primary school and some completed high school. • A few attended tertiary school.
	8. Income	<ul style="list-style-type: none"> • \$200 /week household
8. Is the demographic characteristic stable or changing?	<ul style="list-style-type: none"> • Stable 	
EMPLOYMENT		

Questions	Responses
9. Are there job opportunities available in the community? <ul style="list-style-type: none"> • If yes, what are they? 	<ul style="list-style-type: none"> • Although employment is a big problem in the community, the citrus industry provides some households with temporary employment during the harvesting season, which starts in November and ends in May of each year. • There is a Tilapia Farm but not employing anyone from the community. • Most people work outside the community. • A few individuals from the community are working on the present coastal road construction project.
10. What are the types of jobs people do? <ul style="list-style-type: none"> • Women versus Men 	<ul style="list-style-type: none"> • Construction (men) • Farm Hand – citrus industry (men and women) • Non-skilled laborers (men and women)
11. What is the magnitude and composition of unemployed? <ul style="list-style-type: none"> • Women versus Men 	<ul style="list-style-type: none"> • The Village is one of the poorest in the Belize District. Agriculture farming is limited due to the unavailability of land and the few involved produces only for home consumption. Most women are housewives dedicated to housework while single mothers are forced to seek jobs outside the community to maintain their children.
COMMUNITY RESOURCES	
12. What all community resources are found in the community	<ul style="list-style-type: none"> • There is no health post in the community thus forcing families to transport their beloved ones when sick to the nearest hospital, which is Belmopan. • Community Center is the only community structure and needs refurbishment. It is currently not functional. • Basketball Court needs resurfacing and new backboards.
13. How do people use the land in the community?	<ul style="list-style-type: none"> • The Village is surrounded by private land with no land for community expansion. • The land which lies on the east is very low and floods during the raining season. • On the south is the citrus groves which belong to the Polack Cattle and Citrus Farm.
14. Are there conflicts between these different land uses?	<ul style="list-style-type: none"> • None
15. Do people use lands outside of the community?	<ul style="list-style-type: none"> • No
16. Are there valued historic places, archaeological sites, or historical artifacts in your community?	<ul style="list-style-type: none"> • Nothing in the community, however the community is located near the Belize Zoo, Monkey Bay Wildlife Sanctuary, and Runaway Creek. • Cave system near the community – Tiger Sandy Bay

Appendix 7.2: Mahogany Heights Village

Questions	Responses		
HISTORY			
<ul style="list-style-type: none"> Mahogany Heights Village was established on May 5, 2003, by the Government of Belize with financing from the Development Finance Corporation. This Village was first inhabited by people mainly from Belize City due to land scarcity in the city and inadequate housing for poor city residents. Located at Mile 31 on the George Price Highway in the Belize District. 			
COMMUNITY STRUCTURE, INSTITUTION, and INFRASTRUCTURE			
1. How is your community organized in terms of leadership/structure?	Group	Characteristics	Role/Function
	1. Village Council	<ul style="list-style-type: none"> Members elected every 3 years One Chairperson One Vice Chairperson 5 Counsellors 	<ul style="list-style-type: none"> Governing body of the community Works closely with local government
	2. Water Board	<ul style="list-style-type: none"> Members appointed every 3 years after village council elections 5 members: <ul style="list-style-type: none"> One Chairperson One Chairperson appointee Two Area Rep appointees One Village council appointee Community health personnel work closely with waterboard 	<ul style="list-style-type: none"> Water system management Billing and maintenance of system Every 2 months water check is done
3. Six Churches	<ul style="list-style-type: none"> Baptist (2) Nazarene Anglican Pentecostal Evangelist 	<ul style="list-style-type: none"> Focus on spiritual development Sunday service Community development via a feeding program and education Active youth groups 	

Questions	Responses		
	4. Mahogany Heights Women's Group	<ul style="list-style-type: none"> • Informal group • Recruiting membership • Impacted by COVID 	<ul style="list-style-type: none"> • Assist in any area of community need • Community development
2. Are there any existing economic, social, or cultural differences among the groups?	<ul style="list-style-type: none"> • Demographic differences only within the churches. One Evangelical church that is mostly Hispanic. • All the other groups are made up of the various ethnicities from the community. 		
3. What factors influence the daily lives of residents of your community?	<ul style="list-style-type: none"> • Poverty – comprised of low income families. Access to food for some families is an issue. • Health – inadequate health services. Only a nurse's aide in the community. Takes long for ambulance service to reach community. • Crime – several major crimes have occurred recently and has negatively impacted the community. • Development – unsettled land issue where land ownership of community space and residence are in limbo. This has impacted investment in the area. • Travelling Cost – most people work out of the community and the Cost of transportation has increased causing a lot of them to reduce commuting (only come up on weekends). 		
4. Do people in different groups feel that they currently have a satisfying way of life?	<ul style="list-style-type: none"> • Community survey required. 		
5. How stable is the pattern of residence? <ul style="list-style-type: none"> • Do you have a lot of people moving in and out of the community? 	<ul style="list-style-type: none"> • People have moved in and out of the community. • No expansion – children move out of the community when they become adults. 		
6. How available are community services and infrastructure?	Services/Infrastructure	Availability	
	10. Water	<ul style="list-style-type: none"> • Rural water system 	
	11. Electricity	<ul style="list-style-type: none"> • National grid 	
	12. Telephone/Internet	<ul style="list-style-type: none"> • Access to phone, internet, and cable TV services 	
	13. Education	<ul style="list-style-type: none"> • One Pre-school • One Primary School – Standard 2, 3, & 4 only 	
14. Transportation	<ul style="list-style-type: none"> • Two Bus Companies (to Belize City) 		

Questions	Responses	
		<ul style="list-style-type: none"> • Outside of these, residents rely on bus coming from Cayo or Belize City through the George Price Highway.
	15. Law Enforcement	<ul style="list-style-type: none"> • Sub-station with 22 Officers and an Inspector in Charge • Three rotating shifts
	16. Healthcare	<ul style="list-style-type: none"> • Health Post – One Community Health worker (Nurse’s Aide) • Mobile clinic every two months
	17. Waste Disposal	<ul style="list-style-type: none"> • Truck from Belmopan passes every Saturday for garbage collection. • Sewer system is not functioning. Some houses have septic tanks while others empty unto the ground.
	18. Housing	<ul style="list-style-type: none"> • Most house structures are of concrete walls and zinc roof; a few are concrete walls with concrete roofs.
DEMOGRAPHIC CONDITIONS		
7. What are the demographic characteristics of the community?	Characteristic	Response
	9. Population Size	<ul style="list-style-type: none"> • 1,842 - Total • 490 (1-10 yrs) • 1,142 (10 -18 yrs) • 210 (19 yrs up)
	10. Household	<ul style="list-style-type: none"> • 300 households • Average household size - 6
	11. Ethnicity	<ul style="list-style-type: none"> • Garifuna – 50% • Creole – 30% • Hispanic – 20%
	12. Gender	<ul style="list-style-type: none"> • Approximately even between the genders.
	13. Language	<ul style="list-style-type: none"> • Mainly Creole • Some Garifuna • Some Spanish

Questions	Responses	
	14. Education Level	<ul style="list-style-type: none"> • Secondary School Completion - Adults
	15. Income	<ul style="list-style-type: none"> • \$1,000/month per household
8. Is the demographic characteristic stable or changing?	<ul style="list-style-type: none"> • Demographic is constantly shifting as young adults and adults move out of the community to find work. 	
EMPLOYMENT		
9. Are there job opportunities available in the community?	<ul style="list-style-type: none"> • Limited job opportunities. • Most people work outside of the community. 	
10. What are the types of jobs people do? <ul style="list-style-type: none"> • Women versus Men 	<ul style="list-style-type: none"> • Combination of public and private sector workers. • Store attendants, construction, carpentry, auto mechanics, electricians, domestic workers and a few in tourism industry. • Some community members have started to rear domesticated animals and also are doing planting of ground food and vegetables in their yards. 	
11. What is the magnitude and composition of unemployed? <ul style="list-style-type: none"> • Women versus Men 	<ul style="list-style-type: none"> • High unemployment in the community compounded by difficulty to find work outside because of the high travel cost. 	
COMMUNITY RESOURCES		
12. What all community resources are found in the community	<ul style="list-style-type: none"> • Small shops and one supermarket • Community center • Six churches • One preschool and primary school with a split system primary school • One health center • One police station • One basketball court • One football field 	

Questions	Responses
13. How do people use the land in the community?	<ul style="list-style-type: none"> Residential purposes
14. Are there conflicts between these different land uses?	<ul style="list-style-type: none"> Ongoing land dispute in the court system
15. Do people use lands outside of the community?	<ul style="list-style-type: none"> Hunting done in areas (private and public) surrounding the community.
16. Are there valued historic places, archeological sites, or historical artifacts in your community?	<ul style="list-style-type: none"> Nothing in the community, however the community is located near the Belize Zoo, Monkey Bay Wildlife Sanctuary, and Runaway Creek. Cave system near the community – Tiger Sandy Bay.

Appendix 7.3: Franks Eddy Village

Questions	Responses		
HISTORY			
	<ul style="list-style-type: none"> The community started as a farming community in the late 1970's and served as a refuge for civil war victims from Central America republics of El Salvador, Guatemala and Honduras. The community is one-half mile off the junction at the Mile 37 on the Western Highway in the Cayo District on a partially paved road that goes over five miles to the Jaguar Paw tourist resort. Most of the community is located along this road. 		
COMMUNITY STRUCTURE, INSTITUTION, and INFRASTRUCTURE			
1. How is your community organized in terms of leadership/structure? <ul style="list-style-type: none"> Talk about Formal & Informal Groups. 	Group	Characteristics	Role/Function
	1. Village Council	<ul style="list-style-type: none"> Members elected every 3 years One Chairperson One Vice Chairperson 5 Counsellors 	<ul style="list-style-type: none"> Governing body of the community Works closely with local government

Questions	Responses		
<ul style="list-style-type: none"> What is the role & function of the various groups? 	2. Seven Churches	<ul style="list-style-type: none"> Catholic Adventist Evangelist (5) 	<ul style="list-style-type: none"> Focus on spiritual development Sunday and Saturday services
2. Are there any existing economic, social, or cultural differences among the groups? <ul style="list-style-type: none"> What are their causes? 	<ul style="list-style-type: none"> No 		
3. What factors influence the daily lives of residents of your community? <ul style="list-style-type: none"> Social (employment, safety, employment, education) Health Environment 	<ul style="list-style-type: none"> The unavailability of land for village expansion is the most pressing issue. The youth population has increased with nowhere to construct their homes. 		
4. Do people in different groups feel that they currently have a satisfying way of life?	<ul style="list-style-type: none"> Yes - Not much social and economic challenges in the community. 		
5. How stable is the pattern of residence? <ul style="list-style-type: none"> Do you have a lot of people moving in and out of the community? 	<ul style="list-style-type: none"> Stable mainly because there are consistent employment opportunities. 		
6. How available are community services and infrastructure?	Services/Infrastructure	Availability	
	1. Water	<ul style="list-style-type: none"> National water company (BWSL) 	
	2. Electricity	<ul style="list-style-type: none"> National grid 	
	3. Telephone/Internet/TV	<ul style="list-style-type: none"> Access to phone, internet, and cable TV services 	
	4. Education	<ul style="list-style-type: none"> One Pre-school One Primary School – Infant 1 through Standard 6 	
	5. Transportation	<ul style="list-style-type: none"> Three Bus Companies (Busito) travels from the community to Belmopan. 	

Questions	Responses	
		<ul style="list-style-type: none"> • Outside of these, residents rely on bus coming from Cayo or Belize City through the George Price Highway.
	6. Law Enforcement	<ul style="list-style-type: none"> • None
	7. Healthcare	<ul style="list-style-type: none"> • None • Mobile clinic for immunizations only.
	8. Waste Disposal	<ul style="list-style-type: none"> • Truck from Belmopan passes every Saturday for garbage collection. • Houses have septic system.
	9. Housing	<ul style="list-style-type: none"> • Most house structures are of concrete walls and zinced roof; a few are concrete walls with concrete roofs. • Some wooden houses with zinc roof.
DEMOGRAPHIC CONDITIONS		
7. What are the demographic characteristics of the community?	Characteristic	Response
	1. Population Size	<ul style="list-style-type: none"> • 1,500
	2. Household	<ul style="list-style-type: none"> • 300 households • Average household size - 5
	3. Ethnicity	<ul style="list-style-type: none"> • Hispanics
	4. Gender	<ul style="list-style-type: none"> • Approximately even
	5. Language	<ul style="list-style-type: none"> • Mainly Spanish, and Creole spoken widely among the youth
	6. Age	<ul style="list-style-type: none"> • 60 – 70% of population under 24 years
	7. Education Level	<ul style="list-style-type: none"> • Most completed primary school with high secondary school dropout rate.
8. Income	<ul style="list-style-type: none"> • Unaware 	
8. Is the demographic characteristic stable or changing?	<ul style="list-style-type: none"> • Stable 	

Questions	Responses
EMPLOYMENT	
9. Are there job opportunities available in the community? <ul style="list-style-type: none"> • If yes, what are they? 	<ul style="list-style-type: none"> • Tourism and farming are the main occupations. • Several families conducting farming in vegetable production while some individuals work for the large citrus farms and cane factory in the area. • A few people work outside the community doing construction.
10. What are the types of jobs people do? <ul style="list-style-type: none"> • Women versus Men 	<ul style="list-style-type: none"> • Most women are housewives. Those who work perform cooking and cleaning jobs in the tourism industry. • Men perform farming, construction, tour guides, and other labour-intensive work.
11. What is the magnitude and composition of unemployed? <ul style="list-style-type: none"> • Women versus Men 	<ul style="list-style-type: none"> • Low unemployment • Most working persons in the community have a job
COMMUNITY RESOURCES	
12. What all community resources are found in the community	<ul style="list-style-type: none"> • Ten small convenience stores • Six restaurants • Unfinished community center • Seven churches • One preschool and primary school • One football field
13. How do people use the land in the community?	<ul style="list-style-type: none"> • Residential • Farming – most farmers rent the land they use from original landowners within the community.
14. Are there conflicts between these different land uses?	<ul style="list-style-type: none"> • None
15. Do people use lands outside of the community? <ul style="list-style-type: none"> • How? Where? 	<ul style="list-style-type: none"> • Use of some lands 30-40 minutes by river outside the community for farming. • Some families engage in hunting for home consumption.
16. Are there valued historic places, archeological sites, or historical artifacts in your community?	<ul style="list-style-type: none"> • Nohoch Che'en Archaeological Reserve along the Sibun River.

Appendix 7.4: St. Mathews Village

Questions	Responses				
HISTORY					
<ul style="list-style-type: none"> Established in 1981 just after Belize's Independence. The government was undertaking nationalization of lands under the control of colonial companies such as the Belize Estate and Produce Company (BEC) and distributing these lands to Belizeans in a land reform program. With a land reform program in process, the government of Belize was encouraging Belize City residents to move inland to avoid loss of life and property from hurricanes. Also, during that time, Belize was experiencing an influx of Central American refugees. The new highway made traveling to the Cayo district easier and more enjoyable, so more people started to notice the opportunity of starting a new life in a rural setting. Some of the first settlers to St Matthew's area were Mr. Matthews and family (Belizean Jamaican), Albert Marsden, John Burns, Oswald Young, Enrique Alpuche Sr, Kenneth Dunn, Norman Arnold, Hugh McSweeny and Ernesto Jeffords. Since the first settlers to the area were not farmers or accustomed to bush work and farming, they employed incoming Central American families to clear the land and maintain their investments. Among the first group of farm workers were Pedro Zuleta and family, Benito Arriaza and family and Juan Avilez and family. As more people settled in the area, it became necessary to establish a formal village committee to administrate the community. A village committee was elected by the then residents of the area. Elected as the first Village Chairman was Mr. Oswald Young and Thomas Marsden as the Vice Chairman. At that same meeting, the name St Matthews village was adopted. This name was chosen in homage to the biblical Apostle of Jesus Christ and in memory of the Matthews family who were brutally murdered at their home in the Village. Mr. Matthews always offered good advice and represented a good role model in the developing community. Located along the George Price Highway thirty-six (36) miles from Belize City and twelve (12) miles from the Capital City of Belmopan. The Village stretches two and half miles (2 ½) along the highway. 					
COMMUNITY STRUCTURE, INSTITUTION, and INFRASTRUCTURE					
1. How is your community organized in terms of leadership/structure? <ul style="list-style-type: none"> Talk about Formal & Informal Groups. What is the role & function of the various groups? 	Group	Characteristics	Role/Function		
	1. Village Council	<ul style="list-style-type: none"> Members elected every 3 years One Chairperson One Vice Chairperson 5 Counsellors 	<ul style="list-style-type: none"> Governing body of the community Works closely with local government 		
2. Seven Churches				<ul style="list-style-type: none"> Nazarene Adventist Pentecostal Evangelist (3) 	<ul style="list-style-type: none"> Focus on spiritual development Sunday and Saturday services

Questions	Responses	
2. Are there any existing economic, social, or cultural differences among the groups? <ul style="list-style-type: none"> • What are their causes? 	<ul style="list-style-type: none"> • No 	
3. What factors influence the daily lives of residents of your community?	<ul style="list-style-type: none"> • Poor community infrastructure. The community is flood prone, the streets are poor, and some areas in don't have lighting which is a security concern. 	
4. Do people in different groups feel that they currently have a satisfying way of life?	<ul style="list-style-type: none"> • Not satisfied due to high unemployment, especially among young males. 	
5. How stable is the pattern of residence? <ul style="list-style-type: none"> • Do you have a lot of people moving in and out of the community? 	<ul style="list-style-type: none"> • Stable pattern of residence. Don't have many new persons coming into the community. 	
6. How available are community services and infrastructure?	Services/Infrastructure	Availability
	1. Water	<ul style="list-style-type: none"> • National water company (BWSL)
	2. Electricity	<ul style="list-style-type: none"> • National grid
	3. Telephone/Internet	<ul style="list-style-type: none"> • Access to phone, internet, and cable TV services
	4. Education	<ul style="list-style-type: none"> • One Pre-school • One Primary School – Infant 1 through Standard 6
	5. Transportation	<ul style="list-style-type: none"> • Three Bus Companies (Busito) travel from the community to Belmopan. • Residents also rely on the bus coming from Cayo or Belize City via the George Price Highway.
	6. Law Enforcement	<ul style="list-style-type: none"> • None

Questions	Responses	
	7. Healthcare	<ul style="list-style-type: none"> • None • Mobile clinic for immunizations only
	8. Waste Disposal	<ul style="list-style-type: none"> • Truck from Belmopan passes every Saturday for garbage collection. • Houses have septic system.
	9. Housing	<ul style="list-style-type: none"> • Mixed of house structures; concrete walls and zinced roof and wooden houses with zinc roof.
DEMOGRAPHIC CONDITIONS		
7. What are the demographic characteristics of the community?	Characteristic	Response
	1. Population Size	<ul style="list-style-type: none"> • 2,000
	2. Household	<ul style="list-style-type: none"> • 400 households • Average household size – 5
	3. Ethnicity	<ul style="list-style-type: none"> • Mainly Hispanics (70%) • Some Creoles and Mayas
	4. Gender	<ul style="list-style-type: none"> • Approximately even
	5. Language	<ul style="list-style-type: none"> • Spanish and Creole
	6. Age	<ul style="list-style-type: none"> • 65% under 24 years
	7. Education Level	<ul style="list-style-type: none"> • Most completed primary school with high secondary school dropout rate
	8. Income	<ul style="list-style-type: none"> • Household - \$300/week

Questions	Responses
8. Is the demographic characteristic stable or changing?	<ul style="list-style-type: none"> • Stable
EMPLOYMENT	
9. Are there job opportunities available in the community? • If yes, what are they?	<ul style="list-style-type: none"> • Limited jobs in the community. Landscaping is the main job. • Most people work outside the community.
10. What are the types of jobs people do? • Women versus Men	<ul style="list-style-type: none"> • Construction (men) • Tourism in Franks Eddy • Call Centers – many of the young people who completed secondary school.
11. What is the magnitude and composition of unemployed? • Women versus Men	<ul style="list-style-type: none"> • High unemployment • Most older women are housewives
COMMUNITY RESOURCES	
12. What all community resources are found in the community	<ul style="list-style-type: none"> • Small shops • No community Center – school is used • Six churches • One preschool and primary school • One football field • One basketball court • Small Park
13. How do people use the land in the community?	<ul style="list-style-type: none"> • Residential purpose
14. Are there conflicts between these different land uses?	<ul style="list-style-type: none"> • None

Questions	Responses
15. Do people use lands outside of the community? • How? Where?	<ul style="list-style-type: none"> Generally, no. However, a few people engage in hunting for home consumption.
16. Are there valued historic places, archeological sites, or historical artifacts in your community?	<ul style="list-style-type: none"> None

Appendix 7.5: Cotton Tree Village

Questions	Responses		
HISTORY			
Not Available			
COMMUNITY STRUCTURE, INSTITUTION, and INFRASTRUCTURE			
1. How is your community organized in terms of leadership/structure? • Talk about Formal & Informal Groups. • What is the role & function of the various groups?	Group	Characteristics	Role/Function
	1. Village Council	<ul style="list-style-type: none"> Members elected every 3 years One Chairperson One Vice Chairperson 5 Counsellors 	<ul style="list-style-type: none"> Governing body of the community Works closely with local government
	2. Churches	<ul style="list-style-type: none"> Baptist Nazarene Principe de Paz (Familia de Dios) Pentecostal Evangelist Catholic 	<ul style="list-style-type: none"> Focus on spiritual development Sunday service – Catholic Church at Community Center Others Community development through a feeding program, education, active youth and women groups

Questions	Responses	
2. Are there any existing economic, social, or cultural differences among the groups? <ul style="list-style-type: none"> • What are their causes? 	<ul style="list-style-type: none"> • Yes • Not all have same resources (i.e., money) 	
3. What factors influence the daily lives of residents of your community?	<ul style="list-style-type: none"> • Garbage – thrown everywhere; issue with garbage pickup • Poverty – comprised of low income families. Access to food for some families is an issue, as well as abuse of alcohol consumption. Families without resources get a stipend of \$150 every three months. • Unemployment • Health – no health services. Health officials visit the village only for immunizations, etc. • Crime – petty crime • Development /Investment – few infrastructure • Travelling Cost – majority work outside of village (i.e., Jaguar Paw, Belize City, Belmopan) 	
4. Do people in different groups feel that they currently have a satisfying way of life?	<ul style="list-style-type: none"> • More or less 	
5. How stable is the pattern of residence? <ul style="list-style-type: none"> • Do you have a lot of people moving in and out of the community? 	<ul style="list-style-type: none"> • People move in and out of the community • A few people move to community to rent • Village has grown in the past 5 years; the newer generations stay behind and build 	
6. How available are community services and infrastructure?	Services/Infrastructure	Availability
	1. Water	<ul style="list-style-type: none"> • National water company (BWSL)
	2. Electricity	<ul style="list-style-type: none"> • National grid
	3. Telephone/Internet	<ul style="list-style-type: none"> • Access to phone, majority have internet, and cable TV services
	4. Education	<ul style="list-style-type: none"> • One Pre-school - Nazarene • Primary School infant 1 – Standard 6 (more than 400 kids, even use community center for classes)

Questions	Responses	
	5. Transportation	<ul style="list-style-type: none"> Residents rely on bus coming from Cayo or Belize City through the George Price Highway.
	6. Law Enforcement	<ul style="list-style-type: none"> None. Currently uses the Roaring Creek enforcement (officers often take more than 2 hrs to respond).
	7. Healthcare	<ul style="list-style-type: none"> None Mobile clinic for immunizations only
	8. Waste Disposal	<ul style="list-style-type: none"> Garbage truck from Belmopan collects garbage, but there is no set schedule and it is not reliable. Chair pays \$40 for a vehicle to pick up garbage to take to a site to burn. Majority of the houses have septic tanks.
	9. Housing	<ul style="list-style-type: none"> 60% cement houses - 10% cement roof, 90% zinc roofs 40% wood houses
DEMOGRAPHIC CONDITIONS		
7. What are the demographic characteristics of the community?	Characteristic	Response
	9. Population Size	<ul style="list-style-type: none"> 1,573 (Chair estimates closer to 2,500)
	10. Household	<ul style="list-style-type: none"> 319 households Average household size - range from 2 -10, some properties have 2-3 houses
	11. Ethnicity	<ul style="list-style-type: none"> Hispanic, Creole, Mayas, Garifuna, Asian.
	12. Gender	Male – 792 Female - 780
	13. Language	<ul style="list-style-type: none"> English Creole Spanish Some Garifuna Some Asian (Mandarin, Chinese)

Questions	Responses	
	14. Age	<ul style="list-style-type: none"> Majority are youths
	15. Education Level	<ul style="list-style-type: none"> Secondary School Completion - Adults
	16. Income	<ul style="list-style-type: none"> Depends where and with whom
8. Is the demographic characteristic stable or changing?	<ul style="list-style-type: none"> Changes some 	
EMPLOYMENT		
9. Are there job opportunities available in the community? <ul style="list-style-type: none"> If yes, what are they? 	<ul style="list-style-type: none"> Yes, there is work. Work is mostly farming, which is outside of the community, construction work, and working in small businesses. 	
10. What are the types of jobs people do? <ul style="list-style-type: none"> Women versus Men 	<ul style="list-style-type: none"> Women – domestic workers, some work in offices, tourism Men – farmers, construction, tourism - guides 	
11. What is the magnitude and composition of unemployed? <ul style="list-style-type: none"> Women versus Men 	<ul style="list-style-type: none"> Not a lot of unemployment, but those that are, are mostly men. Some of these men find temporary jobs. 	
COMMUNITY RESOURCES		
12. What all community resources are found in the community	<ul style="list-style-type: none"> 12 Small shops and one supermarket Community Center 13 churches. One preschool and primary school One football field School – basketball 	

Questions	Responses
13. How do people use the land in the community?	<ul style="list-style-type: none"> • Residential purposes only, with few small stores attached to homes
14. Are there conflicts between these different land uses?	<ul style="list-style-type: none"> • Few problems. Squatters that live and work on land may be owned by someone else. Several issues arise from this situation.
15. Do people use lands outside of the community? <ul style="list-style-type: none"> • How? • Where? 	<ul style="list-style-type: none"> • Agriculture, farming • Hunting in some areas
16. Are there valued historic places, archeological sites, or historical artifacts in your community?	<ul style="list-style-type: none"> • None

Appendix 8 – Key Community Stakeholders Interviewed

Name	Organization	Position
Peter Crispin Lewis	La Democracia Village Council	Chairperson
Gary Clark	La Democracia Village Council	Counsellor
Frank Clark	La Democracia Village Council	Counsellor
Jermaine Sanchez	Mahogany Heights Village Council	Chairperson
Raquel Vega	Mahogany Heights Village Council	Vice Chairperson
Alfredo Reyes	Franks Eddy Village Council	Chairperson
Cristian Reyes	Franks Eddy Village	Resident
Elida Gomez	St. Mathews Village Council	Vice Chairperson
Oscar Otero	Cotton Tree Village Council	Chairperson

Appendix 9 – Stakeholder Engagement Plan

The Stakeholder Engagement Plan outlines the approach to be taken for stakeholder engagement. It details the engagement objectives for each management plan component, the stakeholders targeted by component, the engagement method/action, frequency of engagement, and expected results or benefits along with the indicators to measure whether the results are achieved.

Management Plan Components	Objectives of the Engagement	Stakeholders Targeted for Engagement	Activity	Frequency of Activity	Expected Results	Indicators
Management Plan Implementation						
<ul style="list-style-type: none"> PROGRAM 1 Natural Resources Management Program 	<ul style="list-style-type: none"> By 2025, develop and maintain an effective surveillance and enforcement program for the purpose of resource management within MBWS. By 2027, improve the structure of the pine savanna ecosystem. By 2026, develop a restoration program to support landscape connectivity By 2027, conduct a carbon feasibility assessment for MBWS to explore 	MFC Coalition	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings Workshops 	Monthly	<ul style="list-style-type: none"> Effective enforcement of the landscape 	<ul style="list-style-type: none"> Management effectiveness score
		Police and Forest Departments; NBIO; DOE; WCS	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly		
		UB-ERI	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly		
		Communities	<ul style="list-style-type: none"> Correspondence by phone/email/text Community visits Workshops 	Quarterly	<ul style="list-style-type: none"> Reduction of intrusions or illegal activity. 	<ul style="list-style-type: none"> # of training workshops delivered # of individuals trained
		Domestic Visitors	<ul style="list-style-type: none"> Sharing of blogs/articles on management plan activities Broadcast & social media 	Quarterly	<ul style="list-style-type: none"> Reduction in damage caused by wild and uncontrolled fires. 	<ul style="list-style-type: none"> # of social media reach # of likes

Management Plan Components	Objectives of the Engagement	Stakeholders Targeted for Engagement	Activity	Frequency of Activity	Expected Results	Indicators
	carbon market opportunities.					
<ul style="list-style-type: none"> PROGRAM 2 Research and Monitoring Program 	<ul style="list-style-type: none"> By 2023, develop and establish a monitoring and research program within and around MBWS 	UB-ERI	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly	<ul style="list-style-type: none"> Identification of habitat and species population changes 	<ul style="list-style-type: none"> # of partnerships with research/education institutions Management effectiveness score
		MFC Coalition	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly		
		Panthera and WCS	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly		
<ul style="list-style-type: none"> PROGRAM 3 Community Engagement Program 	<ul style="list-style-type: none"> By 2027, develop a restoration program for the socioeconomic benefits of the buffer communities. By 2025, develop and maintain an effective education and outreach program within and around MBWS. By 2025, develop and establish an entrepreneurship program 	Communities	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings Workshops 	Monthly	<ul style="list-style-type: none"> Improved communication and understanding of sustainable development among stakeholders Reduction of the extractive pressures within and 	<ul style="list-style-type: none"> # of training workshops delivered # of individuals trained # of advisory committee meetings # of community stakeholder champions for MBWS advocacy.
		Landowners	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings Workshops 	Monthly		

Management Plan Components	Objectives of the Engagement	Stakeholders Targeted for Engagement	Activity	Frequency of Activity	Expected Results	Indicators
	<p>for key community stakeholders, i.e., Mahogany Heights and La Democracia.</p> <ul style="list-style-type: none"> By 2024, in partnership with neighbouring landowners, support the implementation of a comprehensive disaster relief plan for MBWS and the surrounding communities/farms. 				<p>around MBWS.</p> <ul style="list-style-type: none"> Functioning advisory committee 	
<ul style="list-style-type: none"> PROGRAM 4 Tourism and Recreation Management Program 	<ul style="list-style-type: none"> By 2026, expand the resource mobilization from the education and ecotourism activities within MBWS. By 2027, develop and implement a sustainable tourism strategy for MBWS compatible with the Maya Forest Corridor landscape 	Tourism Org tourism companies/ operators	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Quarterly	<ul style="list-style-type: none"> Increase in visitors to MBWS 	<ul style="list-style-type: none"> # of tourism products # of local visitors to MBWS
		MFC partner organizations	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly		<ul style="list-style-type: none"> # of agreement with tour operators
		Study Abroad Universities	<ul style="list-style-type: none"> Correspondence by phone/email/text Formal meetings 	Monthly		<ul style="list-style-type: none"> # of formal agreements with academia

Management Plan Components	Objectives of the Engagement	Stakeholders Targeted for Engagement	Activity	Frequency of Activity	Expected Results	Indicators
<ul style="list-style-type: none"> PROGRAM 5 Administration and Infrastructure Program 	<ul style="list-style-type: none"> By 2023, manage and enhance the human resources of MBWS. Conduct annual reviews of management activities. 	All Stakeholders	<ul style="list-style-type: none"> Correspondence by phone/email/text Workshops Sharing of blogs/articles on project activities Survey 	Annually	<ul style="list-style-type: none"> Participation in management effectiveness activities. 	<ul style="list-style-type: none"> Management effectiveness score #of stakeholder groupings that participate in project monitoring activities

Appendix 10 – METT Results

The Management Effectiveness Assessment report is based on literature review, observations from a field visit on March 26, 2022, and discussions with Eli Miller, Managing Director of Monkey Bay Wildlife Sanctuary (MBWS). The Management Effectiveness Assessment report draft was also reviewed and updated by Matthew Miller, the co-founder and managing director of MBWS.

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<p>1. Legal status</p> <p>Does MBWS have legal status (or in the case of private reserves is covered by a covenant or similar)?</p> <p><i>Context</i></p>	MBWS is not gazetted/covenanted	0	0	<p>MBWS was publicly declared as a private protected area for the people and wildlife of Belize by Hon. Glenn Godfrey, the Minister of Tourism and Environment, at an Earth Day Celebration on April 22, 1990. No formal document or recognition exists.</p> <p>However, a covenant that states the restriction of development other than for conservation management and education purposes is attached to the Land Title of MBWS.</p> <p>Additionally, MBWS is exempt from the Land Tax based on the Earth Day Dedication from Minister Godfrey.</p>	<p>Confirm the non-development clause during the land search. A copy of the restrictive covenant assigned to the property will be requested from Attorney Jaseth Jackson</p>
	There is agreement that MBWS should be gazetted/covenanted but the process has not yet begun	1			
	MBWS is in the process of being gazetted/covenanted but the process is still incomplete (includes sites designated under international conventions, such as Ramsar, or local/traditional law such as community conserved areas, which do not yet have national legal status or covenant)	2			
	MBWS has been formally gazetted/covenanted	3			
	There are no regulations for controlling land use and activities in MBWS	0		Enforcement is a major weakness within the MBWS. As	Develop specific regulations and

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
2. Protected area regulations Are appropriate regulations in place to control land use and activities (e.g., hunting)? <i>Planning</i>	Some regulations for controlling land use and activities in MBWS exist but there are major weaknesses	1		for regulating land use, the covenant restricting development supports the property to only be used for conservation and education purposes.	enforcement plan for MBWS.
	Regulations for controlling land use and activities in MBWS exist but there are some weaknesses or gaps	2	2		
	Regulations for controlling inappropriate land use and activities in MBWS exist and provide an excellent basis for management	3			
3. Law enforcement Can staff (i.e., those with responsibility for managing the site) enforce protected area rules well enough? <i>Input</i>	The staff have no effective capacity/resources to enforce protected area legislation and regulations	0		As of March 2022, there is one part-time MBWS ranger that has begun limited patrol, monitoring, and reporting activities.	WCS will give special constable training to the MBWS staff in June 2022. The training will be backed by the Forest Department.
	There are major deficiencies in staff capacity/resources to enforce protected area legislation and regulations (e.g., lack of skills, no patrol budget, lack of institutional support)	1	1		
	The staff have acceptable capacity/resources to enforce protected area legislation and regulations, but some deficiencies remain	2			
	The staff have excellent capacity/resources to enforce protected area legislation and regulations	3			
4. Protected area objectives Is management undertaken according to agreed objectives?	No firm objectives have been agreed for MBWS	0		There has been no working management plan. However, there are a few non-formal ad hoc objectives (such as no logging, no hunting, fire management plan, and yellow headed parrot patrols), but nothing has been formalized.	Management plan is under development and will formalize specific objectives.
	MBWS has agreed objectives, but is not managed according to these objectives	1	1.5		
	MBWS has agreed objectives, but is only partially managed according to these objectives	2			
	MBWS has agreed objectives and is managed to meet these objectives	3			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<i>Planning</i>					
<p>5. Protected area design</p> <p>Is MBWS the right size and shape to protect species, habitats, ecological processes, and water catchments of key conservation concern?</p> <p><i>Planning</i></p>	Inadequacies in protected area design mean achieving the major objectives of MBWS is very difficult	0		<p>MBWS has the capacity to protect species of key concern on its own, but it's immediate connection across the river to Monkey Bay National Park, which also connects to the Manatee Forest Reserve, forms part of a continuum of supporting a lot of different species. MBWS also forms part of the MFC, which shares similar species/ecosystems of concern.</p>	<p>Seek co-management agreement for the Monkey Bay National Park, which would broaden the management area to support a wider variety of species.</p> <p>Consider joining the MFC Trust to protect the area in perpetuity.</p>
Inadequacies in protected area design mean that achievement of major objectives is difficult, but some mitigating actions are being taken (e.g., agreements with adjacent landowners for wildlife corridors or introduction of appropriate catchment management)	1				
Protected area design is not significantly constraining achievement of objectives, but could be improved (e.g., with respect to larger scale ecological processes)	2	2			
Protected area design helps achievement of objectives; it is appropriate for species and habitat conservation; and maintains ecological processes such as surface and groundwater flows at a catchment scale, natural disturbance patterns etc	3				

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
6. PROTECTED AREA BOUNDARY DEMARCATION Is the boundary known and demarcated? <i>Process</i>	The boundary of MBWS is not known by the management authority or local residents/neighbouring land users	0		The MBWS boundary is known by the management authority and about half of users from the local communities. Currently, the MBWS demarcation signs along the public road are too small or spaced too far apart, and there are currently no signs along the river front. Although existing roads (such as public and private farm roads) help to define boundaries, signs are still essential to properly demarcate.	Conduct proper boundary demarcation by installing larger and more informative signs within visible places of MBWS. Additionally, consider solutions to install signs along the river front and demarcate the flood zone.
	The boundary of MBWS is known by the management authority but is not known by local residents/neighbouring land users	1			
	The boundary of MBWS is known by both the management authority and local residents/neighbouring land users but is not appropriately demarcated	2	2		
	The boundary of MBWS is known by the management authority and local residents/neighbouring land users and is appropriately demarcated	3			
7. Management plan Is there a management plan and is it being implemented? <i>Planning</i>	There is no management plan for MBWS	0		MBWS does not have a current working management plan, but is being prepared.	Management plan in development.
	A management plan is being prepared or has been prepared but is not being implemented	1	1		
	A management plan exists but it is only being partially implemented because of funding constraints or other problems	2			
	A management plan exists and is being implemented	3			
Additional points: <i>Planning</i>					

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
7a. Planning process	The planning process allows adequate opportunity for key stakeholders to influence the management plan	+1	1	A WCS stakeholder study found that house to house surveys is the preferred means to engage communities on feedback for decision making. Additionally, WCS found that Democracia, Gracie Rock, St. Matthew's, and Mahogany Heights are eager to work with environmental NGOs and local stakeholders in the management planning or decision-making processes. However, about 50% of households in Franks Eddy said they are not willing to participate in decision making processes.	Involve local communities via CAP workshops and group consultations as part of the on-going management plan process.
7b. Planning process	There is an established schedule and process for periodic review and updating of the management plan	+1	0	N/A	
7c. Planning process	The results of monitoring, research and evaluation are routinely incorporated into planning	+1	0	N/A	
8. Regular work plan Is there a regular work plan and is it being implemented? <i>Planning/Outputs</i>	No regular work plan exists	0	0.5	Ad hoc activities are added to the monthly or quarterly task list for MBWS.	Management plan in development, and will guide the development of an official work plan with activities to be achieved.
	A regular work plan exists but few of the activities are implemented	1			
	A regular work plan exists, and many activities are implemented	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
	A regular work plan exists, and all activities are implemented	3			
9. Resource inventory	There is little or no information available on the critical habitats, species, and cultural values of MBWS	0		Data has been compiled for various key areas, habitats, and species. However, the data is not organized and known to the resident managers and staff.	Data needs to be properly organized and filed for easier access to be analysed.
Do you have enough information to manage the area?	Information on the critical habitats, species, ecological processes, and cultural values of MBWS is not sufficient to support planning and decision making	1			
	Information on the critical habitats, species, ecological processes, and cultural values of MBWS is sufficient for most key areas of planning and decision making	2	2		
<i>Input</i>	Information on the critical habitats, species, ecological processes, and cultural values of MBWS is sufficient to support all areas of planning and decision making	3			
10. Protection systems	Protection systems (patrols, permits etc) do not exist or are not effective in controlling access/resource use	0		MBWS has a few management systems in place, such as the fire management plan to manage the resources in the pine savanna, and the bird monitoring system (citizen science via eBird), which includes providing supplementary bird nesting habitat.	MBWS has partnered with WCS to incorporate SMART technology. MBWS has received the device and has sent their desired database to WCS for them to develop. Once developed, WCS will
Are systems in place to control access/resource use in MBWS?	Protection systems are only partially effective in controlling access/resource use	1	1		
<i>Process/Outcome</i>					

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
	Protection systems are moderately effective in controlling access/resource use	2		As aforementioned, there is one part-time MBWS ranger that has begun limited patrol, monitoring, and reporting activities.	then train MBWS staff on how to use the device to collect data during patrols. SMART system will be put in place along with the rest of the MFC team. WCS will also provide special constable training and fire management training. Surveillance program should be in place as part of the management plan.
	Protection systems are largely or wholly effective in controlling access/ resource use	3			
11. Research Is there a programme of management-oriented survey and research work? <i>Process</i>	There is no survey or research work taking place in MBWS	0		Considerable research has been conducted within MBWS, but not all work is easily accessible. Additionally, a lot of independent researchers that stay at Monkey Bay conduct their research in other parts of the region and is not specific to MBWS.	Conduct a literature review of the studies that have been conducted within MBWS. Conduct more bird and camera traps surveys.
	There is a small amount of survey and research work, but it is not directed towards the needs of protected area management	1	1.5		

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
	There is considerable survey and research work, but it is not directed towards the needs of protected area management	2			Include test plots to study impacts of fire on the savanna vegetation.
	There is a comprehensive, integrated programme of survey and research work, which is relevant to management needs	3			Install permanent sampling plots within broadleaf forest to study hardwoods, emergent trees survivability, and density.
12. Resource management	Active resource management is not being undertaken	0		Pine savanna is being managed for both pine regeneration and parrot nesting habitat (specifically for the yellow-headed parrot).	Fire management training will be conducted to address pine regeneration, which also supports parrot nesting.
Is active resource management being undertaken?	Very few of the requirements for active management of critical habitats, species, ecological processes, and cultural values are being implemented	1			Broadleaf forest management will be developed to prevent its decline, especially along the river.
<i>Process</i>	Many of the requirements for active management of critical habitats, species, ecological processes, and cultural values are being implemented but some key issues are not being addressed	2	2		The management plan will formalize and
	Requirements for active management of critical habitats, species, ecological processes, and cultural values are being substantially or fully implemented	3			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
					incorporate what is currently being done.
13. Staff numbers	There are no staff	0		There are no full-time staff that are dedicated to the management of MBWS. Part of the job description for some staff includes management activities such as fire management and bird monitoring.	Work plan will be developed to justify full-time staff members dedicated to addressing management activities.
Are there enough people employed to manage MBWS?	Staff numbers are inadequate for critical management activities	1	1		
	Staff numbers are below optimum level for critical management activities	2			
	Staff numbers are adequate for the management needs of MBWS	3			
<i>Inputs</i>					
14. Staff training	Staff lack the skills needed for protected area management	0		Staff is trained in bird monitoring and fire management.	Apart from the special constable and SMART training (only introductory training has been done) conducted by WCS, staff should also be trained in vegetation identification and data analysis and management.
Are staff adequately trained to fulfil management objectives?	Staff training and skills are low relative to the needs of MBWS	1	1		
	Staff training and skills are adequate, but could be further improved to fully achieve the objectives of management	2			
	Staff training and skills are aligned with the management needs of MBWS	3			
<i>Inputs/Process</i>					
15. Current budget	There is no budget for management of MBWS	0		A portion of the revenue generated from the study abroad programme has funded the management activities. MBWS has a separate bank account for the management needs.	Diversify income opportunities for MBWS. Potential funding opportunities include NTFPs and small-scale agroforestry.
Is the current budget sufficient?	The available budget is inadequate for basic management needs and presents a serious constraint to the capacity to manage	1	1.5		
	The available budget is acceptable but could be further improved to fully achieve effective management	2			
	The available budget is sufficient and meets the full management needs of MBWS	3			
<i>Inputs</i>					

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
				The Study Abroad Campus, as opposed to the MBWS, has a business plan in place.	
16. Security of budget Is the budget secure? <i>Inputs</i>	There is no secure budget for MBWS, and management is wholly reliant on outside or highly variable funding	0		MBWS heavily relies on tourism income (specifically from the study abroad programme).	Diversify income opportunities. Explore methods that would make MBWS accommodations more accessible and develop activities at relatively low cost for local students and visitors. Secure funding to conduct outreach for local children and for environmental education catered to Belizeans.
	There is very little secure budget and MBWS could not function adequately without outside funding	1	1		
	There is a reasonably secure core budget for regular operation of MBWS, but many innovations and initiatives are reliant on outside funding	2			
	There is a secure budget for MBWS and its management needs	3			
17. Management of budget Is the budget managed to meet critical management needs?	Budget management is very poor and significantly undermines effectiveness (e.g., late release of budget in financial year)	0		MBWS has an accountant and has been managing the budget. MBWS has been very frugal when it comes to spending.	
	Budget management is poor and constrains effectiveness	1			
	Budget management is adequate but could be improved	2			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
<i>Process</i>	Budget management is excellent and meets management needs	3	3		
18. Equipment	There is little or no equipment and facilities for management needs	0		Sufficient equipment for the current management activities.	Equipment for future activities will have to be obtained.
Is equipment sufficient for management needs?	There are some equipment and facilities, but these are inadequate for most management needs	1			
	There are equipment and facilities, but still some gaps that constrain management	2	2		
<i>Input</i>	There are adequate equipment and facilities	3			
19. Maintenance of equipment	There is little or no maintenance of equipment and facilities	0		Currently, there is a budget for only basic maintenance of equipment and facilities.	Once the funding opportunities are more diversified, the funding for equipment could be improved.
Is equipment adequately maintained?	There is some <i>ad hoc</i> maintenance of equipment and facilities	1			
	There is basic maintenance of equipment and facilities	2	2		
<i>Process</i>	Equipment and facilities are well maintained	3			
20. Education and awareness	There is no education and awareness programme	0		Study aboard programme is in place and is mostly catered for foreign students.	Improve local outreach and education programme and secure its funding.
Is there a planned education programme linked	There is a limited and <i>ad hoc</i> education and awareness programme	1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
to the objectives and needs? <i>Process</i>	There is an education and awareness programme, but it only partly meets needs and could be improved	2	2.5		MBWS has partnered with UB-ERI to conduct bird ID and monitoring within the MFC for stakeholder communities. GEF funded 10 binoculars to facilitate “building community environmental stewardship in the MFC through avian ecology”.
	There is an appropriate and fully implemented education and awareness programme	3			
21. Planning for land and water use Does land and water use planning recognise MBWS and aid the achievement of objectives? <i>Planning</i>	Adjacent land and water use planning does not take into account the needs of MBWS and activities/policies are detrimental to the survival of the area	0		MBWS is an important area for water catchment and for landscape conservation. Since 2018, MBWS has been an active partner in the MFC Coalition and MBWS makes up a portion of the MFC landscape. Therefore, conservation objectives align.	MBWS will collaborate in the completion of the MFC (aid in securing land and achieving conservation goals).
	Adjacent land and water use planning does not take into account the long term needs of MBWS, but activities are not detrimental the area	1			
	Adjacent land and water use planning partially takes into account the long term needs of MBWS	2			
	Adjacent land and water use planning fully takes into account the long term needs of MBWS	3	3		
Additional points: Land and water planning					
21a: Land and water planning for habitat conservation	Planning and management in the catchment or landscape containing MBWS incorporates provision for adequate environmental conditions (e.g., volume, quality)	+1	1	MBWS and MFC have similar habitat conservation goals of maintaining the ecosystem	

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
	and timing of water flow, air pollution levels etc) to sustain relevant habitats.			services by protecting the watershed and landscape.	
21b: Land and water planning for connectivity	Management of corridors linking MBWS provides for wildlife passage to key habitats outside MBWS (e.g., to allow migratory fish to travel between freshwater spawning sites and the sea, or to allow animal migration).	+1	1	MBWS forms an integral part of the MFC	
21c: Land and water planning for ecosystem services & species conservation	Planning addresses ecosystem-specific needs and/or the needs of a particular species of concern at an ecosystem scale (e.g., volume, quality and timing of freshwater flow to sustain particular species, fire management to maintain savannah habitats etc.)	+1	1	Members of the MFC Coalition are also training and/or are trained in fire management to maintain the integrity of the savanna. Conservation targets of the MFC align with that of MBWS.	
22. State and commercial neighbours Is there co-operation with adjacent land and water users? <i>Process</i>	There is no contact between managers and neighbouring official or corporate land and water users	0		Very good communication with neighbours on fire management and use of farm equipment for fire management.	Reach out to the new owners of the adjacent properties and formalize a communication channel with them.
	There is contact between managers and neighbouring official or corporate land and water users but little or no cooperation	1			
	There is contact between managers and neighbouring official or corporate land and water users, but only some cooperation	2			
	There is regular contact between managers and neighbouring official or corporate land and water users, and substantial cooperation on management	3	3		
23. Local communities Do local community residents or	Local communities have no input into decisions relating to the management of MBWS	0	0	MBWS is private and has not currently been considering local community input.	Management plan will consider feedback and input from local communities, and will
	Local communities have some input into discussions relating to management but no direct role in management	1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
residents near MBWS have input to management decisions? <i>Process</i>	Local communities directly contribute to some relevant decisions relating to management, but their involvement could be improved	2		Note from WCS stakeholder findings: Mahogany Heights, Democracia, and Gracie Rock felt that they were very uninvolved in the decision making of their area in terms of conservation.	aid in designing a local community outreach programme.
	Local communities directly participate in all relevant decisions relating to management, e.g., co-management	3			
Additional points Local communities					
23 a. Impact on communities	There is open communication and trust between local people, stakeholders, and protected area managers	+1	1	There is trust and communication with neighbours and the surrounding community.	Formalize a communication channel.
23b. Impact on communities	Programmes to enhance community welfare, while conserving protected area resources, are being implemented	+1	0		Will be developed into the management plan
23c. Impact on communities	Local people/stakeholders actively support MBWS	+1	0.5	Local communities support MBWS and recognize the economic impact in terms of job creation. The community may not appreciate the environmental aspect of MBWS.	Conduct more environmental outreach within local communities.
24. Economic benefit Is MBWS providing economic benefits to local communities, e.g., income,	MBWS does not deliver any economic benefits to local communities	0		MBWS mostly employs staff from local communities. Locally made food are purchased within the communities, and contract mechanics and tour guides are also from the local communities.	Develop an evaluation of the socio-economic benefits.
	Potential economic benefits are recognised and plans to realise these are being developed	1			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
employment, payment for ecosystem services?	There is some flow of economic benefits to local communities	2		A large portion of MBWS' budget goes to payroll.	
<i>Outcomes</i>	There is a major flow of economic benefits to local communities from activities associated with MBWS	3	3		
25. Monitoring and evaluation	There is no monitoring and evaluation in MBWS	0		Bird monitoring and savannah monitoring for overgrown areas are taking place. There is evaluation for progress, but not for long term trends.	Management plan will address monitoring and evaluation, which will inform management.
Are management activities monitored against performance?	There is some <i>ad hoc</i> monitoring and evaluation, but no overall strategy and/or no regular collection of results	1	1		
	There is an agreed and implemented monitoring and evaluation system, but results do not feed back into management	2			
<i>Planning/Process</i>	A good monitoring and evaluation system exists, is well implemented, and used in adaptive management	3			
26. Visitor facilities	There are no visitor facilities and services despite an identified need	0		MBWS property and campus are operated by the NGO.	Create budget for the management activities and area.
Are visitor facilities adequate?	Visitor facilities and services are inappropriate for current levels of visitation	1		Hosting facilities are catered for the Belize Study Abroad programme.	
	Visitor facilities and services are adequate for current levels of visitation but could be improved	2	2	Other facilities within MBWS are catered for overnight or day visitors.	
<i>Outputs</i>	Visitor facilities and services are excellent for current levels of visitation	3			
27. Commercial tourism operators	There is little or no contact between managers and tourism operators using MBWS	0			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
Do commercial tour operators contribute to protected area management? <i>Process</i>	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	1		MBWS functions as the inhouse tour operators. No outside local tour operators are allowed to function within the MBWS.	Clarify the division between MBWS and the Study Abroad Campus.
	There is limited cooperation between managers and tourism operators to enhance visitor experiences and maintain protected area values	2			
	There is good cooperation between managers and tourism operators to enhance visitor experiences, and maintain protected area values	3	3		
28. Fees If fees (i.e., entry fees or fines) are applied, do they help protected area management? <i>Inputs/Process</i>	Although fees are theoretically applied, they are not collected	0		\$30,000 a year is deposited in a separate account for the management of MBWS.	Develop a cost restructuring programme for Belizeans and address the costs for local students and visitors.
	Fees are collected, but make no contribution to MBWS or its environs	1			
	Fees are collected, and make some contribution to MBWS and its environs	2			
	Fees are collected and make a substantial contribution to MBWS and its environs	3	3		
29. CONDITION OF VALUES What is the condition of the important values of MBWS as compared to when it was first designated? <i>Outcomes</i>	Many important biodiversity, ecological or cultural values are being severely degraded	0		There are pressures on the surrounding areas of MBWS, but overall, the MBWS is in good condition, especially compared with the surrounding areas.	Work with adjacent property owners to maintain the biodiversity and ecology of the landscape.
	Some biodiversity, ecological or cultural values are being severely degraded	1			
	Some biodiversity, ecological and cultural values are being partially degraded but the most important values have not been significantly impacted	2	2		
	Biodiversity, ecological and cultural values are predominantly intact	3			

Issue	Criteria	Score: Tick only one box per question		Comments/Explanation	Next steps
Additional Points: Condition of values					
29a: Condition of values	The assessment of the condition of values is based on research and/or monitoring	+1	0		
29b: Condition of values	Specific management programmes are being implemented to address threats to biodiversity, ecological and cultural values	+1	1	Bird monitoring and fire monitoring and management are in place.	
29c: Condition of values	Activities to maintain key biodiversity, ecological and cultural values are a routine part of MBWS management	+1	1	Constantly being monitored.	
TOTAL SCORE		87	58		
PERCENTAGE			66.67 %		