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Five Ladies of the Forest Waterfalls

Management Plan

Noj Ka'ax H'Men

Elijio Panti National Park

2009 – 2014



Wildtracks, 2008

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Noj Ka'ax H'Men Elijio Panti National Park

Management Plan

2009 - 2014

Prepared by

Itzamna Society

Forest Department
Ministry of Natural Resources

Wildtracks



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Contents

1. Introduction	4
1.1 Background and Context	4
1.2 Purpose and Scope of Plan	4
2. Current Status	6
2.1 Location	6
2.2 Regional Context	9
2.3 National Context	12
2.3.1 Legal and Policy Framework	12
2.3.2 Land Tenure	14
2.3.3 Evaluation of Protected Area	14
2.3.4 Socio-Economic Context	19
2.4 Physical Environment of Management Area	25
2.4.1 Climate	25
2.4.2 Geology and Soils	28
2.4.3 Hydrology	37
2.5 Biodiversity of Management Area	39
2.5.1 Ecosystems	39
2.5.2 Flora	45
2.5.3 Fauna	46
2.5.4 Past and Present Research	54
2.6 Cultural and Socio-Economic Values of Management Area	54
2.6.1 Community and Stakeholder Use	56
2.6.2 Cultural Heritage	
2.6.3 Tourism and Recreation Use	57
2.6.4 Other Economic Use	57
2.6.5 Education Use	57

**Elijio Panti National Park – Draft Management Plan
2009-2014**

3. Conservation Planning	59
3.1 Conservation Targets	59
3.1.1 Identification of Conservation Targets	59
3.1.2 Assessment of Conservation Target Viability	60
3.2 Threats to Biodiversity	66
3.2.1 Identified Threats	66
3.2.2 Prioritizing Threats	75
3.3 Strategies to reduce Threats	76
3.4 Monitoring of Success of Conservation Strategies	77
4. Management Planning	81
4.1 Management and Organizational Background	81
4.2 Review of Previous Management Effectiveness	82
4.3 Management Goals	88
4.4 Management Strategies	89
4.4.1 Regulations	89
4.4.2 Management Zones	90
4.4.3 Limits of Acceptable Change	93
4.4.4 Management Constraints and Limitations	93
4.5 Management Programmes and Objectives	94
A. Natural Resource Management Programme	95
B. Research and Monitoring Programme	106
C. Community Participation Programme	112
D. Public Use Programme	117
E. Infrastructure Management Programme	120
F. Administrative Programme	123
4.5.1 Management Policies	130
4.6 Monitoring and Review	130
4.7 Timeline	132
4.8 Financing	133
References	134
Annexes:	
	Annex One: Plant Species List
	Annex Two: Bird Species List
	Annex Three: Fish Species List
	Annex Four: Reptile and Amphibian Species List

Tables, Maps and Figures

Tables

Table 1	International Conventions and Agreements of Relevance to Eljio Panti National Park	11
Table 2	Provisional Species Numbers for the Eljio Panti National Park	14
Table 3	Species of International Concern of Eljio Panti National Park	15
Table 4	Ecosystem Services of Eljio Panti National Park	16
Table 5	Export, GDP and Labor statistics	19
Table 6	Stakeholder Communities of Eljio Panti National Park	20
Table 7	Stakeholder Analysis for Eljio Panti National Park	23
Table 8	Hurricanes affecting the Eljio Panti Areas Area	27
Table 9	Time Scale of Formation of Maya Mountain Massif Geology	29
Table 10	Land Region, Land System and Soil Characteristics for Eljio Panti National Park	33
Table 11	Ecosystems of Eljio Panti National Park	39
Table 12	Plant Species of International Concern of Eljio Panti National Park (IUCN: Red list 2008)	45
Table 13	Vertebrate species breakdown for Eljio Panti National Park to date	46
Table 14	Vertebrate Species of International Concern (IUCN: Red list 2008) of the Eljio Panti National Park	46
Table 15	Mammal Species of EPNP of International Concern	47
Table 16	Mammal Species of Eljio Panti National Park	48
Table 17	IUCN Bird Species of International Concern of Vaca Project Area	49
Table 18	Reptile and Amphibian Group Breakdown (Walker, 2006)	50
Table 19	Eljio Panti National Park: Herpetofauna recorded in the Vaca Falls area of the Macal River	51
Table 20	Fish Survey of the Macal River (Che Chem Ha to Rio On confluence; Walker Z., 2005)	52
Table 21	Species of the Eastern Branch Belize River / Macal System	53
Table 22	Potential Conservation Targets for Eljio Panti National Park	59
Table 23	Focal Conservation Targets for Eljio Panti National Park	59
Table 24	Conservation Targets	61
Table 25	Conservation Target Assessment	63
Table 26	Conservation Targets – Current Rating	65
Table 27	Conservation Targets – Prioritization	65
Table 28	Threats impacting Eljio Panti National Park	66
Table 29	Threats to biodiversity of the Eljio Panti National Park	67
Table 30	Prioritization of Identified Threats	75
Table 31	Strategy leverage	76
Table 32	Monitoring Success of Strategy Implementation	78
Table 33	Monitoring Success of Strategy Outputs	79

Tables (continued)

Table 34	Implementation Effectiveness of Activities highlighted under Draft Management Plan	82
Table 35	Indicator Categories for Assessment of Management Effectiveness	83
Table 36	Management Indicators Scoring One	86
Table 37	Management Indicators Scoring Two	86
Table 38	Annual Fire Readiness Activities	
Table 39	Maya Mountains Massif System-Level Research and Monitoring Requirements	107
Table 40	Management Tracking Matrix (Layout Example)	131
Table 41	Timeline (example), based on ‘Year’ column of management programmes	132

Maps

Map 1	Location of Noj Ka’ax H’Men Elijio Panti National Park	9
Map 2	Location of Noj Ka’ax H’Men Elijio Panti National Park in relation to nearby Protected Areas and Rivers	10
Map 3	Local Landscape of Noj Ka’ax H’Men Elijio Panti National Park	22
Map 4	Rainfall belts of Belize	25
Map 5	Maya Mountains Massif (General Elevation)	29
Map 6	Elijio Panti National Park: Elevation	30
Map 7	Elijio Panti National Park: Geology	31
Map 8	Elijio Panti National Park: Soils (after Wright)	32
Map 9	Elijio Panti National Park: Agricultural Value	36
Map 10	Watershed Regions of Belize	37
Map 11	Elijio Panti National Park: Hydrology	38
Map 12	Elijio Panti national Park: Broad Ecosystems (after Meerman, 2005)	43
Map 13	Elijio Panti National Park: Broad Ecosystems (after Meerman, 2005)	44
Map 14	Elijio Panti National Park: Offering Cave	55

Figures

Figure 1	Ethnic Groups of Belize	19
Figure 2	Rainfall	25
Figure 3	Temperature Fluctuations for inland Central Belize	26
Figure 4	<i>Dalechampia schippii</i>	45
Figure 5	Visitor’s Centre	57
Figure 6	Range of Indicator Category average scores for management effectiveness of Noj Ka’ax H’Men Elijio Panti National Park	93
Figure 7	Checklist for Effective Protected Area Management	95

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First Draft of Management Plan

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María García

**President
Itzamna Society**

Second Draft of Management Plan

We would like to add our thanks to the community participants of San Antonio, Cristo Rey and El Progreso – 7 Miles for their participation in the three workshops conducted as part of the management planning process, and their input into this second draft of the management plan.

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Paul and Zoe Walker

**Consultants
Wildtracks**

1. Introduction

Background and Context

Noj Ka'ax H'Men Elijio Panti National Park, named for the traditional healer, Don Elijio Panti, is one of fourteen protected areas that form an integral part of the Maya Mountains Massif, one of Belize's three national priority areas, highlighted for system-level management (NPASP, 2005). The Maya Mountains Massif covers an estimated 1,260,800 acres of near-pristine tropical forest which, together with the contiguous forests of the Chiquibul / Montañas Mayas of Guatemala, is considered a regional and global conservation priority. It is one of the few remaining non-fragmented forest nodes in Central America, providing a critical landscape function in the region. It is also important in its role in maintaining viable populations of many threatened species, in the maintenance of regional biodiversity, and protecting watershed functionality, critical for communities in both Belize and Guatemala.

The National Park, located at UTM 284 190 E; 1887 285 N covers 12,657.50 acres of tropical broadleaf and needleleaf forest and was declared as a protected area in December 2001 (SI 177 of 2001). It is particularly important within the Maya Mountains Massif System in its role as a community co-managed protected area, providing benefits for community stakeholders as a local tourism resource, and a mechanism for community participation in protected area management activities, in addition to its role in protection of the ecosystems and cultural values of the area. The co-management organization, Itzamna Society, is a registered NGO established in 2000 with the purpose of promoting biodiversity conservation, cultural patrimony and community development. It seeks to encourage participation in conservation activities from San Antonio, Cristo Rey and El Progreso-7 Miles (the three communities identified as stakeholders of the protected area).

Whilst being managed by Itzamna Society, as the co-manager, under co-management agreement between the NGO and Forest Department, signed in 2001, management activities are also to be guided in the future by the system-level management programmes of the Maya Mountains Massif System, which will co-ordinate system-level activities in the future. Whilst this larger-scale management framework is still being developed, the requirement to collaborate in these programmatic areas has been incorporated into the Management Programmes in this Management Plan.

Purpose and Scope of Plan

The management of Noj Ka'ax H'Men Elijio Panti National Park is guided by its categorization as a National Park (the Noj Kaax Meen Elijio Panti National Park¹, designated under the National Park Systems Act of 1981, Chapter 215, Laws of Belize, Revised Edition 2000), being set aside:

“for the protection and preservation of natural and scenic values of national significance for the benefit and enjoyment of the general public”

This management plan has been prepared to fit within the framework required by the National Protected Area Policy and System Plan (NPASP, 2005), and the system-level objectives and strategic actions outlined under the Maya Mountains Massif initiative (Walker and Walker, 2008). It includes general information on the physical and biological attributes of the National Park, documents the current uses and management problems, defines the goals and objectives of

¹ Various spellings of Noj Ka'ax H'Men Elijio Panti National Park exist – Itzamna Society confirms that 'Noj Ka'ax H'Men Elijio Panti National Park' is the correct version, and is used, along with the shortened "Elijio Panti National Park", throughout this document

Elijio Panti National Park – Draft Management Plan 2009-2014

management for the protected area, summarizes conservation planning, outlines specific management programmes and strategic management mechanisms, such as zoning, sets in place the means for measuring management effectiveness, and recommends an implementation schedule.

In line with NPAPSP recommendations, this Management Plan has been prepared with the input of the various stakeholders through community meetings with the three buffer communities, meetings with the Itzamna Society (which is recognized as the prospective co-manager by Forest Department for the area), and interviews with a variety of stakeholders, including farmers and the tourism sector, and seeks to protect the resources of the protected area whilst allowing economic benefit through sustainable tourism. The management programmes are based on the best available data and scientific knowledge, with the integration of conservation planning strategies, and fit within the scope of the current zoning scheme and regulations that govern the National Park.

The management plan, submitted to Forest Department, is designed to guide the management of the National Park through the next five years, providing a framework for both broad management activities as well as more specific research and monitoring activities. Detailed operational plans will be developed on an annual basis by the co-management agency, with the support of Forest Department, based on the framework provided by this management plan. In addition an annual review of implementation success will allow for adaptive management during the five year period.

2. Current Status

2.1 Location

The Noj Ka'ax H'men Elijio Panti National Park (EPNP) is located in the Cayo District, the most westerly of Belize's six districts, and lies approximately 7.5 miles (12 km) south of the Western Highway and San Ignacio, on the north-facing foothills of the Maya Mountains Massif, at UTM 284 190 E; 1887 285 N.

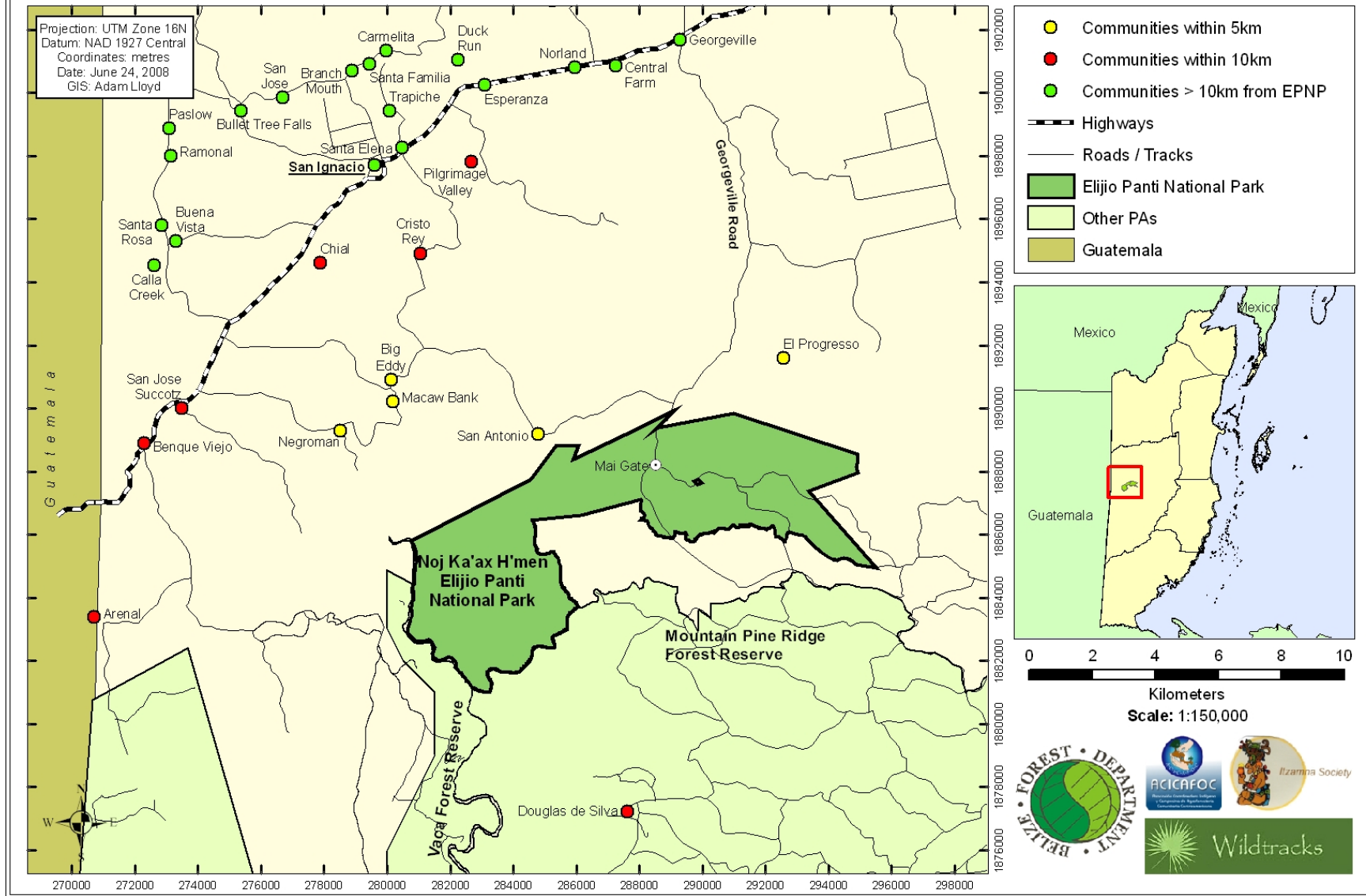
The National Park lies entirely within the Belize River watershed system, and is a 12,657.5-acre (5,122 ha) matrix of tropical broadleaf and needle-leaf forests, bounded on the south / south west by the Mountain Pine Ridge Forest Reserve and Pine Ridge Chito Enclave, the boundary being defined in part by the Rio On, Privassion Creek and Little Vaqueros Creek (Map 1, Map 2).

Three areas have been excised from the protected area since its establishment:

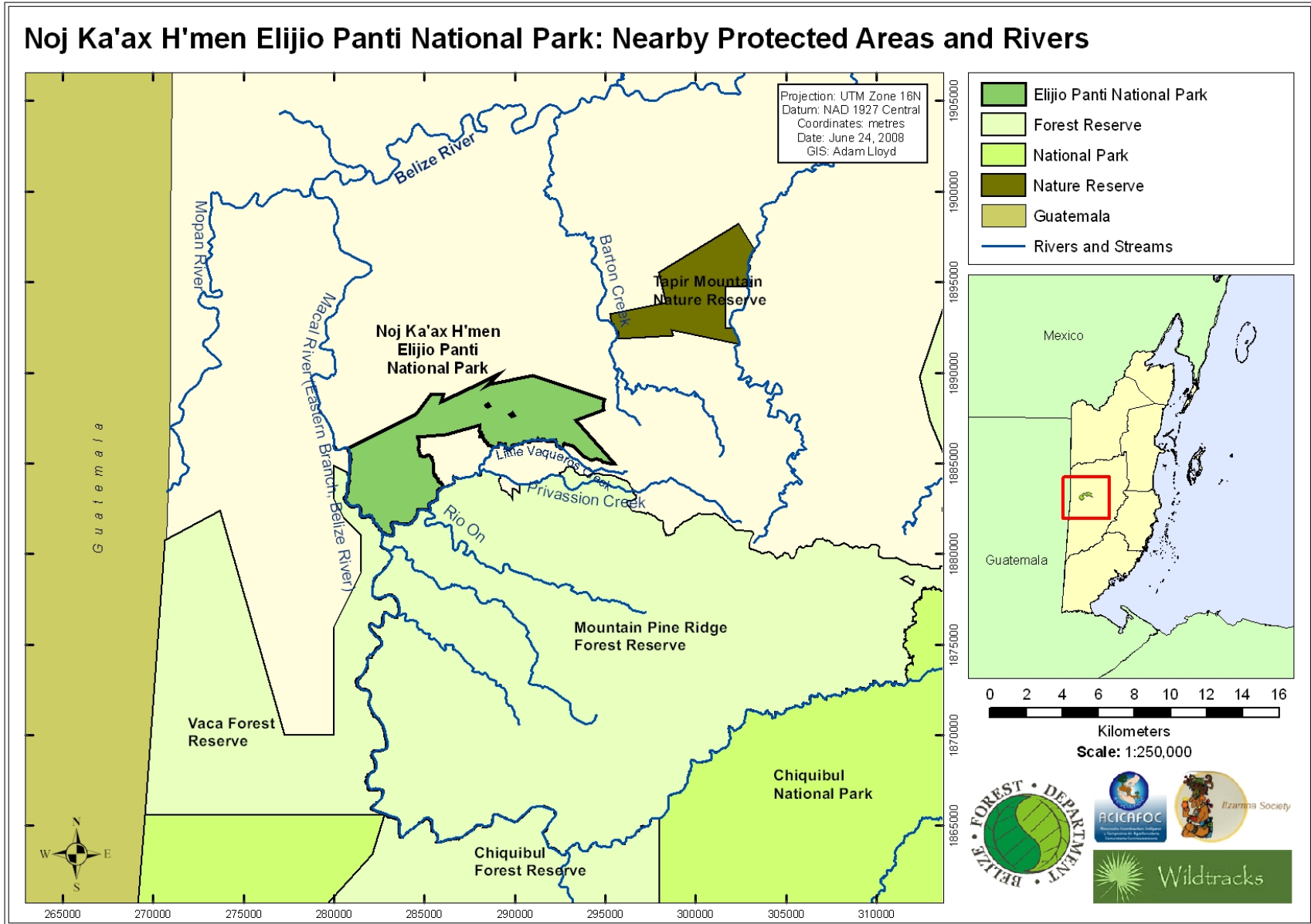
- Pine Ridge Chito Enclave for the San Antonio Peanuts and Grains Cooperative
- Privassion Enclave
- Pine Ridgito Gate Enclave for the barrier gate on the Chiquibul Road MPRFR entrance point

To the west, the National Park is bounded by the Macal River, with the Vaca Forest Reserve on the western bank of the river. The Vaca Dam (currently under construction – 2008) also lies within this boundary area, and will result in inundation of a portion of the National Park, where it runs along the Macal River boundary. These boundaries were established in consultation with members of the local communities (Itzamna Society, pers. com.).

Noj Ka'ax H'men Elijio Panti National Park: Location



Map 1: Location of Noj Ka'ax H'Men Elijio Panti National Park



Map 2: Location of Noj Ka'ax H'Men Elijio Panti National Park in relation to nearby Protected Areas and Rivers

Elijio Panti National Park – Draft Management Plan 2009-2014

The National Park provides an environmental, historical, and tourism resource for the San Antonio community, in particular. It contains intricate Mayan caves, ancient Mayan temples and magnificent waterfalls in addition to a large array of ecologically and economically important flora and fauna. Basic visitor facilities are already in place, with the construction of a Visitor's Centre, through the assistance of Trekforce Expeditions, and funding from the GEF Small Grants Programme. Camping facilities – camping platforms and shelters – have also been constructed at strategic points within the National Park.

The primary stakeholder community is San Antonio, with a population estimated at approximately 1,400 (Itzamna Society, 2008), focused primarily on commercial agricultural activities and employment in the tourism sector. Other communities also considered to impact the area include Cristo Rey (population: 691) and El Progreso-7 Miles (population: 550).

The village lands of the two closest communities (San Antonio and El Progreso-7 Miles) lie to the north and northeast of the protected area (Map 1). Access is by road, through San Antonio or Georgeville, which passes through a portion of Elijio Panti National Park before entering the Mountain Pine Ridge Forest Reserve. There is also four-wheel drive access from San Antonio, where a Visitor's Centre and camping site lie near the boundary. Mai Gate, the entry point for Mountain Pine Ridge Forest Reserve, lies within a Forest Reserve enclave within the National Park.

The co-management body, the Itzamna Society, is considered the prospective management organization, and is in the process developing a co-management agreement with the Forest Department (June, 2008).

2.2 Regional Context

Central America is highlighted as a world 'hotspot for species diversity' (Conservation International, 2003), and considered critical for the preservation of the biodiversity of the Western Hemisphere. Here, the Nearctic bioregions of North America converge with the Neotropical bioregions of South America, and, in Belize in particular, also with the Greater Antillean bioregion of the Caribbean. Each of these three bring a unique assemblage of plants and animals which has resulted in a particularly rich biodiversity, with components of all three regions being represented within the Central American land bridge – with 8% of the world's known plant species, and 10% of its vertebrates. The bridge has also enabled movement of species between the North and South American regions since the late Pliocene, and is still of vital importance today to migratory bird species, both as a corridor and as an over-wintering location. This importance will increase with the predicted shifts in ecosystem ranges due to climate change.

The entire Central American region has suffered from an alarming rate of deforestation, with as much as two thirds of the forest having been converted into agricultural land within the last 50 years, much of which has then been degraded by unsustainable agricultural practices and cattle-farming. Belize, with its relatively low population, and large areas of natural vegetation still intact, therefore plays an important role in the survival of many of the threatened species of Central America, and is an important waypoint for Nearctic and Neotropical migrants. Up until recently, much of Belize has escaped most of the more destructive land clearance practices, but significant land use change is now taking place, increasing pressure for land - such that Belize's current rate of deforestation is thought to be the highest in the region (Young, 2007).

Through the Central American Environmental Agenda - Plan Ambiental de la Region Centroamericana (PARCA), several regional agreements have been reached to help balance environmental concerns and development, starting with the creation of the **Central American Commission for Environment and Development (CCAD)** in 1989. The Government of Belize is a participant in this Commission, as well as in the **Convention for the Conservation of**

Biodiversity and Protection of Priority Wilderness Areas in Central America (formed in 1992), and the **Regional Alliance for Sustainable Development (ALIDES)** (1994).

Under these regional initiatives, and associated ecoregional planning exercises (Conservation International and The Nature Conservancy), two large blocks of tropical forest within Belize have been highlighted as regionally important – one of these being the Maya Mountains Massif. Elijio Panti National Park and is one of the fourteen protected areas that comprise the Maya Mountains Massif, and lies in the northern foothills of the Maya Mountains Massif. As one of the largest remaining contiguous blocks of forest in Central America, it is recognized for its role in maintenance of the matrix of the tropical broadleaf forests that are characteristic of northern Mesoamerica, but are currently greatly diminished in comparison with the historic range.

Until recently, the Maya Mountains Massif was considered to be maintaining the full range of natural processes and disturbance regimes, and to be functioning within the range of acceptability, with minimal human intervention. Recent pressures, however, particularly from Guatemalan incursions, are having significant impacts on the biodiversity, and require immediate intervention if the long term degradation of the natural and cultural resources is to be avoided, and the critical ecosystem functions of the Maya Mountains Massif are to be maintained.

Elijio Panti National Park, as an integral component of the Maya Mountains Massif, assists Belize in the fulfillment of the country's regional and global commitments under a number of agreements and conventions (Table 1).

Table 1: International Conventions and Agreements of Relevance to Elijio Panti National Park	
Convention on Biological Diversity (Rio de Janeiro, 1992) Ratified in 1993	To conserve biological diversity to promote the sustainable use of its components, and encourage equitable sharing of benefits arising from the utilization of natural resources. <i>Elijio Panti National Park plays an integral part in the National Protected Areas System, protecting biodiversity and threatened species, as per Belize's commitment under the CBD.</i>
Alliance for the Sustainable Development of Central America (ALIDES) (1994)	Regional alliance supporting sustainable development initiatives. <i>Itzamna Society's initiatives within the three stakeholder communities of the area – San Antonio, Cristo Rey and El Progreso – 7 Miles - are targeted at facilitation of sustainable economic and environmental development</i>
Central American Commission for Environment and Development (CCAD) (1989)	Regional organisation of Heads of State formed under ALIDES, responsible for the environment of Central America. Initiated Mesoamerican Biological Corridors and Mesoamerican Caribbean Coral Reef Programmes. <i>Elijio Panti National Park is an integral part of the Maya Mountains Massif, which plays a critical role in the Mesoamerican Biological Corridors Programme promoted by CCAD.</i>
Convention on the Conservation of Biodiversity and the Protection of Priority Wilderness Areas in Central America (Managua, 1992)	To conserve biological diversity and the biological resources of the Central American region by means of sustainable development. <i>Itzamna Society's initiatives within the three stakeholder communities of the area – San Antonio, Cristo Rey and El Progreso – 7 Miles - are targeted at facilitation of sustainable economic and environmental development</i>
United Nations Framework Convention on Climate Change (New York, 1992)	<i>Belize is identified by the 1994 National Inventory as a net remover of CO₂, the high percentage of vegetation cover, including EPNP, estimated to be absorbing 6 billion tons of CO₂ a year against a total emission estimated at 3 million tons. Elijio Panti National Park retains the majority of its natural vegetation, contributing towards the vegetation cover of Belize</i>
Convention on the Protection of Archaeological, Historical and Artistic Heritage of American Nations (Santiago, 1976)	To protect the archaeological heritage of signatory countries. <i>Elijio Panti National Park encompasses several Maya archaeological sites – both plazas and ceremonial cave sites.</i>
Other Relevant International Agreements	
UNESCO Man and the Biosphere Programme (1990) Mundo Maya Agreement Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington, 1973) International Plant Protection Convention (Rome, 1951)	

2.3 National Context

2.3.1 Legal and Policy Framework

Elijio Panti National Park was established through statutory instrument (SI 177 of 2001) under the National Parks System Act (1981) to protect the biodiversity, and more specifically, the medicinal plant resources of the area. Its position as a buffer on the northern edge of the Mountain Pine Ridge Forest Reserve was also taken into account.

The San Antonio community, the primary stakeholder, has strong roots as a farming community, and originally sought the land as an extension to the village farmlands. It was recognized, however, that it was also important to retain part of the area in its natural state as a village resource, to ensure continued availability of forest products, particularly medicinal plants, and continued ecosystem services into the future. A portion of the land was therefore retained and declared as a National Park, with the remainder being developed by farmers of the stakeholder communities as the Pine Ridgito Enclave, for cacao and xate production.

Establishment of the protected area came following lobbying by the three communities that occupy the northern foothills of the Mountain Pine Ridge Forestry Reserve - San Antonio, Cristo Rey, and El Progreso-7-Miles. Following concern at the rapid changes, subdivision and distribution of land taking place in the adjacent landscape, and lack of community consultation in these processes, members of San Antonio came together in December 1998, and identified the need for rationally defined utilization. Following lobbying with GOB to reacquire the subdivided land, a portion was placed under agriculture, particularly for farmland for first-time landowners and young farmers from the community, and the remainder was designated for biodiversity and natural resource protection as the National Park. Itzamna Society successfully negotiated with the Government and the Farmers Cooperative to have land in the Pine Ridgito Enclave acquired for farming purposes, with each new landowner acquiring ten acres, on which cacao and xate would be cultivated organically.

In June 2001, GOB and the Itzamna Society signed a co-management agreement and in December 2001 Noj Ka'ax H'Men Elijio Panti National Park was officially inaugurated.

The National Park is one of five distinct categories of protected area under the National Parks System Act of 1981, each of which is protected by restrictions strictly defined by law. The National Park designation is for the protection and preservation of natural and scenic values of national significance for the benefit and enjoyment of the general public, and allows for research, tourism and education but no extractive activities.

The national objectives for conservation revolve around the protection, conservation and rational use of Belize's natural resources within the context of sustainable human development. These goals are supported by the **National Strategy on Biodiversity**, through the National Biodiversity Strategy and Action Plan (Jacobs and Castaneda, 1998), and more recently, the **National Protected Areas Policy and System Plan** (NPAPSP, 2005), these two planning frameworks fulfilling two of Belize's commitments following the signing of the Convention on Biological Diversity in 1992 (later ratified by Belize in 1995). The overall goal of these two initiatives reflects the national objectives - ecological and economic sustainability over the long term, and recognizes the need to build both human and institutional capacity to effectively manage the biodiversity resources within Belize. There are also moves towards decentralization of the management of these resources, with a strong focus on co-management partnerships such as that being sought by Itzamna Society, and on community-based participation and equitable benefit from conservation efforts, a major objective of the community co-management partner.

National Legislation Protecting Fauna, Flora, and National Heritage

The Forest Act (1990)

Promotes the forestry industry, with the implementation of conservation techniques

The Wildlife Protection Act (1981)

“to provide for the conservation, restoration and development of wildlife, for the regulation of its use and for all other matters connected therewith”

Environmental Protection Act (1992)

“to promote the preservation and improvement of the environment, the rational use of natural resources, the control of pollution, and matters connected therein”

The National Parks Systems Act (1981)

Empowers government to create or maintain a “national system” of protected areas.

The Fisheries Act (1980)

Provides regulation of the fishing industry, and is directly concerned with maintaining sustainable fish stocks and protecting the marine and freshwater environments.

The Ancient Monuments and Antiquities Act (1971)

Enables the Minister responsible for Archaeology to designate land as an Archaeological Reserve to protect Ancient Monuments

National Lands Act (1992)

Provides legislation for protecting the 66’ reserve along river edges, and allows GoB permission to access minerals etc.

Elijio Panti National Park falls under the Forest Department of the Ministry of Natural Resources and the Environment, and management is guided by the National Protected Areas Policy and System Plan (though limited resources currently prevent effective management). It also falls within the Maya Mountains Massif, the first of three areas highlighted for system-level management, and as such, the management plan also incorporates system-level planning activities developed during the Conservation Action Plan process (Walker and Walker, 2008). The Government of Belize, the Forest Department, and the Itzamna Society entered into a co-management agreement on June 16th, 2001. This agreement is currently being considered for renewal.

Also contributing to the conservation framework of Belize are a number of laws designed to protect wildlife and national heritage within Belize. Administered under the Forest Department are the Forest Act (1990), Wildlife Protection Act (1981), and the National Parks System Act (1981). These three focus on the protection of the environment and natural resources.

The Environmental Protection Act (1992) was developed under the Department of the Environment, a department of the Ministry of Natural Resources and the Environment, with the aim of ensuring that development initiatives within Belize are planned for minimum environmental impact.

Under the Ministry of Natural Resources, the Wildlife Protection Act provides protection for terrestrial wildlife, with the regulation of hunting and commercial extraction. Archaeological sites, and artifacts (such as those found in caves within the National Park), also fall under the protection of the Ancient Monuments and Antiquities Act of 1971.

Whilst the above are the legislative Acts most relevant to Elijio Panti National Park, there are others - such as the Mines and Minerals Act (1989) and the Petroleum Act (1991), which regulate the exploration and extraction of all non-renewable resources, governing natural resources other than wildlife. These Acts regulate activities including mining of slate, which has been highlighted as a potential resource extraction activity within the National Park.

The National Park designation allows for education, tourism and research activities, though medicinal plant harvesting has been highlighted as a traditional use, and whilst illegal under this designation, is thought to be continuing at very low levels within the National Park. It is hoped that, with the promotion of cultivation of these resources within the local communities, that

traditional medicinal plants will still be available for traditional healers of the community, without impacting the National Park.

The Government has developed a funding mechanism to assist in management and development activities within protected areas – the Protected Areas Conservation Trust (PACT), through a ‘conservation tax’ of Bz\$7.50 levied on non-residents as they leave the country. Protected Area co-managers can apply for funding from this trust, towards management of the protected areas.

2.3.2 Land Tenure

Elijio Panti National Park is national land, designated as a protected area under the mandate of the Forest Department. Any activity within the protected area needs to be approved by both the Forest Department, as the manager, and Itzamna Society, as the co-management organization. Any mining, including slate mining, also requires a license from the Geology & Petroleum Department.

The San Antonio community, the primary stakeholder, has strong roots as a farming community, and originally sought the land as an extension to the village farmlands. It was recognized, however, that it was also important to retain part of the area in its natural state, as a village resource to ensure continued availability of forest products, particularly medicinal plants, and continued ecosystem services into the future. Therefore a portion of the land was retained and declared as a National Park, with the remainder being developed by farmers of the stakeholder communities as the Pine Ridgito Enclave.

Land adjacent to the National Park is primarily in community or private ownership, except to the west and south west borders, which touch on other protected areas – Vaca and Mountain Pine Ridge Forest Reserves. There is one area of disputed ownership within the National Park, which is currently being addressed.

2.3.3 Evaluation of Protected Area

Conservation Value

From a conservation standpoint, the Elijio Panti National Park’s primary importance within Belize’s protected areas system lies in its position as part of the Maya Mountains Massif, and in its perception as a community co-managed protected area, with the associated benefits of community participation in management and increased awareness and support of conservation initiatives.

Table 2: Provisional Species Numbers for the Elijio Panti National Park	
<i>Plants</i>	160 Species
<i>Mammals</i>	28 Species
<i>Birds</i>	237 Species
<i>Reptiles and Amphibians</i>	28 Species
<i>Fish</i>	7 Species

Preliminary surveys suggest that Elijio Panti National Park is relatively species rich (Table 2). Initial plant surveys identified over 160 plant species, 28 species of mammal, 28 reptiles and amphibians and 7 species of fish (Walker and Walker, 2005; Walker P., 2008). A survey of the bird populations produced a species list of 237 species (L. Gentle, 2006; Birds without Borders, 2007). Undoubtedly more species will be

added to these lists as further work is conducted in the National Park.

**Elijio Panti National Park – Draft Management Plan
2009-2014**

The National Park, whilst too small to support minimum dynamic areas of the ecosystems within its boundaries, does contribute towards the maintenance of viable populations of at least 7 species of international concern (rated as Critically Endangered, Endangered or Vulnerable (IUCN, 2008)). A further 3 species have ranges considered to include the protected area, but their presence is still to be confirmed, including the Critically Endangered Morelet's Treefrog (*Agalychnis moreletii*), a species found primarily in mid to upper elevations. Seven species rated as Lower Risk/Near Threatened, including the jaguar and a number of game species, are also recorded within the area (Table 3).

Table 3: Species of International Concern of Elijio Panti National Park		
IUCN Category	Species	
Critically Endangered	<i>Agalychnis moreletii</i> ¹	Morelet's Treefrog
Endangered	<i>Alouatta pigra</i>	Yucatan Black Howler Monkey
	<i>Eleutherodactylus sandersoni</i> ¹	Sanderson's Rainfrog
	<i>Tapirus bairdii</i>	Baird's Tapir
	<i>Vitex gaumeri</i>	Yaxnik, Fiddlewood
Vulnerable	<i>Cedrela odorata</i>	Cedar
	<i>Eleutherodactylus leprus</i> ¹	Leprus Chirping Frog
	<i>Guassia maya</i>	Guassia Palm
	<i>Schippia concolor</i>	Schippia Palm
	<i>Swietenia macrophylla</i>	Big-leaf Mahogany
Lower Risk / Near Threatened	<i>Contopus cooperi</i>	Olive-sided Flycatcher
	<i>Craugastor chac</i>	Chac's Rainfrog
	<i>Crax rubra</i>	Great Curassow
	<i>Panthera onca</i>	Jaguar
	<i>Puma concolor</i>	Puma
	<i>Rana juliani</i>	Maya Mountain frog
	<i>Zamia polymorpha</i>	Cycad
¹ To be confirmed		

The rapid assessment of the Elijio Panti National Park, consultations with community members, and previous bird surveys conducted within the Park confirmed a representative mammal and bird population, though depressed by hunting pressure. White-lipped peccary, considered an important indicator of hunting pressure, is reported as present within the protected area (though it should be noted that Elijio Panti National Park, on its own, is not large enough to support a single herd of this wide-ranging species, and that connectivity with the Maya Mountains Massif is essential to the continued presence of several of the larger species within the National Park).

Environmental Services of the Protected Areas

As well as the specific values of the protected area for protection of biodiversity, the forest and aquatic ecosystems present in Elijio Panti National Park also provide a number of ecosystem services (Table 4).

Table 4: Ecosystem Services of Elijio Panti National Park	
Provisioning	<p>Food Sources: Plant and animal species harvested for food – game species (paca, collared and white-lipped peccary, white-tailed deer etc.), fish (mountain mullet, cichlids etc.), palms (heart of palm) and other plants and animals</p>
	<p>Biochemicals, natural medicines and pharmaceuticals: There is a current demand for natural medicinal plants such as balsam in the San Antonio area with harvesting from the local forests (including Elijio Panti National Park), some at sustainable levels, and others considered unsustainable. There is also a growing global demand for biochemicals and new pharmaceuticals, much of it still based on natural sources and products. There is also growing use of many other products from natural resources (for example, for cosmetics, personal care, bioremediation, biomonitoring, ecological restoration). However, local species declines through overharvesting are diminishing the availability of these resources for future exploration and use.</p>
	<p>Firewood: Local use for cooking</p>
	<p>Construction materials: Tropical woods, palm leaves for thatch (bayleaf and cohune), used in both local construction (for the poorer components of the San Antonio population) and in demand for tourism facility construction for the large resorts of the Mountain Pine Ridge.</p>
	<p>Fresh Water: Clean freshwater from the Maya Mountains Massif is vital to the stakeholder communities – for drinking and for irrigation. Watershed management and vegetation changes have been shown to have had an impact globally on seasonal river flows and water quality, and local changes in water flow have also been noticed (the drying of the water source in San Antonio being a case in point). San Antonio and El Progreso – 7 Miles both rely on fresh water from the Mountain Pine Ridge Forest Reserve, extracted from the headwaters of Barton Creek. Fresh water flowing in rivers also provides a service in the form of energy that is exploited through hydropower (e.g. the three-dam Macal hydroelectricity scheme).</p>
	<p>Genetic resources: Use of genetic resources is growing in connection with new industries based on biotechnology – these genetic resources are generally discovered in naturally vegetated areas such as Elijio Panti National Park. Genetic resources have been lost through the loss of traditional cultivars of crop species (due in part to the adoption of modern farming practices and varieties) and through species extinctions. Traditional crop breeding has relied on a relatively narrow range of germplasm for the major crop species. New genetic material from tropical forested areas may prove important in future development of more resistant crops.</p>

Table 4: Ecosystem Services of Elijio Panti National Park (continued)	
Regulating	<p>Climate regulation: Changes in land cover have affected regional and local climates, generally negatively. For example, tropical deforestation has tended to reduce local rainfall. Protected areas such as Elijio Panti National Park, retain their natural vegetation cover, and assist in mitigation of some of the climate change effects.</p>
	<p>Water purification and waste treatment: Natural ecosystems are important filters of waste – particularly nitrogen waste. Nitrate concentration in water has grown rapidly in Belize in the last 30 years from poor agricultural practices, increasing human footprint and associated waste contamination. The importance of ecosystem protection in the upper watersheds, such as Elijio Panti National Park, with minimal water contamination, provides clean water to communities and agricultural areas downstream.</p>
	<p>Pollination: Pollination is a critical ecosystem function for the reproduction of most plants, including crops. There is established but incomplete evidence of a global decline in the abundance of pollinators which, whilst rarely resulting in complete failure to produce seed or fruit, more frequently results in lower seed and fruit production. Viability of pollinators is essential to the long term existence of plant species (and therefore biodiversity in general) of Elijio Panti National Park.</p>
	<p>Air quality: Belize with its low industrialization is thought to have relatively clean air. The atmosphere has been considered able to absorb pollution levels in the past, and ecosystems such as the tropical forests of Elijio Panti National Park act as a sink for tropospheric ozone, ammonia, NO_x, SO₂, particulates, and CH₄.</p>
	<p>Erosion Regulation: Retention of forest cover on the steep slopes prevents excessive soil erosion and sedimentation of rivers and creeks within the National Park. This assists in prevention of impacts downstream, sedimentation of the Vaca Dam (currently under construction), and impacts on the coral reef and sea grass beds that lie offshore of the river outflow.</p>
	<p>Ecosystem Regulation of Natural Hazards: The forest cover of Elijio Panti provides protection against natural hazards, anchoring soils against landslides in tropical storm rains, and providing a buffering flood control function. People are increasingly occupying regions and localities that are exposed to extreme events, thereby exacerbating human vulnerability to natural hazards. This trend, along with the decline in the capacity of ecosystems to buffer from extreme events, has led to continuing high loss of life globally and rapidly rising economic losses from natural disasters.</p>
	<p>Water Regulation: The forest cover in the Macal watershed, part of which lies within the EPNP, regulates the timing and magnitude of runoff, flooding, and aquifer recharge. Natural runoff patterns are being altered through the construction of the three dams within the larger watershed, but the effectiveness of these dams is reliant to a large extent on the intact forest cover of the watershed.</p>

Table 4: Ecosystem Services of Elijio Panti National Park (continued)	
Supporting	<p>Soil formation: The presence of the natural vegetation within Elijio Panti National Park provides the organic material essential for the formation of soils, some of which are washed downstream to form the nutrient rich alluvial soils deposited in the river valleys downstream, where the farmlands of San Antonio, Cristo Rey and El Progreso – 7 Miles are located. Whilst this is a long-term supporting service, measured in hundreds of years, it is a vital role that continues into the future.</p>
	<p>Primary Production and Nutrient Cycling: Primary production and nutrient cycling are ongoing natural processes that are essential to the health of all ecosystems, and ensure the future existence of the forest and forest products present in Elijio Panti National Park – whether peccary, construction materials or medicinal plants</p>
Cultural	<p>Recreation and Tourism: The scenic beauty of the forests, waterfalls and caves of Elijio Panti National Park are important as recreational and tourism resources. The demand for recreational use of landscapes is increasing, and areas are increasingly being managed to cater for this use, to reflect changing cultural values and perceptions. However, many naturally occurring features of the landscape (e.g., cave systems) can be easily degraded as resources for recreation without careful management.</p>
	<p>Spiritual and RELigious Values: The cave systems in the karstic areas of Elijio Panti National Park are important for their spiritual value, forming a bridge to link the current population of the area with their Maya heritage</p>
	<p>Education: Elijio Panti National Park is critical in its role as an educational resource if the future generations are going to have an appreciation of the ecosystems and ecosystem services provided by biodiversity and natural areas.</p>

(Adapted from Millennium Ecosystem Assessment, 2005)

2.3.4 Socio-Economic Context

National: Belize is located in northern Central America, bordered by Mexico to the north, Guatemala to the west and south, and the Caribbean Sea to the east. The country covers a land area of 22,963 km² (8,867 square miles), with a current population estimated at approximately 301,270 (CIA, 2008). Population densities are low, with an average of 13 persons per sq. km., concentrated primarily within the coastal plain, Belize River Valley and Stann Creek Valley, with much of the remaining country being less suited to human habitation, with waterlogged soils on the coastal plains and steep terrain and nutrient-poor in the Maya Mountains.

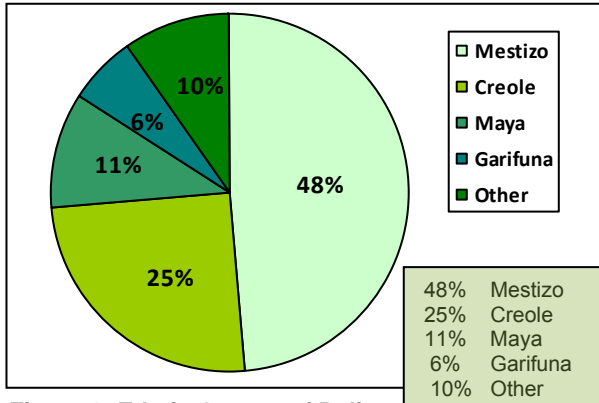


Figure 1: Ethnic Groups of Belize

Belize, which gained its independence from Britain in 1981, is a country of many ethnic cultures, with Mestizo, Creole, Maya and Garifuna being the major population groups (Figure 1). The original Maya occupants are broadly subdivided into three ethnic groups, in three geographic regions – the Yucatec (or Masewal) Maya of the north, the Mopan Maya of the west and south, and the Ketchi of the southern regions.

There is an ongoing emigration of Belizeans to the United States and also a significant influx of Central American economic refugees, primarily from Guatemala, Honduras and El Salvador, contributing approximately 13% towards the total population of Belize and resulting in the relatively high population growth rate of 2.3%. At the present rate of immigration, it has been calculated that the population of Belize will double in twenty-six years, with much of this immigrant sector tending to be rural-based with low levels of education, placing far greater stress on the natural resources than currently exists.

Belize's current primary export is crude petroleum, from the new oil reserves being tapped (Table 5). This new source of income now exceeds the traditional exports of Belize, which have been based largely on agriculture (primarily sugar, citrus, bananas and shrimp) and tourism.

In Cayo District, the location of Elijio Panti National Park, tourism is one of the primary activities – as a nation, over 25% of all jobs are tourism-driven or tourism-related. This sector is rapidly becoming the major foreign exchange earner, with over 255,760 overnight visitors in 2007 (BTB, 2007), and with the industry being directly responsible for over 18% of the GDP, accounting for a revenue Bz\$590 million in 2007.

Major Exports		
	2006 Bz\$ million	2007 Bz\$ million
Marine Products	86.02	42.16
Sugar	100.07	88.14
Citrus Concentrate	108.99	117.44
Bananas	50.59	41.46
Garments	36.59	18.79
Papayas	31.01	26.07
Crude Petroleum	88.56	142.62
Other	34.58	31.20
Total	536.41	507.88

CSO (2008)

The Belize GDP and Labor Force		
	GDP Composition by Sector (%) (2007 est.)	Labor Force (Occupation) (%) (2005 est.)
Agriculture	21.3%	22.5%
Industry	13.7%	15.2%
Services	65%	62.3%

CIA (2007)

Table 5: Export, GDP and Labour statistics

There is an increasing national reliance on this developing tourism industry and associated services (Table 5), one of the fastest growing sectors in Belize. The majority of visitors to San Antonio are passing through on their way to Mountain Pine Ridge and Caracol as part of a day trip, primarily out of San Ignacio.

Stakeholder Communities

San Antonio has been highlighted as the primary stakeholder community for Elijio Panti National Park, with Cristo Rey and El Progreso-7 Miles also being identified by Itzamna Society as secondary stakeholders. All three are refugee communities – San Antonio and Cristo Rey were established in the last decades of the 19th century, as a result of the 1847 Caste War in Yucatan, when some 5,000 people of the “Masewal” or Yucatec Maya left the Yucatan and fled southwards towards Belize. Settling throughout northern Belize, some of these refugees formed temporary settlements in the Mountain Pine Ridge, one being at the confluence of Privassion and Little Vaquero Creeks (abandoned in 1898), others at Duffy Bank, and Barton Creek.

Table 6: Stakeholder Communities of Elijio Panti National Park				
Community	Location (UTM) Distance to EPNP (km)	Population (approx.)*	Population components	Comments
San Antonio	< 1km	1,400	Yucatec Maya	Agricultural community with some hunting within the protected area
Cristo Rey	8 km	690	Yucatec Maya	Primary employment is in the tourism sector and construction industries associated with San Ignacio and Placencia. Some farming, recreational hunting
El-Progreso-7 Miles	2 km	550	Central American Refugee	Agricultural community, with some employment in the tourism industry in Placencia
*Figures provided by Itzamna Society (San Antonio) and Village Chairmen, 2008				

San Antonio

San Antonio is located approximately 6 miles south of San Ignacio Town and borders the Noj Ka'ax H'Men Elijio Panti National Park. Following its establishment in 1878, San Antonio grew rapidly until, by 1900, it was the main center of the Masewal people, with a population of 112 recorded in the 1891 population census for Belize. It was governed under the traditional Alcalde system until 1959, when the system of an elected village council was introduced.

The present day population of San Antonio is approximately 1,400 inhabitants who speak mostly Maya Mopan, Spanish, and English. The economy of San Antonio is based on traditional agriculture, with an estimated 90% of households involved in agriculture (Community participants, Workshop 1, March 2008), and is one of the largest producers of vegetables in the country. Some farmers are working with alternative agricultural methods (including organic production) in demonstration plots. Itzamna Society is presently organizing/coordinating training for farmers to improve



agricultural practices, promote organic farming, and introduce more non-traditional and traditional crops.

San Antonio has 24-hour electricity and a potable water system sourced from the headwaters of Barton Creek, and jointly managed by San Antonio and El Progreso-7 Miles. Pipes for this system pass through the National Park, with the pipe line maintained for ease of access for maintenance.

Cristo Rey

Cristo Rey, established in 1915, is situated approximately three miles south of San Ignacio Town and three miles north of San Antonio, and has a population estimated as 690 inhabitants (Village Chairman, pers. coms. 2008).

The primary sources of employment lie in the tourism sector and construction work, with many people commuting daily to San Ignacio. Farming activities focus mainly on corn, sweet potatoes, red kidney beans, and peanuts. Whilst interested in the National Park, community meetings suggest that, other than an occasional hunting incursion, there is little interface between Cristo Rey and the National Park. There is some interest, however, in utilizing the area in the future as a tourism resource.

El Progreso - 7 Miles

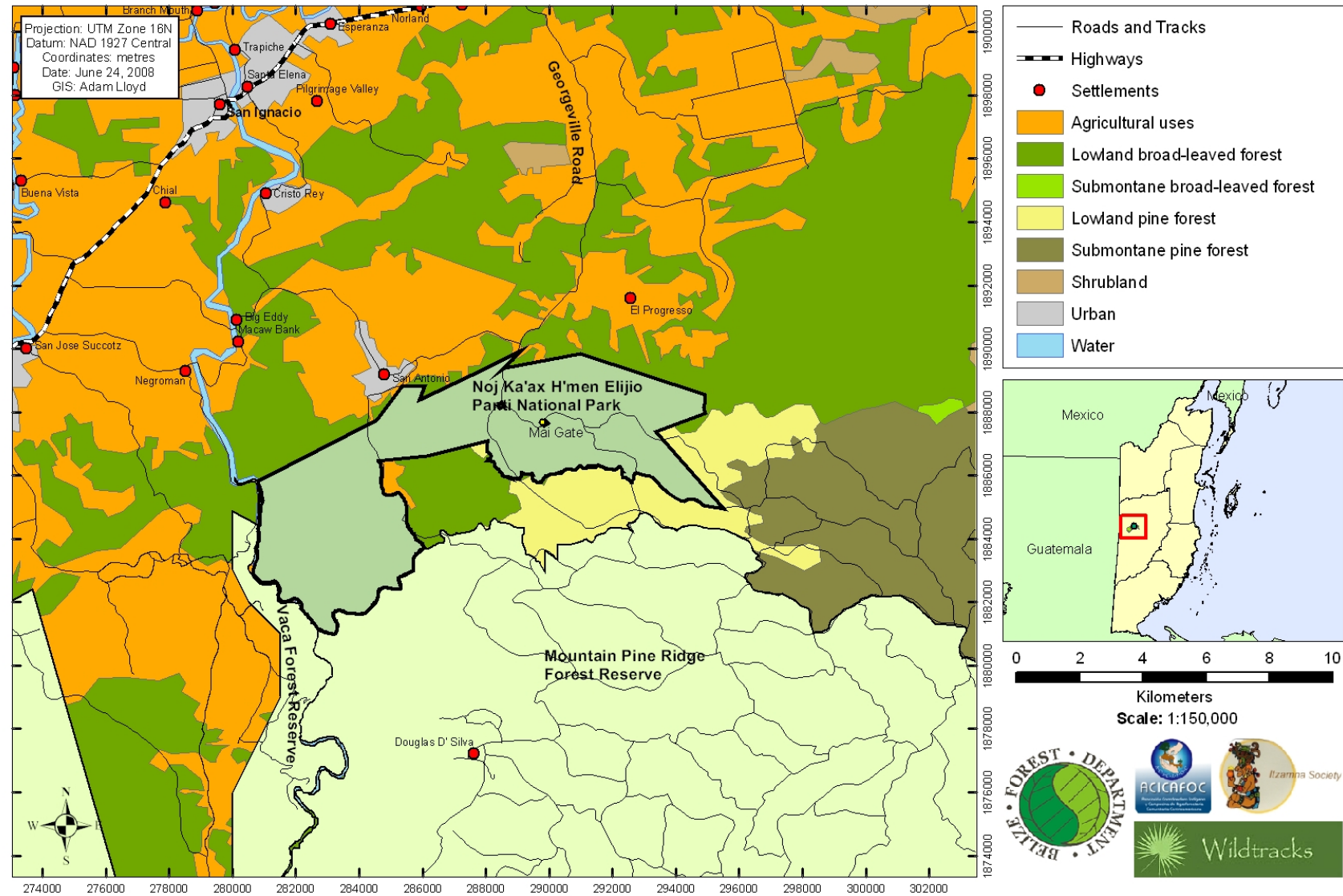
El Progreso, also known as 7 Miles, is located seven miles south on the Georgeville Road, approximately 14 miles south east of San Ignacio Town, and currently has a population estimated at 550 (Village Chairman, pers. coms. 2008).

The community was established in the 1980's, when Salvadorian and Guatemalan political refugees fleeing wars in their countries began settling in the area. Whilst five Salvadorian families initially settled in the area, this number had expanded by 1989 to approximately 50 families. Whilst formerly privately owned (belonging to Mr. David Courtney), a portion was initially rented to some of the refugees, while others simply squatted. The rapid growth of the community and the need for land led the Government of Belize to then negotiate for the acquisition of the land.

El Progreso – 7 Miles is one of the largest agricultural communities of the San Antonio area of the Cayo District, producing mainly vegetables, potatoes, and red kidney beans. Mains electricity does not yet reach the village, but the community has established a gravity-fed water system that provides 24- hour potable water to the entire. The water is sourced from the Mountain Pine Ridge, with the pipes passing through the Noj Ka'ax H'Men Elijio Panti National Park.

Noj Ka'ax H'men Elijio Panti National Park: Local Landscape

Ecosystem data derived from National Ecosystem Map 2004c edition (Meerman et al.)



Map 3: Local Landscape of Noj Ka'ax H'Men Elijio Panti National Park

Table 7: Stakeholder Analysis for Elijio Panti National Park				
Stakeholder	Influence or Impact of Elijio Panti National Park on Stakeholder		Influence or Impact of Stakeholder on Elijio Panti National Park	
San Antonio	<ul style="list-style-type: none"> • Protection of biodiversity • Provides potential source for medicinal plant resources • Provides a potential resource for tourism as an alternative livelihood option • Protection of natural resources for the enjoyment and education of future generations • Assists in protection of watershed vegetation cover for Macal River • Increased tourism potential and marketing ability • Potential exclusion from traditional hunting and natural resource harvesting areas 	+ + + + + + -	<ul style="list-style-type: none"> • Community interest in co-management of Elijio Panti National Park, through the Itzamna Society • Low level of cooperation and interest from other sectors of the community • Hunting and other extraction impacts within protected areas 	+ - -
Cristo Rey	<ul style="list-style-type: none"> • Protection of natural resources for the enjoyment and education of future generations • Assists in protection of watershed vegetation cover for Macal River 	+ +	<ul style="list-style-type: none"> • Supportive of conservation goals of Elijio Panti National Park • Low-level hunting impacts within protected areas 	+ -
El Progreso-7 Miles	<ul style="list-style-type: none"> • Protection of natural resources for the enjoyment and education of future generations • Potential exclusion from traditional hunting and natural resource harvesting areas 	+ -	<ul style="list-style-type: none"> • Low-level hunting impacts within protected areas 	-
Tour Guides	<ul style="list-style-type: none"> • Benefit from having Elijio Panti National Park as a venue for natural and cultural resource associated tourism 	+	<ul style="list-style-type: none"> • Support the conservation goals of Elijio Panti National Park • Provide interpretation for visitors, facilitating overall visitor appreciation • Presence deters hunting and other illegal activities • If well trained, assist with visitor management within the protected area • If poorly trained, can result in poor visitor management and increased impact on biodiversity 	+ + + + -
BTIA / BTB	<ul style="list-style-type: none"> • Benefits from having Elijio Panti National Park as a tourism venue, attracting visitors to Belize 	+	<ul style="list-style-type: none"> • Potential to provide national and international marketing of Elijio Panti National Park • Support the conservation goals of Elijio Panti National Park 	+ +
General Belize Public	<ul style="list-style-type: none"> • Maintenance of biodiversity • Environmental services • Cultural and aesthetic appreciation • Increased awareness through education • Assists in protection of watershed vegetation cover for Macal River 	+ + + + +	<ul style="list-style-type: none"> • Support of the general public will strengthen the position of protected area • Lack of support may increase risk of dereservation for farmland 	+ -

Table 7: Stakeholder Analysis for Elijio Panti National Park (continued)				
Stakeholder	Influence or Impact of Elijio Panti National Park on Stakeholder		Influence or Impact of Stakeholder on Elijio Panti National Park	
Visitors: Tourists	<ul style="list-style-type: none"> • Enjoy Elijio Panti National Park as a tourism destination • Benefit from education and awareness opportunities 	<p>+</p> <p>+</p>	<ul style="list-style-type: none"> • Potential for entrance fee contributing towards park management sustainability • Provide marketing nationally and internationally by word of mouth, if happy with level of product • Presence deters hunting and other illegal activities within protected area • May negatively impact the environment and wildlife 	<p>+</p> <p>+</p> <p>+</p> <p>-</p>
Visitors: Researchers	<ul style="list-style-type: none"> • Benefit from being linked to Elijio Panti National Park • Benefit from information on past research activities within the protected area, 	<p>+</p> <p>+</p>	<ul style="list-style-type: none"> • EPNP benefits from data gathered, greater knowledge for informing management • Benefit from increased activity within area, assisting against illegal hunting and xate harvesting activities • Possible impact of research activities on terrestrial / aquatic environments 	<p>+</p> <p>+</p> <p>-</p>
Xateros	<ul style="list-style-type: none"> • Provides a resource for harvesting of xate and associated hunting activities (however, this is illegal) 	<p>+</p>	<ul style="list-style-type: none"> • Impacts xate and game species populations 	<p>-</p>
BECOL	<ul style="list-style-type: none"> • Provides forested, national lands within which to construct the Vaca Dam 	<p>-</p>	<ul style="list-style-type: none"> • Interruption of natural flow of water • Contamination of aquatic system during construction • Noise and air pollution during construction phase 	<p>-</p> <p>-</p> <p>-</p>
Government of Belize	<ul style="list-style-type: none"> • Elijio Panti National Park is included within the National Protected Areas System Plan • Elijio Panti National Park is included in system level planning for the Maya Mountains Massif • Assists in demonstrating Belize Government's commitment to the conservation of natural resources, CCAD and CBD • Provides employment opportunities in stakeholder communities • Environmental services 	<p>+</p> <p>+</p> <p>+</p> <p>+</p> <p>+</p>	<ul style="list-style-type: none"> • Political support (currently being strengthened through the NPAPSP) • Uncertainty of long term future commitment 	<p>+</p> <p>-</p>

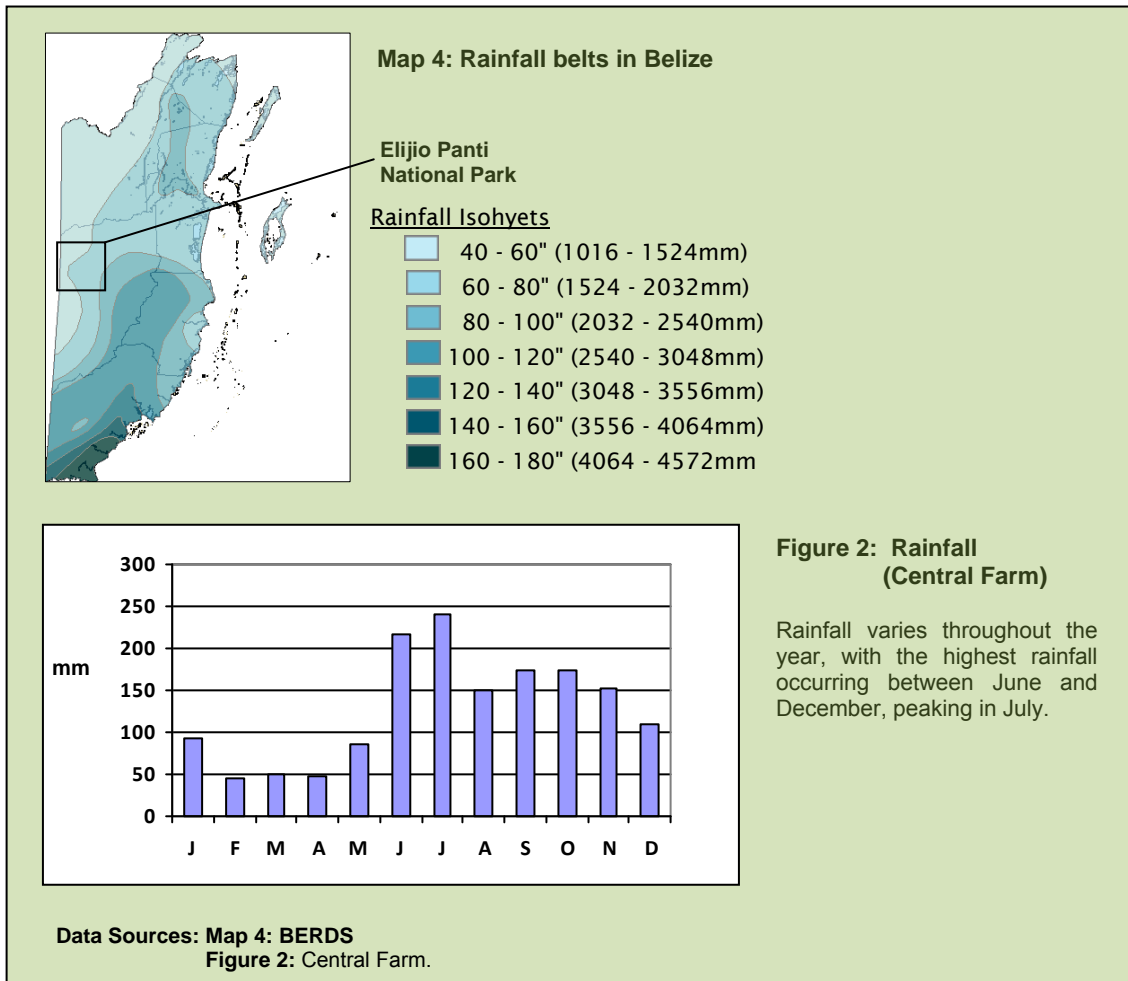
2.4 Physical Environment of Management Area

2.4.1 Climate

Belize lies within the outer tropical geographical belt – with the relatively high temperature and rainfall patterns associated with the tropics being one of the factors that promote and sustain the high levels of biodiversity within the region. Prevailing winds are easterly, from the Caribbean.

Rainfall Patterns

Elijio Panti National Park is situated on the lower, north-facing slopes of the Maya Mountains Massif, an area defined climatically as sub-tropical, with distinct wet and dry seasons. It lies within the second driest rainfall belt in Belize, with a general average annual rainfall of 1,778mm (70”) per annum (National Meteorological Service, 2005; Map 4; Figure 2).



Mean annual rainfall recorded for Central Farm, the nearest meteorological station, is 1541 mm. The driest months are February-April with an average of 48 mm per month, whilst June and July are the wettest with an average of 200 mm of rain. The average rainfall in the study area is expected to be similar. Passing of a tropical depression or storm can bring more than 80 mm of rain in one day - these daily extremes strongly influence the monthly averages.

Elijio Panti National Park – Draft Management Plan 2009-2014

There is a pronounced dry season stretching from February through to the end of May, with minimum monthly rainfall of as low as 45 mm in February, the driest month. During this season, the needleleaf forests of the National Park become parched, and as a result are prone to extensive seasonal wildfires, started by hunters seeking to attract game to the ash and regenerating grass shoots.

The dry season is followed by a wetter season (June to December / January) with maximum monthly rainfalls in the region of 240mm, punctuated by a mini dry season in August. The majority of the rain falls within the hurricane season (June to November), associated with passing tropical storms (particularly between September and November).

Temperature and Humidity

Lying within the subtropics, annual temperatures in the inland area of central Belize (including the Elijio Panti National Park) average approximately 25.9°C. Minimum mean temperatures of 20.5°C occur in January, during the cold fronts, whilst maximum mean temperatures of 31.3°C are recorded in May (Central Farm, National Meteorological Service, 2005) (Figure 3).

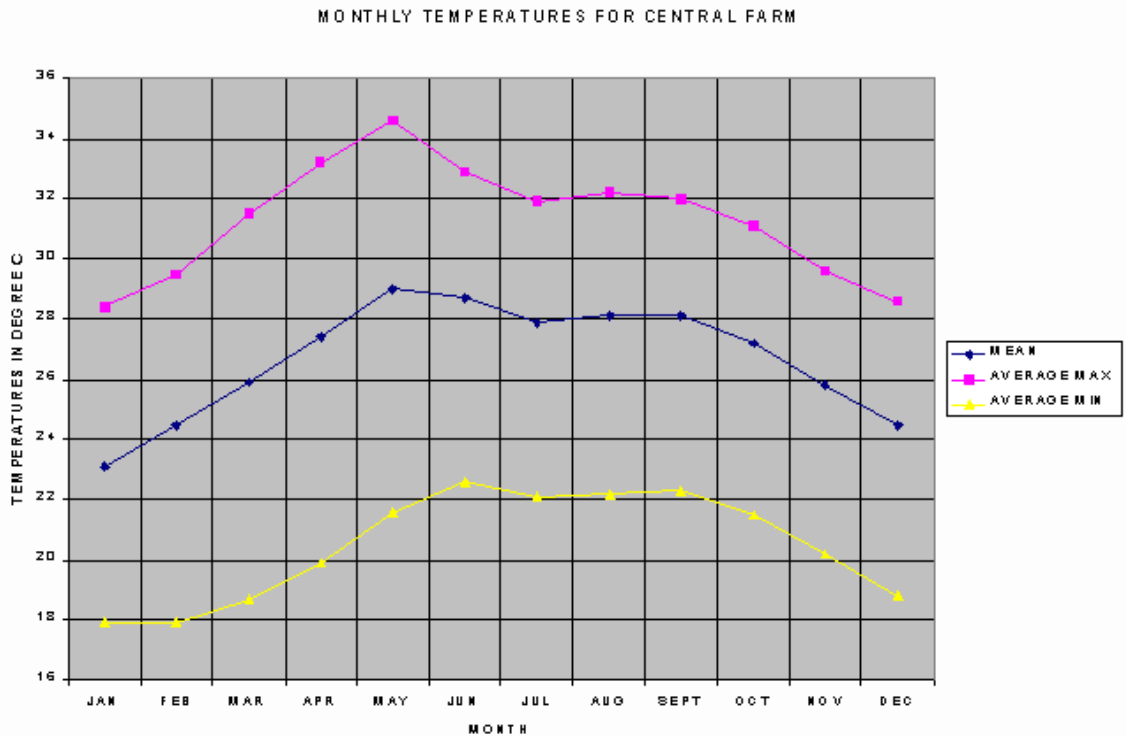


Figure 3: Temperature Fluctuations for inland Central Belize

Data Sources: Central farm National Meteorological Service of Belize, 2005.

During the dry season, humidity averages 70%, with March and April being the hottest, driest months. Humidity increases with the onset of the rainy season at the end of May / beginning of June. During the wet season, which lasts until December / January, the weather is influenced by tropical storm activity that forms in the Atlantic between June and November, and then irregular cold, often wet, frontal systems moving southward from the continental US and the Gulf of Mexico. Both these processes influence humidity.

Weather Systems

Belize is affected by three very distinct seasonal weather systems - the Trade Winds (the prevailing winds, blowing from the east), tropical storms (occurring between June and November), and northers (occurring between October and April), all of which have an influence on the rainfall and temperature patterns.

Tropical Storms / Cyclones

Tropical storms form in the Atlantic Ocean over warm, tropical waters and are non-frontal systems, developing highly organized circulations. Ranging in scale from tropical depressions and storms (with sustained wind speeds of < 74 mph) to hurricanes (with sustained wind speed > 74 mph), these storms generally move westward towards the Caribbean, gathering strength until they hit land. Data ranging from 1889 – 2000 shows that most storms have historically made landfall in October and November (National Meteorological Service of Belize, 2005), though this pattern is currently thought to be shifting, with storms becoming more unpredictable in their timing and strength.

The Elijio Panti /San Antonio area has historically been affected by a number of tropical storms (Table 8), resulting in excessive rainfall and uprooting of trees. Hurricane Hattie, in 1961, was considered to have the most severe impact, leveling the forest and destroying most of the houses in San Antonio.

Table 8: Hurricanes affecting the Elijio Panti Areas Area				
Year	Hurricane	Category at Passing	Date of Landfall	Notes
1931	Un-named	Tropical Storm	16/08/1931	Made landfall just north of Dangriga as a Tropical Storm, with winds of 40 mph, then passed within 10 miles of the north of EPNP, with winds of 35mph
1934	Un-named	Tropical Storm	6/06/1934	Made landfall as a Tropical Storm, with 40mph winds. Passed through San Ignacio / San Antonio with 40 mph winds
1945	Un-named	Tropical Storm	31/08/1945	Made landfall at Belize City as a Tropical Storm, with winds of 40 mph, then passed within 10 miles to the north of EPNP, with winds dropping to 35mph
1961	Anna	Hurricane Cat. 1	24/07/1961	Made landfall as a Category 2 hurricane, with winds of 80 mph, dropping to 70mph as it passed through Cayo
1961	Hattie	Tropical Storm	31/10/1961	Made landfall as a Category 4 hurricane, with 120 mph winds. Passed south of EPNP as a tropical storm, with winds dropping to 60 mph
1978	Greta	Hurricane Cat. 2	19/09/1978	Made landfall just north of Dangriga as a Category 3 hurricane, with 100 mph winds. Passed south of EPNP as a Category 2 hurricane, with winds dropping to 95 mph
Data Source: National Hurricane Centre (http://maps.csc.noaa.gov/hurricanes)				

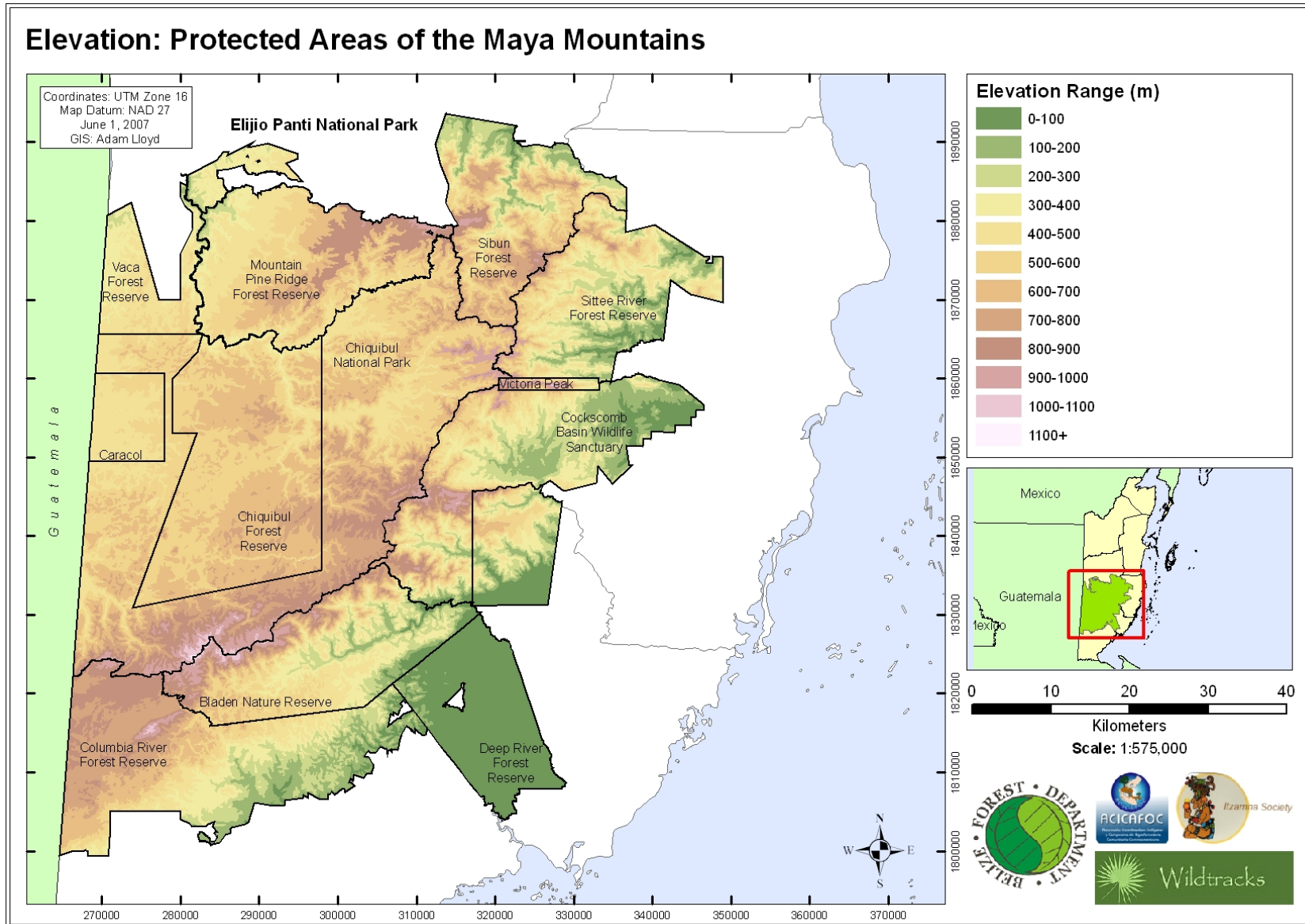
2.4.2 Geology and Soils

Geology

Elijio Panti National Park lies on the periphery of the Maya Mountains Massif, the prominent elevated geological and topographical feature that dominates the south west of Belize (Map 5, Map 6), consisting of hard Paleozoic rocks laid down during two separate stages of sedimentation, and seen in the National Park in the slate that gives Slate Creek its name. Meta-sediments of the Santa Rosa Group, some of the oldest rocks in Central America, deposited in the Carboniferous and Permian Periods between 225 to 350 million years ago, form intrusions, created during times of uplift (Table 9; Map 7; Ower, 1928; Dixon, 1956; Bateson and Hall, 1977).

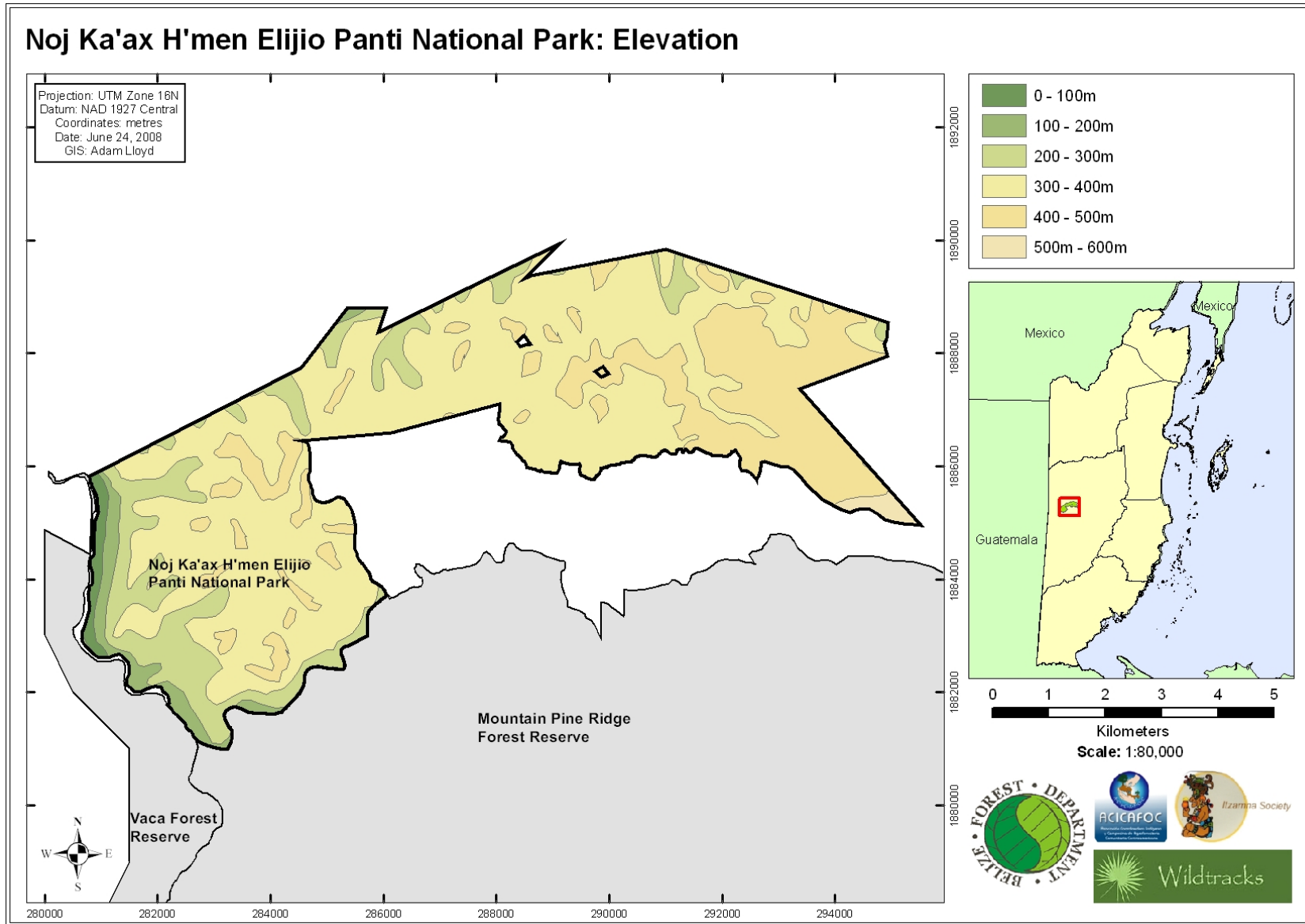
Remnants of the Cretaceous limestone that once blanketed the Maya Mountains, laid down in the Mesozoic and early Tertiary period over the Paleozoic rocks, can still be seen in the northern margins of the plateau in the northern and central areas of Elijio Panti National Park. Here, characteristic landscape features are the rugged limestone topography of vertical-sided sinkholes, underground streams and caves. Water is scarce in this karst landscape, especially during the dry months, and smaller streams that emerge as springs within the hill slopes then disappear underground again after flowing a short distance – characteristic of this limestone topography.

Table 9: Time Scale of Formation of Maya Mountain Massif Geology			
Era	Period	Time Span (million years ago)	Geological Activity
Palaeozoic Era	Permian	225 – 570	Belize covered by a shallow ocean. Sedimentary rocks of the Santa Rosa Group) deposited. Volcanic activity in the Bladen area
	Carboniferous		
Mesozoic Era	Triassic Period	190-225	Tectonic uplifts and folding of sedimentary rocks, forming Maya Mountains. Granite intrusion occurs, with contact metamorphosis of adjacent sedimentary rocks to form slate and quartzite
	Jurassic Period	136 – 190	Rift valleys form with erosion of Maya Mountains
	Cretaceous Period	65 – 136	Marine inundation by oceanic water covers the Maya Mountains with limestone
Cenozoic Era	Tertiary Period	2 – 65	Renewed uplift of Maya Mountains creating present high relief topography. Coastal zone sediments deposited. Erosion of Cretaceous limestone
	Quaternary Period	0 – 2 million	Continued erosion of limestone sequence from Maya Mountains, incision of mountains by streams and rivers



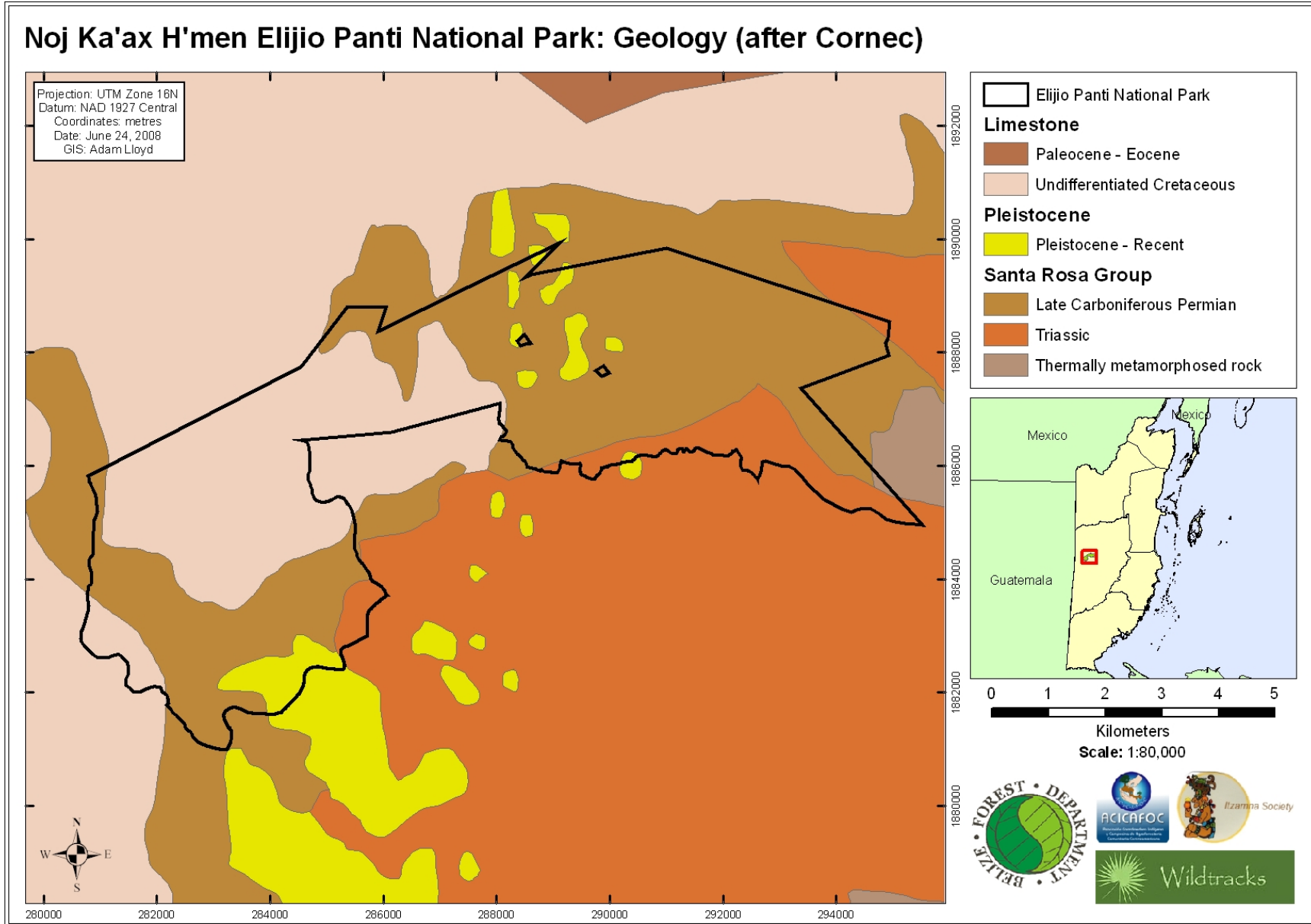
Map 5: Maya Mountains Massif (General Elevation)

Mapping: A. Lloyd; Wildtracks



Map 6: Elijio Panti National Park: Elevation

Mapping: A. Lloyd; Wildtracks

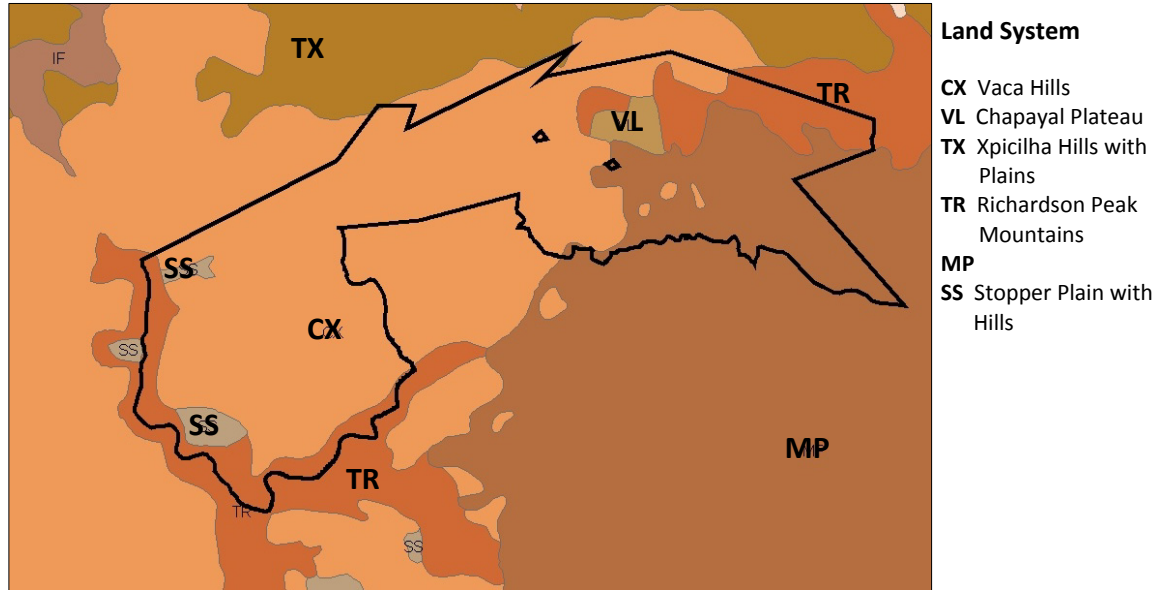


Map 7: Elijio Panti National Park: Geology

Mapping: A. Lloyd; Wildtracks

Soils

Soils in the National Park belong to three soil regimes – acidic (originating from the granitic rocks of the Maya Mountains), constantly lime-enriched and intermittently lime enriched (both originating from the Cretaceous limestone) (Map 8).



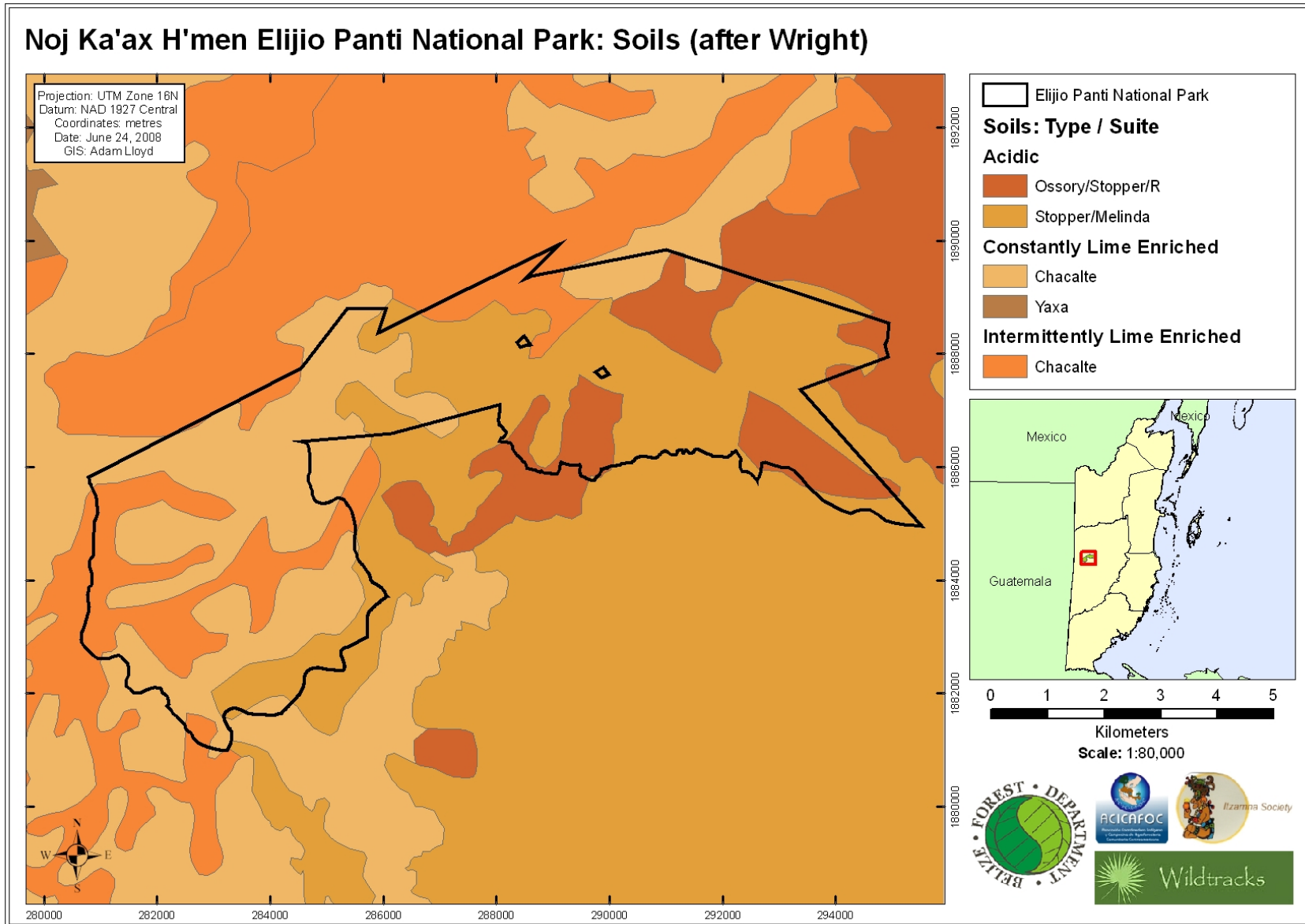
Map 8: Elijio Panti National Park: Geology

Chacalte suite soils were formed on the steep slopes of the karst hills on the hard Cretaceous limestones that flank the Maya Mountains to the north. Soils are characteristically very shallow, stony black clays that are neutral or alkaline (pH7 or higher), and shrink and crack when dry. On the more gently graded lower slopes and in the interkarstic basins, the clays washed off the hills accumulate to give deeper colluvial soils that are heavy and sticky clay. The Chacalte suite is divided in 3 subsuites: Cabro, Xpicilha and Cuxu.

Ossory soils are highly acidic with a low nutrient continent, and high potassium and magnesium concentrations.

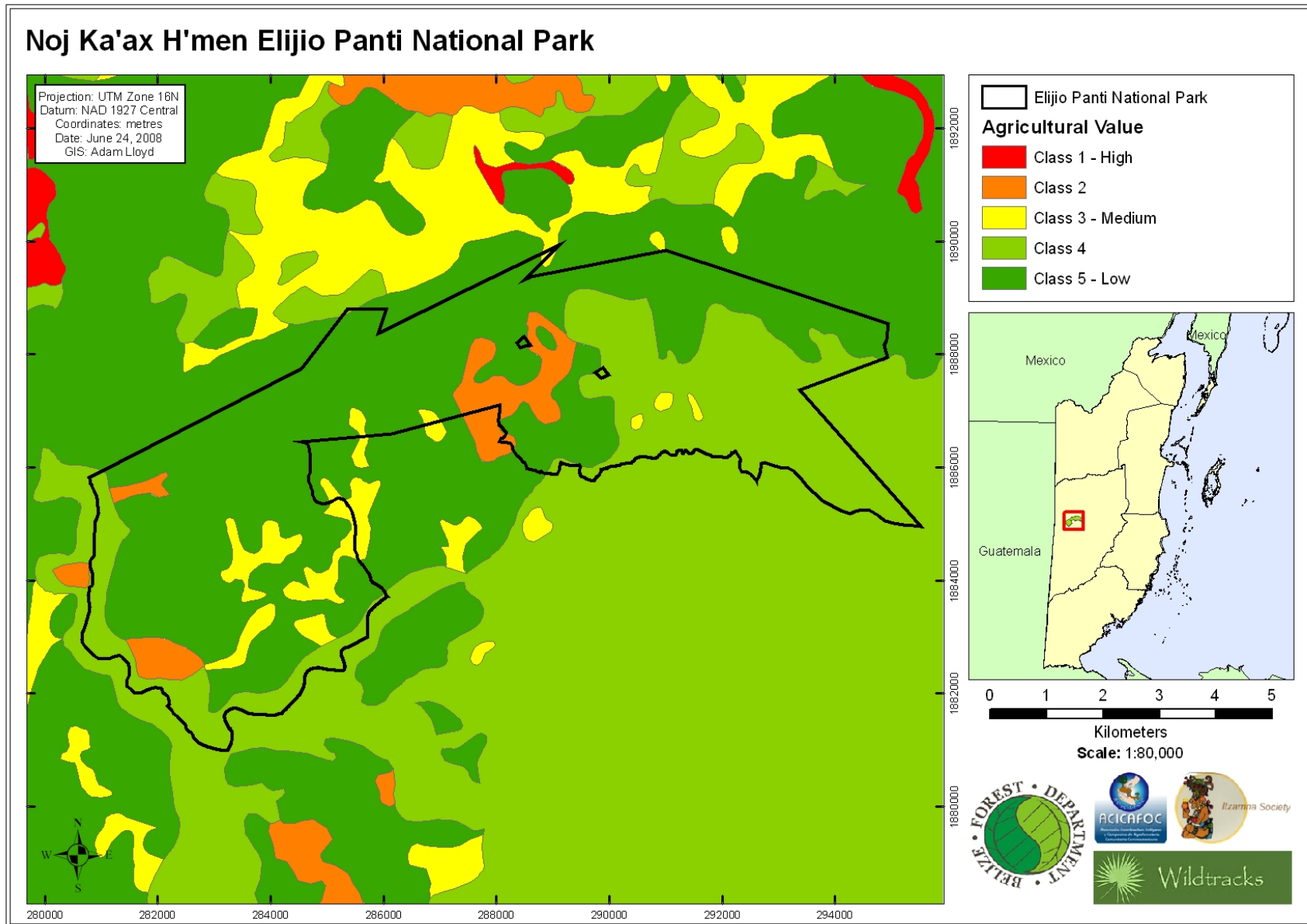
Table 10: Land Region, Land System and Soil Characteristics for Elijio Panti National Park				
Land Region	Land System	Soil Type <i>Suite:</i> Sub-suite	Characteristic	Location
Western Uplands Land Region	Xpencilha Hills with Plains (TX)	Chacalte Xipencilha + Cuxu	Fine textured, moderately deep, basic, soils formed from cretaceous limestone in a Rolling Plain (R) landscape	The outermost extension of the EPNP includes a very small area of Xpencilha Hills, just south of the junction of the San Antonio and Georgeville roads
		Chacalte San Lucas + Xipencilha	Deeper soils with a higher clay content formed from cretaceous limestone in an Undulating Plain (U)	
	Vaca Hills (CX)	Chacalte Shallow Cuxu / Cuxu	Shallow, mildly alkaline or neutral soils of the Vaca Hills, formed from cretaceous limestone, occurring on the steep hill slopes and peaks of High Karst (HK) and Medium Karst (MK) landscape, and in the Undulating Plain (U) and Valley Bottom (VB) landscapes of the valleys. The Ancient Maya are known to have used these soils extensively for agriculture	Much of the western half of the National Park has soils of the Chacalte Suite (Map 9), exceptions being the alluvial soils of the river valleys (Macal, Rio On, Rio Frio and Privassion Creek), and the Mountain Pine Ridge soils in the south east
		Chacalte Granodoro + Cuxu	Soils derived from both cretaceous limestone and Santa Rosa metasediments, in a Siliceous Undulating Plain (SU) landscape	
	Stopper Plain with Hills (SS)	Chacalte Stopper > Palmasito	Soils over a Rolling Plain (R) landscape	Small pockets lie within the National Park, on the flood plain of the Macal River and the Rio On
		Chacalte Stopper > Palmasito	Soils over an Undulating Plain (U) landscape	
Central Foothills Land Region	Cayo Floodplains (CF)	Stopper / Melinda Canquin + Stony Canquin > Quamina	Acidic riverine alluvium soils derived from Santa Rosa Meta-sediments / Granite Terrace (T)	A small patch on the boundary, on the east Privassion Creek tributary of Rio On, following the creek valley for approx. 1.5km

Table 10: Land Region, Land System and Soil Characteristics for Elijio Panti National Park				
Land Region	Land System	Soil Type <i>Suite:</i> Sub-suite	Characteristic	Location
Maya Mountains Land Region	Richardson Peak Mountains (TR)	<i>Ossory / Stopper</i> Cabbage Haul > Curassow	These soils are found over metasedimentary hills (o) - Ossory soils are the most extensive of the Maya Mountains, derived from metasediments of the Santa Rosa group whilst Stopper soils are the hillwash and colluvial soils, derived from granite. The shallow, stony Cabbage Haul soils tend to occur on the steep slopes, whilst the deeper, red Curassow soils are found on the gentler slopes.	Two small areas occur less than a kilometer north of Mai Gate sandwiching a small area characterized as Chapayal Plateau. These are all located in areas where the river has eroded through the surrounding limestone to reveal the metasediments and granite underneath
	Chapayal Plateau (VL)	<i>Ossory / Stopper</i> Granodoro + Chacalte		A small area sandwiched between two areas characterized as Richardson Peak Mountains, occurring less than a kilometer north of Mai Gate. These are all located in areas where the river has eroded through the surrounding limestone to reveal the metasediments and granite underneath.



Map 8: Elijio Panti National Park: Soils (after Wright)

Mapping: A. Lloyd; Wildtracks

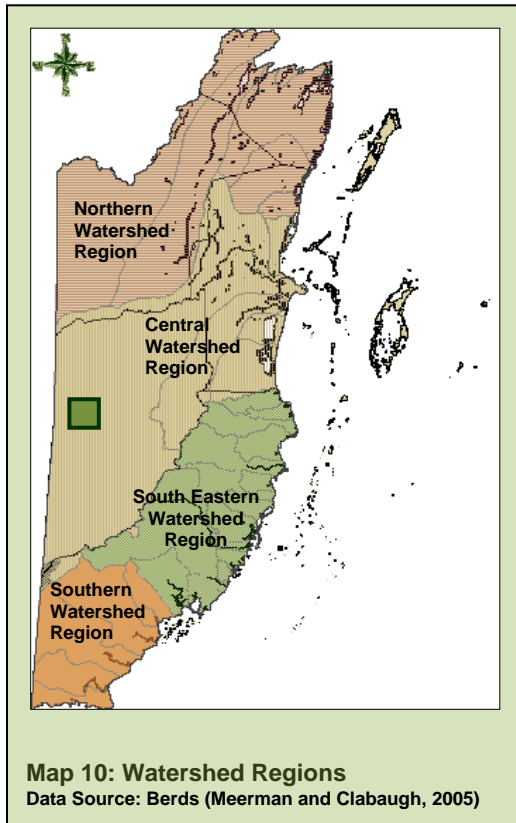


Map 9: Elijio Panti National Park: Agricultural Value

Mapping: A. Lloyd; Wildtracks

2.4.3 Hydrology

The National Park lies within the Central Watershed Region (Map 10), as part of the Belize River Watershed (Map 11), and is defined on some of its borders by hydrological features – the Macal (Eastern Branch, Belize River) to the west, and a series of tributaries - Rio On and Privassion Creek to the south-west, and Little Vaqueros Creek to the south east.



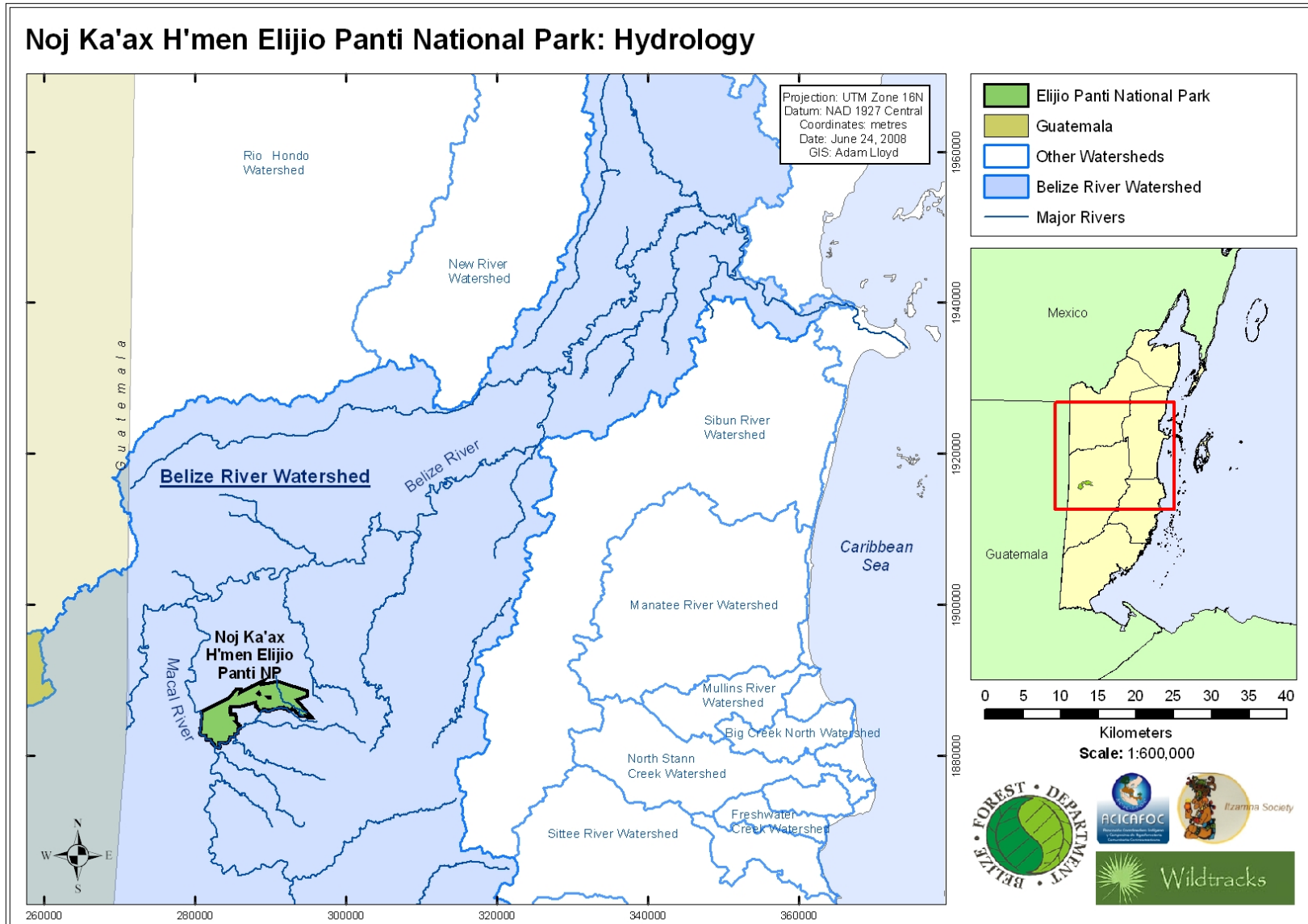
The confluence of the Rio On and Macal River

The geology of the area, a combination of limestone and Santa Rosa group metasediments, dictates to some extent the hydrology of the area. In the karstic limestone areas, surface streams are limited, and features such as sinkholes with disappearing streams occur. The majority of the permanent streams flow over the non-karstic metasediment.

The largest tributary within the National Park, the Macal River, flows along the western boundary, and is the focus of the third in a series of three dams in the Macal hydroelectric system. This third dam, the Vaca Dam, is currently being constructed on the boundary of the protected area, and will have implications on water flow and quality. However, the presence of two other dams upstream – Mollejon and Chalillo – have already resulted in changes in flow and water quality of the river system, so the impact of this third dam will be limited in comparison to that of the first dam constructed. A number of tributaries flow westwards into the Macal, draining the west of the National Park. The most southerly of these, the Rio On forms one of the major tributaries draining the Mountain Pine Ridge.

In the northeast of the protected area, two permanent streams flow north, descending from Mountain Pine Ridge Forest Reserve. The first, Barton Creek, flows through the eastern-most portion of the protected area, and provides an important water source for both San Antonio and El Progreso – 7 Miles, with water extraction from the headwaters. The second, Slate Creek, bisects the National Park, disappearing into a sinkhole after it leaves the boundary and enters karstic terrain.

A few other small, seasonal streams spring up in the limestone foothills in the north of the national park, flowing north towards San Antonio village. One of these is reported to have once retained water all year round, the main reason for the establishment of San Antonio in its current location. More recently, however, this stream has become more seasonal.



Map 11: Elijio Panti National Park: Hydrology

Mapping: A. Lloyd; Wildtracks

2.5. Biodiversity of Management Area

2.5.1 Ecosystems

Under the UNESCO classification system, five natural terrestrial ecosystems have been identified to date within Elijio Panti National Park: two broadleaf forest types, two needle-leaved categories, and one riparian shrubland (Table 11).

The predominant vegetation in the north-west and central parts of the National Park, broadly defined as tropical evergreen broadleaf lowland forest, lies on the steep limestone karst areas. Two ecosystems have been identified – the first on the steep slopes of the karstic hills (Tropical evergreen broadleaf lowland forest over steep karstic hills), and the second in the valleys between these hills (Tropical evergreen broadleaf lowland forest over rolling karstic hills).



Drought conditions during dry season in the Riparian shrubland and Tropical evergreen seasonal broadleaf lowland forest over steep karstic hills on the Macal River boundary of EPNP

The ecosystems overlying the more nutrient-poor metasedimentary rocks are dominated by pine, with a matrix of needle-leaf and broadleaf forests in the transitional areas, characterized by a needle-leaf forest landscape with broadleaf forest on limestone outcrops.

Riparian shrubland is found in association with the one aquatic ecosystem, the freshwater ecosystem, which ranges from small mountain creeks to the Macal River that forms the western boundary of the Park. These all fall within the ‘river’ ecosystem under this classification.

Table 11: Ecosystems of Elijio Panti National Park	
UNESCO classification	Legend (Meerman and Sabido 2001, 2004)
Tropical evergreen seasonal broadleaf lowland forest over rolling karstic hills	19
Tropical evergreen seasonal broadleaf lowland forest over steep karstic hills	20
Tropical evergreen seasonal mixed needle and broadleaf lowland hill forest	30
Tropical evergreen seasonal needle-leaf lowland hill forest	32
Deciduous broadleaf lowland riparian shrubland in hills	61
River	77
Shifting cultivation including unimproved pasture (past)	80

19 Tropical evergreen seasonal broadleaf lowland forest over rolling karstic hills

This ecosystem occurs in the flatter valley floors between the karstic hills that dominate the central and western portion of the Park. With its patchy distribution between the hills, it was not identified or mapped as occurring in Elijio Panti National Park within the Belize Ecosystem Map (Meerman & Sabido, 2001; Meerman, 2004) – though it's likely occurrence in such localities was noted. Occurring on quite deep, humid, relatively rich soils, this forest has a high canopy in the National Park, with some trees in excess of 30m in height. With a dense canopy cover and relatively open understory, its abundance of palms and patches of heliconias, it is an aesthetically pleasing and rich forest with significant tourism potential.

In several areas it is evident that the forest is seasonally flooded, such that components of the ecosystem closely resemble another – 'tall swamp forest'. The current geology map shows a band of sedimentary rock of the Santa Rosa Group as lying along, and bisecting, the southwestern portion of the Park on which only limestone ecosystems have been identified to date, meriting further investigation in the future.

20 Tropical evergreen seasonal broadleaf lowland forest over steep karstic hills

This is the predominant ecosystem within the Park, occurring across most of the northern, western and central areas. As its name implies, it occurs on steep limestone terrain - gradients vary from a minimum of approx 45 degrees to almost vertical. There is a significant shift in species composition and canopy height along the altitudinal gradient on the hills (from 25m on the lower slopes to 1m on the hill-tops), with the hill-tops being very parched during the dry season and having a lower, more deciduous forest than that on the lower slopes. As noted above, the lower slopes grade into another ecosystem type, with a very similar species composition, but with a rather taller stature.

Canopy trees and understory plants of Tropical evergreen seasonal broadleaf lowland forest over rolling karstic hills	
Wild Tamarind	<i>Acacia dolychostachya,</i>
Wild Mamey	<i>Alseis yucatenensis,</i>
Mylady	<i>Aspidosperma megalocarpon,</i>
Cohune	<i>Attalea cohune,</i>
Ramon, Breadnut	<i>Brosimum alicastrum,</i>
Santa Maria	<i>Calophyllum brasiliense,</i>
Spanish Cedar	<i>Cedrela odorata,</i>
	<i>Cordia sp.,</i>
Escoba palm	<i>Cryosophila stauracantha,</i>
	<i>Cupania sp.,</i>
Heliconia	<i>Heliconia aurantiaca</i>
Sapote	<i>Manilkara zapota,</i>
Allspice	<i>Pimenta dioica,</i>
Pouteria	<i>Pouteria sp.,</i>
Copal	<i>Protium copal,</i>
Bayleaf, Botan	<i>Sabal mauritiiformis,</i>
	<i>Sebastiania tuerckheimiana,</i>
Hogplum	<i>Spondias radlkoferi,</i>
Cojeton	<i>Stemmadenia donnell-smithii,</i>
Bastard Line	<i>Trichilia havanensis,</i>
Yaxox, Red Breadnut	<i>Trophis racemosa,</i>
Yaxnik	<i>Vitex gaumeri</i>
Prickly Yellow sp.	<i>Zanthoxylum sp.</i>

Canopy trees and understory plants of Tropical evergreen seasonal broadleaf lowland forest over steep karstic hills	
	<i>Alseis yucatenensis,</i>
Jobillo, Glassy wood	<i>Astronium graveolens,</i>
Mapoal, Sant Domingo	<i>Bernoullia flammea,</i>
Wild Mamey	<i>Brosimum spp.,</i>
Gumbo limbo	<i>Bursera simaruba,</i>
Spanish Cedar	<i>Cedrela odorata,</i>
	<i>Coccoloba sp.</i>
Costus	<i>Costus pictus,</i>
Escoba palm	<i>Cryosophila stauracantha,</i>
	<i>Cupania sp.</i>
Byaal, Basket tie-tie	<i>Desmoncus orthacanthos,</i>
Gaussia palm	<i>Gaussia maya,</i>
Limestone Hill Heliconia	<i>Heliconia spissa,</i>
Sapote	<i>Manilkara zapota,</i>
Black Poisonwood	<i>Metopium brownei,</i>
Allspice	<i>Pimenta dioica,</i>
	<i>Piper spp.,</i>
	<i>Pithecellobium sp.,</i>
Wild Frangipani	<i>Plumeria rubra,</i>
Pouteria	<i>Pouteria sp.,</i>
Copal	<i>Protium copal,</i>
	<i>Pseudobombax ellipticum,</i>
White Poisonwood	<i>Sebastiania tuerckheimiana,</i>
Bastard Lime	<i>Trichilia havanensis,</i>
Yaxnik	<i>Vitex gaumeri</i>
Prickly Yellow sp.	<i>Zanthoxylum sp</i>

30 Tropical evergreen seasonal mixed needle and broadleaf lowland hill forest

Under the Belize Ecosystem Map (Meerman & Sabido, 2001; Meerman, 2004) a tiny area of approximately 10 acres of this ecosystem were mapped as intruding into the southeastern portion of the Park, surrounded by the more extensive needle-leaf forest. Closely resembling the latter, and having a similar overall species composition, it differs mostly in the greater relative abundance of the broad-leaf component – occurring along the banks of creeks and thereby having a somewhat less severe fire regime. *Pinus caribaea* is the dominant species.

Canopy trees and understory plants of Tropical evergreen seasonal mixed needle and broadleaf lowland hill forest	
Caribbean Pine	<i>Pinus caribaea</i>
Sacpa, Nancen	<i>Byrsonima crassifolia</i>
	<i>Clusia massoniana</i>
Oak	<i>Quercus spp.</i>
Yaha, Sandpaper Tree	<i>Curatella americana</i>
Mountain Palmetto, Mis	<i>Schippa concolor</i>
Yemeri, San Juan	<i>Vochysia hondurensis</i>

32 Tropical evergreen seasonal needle-leaf lowland hill forest

Occurring on the granitic rock extending northwards from the Mountain Pine Ridge Forest Reserve, this ecosystem is commonly termed ‘pine ridge’. As noted by Meerman & Sabido (2001), it is caused and maintained by fires – both natural and anthropogenic. Managed through much of the twentieth century for pine production, natural fires were supplemented by controlled burns, and sometimes physical under-brushing, to suppress broadleaf growth and encourage optimal pine growth. *Pinus caribaea* is amongst the predominant trees, with *Dicranopteris* sp. abundant in areas of excessive fire frequency.

Canopy trees and understory plants of Tropical evergreen seasonal needle-leaf lowland hill forest	
Caribbean Pine	<i>Pinus caribaea</i>
Sacpa, Nancen	<i>Byrsonima crassifolia</i>
	<i>Clusia massoniana</i>
Oak	<i>Quercus spp.</i>
Mountain Palmetto, Mis	<i>Schippa concolor</i>
Yemeri, San Juan	<i>Vochysia hondurensis</i>
Nargusta	<i>Terminalia amazonia</i>
	<i>Dicranopteris sp.</i>

61 Deciduous broadleaf lowland riparian shrubland in hills

This ecosystem is restricted to a narrow belt along both sides of the rivers (Macal and Rio On), within the normal seasonal flood zone. Vegetation ranges up to 3-5m in height, and has a far more limited species richness than does the forest above the flood zone. This riparian shrubland occurs on the river edges, generally stretching 5-15m away from the main river course, depending largely upon the gradient of the banks – it rarely extends more than approx 8m above dry season water levels, being restricted to the area that is flooded annually and repeatedly. The soils of this ecosystem are generally sandy, lacking significant organic content and limited to small pockets within the fissures in the granitic rock. Much of the limited extent of this ecosystem within the Elijio Panti National Park will be lost with the inundation of the Vaca Hydro-electric Facility currently under construction. The woody, white-flowering shrub, *Lindenia rivalis*, is very prevalent within this ecosystem, along with a relatively sparse ground cover of grasses, Ixcanan, Lantana, and *Solanum* sp.. Stunted specimens of Salam are dotted amongst *Inga vera*, with tall Bullet Tree, or Pucte, being dominant in the ecotone between the riparian shrubland and the taller broadleaf forest on the steep calcareous hills.

Canopy trees and understory plants of Deciduous broadleaf lowland riparian shrubland	
Bullet Tree, Pucte	<i>Bucida buceras</i>
Polly Red-head, Ixcanan	<i>Hamelia patens</i>
Lantana	<i>Lantana camara</i>
	<i>Lindenia rivalis</i>
Salam	<i>Lysolima latisiliquum</i>
	<i>Inga vera</i>
	<i>Solanum sp.</i>

77 River

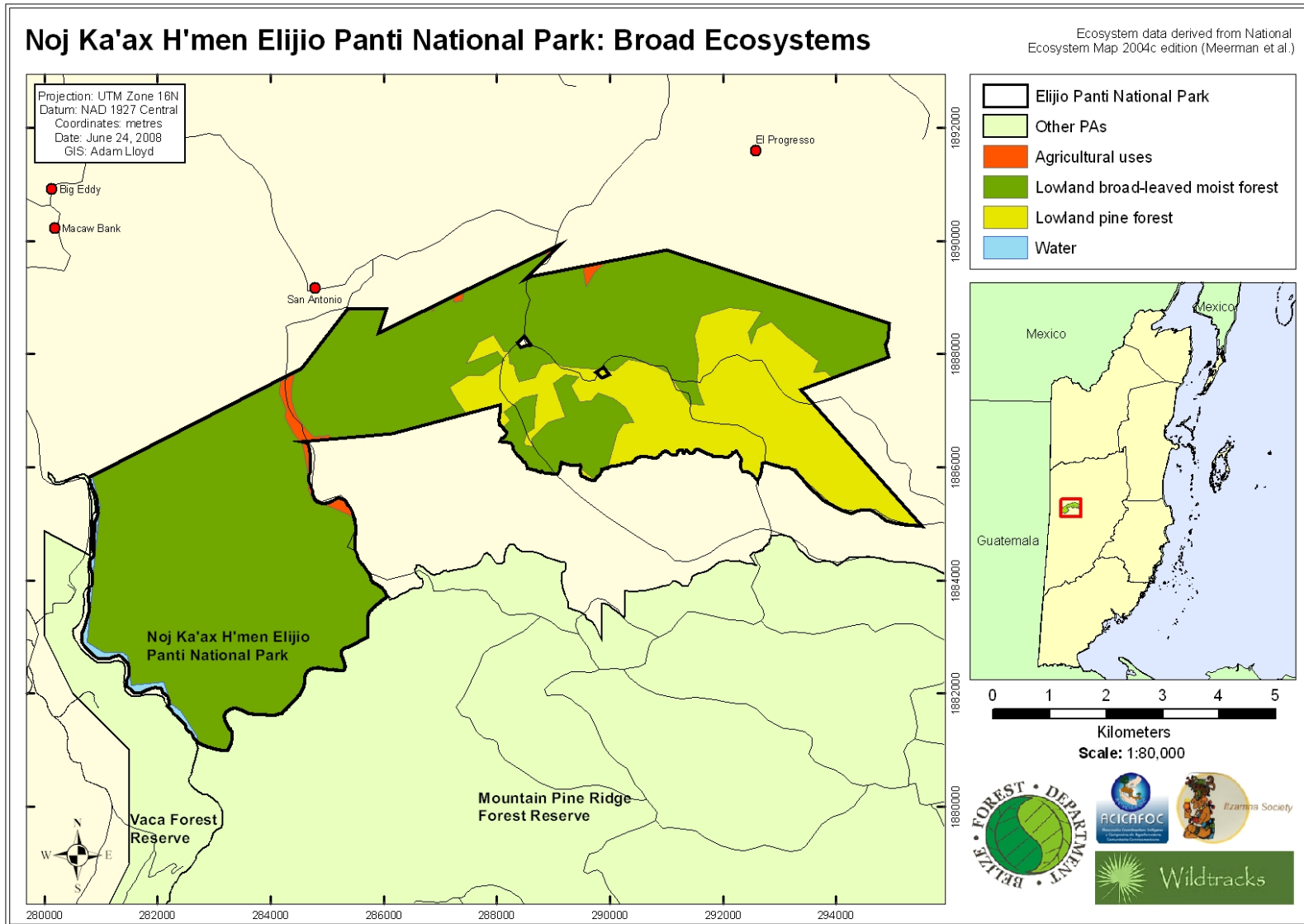
With low nutrient content, seasonally strong currents and flash-floods, very little herbaceous growth is evident within the rivers and creeks. Morelet’s crocodile occurs in low numbers in this section of the Macal River, along with a number of amphibians that utilize the isolated river-side pools for breeding. Spraint of the Central American river otter is evident along most of its extent.

80 Shifting cultivation including unimproved pasture (past)

A little under 100 acres of shifting agriculture previously occurred within the National Park, along the main access road. Whilst the squatter farmers vacated the land some years ago, their past presence is still evident with the low canopy of the regenerating secondary forest – containing a high proportion of early colonizers such as *Guazumia ulmifolia*, Hogplum, Jackass Bitters, *Thevetia sp.* and abundant grasses. Regeneration is currently impaired by the impacts of several free-roaming horses belonging to the co-management organization.

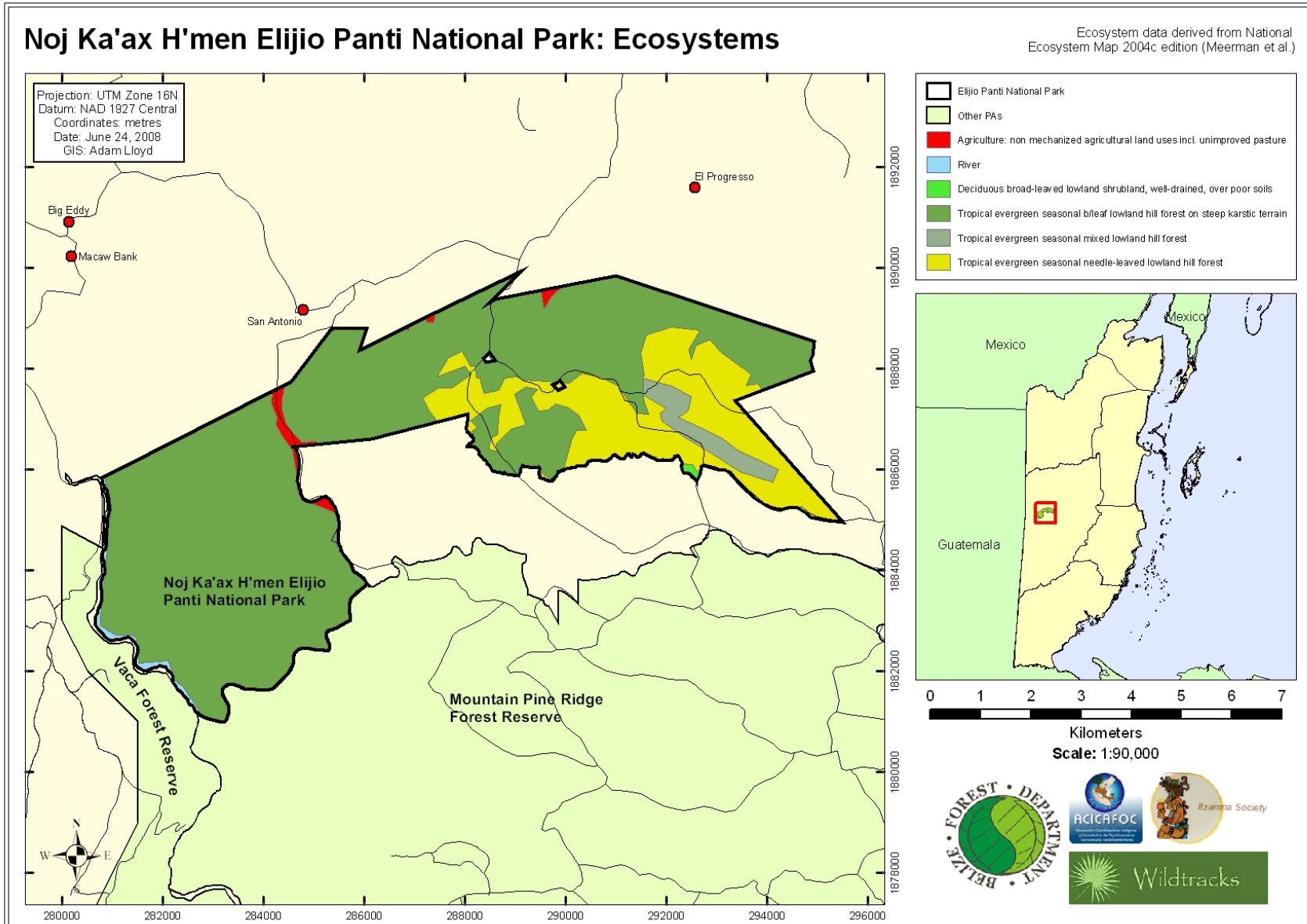
Early colonizers of regenerating Shifting cultivation (past)	
	<i>Guazumia ulmifolia</i>
Jackass Bitters	<i>Neurolaena lobata</i>
Hogplum	<i>Spondias radlkoferi</i>
	<i>Thevetia sp.</i>





Map 12: Elijio Panti national Park: Broad Ecosystems (after Meerman, 2005)

Mapping: A. Lloyd; Wildtracks



Map 13: Elijio Panti National Park: Ecosystems (after Meerman, 2005)

Mapping: A. Lloyd; Wildtracks

2.5.2 Flora

The flora of Elijio Panti National Park is not well known. Brief surveys undertaken during the development of this management plan indicate that the flora of the western broadleaf forest is more diverse than might be expected from previous ecosystem mapping, with a mosaic of topography, aspect, soil and drainage being likely determinants of species assemblage and distribution.

Tall, mature forests occur in the valleys between the hills, with a broad array of epiphytes and herbaceous ground species that have yet to be surveyed. The absence of past logging tracks through these forest tracts has helped maintain their structural condition and integrity in a near pristine state.

Four plant species found in Elijio Panti National Park are identified as of global concern (Table 12). Two of these are highly sought-after commercial timber species (mahogany and cedar), which have been exposed to occasional small-scale timber rustling adjacent to the Park Boundaries. Records indicate

Table 12: Plant Species of International Concern of Elijio Panti National Park (IUCN: Red list 2008)		
Endangered	Yaxnik; Fiddlewood	<i>Vitex gaumeri</i>
Vulnerable	Gaussia palm	<i>Gaussia maya</i>
	Spanish Cedar	<i>Cedrela odorata</i>
	Large-leaved Mahogany	<i>Swietenia macrophylla</i>

that the broadleaf forests of the Park area have never been logged commercially (Perera, D, pers. com.) - presumably indicating that timber stocks within the more readily accessible areas were not considered economically attractive in the past. Cedar (*Cedrela odorata*) is more abundant on the steep limestone hills - where logging is difficult, and where tree bole size is often smaller than on less steep terrain

Forty one plant species have been listed as endemic to Belize (Balick, 2000; BERDS, 2007), many of these being recorded only from the highly restricted Belizean Pine Ecoregion and its fire-adapted savanna ecosystems (Balick, 2000; WWF, 2001), fifteen of which are recorded from the project area.

Dalechampia schippii (Figure 4) and *Schippia concolor* are common throughout the adjacent Mountain Pine Ridge, occurring together at the majority of pine savanna sites, including those within the Privassion Enclave, and are therefore also presumed to be within the adjacent EPNP.

Endemic Plant Species recorded in EPNP and adjacent areas
<i>Anemia bartletti</i>
<i>Axonopus ciliatifolius</i>
<i>Telanthophora bartletti</i>
<i>Dalechampia schippii</i>
<i>Galactia anomala</i>
<i>Koanophyllon sorensenii</i>
<i>Mimosa pinetorum</i>
<i>Oxandra proctorii</i>
<i>Pisonea proctorii</i>
<i>Schippia concolor</i>
<i>Syngonanthus bartlettii</i>
<i>Zinowiewi pallida</i>



Figure 4:
Dalechampia schippii

2.5.3 Fauna

Introduction

Little baseline research is available on the fauna for Elijio Panti National Park itself. However, a number of surveys have been conducted in adjacent areas and in the periphery of the National Park, and provide data on expected species.

Despite the limitations of the baseline faunal surveys to date, and the absence of significant species surveys across the majority of the ‘major’ taxa, Elijio Panti National Park is expected to be home to a

very significant percentage of the generalist species found in tropical broadleaf and pine needle-leaf forests in Belize, and any future surveys focused on filling information gaps (such as the bats) will increase the inventoried number of species significantly.

Table 13: Vertebrate species breakdown for Elijio Panti National Park to date		
Vertebrate Group	No. Species (EPNP)	No. Species (Belize)
Mammals	29	163
Birds	323	574
Reptiles	53	121
Amphibians	26	40
Freshwater Fish	19	119
Sub-totals	450	1,017

Table 14: Vertebrate Species of International Concern (IUCN: Red list 2008) of the Elijio Panti National Park		
Critically Endangered	Morelet’s Treefrog*	<i>Agalychnis moreleti</i>
Endangered	Mexican Black Howler	<i>Alouatta pigra</i>
	Baird’s Tapir	<i>Tapirus bairdii</i>
Vulnerable	Keel billed Motmot	<i>Electron carinatum</i>
Least Risk / Near Threatened	Morelet’s Crocodile	<i>Crocodylus moreleti</i>
	Great Curassow	<i>Crax rubra</i>
	Golden-winged Warbler	<i>Vermivora chrysoptera</i>
	Jaguar	<i>Panthera onca</i>
	Puma	<i>Puma concolor</i>
<i>*Not yet confirmed as present, but within potential range</i>		

Mammals of Elijio Panti National Park

A total of fifteen mammals are confirmed as present to date within the focal area - either directly from sightings or signs (tracks etc.) or during fieldwork associated with the Vaca Dam Environmental Impact Assessment (2006). A further thirteen species have been identified during discussions with management staff, local hunters and farmers, and community consultations during the preparation of the first draft of this management plan, and are considered to be present but awaiting confirmation (Table 16). The bats are the biggest data gap in knowledge of the mammals of the area, and an inventory of these species would have the potential to add to the species list by 50% or more.

Of the mammals currently recorded in or adjacent to Elijio Panti National Park, two species – the Baird’s tapir and Yucatan black howler – are considered ‘endangered’ under IUCN classification (Table 15; IUCN, 2008). Other species of concern include the two largest wild cats (the jaguar and puma), and two species are considered to be potentially at risk, but lack data on abundance and / or distribution to allow an assessment of viability – the Neotropical river otter and red brocket deer.

Table 15: Mammal Species of EPNP of International Concern	
<i>Endangered:</i>	
Yucatan Black Howler Monkey	<i>Alouatta pigra</i>
Baird’s Tapir	<i>Tapirus bairdii</i>
<i>Lower Risk/ Near Threatened</i>	
Jaguar	<i>Panthera onca</i>
Puma	<i>Puma concolor</i>
<i>Data Deficient</i>	
Neotropical River Otter	<i>Lontra longicaudis</i>
Red Brocket	<i>Mazama americana</i>
<i>IUCN Red List, 2008</i>	

There are also a number of species endemic to the Mesoamerican or Yucatan region – the black howler monkey and big-eared climbing rat being examples. Other species such as white-lipped and collared peccary and Baird’s tapir are highlighted as of National Concern (Meerman, 2005) as hunting pressure increases and the necessary forested habitat decreases.

Whilst the species list cannot be considered comprehensive (particularly lacking data on bat species), it does indicate that the area supports a mammal diversity typical of a tropical broadleaf forest ecosystem in Belize. Indications are that the mammal densities are low, particularly the game species such as collared peccary and white tailed deer. Community participants and management staff confirm that white-lipped peccary (an indicator species with reduced populations in areas of hunting pressure and habitat disturbance), though present, are found in fewer numbers than in the past, and are generally found further from human settlement than the focal area. Similarly, the Tunich-Nah (2005) survey suggests that the low numbers of white-tailed deer in the area are symptomatic of heavy hunting pressure. The presence of active hunting pressure within the protected area from all three local communities (particularly San Antonio), of hunting by xateros moving through the area, and the presence of small farms, all combine to reduce game species populations, and therefore also the abundance of predatory species such as puma and jaguar.

There are a number of species not on the list that have ranges and ecosystem requirements that suggest they will be present within the area. Whilst only two of the eight species of opossum present in Belize have been recorded within EPNP, it is expected that several more will be recorded once a biodiversity monitoring programme is in place – the common and water opossums should both be present, as should the Mexican mouse opossum. Two species of Edentata have been identified in the protected area – the northern tamandua, and the nine-banded armadillo.

Table 16: Mammal Species of Elijio Panti National Park		Vaca EIA 2006	Tunich Na 2005 Vaca REA	Community Reports / First MP
Virginia Opossum	<i>Didelphis virginiana</i>			x
Grey Four-eyed Opossum	<i>Philander opossum</i>			x
Northern Tamandua	<i>Tamandua mexicana</i>			x
Nine-banded Armadillo	<i>Dasytus novemcinctus</i>		x	x
Yucatan Black Howler	<i>Alouatta pigra</i>	x	x	x
Yucatan Squirrel	<i>Sciurus yucatanensis</i>			x
Deppe's Squirrel	<i>Sciurus deppei</i>	x	x	x
Hispid Pocket Gopher	<i>Orthogeomys hispidus</i>	x	x	
Big-eared Climbing Rat	<i>Otodylomys phyllotis</i>	x		x
Mexican Porcupine	<i>Coendou mexicanus</i>			x
Central American Agouti	<i>Dasyprocta punctata</i>	x	x	x
Paca	<i>Agouti paca</i>	x	x	x
Grey Fox	<i>Urocyon cinereoargenteus</i>	x		x
Northern Raccoon	<i>Procyon lotor</i>			x
White-nosed Coati	<i>Nasua narica</i>			x
Kinkajou	<i>Potos flavus</i>	x		x
Long-tailed Weasel	<i>Mustela frenata</i>			x
Neotropical River Otter	<i>Lutra longicaudis</i>	x		x
Ocelot	<i>Leopardus pardalis</i>			x
Margay	<i>Leopardus wiedii</i>			x
Jaguarundi	<i>Herpailurus yagouaroundi</i>			x
Puma	<i>Puma concolor</i>		x	x
Jaguar	<i>Panthera onca</i>	x	x	x
Baird's tapir	<i>Tapirus bairdii</i>	x	x	x
Collard Peccary	<i>Tayassu tajacu</i>		x	x
White-lipped Peccary	<i>Dicotyles pecari</i>			x
White-tailed Deer	<i>Odocoileus virginianus</i>			x
Red brocket Deer	<i>Mazama americana</i>		x	x

Of the smaller, non-flying mammals, six species of rodent have been recorded from within the National Park or in adjacent protected areas. The Mexican hairy porcupine, Deppe's squirrel and the Yucatan squirrel are confirmed for the area, and hispid pocket gophers have been recorded in the regrowth from milpa activities on the narrow flood plains associated with the Macal River, within the Vaca Forest Reserve. The big-eared climbing rat, too, has been reported - these small rodents, and the other, similar species (such as the spiny pocket mouse), that should be present within the National Park, form an important prey base for Neotropical carnivores. The larger rodents – paca and agouti – are also important prey species for the larger cats (particularly jaguar), but are thought to have decreased in numbers with the hunting pressure, exacerbated by the limited number of staff available for active surveillance and enforcement.

The five cat species present in Belize have all been recorded within Elijio Panti National Park or adjacent protected areas, though no population estimates are available. A current project is being implemented to provide more data on these species through camera trapping.

Of the non-Felidae Carnivora, the grey fox (*Urocyon cinereoargenteus*), white-nosed coati (*Nasua narica*), raccoon (*Procyon lotor*) and kinkajou (*Potos flavus*) are all reported as present. The Neotropical river otter (*Lutra longicaudis*) has been reported from the Macal River, and from within the National Park. The long-tailed weasel (*Mustella frenata*) has also been reported by local participants. There are, however, no reports of other Mustelidae species to date, though it is expected that skunks and tayra will both be present

Black howler monkeys (*Alouatta pigra*) are reported to be present within the protected area. This species, endemic to a small area of the Yucatan Peninsula, Belize and the Peten, was decimated by a yellow fever epidemic in 1956/1957 that swept through the *Alouatta* population throughout most of Belize, compounded by the effects of Hurricane Hattie in 1961. Populations in the EPNP / Vaca FR area appear to have recovered.

Large game species recorded within the protected area include the two deer species – white-tailed deer (*Odocoileus virginianus*) and red brocket (*Mazama americana*), as well as both collared and white-lipped peccary (*Tasassu tajacu* and *Dicotyles pecari*).

Baird's tapir (*Tapirus bairdii*) is the largest herbivore present in Elijio Panti National Park, and is associated primarily with the riverine areas, where this large herbivore grazes on the herbaceous vegetation. It is shy, and seen infrequently, though tracks can be commonly found. Listed as an endangered species on the IUCN Red List, this species is generally thought to be common and widespread throughout Belize, and is seldom hunted for its meat. However, it is threatened by increasing destruction of its habitat, and in most areas, numbers are thought to be decreasing as they get pushed back into marginal habitats.

Birds

Birds are the best surveyed of the vertebrate groups, with a total of 237 species recorded to date, through a mist-netting survey conducted within Elijio Panti National Park by Birds without Borders, and previous wet and dry season surveys in the Vaca area by the Tunich-Nah Consultant group (Gentle, 2005). The majority of the species are characteristic of broadleaf forest, with some riverine species such as the bare-throated tiger-heron, great and little blue herons, great egret, and green heron, present along the Macal river itself. Also recorded are a small number of species that are more indicative of the needle leaf forest within the National Park (for example, the blue-gray gnatcatcher and yellow-backed oriole).

Three IUCN-red listed international species of concern have been highlighted for this area (Table 17), with a fourth, the orange-breasted falcon, also being included as a species of national concern.

The global population of the keel-billed motmot (*Electron carinatum*; IUCN status: Vulnerable), is facing a continuing decline as the habitat becomes fragmented and destroyed (Birdlife International, 2005), but it is still present in isolated patches in the Maya Mountain Massif. Elijio Panti National Park is contiguous with this, but is only marginal habitat for this species, and is therefore probably not critical for the survival of a viable population of this species, in view of the presence of large, adjacent, protected areas of less human-impacted habitat. This species is rare or absent from most of its range (southeastern Mexico to western Costa Rica), remaining populations being largely concentrated in Belize and Nicaragua. It requires large

<p>Table 17: IUCN Bird Species of International Concern of Vaca Project Area</p> <p>Vulnerable</p> <p>Keel-billed Motmot <i>Electron carinatum</i></p> <p>Lower Risk/ Near Threatened</p> <p>Great Curassow <i>Crax rubra</i> Golden-winged Warbler <i>Vermivora chrysoptera</i></p> <p style="text-align: right;"><i>IUCN Red List, 2005</i></p>

areas of contiguous, undisturbed habitat to ensure viable populations, where it occurs in low densities. In Belize, it appears to show a preference for steep terrain in the Maya Mountains, intersected by streams, where it nests in excavated holes in the bankside.

Two species are of IUCN “Near Threatened” status – the great curassow (*Crax ruber*) and the golden-winged warbler (*Vermivora chrysoptera*). The great curassow is not considered endangered yet within Belize as it is currently doing well in the national parks, where it is considered to be protected from hunting (Jones and Vallely, 2001). It is however heavily hunted throughout the rest of Central America, with significant population decline (Birdlife International, 2005). Within Elijio Panti and the adjacent area, the population is thought to have declined, following increasing incursions, hunting pressure associated with xate harvesting by Guatemalan xateros, and direct hunting pressure by local community hunters (as also indicated by the depressed game species populations (Herrera, 2005)). This has been exacerbated by the creation of the Mollejon access road, giving access to the west of the protected area along its boundary with Vaca by hunters from Cristo Rey, Benque, San Ignacio and other adjacent communities.

The second near-threatened species, the golden-winged warbler, is one of many migratory species that transit through the area, traveling southwards from Canada to as far south as Venezuela. As it moves into Central and South America, it is reliant on broadleaf tropical forest in both the countries it migrates through, and at its overwintering sites. It is known to be a winter resident in Cayo District (Jones and Vallely, 2001).

Whilst not listed as a species of concern by IUCN, the orange-breasted falcon (*Falco deiroleucus*) is highlighted as vulnerable in the Central American portion of its range, and very rare, perhaps extinct, south of Belize and Petén, Guatemala (Jones and Vallely, 2001; The Peregrine Fund, 2005). It is only known to nest in a limited number of locations in Belize, one of these being in the Vaca area along the border with EPNP (Jones and Vallely, 2001), with two pairs have been recorded nesting on cliffs between Black Rock and Mollejon (Whitacre, 1994 (cited in BBIS)). The Peregrine Fund monitors known nesting sites within Belize, and has been engaged in a release programme in the Maya Mountains to try to boost the Belize population (The Peregrine Fund, 2005).

Reptiles and Amphibians

There is currently very limited data on the herpetofauna of Elijio Panti National Park, with only a tiny fraction of the Park having been surveyed in a structured manner. A brief survey along the western boundary of the Park located 28 species of amphibian & reptile representing 6 orders and 18 families (Table 18). It is likely that the total herpetofaunal species assemblage across the habitats of the National Park will include approximately 100 species, with another 72 species assessed as likely to be present but not yet recorded there, based on their known ranges and habitat preferences, and a further 13 species that could occur there, with known ranges close to Elijio Panti – so the total species count could in fact exceed 100 species, which would make the Park amongst the most herpetofaunally biodiverse in Belize. This diversity is in large part because of its

Table 18: Reptile and Amphibian Group Breakdown (Walker, 2006)		
Group	Number of recorded species	Number of potential species
Salamander	1	1
Anurans (frogs and toads)	7	17
Turtles	1	6
Snakes	8	40
Crocodiles	1	-
Lizards	10	21
Total	28	85

**Elijio Panti National Park – Draft Management Plan
2009-2014**

geographic location in the northern limit of the Maya Mountain Massif, on the northern edge of the range for several more southerly species, whilst also being at the southern range limit for several Yucatan species.

Elijio Panti National Park includes a relatively wide variety of habitats for reptiles and amphibians, from the steep and seasonally dry hill slopes of the Vaca and central western portion of the park, to the impressively tall seasonally inundated forests between the hills, and the mixed broadleaf & needle-leaf forests that lead into the needle-leaf forest and pine savanna in the south-eastern portion of the National Park. The habitats occur across an altitudinal range from under 100m above sea level (asl) to approximately 450m on the karstic hill tops, and across a number of geological formations. The overall quality of habitat, in terms of herpetofauna, is excellent – with only very limited sites having been structurally impacted by human activity.

Table 19: Elijio Panti National Park: Herpetofauna recorded in the Vaca Falls area of the Macal River (Walker, P., 2006)

Family	Species	
Plethodontidae	Mexican Mushroomtongue Salamander	<i>Bolitoglossa mexicana</i>
Leptodactylidae	Sabinal Frog	<i>Leptodactylus melanonotus</i>
Bufonidae	Cane Toad	<i>Bufo marinus</i>
	Gulf Coast Toad	<i>Bufo valliceps</i>
Hylidae	Red-eyed Treefrog	<i>Agalychnis callidryas</i>
	Yellow Treefrog	<i>Hyla microcephala</i>
	Common Mexican Treefrog	<i>Smilisca baudinii</i>
Ranidae	Rainforest Frog	<i>Rana vaillanti (palmipes)</i>
Crocodylidae	Morelet's Crocodile	<i>Crocodylus moreletii</i>
Kinosternidae	White-lipped Mud Turtle	<i>Kinosternon leucostomum</i>
Eublepharidae	Yucatan Banded Gecko	<i>Coleonyx elegans</i>
	Gekkonidae	Spotted Dwarf Gecko
Corytophanidae	Brown Basilisk	<i>Basiliscus vittatus</i>
	Smoothhead Helmeted Basilisk	<i>Corytophanes cristatus</i>
	Hernandez's Helmeted Basilisk	<i>Corytophanes hernandezii</i>
Iguanidae	Green Iguana	<i>Iguana iguana</i>
Phrynosomatidae	Rosebelly Lizard	<i>Sceloporus variabilis</i>
Polychrotidae	Ghost Anole	<i>Anolis lemurinus</i>
Teiidae	Middle American Ameiva	<i>Ameiva festiva</i>
	Rainbow Ameiva	<i>Ameiva undulata</i>
Boidae	Boa Constrictor	<i>Boa constrictor</i>
Colubridae	Black-striped Snake	<i>Coniophanes imperialis</i>
	Lizard Eater	<i>Dryadophis melanolomus</i>
	Blunthead Tree Snake	<i>Imantodes cenchoa</i>
Elapidae	Mexican Vine Snake	<i>Oxybelis aeneus</i>
Viperidae	Variable Coral Snake	<i>Micrurus diastema</i>
	Jumping Pitviper	<i>Atropoides nummifer</i>
	Fer-de-Lance	<i>Bothrops asper</i>

Of the herpetofaunal species recorded to date (Table 19), Morelet's Crocodile is the only IUCN red-listed species – rated as Lower Risk. It is present in the Vaca area of the Macal River, and is likely to be present in the lower sections of the Rio On, along the southern boundary of the National Park, and possibly in some the other larger creeks. These habitats, with low fish

densities, are marginal habitat for crocodiles – with only a few specimens likely to be present within the National Park (Walker, pers. obs). Of the many species likely (or possibly) to occur within the Park, up to 11 are IUCN red-listed – including the Critically Endangered Morelet’s treefrog, the Vulnerable Leprus chirping frog, the Near-Threatened or Lower Risk Chac’s rainfrog, broadhead rainfrog, and the Maya Mountain Frog, the narrowbridge musk turtle, the Mexican giant musk turtle, the Tabasco mud turtle, the furrowed turtle and the slider, along with the Rozella’s lesser galliwasp.

Fish

Nine species of fish were confirmed during an initial rapid survey of the Rio On / Macal confluence area (Table 20).

A number of streams dissect the Elijio Panti National Park, draining into the Macal River. Reviewing data from previous surveys, it would appear that the series of falls along the section of the Macal (also known as the Belize River (Eastern Branch)) between Black Rock and downstream of the Rio On confluence act as an

Table 20: Fish Survey of the Macal River (Che Chem Ha to Rio On confluence; Walker Z., 2005)		
Order	Species	
Characidae	<i>Astyanax aeneus</i>	Tetra, Billum
Poeciliidae	<i>Belonesox belizanus</i>	Pike Killifish
	<i>Heterandria bimaculata</i>	Two-spot Livebearer
	<i>Poecilia teresae</i>	Mountain Molly
	<i>Xiphophorus helleri</i>	Green Swordtail
	<i>Gambusia luma</i>	Sleek Mosquitofish
Cichlidae	<i>Cichlasoma salvini</i>	Yellowbelly Cichlid
	<i>Cichlasoma spilurum</i>	Blue-eye Cichlid
Mugilidae	<i>Agonostomus monticola</i>	Mountain Mullet

effective barrier to fish movement upstream, with species diversity decreasing upstream towards the confluence of the Macal with Rio On. Studies of the fish populations of these tributaries show two distinct species assemblages – those of the fast flowing headwaters such as the Rio On, above waterfalls considered to be barriers to most fish movement, and those of the mid-stream, below these barriers (Greenfield and Thomerson, 1997).

Rio On and the other fast flowing tributaries of the Macal River contain a distinctive assemblage of four species (the mountain molly (*Poecilia teresae*), tetra (*Astyanax aeneus*), two-spot livebearer (*Heterandria bimaculata*) and the green swordtail (*Xiphophorus helleri*)). One of these, the mountain molly, is one of Belize’s few endemic species, and confined to the Maya Mountains.

The Macal, which forms the western boundary of the protected area, shows a fish population more representative of the mid-reaches (Table 21), with cichlids (the yellowbelly cichlid (*Cichlasoma salvini*) and blue-eye cichlid (*Cichlasoma spilurum*), and a number of other mid to lower reaches species that are unable to move past the higher waterfalls of the Mountain Pine Ridge. The mountain mullet (*Agonostomus monticola*) is present, though it is thought that this species, and others, have been affected by the construction of the Mollejon Dam upriver. It is an amphidromous species (in which spawn and larvae are thought to be swept downstream to the sea, where the larval stage develops, with the young returning upstream), with the presence of the Mollejon dam effectively fragmenting the *Agonostomus* population to those above the dam, and those below, preventing upstream migration of young fish beyond the dam itself. Effects of dam structure on this assemblage are thought to dramatically alter species composition upstream, if there is no provision for a marine-headwater link (Holmquist 1998).

Table 21: Species of the Eastern Branch Belize River / Macal System					
Species	Survey Sites				
	ENP Macal ¹	Cristo Rey ²	Upper Macal ^{3/4}	Mollejon ⁵	Rio Frio ⁶
Reference Date	2005	1997	2001/ 2005	1992	1997
<i>Dorosoma petenense</i>		x	x		
<i>Astyanax aeneus</i>	x	x	x		x
<i>Astyanax fasciatus</i> *				x*	
<i>Ictalurus furcatus</i>		x	x		
<i>Rhamdia guatemalensis</i>		x			
<i>Rhamdia laticauda</i>		x		x	
<i>Belonesox belizanus</i>	x	x			
<i>Gambusia luma</i>	x	x			
<i>Gambusia sexradiata</i>		x			
<i>Gambusia yucatan</i>		x			
<i>Heterandria bimaculata</i>	x	x		x	x
<i>Poecilia mexicana</i>		x			
<i>Poecilia teresae</i>	x		x	x	x
<i>Cichlasoma intermedium</i>		x			
<i>Cichlasoma meeki</i>	?	x			
<i>Cichlasoma robertsoni</i>		x			
<i>Cichlasoma salvini</i>	x	x	x	x	
<i>Cichlasoma spilurum</i>	x	x	x	x	
<i>Cichlasoma synspilum</i>		x			
<i>Petenia splendida</i>		x			
<i>Xiphophorus helleri</i>	x	x	x	x	x
<i>Agonostomus monticola</i>	x		x		
<i>Atherinella sp. 1</i>		x			
<i>Ophisternon aenigmaticum</i>		x			
<i>Anguilla rostratus</i>				x	
No. of Species	9	21	8	8	4

* considered to be synonymous with *A. aeneus* (Greenfield and Thomerson, 1997)

¹**2005 Vaca Survey Site:** Confluence with Rio On. Sequence of riffles, pools, and small falls. **down to** Che Chem Ha. Deeper pools with riffles connecting them, 2.5km below the confluence with the Rio On. Sequence of riffles / pools. VACA EIA (2005)

²**Cristo Rey Area:** Below the first major falls of the Eastern Branch Belize River system, as the river enters the middle reaches, in the flood plain area south of San Ignacio. Slow flowing with pools. Greenfield and Thomerson (1997).

³**Vaca Survey Site:** Tunich-Nah Consultants and Engineering (2005)

⁴**Upper Macal River:** Five survey points located within the general Macal / Raspaculo confluence area “mid-order streams characterized by wide channels open to solar exposure, with shallow, clear waters”. With riffle / pool sequence. Tunich Nah for BECOL, Macal River Upstream Storage Facility environmental Impact Assessment – Part 2 Support Documents – Volume II of IV (2001)

⁵**Mollejon Site:** Glaholt (1992).

⁶**Rio On:** Above the primary waterfall barriers to fish movement upstream. Greenfield and Thomerson (1997).

This species, along with cichlids, was once a favored food fish, being preferentially sought by local fishermen, though following reports of high mercury contents associated with the two dams currently in place, and the declining water quality associated with the construction of the third, many fishermen have stopped fishing the Macal. Findings suggest that fish populations downstream can recover within months from the immediate impacts from dam construction, despite initial declines in abundance and health (Craig, 2000), so fish populations within the EPNP stretch of the Macal can be expected to recover.

2.5.4 Past and Present Research

With its relatively recent establishment, little research has been conducted within Elijio Panti National Park. Reports associated with the Environmental Impact Assessment for the run-of-three dams (Chalillo, Mollejon and Vaca) have provided some basic inventory data, as has botanical work conducted within the Privassion Enclave, which identified a number of plant species endemic to the needle-leaf forests of Belize.

A recent bird survey by Birds Without Borders provided inventory information on bird species within the area, using mist netting and transects.

A current camera trapping initiative is in place to provide information on the cats of the area, particularly jaguars, funded under the Ford Motor Company initiative.

2.5 Cultural and Socio-Economic Values of Management Area

Local Cultural Values: Elijio Panti National Park was created as a joint initiative by local communities to ensure that the natural values of the broadleaf and needle-leaf forests of the area were not lost through uncontrolled development. There is general recognition of the importance of maintaining the National Park as protection for water catchments, for educational and scenic values and for its value as a tourism resource.

Only San Antonio, however, indicated an importance for cultural resources – primarily through harvesting of traditional medicinal plants. There is also a value placed on local game species, which are favored as a traditional cultural food, particularly as much of the forested area in the adjacent landscape is being cleared for agriculture and tourism developments.

Archaeological Values: The Vaca Plateau has been extensively surveyed by archaeologists, with the discovery of many caves containing ceremonial artifacts dating back to the ancient Maya. Whilst the majority of the explored caves have been located on the slopes overlooking the Macal River within the Vaca Forest Reserve, on the opposite side to EPNP, a number of caves have been discovered within EPNP itself.

A survey of the Macal riparian belt from the Mollejon Dam to the Che Chem Ha area, including the EPNP banks of the Macal, did not identify any major features of archaeological significance, though a number of small mounds were located within cohune-dominated forest, thought to be associated with early agriculture by the ancient Maya (Awe, 2005). Further from the river, in the karstic limestone hills, a number of caves have been identified, containing ancient Maya artifacts. The Offering Cave, so called because of the large number of ceremonial vessels, was mapped by the Xibalba Mapping and Exploration team in 2002 – 2003. This cave, with a surveyed length of approximately 2,800ft, and sinking to a depth of approximately 150ft, is currently managed by Itzamna Society on an informal basis, but lies under the mandate of the Institute of Archaeology.










Offering Cave

Elijio Panti National Park
Cayo District, Belize

Surveyed Length 2,799 ft., Depth 151 ft.

2002-3 Survey by XMET (Xibalba Mapping and Exploration Team)
Rich Breisch, John Brooks, Concepcion Col, Bill English,
Rick Geissler, Stephanie Geissler, Tom Gilleland, Joyce Hoffmaster,
Devin Kouts, David Larson, Eleanor Larson, Roger McClure,
James Mesh, Vanessa Miro, Brian Pease, Kenny Stabinsky, Joe Wolf

Cartography by Tom Gilleland

-  Breakdown
-  Dirt Floor
-  Column
-  Flowstone
-  Pottery / Shards
-  Sloped Floor
-  Stalactite / Stalagmites
-  Trail
-  Tree



Map 14: Elijio Panti National Park: Offering Cave

Mapping: Tom Gilleland, Xmet

2.6.1 Community and Stakeholder Use

Community consultations with San Antonio, Cristo Rey and El Progreso-7-Miles provided information on community use by these stakeholder communities.

San Antonio: Participants identified game species, non-timber forest products and medicinal plants as the natural resources most frequently extracted from the National Park, though these uses have declined significantly since the establishment of the protected area. Hunting is considered the highest illegal use of the area, particularly with the increasing private ownership of forested lands adjacent to the community. Preferred game species populations such as paca (gibnut (*Agouti paca*)) are reported to be lower than ten years ago, and the increasing value of the meat (selling in San Antonio for around Bz\$5 per pound, and in Belmopan at Bz\$8 to \$10 per pound) encourages hunting activity to supply this traditional cultural market. The number of local hunters, however, is estimated at only between five and ten people, who hunt primarily for home use, selling meat within the village if there is a surplus.

Two to three people used to harvest medicinal plants from within the National Park – billy web and balsam bark in particular – but previous indiscriminate logging is reported to have reduced the density of these species available for harvesting, and there is concern about impacts from overharvesting. Medicinal plant collection is considered to have more or less stopped since the establishment of the National Park, but the recognition of the cultural importance to the community has prompted Itzamna Society to consider the possibility of establishing local medicinal plant nurseries in collaboration with the traditional healers, from root stock harvested under permit from within EPNP.

Construction materials have also been traditionally harvested from the forests around San Antonio, though the shift towards concrete and wooden houses from the traditional palmetto / palm structures has reduced the pressure from local users. With only the poorer sectors of the community now using local materials for construction, Elijio Panti National Park is not considered to currently be a material source, being too far, with difficult access, for people with limited finance. As these resources become scarce in the adjacent area, and with forested land being locked up in private ownership, harvesting of bay leaf and posts within the protected area may well increase. There is discussion of the feasibility of growing these natural materials closer to the community, particularly bay leaves, to supply this recognized demand. Bay leaf plantations would also assist with reducing impacts from local tourism operations, which have a seemingly almost inexhaustible demand for thatching leaves, and have been reported to have harvested leaves illegally from the protected area in the past.

Itzamna Society has provided training opportunities for a number of community members as tour guides, though tourism within the protected area is limited by poor access. The potential, however, exists for increased use of the National Park as a tourism resource, and Itzamna Society contracted an assessment of the eco-touristic situation for the protected area (Weizsman Consulting, 2006). Recommendations from community consultations suggest that there should be greater interface between Itzamna Society and the local tour guides to encourage greater use of the park and its facilities, and mechanisms such as a self guided medicinal plant trail to assist tour guides in using the protected area.

When asked for views on the importance of the protected area to the community, the majority of participants highlighted the protection of the natural values of the forest and watershed as the most highest priority, with an emphasis on using the National Park as a tool to build local knowledge of environmental services, and ensure that future generations are able to know the wildlife of the San Antonio area. Also listed as important were the sustainable use of medicinal plants and construction materials, and income generation through tourism.

Elijio Panti National Park – Draft Management Plan 2009-2014

It was generally agreed that for greater community use of the area, there needed to be an improvement in the mechanisms for community participation, with benefits spread more widely through the community. There was also recognition for increased community awareness through greater flow of information to build support and appreciation for the National Park, using newsletters and other information outlets.

Tourism Use: Tourism use of Elijio Panti is currently very low, but Itzamna Society has been concentrating on tourism infrastructure development, and has put time into assessing the organizational and community requirements for increasing tourism use of the area and associated benefits for local communities. This has been assisted by Trekforce, a UK-based volunteer organization that provides labor for community and conservation projects.

Year	No. Visitors	No. Trekforce Volunteers
2005	22	
2006	30	18
2007	27	15
2008	27	12

Visitation figures for Elijio Panti

A Visitors Centre is located at the entry to the park, and two camping areas have been established, one at the Visitor's Centre and one on the trail towards the cave, with raised camping platforms and thatch-covered tables (Figure 5).



Figure 5: Visitor's Centre

Other Stakeholders: There is some pressure on the natural resources by a number of the tourism stakeholders located within the Privassion Enclave, with reports of thatch leaf and slate extraction, both within the protected area and in adjacent forests.

2.6.4 Other Economic Use

The past government administration decided to de-reserve a part of Elijio Panti to allow for slate extraction by local craftsmen. Two sites have been highlighted for this use - one on the Mountain Pine Ridge in the Pineridgito Enclave, and the other in the Black Rock area.

2.6.5 Research and Education Use

Elijio Panti National Park has been the focus of a number of research activities between 2006 and 2008:

1. The tourism analysis. Wizseman Consulting (2006)
2. Bird species checklist. Colin Young (2007)
3. Jaguar monitoring census (ongoing - 2007-2008).

In each of these projects, community participation, input and capacity building was an integral part of the activities. The current ongoing project focusing on jaguars (2008) has monitoring cameras installed in the protected area, to census the mammals of the National park (particularly jaguar), with associate activities ensuring the results are communicated through presentations to the schools in the stakeholder communities..

Elijio Panti National Park – Draft Management Plan
2009-2014



Year	No. Students
2006	48
2007	72
2008	112

Whilst Itzamna Society has been working with the local schools, community consultations in all three communities suggested that all participants felt that there could be an increase in the awareness activities within the schools, and an increase in school visits to the National Park.

3. Conservation Planning

This conservation planning section looks at the species and ecosystems of concern, at the threats that impact them, and the strategies that can be used within the management of the area to abate these threats.

3.1 Conservation Targets

Conservation targets may be species, species assemblages or ecosystems that are selected as representing the biodiversity of a protected area – such that strategic actions, taken to ensure their continued viability and reduce the pressures impacting them, will adequately address the needs of the system as a whole.

3.1.1 Identification of Conservation Targets

After an overview of the concept of conservation targets, and as a first step in the Conservation Planning process, participants suggested a number of potential conservation targets - to represent and encompass the biodiversity and cultural values of the area, and to provide a basis for setting goals, developing strategies and actions, and monitoring success.

An initial list of 23 potential targets was first generated (Table 1), on which the final target selection was based. These were then reviewed, combined or nested into a list of seven conservation targets (Table 2), each representing or capturing the array of ecological systems, communities and species at the National Park, including those highlighted in the preliminary list.

The seven conservation targets selected for Elijio Panti National Park can be divided into four subgroups:

Ecosystem Level: Assemblages of ecological communities that occur together, share common ecological processes, and have similar characteristics. Two terrestrial ecosystems have been selected

- **Broadleaf and Pine Forests**
- **Aquatic and Riparian Ecosystems**

Potential Conservation Targets for Elijio Panti National Park

- Broadleaf and Pine Forests (1)
- Pine Forest and Savanna (1)
- Aquatic and Riparian Ecosystems (2)
- Watersheds (1,2)
- Jaguar (3)
- Caves (7)
- Medicinal Plants (4)
- Baird's Tapir (3)
- Commercial tree species (4)
- Yucatan black howler monkey (1)
- Spider Monkey (1)
- Deer species (6)
- Paca (6)
- Bats (7(caves))
- Archaeological sites (7)
- Xate (5)
- Bayleaf (4)
- Breadnut (4)
- Great curassow, Crested guan, Ocellated turkey (6)
- Pacaya (4)
- Amphibians and reptiles (1,2)
- Waterfalls / Aesthetic beauty (7)
- Orchids and ornamental plants (4)

Numbers in brackets indicate the focal conservation target(s) that represents these potential targets, listed in Table 23.

Table 22

Focal Conservation Targets for Elijio Panti National Park

1. Broadleaf and Pine Forests
2. Aquatic and Riparian Ecosystem
3. Landscape Species
4. Forest Products
5. Xate
6. Game Species
7. Cultural Resources

Table 23

Species Assemblages: Groups of species that share common natural process or have similar conservation requirements:

- **Forest Products**
- **Game Species**
- **Landscape Species**

Keystone / Umbrella / Flagship Species: Also included is one species considered to have specific threats, and therefore specific conservation actions:

- **Xate**

Cultural Resources were chosen to represent the cultural values of the Elijio Panti National Park. This target includes the caves of the National Park, which are recognized to have both biodiversity and cultural elements, but it is assumed that conservation actions to protect the cave system will also provide protection for the bats and other species that are associated with the caves.

The justification for Conservation Target selection and a summary of the species, communities and ecological system represented by these targets is summarized in Table 24.

3.1.2 Assessment of Conservation Target Viability

For each conservation target, the viability of each of the conservation targets (Table 25) is assessed to give a reflection of their abundance and condition. Each is rated as Very Good, Good, Fair, or Poor, based on site specific knowledge of the ecosystems and species chosen, local knowledge and social conditions, using the viability ratings developed by TNC.

Viability Ratings

(Adapted from TNC 5-S System)

- | | |
|-------------------|--|
| Very Good: | Requires little or no human intervention to maintain conservation target at acceptable level (e.g. healthy, breeding populations, minimally impacted ecosystems) |
| Good: | May require some human intervention to maintain conservation target at acceptable level (e.g. reducing / preventing hunting pressure) |
| Fair: | Requires human intervention - if unchecked, the conservation target will be seriously degraded |
| Poor: | If allowed to remain in the present status, restoration or preventing local extinction will be impossible |

Justification is provided for the current viability rating, and a future viability goal is determined that is considered feasible within the 5-year term of the management plan, assuming the identified strategic actions are successfully implemented. Viability indicators are also listed, so that the co-management agency can monitor viability on an ongoing basis.

The justification for Conservation Target selection and a summary of the species, communities and ecological system represented by these targets is summarized in Table 24.

Table 24: Conservation Targets		
Conservation Target	Justification for Target Selection	Species, Communities or Ecological Systems Represented by Target
Forest Products	Strong tradition of medicinal plant use, with historical harvesting from the NP – park named after traditional healer. Still traditional harvesting of pacaya in January – March	Commercial timber species – including mahogany, cedar, santa maria, sapote and billy webb. Pacaya palm – the only species reported as currently being harvested by the community. Traditionally other species – medicinal plants, bayleaf, breadnut, orchids and other ornamental plants, etc., were collected.
Landscape (Wide-ranging) Species	Although relatively small, the protected area does provide protection for landscape species, including tapir and jaguar, as long as connectivity is maintained with the Maya Mountain Massif (MMM).	Baird’s Tapir, Jaguar
Broadleaf and Pine Forest	Protection of both the broadleaf and pine forests provides protection for a large number of species, as well as maintaining ecosystem processes and watershed protection	General wildlife species including birds, amphibians (possibly including the Critically Endangered <i>Agalychnis moreletii</i>) and reptiles, watershed protection. Mammals including the regional endemic – the Yucatan black howler monkeys, spider monkeys.
Game Species	Species considered of cultural importance, targeted by local hunters.	Ocellated turkey, great curassow, guan, paca, white tailed deer, brocket deer, white-lipped and collared peccary
Cultural Resources	Recognized as an important component of the resources of the Park	Archaeological structures, caves and archaeological artifacts, waterfalls / aesthetic landscapes
Aquatic and Riparian Resources	Recognized as an important component of the resources of the Park – particularly with the importance of watershed protection	Amphibians (including the endemic Maya Mountain Frog, <i>Lithobates juliani</i>) and reptiles (including Morelet’s crocodile),
Xate	Heavily impacted non-timber forest product.	Xate

Assessing Viability

The Viability Assessment, as conducted under the Conservation Planning process provides:

- An means for determining changes in the status of each focal conservation target over time, allowing Itzamna Society to measure success of its conservation strategies, compare the status of a specific focal target with future conditions, and with other projects in Belize / Central America that focus on that target
- A basis for the identification of current and potential threats to a target and identifies past impacts that require mitigation actions
- A basis for strategy design and the foundation for monitoring

Each Conservation Target was assessed using the following viability ratings:

- **Very Good** – The Indicator is considered to have an ecologically desirable status, requiring little or no intervention for maintenance.
- **Good** – The indicator lies within the acceptable range of variation, though some intervention is required for maintenance.
- **Fair** – The indicator lies outside the acceptable range of variation, and human intervention is required if the viability of the target is to be maintained
- **Poor** – Restoration of the conservation target is increasingly difficult, and impacts may result in extirpation from the conservation area

Table 25: Conservation Target Assessment			
Conservation Target	Current Rating	Goal	Justification for Rating, Goal and Indicator
Non-timber Forest Products	VERY GOOD	VERY GOOD	Justification: People in the past cutting for medicinal plants – especially balsam tree (non sustainable harvesting). Extraction of non-timber forest products largely stopped when the National Park was established, and plants are considered to have recovered to original levels
			Goal: To maintain current population levels of identified non-timber forest products
			Indicators: Regeneration, number of reports of illegal extraction of non-timber forest products
Landscape (Wide-ranging) Species	VERY GOOD	VERY GOOD	Justification: Jaguar populations are considered healthy, with breeding activity reported within the protected area. There is food available, and more tracks are seen than before. Tapir populations are also considered very good, with individuals coming into farmlands. Some conflict with farmers for both species. Xateros not doing too much hunting within area - the NP being too small for them to harvest a lot of xate, so not staying to hunt. Therefore no reduction in prey populations, as is seen in Chiquibul
			Goal: To maintain the current population as Very Good
			Indicators: Number of reports of hunting activity, number of tracks / sightings / faeces recorded by patrols. Number of tracks of juveniles recorded by patrols - per year
Broadleaf and Pine Forest	GOOD	VERY GOOD	Justification: The forest structure is considered good in both broadleaf and pine ecosystems, except in areas of regenerating agriculture and fire damage. Agricultural lands are regenerating, assisted by presence of good seed trees. Some limited illegal logging has occurred, with more human resources needed to protect the forest more effectively

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Conservation Target Assessment / 2			
Conservation Target	Current Rating	Goal	Justification for Rating, Goal and Indicator
Game Species	GOOD	VERY GOOD	Justification: Some hunting of game species, particularly from (though not restricted to) San Antonio, but populations are thought to be recovering from previous levels before establishment of protected area
			Goal: Very good, with no hunting incursions
			Indicators: Number of sightings of target species (paca, white-tailed / brocket deer, white lipped / collared peccary, great curassow, crested guan, ocellated turkey) during patrols, number of hunting activity reports per patrol, camera-trap reports
Cultural Resources	GOOD	GOOD	Justification: Whilst many artifacts remain intact within the caves, there has been some looting and breakage. There has also been structural damage to archaeological structures, which is considered to be increasing with increasing xatero activity. Some concerns on potential tourism impacts within caves if they are opened for tourism, and at waterfalls
			Goal: Maintain the current level as Good
			Indicators: Monitor human impacts at identified sites, number of reports of looting, % of cultural resources (waterfalls etc.) of protected area dereserved; Level of garbage per month / year
Aquatic and Riparian Resources	GOOD	GOOD	Justification: Privassion – Good – though there are perhaps some impacts from resorts, and resorts need to know of concerns. Macal – Fair. Water quality changed, contaminated, fewer fish. No-one fishes now due to concerns of mercury contamination
			Goal: Good. Can potentially improve Privassion by talking with resorts, but not Macal, though may improve once dam construction has finished. May eventually flush out, if watershed remains protected
			Indicators: Water quality, % watershed intact, number of creeks that are dammed (resorts)
Xate	FAIR	GOOD	Justification: Some areas still intact, others are harvested. Xateros active, and will seriously degrade the resource if not stopped
			Goal: Xate resources regenerating towards natural levels & condition
			Indicators: Number of uncut leaves, young plants, xatero activity reported

The results of the workshop output on Conservation Target viability are summarized (Table 26), with proposed management strategies targeted at increasing viability ratings over time.

Table 26: Conservation Targets – Current Rating		
Conservation Target	Current Rating	Goal
Forest products	Very Good	Very Good
Wide-ranging Species	Very Good	Very Good
Broadleaf and Pine Forest	Good	Very Good
Game species	Good	Very Good
Cultural Resources	Good	Good
Aquatic and Riparian Ecosystems	Good	Good
Xate	Fair	Good

Summary of Conservation Target Viability – Prioritization

Using the Viability Ratings, it is possible to prioritize the conservation importance of each of the Conservation Targets within the Elijio Panti National Park, to assist decision making in allocation of funding and future project targets.

Priority	Conservation Target	Viability Rating
High Priority	<i>Xate</i>	Fair
Medium Priority	<i>Aquatic and Riparian Ecosystems</i>	Good
	<i>Cultural Resources</i>	Good
	<i>Game Species</i>	Good
	<i>Broadleaf and Pine Forest</i>	Good
Lower Priority	<i>Wide-ranging Species</i>	Very Good
	<i>Forest Products (excluding xate)</i>	Very Good

3.2 Threats to Biodiversity

A fully participatory threat analysis was conducted in 2006 for the biodiversity assessment process, with input from a wide range of stakeholders – particularly community hunters and fishermen, and members of Itzamna Society with local and technical knowledge of the wildlife of the area.

3.2.1 Identified Threats

Outputs from the threat assessment identified nine threats (Table 28). These were then assessed using a series of three criteria to allow prioritization of conservation actions and resources towards mitigating those identified as the most critical threats.

Threats impacting Elijio Panti National Park	
▪	Hunting
▪	Extraction of non-timber forest products
▪	Logging
▪	Looting
▪	Dereservation
▪	Reduced water quality
▪	Fires
▪	Southern Pine Bark Beetle
▪	Xateros
▪	Dereservation

Table 28

This assessment rated:

- the area affected by the threat
- the severity of the threat
- the urgency of actions needed to mitigate the threat

Rating Critical Threats

The critical threats are assessed by Area, Severity and Urgency, using the following criteria:

- Area:** The area of the threat (how much of the conservation target area it affects)

Proportion of Area Affected (adapted from WCS)		
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:** The severity of the threat – how intense or great the impact is

Severity Ranking (adapted from WCS)		
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 five years

Urgency Ranking (adapted from WCS)		
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	Won't happen in > 10 years

Table 29: Threats to biodiversity of the Elijio Panti National Park			
Hunting	Status: Historically a lot, now reduced but still active, potential		
	Target: Game Species		
	Threats (Direct): <ul style="list-style-type: none"> ▪ Hunting from all three communities – primarily San Antonio. El Progreso has forest areas near community that are closer for hunting 		
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ Traditional food source ▪ Game species populations reduced outside pa 		
	Area	4	Whole area is being affected by hunting from the three communities (primarily San Antonio), and xateros,
	Severity	2	Used to be able to get 3 paca a night, now only one.
Urgency	3	Currently occurring	
<p>Management Goal: Reduce hunting within the protected area</p> <p>Management Strategies:</p> <p>Strategy 1: Increased surveillance and more effective enforcement of laws.</p> <p>Strategy 2: Increased collaboration - with FD, BDF, police, FCD and other agencies towards more effective surveillance and enforcement</p> <p>Strategy 3: Facilitate complementary programmes and activities to assist local communities to develop improved access to game species through ex-situ farming</p> <p>Strategy 4: Increase awareness of environmental services and importance of conservation</p> <p>Strategy 5: Increase effectiveness of education and awareness activities</p>			

Threats to biodiversity of the Elijio Panti National Park			
Non-sustainable extraction of non-timber forest products (excluding xate)	Status: <i>Active</i>		
	Target: <i>Non-timber forest products</i>		
	Threats (Direct): <ul style="list-style-type: none"> ▪ <i>Harvesting of pacaya</i> ▪ <i>Potential harvesting of wano and medicinal</i> 		
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ <i>Income</i> ▪ <i>Traditional food</i> 		
	Area	3	<i>Harvesting occurs in the majority of the accessible areas where these non-timber forest products occur</i>
	Severity	0	<i>Locally, harvesting is considered to be sustainable, but harvesting by xateros is not.</i>
	Urgency	3	<i>Seasonally, in January - March</i>
<p>Management Goal: To ensure any permitted extraction of NTFP is sustainable.</p> <p>Management Strategies:</p> <p>Strategy 1: Facilitate complementary programmes and activities to assist local communities to develop improved access to forest products through ex-situ cultivation - investigate potential for ex-situ cultivation of pacaya, wano and medicinal plants</p> <p>Strategy 2: Education and awareness of legislation of protected area and opportunities for ex-situ sustainable production</p> <p>Strategy 3: If there is the potential for ex-situ cultivation, liaise with FD for permission for extraction of seed stock for nursery for non-timber product cultivation</p>			

Threats to biodiversity of the Elijio Panti National Park		
Illegal Logging	Status: Historical, Potential	
	Target: Broadleaf and Pine Forest	
	Threats (Direct): <ul style="list-style-type: none"> ▪ Logging 	
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ Income - Commercial use ▪ Requirement for Fence posts ▪ Requirement for House posts 	
	Area	1
Severity	1	<i>The current limited number of trees taken has little impact on the forest structure</i>
Urgency	2	<i>It is thought that illegal logging may occur sometime in the next three years, but is not a continuous current activity</i>
Management Goal: Prevent illegal logging		
Management Strategies:		
Strategy 1: Investigate the potential for long term investment in planting commercial tree species (ex-situ)		
Strategy 2: Increased surveillance and enforcement – reduced unsustainable xate harvesting, illegal hunting, looting and logging		
Strategy 3: Increased collaboration - with FD, BDF, police, FCD and other agencies towards more effective surveillance and enforcement		
Strategy 4: Maintain clear boundary in San Antonio and Mai Gate areas, and increase signage		
Strategy 5: Increased education re. environmental benefits of the protected area		

Threats to biodiversity of the Elijio Panti National Park			
Looting	Status: Historical, Active, Potential		
	Target: Cultural resources		
	Threats (Direct): <ul style="list-style-type: none"> ▪ Damage to structures and artifacts ▪ Removal of artifacts 		
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ Income generation, primarily for xateros, but also for local community members ▪ Lack of respect for cultural values 		
	Area	4	All known archaeological sites have signs of looting
	Severity	3	Looting is destructive and irreparable, with removal and loss of artifacts
	Urgency	3	Looting is currently occurring, wherever xateros encounter archaeological structure
<p>Management Goal: To prevent looting of archaeological sites within the National Park</p> <p>Management Strategies:</p> <p>Strategy 1: Increased surveillance and enforcement – reduced unsustainable xate harvesting, illegal hunting, looting and logging</p> <p>Strategy 2: Increased collaboration - with FD, BDF, police, FCD and other agencies towards more effective surveillance and enforcement</p> <p>Strategy 4: Develop memorandum of understanding with Institute of Archaeology for caves, and request more technical support from IoA in management.</p> <p>Strategy 5: Increase tourism for increased human presence</p> <p>Strategy 6: Ensure any tourism impacts are minimized - signs in caves requesting no touching/ breaking</p>			

Threats to biodiversity of the Elijio Panti National Park			
Unsustainable harvesting of Xate	Status: Active		
	Target: Xate		
	Threats (Direct): <ul style="list-style-type: none"> ▪ Harvesting of leaves ▪ Potential harvesting of seeds and seedlings 		
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ Xate industry in Guatemala ▪ Limited economic opportunities in Guatemala communities ▪ Xate industry in Belize ▪ Very limited control & monitoring of Belizean xate industry 		
	Area	4	60 – 65% is thought to have been harvested. Is likely to increase to 100% with increasing xatero activity.
	Severity	2	
	Urgency	3	
<p>Management Goal: To prevent further harvesting of xate within the National Park</p> <p>Management Strategies:</p> <p>Strategy 1: Support national initiatives towards improved regulation /control / monitoring & enforcement of the Belize Xate industry</p> <p>Strategy 2: Increase effectiveness of surveillance and enforcement activities</p> <p>Strategy 3: Increased collaboration - with FD, BDF, police, FCD and other agencies towards more effective surveillance and enforcement</p> <p>Strategy 4: Facilitate complementary programmes and activities to assist local communities to developed improved access to forest products through ex-situ cultivation - Investigate the potential for extending community cultivation of xate for industry – through provision of seeds</p> <p>There is concern that xate may be being illegally harvested for the Xate industry in Belize this paying a higher price than the adjacent Guatemala market</p>			

Threats to biodiversity of the Elijio Panti National Park		
Fire	Status: <i>Historical, Potential</i>	
	Target: Broadleaf Forest. (Fire impacts have reportedly not affected the pine forest)	
	Threats (Direct): <ul style="list-style-type: none"> ▪ Agricultural fires 	
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ Poorly managed milpa fires ▪ Lack of enforcement of Agricultural Fire act 	
	Area	1 <i>In boundary area</i>
	Severity	2 <i>Destroys understory, can burn up the hill slopes</i>
	Urgency	2 <i>May happen this year, but not 100% certain</i>
<p>Management Goal: To prevent anthropogenic fire impacts within Elijio Panti National Park</p> <p>Management Strategies:</p> <p>Strategy 1: Implement Fire Management Programme - liaise with Agricultural Department for enforcement of Agricultural Fire Act</p> <p>Strategy 2: Implement Fire Management Programme - increase education and awareness of milpa fire management</p> <p>Strategy 3: Implement Fire Management Programme - dialogue with farmers at start of dry season</p> <p>Strategy 4: Implement Fire Management Programme - collaborate with fire management initiatives under the Forest Department</p>		

Threats to biodiversity of the Elijio Panti National Park		
Reduced water quality	Status: Active	
	Target: <i>Aquatic and Riparian Ecosystems</i>	
	Threats (Direct): <ul style="list-style-type: none"> ▪ Dams ▪ Release of effluents ▪ Logging in the upper Privassion ▪ Increased sedimentation from land use change in watershed ▪ Potential development of further tourism resorts 	
	Source (Indirect Threat): <ul style="list-style-type: none"> ▪ Demand for Energy production ▪ Poorly constructed / maintained septic systems ▪ Road maintenance in MPRFR ▪ Forest clearance ▪ Flooding 	
Area	1	<i>Whilst the Macal is the most seriously degraded, it is only a portion of the aquatic systems within or adjacent to the protected area. All others are considered to be unimpacted, or only minimally impacted</i>
Severity	1	<i>Whilst impacts on the Macal are considered to be severe, it is only a portion of aquatic systems within or adjacent to the protected area.</i>
Urgency	3	<i>Impacts are currently occurring as a result of the construction of the Vaca Dam, and the presence of other dams</i>
<p>Management Goal: To maintain and improve water quality in the aquatic systems of Elijio Panti National Park where possible</p> <p>Management Strategies:</p> <p>Strategy 1: Ensure maintenance of good water quality and flow - liaise with resort owners and DoE re. ensuring minimal impact sewage systems</p> <p>Strategy 2: Ensure maintenance of good water quality and flow - monitor land use change in watershed, and actively lobby against any further land use change</p> <p>Strategy 3: Ensure maintenance of good water quality and flow - develop water quality monitoring programme, including monitoring for potential contamination of water system by pesticide drift</p>		

Threats to biodiversity of the Elijio Panti National Park			
Dereservation	Status: Historical, Potential		
	Target: Broadleaf and Pine Forest, Aquatic and Riparian Ecosystems		
	Threats (Direct):		
	<ul style="list-style-type: none"> ▪ Land clearance ▪ Release of effluents, agricultural chemicals into creeks ▪ Removal of riparian vegetation ▪ Increased sedimentation from land use change in watershed 		
	Source (Indirect Threat):		
	<ul style="list-style-type: none"> ▪ Demand for agricultural land ▪ Demand for tourism properties with waterfalls and caves ▪ Demand for slate extraction for local crafts ▪ Weakness in the protected area system allowing dereservation 		
	Area	1	Specific locations within the national Park, due to aesthetic, geological or soil properties
	Severity	3	Once dereserved, some land use change can be expected to occur
	Urgency	1	There has been dereservation in the past for access to slate, with pressure for further dereservation in areas of agricultural and tourism potential
	<p>Management Goal: To maintain the natural and cultural values of Elijio Panti National Park where possible</p> <p>Management Strategies:</p> <p>Strategy 1: Increase profile of Elijio Panti National Park, to reduce potential for dereservation</p> <p>Strategy 2: Increase local support for the National Park through greater community participation and involvement, and increased community awareness activities</p>		

3.2.2 Prioritizing Threats

Once the threat assessment has been completed, it is important to prioritize threats, to indicate where financial and human resources need to be most focused. This is done a standard prioritization process.

The threats are listed, and for each threat, the scores are transferred from the previous threat assessment (Table 30):

Table 30: Prioritization of Identified Threats					
Threat	Criteria Ratings			Total AxSxU	Rank
	Area	Severity	Urgency		
Looting	4	3	3	36	1
Xateros	4	2	3	24	2
Hunting	4	2	3	24	2
Fire	1	2	2	4	4
Water Quality	1	1	3	3	5
Derreservation	1	3	1	3	5
Logging	1	1	2	2	7
NTPF	3	0	3	0	0

The threat with the highest total threat score is ranked as the highest threat. As expected, this places looting as the highest priority, as the archaeological resources are non-renewable, and once lost cannot be regained.

Unsustainable harvesting of xate and hunting are both highlighted as the second highest priorities, reflecting the high level of impact faced throughout the Chiquibul forest to the south, primarily from illegal xatero incursions from Guatemala. Hunting is also thought to be occurring from stakeholder community members – particularly San Antonio.

3.3 Strategies to Reduce Threats

During the threat assessment process, the primary cross cutting strategies were identified for effective management of Elijio Panti National Park, and the leverage of each activity analyzed in terms of the number of targets they impact (Table 31).

Strategies	Forest Products	Wide-ranging Species	Broadleaf and Pine Forests	Game Species	Cultural Resources	Aquatic and Riparian Ecosystems	Total
Increase effectiveness of education and awareness activities							
Increase awareness of legislation associated with natural and cultural resources, and protected areas							
Increased surveillance and enforcement – reduced unsustainable xate harvesting, illegal hunting, looting and logging							
Increased collaboration - with FD, BDF, police, FCD and other agencies towards more effective surveillance and enforcement							
Maintain clear boundaries in areas of potential illegal entry							
Increase awareness of environmental services and importance of conservation							
Support national initiatives towards improved regulation / enforcement of the Belize Xate industry							
Facilitate complementary programmes and activities to assist local communities to developed improved access to forest products and game species through ex-situ cultivation							
Ensure tourism impacts are minimized							
Ensure maintenance of good water quality and flow							
Implement fire management programme							
Key	Low	Impacts 1 – 2 targets					
	Medium	Impacts 3 – 4 targets					
	High	Impacts 5 – 6 targets					

Table 31: Strategy Leverage

Of the eleven strategies, one is highlighted as being of the greatest impact across the conservation targets:

- **Increase effectiveness of education and awareness activities**

with a further six strategies impacting five of the six targets.

If prioritized and implemented, these will have the greatest positive effect on the Elijio Panti National Park. One strategy has a medium level impact – positively affecting between four targets, whilst the last three strategies are more specific, affecting one or two targets.

3.4 Monitoring of Success of Conservation Strategies

Monitoring of success of key conservation strategies should be conducted annually, to provide IS with a means of prioritizing activities to ensure that management fulfills its commitment to effective conservation of natural and cultural resources within Elijio Panti National Park. Monitoring will be conducted using the following two measures of success matrices – the first monitoring success of implementation (Table 32), and the second, monitoring success of outputs (Table 33).

Strategy	Year					Comments: Justification for Measure of Success rating. Problems, concerns. Notes for inclusion in operational plan / updated Management Plan
	1	2	3	4	5	
Increase effectiveness of education and awareness activities						
Increase awareness of legislation associated with natural and cultural resources, and protected areas						
Increased surveillance and enforcement – reduced unsustainable xate harvesting, illegal hunting, looting and logging						
Increased collaboration - with FD, BDF, police, FCD and other agencies towards more effective surveillance and enforcement						
Maintain clear boundaries in areas of potential illegal entry						
Increase awareness of environmental services and importance of conservation						
Support national initiatives towards improved regulation of the Belize Xate industry						
Facilitate complementary programmes and activities to assist local communities to developed improved access to forest products and game species through ex-situ cultivation						
Ensure tourism impacts are minimized						
Ensure maintenance of good water quality and flow						
Implement fire management programme						

During each annual assessment, each strategic area is graded as follows: **Succeeded, Improved, No change, Worse**. This provides an ongoing review of success of implementation, indicating which areas need to be prioritized within annual operational plans, and guiding funding requirements.

Strategy	Current Status	Year					Desired Status
		1	2	3	4	5	
Facilitate complementary programmes and activities to assist local communities to developed improved access to forest products and game species through ex-situ cultivation	IS has initiated projects associated with xate production, and plans to investigate programmes for production of other non timber forest products						Key community stakeholders are benefitting from access to cultivated non timber forest products
Ensure tourism impacts are minimized	Limited tourism, but awareness that if caves, in particular, become tourism sites, there may be tourism impacts without careful planning, monitoring and engagement of tour guides						Tourism impacts are limited through careful planning, collaboration with tour guides, enforcement and monitoring
Ensure maintenance of good water quality and flow	Water quality and flow within EPNP are good, except for Macal, following construction of dam						Water quality and flow remain good within EPNP, through monitoring of adjacent landuse within the watershed and addressing issues
Implement fire management programme	Staff are trained and equipped for fire management. Fire management programme not yet finalized						Fire management programme finalized and implemented, with reduced fires within EPNP

In November of each year, during the annual management review, the current status should be noted for each priority conservation strategy, providing clear indication of how IS is succeeding in achieving its conservation goals.

4. Management Planning

4.1 Management and Organizational Background

Itzamna Society (IS) is community-based CBO, registered in February 2000, with the purpose of developing and managing Elijio Panti National Park and promoting biodiversity conservation, cultural patrimony, and community development within the three stakeholder communities.

The Society consists of volunteer members representing the communities of San Antonio, Cristo Rey, and El Progreso 7 Miles, organized as a group in the recognition that a coordinated, unified voice would facilitate effective decision-making for management of local lands. The Society is based on recognition of the value the ecological and cultural importance of the area and is committed to its preservation and sustainable development for the future. All members are active community leaders (village council members, police officers, cultural awareness leaders, water board members, farmers, and teachers) who represent the communities. In addition to possessing strong leadership skills, many members have received training (including forest planning and management, organic cultivation, and conservation awareness), and have attended valuable workshops on park management and conservation of protected areas to build their capacity. Overall, the committee members are very familiar with the surrounding communities and are the most qualified to spearhead management of Noj Ka'ax H'Men Elijio Panti National Park (EPNP).

The committee meets once a month to discuss the park's management and development, while the executive members meet weekly to plan and coordinate activities. The seven member executive committee is comprised of the following persons:

Chairperson	-	Maria Garcia
Vice-Chairperson	-	Rafael Mesh
Secretary	-	Gilbert Canto
Treasurer	-	James Mesh
Councillor	-	Inocencio Canto
Councillor	-	Marco Tzib
Councillor	-	Julio Ruano

IS has worked to accomplish its goals by providing educational and training opportunities for community members including women, youth, students, farmers and indigenous peoples from San Antonio, Cristo Rey and El Progreso 7 Miles. These activities focused on many topics such as park management and planning, project design and management, sustainable tourism development, cave guiding, conservation awareness, organic farming practices, indigenous permaculture practices, pine bark beetle monitoring, and fire control issues. IS also took the initiative to educate students from both the United Pentecostal and Roman Catholic Schools of San Antonio on environmental issues. They also organized a two- day field trip for farmers to learn about organic cacao growing, facilitated cooking and ceramics courses for women and youth, and began to teach members from the buffering communities about the park's regulations and environmental importance in protecting biodiversity.

The Itzamna Society recognizes the importance of forming partnerships and has worked along with community volunteers to develop and manage EPNP on projects including the maintenance of the park access road, the construction of a warden's shelter, the construction of trails, and providing transportation into the park. IS has also allied with other organizations and relevant government agencies to further its goals. IS has a strong working relationship with Trekforce

Expeditions to train wardens, construct campsites, trails, and other infrastructure, conduct topographical transects, and spearhead a conservation awareness program in San Antonio village. Peace Corps also supports I.S. by providing environmental and educational volunteers and LightHawk has conducted over-flights for community members. In addition, the GOB, the Embassy of the Federal Republic of Germany, and the Protected Areas Conservation Trust have worked along with IS to complete various projects. Most recently, in October 2003, IS joined the international organization Asociacion Coordinadora Indigena y Campesina de Agroforesteria Comunitaria Centroamericana (ACICAFOC) to expand opportunities and support.

4.2 Review of Previous Management Effectiveness

The management programmes and activities within the 2005 draft management plan were used to generate a measures-of-success matrix (Table 34) to assist in evaluating the current status of activities within the national park.

Measures of Success of Implementation of Activities under EPNP Draft Management Plan					
	Total	Succeeded	Improved	No Change	Worse
Resource Management and Protection Programme	15	4	5	5	1
Research and Monitoring Programme	9	0	4	5	0
Human Use Programme - Specific Activities	20	5	3	12	0
Human Use Programme - Tourism	7	1	3	3	0
Human Use Programme - Interpretation	6	1	1	4	0
Human Use Programme - Education	7	3	1	3	0
Human Use Programme – Community Development	11	5	2	4	0
Administration Programme	12	0	5	7	0
Administration Programme - Maintenance	4	0	3	1	0
Development Programme	4	1	1	2	0
Total	95	20	28	46	1
%		21.1	29.5	48.4	1.1
% +ve / -ve		50.5		49.5	

Table 34: Implementation Effectiveness of Activities highlighted under Draft Management Plan

Of the 95 activities listed under the draft management plan, only one of the areas of influence is considered to have shown a decrease in effectiveness – the human resources available to protect the National Park (during the development of the draft management plan, two park wardens were employed. Now, only one is employed, with support from interns on a short term basis).

Approximately half of the activity areas are considered to have improved (29.5%) or succeeded (21.1%), whilst approximately half show no change in status. It should be noted that as the management plan was not approved, and as only 2½ years has passed since the programmes and activities were developed, this level of achievement is considered good. However, it should be noted there is also significant overlap in strategies between management programmes, which may result in a skewed assessment, with a higher effectiveness output than is actually the case.

Itzamna Society also participated in a national review of management effectiveness in July, 2006, using the Management Effectiveness Tracking Tool developed under the NPAPSP.

Summary of the outputs from the 2006 NPAPSP assessment:

Individual Indicators*	
Indicator Category	Average Score (out of a possible Score of 4)
1. Resource Information	2.50
2. Resource Administration, Management and Protection	3.22
3. Participation, Education and Socio-Economic Benefit	3.18
4. Management Planning	3.00
5. Governance	3.00
6. Human Resources	2.00
7. Financial and Capital Management	2.13
Overall	2.72

* Indicators and Indicator categories used are from Young et. al., 2005

Table 35: Indicator Categories for Assessment of Management Effectiveness

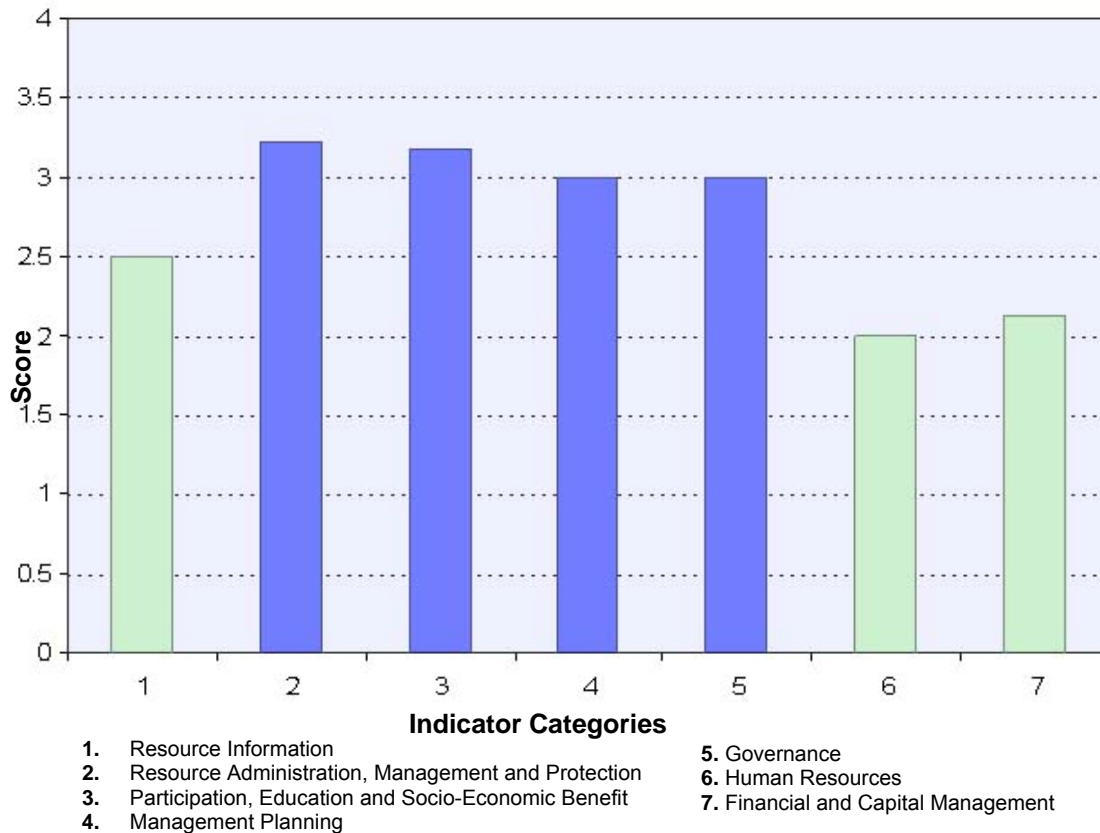
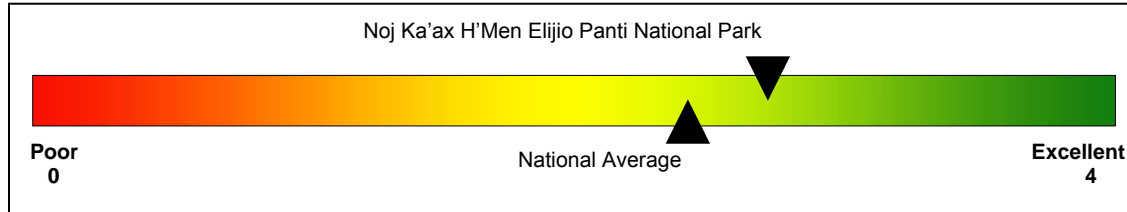


Figure 6: Range of Indicator Category average scores for management effectiveness of Noj Ka'ax H'Men Elijio Panti National Park

Whilst this assessment is not designed to give comparisons between protected areas, it is useful to compare the performance of Noj Ka'ax Me'en Elijio Panti National Park with the average for all protected areas assessed. Overall, the assessed protected areas score a total average of **2.51**. When averaged across the seven Indicator Categories, Noj Ka'ax Me'en Elijio Panti National Park scores **2.72**.



Conclusions and Recommendations

1. Resource Information

The management of the Elijio Panti National Park is assessed as being in need of general strengthening in the area of resource information, and in the collation of baseline data on the physical and biotic environment, cultural and archaeological resources, resource use and threat assessment, and in the area of research activities. It is assessed as being somewhat stronger in the areas of baseline data on socio-economic context, tenure claims information, incorporation of traditional knowledge, environmental monitoring, and data management, (though would still benefit from additional strengthening), and as having adequate identification of conservation targets – though in view of management in all other areas of resource information (which are necessary for adequate identification of conservation targets), this may be erroneous (*Note: The conservation planning for this management plan fills this gap. June 2008*)

2. Resource Administration, Management and Protection

The management of the Elijio Panti National Park is assessed as being relatively strong in the areas of resource administration, management and protection – though would still benefit from additional strengthening. Its legal status, boundary demarcation and visitor monitoring activities are assessed as adequate, but management is weak in the area of policies for best management practices. Surveillance, enforcement, tenure claim conflict resolution, permitting processes and visitor management would also benefit from further strengthening.

3. Participation, Education and Socio-Economic Benefit

The management of the Elijio Panti National Park is assessed as being strong in the areas of communication, and stakeholder participation, but weak in providing opportunities for local economic benefits, and in local recognition of the protected area – and would benefit from strengthening in these areas. There is also scope to strengthen management in the areas of environmental education, dissemination of knowledge, in its volunteer programme, capacity-building and socio-economic benefits strategy. (*Note: Recent conflict within the San Antonio community suggests that community engagement has not been successful and this area needs higher prioritization. Output from community workshops in Cristo Rey and El Progreso – 7 Miles also suggests that whilst these communities are supportive, they do not*

feel that they are participating. There is also the question of whether Cristo Rey is a key stakeholder community. June, 2008)

4. Management Planning

The management of Elijio Panti National Park is assessed as being weak in the area of management planning, though it is considered to have adequately identified long-term needs. A management plan is needed to provide a framework from which the management organization can operate in a more structured and effective manner, with integrated operational planning, implementation of zoning regulations and programme monitoring and evaluation, for all of which there is scope for strengthening.

5. Governance

The management of Elijio Panti National Park is assessed as being strong in having clear objectives and a co-management agreement that is adequate for management purposes. It would, however, benefit from having a local advisory committee providing input from the stakeholder communities, and in improving the current limited communication / collaboration with counterpart protected area managers. There is also scope to strengthen the effectiveness of the board of directors, and the administrative autonomy of the protected area.

6. Human Resources

The management of Elijio Panti National Park is assessed as being limited by limitations in human resources and would benefit from strengthening, particularly in the areas of site manager qualifications, and in the very limited availability of any other staff. There is also scope to strengthen staff training activities, and implement human resource surveys.

7. Financial and Capital Management

Whilst the management of the Elijio Panti National Park is assessed as being strong in financial management, there is limited access to adequate funding, equipment, infrastructure, maintenance and signage – all areas that would benefit from strengthening.

The Management Effectiveness assessment highlights the areas requiring particular attention – those scoring only One or Two when being assessed. These are identified and specific activities recommended for improving effectiveness (Tables 36 – 37).

Table 36: Management Indicators Scoring One	
1. Resource Inventory	
1.12 Scientific research activities	Activity: Develop a research programme focused on critical management needs, and locate qualified personnel to conduct the identified research (volunteers, UB, Trekforce)
2. Resource Administration, Management and Protection	
2.3 Legal registration, permit and approval process	Activity: Liaise more closely with Forest Department over permitting issues
4.4 Identification of long term management needs	Activity: Develop a Strategic Plan to identify long term management requirements
5. Human Resources	
6.1 Qualified Site Manager	Activity: Build the capacity of current site staff Activity: Locate funding for a dedicated, qualified site manager
6.3 Administrative Staff	Activity: Locate funding for administrative staff
6.4 Technical, scientific and professional staff	Activity: Liaise with Forest Department and other organizations of the Maya Mountains Massif for access to technical, scientific and professional assistance
6.5 Operational Staff	Activity: Liaise with Forest Department and other organizations of the Maya Mountains Massif towards collaborative patrols Activity: Locate funding for a second site ranger
7. Finance and Capital Management	
7.4 Infrastructure adequate for management	Activity: Assess current infrastructure, and future infrastructure requirements. Address identified gaps
7.5 Equipment adequate for management	Activity: Assess current equipment, and future equipment requirements. Address identified gaps
7.8 Maintenance adequate for management	Activity: Assess maintenance activities and address identified requirements

Table 37: Management Indicators Scoring Two	
1. Resource Inventory	
1.1 Inventory of physical environment	An inventory of the physical environment has been conducted during the development of this Management Plan
1.2 Inventory of biotic environment	Activity: Expand basic inventory of the biotic environment provided in this management plan
1.3 Inventory of social, cultural and economic context	Activity: Expand basic inventory of the social, cultural and economic context provided in this management plan
1.5 Resource use and occupancy	Activity: Establish a clear understanding of tenures and claims within Elijio Panti National Park
1.8 Systematic threat assessment	Activity: A systematic threat assessment has been conducted during the development of this Management Plan
2. Resource Administration, Management and Protection	
2.5 Guidelines and best management practices exist	Activity: Develop guidelines and best management practices for Itzamna Society
3. Participation, Education and Socio-Economic Benefit	
3.3 Dissemination of knowledge and information	Activity: Establish mechanisms for dissemination of knowledge and information – through LAC, workshops, and education and awareness programmes
3.4 Level of stakeholder participation in management	Activity: Establish mechanisms for stakeholder participation in management decisions, through Local Advisory Committee and workshops
3.9 Existence of socio-economic benefits strategy	Activity: Establish and implement a socio-economic benefits strategy

Table 37: Management Indicators Scoring Two (continued)	
3. Participation, Education and Socio-Economic Benefit	
3.10 Extent of local economic benefits	Activity: Establish a programme to monitor the extent of socio-economic benefits
3.11 Local recognition of protected area benefits	Activity: Establish a programme to monitor the extent of local recognition of protected area benefits
4. Management Planning	
4.1 Management plan	Activity: The need for a Management Plan is currently being addressed
4.3 Regulation and implementation of management zones	Activity: Regulations and implementation of management zones need to be well founded through a series of community workshops if zoning is to succeed
4.5 Programme monitoring and evaluation	Activity: Monitor and evaluate success and implementation of programme activities annually
6. Human Resources	
6.1 Qualified site manager	Activity: Ensure funding is located to employ a qualified protected area manager
6.2 Site manager availability (part time / full time)	Activity: Ensure funding is located to employ a qualified protected area manager
6.3 Administrative staff	Activity: Ensure funding is located to employ essential administrative staff

4.3 Management Goals

Under the National Protected Areas Policy and System Plan, there is a move to standardize protected area categories with those of the global conservation community, following the IUCN system. Under this, Elijio Panti National Park is designated as a Category II protected area. This provides guidelines for activities that can take place within the protected areas, to be taken into account during the development of future goals and objectives.

Elijio Panti National Park	
CATEGORY II	National Park: protected area managed mainly for ecosystem protection and recreation
Definition	Natural areas of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation detrimental to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.
Guidance for Selection	<ul style="list-style-type: none"> ▪ The area should contain a representative sample of major natural regions, features or scenery, where plant and animal species, habitats and geo-morphological sites are of special spiritual, scientific, educational, recreational, and tourist significance. ▪ The area should be large enough to contain one or more entire ecosystems not materially altered by current human occupation or exploitation
Objectives	<ol style="list-style-type: none"> 1. To protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes; 2. To perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity; 3. To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state; 4. To eliminate and thereafter prevent exploitation or occupation detrimental to the purposes of designation; 5. To maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation; and 6. To take into account the needs of indigenous people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

IUCN Protected Area definitions

In accordance with the National Parks System Act of 1981, management will be guided by the following series of management objectives, which have been developed to provide a framework for management for the next five-year period:

Elijio Panti National Park

Overall Management Objectives:

- To conserve and protect the biodiversity of Noj Ka'ax H'Men Elijio Panti National Park, its natural and genetic resources, hydrological beauty and quality, and the soil and geological resources.
- To provide recreation, education, and research opportunities for local, national, and international visitors in manner that is compatible with the natural and cultural environment.
- To promote the cultural diversity of the local communities and relationships between those cultures and the natural environment.
- To provide mechanism for community involvement in the management and protection of the National Park.
- To develop and provide economic sustainability for the national park and support the economic development of the local communities and surrounding areas.
- To conserve and protect the valuable archaeological resources within the national park.

These objectives and their associated individual management programme objectives and activities cannot be taken as discrete units, as they exist as a part of an integrated overall management concept. To succeed, all parts of the whole have to be addressed and acted upon, as actions of each management programme support the others.

4.4 Management Strategies

4.4.1 Regulations

The Itzamna Society, the co-management agency for Elijio Panti National Park, has established the following regulations:

1. No pets are allowed within the National Park
2. Stay on trails provided in order to avoid damage to plants life.
3. Use only designated campsite and fire pits.
4. No Hunting and/or fishing allowed within the park.
5. Visitors are responsible for the removal of any trash.
6. Collection of any plants or animals is prohibited.

4.4.2 Management Zones

As part of the overall Maya Mountains Massif, Eljio Panti is located in the General Purpose zone, for general biodiversity protection, with visitor access for tourism, education and research.

General Protection Zone – System-Level Zoning for the Maya Mountains Massif		
Zone	Objective	Regulations / Guidelines
IUCN Category II		
<p>II General Protection Zone</p> <p>General biodiversity and cultural resource protection, with visitor access for tourism, education and research</p> <p>Provides a buffer for the Core Preservation Zone</p>	<ul style="list-style-type: none"> ▪ To maintain biodiversity resources and watershed functionality with minimal human impact, under management of the Forest Department and site-level protected area co-managers ▪ To maintain cultural resources with minimal human impact, under management of the Institute of Archaeology, in collaboration and site-level protected area co-managers and, where relevant, Forest Department ▪ To allow access for scientific research, education and low-medium impact tourism ▪ To ensure effective surveillance and enforcement 	<ul style="list-style-type: none"> ▪ Minimal impact research under permission from Forest Department, Institute of Archaeology (dependent on research target) and site-level protected area co-managers ▪ No collecting of flora, fauna or inorganic material other than by approved researchers (as defined within the Research Policy document) with the permission of Forest Department, in consultation with site-level protected area co-managers ▪ Low to medium impact tourism, where site-level management zones permit ▪ All mining operations (exploratory and extractive), to have EIA, with strict ECP guidelines, and monitoring by FD, FCD and Geology and Petroleum, funded by concession holder ▪ Where exploratory and /or extractive mining activities are approved, best practices for “minimum impact” are implemented, geared towards limiting footprint, damage, destruction or disturbance of natural habitat and cultural resources ▪ Close liaison and collaboration with Department of Geology and Petroleum, towards integrated management. ▪ Effective Surveillance and enforcement

Under System-Level planning, Eljio Panti National Park is also recognized as an important focus for community participation, with an emphasis on increasing community awareness of environmental benefits

Within the framework of this system-level zonation, Eljio Panti National Park itself is divided into two zones at site level, related to the management of fire risk.

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Zone	Objectives	Regulations
General Use Zone	<ul style="list-style-type: none"> ▪ To provide opportunities for established recreational / tourism uses and activities (swimming, interpretative hiking, camping, picnicking, bird watching) in an environmentally sustainable manner ▪ To facilitate environmental education and recreation with the least possible negative environmental impact. 	<ol style="list-style-type: none"> 1. Recreational activities are permitted, managed and controlled by management organization. 2. Controlled education and research activities are permitted with permission from management organization and Forest Department. 3. Minimal alteration of the natural habitat and cultural features are permitted, to accommodate visitors and facilities, following consultation with Forest Department and the Institute of Archaeology. 4. Visitors must remain in designated visitor-use areas.
<p>Special Management Zone</p> <p>At EPNP, all forest fire, regardless of ignition source, will be suppressed. Prescribed fire and/or non-fire applications will be used to achieve a variety of resource management objectives.</p> <p style="text-align: center;"><i>Draft Integrated Fire Management Plan</i></p>	<ul style="list-style-type: none"> ▪ To provide a management regime that minimizes fire risk 	<ol style="list-style-type: none"> 1. Increased monitoring for fires during dry season 2. Increased surveillance and enforcement presence during dry season 3. Implementation to achieve fire management goals, as outlined in the draft Integrated Fire Management Plan (Figure ...).

Elijio Panti National Park - Draft Integrated Fire Management Plan

Forest Fire Management Goals

The following fire management goals will be pursued at EPNP:

- Suppress all forest fire in a cost-effective manner, consistent with resource objectives, considering firefighter and public safety (always the highest priority), and values to be protected (including adjacent non-agency land).
- Use prescribed fire and/or non-fire applications to:
 - Reduce hazard fuels accumulation, which in turn:
 - reduces the threat of catastrophic forest fire, and reduces the risk of negative impacts to park resources in the event of a forest fire.
 - improves conditions for firefighter and public safety, and reduces suppression costs in the event of a forest fire.
 - Promote ecosystem sustainability.
 - Restore, preserve and maintain the touristic landscape.
 - Promote exotic vegetation species control.
 - Initiate nutrient recycling for healthy soil conditions.
- Manage all forest fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics, and maximizing efficiency via interagency coordination and cooperation.
- Maintain existing memoranda of understanding with national and local fire management agencies in order to facilitate close working relationships and mutual cooperation regarding fire management activities.
- Develop and conduct a monitoring program with recommended standard monitoring levels commensurate with the scope of the fire management program, and use the information gained to continually evaluate and improve the fire management program.
- Minimize the occurrence of human-caused forest fires via the implementation of fire prevention activities, including public and employee education.
- Integrate knowledge gained through natural resource research into future fire management decisions and actions.
- Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective fire management program.
- Plan and conduct all fire management activities in accordance with all applicable laws, policies and regulations.
- Incorporate minimum impact suppression tactics to the greatest extent feasible and appropriate into all suppression activities.

Draft Integrated Fire Management Plan for Elijio Panti National Park

4.4.3 Limits of Acceptable Change

With increasing visitation comes the potential for increasing impacts to the environment, presenting the ever-present dilemma of how a protected area can develop a sustainable financial income from tourism without causing significant damage to the natural resources that attract the visitors. This poses the question that, given increasing recreational use and the inevitable impact this will have on the local environment, what are the biophysical and social conditions that should be considered as acceptable to both the management organization and to visitors.

Planning for the mitigation of visitor impacts is based on the recognition of a number of specific values that are essential for both the conservation management of the area and for future appreciation by visitors.

- The quality of the environment, which forms the basis for all other human values and benefits associated with the protected area
- The dependence of recreational activities on the maintenance of near-pristine conditions
- The importance of economic and social benefits to both local stakeholders and to the Belize economy as a whole
- The value of the protected area as a recreational and educational resource

With the relative youth of the potential co-management organization, and the limited tourism currently being experienced in the Elijio Panti National Park, it is suggested that the development of a Limits of Acceptable Change programme should not be considered for at least the initial two years of plan implementation, to enable Itzamna Society to focus on developing its management capacity and establishing a management presence. Guidance should, however, be sought from the Institute of Archaeology for mechanisms to limit impacts on cave structures before such a programme is developed and implemented.

4.4.4 Management Constraints and Limitations

This Management Plan has been developed with the assumption that the Itzamna Society can resolve its current management issues, primarily through increasing community engagement and active participation. Whilst having several dedicated members, Itzamna Society needs to build an active Board again as a matter of urgency if it wants to move forward into a co-management position, and revitalize its position within the three stakeholder communities (San Antonio, in-particular).

Current operational constraints include the lack of a dedicated, paid staff members, and equipment and capacity for effective surveillance and enforcement. Other management constraints have been also been identified under 4.2 (Review of Previous Management Effectiveness).

Checklist for Effective Protected Area Management

- Be clear about objectives
- Seek local support
- Build partnerships
- Plan for financial sustainability
- Don't prohibit more than necessary
- Build for the unforeseen
- Put in place structures for conflict resolution
- Establish self-enforcement as much as possible

Figure 7: Adapted from Kelleher, 1999

Development of the management plan has also taken into account recommendations for effective protected area management (Figure 7; Kelleher, 1999).

4.5 Management Programmes and Objectives

Itzamna Society had been the co-management partner for Elijio Panti National Park since its establishment, and was formed as a result of community action. It has been recognized, however, that regaining and maintaining past community support and participation needs to be a high priority within the Management Programme activities, as well as increasing effective surveillance and enforcement activities.

This has to be in close collaboration with the Village Councils of the three stakeholder communities – San Antonio, Cristi Rey and El Progreso-7 Miles - and community members. Several of the management activities are specifically focused on establishing mechanisms to facilitate community participation, whilst also ensuring that the conservation planning activities are implemented effectively.

It should be borne in mind that the Programmes of a Management Plan are interconnected over space and time, supporting each other and forming a whole that is greater than the single parts. As such, Management Programmes cannot be considered individually, but must be seen in terms of a bigger picture – the integrated management of Elijio Panti National Park towards the fulfillment of the Management Objectives (Figure...).

Elijio Panti National Park, as part of a larger, system level, planning initiative – the Maya Mountains Massif - also has a number of commitments that need to be integrated into the management programmes. The operationalization of the system level framework is currently in progress (April, 2009)

Management Programmes

There are six programmes within the overall Management Strategy for Elijio Panti National Park:

- A. Natural Resource Management Programme**
- B. Research and Monitoring Programme**
- C. Community Participation Programme**
- D. Public Use Programme**
- E. Site and Infrastructure Management Programme**
- F. Administration Programme**

When prioritizing activities within these programmes, the results of the Conservation Planning prioritization have been taken into account:

Priority	Conservation Target	Viability Rating	Primary Threat within EPNP
High Priority	<i>Xate</i>	Fair	Unsustainable and illegal xate harvesting
Medium Priority	<i>Aquatic and Riparian Ecosystems</i>	Good	Dam construction
	<i>Cultural Resources</i>	Good	Looting
	<i>Game Species</i>	Good	Hunting
	<i>Broadleaf and Pine Forest</i>	Good	Fire
Low Priority	<i>Wide-ranging Species</i>	Very Good	Fragmentation
	<i>Forest Products (excluding xate)</i>	Very Good	Unsustainable harvesting

...as has the leverage value of cross cutting strategies (Table 31).

A. Natural and Cultural Resource Management Programme

Vision

To ensure the continued maintenance of natural processes, healthy, functioning ecosystems and viable populations of all species maintain within Elijio Panti National Park

Objective	Activity Areas	Actions
Reconsolidate and strengthen management structure and capacity of Itzamna Society to effectively manage the natural and cultural resources of EPNP	▪ Reconsolidation of co-management structure	A1
	▪ Increase participation and collaboration with stakeholder communities	A2
	▪ Ensure long term security of EPNP	A3 – A9
	▪ Ensure active collaboration with the other management and co-management agencies for system-level management	A10 – A12
To reduce identified priority threats and increase the viability of Conservation Targets	▪ Establish and maintain effective enforcement	A13 – A 25
	▪ Implement Fire Management Programme	A26 – A34
	▪ Ensure prevention of unsustainable harvesting of xate	A35 – A37
	▪ Maintain and improve water quality of aquatic resources within EPNP	A38 – A39
	▪ Ensure protection of cultural resources	A40 – A43
	▪ Promote reforestation of regenerating agricultural areas	A44 – A45

A. Natural Resource Management Programme						
EPNP: Elijio Panti National Park IS: Itzamna Society FD: Forest Department LAC: Local Advisory Committee El Progreso: El Progreso / 7-Miles MMM: Maya Mountains Massif						
Reconsolidate and strengthen management structure and capacity of Itzamna Society to effectively manage the natural and cultural resources of EPNP						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Reconsolidation of co-management structure						
A1	Reconsolidate co-management structure					See Administration Programme
A2	Increase participation, communication and collaboration with stakeholder communities					See Administration Programme
Ensure long term security of EPNP						
A3	Increase profile of, and public support for, Elijio Panti National Park, to reduce potential for dereservation	With low profile and very limited community support, EPNP is very vulnerable to the risk of dereservation	EPNP and IS have a high and positive profile, with IS having good community support for its work – significantly reducing the risk of dereservation	1 st - 2 nd	EPNP	Much headway must be made in engendering good public support for IS
A4	Increase local support for the National Park through greater community participation and involvement, and increased community awareness activities	Park management has very little public participation, though communities are generally supportive of the Park, despite knowing little about it.	The three primary stakeholder communities are broadly involved in Park management, are informed and supportive of management decisions and actions	1 st – 5 th	IS	Requires that IS and communities establish Local Advisory Committees and that IS prioritizes public awareness
A5	Increase local support for EPNP through greater community benefit from the National Park	IS has facilitated tour-guide training in communities, and implemented a xate-production project. Limited number of beneficiaries.	Projects are broadened and extended, and made accessible to a larger cross section of each community, to engender greater support for the Park	1 st - 5 th	IS	Relies on equitable access to benefits and opportunities associated with the Park

A. Natural Resource Management Programme						
Reconsolidate and strengthen management structure and capacity of Itzamna Society to effectively manage the natural and cultural resources of EPNP						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Ensure long term security of EPNP						
A6	Increase financial sustainability of EPNP / IS	IS has been relatively successful in securing grant funds, but without a long-term plan and greater transparency, future funding will be limited	IS has a financial sustainability plan, and management of the Park is less dependent on grant monies	1 st - 5 th	IS	IS needs greater capacity in financial planning and management, and reporting. Greater public use of the Park is needed to increase sustainability
A7	Work with other local and national organizations towards maintaining connectivity between the EPNP and the MMM	IS not collaborating fully with other managers and co-managers of the MMM	IS liaising and collaborating closely with other organizations and initiatives, and ensuring connectivity between EPNP and the Maya Mountains Massif	1 st - 5 th	IS	Limited by human and financial resources, and by lack of prioritization
A8	Investigate potential for long-term investment in planting of commercial tree species (ex-situ)	EPNP has no financial sustainability mechanism	Commercial forestry provides some future financial sustainability	3 rd - 5 th	IS	
A9	Explore feasibility of developing a long term policy and contingency plan in case a mining or oil exploration permit should be issued	No long term policy or plan exists at present to be enacted should a mining permit be issued	Advanced planning as to strategies to put into place should a permit be issued	1 st	IS	Ensure knowledge of legal aspects of situation, to allow proactive rather than reactive response
Ensure active collaboration with the other management and co-management agencies for system-level management						
A10	Ensure Board and LAC are aware of IS obligations at system level as a co-management partner of the MMM	Obligations of pa managers of pas within the Maya Mountains Massif are not yet familiar with the obligations this entails under system level planning	IS Board and LAC members familiar with the obligations IS has under system level planning for the Maya Mountains Massif	1 st	IS Forest Dept MMM Directorate	As a co-management partner of a protected area that is part of the Maya Mountain Massif, IS will be responsible for implementation of some system level activities
A11	Collaborate with MMM Directorate bodies	Participation in the MMM planning process was limited, and IS would benefit from greater collaboration with other partners in system level programme implementation	IS is an active, collaborating partner in system level programme implementation and meeting system-level targets for natural resource management	1 st -5 th	IS Forest Dept MMM Steering Committee	As a co-management partner of a protected area that is part of the Maya Mountain Massif, IS will be responsible for implementation of some system level activities

A. Natural Resource Management Programme						
Reconsolidate and strengthen management structure and capacity of Itzamna Society to effectively manage the natural and cultural resources of EPNP						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Ensure active collaboration with the other management and co-management agencies for system-level management						
A12	Collaborate with organizations fulfilling the coordination role for the MMM system level Natural Resource Management programme, towards implementation of system-level strategic actions	Participation in the MMM planning process was limited, but IS will be expected to implement strategic actions towards meeting system-level targets for natural resource management	IS is an active, collaborating partner in system level programme implementation and meeting system-level targets for natural resource management	1 st -5 th	IS Forest Dept MMM Steering Committee Coordinating agencies for Natural Resource Management Programme	As a co-management partner of a protected area that is part of the Maya Mountain Massif, IS will be responsible for implementation of some system level activities...see Technical Assessment of the Maya Mountains Massif documents
Reduce identified priority threats and increase the viability of Conservation Targets						
Establish and maintain effective enforcement						
A13	Demarcate and maintain boundaries of National Park	Boundaries of area are not yet clear in all critical areas, either to the managers or to the local communities	Boundaries clearly demarcated, and community aware of boundaries, particularly in identified critical areas	1 st	IS San Antonio, Cristo Rey and El Progreso Village Councils	San Antonio and Mai Gate are highlighted as critical areas for clear boundary definition. Ines are not yet cut in area of realignment
A14	Resolve outstanding land disputes within EPNP	Outstanding land dispute exists within EPNP	Outstanding land dispute within EPNP is resolved	1 st	IS Forest Department	
A15	Increase general awareness and agreement of location of boundaries within the key stakeholder communities	Some dispute over location of boundaries of EPNP within the key stakeholder communities	Agreement on location of boundaries within the key stakeholder communities	1 st	IS San Antonio, Cristo Rey and El Progreso Village Councils	Promote community awareness and respect of boundaries
A16	Develop community support for zoning for protected area	Insufficient community participation and engagement for development of community-supported zoning for EPNP	Zones are well founded through a structured community validation workshop	1st	IS San Antonio, Cristo Rey and El Progreso Village Councils	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

A. Natural Resource Management Programme						
Reduce identified priority threats and increase the viability of Conservation Targets						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Establish and maintain effective enforcement						
A17	Develop and implement Enforcement Plan to guide surveillance and enforcement	No Enforcement Plan, and limited surveillance and enforcement (limited human resources)	Increased effective enforcement guided by a strong Surveillance and Enforcement Plan	1 st	IS Forest Dept LAC	Collaboration should also be sought from Police Department and local fishermen & hunters.
A18	Review Enforcement Plan at end of year, and modify where necessary	No Enforcement Plan exists	Annual review of Monitoring and Enforcement Plan by management and staff, with modifications to increase effectiveness	1 st – 5 th	IS Forest Dept LAC.	Illegal activities will vary with time, need for adaptive management - guided by outputs from monitoring and collaboration with recognized traditional natural resource users
A19	Ensure adequate number of rangers for effective enforcement	Only one ranger responsible for all surveillance or enforcement activities currently occurring within EPNP	Sufficient staff for effective surveillance and enforcement	1 st - 5 th	IS Forest Dept Other protected area managers	Limited by finance. Investigate liaison with other MMM protected area co-managers for potential to collaborate surveillance and enforcement activities.
A20	Increase effectiveness of rangers through provision of adequate equipment	Limited equipment for surveillance and enforcement activities	Patrols are functional, and well equipped for task	1 st	IS	Dedicated patrol equipment, digital camera, GPS (and training in use), binoculars, maps, medical kit, radio communications, uniform, ID cards
A21	Rangers trained as Special Constables, with legal mandate to react to illegal occurrences within area	Ranger has no powers to enforce	Rangers have full powers of Special Constable, and are therefore able to enforce	1 st	IS Forest Dept	FD Green Laws training, special constable training
A22	Increased liaison and collaboration with FD, BDF, police, IoA and other pa co-management agencies on enforcement issues	Limited liaison and collaboration at present with Forest Department	IS in ongoing liaison with Forest Department, BDF, police, IoA and other pa co-management agencies on enforcement issues	1 st -5 th	IS Forest Dept.	Support from the Forest Dept. and other enforcement agencies will assist community acceptance and recognition of need for enforcement
A23	Increased liaison with FD on permitting issues	Limited liaison at present with Forest Department	Increased liaison with Forest Department on permitting issues	1 st -5 th	IS Forest Dept.	Research and other permits only issued following agreement of IS

**Elijio Panti National Park – Draft Management Plan
2009-2014**

A. Natural Resource Management Programme						
Reduce identified priority threats and increase the viability of Conservation Targets						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Establish and maintain effective enforcement						
A24	Ensure awareness of National Park regulations and legislation associated with natural and cultural resources, within the key stakeholder communities	Key stakeholder communities feel ill-informed of activities concerning EPNP	Key stakeholder communities are aware of National Park regulations	1 st	IS San Antonio, Cristo Rey and El Progreso Village Councils	Leaflet on Know your National Park – Rules and Regulations
A25	Annual overflight with Lighthawk	Lighthawk flight not always used effectively for surveillance	Lighthawk flight used effectively for gathering surveillance information	1 st – 5 th	IS	To assess incursions, extent of fire damage and changes in adjacent land-use
Implement Fire Management Programme						
A26	Collaborate with FD and other pa managers for joint fire management in the MMM	Draft Fire Management Plan finalized	Finalization of Fire Management Plan and implementation	1 st -5 th	IS FD	Might be useful to have an MoU for the collaborative partnership
A27	Train rangers and other staff for effective fire fighting role	IS staff have participated in training under the Integrated Fire Management approach promoted by TNC. However, there are insufficient staff for effective fire management within EPNP	Increased IS staff, trained and collaborating effectively with other protected area managers of the MMM in Fire Management at site and system level	1 st -5 th	IS FD	Increase firefighting capability and capacity for initial response, extended response, and large fire support that will reduce the number of small fires becoming large, to better protect natural resources
A28	Adequately equip staff for fire management role	IS is adequately equipped for fire management	IS staff continue to be equipped for effective fire management	1 st -5 th	IS	
A29	Ensure implementation of annual fire readiness activities	Fire plan has been developed	IS ensures implementation of annual fire readiness activities	1 st -5 th	IS FD	Fire readiness activities listed in Table 38
A30	Liaise with Department of Agriculture for enforcement of Agricultural Fire Act	Agricultural fires adjacent to the protected area are a threat to the national park	Agricultural fires are better controlled following liaison with A Department for enforcement of Agricultural Fire Act	1 st -5 th	IS	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

A. Natural Resource Management Programme						
Reduce identified priority threats and increase the viability of Conservation Targets						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Implement Fire Management Programme						
A31	Implement education component of fire management programme		IS has ongoing education and awareness of fire management issues	1 st -5 th	IS FD	Educating the public regarding the importance of forest fire prevention can change people's behavior. Printed materials, signs, posters, face-to-face contacts with visitors, interpretive and educational programs, and outreach programs all facilitate public awareness, understanding, and support.
A32	Start dialogue with farmers at start of dry season	Currently, no dialogue with farmers at start of dry season	Dialogue with farmers at start of dry season, leading to increased fire awareness and fire control	1 st – 5 th	IS FD Agriculture Dept.	
A33	Implement enforcement component of fire management programme		IS has ongoing enforcement to ensure compliance with fire regulations (including public use and access restrictions during times of high fire danger or prescribed fire operations).	1 st – 5 th	IS FD	Aggressively investigate all forest fires, both to identify the responsible party, and to gain information that can be applied to future prevention efforts.
A34	Prosecute repeat offenders for illegal fires	Culprits of illegal fires see no response to their actions	Repeat offenders know that legal action is likely if caught	1 st -5 th	IS FD Dept. of Agric.	Unwillingness of co-management body and authority to risk alienating communities by enforcing legislation.
Ensure prevention of unsustainable harvesting of xate						
A35	Support national initiatives towards improved regulation / control / monitoring of the Belize xate industry	IS has a xate project, but is not well integrated into the national initiatives under FD and the MMM	IS actively supports national initiatives towards improved regulation / control / monitoring	1 st – 5 th	IS FD	See activities under the MMM CAP process

A. Natural Resource Management Programme						
Reduce identified priority threats and increase the viability of Conservation Targets						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Ensure prevention of unsustainable harvesting of xate						
A36	Facilitate programmes and activities to assist local communities to develop improved access to forest products through cultivation	IS has a community xate project, and an interest in cultivation of medicinal plants	Increased focus on programmes and activities to assist local communities to develop improved access to forest products through cultivation	1 st – 5 th	IS FD	See activities under Community Participation
A37	Increased collaboration - with FD, BDF, Police, FCD and other agencies towards more effective surveillance and enforcement against xateros	Some collaboration towards joint patrols, but not yet fully effective within EPNP	Collaboration with FD, BDF, Police, FCD and other agencies towards more effective surveillance and enforcement against xateros through joint patrols, decreasing the level of xate activity within EPNP	1 st -5 th	IS FD	Collaboration for more effective enforcement should be strengthened at system-level through implementation of the MMM system-level planning of the Natural Resource Management Programme
Maintain and improve water quality of aquatic resources within EPNP						
A38	Liaise with resort owners in enclave, and DoE, re. ensuring minimal impact sewage systems	Very limited contact with resorts, IS has no data on sewage disposal systems of the resorts	Resort owners are aware of potential sewage impacts on biodiversity conservation, and follow best practices	1 st -5 th	IS	Need to develop a good working relationship with resort owners in order to establish collaborative input.
A39	Monitor land use change in watershed, and actively lobby against any further land use change in the upper watershed	The eastern portion of EPNP is being impacted by the construction of the Vaca Dam, and will lose riparian shrubland under the inundation area. IS was not actively involved in planning or baseline data collection	IS has good baseline data on land-use and vegetation condition and pesticide use within the watershed, monitors on an ongoing basis, and is well informed to lobby against further change.	1 st -5 th	IS	IS will need training, capacity-building and equipping in order to fulfill these functions.
Ensure protection of cultural resources						
A40	Increase surveillance and enforcement focused on protection of cultural resources	IS is limited in its surveillance and enforcement activities by the number of staff available, and has problems of vandalism and looting associated with the cave systems	IS has effective surveillance and enforcement in place	1 st – 5 th	IS FD	Manpower, finances, capacity. Investigate increasing tourism activities in area for increased presence (need to balance against impacts)

A. Natural Resource Management Programme						
Reduce identified priority threats and increase the viability of Conservation Targets						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Ensure protection of cultural resources						
A41	Develop Memorandum of Understanding between IS and loA for cultural resource management, and for greater technical support	Limited liaison with loA, but MoU / co-management agreement under discussion	MoU / co-management agreement signed between IS and loA for protection of cultural resources	1 st	IS loA	
A42	Increased liaison with the Institute of Archaeology for increasing effective surveillance and enforcement	Limited liaison with loA	IS has increased liaison with the Institute of Archaeology for surveillance and enforcement issues	1 st – 5 th	IS loA	
A43	Minimize tourism impacts in caves through developing Best Practices guidelines for tour guides and tourists	No guidelines exist	Guidelines for tourism Best Practices have been developed based on technical advice from loA	1 st -3 rd	IS loA Tour guides	
Promote reforestation of regenerating agricultural areas						
A44	Develop and implement active forest restoration plan for regenerating agricultural and horse-impacted areas	Regeneration of past agricultural areas is currently impaired by grazing activities of free ranging horses	Past agricultural areas are reforested	1 st - 5 th	IS	Requires implementation of Activity A45
A45	Ensure that livestock (including rangers horses) is not allowed free range within EPNP	Rangers horses are allowed to graze free range within EPNP, which is incompatible with protected area objectives	If horses are to be kept within EPNP, they must be confined within well-fenced paddock	1 st - 5 th	IS	Will require permission from Forest Department

Specific Fire Management Objectives

(Adapted From: Draft Integrated Fire Management Plan)

Specific fire management objectives focus on a fire management zone, which comprises the areas that are high-risk fire hazard. A joint fire operational plan is to be developed between the Forest Department and Itzamna Society for the effective management of this area. Important considerations for the management of this area include:

- Conducting an initial response within 30 minutes of the time a forest fire report is received.
- Control 95% or more of all forest fires during initial response.
- Conduct prescribed burning of approximately 350 acres for a variety of resource benefits, including hazard fuels reduction, ecosystem sustainability, landscape preservation, and exotic vegetation species control. .

Management Considerations relating to Fire

- Ensure that firefighter and public safety remains the primary consideration in planning and conducting all fire management activities.
- Ensure that smoke management is considered in planning and conducting all fire management activities.
- Ensure that all applicable laws, policies and regulations are considered in planning and conducting all fire management activities.
- Ensure that socio-political economic impacts are considered in planning and conducting all fire management activities.
- Ensure that appropriate fire prevention and suppression actions are included in any right-of-way plans associated with electrical transmission lines and water pipe lines located within the protected area.
- Ensure that fire management activities are coordinated as appropriate with all affected parties.

Fire Readiness Activities

(Adapted from: Draft *Integrated Fire Management Plan*)

The park maintains a cache of materials, equipment, and supplies sufficient to meet normal fire year requirements. The Annual Fire Readiness table lists activities that should be performed annually at the park to ensure the fire readiness of personnel, equipment and supplies, as well as a timetable for when each activity should be accomplished.

Annual Fire Readiness Activities

	Jan	Feb	Mar	April	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Maintain state of fire readiness.	X	X	X	X	X	X	X	X	X	X	X	X
Access weather data through Weather Bureau daily.		X	X	X	X	X		X				
Complete project accomplishment reports.	X	X	X	X	X	X	X	X	X	X	X	X
Complete park training analysis.	X										X	X
Review fire management plan and program.	X										X	X
Inspect fire-related mechanical equipment.	X								X			
Inventory fire cache; restock as necessary.	X								X			
Equip fire-qualified staff with personal equipment as needed.	X								X			
Update park firefighter qualifications.	X									X	X	X
Fitness / medical test permanent park staff.	X											
Coordinate fire training.	X									X	X	X
Provide annual refresher training.	X											X
Fitness test and train seasonal park staff.	X											X
Update interagency agreements.	X									X	X	X

Table 38: Annual Fire Readiness Activities

B. Research and Monitoring Programme

Vision

To facilitate applied conservation research towards increasing management effectiveness for biodiversity conservation, and ensure effective monitoring and evaluation

Objective	Activity Areas	
To provide the framework for effective research and monitoring	▪ Framework for research and monitoring	B1 – B6
	▪ Establish site level baseline information	B7 – B12
	▪ Establish system level baseline information	B14, B15
	▪ Monitor biodiversity targets and threats at site and system levels	B16 – B19
	▪ Strengthen cross linkages with other research and conservation initiatives	B20

Whilst Itzamna Society's focus is on community participation, benefit and development, the position of Elijio Panti as a National Park within the protected areas system is based on biodiversity protection, bringing with it a responsibility to effectively manage the protected area for its biodiversity values. For effective management, baseline knowledge of the biodiversity of the National Park is required, and monitoring to ensure that the status of the biodiversity and cultural components of the protected area are maintained or improved.

As one of the co-managers of the protected areas of the Maya Mountains Massif, Itzamna Society has commitments to incorporate system level research and monitoring goals into its Research and Monitoring Programme, and will benefit from input from the system-level Research and Monitoring Programme, towards system level goals, with research and monitoring data feeding into both site and system-level adaptive management (Table ...). Many of the monitoring requirements are also defined either during the target viability or threat assessments of Section 3: Conservation Planning.

Maya Mountains Massif System Level Research and Monitoring Requirements	
Programme Area	Recommendations
<p>Research and Monitoring Identify and prioritize system-level management needs re. applied conservation research and monitoring</p>	<ul style="list-style-type: none"> ▪ Baseline data on species distributions, abundances, population trends and natural range of variation ▪ Baseline data on edaphic parameters determining biodiversity distribution patterns across the Massif ▪ Pressures and threats impacting populations ▪ Baseline data re. possible sustainable use of resources ▪ Watershed integrity and water quality ▪ Map and assess archaeological sites across the Massif and build a system-level database ▪ Prioritize and increase number of archaeological sites with ongoing and long-term research programmes
<p>Implement additional system-level research & monitoring related needs identified in the CAP process</p>	<ul style="list-style-type: none"> ▪ Ensure effective protocols are in place in the vetting of research proposals, particularly within the Core Preservation Zone ▪ Adequate monitoring of fieldwork where threatened or sensitive species are targeted ▪ Assess biodiversity importance and health of the freshwater systems of the MMM to inform biodiversity conservation, zoning and management ▪ Initiate and implement ongoing monitoring of flow, sediment and energy regime parameters and key species ▪ Collect baseline data to establish benchmarks for defining viable game species populations, and implement monitoring ▪ Conduct studies on the ecology of the Pine Bark Beetle ▪ Identify and implement internationally accepted assessment and monitoring protocols for amphibian populations to determine deviations from baseline conditions ▪ Monitor agrochemical deposition by orographic rainfall in upper elevation areas ▪ Monitor agrochemical presence in creeks and rivers leaving the Maya Mountains Massif

Table 39: Maya Mountains Massif System-Level Research and Monitoring Requirements

**Elijio Panti National Park – Draft Management Plan
2009-2014**

B. Research and Monitoring Programme						
To provide the framework for effective research and monitoring for Elijio Panti National Park						
Management Actions		Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements
Framework for Research and Monitoring						
B1	Provide a structured framework for research conducted within EPNP, focused on critical management needs	Some structure exists under the Itzamna Society Strategic Plan, but this needs to be developed to form a framework that can be used for effective planning and management of research activities within EPNP	Well structured research programme integrated with the management of the National Park, and complimenting system and national level goals	1 st – 2 nd	IS Forest Dept. MMM Research and Monitoring coordinating agency	Requires close liaison with the MMM system level Research and Monitoring Programme EPNP would benefit from locating a research partner organization
B2	Integrate research and monitoring into adaptive management planning	No integration of research and monitoring into previous operational planning	Management planning is informed by research and monitoring outputs	1 st – 5 th	IS	
B3	Develop a priority research list for targeted research, to feed into adaptive management, and locate qualified research partners	No prioritization of research needs	Prioritization of research needs, based on adaptive management and system level requirements, and engage qualified research partners	1 st – 2 nd	IS	Eg. Impacts of construction of Vaca Dam and subsequent operation Xate resources and impacts of xateros Medicinal plant research Archaeological research
B4	Identify site-level inventory data gaps - mammals (especially bats), reptiles, amphibians and other fauna, and flora with distributional data, and collaborate with researchers to target these gaps	Some biodiversity gaps have been identified through the management planning process	Biodiversity information gaps are identified and filled.	1 st – 5 th	IS	Priority inventory data gaps - mammals (especially bats), reptiles and amphibians Better knowledge of flora and fauna presence and distribution within EPNP
B5	Develop a system for managing data and research information	Limited past data, not easily accessible	List of research that has been conducted within EPNP, with research information easily accessible	1 st	IS	Data management system needs to be established
B6	Establish research guidelines and policies for researchers and students using the area	No research guidelines or policies in place	Research guidelines and policies in place	1 st	IS	With assistance and input from Forest Department

**Elijio Panti National Park – Draft Management Plan
2009-2014**

B. Research and Monitoring Programme						
To provide the framework for effective research and monitoring for Elijio Panti National Park						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Site-Level Baseline Information						
B7	Establish conservation planning baseline for implementation of monitoring framework	Conservation planning framework developed during management planning	Biodiversity baseline is developed to enable conservation planning evaluation	1 st – 5 th	IS	Biodiversity baseline requirements for conservation planning include: medicinal plants, bay leaf, jaguar, tapir, area of broadleaf forest, area of needed-leaf forest, sightings data for game species (paca, white-tailed / brocket deer, white lipped / collared peccary, great curassow, crested guan, ocellated turkey), water quality in Macal, Rio On and Privassion Creek, xate
B8	Mapping of mosaic components of broadleaf forest	Current mapping shows a contiguous cover of Tropical evergreen seasonal broad-leaved lowland hill forest on steep karstic terrain	Map of mosaic components of broadleaf forest for guiding management activities	1 st – 5 th	IS Independent researchers	Distribution of other forest types within this mosaic may impact future planning for zonation and infrastructure
B9	Establish cultural baseline for implementation of conservation planning framework	Conservation planning framework developed during management planning includes cultural baseline	Cultural baseline is developed to enable conservation planning evaluation	1 st – 5 th	IS IoA	Cultural baseline requirements for conservation planning include: inventory of caves, Maya artifacts, ceremonial sites and structures.
B10	Establish threats baseline for implementation of conservation planning framework	Conservation planning framework developed during management planning	Threats baseline is developed to enable conservation planning evaluation	1 st – 5 th	IS	Threat baseline requirements for include: Looting and hunting activity, xatero presence, frequency of fires, water quality, illegal logging and illegal harvesting of non-timber forest products
B11	Establish baseline of tourism activity within EPNP – numbers / activities	No baseline established for tourism level and activity within the EPNP	Baseline for tourism level and activity within the EPNP	2 nd – 5 th	IS	Should feed into the development of the 'Limits of Acceptable Change' programme. Assistance from BTIA / BTB and FD

**Elijio Panti National Park – Draft Management Plan
2009-2014**

B. Research and Monitoring Programme						
To provide the framework for effective research and monitoring for Elijio Panti National Park						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Research for System-Level Baseline Information						
B12	Establish baseline data for contribution to knowledge of species distributions in MMM	IS is not yet fully engaged in MMM system-level research and monitoring	IS contributing towards species distribution data for the MMM	1 st – 5 th	IS	Additional baseline requirements for system level include: upper elevation amphibian species
B13	Liaise with other MMM organizations for sharing of technical, scientific and professional assistance	IS is not currently liaising fully with other MMM organizations for cost and skills sharing	IS is liaising fully with other MMM organizations for cost and skills sharing	1 st – 5 th	IS	
Monitor biodiversity targets and threats at site and system levels						
B14	Develop Conservation Monitoring Programme	There is currently no framework for monitoring Conservation Targets and threats	A Monitoring Programme has been developed to monitor the success of conservation activities designed to protect conservation targets, and integrates community participation in monitoring activities	2 nd – 5 th	IS+	Should include monitoring of: <ul style="list-style-type: none"> ▪ Extent and condition of broadleaf and needle leaf ecosystems ▪ Extent and condition of riparian forest along creeks and river ▪ Relative population size and distribution of game species ▪ Medicinal plant distribution and abundance ▪ Xate distribution and abundance ▪ Looting activity ▪ Xatero activity ▪ Hunting activity ▪ Impacts of dam construction ▪ Fire impacts (area / severity)
B15	Establish a water quality monitoring programme for EPNP	There is currently no programme to monitor water quality	A water quality monitoring programme is established for EPNP	2 nd – 5 th	IS	Collaborate with BECOL and Public Health / DoE - access to equipment resources to look at water parameters (e.g. sediments, contaminants, pathogens)

**Elijio Panti National Park – Draft Management Plan
2009-2014**

B. Research and Monitoring Programme						
To provide the framework for effective research and monitoring for Elijio Panti National Park						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Monitor biodiversity targets and threats at site and system levels						
B16	Monitor howler monkey populations within EPNP	No baseline or documented knowledge of changes in populations of howler monkeys within EPNP	Baseline and knowledge of changes in populations of howler monkeys within EPNP	2 nd – 5 th	IS	Important tourism resource
B17	Monitor tourism impact on natural resources through development of a structured monitoring programme based on 'Limits of Acceptable Change' programme	No 'Limits of Acceptable Change' programme	A 'Limits of Acceptable Change' programme is in place and implemented - output of findings presented in an annual report. Guidelines in place for monitoring and reporting of tourism impact – especially for caves.	1 st – 5 th	IS IoA	Intern to assist with development of LOAC programme. Data collected through the monitoring programme needs to be analyzed, and report written on perceived impacts or lack of impacts. This then needs to be acted upon.
B18	Develop monitoring programme for socio-economic impacts of tourism	No comprehensive knowledge of the contribution of tourism associated with EPNP to the socio-economic status of stakeholder communities	Knowledge of impacts of tourism associated with EPNP to the stakeholder communities and changes over time	1 st – 5 th	IS, tour guides	To be developed, then monitoring every two years. Integrated into Management Plan.
B19	Participate in and contribute to system-level monitoring initiatives for the Maya Mountains Massif	Little system-level collaboration	Collaboration and participation in system-level monitoring initiatives for the Maya Mountains Massif	1 st – 5 th	IS Forest Dept MMM Research and Monitoring coordinator	
Strengthen collaboration for research and monitoring at site and system levels						
B20	Strengthen cross linkages with organizations involved in research and monitoring locally, nationally and regionally	Links exist with Forest Department and Birds without Borders	Strong cross linkages with organizations involved in relevant research and monitoring, especially in the Maya Mountains Massif	1 st – 5 th	IS Forest Dept MMM Research and Monitoring coordinator	

C. Community Participation Programme

Vision

Integrated community participation in the conservation management of Elijio Panti National Park by key stakeholders

Objective	Activity Areas	
To provide the framework for integrated community participation in conservation management of Elijio Panti National Park	<ul style="list-style-type: none"> ▪ Strengthen capacity of Itzamna Society for community engagement 	C1 – C8
	<ul style="list-style-type: none"> ▪ Provide mechanisms for community participation 	C9 – C13
To increase effectiveness of education and awareness activities	<ul style="list-style-type: none"> ▪ Increase community awareness 	C14 – C19
To increase direct and indirect community benefits	<ul style="list-style-type: none"> ▪ Increase community benefits 	C20 – C27

**Elijio Panti National Park – Draft Management Plan
2009-2014**

C. Community Participation						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
To provide the framework for integrated community participation in conservation management of Elijio Panti National Park						
Strengthen capacity of Itzamna Society for community engagement						
C1	Hold Annual General Meeting to reconsolidate Itzamna Society as the management body for EPNP, with re-elections for Board	Itzamna Society needs to reconsolidate through the AGM Board election process before it can engage the communities in co-management of EPNP	Functional, active Itzamna Society effectively representing the communities in co-management of EPNP	1 st	IS	Current consensus is that key community stakeholders of EPNP are not being effectively engaged or represented
C2	New Board to develop Annual Operational Plan of activities based on the Actions within the Management Plan	No Operational Plan to guide management of EPNP	Operational Plan developed to guide management of EPNP through each year	1 st – 5 th	IS	See also Administration Programme
C3	Capacity building of IS for effective engagement of stakeholder communities	Recognized requirement for increasing engagement of stakeholders	IS builds it capacity to engage stakeholder communities	1 st – 2 nd	IS	
C4	Reconsolidate Local Advisory Committee (LAC) within stakeholder communities	Community participation in management decisions has been limited	Community representatives are established as Local Advisory Committees, to provide input and transparency into decision making process	1 st – 2 nd	IS	Current consensus is that key community stakeholders of EPNP are not being effectively engaged or represented
C5	Develop structured role for LAC within EPNP stakeholder communities	No working LAC	LAC has a structured role – providing a two-way conduit for communication between IS and stakeholder communities	1 st – 5 th	IS LAC	Past experience shows that LACs need to have very specific TOR's, and scheduled meetings / activities to maintain motivation and commitment
C6	Build capacity of LAC for role in co-management	No working LAC	IS builds the capacity of the LAC to fulfill its role	1 st – 2 nd	IS	Need to identify capacity-building needs – C5
C7	Determine the criteria for defining which communities are considered stakeholders of EPNP.	Not all communities currently considered stakeholders are actively using or affecting EPNP	Community consultations recommend that stakeholder communities should be those actively participating in management of the National Park, and using the natural resources.	1 st	IS LAC	Possibly a 2-tier stakeholder system – key stakeholders are San Antonio and 7-Miles. Other current identified stakeholder is Cristo Rey, but feedback suggests that this community doesn't use the protected area

**Elijio Panti National Park – Draft Management Plan
2009-2014**

C. Community Participation						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
To provide the framework for integrated community participation in conservation management of Elijio Panti National Park						
Strengthen capacity of Itzamna Society for community engagement						
C8	IS to present quarterly activities to LAC for approval, and annually at annual community meeting, to inform, and for input and suggestions from the community	There is currently no structured mechanism for input into management decisions by stakeholder communities	Local Advisory Committee established to provide a mechanism for input by stakeholder communities	1 st – 5 th	IS LAC	
Provide mechanisms for community participation						
C9	Provide mechanisms for community participation in conservation / natural resource management activities	Limited participation in conservation / natural resource management activities	Greater community participation in conservation / natural resource management activities	1 st – 5 th	IS LAC	Community activity days, community reforestry of old agricultural areas
C10	Provide mechanisms for community participation in research / monitoring activities	Some participation in research and monitoring activities	Greater community participation in research and monitoring activities	1 st – 5 th	IS LAC	Establish community research assistants programme linked to researchers
C11	Establish programme to improve access of communities to forest products and game species through ex-situ cultivation	The National Park legislation doesn't permit extractive use – limited local use is occurring for medicinal plants and game species	Local extractive use of EPNP reduced through access to farmed resources	1 st – 5 th	IS LAC	Wano, pacaya, xate, game species. Need to liaise with FD for permission to extract seed stock for nursery for non-timber forest products
C12	Investigate potential for establishing back yard plots for medicinal plants in San Antonio	Healers expressed an interest in alternatives to harvesting medicinal plants from the National Park	Advice, assistance and plant stocks are provided for people wanting to grow medicinal plants in their back yards	2 nd – 5 th	IS Traditional Healers	Work would need to be done to identify requirements for specific medicinal plants. Liaison and permitting required from Forest Department
C13	Establish mechanism for community reporting of illegal activities within the National Park	Limited effective surveillance activities in place	Community participation in surveillance activities	1 st – 5 th	IS LAC	Particularly xate harvesting

**Elijio Panti National Park – Draft Management Plan
2009-2014**

C. Community Participation						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
To increase effectiveness of education and awareness activities						
Increase community awareness						
C14	Develop structured community awareness programme	Stakeholder communities are aware of the watershed protection benefits of the National Park, but this awareness may not extend to all the community, or to all environmental services	Increased community awareness of the watershed protection, other environmental services and biodiversity values of the protected area	1 st – 5 th	IS LAC	Meetings, workshops, activities
C15	Involve youth volunteer groups and high school students in conservation activities through structured volunteer programme	Volunteer opportunities are available for high school students from San Ignacio	A structured volunteer programme taking local, national and international volunteers	1 st – 5 th	IS LAC	Youth Group, UB
C16	Provide regular awareness activities/lessons for the schools of the stakeholder communities	Community feedback suggested that IS needs to target the schools a lot more than it is currently doing	Monthly school activities increasing awareness of National Park and its environmental benefits	1 st – 5 th	IS	
C17	Structured school visits to the National Park to build sense of ownership	Limited number of school visits to National Park	Increased school visits to National Park, with structured conservation awareness activities	1 st – 5 th	IS	Goal is one visit per school per quarter. Focus would be on upper primary level. 8 trips in 2007
C18	Establish mechanisms for dissemination of information on EPNP	Itzamna Society needs to increase the flow of information to its stakeholders	Mechanisms are established for dissemination of information on EPNP	1 st – 5 th	IS LAC	Workshops, newsletters, leaflets, open days, LAC, education programme etc.
C19	Annual structured community visits to EPNP to increase environmental awareness	There have been field trips organized for community members	Continued annual structured community visits to EPNP to increase environmental awareness	1 st – 5 th	IS	
To increase direct and indirect community benefits						
C20	Establish and implement a socio-economic benefit strategy	No structured strategy in place for increasing socio-economic benefits for stakeholder communities	Structured strategy in place for increasing socio-economic benefits for stakeholder communities, guiding funding priorities	2 nd – 5 th	IS	

C. Community Participation						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
To increase socio-economic benefits for stakeholder communities						
C21	Locate funding for Conservation Scholarships to assist students in continuing in education at High School level	Illegal use of natural resources from the National Park appears to be linked to lower income and limited education	More students continue school beyond primary level. IS and EPNP seen as positive within the community	1 st – 5 th	IS	
C22	Establish a baseline and monitoring programme for monitoring of socio-economic benefits and stakeholder recognition of benefits	No baseline available for monitoring socio-economic change	Baseline and monitoring programme established for measuring socio-economic benefits and local perceptions of these benefits	2 nd – 5 th	IS	
C23	Support community initiatives for tourism development in San Antonio	IS has supported some tour guide training. Limited tourism – most tourists pass through the San Antonio	Encourage development of infrastructure that will provide incentives for tour guides to use San Antonio as a resource	1 st – 5 th	IS	Eg. Restaurant / craft centre
C24	Encourage use of EPNP as a tourism resource for the benefit of stakeholder communities	Most local tour guides do not access EPNP	Make EPNP more accessible and easier for tour guides to use – self-guided trails, identification signs for trees, plants and features of interest; training of tour guides in use of EPNP	1 st – 5 th	IS	
C25	Promote Bed and Breakfast group in San Antonio	Five families offer homestays	Increased awareness and promotion of homestay opportunities in San Antonio	1 st – 5 th	IS	
C26	Promote arts and crafts production in stakeholder communities	Itzamna Society has members skilled in arts and crafts, who are working with local students	Continued promotion of arts and crafts through working with local students	1 st – 5 th	IS	Increased marketing required
C27	Promote organic agriculture and cultivation of non-timber products (including xate)	Itzamna Society is promoting organic agriculture and cultivation of non-timber products (including xate)	Itzamna Society continues to promoting organic agriculture and cultivation of non-timber products (including xate)	1 st – 5 th	IS	Increased marketing required

D. Public Use Programme

Vision

Providing opportunities for visitor use of the Eljio Panti National Park, increasing awareness of the conservation value of the area, developing broad-scale public support, and providing economic benefits

Objective	Activity Areas	
To provide the framework for sustainable, eco-friendly tourism	▪ Establish best practices and guidelines for tourism	D1 – D7
	▪ Increase the range of interpretive facilities and activities available to increase visitor awareness	D8 – D14
	▪ Establish monitoring framework for tourism	D15, D16

**Elijio Panti National Park – Draft Management Plan
2009-2014**

D. Public Use						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Provide the framework for sustainable, eco-friendly tourism						
Establish best practices and guidelines for tourism						
D1	Work with tour guides to ensure best practices within Elijio Panti National Park	Very limited liaison between IS and tour guides. No best practices guidelines in place	Tour guides work with IS, and follow best practices guidelines within EPNP.	1 st – 5 th	IS Local Tour Guides	
D2	Develop users agreement between IS and tour guides	Limited use of EPNP by tour guides	Framework established for tourism activities within EPNP, entrance fee payment, best practices and guidelines	1 st – 5 th	IS Local Tour Guides	
D3	Establish guidelines for camping within EPNP	No guidelines exist for camping in EPNP	Guidelines for camping within EPNP are established and enforced	1 st – 5 th	IS Local Tour Guides	
D4	Develop and enforce regulations regarding visitor and tour guide behavior (eg. noise pollution, litter, etc.)	No best practices guidelines developed for visitor and guide behavior expectations	Written Best Practices guidelines provide clear guidelines on acceptable visitor and guide behavior	1 st – 5 th	IS Local Tour Guides	Develop clear guidelines with tour guides, to help reduce impact on biodiversity (eg. no disturbance of wildlife, no noise when watching howler monkeys.)
D5	Establish guidelines for public access to caves within EPNP	No access to caves permitted	Guidelines are established for public access to caves within EPNP	2 nd – 5 th	IS Local Tour Guides IoA	Guidelines should include limits on number of visitors per guide / per time, and input from IoA
D6	Establish safety measures for public access to caves within EPNP	No access to caves permitted	Safety measures are established for public access to caves within EPNP	2 nd – 5 th	IS Local Tour Guides IoA	Warning signs, regulated access routes, training of guides, accident and emergency plan, emergency rescue equipment
D7	Provide caving equipment (lights and helmets) for rent to visitors	No access to caves permitted	IS has caving equipment (lights and helmets) for rent to visitors	2 nd – 5 th	IS Local Tour Guides	
Increase the range of interpretive facilities available to increase visitor and community awareness						
D8	Upgrade Interpretive Centre, and extend interpretive exhibits	Facility for visitors and local community members to learn more about the biodiversity of the EPNP, and local culture	Interpretive Centre providing additional information for visitors	1 st – 5 th	IS Local Tour Guides	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

D. Public Use						
Management Actions	Present Status	Desired Status	Year	Responsible Parties	Limitations/Requirements	
Provide the framework for sustainable, eco-friendly tourism						
Increase the range of interpretive facilities and activities available to increase visitor and community awareness						
D9	Develop introductory talk for ranger delivery	No standard introduction has been developed for ranger delivery	Standard introduction has been developed for ranger delivery	1 st	IS	
D10	Investigate feasibility of establishing an orchid garden showcasing local orchids	Limited interpretive facilities available for visitors / tour guides	Orchid garden established, showcasing orchids of EPNP	3 rd – 5 th	IS Local Tour Guides	Need to liaise with Forest Department for permits for translocating orchids
D11	Establish medicinal trail with map and self-guided booklet	Concept has been identified	Informative, well planned medicinal trail	3 rd – 5 th	IS Local Tour Guides	Need to liaise with Forest Department for permits for translocating medicinal plants
D12	Develop interpretive information on stakeholder communities	Communities are not linked to EPNP in view of visitors	Communities seen by visitors as important to EPNP through interpretive information	3 rd – 5 th	IS Local Tour Guides	
D13	Develop and implement education field programme for primary education level based in and around EPNP	Increase structured educational field activities for EPNP stakeholder community primary schools	Structured educational field activities raising awareness of students and teachers of biodiversity and local conservation issues	1 st – 5 th	IS	Tie into conservation targets and watershed protection
Establish monitoring framework for visitor activities						
D14	Ensure that data on visitation and public use is available to assist in management decisions	No easily accessible figures or information for assessing visitor flow, activities and visitor satisfaction	Information gathered and made available in quarterly and annual report on visitor flow, activities and visitor satisfaction	1 st – 5 th	IS Local Tour Guides	Need to develop a visitor satisfaction questionnaire – 'Visitor' also includes VIPs, researchers, students etc.
D15	Develop monitoring and implement programme for environmental and socio-economic impacts of tourism	No monitoring programme in place for assessing environmental, economic and social impact of visitation to EPNP	Monitoring programme in place and being implemented	1 st – 5 th	IS Local Tour Guides	

E. Infrastructure Programme

Vision

Itzamna Society, as the management body of Elijio Panti National Park, has adequate infrastructure for effective management of the natural resources of the protected area

Objective	Activity Areas	
<p>To provide the infrastructural framework for the effective management of the Elijio Panti National Park</p>	<ul style="list-style-type: none"> ▪ Infrastructure and equipment requirements 	E1 – E8
	<ul style="list-style-type: none"> ▪ Solid Waste Disposal 	E9–E12

E. Infrastructure Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
Provide the infrastructural framework for effective management of EPNP						
Infrastructure and equipment requirements						
E1	Identify essential facilities and equipment required for effective management of the conservation area	Facilities and equipment currently exist for EPNP, but are not sufficient for effective management	Essential facilities and equipment are identified and located for effective management of EPNP	1 st – 5 th	IS	For all programmes: Surveillance and Enforcement Research and Monitoring Education and Awareness Public Use Administration
E2	Continue to ensure that all facilities and infrastructure are well maintained	Current facilities and equipment are maintained	All facilities and equipment continue to be well maintained	1 st – 5 th	IS	
E3	Continue annual road maintenance	Road requires annual maintenance	Road continues to be maintained, with improved access	1 st – 5 th	IS	
E4	Install signs to direct visitors from Santa Elena	No signs directing visitors to EPNP from Santa Elena	Signs installed directing visitors to EPNP from Santa Elena	1 st	IS	
E5	Install trail map sign, with distances, to guide visitors	No trail map sign installed	Trail map sign installed	2 nd	IS Local Tour Guides	
E6	Install barbecue pits in camping areas, with signs warning of fire hazard	No facilities for outdoor cooking	Barbecue pits installed in camping areas, with signs warning of fire hazard	2 nd	IS Local Tour Guides	
E7	Investigate feasibility of constructing Observation Tower	Concept is included in previous draft management plan	Feasibility study (financial, logistical and liability / risk assessment) guides decision whether to construct Observation Tower	3 rd	IS	
E8	Keep up to date equipment inventory	No inventory kept of equipment	Up to date inventory kept of equipment	1st to 5th	IS	
Solid Waste Disposal						
E9	Post signs requesting tour guides and visitors to take their garbage with them	Some signs request visitors to take garbage with them	More signs are posted where needed requesting tour guides and visitors to take their garbage with them	1st to 5th	IS	See also E6

E. Infrastructure Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
Provide the infrastructural framework for effective management of EPNP						
Solid Waste Disposal						
E10	Install signs and garbage bins to minimize visitor impacts at swim pools and picnic sites	No signs or garbage bins installed	Signs and garbage bins installed to minimize visitor impacts at swim pools and picnic sites	1 st – 2 nd	IS Local Tour Guides	'No litter' signs should also request that visitors carry out their garbage. See also Solid Waste Disposal
E11	Ensure garbage collection is included in patrol activities	Not all garbage is collected	Garbage collected	1st to 5th	IS	Litter is not just from tourists, but xateros and local hunters as well
E12	Ensure adequate planning for garbage collected from EPNP	Not all garbage is collected	Garbage is taken to nearest official dump for disposal	1st to 5th	IS	

F. Administration Programme

Vision

Itzamna Society, as the co-management body for the Elijio Panti National Park, has the administrative structure and capacity to effectively manage the protected area.

Objective	Activity Areas	
To provide the administrative framework for the effective management of the Elijio Panti National Park	▪ Re-establish Itzamna Society as the formal co-management body	F1 – F7
	▪ Provide an effective administrative framework	F8 – F13
	▪ Ensure human resources are in place for effective management	F14 – F20
	▪ Ensure effective financial management and planning	F21 – F28
	▪ Address health and safety issues	F29, F30
Monitoring and Evaluation	▪ Ensure effective monitoring and evaluation procedures are in place	F31 – F37

F. Administrative Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
To provide the administrative framework for effective management of EPNP						
Reconsolidate Itzamna Society in the co-management role for EPNP						
F1	Reconsolidate Itzamna Society as an effective community-supported organization	IS needs to reconsolidate and strengthen, and build capacity to engage key communities for effective co-management	Active IS with the support of key stakeholder communities towards co-management of EPNP	1 st	IS LAC	Hold re-elections for re-newel of Board, Greater community participation in planning, and capacity building for management
F2	Establish and maintain a fully functional Board of Directors with appropriate commitment, skills base and representation	Board of Directors does not appear to be fully functional	Fully functional Board of Directors with appropriate commitment, skills base and representation	1 st	IS	
F3	Develop ToRs for Board and staff, with effective organizational structure and management	No clear ToRs or effective organizational structure and management	Board and staff have clear ToRs, and an effective organizational structure and management	1 st	IS	
F4	Itzamna Society takes on role of co-management for EPNP	Itzamna Society has been recognized as a potential co-management partner for EPNP by the Forest Department	Itzamna Society has signed an agreement for co-management of EPNP	1 st	IS Forest Dept.	Liaise with Forest Department towards co-management agreement. With support of communities
F5	Establish Local Advisory Committee for EPNP	Community participation in management decisions is limited with no participation mechanism	Functional Local Advisory Committee is established to provide input into decision making, and ensure transparency	1 st	IS	Drawn from representatives of key sectors of the primary stakeholder communities
F6	Ensure Board and LAC are aware of IS obligations at system level as a co-management partner of the MMM	Obligations of pa managers of pas within the Maya Mountains Massif are not yet familiar with the obligations this entails under system level planning	IS Board and LAC members familiar with the obligations IS has under system level planning for the Maya Mountains Massif	1 st	IS Forest Dept MMM Directorate	As a co-management partner of a protected area that is part of the Maya Mountain Massif, IS will be responsible for implementation of some system level activities

**Elijio Panti National Park – Draft Management Plan
2009-2014**

F. Administrative Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
To provide the administrative framework for effective management of EPNP						
Reconsolidate Itzamna Society in the co-management role for EPNP						
F7	Establish clear role for Local Advisory Committee	Role of Local Advisory Committee is defined in previous draft management plan	Local Advisory Committee has a well defined role	1 st	IS	Role includes: <ul style="list-style-type: none"> ▪ Regular review of management activities and revision of management plan ▪ Comment on and recommend regulations ▪ Provide input and advice on applications for permits for EPNP (including research) ▪ Report on matters affecting EPNP ▪ Liaise with Government agencies ▪ Assist and support the development of sustainable financing mechanisms for EPNP, ▪ Advise and assist with administrative matters, public awareness, education and interpretive activities
Provide an effective administrative framework						
F8	Develop a Strategic Plan to identify long term management requirements	No Strategic Plan in place to guide long term management	Strategic Plan in place to guide long term management	1 st	IS LAC Community Leaders	Need to focus on planning goals for EPNP, not IS
F9	Develop Operational Plan in November for forthcoming year	No Operational Planning	Operational Plan is prepared in November for forthcoming year	1st to 5th	IS	Based on Management Plan
F10	Keep daily log of activities for EPNP, and prepare monthly report on enforcement activities, general situation report.	No activities ongoing. Ranger keeps daily log of surveillance activities	Daily log is completed, and summarized in monthly and annual reports of logged activities	1 st to 5 th	IS	Enforcement activities, maintenance activities, number of visitors, entrance fees, and a general situation report.

**Elijio Panti National Park – Draft Management Plan
2009-2014**

F. Administrative Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
To provide the administrative framework for effective management of EPNP						
Provide an effective administrative framework						
F11	Conduct regular (bi-annual?) management effectiveness assessment and submit to FD	First Management Effectiveness assessment conducted in July 2006	Regular management effectiveness assessment and submitted to PA administration authority	1 st to 5 th	IS	Should include input from LAC, Forest Department and stakeholder communities
F12	Establish administration structure for managing surveillance and monitoring data	No structure exists	A structure exists for storing surveillance and monitoring data, patrol reports etc. and producing quarterly and annual reports	1 st – 5 th	IS	
F13	Prepare annual report	Reports prepared on an annual basis	Reports prepared on an annual basis and submitted to Forest Department	1 st to 5 th	IS	Following Forest Department format
Ensure Human Resources are in place for effective management						
F14	Identify priority staffing requirements and locate funding to fill gaps	Insufficient staff employed currently for effective management.	Priority staff are employed for effective management	1 st – 2 nd	IS	Site Manager (currently voluntary) Administrative Staff 2 nd Ranger
F15	Identify priority capacity building requirements for staff	Staff do not currently have all the skills for effective management	Staff are trained in skills required for effective management	1 st to 5 th	IS	
F16	Recruit, train and retain effective staff members	Limited human resources for effective management	Effective, trained staff, sufficient for effective management	1 st to 5 th	IS	
F17	Develop an employee handbook covering topics such as job duties, employee policies, transport policy, and a staff appraisal process	No guidelines are available for staff	An employee handbook is developed covering topics such as job duties, employee policies, transport policy, and a staff appraisal process	1 st to 2 nd	IS	
F18	Develop operational policies covering topics such as race and gender issues, expected behavior, health and safety	No operational policies or best management practices are in place	Operational policies and best management practices are developed covering topics such as race and gender issues, expected behavior, health and safety	1 st to 5 th	IS	

F. Administrative Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
To provide the administrative framework for effective management of EPNP						
Ensure Human Resources are in place for effective management						
F19	Ensure accurate staff records of are maintained		Accurate staff records are maintained	1 st to 5 th	IS	
F20	Establish a well structured volunteer programme to fill critical gaps	IS has received some support from skilled volunteers in the past	IS has a more structured volunteer programme, with volunteers providing skills for filling identified human resource gaps	1 st to 5 th	IS	
Ensure effective Financial Administration						
F21	Develop financial plan for EPNP for next five years to set course for economic sustainability	No financial planning / business planning	Good financial plan developed and implemented to guide future financing and expenditure	3 rd	IS Consultant	
F22	Secure appropriate short term and medium term grant funding for the effective management of the EPNP	Short term funding is unreliable	IS has funding to implement effective management activities	1 st – 5 th	IS	
F23	Identify financial sustainability mechanisms for long term funding	Currently no financial sustainability mechanisms in place for long term funding	Financial sustainability mechanisms identified and in place for long term funding	3 rd – 5 th	IS	
F24	Consolidate administration structure for record keeping, accounting etc. for management of the conservation area	Administrative structure currently in place for record keeping, reporting, accounting etc., but effectiveness could be increased	An effective administration structure in place for the conservation area for record keeping, accounting etc.	1 st -2 nd	IS	
F25	Prepare timely financial and management accounts and submit monthly	Currently no funding	Reports prepared on a monthly basis and forwarded for review by IS and LAC	1st to 5th	IS	
F26	Prepare timely financial and management accounts and submit monthly	Currently no funding	Reports prepared on a monthly basis and forwarded for review by IS and LAC	1st to 5th	IS	

Elijio Panti National Park – Draft Management Plan
2009-2014

F. Administrative Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
To provide the administrative framework for effective management of EPNP						
Ensure effective Financial Administration						
F27	Develop and implement mechanisms for more effective fee collection	No clear method or location for paying entrance fee. Some lodges using the area without paying	Clear method or location for paying entrance fee. Engaged lodges pay entrance fees when using EPNP	1 st – 5 th	IS Local Tour Guides MPR Lodges	Develop agreements with MPR lodges
F28	Prepare financial reports as needed for funding agencies	Financial reports prepared and submitted in time to funding agencies	Financial reports prepared and submitted in time to funding agencies	1st to 5th	IS	
Address Health and Safety Issues						
F29	Ensure an effective Hurricane Plan is in place, and staff trained in implementation	Hurricane preparations are not guided by an effective Hurricane Plan	Hurricane Plan guides effective hurricane preparedness, with staff trained in implementation	1 st to 5 th	IS LAC	
F30	Ensure effective emergency procedures are in place for tourism activities and sites (including caves), and staff trained in implementation	There are no effective emergency procedures in place for tourism activities and sites (including caves), and staff trained in implementation	Effective emergency procedures are in place, with for tourism activities and sites (including caves), and staff trained in implementation	1 st to 5 th	IS LAC	
Ensure effective Monitoring and Evaluation procedures are in place						
F31	Annual review of measures of success	No review system at present in place for success of management strategies	Annual review of measures of success of strategies and implementation prior to developing annual work plan	1 st to 5 th	IS LAC	
F32	Annual evaluation of operational plan	No Operational Plan	Review operational plan in October and use successes/ failures to input into new Operational Plan	1 st to 5 th	IS LAC	
F33	Annual evaluation of surveillance and enforcement activities	No surveillance and enforcement activities	Evaluation success / failures of surveillance and enforcement activities	1st to 5 th	IS LAC	

F. Administrative Programme						
Management Actions	Present Status	Desired Status	Year	People	Limitations/Requirements	
To provide the administrative framework for effective management of EPNP						
F34	Annual review of education activities	Review of education activities over the past year before developing new operational plan	Develop new operational plan with input on successes/failures of education activities in old workplan	1st to 5th	IS LAC	
F35	Annual review of community participation activities	Review of community participation activities over the past year before developing new operational plan	Develop new operational plan with input on successes/failures of community participation activities in old workplan	1st to 5th	IS LAC	
F36	Re-evaluate management plan after 2½ years	No previous management plan	Update and re-evaluate information in all sections of Management Plan - including Environmental Assessment	3 rd year	IS LAC Forest Department	
F37	Re-evaluate management plan after 5 years	No standardized re-evaluation of management plan currently takes place	Update information in all sections of Management Plan - including Environmental Assessment	5th year	IS LAC Forest Department	

4.5.1 Management Policies

A number of policies need to be developed for effective management.

Enforcement Policy

Itzamna Society would benefit from a clear Enforcement Policy, with input from Forest Department, to guide protected area staff through standardized procedures for approaching and apprehending people in contravention of the protected area regulations. Forest Department has strengthened its ability to assist co-management organizations with enforcement issues, and now offers Green Laws training in the relevant legislative background when dealing with enforcement issues.

Staff and Volunteer Policies

Staff and Volunteer policies should be developed with clear guidelines to address health, safety, race and gender issues, as well as behavior, arbitration and work output, relevant to staff, and local, national and international volunteers assisting the IS with management activities associated with EPNP.

Health and Safety Policies

An Accident and Emergency Policy should be developed, with staff trained in implementation, to address emergency situations – especially in relation to high risk areas such as the waterfalls and caves. Staff should also be trained and certified in emergency first aid.

Whilst hurricane impacts are lower in the EPNP area than in the coastal zone of Belize, a Hurricane Preparedness Plan should be in place to ensure protection of life and property during hurricane events. Any EPNP buildings, equipment, and files should be secured as well as possible, with guidance in place as to where and how.

4.5 Monitoring and Review

Monitoring and evaluation are integral components of any management system and annual evaluation of protected area management should be conducted in house at least once a year. In the development of this management plan, the action areas are relatively specific, simplifying the process of monitoring success of implementation, and providing a mechanism for continual tracking of management activities, through annual review by IS, the Forest Department, and the Local Advisory Committee.

Management evaluation is also achieved by an assessment of management effectiveness. An initial management effectiveness evaluation was conducted in 2006 (Walker and Walker, 2006), to provide a baseline for assessment. A summary of results are presented in 4.2. Under the NPAPSP, it is recommended that regular management effectiveness assessments be conducted nationally.

It is recommended that a monitoring and evaluation tracking matrix be developed for the activities under the management programme, following the outline example (Table 40).

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Tracking of Management Action Implementation							
Management Actions	Present Status	1st Year	2nd Year	3rd Year	4th Year	5th Year	Desired Status
F1 Reconsolidate Itzamna Society as an effective community-supported organization	IS needs to reconsolidate and strengthen, and build capacity to engage key communities for effective co-management						Active IS with the support of key stakeholder communities towards co-management of EPNP
F2 Establish and maintain a fully functional Board of Directors with appropriate commitment, skills base and representation	Board of Directors does not appear to be fully functional						Fully functional Board of Directors with appropriate commitment, skills base and representation
F3 Develop ToRs for Board and staff, with effective organizational structure and management	No clear ToRs or effective organizational structure and management						Board and staff have clear ToRs, and an effective organizational structure and management
F4 Itzamna Society takes on role of co-management for EPNP	Itzamna Society has been recognized as a potential co-management partner for EPNP by the Forest Department						Itzamna Society has signed an agreement for co-management of EPNP

Table 40: Management Tracking Matrix (Layout Example)

4.7 Timeline

The Programme matrices include suggested time frames for implementation of activities. These should be used by the IS Board, once reconsolidated, to develop a timeline, using the following framework (Table 41).

Management Actions		Desired Status	1 st Year	2 nd Year	3 rd Year	4 th Year	5 th Year
F1	Reconsolidate Itzamna Society as an effective community-supported organization	Active IS with the support of key stakeholder communities towards co-management of EPNP					
F2	Establish and maintain a fully functional Board of Directors with appropriate commitment, skills base and representation	Fully functional Board of Directors with appropriate commitment, skills base and representation					
F3	Develop ToRs for Board and staff, with effective organizational structure and management	Board and staff have clear ToRs, and an effective organizational structure and management					
F4	Itzamna Society takes on role of co-management for EPNP	Itzamna Society has signed an agreement for co-management of EPNP					

Table 41: Timeline (example), based on ‘Year’ column of management programmes

4.8 Financing

Itzamna Society has shown a track record of being able to locate small-scale funding for project implementation. However, there is a need to focus on building its capacity for financial planning and financial management, with the identification of core, critical and optimal operational costs. IS also needs to identify medium and long term financial sustainability mechanisms, through an effective financial planning process, with the development of business plans to implement the selected priority strategies.

A rapid assessment provided by the organization of predicted expenditures for implementing core activities under the five-year management plan estimates a total cost of \$1,400,000

Natural resource management programme	\$200,000.00
Research and monitoring programme	\$150,000.00
Community participation programme	\$300,000.00
Public use programme	\$200,000.00
Site and infrastructure management programme	\$350,000.00
Administrative programme	\$200,000.00
Total (5-years)	\$1,400,000

Entrance Fees

Under the previous co-management agreement structure, entrance fees could be charged by Itzamna Society, with a percentage of these fees being retained towards management costs (the rest is submitted to GoB). The national co-management agreement is currently being revised, but it is hoped that IS will still be able to retain at least a portion of entrance fees charged, to assist in covering core costs.

Donor Contributions

A major source of past funding for Elijio Panti National Park has been from grants from both national and international agencies. Most recently (2008), funding has been received from PACT (\$40,000) and Ford Motor Company (Bz\$15,000) for two projects – infrastructure development / strengthening surveillance and enforcement, and monitoring jaguar populations with associated educational activities.

Accessing international donor funds is becoming more and more competitive and the IS will need to demonstrate effective management to be able to successfully compete. It is also important for the organization to develop a funding strategy to direct their efforts, rather than being reactive to funding opportunities.

Cost sharing mechanisms

In an effort to reduce costs and yet achieve good management, IS should explore possibilities of sharing certain management responsibilities with stakeholder groups such as tour guides and traditional healers, through written agreements, involving them in areas such as surveillance and visitor monitoring (in the case of tour guides). This type of sharing of responsibility should also foster a greater sense of ownership by the users of the protected area.

Financial Sustainability Plan

IS needs to develop a variety of funding sources in order to achieve sustainable financing to cover its expenses. In Belize, these sources have traditionally been based primarily on entrance fees and grants from national and international donors. However, in the future, other innovative sources and mechanisms for revenue generation will become essential to maintaining and increasing management effectiveness.

A Financial Plan - an economic or cost/benefit analysis of the protected area - should be conducted once management is in place, to determine the direct and indirect values of the reserve and compare these to the costs of management, to identify funding gaps. This will provide justification for the financing of the Elijio Panti National Park. Clearly demonstrating that the value of the protected outweighs the management costs is a powerful argument to justify the expenditures made in protecting the National Park, and also in providing benefits for the local communities.

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Integrated Fire Management Plan for Elijio Panti National Park (draft)

Annexes

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Annex One: Plant Species List

Family	Species	Common name	Draft Mgmt Plan / Fire Plan	Vaca EIA	2008 Rapid Site Survey	2006 Big Rock Survey
Acanthaceae	<i>Blechnum pyramidatum</i>	Belchum			x	
Adiantaceae	<i>Adiantum tenerum</i>	Maidenhair fern		x		
Agavaceae	<i>Agave angustifolia</i>	Agave			x	
Anacardiaceae	<i>Astronium graveolens</i>	Jobillo, Glassy wood		x		
	<i>Metopium brownei</i>	Black Poisonwood, Chechem		x	x	
	<i>Spondias radlkoferi</i>	Hogplum	x	x	x	
Annonaceae	<i>Xylopia frutescens</i>	Polewood		x	x	x
Apocynaceae	<i>Aspidosperma megalocarpon</i>	Mylady			x	
	<i>Plumeria obtusa</i>	Wild frangipani, flor de mayo		x		
	<i>Stemmadenia donnell-smithii</i>	Cojeton		x	x	
	<i>Tabernaemontana alba</i>	Dog balls		x	x	
Araceae	<i>Anthurium sp.</i>	Anthurium, Creole gal				x
	<i>Anthurium sp.</i>	Birds' nest 'fern'		x	x	
	<i>Philodendron radiatum</i>	Common philodendron			x	
	<i>Philodendron sp.</i>	Philodendron		x	x	x
	<i>Philodendron tripartitum</i>	Three-lobed philodendron			x	
	<i>Syngonium sp.</i>			x	x	
Arecaceae	<i>Acrocomia aculeata</i>	Supa palm, coco-yol			x	
	<i>Attalea cohune</i>	Cohune	x	x	x	
	<i>Bactris mexicana</i>	Pokenoboy -red fruit		x	x	
	<i>Chamaedorea ernesti-augustii</i>	Xate		x	x	
	<i>Chamaedorea oblongata</i>	Xate macho		x		
	<i>Chamaedorea pinnatifrons</i>				x	
	<i>Chamaedorea sp.</i>			x		
	<i>Cryosophila stauracantha</i>	Escoba palm		x	x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Family	Species	Common name	Draft Mgmt Plan / Fire Plan	Vaca EIA	2008 Rapid Site Survey	2006 Big Rock Survey
Areaceae (cont.)	<i>Desmoncus orthacanthos</i>	Bayal, basket tie tie, stay-a-while		x	x	
	<i>Goussia maya</i>		x	x	x	
	<i>Sabal mauritiformis</i>	Bay-leaf, Botan	x	x	x	
	<i>Schippia concolor</i>	Mountain palmeto, Mis		x	x	x
Asclepiadaceae	<i>Asclepias curassavica</i>	Asclepias		x		
Asteraceae	<i>Neurolaena lobata</i>	Jackass bitters		x	x	
Begoniaceae	<i>Begonia sericoneura</i>	Begonia			x	
Bignoniaceae	<i>Tabebuia rosea</i>	Mayflower		x		
	<i>Tabebuia chrysantha</i>	Cortex		x	x	
Bixaceae	<i>Cochlospermum vitifolium</i>	Wild cotton, (yellow) Cotton flower			x	
Bombacaceae	<i>Bernoullia flammea</i>	Mapola		x	x	
	<i>Ceiba pentandra</i>	Ceiba / cotton tree	x		x	
	<i>Ochroma pyramidale</i>	Balsa		x	x	
	<i>Pseudobombax ellipticum</i>				x	
	<i>Quararibea funebris</i>	Guayabillo, Batidos		x	x	
Boraginaceae	<i>Bouyeria oxyphylla</i>	Chi-che	x			
	<i>Cordia alliodora</i>	Salmwood, Samwood	x		x	
	<i>Cordia gerascanthus</i>	Barillo		x		
	<i>Cordia sp.</i>	Cordia		x		
Bromeliaceae	<i>Aechmea sp.</i>	Bromeliad		x		
	<i>Bromelia plumieri</i>	Pinuela - Aechmea		x	x	
	<i>Tillandsia bulbosa</i>					x
	<i>Tillandsia spp.</i>	Air-plants		x	x	
Burseraceae	<i>Bursera simaruba</i>	Gumbo limbo		x	x	
	<i>Protium copal</i>	Copal	x	x	x	
	<i>Tetragastris panamensis</i>	Carbon			x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Family	Species	Common name	Draft Mgmt Plan / Fire Plan	Vaca EIA	2008 Rapid Site Survey	2006 Big Rock Survey
Cactaceae	<i>Selenicereus testudo</i>	Devil's gut cactus		x		
Cecropiaceae	<i>Cecropia peltata</i>	Trumpet, Warumo	x	x	x	
Clusiaceae	<i>Calophyllum brasiliense</i>	Santa maria	x	x	x	x
	<i>Clusia massoniana</i>			x	x	x
	<i>Hypericum terrae-firmae</i>	Yellow-flowering MPR shrub				x
	<i>Vismia camparaguey</i>	Wild annato		x	x	x
Combretaceae	<i>Bucida buceras</i>	Bullet Tree, Pucte		x		
	<i>Terminalia amazonia</i>	Nargusta		x	x	
	<i>Ipomoea sp.</i>	Ipomoea				
Costaceae	<i>Costus sp.</i>	Costus		x	x	
Cucurbitaceae	<i>Mormordica charantia</i>	Sorosi				
		Treefern				x
Cyatheaceae						
Cyperaceae	<i>Rhynchospora cephalotes</i>	Armadillo grass		x		
	<i>Scleria bracteata</i>	Cutting grass		x		
Dennstaedtiaceae	<i>Pteridium caudatum</i>	Pteridium, Bracken			x	
Dilleniaceae	<i>Curatella americana</i>	Yaha, Sandpaper tree				x
	<i>Davilla sp.</i>			x	x	
Dioscoreaceae	<i>Dioscorea sp.</i>	Chinee yam		x	x	
Droseraceae	<i>Drosera capillaris</i>	Red sundew				x
Euphorbiaceae	<i>Dalechampia schippii</i>	Dalechampia (endemic)				x
	<i>Dalechampia sp.</i>	Pica-pica		x		
	<i>Sebastiania tuerckheimiana</i>	White Poisonwood			x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

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Fabaceae						
Caesalpinioideae	<i>Bauhinia jenningsii</i>	Wild Bauhinia				
	<i>Dialium guianense</i>	Ironwood			x	
	<i>Schizolobium parahyba</i>	Quamwood	x	x	x	
Mimosoideae	<i>Acacia collinsii</i>	Subin		x	x	x
	<i>Acacia dolichostachya</i>	Wild tamarind			x	
	<i>Inga affinis</i>	Bri-bri		x		
	<i>Inga pinetorum</i>	Tama-tama			x	
	<i>Inga sp.</i>	Inga		x		
	<i>Inga vera</i>	Bri-bri	x			
	<i>Lysiloma latisiliquum</i>	Salam		x		
	<i>Mimosa pudica</i>	Sensitive weed		x		
	<i>Mimosa tarda</i>	Sensible weed		x		
	<i>Pithecellobium sp.</i>			x		
	<i>Samanea saman</i>	Rain tree			x	
	<i>Sphinga platyloba</i>	red fowl				x
Papilionoideae	<i>Acosmium panamense</i>	Billy webb		x	x	
	<i>Gliricidia maculata</i>			x		
	<i>Gliricidia sepium</i>	Madre de Cacao		x		
	<i>Lonchocarpus castilloi</i>	Cabbage Bark, machich		x		
	<i>Machaerium sp.</i>	Tiger claw		x	x	
	<i>Mucuna sp.</i>	Deer eye, horse eye		x		
	<i>Platymiscium dimorphandrum</i>	Granadillo		x		
	<i>Swartzia cubensis</i>	Catalox, yura-sangre, bastard tambran		x		
Fagaceae	<i>Quercus sp.</i>	Oak				x
Flacourtiaceae	<i>Zuelania guidonia</i>	Water Wood, Tamai, John Crow Wood			x	
Gleicheniaceae	<i>Dicranopteris pectinata</i>	Tiger fern				x
Heliconiaceae	<i>Heliconia aurantiaca</i>				x	
	<i>Heliconia sp.</i>	Heliconia		x		
	<i>Heliconia spissa</i>	Limestone hill heliconia			x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

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Loganiaceae	<i>Strychnos sp.</i>	Chicoloro		x		
Malpighiaceae	<i>Byrsonima crassifolia</i>	Sacpa, Nancen		x	x	x
Malvaceae	<i>Hampea stipitata</i>	Majagua		x	x	
Marantaceae	<i>Calathea sp.</i>	Waha leaf		x	x	
Marcgraviaceae	<i>Souroubea sp.</i>					x
Melastomaceae	<i>Miconia sp.</i>	Miconia		x	x	
Meliaceae	<i>Cedrela odorata</i>	Spanish cedar	x	x	x	
	<i>Swietenia macrophylla</i>	Mahogany		x	x	
	<i>Trichilia havanensis</i>	Bastard lime	x			
	<i>Trichilia minutiflora</i>		x			
Moraceae	<i>Brosimum alicastrum</i>	Ramon, Breadnut		x	x	
	<i>Castilla elastica</i>	Rubber tree		x		
	<i>Ficus sp.</i>	Higo		x		
	<i>Ficus sp.</i>	Fig		x	x	
	<i>Pseudolmedia sp.</i>	Cherry		x	x	
	<i>Trophis racemosa</i>	Yaxox, Red breadnut, White ramon		x	x	
Myrtaceae	<i>Calypttranthes sp.</i>	Riparian shrub		x		
	<i>Eugenia sp.</i>	Eugenia		x	x	
	<i>Pimenta dioica</i>	Allspice		x		
Nyctaginaceae	<i>Pisonia aculeata</i>	Tiger claw		x		
Onagraceae	<i>Ludwigia octovalvis</i>	Clavos		x		
Orchidaceae	<i>Encyclia cochleata</i>	Black orchid			x	
	<i>Sobralia macrantha</i>					x

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Family	Species	Common name	Draft Mgmt Plan / Fire Plan	Vaca EIA	2008 Rapid Site Survey	2006 Big Rock Survey
Passifloraceae	<i>Passiflora biflora</i>	Granadillo			x	
	<i>Passiflora xiikzodz</i>	Narrow-leaved batwing		x		
Pinaceae	<i>Pinus caribaea</i>	Caribbean pine			x	x
Piperaceae	<i>Piper amalago</i>	Cordonzillo			x	
	<i>Piper auritum</i>	Cowfoot, Xmacolan		x	x	
	<i>Piper hispidum</i>	Cordoncillo		x	x	
Poaceae	<i>Guadua longifolia</i>	Riparian bamboo			x	
Polygonaceae	<i>Coccoloba belizensis</i>	Bob		x	x	
	<i>Coccoloba sp.</i>			x		
Rubiaceae	<i>Alibertia edulis</i>	Wild guava		x		
	<i>Alseis yucatanensis</i>	Wild mamey (l.l. cf Vaca spec)	x			
	<i>Guettarda combsii</i>	Glassy wood, tastab		x	x	
	<i>Hamelia patens</i>	Polly red head, Ixcanan		x	x	
	<i>Lindenia rivalis</i>			x	x	
	<i>Psychotria poeppigiana</i>	Hot lips		x		
Rutaceae	<i>Zanthoxylum sp.</i>	Prickly yellow		x	x	
Sapindaceae	<i>Cupania sp.</i>	Grande betty		x	x	
Sapotaceae	<i>Chrysophyllum mexicanum</i>	Chiceh		x	x	
	<i>Manilkara staminodella</i>	Chiquibul sapote			x	
	<i>Manilkara zapota</i>	Sapote		x		
	<i>Manilkara sp.</i>	Sapote	x			
	<i>Pouteria sp.</i>			x	x	
Selaginellaceae	<i>Selaginella sertata</i>				x	
	<i>Selaginella sp.</i>	Selaginella			x	x
	<i>Selaginella umbrosa</i>	Rok-ak-ach			x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

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Simaroubaceae	<i>Simarouba glauca</i>	Negrito		x	x	
Smilacaceae	<i>Smilax sp</i>	Chinee yam, Chinee root				x
Solanaceae	<i>Solanum nudum</i>	Mayan soap			x	
	<i>Solanum sp.</i>	Solanum			x	
Sterculiaceae	<i>Guazuma ulmifolia</i>	Bay cedar, pixoy		x	x	
	<i>Helicteres guazumifolia</i>	Red-flowering pixoy			x	
Ulmaceae	<i>Celtis schippii</i>	Suc'luwiin, female bullhoof			x	
	<i>Trema micrantha</i>	Bastard bay cedar (orange flowers)			x	
Verbenaceae	<i>Aegiphila pauciflora</i>		x			
	<i>Lantana camara</i>	Lantana, Oregano del monte		x	x	x
	<i>Stachytarpheta jamaicensis</i>	Stachytarpheta		x	x	x
	<i>Vitex gaumeri</i>	Yaxnik	x	x	x	
Vochysiaceae	<i>Vochysia hondurensis</i>	Yemeri, San Juan		x		
Zamiaceae	<i>Zamia polymorpha</i>	Palmita		x	x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Annex 2: Elijio Panti National Park: Bird Species List				
BWB: Birds Without Borders survey				
V: Lenny Gentle Vaca Wet and Dry Season Surveys (2005)				
Family	Species		BWB	V
Tinamidae	Great Tinamou	Tinamus major	x	x
	Little Tinamou	Crypturellus soui		x
	Thicket Tinamou	Crypturellus cinnamomeus	x	x
Ardeidae	Bare-throated Tiger-heron	Tigrisoma mexicanum		x
	Great Blue Heron	Ardea herodias		x
	Great Egret	Ardea alba		x
	Little Blue Heron	Egretta caerulea		x
	Green Heron	Butorides virescens		x
	Yellow-crowned Night-heron	Nyctanassa violacea		x
	Boat-billed Heron	Cochlearius cochlearius		x
Threskiornithidae	White Ibis	Eudocimus albus		
Cathartidae	King Vulture	Sarcoramphus papa	x	x
	Black Vulture	Coragyps atratus	x	x
	Turkey Vulture	Cathartes aura	x	x
Acciptridae	White Hawk	Leucopternis albicollis	x	x
	Common Black-hawk	Buteogallus anthracinus		x
	Roadside Hawk	Buteo magnirostris	x	x
	Ornate Hawk-eagle	Spizaetus ornatus	x	
	Short-tailed Hawk	Buteo brachyurus	x	
	Black Hawk-eagle	Spizaetus tyrannus	x	
Falconidae	Laughing Falcon	Herpetotheres cachinnans		x
	Collared Forest-Falcon	Micrastur semitorquatus	x	x
	Barred Forest-Falcon	Micrastur ruficollis	x	
	Bat Falcon	Falco rufigularis	x	
	Orange-breasted Falcon	Falco deiroleucus		x
Cracidae	Crested Guan	Penelope purpurascens	x	x
	Great Curassow	Crax rubra	x	x
	Plain Chachalaca	Ortalis vetula	x	x
Odontoridae	Singing Quail	Dactylortyx thoracicus	x	
	Spotted Wood-quail	Odontophorus guttatus	x	
Rallidae	Ruddy Crake	Laterallus ruber	x	
	Gray-necked Wood-rail	Aramides cajanea		x
Columbidae	Pale-vented Pigeon	Columba cayennensis		x
	Scaled Pigeon	Columba speciosa	x	x
	Red-billed Pigeon	Columba flavirostris	x	x
	Short-billed Pigeon	Columba nigrirostris	x	x
	Ruddy Ground-Dove	Columbina talpacoti	x	x
	Blue Ground-Dove	Claravis pretiosa	x	x
	White-tipped Dove	Leptotila verreauxi	x	x
	Gray-headed Dove	Leptotila plumbeiceps	x	x
	Gray-chested Dove	Leptotila cassini	x	x
	Ruddy Quail-Dove	Geotrygon montana	x	
Psittacidae	Olive-throated Parakeet	Aratinga nana	x	x

**Elijio Panti National Park – Draft Management Plan
2009-2014**

Elijio Panti National Park: Bird Species List				
BWB: Birds Without Borders Survey				
V: Lenny Gentle Vaca Wet and Dry Season Surveys (2005)				
Family	Species		BWB	V
Psittacidae	Brown-hooded Parrot	<i>Pionopsitta haematotis</i>	x	
	White-crowned Parrot	<i>Pionus senilis</i>	x	x
	White-fronted Parrot	<i>Amazona albifrons</i>	x	
	Yellow-lored Parrot	<i>Amazona xantholora</i>		x
	Red-lored Parrot	<i>Amazona autumnalis</i>	x	x
	Mealy Parrot	<i>Amazona farinosa</i>		x
Cuculidae	Squirrel Cuckoo	<i>Piaya cayana thermophila</i>	x	x
	Groove-billed Ani	<i>Crotophaga sulcirostris</i>		x
Strigidae	Vermiculated Screech-Owl	<i>Otus guatemalae</i>		x
	Spectacled Owl	<i>Pulsatrix perspicillata</i>		x
	Ferruginous Pygmy Owl	<i>Glaucidium brasilianum</i>		x
	Mottled Owl	<i>Ciccaba virgata</i>	x	x
	Black-and-white Owl	<i>Ciccaba nigrolineata</i>	x	
Caprimulgidae	Common Paraque	<i>Nyctidromus albicollis</i>		x
	Lesser Nighthawk	<i>Chordeiles acutipennis</i>		x
	Common Nighthawk	<i>Chordeiles minor</i>		x
Apodidae	Vaux's Swift	<i>Chaetura vauxi</i>	x	x
Trochilidae	Long-tailed Hermit	<i>Phaethornis superciliosus</i>	x	
	Little Hermit	<i>Phaethornis longuemareus</i>		x
	Band-tailed Barbthroat	<i>Threnetes ruckeri</i>	x	
	Scaly-breasted Hummingbird	<i>Phaeochroa cuvierii</i>	x	
	Wedge-tailed Sabrewing	<i>Campylopterus curvipennis</i>	x	
	Green-breasted Mango	<i>Anthracothorax prevostii</i>		x
	Canivet's Emerald	<i>Chlorostilbon canivetii</i>	x	x
	White-bellied Emerald	<i>Amazilia candida</i>	x	x
	Rufous-tailed Hummingbird	<i>Amazilia tzacatl</i>	x	x
	Trogonidae	Black-headed Trogon	<i>Trogon melanocephalus</i>	x
Violaceous Trogon		<i>Trogon violaceus</i>	x	x
Collared Trogon		<i>Trogon collaris</i>		x
Slaty-tailed Trogon		<i>Trogon massena</i>	x	x
Momotidae	Tody Motmot	<i>Hylomanes momotula</i>	x	x
	Blue-crowned Motmot	<i>Momotus momota</i>	x	x
	Keel-billed Motmot	<i>Electron carinatum</i>		x
Alcedinidae	Amazon Kingfisher	<i>Chloroceryle amazona</i>		x
	Green Kingfisher	<i>Chloroceryle americana</i>		x
Bucconide	White-necked Puffbird	<i>Notharchus macrorhynchos</i>	x	
	White-whiskered Puffbird	<i>Malacoptila panamensis</i>	x	x
Galbulidae	Rufous-tailed Jacamar	<i>Galbula ruficauda</i>	x	x
Ramphastidae	Emerald Toucanet	<i>Aulacorhynchus prasinus</i>	x	x
	Collared Aracari	<i>Pteroglossus torquatus</i>	x	x
	Keel-billed Toucan	<i>Ramphastos sulfuratus</i>	x	x
Picidae	Acorn Woodpecker	<i>Melanerpes formicivorus</i>	x	
	Black-cheeked Woodpecker	<i>Melanerpes pucherani</i>	x	x
	Red vented Woodpecker	<i>Melanerpes pygmaeus</i>		x

**Elijio Panti National Park – Draft Management Plan
2009-2014**

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Picidae	Golden-fronted Woodpecker	Melanerpes aurifrons		x	
	Chestnut-colored Woodpecker	Celeus castaneus	x	x	
	Smoky-brown Woodpecker	Veniliornis fumigatus		x	
	Golden-olive Woodpecker	Piculus rubiginosus	x	x	
	Lineated Woodpecker	Dryocopus lineatus	x	x	
	Pale-billed Woodpecker	Campephilus guatemalensis	x	x	
	Furnaridae	Plain Xenops	Xenops minutus	x	x
Rufous-breasted Spinetail		Synallaxis erythrothorax	x	x	
Tawny-throated Leaf-tosser		Sclerurus mexicanus	x	x	
Scaly-throated Leaf-tosser		Sclerurus guatemalensis	x	x	
Buff-throated Foliage-gleaner		Automolus ochrolaemus	x		
Dendrocolaptidae		Tawny-winged Woodcreeper	Dendrocincla anabatina	x	x
		Ruddy Woodcreeper	Dendrocincla homochroa	x	x
	Olivaceous Woodcreeper	Sittasomus griseicapillus	x	x	
	Wedge-billed Woodcreeper	Glyphorhynchus spirurus	x	x	
	Northern Barred Woodcreeper ²	Dendrocolaptes sanctithomae	x	x	
	Ivory-billed Woodcreeper	Xiphorhynchus flavigaster	x	x	
	Streak-headed Woodcreeper	Lepidocolaptes souleyetii		x	
Thamnophilidae	Great Antshrike	Taraba major	x	x	
	Barred Antshrike	Thamnophilus doliatus	x	x	
	Russet Antshrike	Thamnistes anabatinus		x	
	Dot-winged Antwren	Microrhophias quixensis	x	x	
	Dusky Antbird	Cercomacra tyrannina	x	x	
	Formicariidae	Black-faced Antthrush	Formicarius analis	x	x
		Tyranidae	Yellow-bellied Tyrannulet	Ornithion semiflavum	x
Greenish Elaenia			Myiopagis viridicata	x	x
Yellow-bellied Elaenia			Elaenia flavogaster	x	
Ochre-bellied Flycatcher			Mionectes oleagineus	x	x
Sepia-capped Flycatcher			Leptopogon amaurocephalus	x	x
Northern Bentbill			Oncostoma cinereigulare	x	x
Slate-headed Tody-Flycatcher	Poecilatriccus sylvia		x	x	
Tyranidae	Eye-ringed Flatbill	Rhynchocyclus brevirostris	x	x	
	Yellow-olive Flycatcher	Tolmomyias sulphurescens	x	x	
	Stub-tailed Spadebill	Platyrinchus cancrinus	x	x	
	Royal Flycatcher	Onychorhynchus coronatus	x		
	Sulphur-rumped Flycatcher	Myiobius sulphureipygius	x		
	Olive-sided Flycatcher	Contopus cooperi	x		
	Eastern Wood-Pewee	Contopus virens	x		
	Tropical Pewee	Contopus cinereus	x		
	Yellow-bellied Flycatcher	Empidonax flaviventris	x		

² For this report, Northern barred Woodcreeper and Barred Woodcreeper are considered as a single species complex

**Elijio Panti National Park – Draft Management Plan
2009-2014**

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Tyranidae	White-throated Flycatcher	<i>Empidonax albigularis</i>	x	
	Least Flycatcher	<i>Empidonax minimus</i>	x	
	Bright-rumped Attila	<i>Attila spadiceus</i>	x	x
	Rufous Mourner	<i>Rhytipterna holerythra</i>	x	
	Dusky-capped Flycatcher	<i>Myiarchus tuberculifer</i>	x	
	Great Crested Flycatcher	<i>Myiarchus crinitus</i>	x	
	Brown-crested Flycatcher	<i>Myiarchus tyrannulus</i>	x	x
	Great Kiskadee	<i>Pitangus sulphuratus</i>	x	
	Boat-billed Flycatcher	<i>Megarynchus pitangua</i>	x	
	Social Flycatcher	<i>Myiozetetes similis</i>	x	x
	Tropical Kingbird	<i>Tyrannus melancholicus</i>	x	x
	Couch's Kingbird	<i>Tyrannus couchii</i>	x	x
	Cinnamon Becard	<i>Pachyramphus cinnamomeus</i>	x	
	White-winged Becard	<i>Pachyramphus polychopterus</i>		x
	Rose-throated Becard	<i>Pachyramphus aglaie</i>	x	
	Masked Tityra	<i>Tityra semifasciata</i>	x	x
Rufous Piha	<i>Lipaugus unirufus</i>	x		
Pipridae	Thrush-like Schiffornis	<i>Schiffornis turdinus</i>	x	x
	White-collared Manakin	<i>Manacus candei</i>	x	x
	Red-capped Manakin	<i>Pipra mentalis</i>	x	x
Hirundinidae	Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	x	
Corvidae	Green Jay	<i>Cyanocorax yncas</i>	x	x
	Brown Jay	<i>Cyanocorax morio</i>	x	x
Troglodytidae	Band-backed Wren	<i>Campylorhynchus zonatus</i>		x
	Spot-breasted Wren	<i>Thryothorus maculipectus</i>	x	x
	Carolina Wren	<i>Thryothorus albinucha</i>	x	
	White-bellied Wren	<i>Uropsila leucogastra</i>	x	x
	White-breasted Wood-Wren	<i>Henicorhina leucosticta</i>	x	x
	Nightingale Wren	<i>Microcerculus philomela</i>		x
Sylviidae	Long-billed Gnatwren	<i>Ramphocaenus melanurus</i>	x	x
	Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>	x	x
	Tropical Gnatcatcher	<i>Polioptila plumbea</i>	x	x
Turdidae	Swainson's Thrush	<i>Catharus ustulatus</i>	x	
	Wood Thrush	<i>Catharus mustelinus</i>	x	x
	Clay-colored Robin	<i>Turdus grayi</i>	x	x
	White-throated Robin	<i>Turdus assimilis</i>	x	x
Mimidae	Gray Catbird	<i>Dumetella carolinensis</i>	x	x
	Tropical Mockingbird	<i>Mimus gilvus</i>		x
Vireonidae	White-eyed Vireo	<i>Vireo griseus</i>	x	
	Mangrove Vireo	<i>Vireo pallens</i>	x	
	Yellow-throated Vireo	<i>Vireo flavifrons</i>	x	
	Red-eyed Vireo	<i>Vireo olivaceus</i>	x	x
	Yellow-green Vireo	<i>Vireo flavoviridis</i>	x	x
	Tawny-crowned Greenlet	<i>Hylophilus ochraceiceps</i>	x	x

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2009-2014**

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Vireonidae	Lesser Greenlet	<i>Hylophilus decurtatus</i>	x	x
	Green Shrike-Vireo	<i>Vireolanius pulchellus</i>		x
	Rufous-browed Peppershrike	<i>Cyclarhis gujanensis</i>		x
Parulidae	Blue-winged Warbler	<i>Vermivora pinus</i>		x
	Tennessee Warbler	<i>Vermivora peregrina</i>	x	
	Yellow Warbler	<i>Dendroica petechia</i>	x	
	Chestnut-sided Warbler	<i>Dendroica pensylvanica</i>	x	x
	Magnolia Warbler	<i>Dendroica magnolia</i>	x	x
	Black-throated Green Warbler	<i>Dendroica virens</i>	x	x
	Grace's Warbler	<i>Dendroica graciae</i>	x	
	Black-and-white Warbler	<i>Mniotilta varia</i>	x	x
	American Redstart	<i>Setophaga ruticilla</i>	x	x
	Prothonotary Warbler	<i>Protonotaria citrea</i>		x
	Worm-eating Warbler	<i>Helmitheros vermivorus</i>	x	x
	Ovenbird	<i>Seiurus aurocapillus</i>	x	x
	Northern Waterthrush	<i>Seiurus noveboracensis</i>	x	x
	Louisiana Waterthrush	<i>Seiurus motacilla</i>	x	x
	Kentucky Warbler	<i>Oporornis formosus</i>	x	x
	Common Yellowthroat	<i>Geothlypis trichas</i>	x	x
	Gray-crowned Yellowthroat	<i>Geothlypis poliocephala</i>	x	
	Hooded Warbler	<i>Wilsonia citrina</i>	x	x
	Wilson's Warbler	<i>Wilsonia pusilla</i>	x	x
	Golden-crowned Warbler	<i>Basileuterus culicivorus</i>	x	x
Rufous-capped Warbler	<i>Basileuterus rufifrons</i>	x		
Yellow-breasted Chat	<i>Icteria virens</i>	x	x	
Gray-throated Chat	<i>Granatellus sallaei</i>	x		
Thraupidae	Golden-hooded Tanager	<i>Tangara larvata</i>	x	x
	Red-legged Honeycreeper	<i>Cyanerpes cyaneus</i>	x	x
	Scrub Euphonia	<i>Euphonia affinis</i>	x	
	Yellow-throated Euphonia	<i>Euphonia hirundinacea</i>	x	x
	Olive-backed Euphonia	<i>Euphonia gouldi</i>	x	x
	Yellow-winged Tanager	<i>Thraupis abbas</i>	x	x
	Gray-headed Tanager	<i>Eucometis penicillata</i>	x	
	Black-throated Shrike-Tanager	<i>Lanio aurantius</i>	x	x
	Red-crowned Ant-Tanager	<i>Habia rubica</i>	x	x
	Red-throated Ant-Tanager	<i>Habia fuscicauda</i>	x	x
	Rose-throated Tanager	<i>Piranga roseogularis</i>		x
	Hepatic Tanager	<i>Piranga flava</i>	x	
	Summer Tanager	<i>Piranga rubra</i>	x	x
	Crimson-collared Tanager	<i>Ramphocelus sanguinolentus</i>	x	x
	Scarlet Tanager	<i>Piranga olivacea</i>	x	x
White-winged Tanager	<i>Piranga leucoptera</i>		x	
Emberizidae	Blue-black Grassquit	<i>Volatinia jacarina</i>	x	
	Variable Seedeater	<i>Sporophila americana</i>	x	

**Elijio Panti National Park – Draft Management Plan
2009-2014**

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Emberizidae	White-collared Seedeater	<i>Sporophila torqueola</i>	x	
	Orange-billed Sparrow	<i>Arremon aurantiirostris</i>	x	x
	Green-backed Sparrow	<i>Arremonops chloronotus</i>	x	x
Cardulidae	Grayish Saltator	<i>Saltator coerulescens</i>	x	x
	Buff-throated Saltator	<i>Saltator maximus</i>	x	x
	Black-headed Saltator	<i>Saltator atriceps</i>	x	x
	Black-faced Grosbeak	<i>Caryothraustes poliogaster</i>	x	x
	Northern Cardinal	<i>Cardinalis cardinalis</i>	x	
	Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	x	
	Blue-black Grosbeak	<i>Cyanocompsa cyanoides</i>	x	x
	Blue Bunting	<i>Cyanocompsa parellina</i>	x	
	Indigo Bunting	<i>Passerina cyanea</i>	x	x
	Icteridae	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
Melodious Blackbird		<i>Dives dives</i>	x	
Great-tailed Grackle		<i>Quiscalus mexicanus</i>		x
Black-cowled Oriole		<i>Icterus prothemelas</i>	x	x
Yellow-backed Oriole		<i>Icterus chrysater</i>	x	x
Yellow-tailed Oriole		<i>Icterus mesomelas</i>	x	x
Baltimore Oriole		<i>Icterus galbula</i>	x	
Yellow-billed Cacique		<i>Amblycercus holosericeus</i>	x	
Montezuma Oropendola		<i>Psarocolius montezuma</i>		x

Annex 3: Fish Species List

Fish Species of Macal River and Mollejon Innundation Area		
Family	Common Name	Scientific Name
Characidae	Central Tetra, Bilum	<i>Astyanax aeneus</i>
Poeciliidae	Two-spot Livebearer	<i>Heterandria bimaculata</i>
	Mountain Molly	<i>Poecilia teresae</i>
	Green Swordtail	<i>Xiphophorus helleri</i>
Cichlidae	Yellowbelly Cichlid	<i>Cichlasoma salvini</i>
	Bue-eyed Cichlid	<i>Cichasoma spilurum</i>
Mugilidae	Mountain Mullet	<i>Agonostomus monticola</i>

Annex 4: Reptile and Amphibian Species List

Reptile and Amphibian Species of Macal River Area		
Family	Common Name	Scientific Name
Plethodontidae	<i>Bolitoglossa mexicana</i>	Mexican Mushroomtongue Salamander
Leptodactylidae	<i>Leptodactylus melanonotus</i>	Sabinal Frog
Bufonidae	<i>Bufo marinus</i>	Cane Toad
	<i>Bufo valliceps</i>	Gulf Coast Toad
Hylidae	<i>Agalychnis callidryas</i>	Red-eyed Treefrog
	<i>Dendropsophus microcephala</i>	Yellow Treefrog
	<i>Smilisca baudinii</i>	Common Mexican Treefrog
Ranidae	<i>Rana vaillanti (palmipes)</i>	Rainforest Frog
Crocodylidae	<i>Crocodylus moreletii</i>	Morelet's Crocodile
Kinosternidae	<i>Kinosternon leucostomum</i>	White-lipped Mud Turtle
Eublepharidae	<i>Coleonyx elegans</i>	Yucatan Banded Gecko
Gekkonidae	<i>Sphaerodactylus millepunctatus</i>	Spotted Dwarf Gecko
Corytophanidae	<i>Basiliscus vittatus</i>	Brown Basilisk
	<i>Corytophanes cristatus</i>	Smoothhead Helmeted Basilisk
	<i>Corytophanes hernandezii</i>	Hernandez's Helmeted Basilisk
Iguanidae	<i>Iguana iguana</i>	Green Iguana
Phrynosomatidae	<i>Sceloporus variabilis</i>	Rosebelly Lizard
Polychrotidae	<i>Anolis lemurinus</i>	Ghost Anole
Teiidae	<i>Ameiva festiva</i>	Middle American Ameiva
	<i>Ameiva undulata</i>	Rainbow Ameiva
Boidae	<i>Boa constrictor</i>	Boa Constrictor
Colubridae	<i>Coniophanes imperialis</i>	Black-striped Snake
	<i>Dryadophis melanolomus</i>	Lizard Eater
	<i>Imantodes cenchoa</i>	Blunthead Tree Snake
	<i>Oxybelis aeneus</i>	Mexican Vine Snake
Elapidae	<i>Micrurus diastema</i>	Variable Coral Snake
Viperidae	<i>Atropoides nummifer</i>	Jumping Pitviper
	<i>Bothrops asper</i>	Fer-de-Lance