COMPILATION OF INFORMATION ON BIODIVERSITY IN BELIZE

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NORWEGIAN MINISTRY OF FOREIGN AFFAIRS

INBio COSTA RICA

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Contents

Introduction:

The National Institute of Biodiversity (INBio) is executing the project “Developing capacities and sharing technology for the management of the biodiversity in Central America” which is financed by the government of Norway.

The project focuses on two specific areas:

1) the development of capacity to generate and to administer botanical information which can be integrated in partner-productive processes, by means of the use and interchange of technologies and by fortifying the capacities of herbaria of the Central American region with the purpose of turning them in true centers of botanical resources; and

2) the construction of a regional agenda of conservation and development that recognizes the interdependence of both.

One of the objectives is for the decision makers of the Central American region to have unified positions and work strategies with respect to the sustainable management of their biodiversity, in order that these decision makers, in the technical and political level, have greater knowledge on tools and opportunities that biodiversity offers to improve the quality of life of the Central American people. One of the activities for this objective is preparing information on the state of the knowledge and conservation of the biodiversity in the region and the species of vertebrates in each individual country of the region. Later this information will be integrated to have a report for the Central American region.

Activities carried out under this initiative include:

1) Compilation and update of the information of Belize on the state of the knowledge and conservation of the biodiversity and the species of vertebrates in particular..
2) Consultation with national specialists of Belize
3) Facilitation of a national workshop to validate the compiled vertebrate data.
4) Preparation of a national report of Belize on the state of the knowledge and conservation of the biodiversity and the species of vertebrates in particular.

The contract for the consultancy was signed by Consultant on June 18, 2005.

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1. State of knowledge:

1.1. Species:

For a number of taxonomic groups the species diversity in Belize is fairly well known. The best known groups include all vertebrate classes and the vascular plants. Fairly little is known about the various other Phyla. Some information may exist but this is not or not easily accessible. Currently some work is being conducted on Fungi in Belize (Baroni, T. J., D. J. Lodge, D. L. Lindner Czederpiltz, in print) and research on marine fungi is being conducted by the Smithsonian Institution (pers. Comm.). The **Biodiversity and Environmental Resource Data System for Belize (BERDS)** http://www.biodiversity.bz is the most complete and most accessible source of biodiversity information in Belize. This site contains species databases for the following species groups:

- Amphibians (Amphibia)
- Birds (Aves)
- Butterflies and moths (Insecta, Lepidoptera; Hesperidae, Lycaenidae, Nymphalidae, Papilionidae, Pieridae, Riodinidae, Saturniidae, Sphingidae & Uraniidae)
- Corals (Cnidara, Anthozoa, Scleractinia)
- Dragonflies and Damselflies (Insecta, Odonata)
- Fishes (Pisces, both marine and inland species)
- Mammals (Mammalia)
- Reptiles (Reptilia)
- Tarantula Spiders (Arachnidae, Araneida; Barychelidae and Theraphosidae)
- Vascular plants (Magnoliophyta, Coniferophyta, Cycadophyta, Psilophyta & Pteridophyta)

In total BERDS has species profiles for over 7,000 species.

1.1.1. Vascular Plants.

Based on the database in the Biodiversity and Environmental Resource Data System for Belize (BERDS), which is based on the recent publication of Balick et al (2000) with addition of some recent information the number of recorded plant species for Belize now stands at 3,750 species. Is has to be noticed that this number includes several introduced species (established or not) but most certainly lacks a number of as yet un-recorded and un-described species. The actual number of native vascular plant species in Belize is expected to be in excess of 4,000.

At the moment the principal constraint to the knowledge of the Belizean plants include the absence of trained plant taxonomists in Belize, and the poor state of the Herbarium held at Forest Department. Importantly, there exists no concise flora of Belize. The most complete treaty of Belize is the Flora of Guatemala (Standley and Steyermark 1946-1978) but this publication is much outdated. An update is underway as part of the Flora Mesoamericana Project (Davidse et al. 1995) but this projects is much behind schedule and only two of the 10 planned volumes have been published thus far.

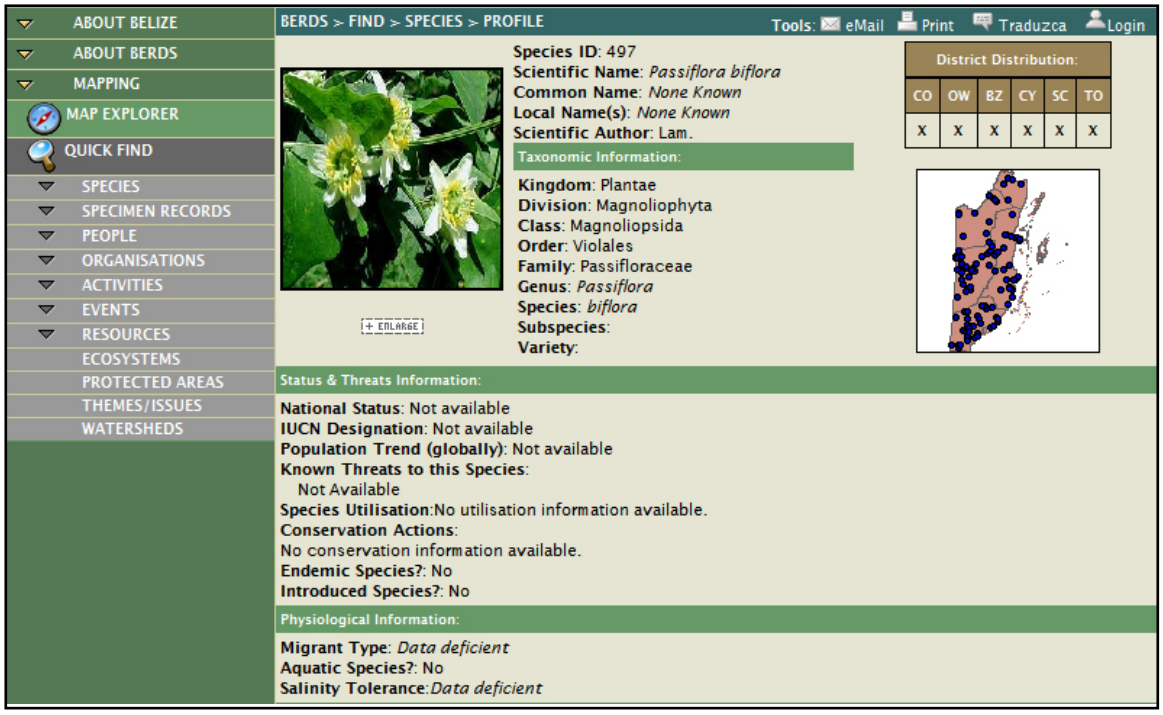

Figure 1. Example of a species profile (part) in the Biodiversity and Environmental Resource Data System for Belize (BERDS) showing the spatial representation of all records in the system of the passionflower *Passiflora biflora*.

A synopsis of the recorded plant species of Belize is given in table 1. A full species list can be accessed at http://www.biodiversity.bz. This site also contains a spatial database of specimens and records (see example in figure 1). A list of endemic plants is presented in table 2.

Table 1. Vascular Plant diversity in Belize by order

Kingdom	Phylum	Class	Order	Order Name	
Plantae	Magnoliophyta	Liliopsida	Alismatales	Alismatids	8
Plantae	Magnoliophyta	Liliopsida	Arales	Aroids	52
Plantae	Magnoliophyta	Liliopsida	Arecales	Palms	46
Plantae	Magnoliophyta	Liliopsida	Asparagales	Agaves, Aloes, Onions	25
Plantae	Magnoliophyta	Liliopsida	Bromeliales	Bromeliads	54
Plantae	Magnoliophyta	Liliopsida	Burmanniales	Burmannias	6
Plantae	Magnoliophyta	Liliopsida	Commelinales	Commelinalids	42
Plantae	Magnoliophyta	Liliopsida	Cyclanthales	Cyclanthalids	5
Plantae	Magnoliophyta	Liliopsida	Cyperales	Sedges	152
Plantae	Magnoliophyta	Liliopsida	Dioscoriales	Yams	21
Plantae	Magnoliophyta	Liliopsida	Haemodorales	Bloodworts	1
Plantae	Magnoliophyta	Liliopsida	Liliales	Lillies	6
Plantae	Magnoliophyta	Liliopsida	Najadales	Najadalids	8
Plantae	Magnoliophyta	Liliopsida	Orchidales	Orchids	307
Plantae	Magnoliophyta	Liliopsida	Poales	Grasses	259
Plantae	Magnoliophyta	Liliopsida	Pontederiales	Water Hyacinths	3
Plantae	Magnoliophyta	Liliopsida	Triuridales	Triurids	1
Plantae	Magnoliophyta	Liliopsida	Typhales	Cattails	1
Plantae	Magnoliophyta	Liliopsida	Zingiberales	Cannales	40
Plantae	Magnoliophyta	Magnoliopsida	Apiales		17
Plantae	Magnoliophyta	Magnoliopsida	Aristolochiales	Birthworts	12
Plantae	Magnoliophyta	Magnoliopsida	Asterales	Composits	160
Plantae	Magnoliophyta	Magnoliopsida	Batales	Beets	1
Plantae	Magnoliophyta	Magnoliopsida	Campanulales	Bellflowers	5
Plantae	Magnoliophyta	Magnoliopsida	Capparales	Mustards, Mallows and Maples	24
Plantae	Magnoliophyta	Magnoliopsida	Caryophyllales	Caryophyllids	70
Plantae	Magnoliophyta	Magnoliopsida	Casuarinales	She-oaks	2
Plantae	Magnoliophyta	Magnoliopsida	Celastrales	Celastralids	26
Plantae	Magnoliophyta	Magnoliopsida	Dilleniales	Dillenialids	10
Plantae	Magnoliophyta	Magnoliopsida	Dipsacales	Dipsacalids	3
Plantae	Magnoliophyta	Magnoliopsida	Ebenales	Ebendalids	31
Plantae	Magnoliophyta	Magnoliopsida	Ericales	Ericas and Rhododendrons	13
Plantae	Magnoliophyta	Magnoliopsida	Euphorbiales	Euphorbias	117
Plantae	Magnoliophyta	Magnoliopsida	Fabales	Legumes	329
Plantae	Magnoliophyta	Magnoliopsida	Fagales	Chesnuts and Oaks	8
Plantae	Magnoliophyta	Magnoliopsida	Gentianales	Gentians	98
Plantae	Magnoliophyta	Magnoliopsida	Geraniales	Geranialids	7
Plantae	Magnoliophyta	Magnoliopsida	Hamamelidales		1
Plantae	Magnoliophyta	Magnoliopsida	Lamiales	Mints and Snapdragons	107
Plantae	Magnoliophyta	Magnoliopsida	Laurales	Lauralids	33
Plantae	Magnoliophyta	Magnoliopsida	Lecythidales	Brazil Nut Trees	1
Plantae	Magnoliophyta	Magnoliopsida	Linales	Coca	4
Plantae	Magnoliophyta	Magnoliopsida	Magnoliales	Custard-apples, Magnolias, Nutmeg and Mace	24
Plantae	Magnoliophyta	Magnoliopsida	Malvales	Malvalids	98
Plantae	Magnoliophyta	Magnoliopsida	Myricales	Myrtalids	197
Plantae	Magnoliophyta	Magnoliopsida	Nepenthales	Sundews	1
Plantae	Magnoliophyta	Magnoliopsida	Nymphaeales	Waterlillies and Pond Weeds	6
Plantae	Magnoliophyta	Magnoliopsida	Papaverales	Poppies	2
Plantae	Magnoliophyta	Magnoliopsida	Piperales	Piperalids	48
Plantae	Magnoliophyta	Magnoliopsida	Plantaginales	Plantains	1
Plantae	Magnoliophyta	Magnoliopsida	Podostemales	River-weeds	6

Kingdom	Phylum	Class	Order	Order Name	
Plantae	Magnoliophyta	Magnoliopsida	Polygalales	Milkworts	54
Plantae	Magnoliophyta	Magnoliopsida	Polygonales	Buckwheats	21
Plantae	Magnoliophyta	Magnoliopsida	Primulales	Primulalids	31
Plantae	Magnoliophyta	Magnoliopsida	Proteales	Proteas	2
Plantae	Magnoliophyta	Magnoliopsida	Rafflesiales	Rafflesias	1
Plantae	Magnoliophyta	Magnoliopsida	Ranuncunales	Ranuncunalids	10
Plantae	Magnoliophyta	Magnoliopsida	Rhamnales	Buckthorns	15
Plantae	Magnoliophyta	Magnoliopsida	Rhizophorales	Red mangroves	2
Plantae	Magnoliophyta	Magnoliopsida	Rosales	Roses and allies	21
Plantae	Magnoliophyta	Magnoliopsida	Rubiales	Gardenias, Coffees and Quinines	150
Plantae	Magnoliophyta	Magnoliopsida	Salicales	Populars and Willows	1
Plantae	Magnoliophyta	Magnoliopsida	Santales	Santalids	24
Plantae	Magnoliophyta	Magnoliopsida	Sapindales	Sapindalids	104
Plantae	Magnoliophyta	Magnoliopsida	Scrophulariales	Bladderworts and Trumpet Creepers	173
Plantae	Magnoliophyta	Magnoliopsida	Solanales	Gentians, Potatoes, Dodders, and Jimsonweed	122
Plantae	Magnoliophyta	Magnoliopsida	Theales	Thealids	41
Plantae	Magnoliophyta	Magnoliopsida	Urticales	Urticalids	71
Plantae	Magnoliophyta	Magnoliopsida	Violales	Violets, etc	119
Plantae	Coniferophyta	Pinopsida	Pinales	Pines	2
Plantae	Coniferophyta	Pinopsida	Podocarpales	Podocarps	1
Plantae	Cycadophyta	Cycadopsida	Cycadales	Cycads	6
Plantae	Pteridophyta	Ophioglossopsida	Ophioglossales	Adder Tongues	3
Plantae	Pteridophyta	Marattiopsida	Marattiatales	Marattiatilds	2
Plantae	Pteridophyta		Salvinales	Ferns	2
Plantae	Pteridophyta	Polypodiopsida	Polypodiales	Ferns	251
Plantae	Psilophyta	Psilotopsida	Psilotopsida	Psilotales	1
Plantae	Lycopodiophyta	Lycopodiopsida	Lycopodiales	Wolfsclaws	7
Plantae	Lycopodiophyta	Lycopodiopsida	Selaginellales	Selaginellas	13
Plantae	Lycopodiophyta	Lycopodiopsida	Isoetales	Isoetales	1
Total list of recorded plants					**3750**

Table 2. Vascular plants endemic to Belize

Division	Class	Family	*Genus*	*species*	Author
Gymnospermae	Cycadophyta	**Zamiaceae**	*Zamia*	*prasina*	W. Bull
Angiospermae	Dicotyledoneae	**Acanthaceae**	*Louteridium*	*chartaceum*	Leonard
Angiospermae	Dicotyledoneae	**Annonaceae**	*Oxandra*	*proctorii*	Lundell
Angiospermae	Dicotyledoneae	**Apocynaceae**	*Laubertia*	*gentlei*	Lundell
Angiospermae	Dicotyledoneae	**Asclepiadaceae**	*Metastelma*	*stenomeres*	Standl. & Steyerm.
Angiospermae	Dicotyledoneae	**Asteraceae**	*Ageratum*	*radicans*	B. L. Rob.
Angiospermae	Dicotyledoneae	**Asteraceae**	*Koanophyllon*	*sorensenii*	R. M. King & H. Rob.
Angiospermae	Dicotyledoneae	**Asteraceae**	*Neurolaena*	*schippii*	B. L. Rob.
Angiospermae	Dicotyledoneae	**Asteraceae**	*Telanthophora*	*bartlettii*	H. Rob. & Brettel
Angiospermae	Dicotyledoneae	**Celastraceae**	*Crossopetalum*	*gentlei*	(Lundell) Lundell
Angiospermae	Dicotyledoneae	**Celastraceae**	*Zinowiewia*	*pallida*	Lundell
Angiospermae	Dicotyledoneae	**Clusiaceae**	*Hypericum*	*aphyllum*	Lundell
Angiospermae	Dicotyledoneae	**Eriocaulaceae**	*Paepalanthus*	*belizensis*	Moldenke
Angiospermae	Dicotyledoneae	**Eriocaulaceae**	*Paepalanthus*	*gentlei*	Moldenke
Angiospermae	Dicotyledoneae	**Eriocaulaceae**	*Syngonanthus*	*bartlettii*	Moldenke
Angiospermae	Dicotyledoneae	**Eriocaulaceae**	*Syngonanthus*	*hondurensis*	Moldenke
Angiospermae	Dicotyledoneae	**Eriocaulaceae**	*Syngonanthus*	*lundellianus*	Moldenke
Angiospermae	Dicotyledoneae	**Eriocaulaceae**	*Syngonanthus*	*oneillii*	Moldenke
Angiospermae	Dicotyledoneae	**Euphorbiaceae**	*Dalechampia*	*schippii*	Standl.
Angiospermae	Dicotyledoneae	**Euphorbiaceae**	*Gymnanthes*	*belizensis*	G. L. Webster
Angiospermae	Dicotyledoneae	**Fabaceae: Mimosoideae**	*Mimosa*	*pinetorum*	Standl.
Angiospermae	Dicotyledoneae	**Fabaceae: Mimosoideae**	*Pithecellobium*	*peckii*	S. F. Blake
Angiospermae	Dicotyledoneae	**Fabaceae: Papilionoideae**	*Galactia*	*anomala*	Lundell
Angiospermae	Dicotyledoneae	**Lamiaceae**	*Scutellaria*	*lundellii*	Epling
Angiospermae	Dicotyledoneae	**Melastomataceae**	*Miconia*	*ochroleuca*	Standl.
Angiospermae	Dicotyledoneae	**Moraceae**	*Dorstenia*	*belizensis*	C. C. Berg
Angiospermae	Dicotyledoneae	**Myrtaceae**	*Calyptranthes*	*bartlettii*	Standl.
Angiospermae	Dicotyledoneae	**Myrtaceae**	*Calyptranthes*	*cuneifolia*	Lundell
Angiospermae	Dicotyledoneae	**Myrtaceae**	*Eugenia*	*rufidula*	Lundell
Angiospermae	Dicotyledoneae	**Myrtaceae**	*Plinia*	*peroblata*	(Lundell) Lundell
Angiospermae	Dicotyledoneae	**Nyctaginaceae**	*Pisonia*	*proctorii*	Lundell
Angiospermae	Dicotyledoneae	**Passifloraceae**	*Passiflora*	*urbaniana*	Killip
Angiospermae	Dicotyledoneae	**Piperaceae**	*Piper*	*schippianum*	Trel. & Standl.
Angiospermae	Dicotyledoneae	**Polygonaceae**	*Coccoloba*	×`lundellii	Standl.
Angiospermae	Dicotyledoneae	**Rutaceae**	*Amyris*	*rhomboidea*	Standl.
Angiospermae	Monocotyledoneae	**Arecaceae**	*Schippia*	*concolor*	Burret
Angiospermae	Monocotyledoneae	**Dioscoreaceae**	*Dioscorea*	*sandwithii*	B. G. Schub.
Angiospermae	Monocotyledoneae	**Orchidaceae**	*Pleurothallus*	*duplooyi*	Luer & Sayers 2001
Angiospermae	Monocotyledoneae	**Poaceae**	*Axonopus*	*ciliatifolius*	Swallen
Angiospermae	Monocotyledoneae	**Poaceae**	*Paspalum*	*peckii*	F. T. Hubb.
Pteridophyta	Polypodiophyta	**Schizaeaceae**	*Anemia*	*bartlettii*	Mickel
Pteridophyta	Polypodiophyta	**Thelypteridaceae**	*Thelypteris*	*schippii*	(Weath.) A. R.Sm.

1.1.2. Amphibia.

Based on the database in the Biodiversity and Environmental Resource Data System for Belize (BERDS), which draws as Lee (1996) Stafford & Meyer (2000) as well as a number of personal data, there have been 41 Amphibian taxa reported from Belize. This number is unlikely to increase much unless some of the *Bolitoglossa* super species are being split up in individual taxa. Another group that is taxonomically confusing is the genus *Eleutherodactylus*. There are several records of this genus in Belize which can not be properly assigned to a species until a thorough review of this genus has been published.

Table 3. Amphibian species for Belize by order

Kingdom	Phylum	Class	Order	Order Name	
Animalia	Chordata	Amphibia	Anura	Frogs and Toads	34
Animalia	Chordata	Amphibia	Caudata	Newts and Salamanders	6
Animalia	Chordata	Amphibia	Gymnophiona	Caecilians	1
					41

There is one endemic frog known from Belize: *Rana juliani.*

The full list of known amphibian species for Belize can be found in appendix 2. Also, a database with species data can be accessed at http://www.biodiversity.bz.

1.1.3. Reptilia

Based on the database in the Biodiversity and Environmental Resource Data System for Belize (BERDS), which draws as Lee (1996) Stafford & Meyer (2000) as well as a number of personal data, there have been 126 Reptilian taxa reported from Belize. This number is unlikely to increase much even with intensified research. The taxonomy of the Belizean reptiles is relatively well understood. There are some potential changes to be expected in the genus *Norops*.

Table 4. Reptile taxa reported from Belize.

Kingdom	Phylum	Class	Order	Order Name	
Animalia	Chordata	Reptilia	Crocodilia	Caimans and Crocodiles	2
Animalia	Chordata	Reptilia	Squamata	Amphisbaenians, Lizards and Snakes	111
Animalia	Chordata	Reptilia	Testudines	Tortoises and Turtles	13
					126

There are two endemic reptile taxa known from Belize. These are the gecko *Phyllodactylus insularis* and the snake *Leptophis mexicanus hoeversi* both insular in distribution.

The full list of known reptilian species for Belize can be found in appendix 2. Also, a database with species data can be accessed at http://www.biodiversity.bz.

1.1.4. Birds

Birds are one of the best studied groups in Belize. The most recent treaty of the birds of Belize is by Jones 2003. There have been a few additions since and these have been incorporated in the database of the Environmental Resource Data System for Belize (BERDS); http://www.biodiversity.bz thus bringing the total to 574 taxa (table 5).

Table 5. Bird species reported from Belize

Kingdom	Phylum	Class	Order	Order Name	
Animalia	Chordata	Aves	Anseriformes	Ducks	16
Animalia	Chordata	Aves	Apodiformes	Hummingbirds & Swifts	29
Animalia	Chordata	Aves	Caprimulgiformes	Nightbirds	9
Animalia	Chordata	Aves	Charadriiformes	Shorebirds & Relatives	63
Animalia	Chordata	Aves	Ciconiiformes	Stork & Relatives	26
Animalia	Chordata	Aves	Columbiformes	Pigeons & Doves	19
Animalia	Chordata	Aves	Coraciiformes	Kingfishers & Allies	8
Animalia	Chordata	Aves	Cuculiformes	Cuckoos, Hoatzins, Turacos and Relatives	8
Animalia	Chordata	Aves	Falconiformes	Falcons & Allies	42
Animalia	Chordata	Aves	Galliformes	Chicken-like Birds	7
Animalia	Chordata	Aves	Gruiformes	Coots, Cranes and Rails	15
Animalia	Chordata	Aves	Passeriformes	Perching Birds	268
Animalia	Chordata	Aves	Pelecaniformes	Pelicans & Relatives	10
Animalia	Chordata	Aves	Phoenicopteriformes	Flamingos	1
Animalia	Chordata	Aves	Piciformes	Woodpeckers & Relatives	17
Animalia	Chordata	Aves	Podicipediformes	Grebes	2
Animalia	Chordata	Aves	Procellariiformes	Shearwaters	3
Animalia	Chordata	Aves	Psittaciformes	Parrots & Allies	10
Animalia	Chordata	Aves	Strigiformes	Owls	13
Animalia	Chordata	Aves	Tinamiformes	Tinamous	4
Animalia	Chordata	Aves	Trogoniformes	Trogons	4
					574

The full list of known bird species for Belize can be found in appendix 2. Also, a database with species data can be accessed at http://www.biodiversity.bz.

1.1.5. Fishes.

Because of the importance of the Marine sector in Belize. Fishes have received a lot of attention. However most attention went to the commercial species. The principal source of information for fishes is Belize is contained in “Fishbase” http://www.fishbase.org. Based on this, and combined with information from other sources, Jacques Carter (2004) prepared an informal “Preliminary fish list for Belize”. Greenfield and Thomerson (1997) published a thorough study of the inland fishes of Belize. Much marine fish work is being conducted by the Smithsonian Institution through their research station at Carrie Bow Caye. This information however, although published is scattered over a large number of publications and a single easy to access species data base does not seem to exist.

Off all the vertebrate groups, the fishes presented the most uncertainty. For this reason it was decided to have a small national workshop based on this group of species. This workshop was held on Tuesday October 25, 2005.

The workshop lead to a lot of information that could be used to establish a more extensive species list. This species list (freshwater and marine combined now stands at 669 species (see table and species list in appendix 2. Also, a database with species data can be accessed at http://www.biodiversity.bz.

In the freshwater realm there are two taxa considered endemic to Belize: The catfish *Rhamdia typhla* and the livebearer *Poecilia teresae.*

One of the principal constraints in the taxonomic knowledge of fishes in Belize is the absence of useful identification keys (apart from the inland fishes). There is a small collection of fish specimens housed at the Fisheries Department, but this collection is not being curated. It is the wish of the Fisheries Department to use this collection for educational purposes. But no fish taxonomists reside in Belize.

Table 6. Fish species list for Belize by order

Kingdom	Phylum	Class	Order	Order Name	
Animalia	Chordata	Actinopterygii	Albuliformes	Bonefishes and Halosaurs	1
Animalia	Chordata	Actinopterygii	Anguilliformes	Eels	24
Animalia	Chordata	Actinopterygii	Antheriniformes	Silversides	2
Animalia	Chordata	Actinopterygii	Aulopiformes	Salmons	7
Animalia	Chordata	Actinopterygii	Batrachoidiformes	Toadfishes	9
Animalia	Chordata	Actinopterygii	Beloniformes	Needlefishes	18
Animalia	Chordata	Actinopterygii	Beryciformes	Sawbellies	8
Animalia	Chordata	Actinopterygii	Characiformes	Characins, f/w Hatchetfishes	3
Animalia	Chordata	Actinopterygii	Clupeiformes	Herrings	23
Animalia	Chordata	Actinopterygii	Cyprinodontiformes	Killifishes, Mosquitofishes	20
Animalia	Chordata	Actinopterygii	Elopiformes	Tarpons, Ladyfishes, etc	2
Animalia	Chordata	Actinopterygii	Gadiformes	Cods and Hakes	13
Animalia	Chordata	Actinopterygii	Gobiesociformes	Clingfishes	8
Animalia	Chordata	Actinopterygii	Lampriformes	Velifers, Tube-eyes and Ribbonfishes	1
Animalia	Chordata	Actinopterygii	Lepisosteiformes	Gars	1
Animalia	Chordata	Actinopterygii	Lophiiformes	Anglerfishes	5
Animalia	Chordata	Actinopterygii	Myctophiformes	Lanternfishes	2
Animalia	Chordata	Actinopterygii	Ophidiiformes	Cusk Eels	10
Animalia	Chordata	Actinopterygii	Osmeriformes	Argentines and Smelts	3
Animalia	Chordata	Actinopterygii	Perciformes	Perch-like Fishes	390
Animalia	Chordata	Actinopterygii	Pleuronectiformes	Flatfishes	14
Animalia	Chordata	Actinopterygii	Scorpaeniformes	Scorpionfishes and Flatheads	15
Animalia	Chordata	Actinopterygii	Siluriformes	Catfishes	7
Animalia	Chordata	Actinopterygii	Stephanoberyciformes	Pricklefishes, Bigscales and Gibberfishes	1
Animalia	Chordata	Actinopterygii	Stomiiformes	Lightfishes and Dragonfishes	6
Animalia	Chordata	Actinopterygii	Synbrachiformes	Spiny Eels	1
Animalia	Chordata	Actinopterygii	Syngnathiformes	Pipefishes and Seahorses	19
Animalia	Chordata	Actinopterygii	Tetraodontiformes	Puffers and Filefishes	24
Animalia	Chordata	Elasmobranchii	Carcharhiniformes	Ground or Whaler Sharks	19
Animalia	Chordata	Elasmobranchii	Lamniformes	Mackerel Sharks	1
Animalia	Chordata	Elasmobranchii	Orectolobiformes	Carpet Sharks	2
Animalia	Chordata	Elasmobranchii	Pristiformes	Sawfishes	2
Animalia	Chordata	Elasmobranchii	Rajiformes	Skates and Rays	8
Animalia	Chordata	Elasmobranchii	Torpediformes	Electric Rays	1
					669

1.1.6. Mammal Species:

Based on the database in the Biodiversity and Environmental Resource Data System for Belize (BERDS), which draws on the species list by McCarthy (1998) as well as a number of personal data, there have been 152 Mammal taxa reported from Belize (Table 7). As part of the current project, this list was reviewed and corrected by Bruce Miller (Wildlife Conservation Society). This number is unlikely to increase much.

There are some good field guides available that cover the mammals in Belize Emmons and Feer (1990) and Reid (1997) but the main constraint in the taxonomic knowledge is the lack of trained taxonomists. There is only one resident person experienced in the taxonomy of Bats for example. Few if any people have a working knowledge of rodent taxonomy. The taxonomic status of Brocket Deer (*Mazama* sp.) has never been seriously researched in Belize.

Table 7. Mammals of Belize by order

Kingdom	Phylum	Class	Order	Order Name	
Animalia	Chordata	Mammalia	Artiodactyla	Even-toed Ungulates	6
Animalia	Chordata	Mammalia	Carnivora	Carnivores	19
Animalia	Chordata	Mammalia	Cetacea	Whales, Dolphins and Porpoises	7
Animalia	Chordata	Mammalia	Chiroptera	Bats	76
Animalia	Chordata	Mammalia	Didelphimorphia	Oppossums and Allies	8
Animalia	Chordata	Mammalia	Insectivora	Insectivores	2
Animalia	Chordata	Mammalia	Lagomorpha	Hares, Pikas and Rabbits	1
Animalia	Chordata	Mammalia	Perissodactyla	Odd-toed Ungulates	1
Animalia	Chordata	Mammalia	Primates	Apes and Monkeys	2
Animalia	Chordata	Mammalia	Rodentia	Rodents	25
Animalia	Chordata	Mammalia	Sirenia	Dugongs and Manatees	1
Animalia	Chordata	Mammalia	Xenarthra	Edentates	4
					152

The full list of known mammal species for Belize can be found in appendix 2. Also, a database with species data can be accessed at http://www.biodiversity.bz

1.2. Ecosystems:

1.2.1 Ecosystem distribution:

Belize has an ecosystems map produced as part of the Central American Ecosystems Map (Worldbank/CCAD, 2001) and originally recognized 86 different ecosystems for Belize. The report described each of the ecosystems including a list of plant species identified in these. Maps give information on altitude, broad ecosystems, detailed ecosystems and fire risk. The report is published in (low resolution) pdf format as Volume I (464 kb) and Volume II (1,422 kb). This 2001 ecosystems map was essentially an update of the 1995 Vegetation map of Belize by Iremonger and Browkaw. This Iremonger and Brokaw map borrowed heavily from the 1959 Natural Vegetation Map of Belize by Wright et al.

This ecosystem map was updated in 2005 principally to better incorporate the marine part. There existed a draft marine habitat map (Mumby & Harborne, 1999). The scale of the latter map was much finer that that of the Belize Ecosystems Map. To overcome the inconsistencies caused by the differences and reliability of both products, the various groups of habitats in the Marine map were clustered as to represent their main classifications and this result was re-digitized into polygons with a minimum size of 1 acre.

The resulting product was further updated and enriched using the following sources:

- Fieldwork data gathered by J. C. Meerman from 2001 through 2004. See http://biological-diversity.info/projects.htm
- Recent Landsat tm images: 1947_2004_02_28; 1948_2004_01_27 and 1949_2004_01_27
- Brokaw & Sabido, 1998. Vegetation of the Rio Bravo Conservation and Management Area.
- Murray et all, 1999. Soil-plant relationships and revised vegetation classification of Turneffe Atoll - Belize.,
- Penn et all, 2004. Vegetation of the Greater Maya Mountains, Belize.
- MET department: Climatological data
- Cornec, 2003. Geology map of Belize
- The Belize Territorial waters extend follows the Maritime Areas Act, (GOB, 2000)

The final product being an all encompassing Belize Ecosystems Map on a scale of 1:100,000 incorporating the main terrestrial and marine habitats (including deep sea habitats). In total 96 habitats were thus mapped (table 8, figure 2):

- 65 Terrestrial classes
- 14 Marine classes
- 7 Agriculture / silviculture / mariculture classes
- 6 Mangrove classes
- 3 Inland water classes
- 1 Urban class

The original ArcView shapefiles can be downloaded as a zipped file (2,904 kb). The shapefile comes with full metadata. Please read the use constraints section in these metadata

before using the data. Also available for download from the Biodiversity and Environmental Resource Data System of Belize.

The 2001 report has not been updated as yet but is still valid except for the "new" ecosystems that were not included in the 2001 version.

Table 8. List of ecosystems recognized in Belize indicating the national coverage in hectares for each ecosystem.

UNESCO_CODE	Unesco Description	HECTARES
IA1a(1)(a)-C	Tropical evergreen broad-leaved lowland hill forest, Callophyllum variant	9,195
IA1a(1)(a)-VT	Tropical evergreen broad-leaved lowland hill forest, Vochysia-Terminalia variant	8,290
IA1a(1)(a)K-r	Tropical evergreen broad-leaved lowland hill forest on rolling karstic terrain	21,993
IA1a(1)(a)K-s	Tropical evergreen broad-leaved lowland hill forest on steep karstic terrain	37,611
IA1a(1)(b)K	Tropical evergreen broad-leaved lowland forest on calcareous soils	1,890
IA1a(1)(b)P	Tropical evergreen broad-leaved lowland forest on poor or sandy soils	66,704
IA1b(1)	Tropical evergreen broad-leaved submontane forest	26,073
IA1b(1)K-r	Tropical evergreen broad-leaved submontane forest on rolling karstic hills	11,733
IA1b(1)K-s	Tropical evergreen broad-leaved submontane forest on steep karstic hills	12,948
IA1b(3)	Tropical evergreen broad-leaved submontane palm forest	12,055
IA1c(1)	Tropical evergreen broad-leaved lower-montane forest	805
IA1c(4)	Tropical evergreen broad-leaved lower montane palm forest	684
IA1f(2)	Tropical evergreen broad-leaved alluvial forest	2,466
IA1f(2)(a)K	Tropical evergreen broad-leaved alluvial forest on calcareous soils	12,716
IA1g(1)(a)	Tropical evergreen broad-leaved lowland swamp forest	20,141
IA1g(1)(a)-AC	Tropical evergreen broad-leaved lowland swamp forest, Aguacaliente variant	438
IA1g(1)(b)	Tropical evergreen broad-leaved permanently waterlogged lowland swamp forest	3,431
IA1g(2)(b)-MA	Tropical evergreen broad-leaved permanently waterlogged lowland swamp forest with palms. Manicaria variant	2,465
IA2a(1)(a)-ST	Tropical evergreen seasonal broad-leaved lowland hill forest, Simarouba-Terminalia variant	120,157
IA2a(1)(a)-VT	Tropical evergreen seasonal broad-leaved lowland hill forest, Virola-Terminalia variant	27,910
IA2a(1)(a)K-r	Tropical evergreen seasonal broad-leaved lowland hill forest, on rolling karstic terrain	37,451
IA2a(1)(a)K-s	Tropical evergreen seasonal broad-leaved lowland hill forest on steep karstic terrain	66,352
IA2a(1)(b)K	Tropical evergreen seasonal broadleaf lowland forest over lime-rich alluvium	34,067
IA2a(1)(b)K-BR	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Belize River variant	16,629
IA2a(1)(b)K-CE	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Central Eastern variant	59,638
IA2a(1)(b)K-CW	Tropical evergreen seasonal broad-leaved lowland forest on clacareous soils, Central West variant	54,221
IA2a(1)(b)K-TP	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Tehuantepec-Peten variant	136,613
IA2a(1)(b)K-Y	Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Yucatan variant	47,333
IA2a(1)(b)S	Tropical evergreen seasonal broad-leaved lowland forest on poor or sandy soils	26,673
IA2a(1/2)(a)	Tropical evergreen seasonal mixed lowland hill forest	378
IA2a(2)(a)	Tropical evergreen seasonal needle-leaved lowland hill forest	9,302
IA2a(2)(b)	Tropical evergreen seasonal needle-leaved lowland forest	17,968
IA2b(1)	Tropical evergreen seasonal broad-leaved submontane elfin forest	103
IA2b(1)-ST	Tropical evergreen seasonal broad-leaved submontane forest, Simarouba-Terminalia variant	45,117
IA2b(1)-VT	Tropical evergreen seasonal broadl-leaved submontane forest: Virola-Terminalia variant	54,980
IA2b(1)K-r	Tropical evergreen seasonal broad-leaved submontane forest on rolling karstic hills	29,083
IA2b(1)K-s	Tropical evergreen seasonal broad-leaved submontane forest on steep karstic hills	29,289

UNESCO_CODE	Unesco Description	HECTARES
IA2b(1/2)	Tropical evergreen seasonal mixed submontane forest	14,950
IA2b(2)	Tropical evergreen seasonal needle-leaved submontane forest	17,463
IA2c(1)	Tropical evergreen seasonal broad-leaved lower montane elfin forest	11
IA2f(2)(a)	Tropical evergreen seasonal broad-leaved alluvial forest	13,955
IA2g(1)(a)-SC	Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant	1,448
IA2g(1)(a)-Sh	Tropical evergreen seasonal broad-leaved lowland swamp forest, short tree variant	37,642
IA2g(1)(a)-T	Tropical evergreen seasonal broad-leaved lowland swamp forest, tall variant	123,648
IA3a(1)(a)	Tropical semi-deciduous broad-leaved lowland forest	6,090
IA5a(1)(a)	Caribbean mangrove forest; dwarf mangrove scrub	16,460
IA5a(1)(b)	Caribbean mangrove forest; freshwater mangrove scrub	11,377
IA5a(1)(c)	Caribbean mangrove forest; mixed mangrove scrub	27,168
IA5a(1)(d)	Caribbean mangrove forest; coastal fringe mangrove	24,652
IA5a(1)(e)	Caribbean mangrove forest; riverine mangrove	4,816
IA5a(1)(f)	Caribbean mangrove forest; basin mangrove	11,049
IB1a(2)	Tropical deciduous microphyllous lowland forest	411
IIIA1b(1)(a)K-s	Tropical evergreen broad-leaved shrubland on steep karstic hills	336
IIIA1b(a)LE	Evergreen broad-leaved lowland shrubland dominated by leguminous shrubs	31,654
IIIA1b(a)MI	Evergreen broad-leaved lowland shrubland, Miconia variant	20,829
IIIA1f	Evergreen broad-leaved lowland peat shrubland with Sphagnum	1,503
IIIB1b(a)	Deciduous broad-leaved lowland shrubland, well-drained, over poor soils	2,426
IIIB1b(a)2	Deciduous broad-leaved lowland disturbed shrubland	18,474
IIIB1b(b)	Deciduous mixed submontane shrubland over poor soils	14,358
IIIB1b(f)H	Deciduous broad-leaved lowland riparian shrubland in hills	2,838
IIIB1b(f)P	Deciduous broad-leaved lowland riparian shrubland of the plains	4,501
SA1a	River	8,836
SA1b(4)(b)	Freshwater Lake	6,438
SA1b(5)	Brackish/saline lake	26,574
SA1d(2)(a)	Coral reef of the Caribbean; Shallow Reefs	24,518
SA1d(2)(b)	Coral reef of the Caribbean; Patch Reefs	15,516
SA1d(2)(b)/s	Coral reef of the Caribbean; Patch Reefs scattered in seagrass beds	15,234
SA1d(2)(c)	Coral reef of the Caribbean; Spur and groove	6,536
SA3b	Caribbean inner lagoon	228,459
SA3c	Caribbean open sea	72,005
SA3d	Caribbean open sea	74,412
SA3f	Caribbean open sea - mesopelagic/bathyal	500,769
SA3g	Caribbean open sea - bathyal	1,019,189
SA3h	Caribbean open sea - abyssal	986,933
SPA	Agriculture	84,874
SPA(1)	Agriculture: non mechanized agricultural land uses including unimproved pasture	157,846
SPA(2)	Agriculture: mechanized agricultural land uses	141,276
SPA(2)b	Agriculture: Semi-woody perennial crops	5,605
SPA(2)c	Agriculture: Woody perennial crops	29,477
SPA(3)	Agriculture: Forest Plantations	2,212
SPC1	Fish ponds and shrimp farms	4,529
U	Urban	19,621
VA2a(1)(2)	Short-grass savanna with scattered needle-leaved trees	88,521
VA2b(2)	Short-grass savanna with shrubs	101,803
VA2c(g)	Short-grass swamp savanna without trees or shrubs	150
VD1a(1)	Eleocharis marsh	573
VE1a(1)	Marine salt marsh rich in succulents	19,677
VF1c(1)L	Fire-induced lowland fern thicket	2,040
VF1c(1)SM	Fire-induced submontane fern thicket	104

UNESCO_CODE	Unesco Description	HECTARES
VIB3a	Tropical coastal vegetation on recent sediments	1,591
VIIB1a	Tropical freshwater reed-swamp	1,208
VIIB4	Tropical lowland tall herbaceous swamp	37,657
VIIIA	Seagrass Beds	391,412
VIIIB1	Sparse algae/sand	23,853
VIIIB2	Sparse algae/silt	101,194
VIIIB3	Fleshy Brown Algae/Gorgonians	11,131

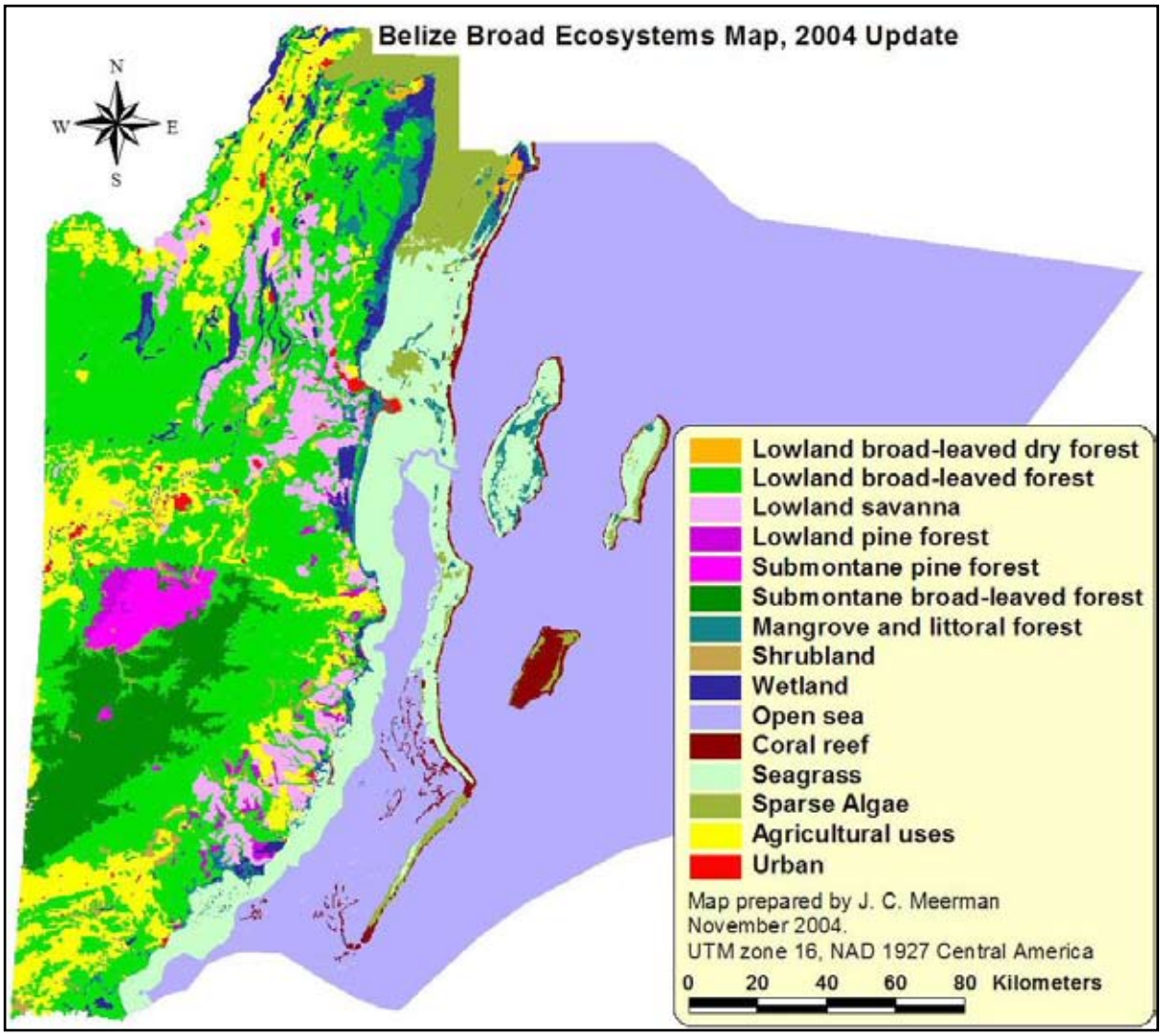

Figure 2. Ecosystems map of Belize based on Meerman, 2005. For reasons of clarity only broad ecosystems are shown.

1.2.2. Threatened Ecosystems

Although a total of 26% of Belize's national territory is currently under some form of protection, the recent Protected Area Analysis (Meerman, 2005) identified that there are still several Belizean ecosystems that are not or insufficiently covered within existing the Protected Areas System and do not even meet the 10% minimum IUCN requirement. These under represented ecosystems include:

- **IA2a(1)(b)K-BR** (Tropical evergreen seasonal broad-leaved lowland forest on calcareous soils, Belize River variant). This is an ecosystem in the Belize River valley and mostly if not entirely found on private property.
- **IA2g(1)(a)-T** (Tropical evergreen seasonal broad-leaved lowland swamp forest, tall variant)
- **IA2g(1)(a)-SC (**Tropical evergreen seasonal broad-leaved lowland swamp forest, Stann Creek variant). This is a poorly researched ecosystem in the Stann Creek district. There is a potential for including some of this in the protected areas system by expansion of the Gra Gra Lagoon National Park.
- **VIB3a** (Tropical coastal vegetation on recent sediments). This more commonly known as "littoral forest". Considered a very important habitat (migratory birds) but located on some of the most coveted real estate.
- **SA3c** (Caribbean open sea) This and the following ecosystem are deep water ecosystems located outside the reef. Virtually no data exist on this huge ecosystem.
- **SA3f** (Caribbean open sea - mesopelagic/bathyal). See above
- **SA3g** (Caribbean open sea – bathyal). See above.
- **SA3h** (Caribbean open sea – abyssal). See above.
- **SA1A** (River) is included in some of the protected area layers but it is unclear whether rivers within protected areas are actually included within the protection. It could very well be that this ecosystem is another one that is essentially not covered within the current system.

A visual presentation of these under-represented ecosystem can be seen in figure 3. Under the National Belize Protected Areas System Plan which was recently completed (Meerman & Wilson, 2005), the mechanism is created to correct these gaps in the existing protected areas system plan as well as to streamline the management of all protected areas.

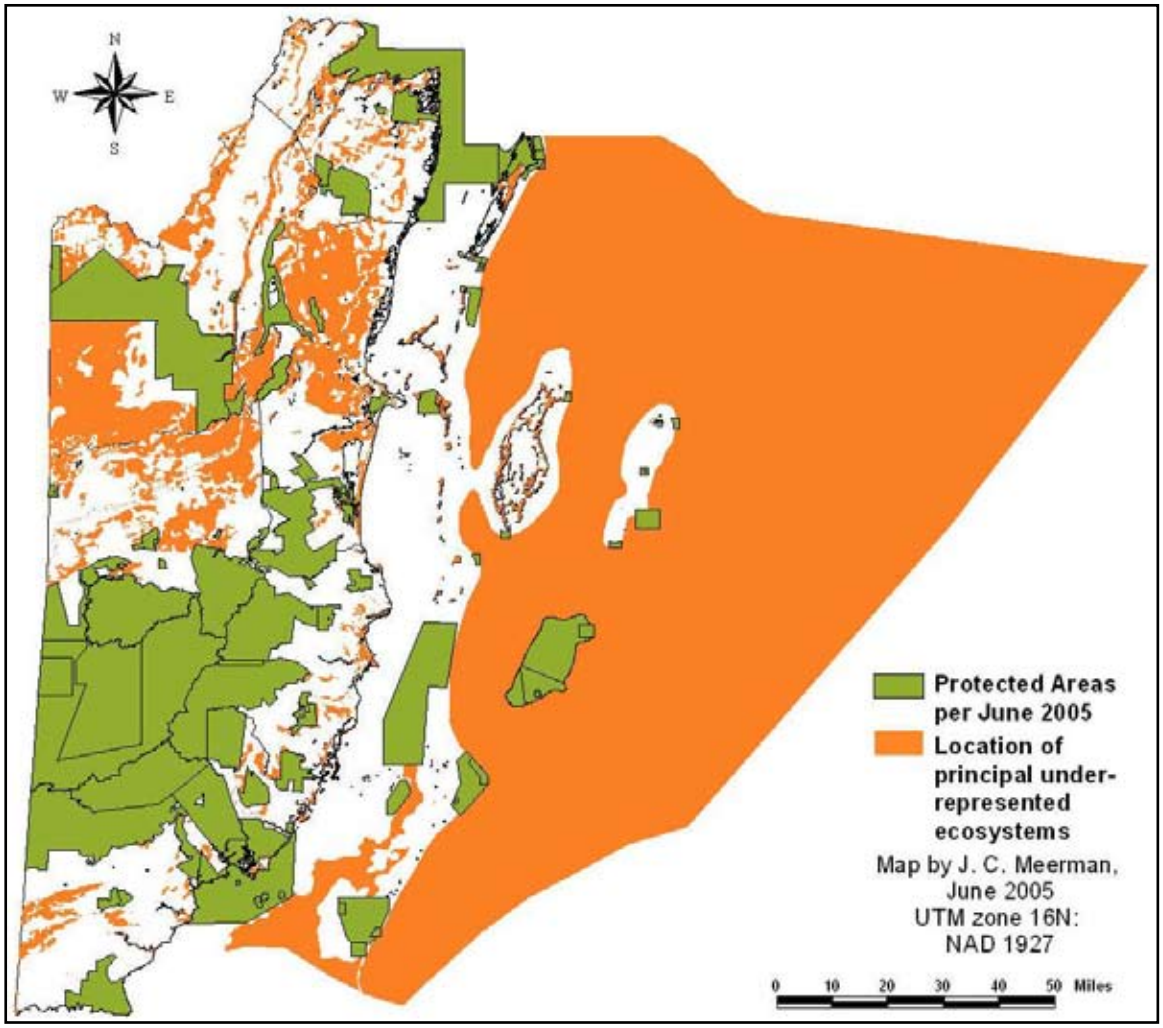

Figure 3. Ecosystems under-represented in the current Belize protected areas system based on Meerman 2005.

2. Research and Decision making institutions:

There are very resident taxonomic researchers in Belize. However, there are a number of institutions that are on occasion involved in taxonomic work. The following is a list of these institutions together with those institutions that have legislative authority on the conservation and use of biodiversity. This list is in alphabetic order.

Organisation Name: **Belize Agricultural Health Department (BAHA)**
Organisation Type: Quasi-governmental

Person in Charge: Nerie Sanz – Managing Director
Tel: 822.0818
Email: baha@btl.net
URL: http://www.baha.bz

Description: The Belize Agricultural Health Authority (BAHA) is a statutory body designed to modernize the Agricultural Health Services in Belize. It was established under the Laws of Belize "Belize Agricultural Health Authority Act, Chapter 211 of the Substantive Laws of Belize Revised Edition 2000." BAHA is governed by a Board of Directors, which is the policy making organ of the Authority, with representatives from both Government and the Private Sector.

BAHA's activities are oriented towards agricultural health monitoring at the national, transboundary and regional level, capacity building activities (*e.g.*, internal training and short-term external training), technical partnerships (*e.g.*, PAHO, IICA) and slightly less so towards replicable cases studies (*e.g.*, BAHA itself (structure and operations), Mealy Bug Project) and international initiatives (*e.g.*, CBD-Biosafety and FAO projects).

BAHA has formal MOUs with various international agencies that require weekly reporting including PAHO, OIE and USDA AFIS.

Organisation Name: **Belize Audubon Society (BAS)**
Organisation Type: Local NGO

Person in Charge: Ana Hoare – Ag. Director
Tel: 223.4988
Email: bas@btl.net
URL: http://www.belizeaudubon.org

Description: The Belize Audubon Society is "a non-governmental membership organization dedicated to the sustainable management of Belize's natural resources through leadership and strategic partnerships with stakeholders in order to create a balance between people and the environment. Under an agreement with the Government of Belize, BAS manages 8 protected areas, covering an area of over 162,000 acres. These include the world's first Jaguar reserve, a Ramsar listed wetlands site and the world renowned dive destination. Their advocacy and education programmes focus on protecting the integrity of these areas, by analysing and influencing policy, and educating the people who will impact

the parks. BAS works closely with the communities that surround the protected areas."

BAS's activities are mainly oriented towards protected areas management, outreach, research and advocacy. They participate at various levels in regional projects and in capacity building activities and less so in transboundary projects, replicable case studies, technical partnerships (WCS) and international initiatives related to UN Conventions. BAS is the national partner for BirdLife International.

BAS has formal and informal institutional arrangements related to data sharing and resource protection with a variety of national (*e.g.*, FON, YCT) and international (*e.g.*, BirdLife Int'l, MBRS) agencies and initiatives.

Organisation Name: **Belize Foundation for Research and Environmental Education (BFREE)**
Organisation Type: Private Foundation

Person in Charge: Jacob & Kelly Marlin – Managing Directors
Tel: 614.3896
Email: bfree@direcway.com
URL: http://www.bfreebelize.net

Description: The Belize Foundation for Research and Environmental Education is a "private research and educational facility located on an 1153 acre reserve in southern Belize, Central America. Founded in 1994 by professional biologists Jacob and Kelly Marlin, the goals of BFREE are:

- To aid in protection of the Bladen Nature Reserve, the jewel of the Belize protected area system;
- To provide top-quality environmental education to foreign visitors and Belize nationals;
- To coordinate and facilitate research of southern Belize rainforests."

BFREE's activities focus mainly on research, management and environmental education and outreach. The foundation focuses largely on replicable case studies (*e.g.*, forest ecology, plant/animal interactions, diversity inventories), technical partnerships (*e.g.*, BMC) and to a lesser extent some internal capacity building activities (*e.g.*, facilities improvement and proposed expansion).

BFREE has a formal institutional arrangement related to data and information sharing with the Bladen Management Consortium. Others are arranged on a case-by-case basis.

Organisation Name: **Belize Tropical Forest Studies (BTFS)**
Organisation Type: Local NGO

Person in Charge: Jan Meerman - Director
Tel: 820.4017
Email: meerman@biological-diversity.info
URL: http://www.biological.-diversity.info

Description: The mission of Belize Tropical Forest Studies is to collect and disseminate

biodiversity information in and about Belize.

BTFS's activities are mainly oriented towards biodiversity assessments but does some work on regional projects (*e.g.*, MBC) and technical partnerships (*e.g.*, PFB)

BTFS has institutional arrangements related to data sharing with the Mesoamerican Biological Corridors Project and informal agreements with a variety of agencies.

Organisation Name: **Birds Without Borders (BWB)**
Organisation Type: Local NGO

Person in Charge: Mario Teul – Director
Tel: 824.4416
Email: bwbasf@btl.net
URL: http://www.zoosociety.org/Conservation/BWB-ASF/

Description: Birds without Borders is a "multi-year research, conservation and education project coordinated by the Zoological Society of Milwaukee (ZSM) in cooperation with the Foundation for Wildlife Conservation, Inc. (FWC) and private landowners. Dr. Gil Boese, president of the ZSM and FWC, initiated the project in 1996 to study migratory and resident bird species in Wisconsin, USA, and Belize, Central America."

BWB's activities are mainly oriented towards monitoring migratory bird species in Belize. BWB maintains close collaborations with researchers in many countries in Central and South America and have strong ties to their parent organisation, the Zoological Society of Milwaukee. BWB is also heavily involved in capacity building activities including environmental education at the primary, secondary and tertiary levels, local training of interns and most recently, training birding guides at Rancho Dolores. BWB has technical partnerships with ZSM, WCS/BAS regarding the BBIS and the Bird Banding Lab at the Pt. Reyes Observatory. BWB also participates in the hemispheric activities of the American Ornithological Union.

BWB has formal institutional arrangements related to data sharing with ZSM and informal arrangements with a variety of collaborators in Central and South America.

Organisation Name: **Coastal Zone Management Authority & Institute (CZMAI)**
Organisation Type: Quasi-Governmental Agency

Person in Charge: Virginia Vasquez – Executive Officer
Tel: 223.0719
Email : czmbze@blt.net
URL: http://www.coastalzonebelize.org

Description: The Coastal Zone Management Authority is "an autonomous public statutory body charged with the responsibility of implementing and monitoring policies that govern the use and development of the coastal zone in Belize. The Coastal Zone Management Institute carries out the

technical functions of coastal management in coordination with the various agencies involved. Its main functions are to conduct marine research, maintain a data centre, provide information as required by the Authority, organize training courses, support other agencies involved in CZM, maintain coastal monitoring programmes, and to assist with preparation of a national CZM plan. Presently, the Institute is involved primarily in data collection and analysis, research on manatees, coastal water quality monitoring, and coastal planning (focusing on the island of Caye Caulker)."

CZMAI's activities are mainly oriented towards regional projects (*e.g.*, MBRS, MACC), capacity building activities (*e.g.*, Fisheries Department) and Technical Partnerships (*e.g.*, Fisheries Department, MBRS, DOE and GPD) and to a lesser extent, case studies/demonstration projects that can be used to replicate best practices elsewhere (*e.g.*, reef monitoring standards, water quality and manatee monitoring)

CZMAI has formal institutional arrangements related to data sharing with a variety of National and International agencies and universities, too numerous to list here.

Organisation Name: **Department of the Environment (DOE)**
Organisation Type: Government Agency

Person in Charge: Martin Alegria – Acting Chief Environmental Officer
Tel: 822.2542
Email: envirodept@btl.net
URL: http://www.mnrei.gov.bz

Description: The Department of the Environment is a department within the Ministry of Natural Resources, the Environment and Industry, responsible for "fostering the prudent use and proper management of natural resources of Belize, the preservation, protection and improvement of the environment and the control of pollution, thus guaranteeing a better quality of life for present and future generations."

DOE's activities are mainly oriented towards the development, monitoring and enforcement of Environmental Impact Assessments. To a lesser degree, the DOE participates in transboundary and regional projects, capacity building activities (*e.g.*, internal training and thru CCAD) and participates at some level in work related to UN Conventions.

DOE has no formal institutional arrangements related to data sharing but cooperates with GOB departments and local and international NGOs.

Organisation Name: **Fisheries Department**
Organisation Type: Governmental

Person in Charge: Beverly Wade – Fisheries Administrator
Tel: 223.2187
Email: species@btl.net
URL: http://www.belize.gov.bz/cabinet/s_baeza/welcome.shtml

Description: The mission of the Fisheries Department is to ensure that Belize's fishery resource "continues as one of the economic pillars of Belize, ensuring food security, generating income and foreign exchange, creating employment and conserving natural resources in order to grow the economy, reduce poverty and empower the local population for sustainable development."

The Fisheries Department is heavily involved in transboundary and regional projects (*e.g.*, TRIGOH, BEMANCOR, MBRS, PREPAC), capacity building internally and towards the Marine Protected Areas it manages (*e.g.*, MBRS, PREPAC, CRFM and co-management partners) and in International initiatives related to UN conventions like MARPOL, SPAW, the IAC convention on Sea Turtles and COMPAM. To a lesser extent, the Department is involved in case studies (*e.g.*, Hol Chan with ICRAN and IUCN) and Technical Partnerships (*e.g.*, MBRS and Bonaire). The Department is involved in issuing all aquatic research and bioprospecting permits/licenses and is involved in both the Spawning Aggregations Working Group and the Belize Water Commission.

The Fisheries Department has institutional arrangements related to data sharing with the Spawning Aggregations Working Group (SPAG), MBRS (tentative) and many MOU's with Marine Protected Areas Co-management partners.

Organisation Name:	**Forest Department – Belmopan HQ**
Organisation Type:	Governmental
Person in Charge:	Wilber Sabido – Chief Forest Officer Tel: 822.1524 Email: cfo@mnrei.gov.bz URL: http://www.mnrei.gov.bz/services.asp?id=21

Description: The mission of the Forest Department is "to guarantee the wise use of Belize's Forest and Protected Areas and it's biodiversity resources through the co-ordination of sound management practices of conservation, protection and sustainable utilization of the resources in perpetuity for the Belizean people.

The Forest Department is responsible for managing the forestry resources of Belize, which includes all national forests, protected areas, wildlife, and biological diversity of terrestrial zones. The responsibilities of the Department are primarily mandated in the Forest Act of 1927 Chapter 213 of the Laws of Belize, revised edition 2000, Forest Ordinance of 1958, National Park System Act of 1981, the Wildlife Protection Act of 1981 and the Protection of Mangrove regulations of 1989."

FD's activities are oriented towards regional projects (*e.g.*, MBC, SIAM, CREP, IABIN) and to a lesser extent, capacity building activities (*e.g.*, internal training) and international initiatives related to UN Conventions (*e.g.*, CBD, RAMSAR, CITES, Cartegena Protocol, CCAD).

FD has no formal institutional arrangements related to data sharing, as such, but has informal arrangements with a variety of local and international agencies.

Organisation Name: **Green Reef Environmental Institute (Green Reef)**
Organisation Type: Local NGO

Person in Charge: Mito Paz – President
Tel: 822.0758
Email: greenreef@btl.net
URL: http://www.greenreefbelize.com

Description: Green Reef Environmental Institute is "a private, non-profit organisation dedicated to the promotion of sustainable use and conservation of Belize's marine and coastal resources. Green Reef aims to promote interest in wildlife and conservation of Belize's natural resources among varying sectors of the community.

Green Reef's has programmes involving establishment of mooring buoys, Nassau Grouper, Jewfish and coral research and monitoring, advocacy, environmental education, and an indigenous plant nursery. Green Reef is optimistic that through its various programs, activities and the continued support and involvement of the community, it will succeed in meeting this objective."

Green Reef's activities are oriented towards transboundary (*e.g.*, chair of BEMAMCCOR) projects, replicable case studies (*e.g.*, Modeling of Marine Protected Areas, marine wildlife surveys) and technical partnerships (*e.g.*, WWF, SPAG, BEMAMCCOR).

Green Reef has formal and informal institutional arrangements related to data sharing with the Spawning Aggregations Working Group and others on a case-by-case basis.

Organisation Name: **Mesoamerican Barrier Reef System Project (MBRS)**
Organisation Type: Regional GEF Project

Person in Charge: Noel Jacobs – Project Coordinator
Tel: 223.3895
Email: jacobs_nd@yahoo.com
URL: http://www.mbrs.org.bz

Description: The Mesoamerican Barrier Reef System project is a 15 year regional initiative funded by the World Bank and regional countries to conserve and sustainably use the Mesoamerican reef system. The Project focuses on marine protected areas (planning, management and monitoring as well as institutional strengthening), a regional environmental monitoring and information system (establishment of a synoptic monitoring program and a distributed, web-based EIS), promoting sustainable use (sustainable fisheries management and sustainable coastal and marine tourism) and public awareness and environmental education (awareness campaigns and formal/informal education).

MBRS's activities are mainly oriented towards transboundary and regional projects, local capacity building and technical partnerships. They are slightly less involved in International initiatives related to various UN Conventions and have no case studies for replication of best practices elsewhere (other than through their Technical Documents).

MBRS has formal institutional arrangements related to data sharing with all local and regional partners to the Regional Environmental Information System.

Organisation Name: **Mesoamerican Biological Corridors Project (MBC)**
Organisation Type: GEF Regional Project

Person in Charge: Glenis Castellanos – Administrative / Technical Assistant
Tel: 822.2868
Email: mbcbelize@btl.net
URL: http://www.biomeso.net

Description: The Mesoamerican Biological Corridors Project will "enhance the conservation of biodiversity in Central America and southern Mexico by establishing a *Programme for the Consolidation of the Mesoamerican Biological Corridor*; the MBC is a priority of the Central American Alliance for Sustainable Development and will consist of a network of protected areas and their buffer zones linked by biological corridors of a variety of uses and degrees of protection. This project will, over eight years, build, integrate and initiate implementation of the basic components of the *Programme* by providing the technical assistance that will allow the governments and societies of Mesoamerican countries to jointly establish the MBC as a system integrating conservation and sustainable uses of biodiversity within the framework of economic development priorities over the medium to long term."

The MBC project in Belize is in a transition phase between classical GEF project execution and further integration and implementation within National priorities and institutions.

MBC's activities are mainly oriented towards regional and transboundary projects which enable the establishment of proposed biological corridors. This is achieved in part through working with national institutions and through technical partnerships with relevant local and international NGO/CBOs

MBC has only informal institutional arrangements related to data sharing with various partners (*.e.g.*, PfB, UB, etc)

Organisation Name: **Programme for Belize (PfB)**
Organisation Type: Local NGO

Person in Charge: Edilberto Romero – Executive Director
Tel: 227.5616
Email: pfbel@btl.net
URL: http://www.pfbelize.org

Description: Programme for Belize is a "Belizean, non-profit organization which promotes conservation in Belize and wise use of its natural resources. The Rio Bravo Conservation Management Area (RBCMA) is its flagship project where PfB seeks to demonstrate practical applications of its principles focused on linking conservation of tropical forest with the development of sustainable land uses which leave the forest and its environmental values intact. PfB is committed to the goal of earning sufficient revenue from its economic activities to support the conservation of the RBCMA. To this end, PfB has carried out major research on the land and its resources to arrive at sustainable development plans which include: ecotourism, sustainable timber extraction, carbon sequestration, agroforestry and

extraction of non-timber products."

PfB's activities are mainly oriented towards transboundary and regional projects, local capacity building, technical partnerships, International initiatives related to various UN Conventions and only slightly less so towards case studies/demonstration projects for replication of best practices elsewhere.

PfB has no formal institutional arrangements in place with other agencies.

Organisation Name: **Protected Areas Conservation Trust (PACT)**
Organisation Type: Quasi-governmental

Person in Charge: Valdemar Andrade – Executive Director
Tel: 822.3637
Email: valdemar@pactbelize.org
URL: http://www.pactbelize.org

Description: The Protected Areas Conservation Trust (PACT) was "established in 1996 as a statutory body after several years of consultation and meetings with various non-government organizations, government departments, private sector and international conservation organizations. Having been formally endorsed through the USAID's project in Belize on developing a National Protected Areas System Plan (NARMAP 1995), PACT opened its doors in June of 1996.

PACT's objectives are to:

- provide financial assistance for activities on the protected areas that foster conservation, sustainable development and management of the area;
- raise funds and receive gifts and donations from Belizeans and foreign individuals, corporations and foundations as well as from bilateral and multilateral organizations, earmarked for activities that help to achieve the mission, goal and purpose of PACT;
- Establish and maintain the institutional arrangements, operational procedures and public awareness programs required for effective and efficient management to carry out the mission of the Trust."

PACT's activities are oriented towards funding Protected Areas projects. The organisation places emphasis on capacity building activities through fund raising for projects and will soon employ a full-time training coordinator to oversee their capacity development activities.

The PACT chaired National Protected Areas Policy and System Plan Project (NPAPSP) is beginning on 05 May 2004 and continuing until 31 September 2005.

Organisation Name: **Sarstoon-Temash Institute for Indigenous Management (SATIIM)**
Organisation Type: Local NGO

Person in Charge: Gregorio Choc – Director
Tel: 722.0103
Email: satiim@btl.net
URL: n/a

Description: The Sarstoon Temash Institute for Indigenous Management (SATIIM) was established by indigenous people in southern Belize to provide technical assistance to indigenous communities to communicate effectively with government agencies and advocate for policy reform. SATIIM's objectives include protection of the ecological integrity and cultural values of the Sarstoon-Temash region, development and implementation of a park management strategy, development and implementation of a regional land management strategy, facilitation of community participation in regional conservation/ natural resource management and development initiatives and encouragement of sustainable agricultural systems.

The objective of the "Community Managed Sarstoon Temash Conservation Project" (COMSTEC) project is to reduce land degradation and conserve globally significant biodiversity resources in the STNP and its buffer zones. Proposed activities are based on the concept of co-management, as the most effective means for addressing open access problems related to indigenous peoples and natural resource use. Co-management aims to reconstitute the incentives at the local level in a way that those closest to the resource - the local indigenous people - are given a greater stake in its long-run viability and to directly involve the population in the effective protection of resources. In practice, this means increasing the feasibility of exclusion (promoting a sense of responsibility for the resource, improving control) and creating awareness for joint benefits of the resource (biodiversity, soil and water conservation).

SATIIM's activities are mainly oriented towards regional (*e.g.,* TRIGOH, MBRS) and transboundary (*e.g.*, TRIGOH, FUNDAECO, Oak Foundation (binational watershed)) projects and mush less so towards technical partnerships (*e.g.*, EcoLogic) and international initiatives (*e.g.*, WPCA).

SATIIM has formal institutional arrangements related to data sharing with FUNDAECO in Guatemala and with the Forest Department through the STNP Co-management Agreement.

Organisation Name: **Toledo Institute for Development and Environment**
Organisation Type: Local NGO

Person in Charge: Wil Maheia – Executive Director
Tel: 722.2274
Email: pgwil@btl.net
URL: http://www.tidebelize.org

Description: The Toledo Institute for Development and Environment (TIDE) was "founded in 1997 to meet the growing environmental and development needs of the Toledo District, the southernmost district of Belize. TIDE was conceived as a grassroots initiative in response to the negative environmental effects from activities such as manatee poaching, illegal fishing, illegal logging, destructive farming methods, and other types of unsustainable development. Initially started by volunteers, TIDE has now grown to include 20 paid staff. TIDE's mission is to research and monitor Toledo's natural resources, to

assist in protected areas planning and management and to lead the development of responsible tourism and other environmentally sustainable economic alternatives by providing training and support to local residents."

TIDE's activities are oriented towards regional (*e.g.*, MBRS, CREP) and transboundary (*e.g.*, TRIGOH) projects, case studies that can be replicated elsewhere (*e.g.*, Paynes Creek National Park and Port Honduras Marine Reserve through the CREP project), capacity building activities (*e.g.*, SAGE, BMC, BACONGO) and technical partnerships *e.g.*, MBRS, Forest and Fisheries Departments). TIDE has won the UNDP Equator Initiative and Kissinger Prizes.

TIDE has formal institutional arrangements related to data sharing with the Spawning Aggregations Working Group (SPAG), MBRS, the Government of Belize (through the co-management agreements), and with PACT, USAID and PfB through their Debt-For-Nature Swap Agreement.

Organisation Name: **University of Belize – Institute of Marine Studies (IMS)**
Organisation Type: Public University

Person in Charge: Eden Garcia – Director
Tel: 606.8016
Email: eden_garcia25@yahoo.com
URL: http://www.ub.edu.bz/ims/

Description: The principal aim of the UB IMS is "to provide facilities for scientific monitoring, research and environmental awareness programs with an immediate focus on shallow water tropical marine ecosystems. Calabash Caye field station supports UB's developing degree programs in Natural Resources Management and Coastal/Marine Studies. It also provides a facility for short training courses and workshops on a wide range of marine related topics for students, teachers and others, from both Belize and overseas. The station is the headquarters for current national efforts to maintain the unique biodiversity of the Turneffe Islands atoll."

IMS's activities are oriented towards education and research; including efforts oriented towards replicable case studies (*e.g.*, Turneffe Islands), transboundary (*e.g.*, BEMAMCCOR), regional projects (*e.g.*, CARICOM), in capacity building activities (*e.g.*, training from MBRS and CZMAI) and less so towards technical partnerships (*e.g.*, Univ. Windsor, Univ. Bremen, Smithsonian).

IMS has formal institutional arrangements related to data sharing with MBRS, CARICOM and the Spawning Aggregations Working Group (SPAG).

Organisation Name: **University of Belize – Natural Resources Management Programme (UB-NRM)**

Organisation Type: Public University

Person in Charge: Ed Boles – Director of NRM Programme
Tel: 602.5823
Email: ubboles@yahoo.com
URL: http://www.ub.edu.bz

Description: The University of Belize Natural Resources Management programme is a 2 year multi-disciplinary (applied) research programme. The NRM programme is going to a 4-year format in late 2004. The programme currently has 19 first year and 9 second year students. Once the programme switches to a 4-year format, the enrollment will likely be capped at 18 students per year.

UB-NRM focuses on applied research including water quality monitoring and rapid environmental assessments as application of theoretical studies. The programme has done work on the Sibun and Belize River watersheds, Punta Negra Lagoon, Cockscomb Basin Wildlife Sanctuary, Five Blues National Park and the Crooked Tree Wildlife Sanctuary to-date. As the programme moves to the 4-year format, activities will expand to include riparian reforestation, bioremediation, environmental education, etc.

UB-NRM's activities are oriented towards regional (*e.g.*, Maya Forest regional Project with Univ. Florida) and transboundary (*e.g.*, Greater Belize Watershed Project, Rio Hondo) projects, internal capacity building (*e.g.*, Oak Foundation, TNC), technical partnerships (*e.g.*, TNC, BAS, TIDE, Univ. Florida and Belmopan City Council) and international student exchange programmes.

Organisation Name: **Wildlife Conservation Society (WCS) – Marine Unit**
Organisation Type: International NGO

Person in Charge: Janet Gibson – Marine Coordinator
Tel: 223.3271
Email: jgibson@wcs.org
URL: http://www.wcs.org/gloversreef

Description: WCS's Marine Unit focuses primarily on the Glover's Reef Marine Research Station which has a three-part mission of research, conservation and public education.

"The first goal is to facilitate first-rate research on the ecology, geology, archeology, zoology and botany of the island and it's surrounding waters. To promote these activities, the station has been developed with researchers in mind, with ample lab space, dormitories and other facilities.

Working in conjunction with the government of Belize, Glover's Reef Marine Research Station has forged a strong conservation relationship. By providing housing for government rangers at Middle Caye, and helping supply critical scientific data, WCS is aiding the Belizean government in its mission to conserve its precious natural heritage.

WCS believes strongly that conservation is not the sole responsibility of professional academics or governments; rather it is the duty of every person. In order to inform people of the ecological fragility of coral reefs, and of the critical threats facing them, Glover's Reef Marine Research Station has recently

begun an active public education program. Moreover, the station has served as a technical training ground for Belizean officials and students."

WCS's activities are mainly oriented towards case studies/demonstration projects that can be replicated elsewhere (*e.g.*, fisheries catch), capacity building activities (*e.g.* Glover's Advisory Committee), technical partnerships (*e.g.*, TNC, WWF) and participation in international efforts concerning several UN conventions.

WCS has a formal institutional arrangement related to data sharing with the Spawning Aggregation Working Group (SPAG).

Organisation Name: **Wildlife Conservation Society (WCS) – Terrestrial Unit**
Organisation Type: International NGO

Person in Charge: Bruce Miller – Associate Conservation Zoologist
Tel: 220.9002
Email: batsncats@direcway.com
URL: http://www.wcs.org

Description: The Wildlife Conservation Society is a research-oriented International conservation NGO. "WCS has supported scientists in every country in Central America, researching the natural history of birds, mammals, and reptiles, and conducting important marine studies. These scientific endeavors contributed to conservation planning and priority-setting in the region. That site-specific work continues today, but is now applied within a comprehensive framework. Beginning in 1991, WCS introduced the innovative concept of integrating conservation initiatives among all Central American countries and Mexico by incorporating biological corridors into conventional park development programs. This notion has been adopted by governments and agencies in the region, and has garnered massive financial support from the international community."

WCS's activities in Belize are mainly oriented towards transboundary (*e.g.*, WCS Petén, ECOSUR-Mexico), regional projects (*e.g.*, Selva Maya Ecoregional Planning, NEOBAT), capacity building activities (*e.g.*, BAS, training and equipment, support to MSBC), technical partnerships (*e.g.*, BAS) and less so towards replicable case studies/demonstration projects and international initiatives related to UN Conventions.

WCS has formal and informal institutional arrangements related to data sharing with a variety of local and regional agencies (*e.g.* ECOSUR, WCS – Peten, BAS, etc)

Organisation Name: **World Wildlife Fund for Nature (WWF)**
Organisation Type: International NGO

Person in Charge: Melanie McField – Senior Program Officer
Tel: 223.7680/81
Email: mcfield@wwfca.org
URL: http://www.wwfca.org

Description: The World Wildlife Fund for Nature - Belize Office is focused on conservation of the Mesoamerican Barrier Reef. They lend technical assistance in areas such as protected area network design, use of marine protected areas as conservation tools, ecolabelling certification for shrimp farming, capacity building and education. WWF is currently working with MBRS and the Summit Foundation to develop analysis tools for monitoring data to determine benchmark s for reef health.

WWF's activities are mainly oriented towards transboundary and regional projects, local capacity building, technical partnerships and less so towards International initiatives related to UN conventions and case studies/demonstration projects for replication of best practices elsewhere.

WWF has formal institutional arrangements in place with the Belize Spawning Aggregations Working Group (SPAG) and informal arrangements with the Coastal Zone Management Authority and Institute (CZMAI).

Organisation Name: **Ya'axche' Conservation Trust (YCT)**
Organisation Type: Local NGO

Person in Charge: Bartolo Teul - Director
Tel: 722.0108
Email: yct_ffi@btl.net
URL: http://www.yct.bz

Description: The mission of the Ya'axche' Conservation Trust is to promote biodiversity conservation, sustainable use and management of natural resources in the Golden Stream watershed (approx. 15,000 acres), while enhancing the socio-economic development of the local Mayan communities who depend upon them. Activities include education and outreach targeted at the surrounding communities, shade-tree organic cacao production, organic vegetable production and a furniture workshop using sustainably-harvested timber. YCT is soon to embark on a structured biodiversity monitoring programme within the Reserve to help assess management effectiveness.

YCT's activities are mainly oriented towards local capacity building but are involved in some technical partnerships (w/ TIDE, FFI and BAS) and minimally in projects of a transboundary or regional nature (w/ MBC and the Xaté initiative).

YCT has institutional arrangements related to data sharing and resource protection with the Toledo Institute for Development and the Environment (TIDE) and the Bladen Management Consortium (BMC).

3. Conservation status:

Belize has recently finished a National Protected Areas Systems Plan (Meerman & Wilson, 2005), as part of this exercise a list of species of special concern was prepared (Meerman, 2005) This list is reproduced here as table and list the species of concern for Belize including the justification for the listing of the individual species as being of concern. This list contains a the rationale for these species to be included in the list.

Table 9. Belize list of species of conservation concern (Meerman, 2005).

Order	*Species*	English Name	IUCN class	Status in Belize	Justification
Amphibians	*Agalychnis moreletii*		CR	DD	3
Amphibians	*Bolitoglossa dofleini*		NT	DD	3
Amphibians	*Bufo campbelli*		NT	LC	3
Amphibians	*Smilisca cyanosticta*		NT	DD	3
Amphibians	*Eleutherodactylus chac*		NT	DD	3
Amphibians	*Eleutherodactylus laticeps*		NT	DD	3
Amphibians	*Eleutherodactylus leprus*		VU	DD	3
Amphibians	*Eleutherodactylus psephosypharus*		VU	DD	3
Amphibians	*Eleutherodactylus sabrinus*		EN	DD	3
Amphibians	*Eleutherodactylus sandersoni*		EN	DD	3
Amphibians	*Hyla bromeliacia*		EN	DD	3
Amphibians	*Rana juliani*		NT	NT	2
Birds	*Agamia agami*	Agami Heron		VU	6,8
Birds	*Ajaia ajaja*	Roseate Spoonbill		VU	6
Birds	*Amazona oratrix*	Yellow-Headed Amazon		EN	4,8,9,10
Birds	*Amazona xantholora*	Yellow-Lored Parrot		VU	10
Birds	*Anous stolidus*	Brown Noddy		VU	6
Birds	*Ara macao cyanoptera*	Scarlet Macaw		EN	4,8,9,11
Birds	*Ardea herodias*	Great Blue Heron		VU	4,10
Birds	*Asio stygius*	Stygian Owl		VU	10
Birds	*Bubo virginianus*	Great Horned Owl		VU	10
Birds	*Cairina moschata*	Muscovy Duck		VU	4
Birds	*Columba leucocephala*	White-Crowned Pigeon	NT	VU	4,7
Birds	*Contopus cooperi*	Olive-Sided Flycatcher	NT	DD	
Birds	*Crax rubra*	Great Curassow	NT	VU	4,9
Birds	*Dendrocygna autumnalis*	Black-Bellied Whistling Duck		VU	4,10
Birds	*Dendrocygna bicolor*	Fulvous Whistling Duck		VU	4,10
Birds	*Dendroica cerulea*	Cerulean Warbler	VU	VU	
Birds	*Egretta rufescens*	Reddish Egret		VU	6,10
Birds	*Egretta thula*	Snowy Egret		VU	6,10
Birds	*Egretta tricolor*	Tricolored Heron		VU	6,10
Birds	*Electron carinatum*	Keel-Billed Motmot		VU	3,8,9
Birds	*Eudocimus albus*	White Ibis		VU	6
Birds	*Falco deiroleucus*	Orange-Breasted Falcon		VU	8,9
Birds	*Fregata magnificens*	Magnificent Frigatebird		VU	6
Birds	*Harpia harpyja*	Harpy Eagle	NT	CR	4,7,9,10

Order	*Species*	English Name	IUCN class	Status in Belize	Justification
Birds	*Harpyhaliaetus solitarius*	Solitary Eagle	NT	CR	4,7,10
Birds	*Jabiru mycteria*	Jabiru		VU	4,7,9,10, 11
Birds	*Laterallus jamaicensis*	Black Rail	NT	DD	
Birds	*Melanoptila glabrirostris*	Black Catbird	NT	NT	8,9
Birds	*Meleagris ocellata*	Ocellated Turkey	NT	VU	3,4,9
Birds	*Morphnus guianensis*	Crested Eagle	NT	CR	4,7,10
Birds	*Mycteria americana*	Wood Stork		VU	4,6,10
Birds	*Nyctanassa violacea*	Yellow-Crowned Night-Heron		VU	6
Birds	*Nycticorax nycticorax*	Black-Crowned Night-Heron		VU	6
Birds	*Pelecanus occidentalis*	Brown Pelican		VU	6,10
Birds	*Penelope purpurascens*	Crested Guan		VU	4
Birds	*Phalacrocorax auritus*	Double-Crested Cormorant		VU	4,6,10
Birds	*Phalacrocorax brasilianus*	Neotropic Cormorant		VU	4,6,10
Birds	*Pionopsitta haematotis*	Brown-Hooded Parrot		DD	
Birds	*Sarcoramphus papa*	King Vulture		VU	7,8,9
Birds	*Sterna anaethetus*	Bridled Tern		VU	6
Birds	*Sterna antillarum*	Least Tern		VU	6
Birds	*Sterna dougallii*	Roseate Tern		VU	6
Birds	*Sterna fuscata*	Sooty Tern		VU	6
Birds	*Sterna sandvicensis*	Sandwich Tern		VU	6
Birds	*Sula leucogaster*	Brown Booby		VU	6
Birds	*Sula sula*	Red-Footed Booby		VU	6
Corals	*Anthozoa – all species*	Gorgonians, Telestaceans, Soft Corals, Black Corals, Stony Corals	VU	VU	9
Corals	*Hydrozoa – all species*	Fire Corals, Lace Corals	VU	VU	9
Fishes	*Balistes vetula*	Queen Triggerfish	VU	VU	4,5
Fishes	*Dermatolepis inermis*	Marbled Grouper	VU	CD	1,4,5,6
Fishes	*Epinephelus itajara*	Goliath Grouper	CR	CD	1,4,5,6,9
Fishes	*Epinephelus morio*	Red Grouper	NT	CD	1,4,5,6
Fishes	*Epinephelus nigritus*	Warsaw Grouper	CR	CD	1,4,5,6
Fishes	*Epinephelus niveatus*	Snowy Grouper	VU	CD	1,4,5,6
Fishes	*Epinephelus striatus*	Nassau Grouper	EN	CD	1,4,5,6,9
Fishes	*Hippocampus erectus*	Lined Seahorse	VU	DD	
Fishes	*Hippocampus reidi*	Longsnout Seahorse	DD	DD	
Fishes	*Lachnolaimus maximus*	Hogfish	VU	VU	4,5
Fishes	*Lutjanus analis*	Mutton Snapper	VU	VU	4,5,6
Fishes	*Lutjanus cyanopterus*	Cubera Snapper	VU	VU	4,5,6
Fishes	*Mycteroperca venenosa*	Yellowfin Grouper	NT	CD	1,4,5,6
Fishes	*Pagrus pagrus*	Red Porgy	EN	DD	4,5
Fishes	*Sanopus astrifer*	Whitespotted Toadfish	VU	DD	
Fishes	*Sanopus greenfieldorum*	Whitelined Toadfish	VU	DD	
Fishes	*Sanopus reticulatus*	Reticulated Toadfish	VU	DD	
Fishes	*Sanopus splendidus*	Splendid Toadfish	VU	DD	
Fishes	*Scarus guacamaia*	Rainbow Parrotfish	VU	VU	4,5
Fishes-Sharks	*Carcharhinus leucas*	Bull Shark	NT	NT	4,5,9,10
Fishes-Sharks	*Carcharhinus limbatus*	Blacktip Shark	NT	NT	4,5,9,10
Fishes-Sharks	*Carcharhinus longimanus*	Oceanic Whitetip Shark	NT	NT	4,5,9,10
Fishes-Sharks	*Carcharhinus plumbeus*	Sandbar Shark	NT	NT	4,5,9,10

Order	*Species*	English Name	IUCN class	Status in Belize	Justification
Fishes-Sharks	*Galeocerdo cuvier*	Tiger Shark	NT	NT	4,5,9,10
Fishes-Sharks	*Isurus oxyrinchus*	Shortfin Mako	NT	NT	4,5,9,10
Fishes-Sharks	*Mustelus canis*	Dusky Smoothhound	NT	DD	
Fishes-Sharks	*Negaprion brevirostris*	Lemon Shark	NT	NT	4,5,9,10
Fishes-Sharks	*Prionace glauca*	Blue Shark	NT	NT	4,5,9,10
Fishes-Sharks	*Pristis pectinata*	Smalltooth Sawfish	NT	CR	4,5
Fishes-Sharks	*Pristis perotteti*	Largetooth Sawfish	CR	CR	4,5
Fishes-Sharks	*Rhincodon typus*	Whale Shark	VU	VU	7,8,9
Fishes-Sharks	*Sphyrna lewini*	Scalloped Hammerhead	NT	NT	4,5,9,10
Fishes-Sharks	*Sphyrna mokarran*	Great Hammerhead	DD	DD	4,5,9,10
Fishes-Sharks	*Sphyrna zygaena*	Smooth Hammerhead	NT	NT	4,5,9,10
Mammals	*Alouatta pigra*	Mexican Black Howler Monkey	EN	VU	3,9
Mammals	*Ateles geoffroyi*	Central American Spider Monkey	VU	VU	9
Mammals	*Balaenoptera physalus*	Fin Whale	EN	DD	9
Mammals	*Balantiopteryx io*	Thomas's Sac-winged Bat,	EN	VU	8
Mammals	*Bauerus dubiaquercus*	Van Gelder's Bat,	VU	VU	8
Mammals	*Cabassous centralis*	Northern Naked-Tailed Armadillo	DD	DD	8
Mammals	*Centronycteris centralis*	Shaggy Bat	VU	VU	8
Mammals	*Dicotyles pecari*	White-Lipped Peccary	VU	VU	4,7,10
Mammals	*Globicephala macrorhynchus*	Short-finned Pilot Whale	VU	DD	9
Mammals	*Herpailurus yaguarondi*	Yaguarundi	VU	LC	10
Mammals	*Leopardus pardalis*	Ocelot	VU	VU	4,9,10
Mammals	*Leopardus wiedii*	Margay	VU	VU	9,10
Mammals	*Lontra longicaudis*	Neotropical River Otter	DD	VU	10
Mammals	*Mazama pandora*	Yucatan Brown Brocket Deer	DD	DD	3,4
Mammals	*Molossops greenhalli*	Greenhall's mastiff Bat	VU	VU	8
Mammals	*Mormoops megalphylla*	Ghost-faced Bat	NT	NT	8
Mammals	*Myotis elegans*	Elegant Myotis	VU	VU	8
Mammals	*Panthera onca*	Jaguar	NT	NT	4,7,9,10
Mammals	*Physeter macrocephalus*	Sperm Whale	VU	DD	9
Mammals	*Pteronotus gymnonotus*	Greater Naked-back Bat	NT	NT	8
Mammals	*Puma concolor*	Puma	NT	NT	4,7,9,10
Mammals	*Stenella frontalis*	Atlantic Spotted Dolphin	VU	VU	9
Mammals	*Stenella longirostris*	Spinner Dolphin	VU	DD	9
Mammals	*Steno bredanensis*	Rough-Toothed Dolphin	VU	DD	9
Mammals	*Tapirus bairdii*	Central American Tapir	EN	VU	4,9,10
Mammals	*Thyroptera tricolor*	Spix's Disk-winged Bat,	VU	VU	8
Mammals	*Trichechus manatus*	West Indian Manatee	VU	VU	4,9
Mammals	*Turiopsis truncatus*	Bottlenose Dolphin	VU	VU	9
Plants	*Ceratozamia robusta*		VU	VU	3
Plants	*Pithecellobium johansenii*		EN	DD	
Plants	*Quiina schippii*		EN	DD	
Plants	*Schippia concolor*	Mountain Pimento	VU	LC	2
Plants	*Swietenia macrophylla*	Large-Leaved Mahogany	VU	VU	5,9
Plants	*Zamia prasina*		CR	DD	2,8
Plants	*Zamia* sp. Nov.	Un-described Zamia		VU	2,8
Plants	*Zamia variegata*	Variegated Zamia	EN	VU	3,9

Order	*Species*	English Name	IUCN class	Status in Belize	Justification
Reptiles	*Caretta caretta*	Loggerhead	EN	EN	4,5,6,9
Reptiles	*Chelonia mydas*	Green Turtle	EN	EN	4,5,6,9
Reptiles	*Crocodylus acutus*	American Crocodile		NT	4,9,10
Reptiles	*Crocodylus moreletii*	Morelet's Crocodile		CD	3,4,5,9,10
Reptiles	*Dermatemys mawii*	Central American River Turtle	EN	EN	3,4,5,9
Reptiles	*Dermochelys coriacea*	Leatherback	CR	CR	4,9
Reptiles	*Eretmochelys imbricata*	Hawksbill Turtle	CR	CR	4,5,6,9
Reptiles	*Phyllodactylus insularis*	Island Gecko		NT	2
Reptiles	*Staurotypus triporcatus*	Mexican Musk Turtle	NT	NT	4
Reptiles	*Trachemys scripta*	Common Slider	NT	LC	4

Justification:

1. The Fisheries Department expressed that it is aware of present trends in the global populations of all Groupers. Measures have been taken to protect spawning sites of these fish in Belize and the Department is attempting to introduce measures that will allow it to sustainably manage this resource. For this reason the grouper all have been placed in the CD = Conservation Dependant category.
2. Endemic species
3. Small Range – Regional Endemic
4. Hunted – Fished
5. Economic importance
6. Colony breeder (restricted number of breeding colonies/locations)
7. Needs large range
8. Specialized ecological requirements
9. Charismatic species drawing national and international attention
10. Prosecuted as perceived pest
11. Genetically different from South American counterpart

4. Protected Wild Areas:

The recently completed Belize National Protected Areas System Plan (Meerman & Wilson, 2005) made an analysis of all protected areas in Belize.

There exist a total of 94 protected areas in Belize (per January 1, 2005 including archaeological reserves and "accepted" private reserves)(Figure 4). Several of these reserves, particularly in the Marine realm have gazetted management zonation. When these zones are taking into account the number of "management units" increases to 115. There is also some overlap. Particularly the "Spawning Aggregations", which are technically "Marine Reserves", have often been created partly inside already existing marine reserves and should possibly best be considered a zonation category within these marine reserves.

A total list of these protected area categories in Belize can be found in table # while a complete list of protected areas is represented in table #. There exist many categories of protected areas but they can be grouped in the following broad categories:

Bird Sanctuaries: The 7 Bird Sanctuaries are some of the oldest protected areas (Crown Reserves) that have biodiversity conservation in mind. They were gazetted in 1977 for the protection of waterfowl nesting and roosting colonies. All of them are tiny islands with a combined surface of 14.7 acre/6.0 ha. There is surprisingly little information on these bird sanctuaries. No recent counts or species occupation data appear to be available. This is a clear data deficiency. Particularly given how easy it would be to gather such data on an annual basis.

Archaeological Reserves include a number Maya Sites managed by the National Institute for Culture and History (NICH). Total surface of these sites is approximately 27,826 acres or 11,261 ha (0.7 % of national territory). It is important to notice that essentially all Archaeological Sites are protected under the Ancient Monuments and Antiquities Act of 1972 (Revised 1980). The 12 archeological reserve sites listed here are the only ones included in the analysis. Additional Sites were only available as point data and as such could not be used in the area calculation.

Extractive Reserves form a grouping of 16 Forest Reserves and 8 Marine Reserves. These management categories were created for the management of extractive resources. This is the largest section of Protected Areas Categories (50 % of total protected area acreage):

- Forest Reserves: 939,809 acres; 380,328 hectares = 9.3 % of Total National Territory
- Marine Reserves: 372,730 acres; 150,839 hectares = 3.7 % of Total National Territory
- Combined coverage 13.0 % of Total National Territory

Conservation Management Categories: This grouping represents management categories with conservation purposes in mind. This can be conservation of biodiversity (Nature Reserve, Wildlife Sanctuary), natural resources (Marine Reserves), landscapes and special features (National Park, Natural Monument). While these are not designed for extractive use, some forms of extraction are often allowed and these protected areas certainly allow for non-extractive uses. All combined they comprise of a total of 53 areas falling in 6 different classes (including conservation/wilderness/no-take zones of marine reserves). Note that many of

the protected Spawning Aggregations fall entirely or largely within already existing marine protected areas. The total national coverage is 9.3 % of the total national territory.

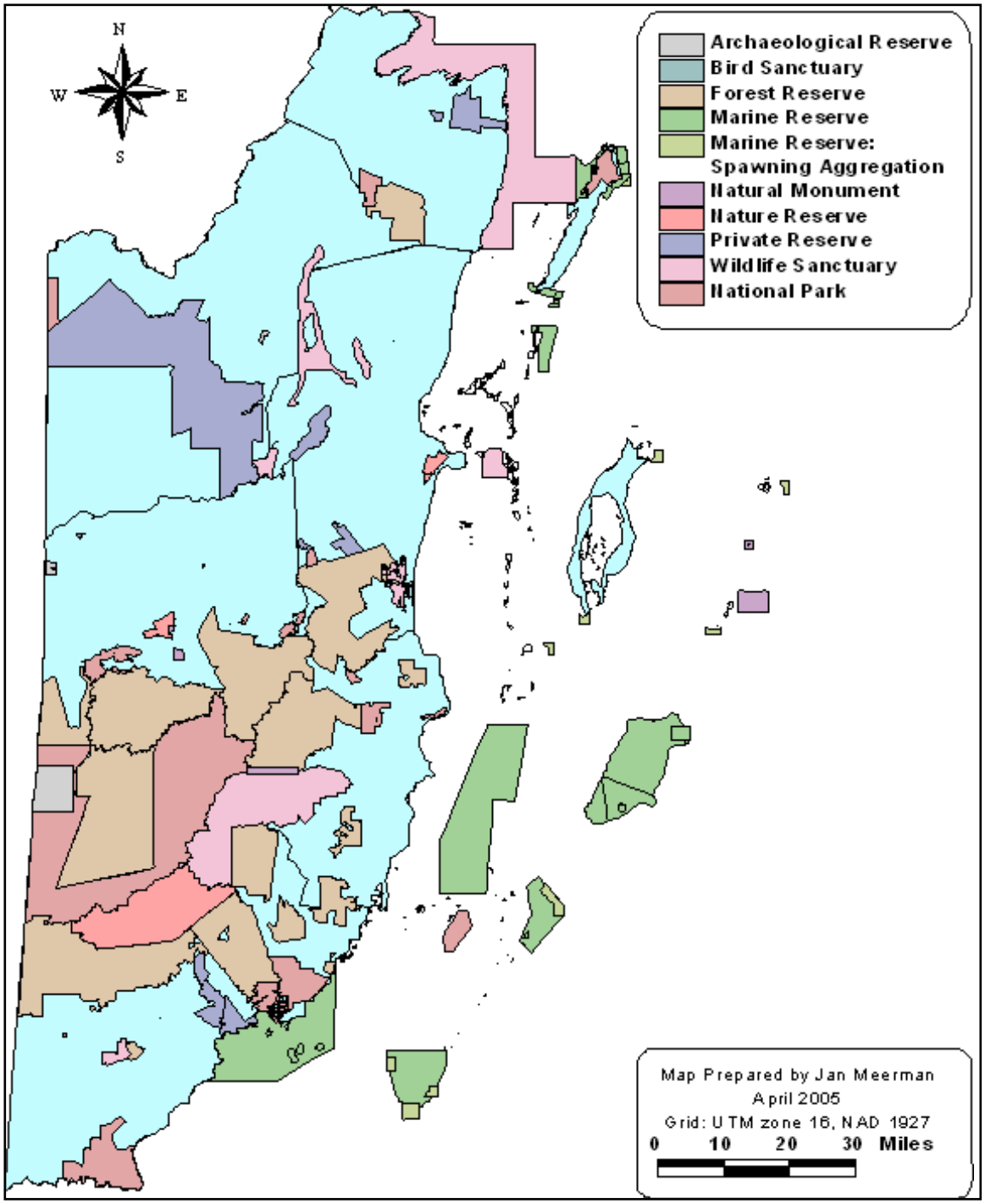

Figure 4. Protected Areas System of Belize in 2005. Based on Meerman, 2005.

Private Protected Areas: In this management category, only those protected areas are included that have a standing agreement with Government (Rio Bravo Conservation and Management Area and Block 127) and those others that have a de-facto recognition + have a management in place (Shipstern, Community Baboon, Runaway Creek, Aguacate Lagoon, Monkey Bay and Golden Stream. Following this classification, there are 8 Private Protected Areas covering 325,346 acres or 131,663 hectares (3.2 % of National Territory). Most of these Private Reserves are essentially multiple use reserves including managed extraction of resources. The Belize Association of Private Protected Areas (BAPPA) has a membership of landowners that are trying to manage their land holdings as for conservation purposes (including those land holdings recognized here).

Table 10. Protected Area Categories and Coverage in Belize

	STATUS	COUNT	ACRES	HECTARES	%
Conservation Management Categories	Marine Reserve incl. SPAG	11	26,595	10,763	0.26
	National Park	16	412,031	166,744	4.09
	Natural Monument	5	16,359	6,620	0.16
	Nature Reserve	3	111,228	45,013	1.10
	Spawning Aggregation adds	11	916	371	0.01
	Wildlife Sanctuary	7	368,786	149,243	3.66
		53		378,754	9.29
Archaeological Reserves	Archaeological Reserve	12	11,261	27,826	0.68
Bird Sanctuaries	Bird Sanctuary	7	6	15	0.00
Extractive Reserves	Forest Reserve	20	939,809	380,329	9.33
	Marine Reserve	17	372,730	150,839	3.70
				531,168	13.02
Private Reserves	Private Reserve	8	325,346	131,663	3.23
% of national territory under protection				1,069,426	26.22
Surface	Land		5,467,841	2,212,765	
	Marine		4,609,230	1,865,300	
	Total		10,077,071	4,078,065	

The total national coverage of protected areas in Belize thus amounts to a little over 26%. A full list of protected areas in Belize is presented in table 11.

Table 11. Protected Areas in Belize as per 2005.

NAME	STATUS	ZONE	IUCN_CAT	GAZETTED	MGMT	CO-MANAGEMENT	ACRES	HECTARES	NOTES
Altun Ha	Archaeological Reserve		II	1995/12/	NICH		38.4	15.6	
Barton Creek	Archaeological Reserve		II	2001/04/	NICH		0.5	0.2	
Cahal Pech	Archaeological Reserve		II	1995/22	NICH		22.4	9.1	
Caracol	Archaeological Reserve		II	1995/55	NICH		25,549.50	10,339.50	
Caves Branch	Archaeological Reserve		II		NICH		15.3	6.2	
Cerros Maya	Archaeological Reserve		II	1976	NICH		24.3	9.9	
El Pilar	Archaeological Reserve		II	1998/052	NICH		1,906.80	771.6	
Lamanai	Archaeological Reserve		II	1985/03/	NICH		979.7	396.5	
Lubaantun	Archaeological Reserve		II		NICH		33.4	13.5	
Nimli Punit	Archaeological Reserve		II	1995/02/	NICH		41.7	16.9	
Santa Rita	Archaeological Reserve		II	1995/02/	NICH		0.1	0	
Xunantunich	Archaeological Reserve		II	1995/02/	NICH		7.7	3.1	
Bird Caye	Bird Sanctuary		IV	1977/09/	Forest Dept		1.3	0.5	
Doubloon Bank	Bird Sanctuary		IV	1977/09/	Forest Dept		3.7	1.5	
Little Guana Caye	Bird Sanctuary		IV	1977/09/	Forest Dept		2.6	1	
Los Salones	Bird Sanctuary		IV	1977/09/	Forest Dept		2.9	1.2	
Man of War Caye	Bird Sanctuary		IV	1977/09/	Forest Dept	BAS	1.9	0.8	
Monkey Caye	Bird Sanctuary		IV	1977/09/	Forest Dept		1.3	0.5	
Un-Named	Bird Sanctuary		IV	1977/09/	Forest Dept		1.1	0.4	
Caye Caulker	Forest Reserve		VI	1998/28	Forest Dept	FAMRACC	93.7	37.9	
Chiquibul	Forest Reserve		VI	1995/54	Forest Dept		147,823.10	59,822.10	
Columbia River	Forest Reserve		VI	1997/115	Forest Dept		148,303.00	60,016.30	
Deep River	Forest Reserve		VI	1990	Forest Dept		67,304.80	27,237.40	
Fresh Water Creek	Forest Reserve		VI	2001/66	Forest Dept	Friends of Freshwater Creek	33,392.90	13,513.70	
Grants Works	Forest Reserve		VI	1989/95	Forest Dept		7,906.10	3,199.50	Under Review
Machaca	Forest Reserve		VI	1998/86	Forest Dept		3,096.10	1,253.00	
Manatee	Forest Reserve		VI	1959	Forest Dept		103,908.00	42,050.20	Under Review
Mango Creek (1)	Forest Reserve		VI	1989/62	Forest Dept		10,803.20	4,371.90	
Mango Creek (4)	Forest Reserve		VI	1989/62	Forest Dept		19,071.80	7,718.10	
Maya Mountain	Forest Reserve		VI	1997/114	Forest Dept		41,729.90	16,887.60	
Monkey Caye	Forest Reserve		VI	1996/130	Forest Dept		1,654.40	669.5	
Mountain Pine Ridge	Forest Reserve		VI	2000/112	Forest Dept		106,352.70	43,039.60	Under Review
Sibun	Forest Reserve		VI	1977	Forest Dept		106,393.00	43,055.90	Under Review

NAME	STATUS	ZONE	IUCN_CAT	GAZETTED	MGMT	CO-MANAGEMENT	ACRES	HECTARES	NOTES
Sittee River	Forest Reserve		VI	1977	Forest Dept		92,316.60	37,359.40	Under Review
Swasey-Bladen	Forest Reserve		VI	1989/90	Forest Dept		14,778.60	5,980.70	
VACA	Forest Reserve		VI	2003/137	Forest Dept		34,886.80	14,118.20	Under Review
Bacalar Chico	Marine Reserve	General Use	IV	1996/88	Fisheries Dept		11,597.00	4,693.20	
Bacalar Chico	Marine Reserve	No take	IV	1996/88	Fisheries Dept		4,196.80	1,698.40	
Caye Caulker	Marine Reserve		VI	1998/35	Fisheries Dept	FAMRACC	9,670.20	3,913.40	
Dog Flea	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,424.30	576.4	
Emily or Caye Glory	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,350.90	546.7	
Gladden Spit	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		3,996.90	1,617.50	
Gladden Spit and Silk Cayes	Marine Reserve		IV	2003/95	Fisheries Dept	Friends of Nature	25,978.30	10,513.10	
Glovers Reef	Marine Reserve	Seasonal Closure	IV	2001/137	Fisheries Dept		3,831.50	1,550.60	
Glovers Reef	Marine Reserve	Conservation	IV	2001/137	Fisheries Dept		17,470.90	7,070.30	
Glovers Reef	Marine Reserve	Wilderness	IV	2001/137	Fisheries Dept		667.4	270.1	
Glovers Reef	Marine Reserve	General Use	IV	2001/137	Fisheries Dept		64,683.30	26,176.50	
Hol Chan	Marine Reserve		II	1987/57	Fisheries Dept		624.2	252.6	
Hol Chan	Marine Reserve		II	1987/57	Fisheries Dept		1,458.60	590.3	
Hol Chan	Marine Reserve		II	1987/57	Fisheries Dept		285.9	115.7	
Hol Chan	Marine Reserve		II	1987/57	Fisheries Dept		454.7	184	
Hol Chan	Marine Reserve	No Take	II	1987/57	Fisheries Dept		989.8	400.5	
Nicholas Caye	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,663.30	673.1	
Northern Glovers Reef	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,536.10	621.7	
Port Honduras	Marine Reserve		IV	2000/9	Fisheries Dept	TIDE	96,731.10	39,145.90	
Port Honduras	Marine Reserve	No Take	IV	2000/9	Fisheries Dept	TIDE	3,270.00	1,323.30	
Rise and Fall Bank	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		4,252.20	1,720.80	
Rocky Point	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,408.80	570.1	
Sandbore	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,288.30	521.4	
Sapodilla Cayes	Marine Reserve		IV	1996/117	Fisheries Dept	TASTE	38,594.00	15,618.50	
Seal Caye	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,600.80	647.8	
Silk Cayes	Marine Reserve		IV	2003/95	Fisheries Dept	Friends of Nature	378.3	153.1	

NAME	STATUS	ZONE	IUCN_CAT	GAZETTED	MGMT	CO-MANAGEMENT	ACRES	HECTARES	NOTES
South Point Lighthouse	Marine Reserve	Spawning Aggregation	IV	2003/161	Fisheries Dept		1,316.50	532.8	
South Point Turneffe	Marine Reserve	Spag	IV	2003/161	Fisheries Dept		1,378.70	557.9	
South Water Caye	Marine Reserve		IV	1996/118	Fisheries Dept		117,874.90	47,702.50	
Aguas Turbias	National Park		II	1994/44	Forest Dept		8,750.40	3,541.20	
Bacalar Chico	National Park		V	1996/89	Forest Dept		11,145.20	4,510.30	
Billy Barquedeer	National Park		II	2001/176	Forest Dept	Friends of the Valley	1,639.10	663.3	
Chiquibul	National Park		II	1995/55	Forest Dept		264,003.30	106,838.80	
Five Blues Lake	National Park		II	1994/52	Forest Dept	BAS	4,061.20	1,643.50	
Gragra Lagoon	National Park		II	2002/86	Forest Dept	Friends of GraGra	1,319.70	534.1	
Guanacaste	National Park		II	1994/46	Forest Dept	BAS	57.6	23.3	
Honey Camp	National Park		II	2001/65	Forest Dept		7,772.00	3,145.20	
Laughing Bird Caye	National Park		II	1996/94	Forest Dept	Friends of Nature	10,119.60	4,095.30	
Mayflower Bocawina	National Park		II	2001/139	Forest Dept	Friends of Mayflower/Boca	7,854.00	3,178.40	Under Review
Monkey Bay	National Park		II	1994/45	Forest Dept		2,122.20	858.8	
Nojkaaxmeen Eligio Panti	National Park		II	2001/177	Forest Dept	Itzama society	12,657.30	5,122.20	
Payne's Creek	National Park		II	2004/149	Forest Dept	TIDE	36,420.50	14,738.90	
Rio Blanco	National Park		II	1994/41	Forest Dept	Friends of Rio Blanco	94.3	38.2	
Sarstoon-Temash	National Park		II	1994/42	Forest Dept	SATIIM	41,854.70	16,938.10	
St. Herman's Blue Hole	National Park		II	1986/109	Forest Dept	BAS	664.5	268.9	
Actun Tunichil Muknal	Natural Monument		Ia	2004/15	Forest Dept	BAS	457.3	185.1	
Blue Hole	Natural Monument		III	1996/96	Forest Dept	BAS	946.5	383	
Blue Hole	Natural Monument		III	1996/96	Forest Dept	BAS	76.6	31	
Halfmoon Caye	Natural Monument		II	1982/30	Forest Dept	BAS	9,770.90	3,954.20	
Thousand Foot Falls	Natural Monument		III	2004/79	Forest Dept		1,290.40	522.2	
Victoria Peak	Natural Monument		III	1998/47	Forest Dept		4,840.60	1,958.90	
Bladen	Nature Reserve		Ia	1990/66	Forest Dept	BMC	99,673.80	40,336.70	
Burdon Canal	Nature Reserve		Ia	1992/88	Forest Dept		5,254.80	2,126.60	Under Review
Tapir Mountain	Nature Reserve		II	2004/15	Forest Dept	BAS	6,299.60	2,549.40	
Aguacaliente	Wildlife Sanctuary		IV	1998	Forest Dept	Aquacaliente Mgmt Team	5,467.90	2,212.80	
Cockscomb Basin	Wildlife Sanctuary		IV	1997/113	Forest Dept	BAS	122,260.10	49,477.10	
Corozal Bay	Wildlife Sanctuary		IV	1998/48	Forest Dept		180,508.30	73,049.40	
Crooked Tree	Wildlife Sanctuary		IV	1984/95	Forest Dept	BAS	36,479.30	14,762.70	RAMSAR

NAME	STATUS	ZONE	IUCN_CAT	GAZETTED	MGMT	CO-MANAGEMENT	ACRES	HECTARES	NOTES
Gales Point	Wildlife Sanctuary		IV	1998/92	Forest Dept		9,096.80	3,681.40	
Spanish Creek	Wildlife Sanctuary		IV	2002/87	Forest Dept	Rancho Dolores Dev. Group	6,001.30	2,428.70	
Swallow Caye	Wildlife Sanctuary		IV	2002/102	Forest Dept	Friends of Swallow Caye	8,972.10	3,630.90	
Aguacate Lagoon	Private Reserve		IV		Private		283.9	114.9	
Block 127	Private Reserve		IV		TIDE		9,231.80	3,736.00	
Community Baboon Sanctuary	Private Reserve		IV		Private		12,980.10	5,252.90	
Golden Stream	Private Reserve		IV		YCT		15,038.10	6,085.70	
Monkey Bay	Private Reserve		IV		Private		1,150.00	465.4	
Rio Bravo C&MA	Private Reserve		VI		PfB		259,205.70	104,897.20	
Runaway Creek	Private Reserve		IV		BWB/ASF		7,123.80	2,882.90	
Shipstern Nature Reserve	Private Reserve		IV		ITCF		20,332.80	8,228.40	

5. Conservation ex-situ:

The national policy in Belize is focused on in-situ conservation, but there are a few institutions in Belize involved in ex-situ conservation. These include:

Belize Zoo and Tropical Education Center http://www.belizezoo.org/

The Belize Zoo and Tropical Education Center was started in 1983. Shortly after the backyard "zoo" began, it was quickly realized that its Belizean visitors were unfamiliar with the different species of wildlife which shared their country. This very aspect fomented the commitment to develop the little zoo into a dynamic wildlife education center. Today, The Belize Zoo is settled upon 29 acres of tropical savanna and exhibits over 125 animals all native to Belize. The zoo keeps animals which were either orphaned, born at the zoo, rehabilitated animals, or sent to The Belize Zoo as gifts from other zoological institutions. The Belize Zoo believes that by bringing the people of Belize closer to the animals which are their natural heritage, they will feel proud of these special resources, and want to protect them for future generations. The Belize Zoo recieves over 10,000 schoolchildren every year as part of the progressive education programs, and popular zoo events include: April the Tapir's birthday party; summer camps; Science Fair; Teacher Training; and Student Career Training.

The Belize Zoo acts primarily as an education tool. It does not act as a genetic reservoir for native wildlife and its conservation importance is principally through education. As such it is certainly one of the more important institutions in Belize.

The Belize Zoo support some research, particularly in Scarlet Macaws (Ara macao cyanoptera) and the Central American Tapir (Tapirus bairdi).

Belize Botanic Gardens: http://www.belizebotanic.org/

Belize Botanic Gardens or BBG is 45 acres of native and exotic plants growing in the Cayo district of western Belize. The garden is in a valley on the banks of the Macal River, surrounded by the Maya Mountain foothills. The mission of the Belize Botanic Gardens is to grow, study, protect and promote tropical flora, especially our native species; to provide information for our community, science, government and industry and to do this in an educationally useful setting,

The BBG's main work is encouraging sustainable agriculture, maintaining conservation collections and engaging in conservation education. What that boils down to is that we aim to inspire both local communities and visitors to protect plant and their habitats by learning more about the world of plants.

The main contribution to conservation by the BBG is education, but increasingly the BBG is involved in sustainable agriculture and horticulture projects and research efforts. The latter mostly focusing on orchids and epiphytes.

Wildlife Care Center wildlifecarecenter@yahoo.com

(WCC) is a holding facility for rescued, orphaned and abandoned wild animals that may have been kept illegally as pets. Established in 1998, WCC aims to repatriate animals that can survive in the wild. Other intended results of the work at WCC are raising public awareness of Belize's wildlife protection laws and discouraging the acquisition and sale of wild animals as pets. The WCC is not open to the public but there are training and intern opportunities for students and conservation volunteers.

The focus of WCC is on primates. The project is under-funded and under-staffed. There is little or no outreach apart from the actual rehabilitation efforts of the primates.

Belize Herpetarium & Aquarium Park vivarium@btl.net

BHAP is a facility currently under development which will highlight the reptiles and amphibians of Belize. The exhibits at the Herpetarium will include the two species of crocodiles native to Belize, the nine venomous snakes, as well as many other non-venomous species of snakes, lizards, frogs, toads and butterflies. The Herpetarium will embark on an education campaign to promote public awareness of the reptiles and amphibians unique to Belize. Schools will be able to visit the facility and get hands on experience by handling and learning about snakes and crocodiles. The Herpetarium plans to collaborate closely with the Conservation Division assisting with expertise in the capture and release (relocation / translocation) of problematic reptiles or accommodating nuisance specimens. Collaboration also with the University of Belize in the field of research, students will be able to conduct research projects at the facility taking advantage of the collections specimens.

6. Uses of the biodiversity (valuation):

The number of species utilized in Belize is vast. As a broad rule, if it has a local name, people will have some use for it.

6.1 Plants:

In their checklist, Balick et al (2000) list known uses for every species. Uses vary from, ornamental, food and construction to poison. Interestingly, some plants have different uses during different phases of their development. In such a case local names will differ as well. A good example is the Bayleaf Palm (*Sabal mauritiiformis*) which is known as "Bayleaf" or "Guanu" when in its immature stem-less phase, but changes name when it reaches maturity and grows a stem. In this stage it is called "Botan". Similarly, if within the same species (or compared with closely related or look-alike species) there is a difference in use, there is frequently a distinction made between "male" and "female" (macho y hembra). Again using the Sabal palm as an example: Young Sabal palms growing in the shade which have developed tender, pliable, leaves are referred to a "female". Palms growing in the sun which have brittle leaves (or similar *S. yapa)* are referred to as "male".

For a full listing of uses, it is best to refer to the publication of Balick et al (2000).

Some plants are now being threatened as a result of over-use. One example of a plant species being over-utilized is the Big-leaf Mahogany *Swietenia macrophylla*. As one of the most valuable timbers, this resource has been over-harvested for decades and even centuries. As a species, Mahogany is not threatened, but the resource itself is certainly under heavy pressure.

Orchids as a group are frequently being collected for ornamental purposes, there is even some limited export of wild-collected orchids. No documented knowledge is available to assess the impact of this. But given the rarity of some species and the demand for them, pressure must be considerable for some species.

Another group of plant species considered under threat are the Cycads (Zamiaceae). There are some species that are very scarce and have ornamental value. Belize actually exports seeds from these species for horticultural purposes. Most of what is currently being exported is now from cultivated specimens and this trade does not affect wild populations. Zamiaceae currently considered to be sensitive are:

- *Ceratozamia robusta*
- *Zamia prasina*
- *Zamia variegata*

There are at least 2 and probably more un-described Zamia species in Belize, all of which have limited distributions and thus have to be considered vulnerable (Meerman, 2005).

There is extensive use of medicinal plants in Belize. No documented knowledge is available to assess the impact of this activity. But given the rarity of some species used and

the demand for them, pressure must be considerable for some species particularly in the case where harvesting methods involve killing the whole plant. Bark of various tree species is in high demand, but bark is often harvested in such a way that it kills the tree.

6.2 Fishes

The fisheries industry is very important to the economy of Belize. In the marine sector the main species are Spiny Lobster *Panulirus argus* and Queen Conch *Strombus gigas* but fin-fishes are increasingly important. There is a large local market but there is an important export of all marine products. Of the finfishes, the most popular are the Groupers and Snappers (Serranidae). These species show clear signs of depletion. These fishes spawn at predictable locations at predictable times. Fishermen have traditionally used these mating aggregations to make a good catch. As a result, many of the historical spawning sites are now historical, that is there is no spawning taking place anymore. Only recently (2003), the government of Belize has put the few remaining spawning sites under protective management (See protected areas: Spawning aggregations).

The species involved here include:

- *Dermatolepis inermis,* Marbled Grouper
- *Epinephelus itajara,* Goliath Grouper
- *Epinephelus morio,* Red Grouper
- *Epinephelus nigritus,* Warsaw Grouper
- *Epinephelus niveatus,* Snowy Grouper
- *Epinephelus striatus,* Nassau Grouper
- *Lutjanus analis,* Mutton Snapper
- *Lutjanus cyanopterus,* Cubera Snapper
- *Mycteroperca venenosa,* Yellowfin Grouper

As a group, sharks have been heavily fished inside Belizean waters. This mostly to supply a high export demand. As a result, most shark species have now become scarce:

- *Carcharhinus leucas,* Bull Shark
- *Carcharhinus limbatus,* Blacktip Shark
- *Carcharhinus longimanus,* Oceanic Whitetip Shark
- *Carcharhinus plumbeus,* Sandbar Shark
- *Galeocerdo cuvier,* Tiger Shark
- *Isurus oxyrinchus,* Shortfin Mako
- *Mustelus canis,* Dusky Smoothhound
- *Negaprion brevirostris,* Lemon Shark

- *Prionace glauca,* Blue Shark
- *Sphyrna lewini,* Scalloped Hammerhead
- *Sphyrna mokarran,* Great Hammerhead

- *Sphyrna zygaena,* Smooth Hammerhead
- *Pristis pectinata,* Smalltooth Sawfish
- *Pristis perotteti,* Largetooth Sawfish

The Whale Shark *Rhincodon typus,*is somewhat of a celebrity in Belizean waters. Their occurrence coincides with the spawning of groupers and snappers when they feed on the spawn of these species.. Whale sharks are not actively fished in Belizean waters but the depletion of snapper and grouper spawning aggregations must have affected their populations.

6.3. Amphibians

There is no recorded utilization of amphibians in Belize.

6.4. Reptiles

There is extensive use of reptiles in Belize. The Green Iguana; *Iguana iguana* is heavily hunted during the breeding season when gravid females are being caught for consumption. In spite of this heavy prosecution, this species is not considered to be in danger in Belize. However, the average size of Green Iguanas has decreased in easily accessible areas.

The crocodiles in Belize have traditionally been under heavy pressure. Traditionally the 2 species in Belize were hunted for their valuable hides. With the cessation of the crocodile hide trade from Belize, one species; the Morelet's Crocodile *Crocodylus moreletii* has made a spectacular comeback and the species is now considered common and frequently considered a nuisance. As a result the pressure on the species now on the increase again. The second species; the American Crocodile *Crocodylus acutus* has fared less well. The national population of this species is considered less than 1,000 individuals and the main nesting sites are threatened by infrastructure development (Platt et al., 2004). Plans are currently underway to increase the level of protection for American Crocodile nesting sites.

Several terrapin species are being gathered for consumption. The most affected species are:

- Central American River Turtle *Dermatemys mawii*
- Common Slider *Trachemys scripta*
- Mexican Musk Turtle *Staurotypus triporcatus*

Particularly Dermatemys mawii is under heavy pressure but there exists little information

on its national status. However, it is generally believed that the harvesting of this species has reached not sustainable levels.

Marine Turtles are also utilized in Belize. Although the larger (reproductive) sizes in Belize are now protected they are still being caught on an artisanal basis and there is little information on the actual of the species involved:

- Loggerhead *Caretta caretta*
- Green Turtle *Chelonia mydas*
- Hawksbill Turtle *Eretmochelys imbricata*

6.5. Birds

Many bird species are being hunted in Belize. The principal game species include:

- Great Curassow *Crax rubra*
- Muscovy Duck *Cairina moschata*
- Black-Bellied Whistling Duck *Dendrocygna autumnalis*
- Ocellated Turkey *Meleagris ocellata*
- Crested Guan *Penelope purpurascens*

All of the above species, with possible exception of the Black-bellied Whistling Duck have severely decreased in numbers due to over exploitation. In addition to the above species, essentially all birds of sufficient size is considered fair game with many hunters. This includes Storks, Herons, Parrots and Toucans. However, there is little documentation on how these species have been affected by this exploitation.

6.6. Mammals

As with the birds many mammals are being hunted. Again, anything big enough is considered fair game with several hunters. This includes species such as

- Jaguar *Panthera onca,*
- Puma *Puma concolor*
- Central American Tapir *Tapirus bairdii*
- West Indian Manatee *Trichechus manatus*
- Yucatan Black Howler-Monkey *Alouatta pigra*
- Central-American Spider-Monkey *Ateles geoffroyi*
- Kinkajou *Potos flavus*
- Hispid Pocket Gopher *Orthogeomys hispidus*

While the above are considered “secondary” game species, the pressure on some of them is quite considerable. Particular the Manatee, which is already vulnerable because of low population size, is being affected by hunting.

The principal hunted species are:

- White-Lipped Peccary *Dicotyles pecari*
- Yucatan Brown Brocket Deer *Mazama pandora*
- Red Brocket Deer *Mazama americana*
- White-tailed Deer *Odocoileus virginianus*
- White-lipped Peccary *Tayassu pecari*
- Paca *Agouti paca*
- Central American Agouti *Dasyprocta punctata*

While all of the above species have seen their numbers reduced due to over-hunting, the White-lipped Peccary is probably the most negatively affected species. This species is very sensitive to habitat fragmentation and hunting easily exterminates this species from fragmented forests.

7. Management of biodiversity:

The various acts and institutions responsible for the management of biodiversity have been listed in the Final Report on Belize’s Policy on Protected Areas (Wo Ching et al, 2005) which is attached as Appendix 3. This excellent treaty can be summarized as follows:

7.1. Legal framework

There are several international conventions related to protected areas and the biodiversity contained in them, signed by Belize, which are subsequently ratified by Government decrees. International instruments include a significant number of obligations for the Belize government vis-a-vis protected areas and biodiversity conservation, in particular, article 8 of the Convention on Biological Diversity:

The Convention on Biological Diversity, a legally binding instrument was signed by Belize in June of 1992 and ratified by the Government in December of 1993.

At a national level, the principal legal instruments are:

- Fisheries Act
- Wildlife Protection Act
- Forest Act
- National Park System Act
- Ancient Monuments and Antiquities Act

Private reserves are not established or regulated by law.

7.2. Institutional framework

The Government of Belize is the highest executive body of state power in Belize. The Government monitors the operation of ministries and other authorities within its sphere of competence.

Several government ministries and departments have mandates for the establishment and management of Protected Areas. The Ministry of Natural Resources and Environment, through the Forest Department is responsible for establishing and managing Forest Reserves, National Parks, Nature Reserves, Natural Monuments and Wildlife Sanctuaries. The Ministry of Agriculture, Fisheries and Cooperatives through the Fisheries Department is responsible for the establishment and management of Marine Reserves. The Ministry of Culture acting through the National Institute of Culture and History (formerly the Archaeology Department) is responsible for the management of Archaeological Sites and Reserves.

The Coastal Zone Management Authority and Institute, in the preparation of a Coastal Zone Management Plan, is required to produce proposals for the establishment of marine protected areas and for the conservation of threatened or potentially threatened or endangered species. (National Report on Protected Areas, Belize, March 2003)

The Institute of Research and Management of Material Culture has primarily the same responsibilities as the former Archaeology Department, under the National Institute of Culture and History (NICH) Act, #46 of 1999; Chapter 331, Laws of Belize, Rev. Ed. 2000. This Act established the National Institute of Culture, with four Institutes. The Institute of Research and Management of Material Culture is responsible for the enforcement of the Ancient Monuments and Antiquities Act, (Ch. 330 of the Revised Laws of Belize 2000) and the Abandoned Wrecks Act (Act # 7 of 1990; Ch 235, Laws of Belize Rev. Ed. 2000). Under the terms of the Ancient Monument and Antiquities Act, and now the NICH Act, provisions are made for the declaration of archaeological reserves and the making of regulations for the management of these reserves (Secs. 359, 67 & 68, Ch. 331, Rev. Laws of Belize 2000). (CEDARENA, 2003, p. 44)

7.3. Political framework

Some important policy instruments include:

- Biodiversity National Strategy and Action Plan (1998)
- Draft Forest Policy (1994)
- Cruise Ship Policy and Environmental Guidelines (2000, revised in 2003)
- Mineral Resources Policy and Marine Dredging Guidelines
- Tourism Strategy Plan (1998)

One of the most important programs, policies or strategies, is the Belize Biodiversity Strategy (1998). This document includes several statements relevant to in-situ conservation, as well as the guiding principles for the achievement of the strategy's objectives.

8. Used sources:

The following people and institutions provided valuable information and background data for this study:

- Adams, Brett, Belize Botanic Garden added many species to the orchid list.
- Azueta, James, Fisheries Dept (principal organizer of the workshop)
- Boomsma, Tineke, Belize Environmental Consultancies
- Carter, Jack. Wildlife Conservation Society. Tentative marine fish list for Belize
- Cherrington, Emil, Coastal Zone Management Institute
- Gibson, Janet, Wildlife Conservation Society (provided on-line information)
- Haughton, Milton, CRFM
- Majil, Isaias, Fisheries Dept
- McField, Melanie, WWF (provided on-line information)
- Meerman, Jan, Belize Tropical Forest Studies
- Miller, Bruce, Wildlife Conservation Society, Corrected Mammal species list.
- Myvett, George, Fisheries Department
- Neal, Dwight, Toledo Institute for Development and the Environment
- Perriott, Lloyd, PREPAC
- Pott, Wilfredo, Fisheries Dept

Other important sources include:

Vertebrates general

The best site for Belizean Vertebrate data is the Biodiversity and Environmental Resource Data System for Belize (BERDS): http://www.biodiversity.bz

Another source of information is the Belize Biodiversity Information System (BBIS): http://fwie.fw.vt.edu/wcs/ which contains managed by the Wildlife Conservation Society. This website has cross-referenced Bird, Fish, Mammal, Reptile and Amphibian data focusing on distribution within Belize's protected areas system.

Mammals

The only publication dealing strictly with Belize's mammals is:

McCarthy, T. J., and E. Méndez. (1998) Mammals of Belize: A Checklist. (19 pp)

This is a brief checklist with some pen drawings, and information on diet, distribution, habitat and locomotion.

Birds

For identification of Belizean birds, ornithologists used to have to rely on books designed for Mexico and/or North America. A new book dealing strictly with Belizean birds (both resident

and migrant), with excellent plates is:

Jones. L. A. 2003. Birds of Belize. University of Texas Press. Austin TX. 317 pp.

Reptiles and Amphibians

The herpetology of Belize is very well covered. With several major publications:

Lee, J. C. (1996). The Amphibians and Reptiles of the Yucatan Peninsula. 500 pp.

Lee, J. C. (2000). Amphibians and Reptiles of the Maya World. 402 pp

Stafford, P. J. & J. R. Meyer. (1999). A Guide to the Reptiles of Belize. 356 pp.

Meyer, J. R. & C. Farneti Foster, (1996) A Guide to the Frogs and Toads of Belize

Fishes

The inland fishes of Belize are well documented and an annotated key exists:

Greenfield, D. W. and Thomerson, J.E. (1997) Fishes of the Continental Waters of Belize.

Unfortunately there are no monographs dealing with the marine fishes of Belize.

Fishbase: http://www.fishbase.org is an excellent database covering all fish species.

Jacques Carter Prepared an informal “Preliminary fish list for Belize”. WCS 2004

Insects

An annotated checklist for some Lepidoptera families is:

Meerman, J. C. (1999) Lepidoptera of Belize: 1) Butterflies, 2) Emperor moths and Hawk moths. 61 pp.

Asite dealing with Belizean insects is: Moths of Belize:

http://www.mbarnes.force9.co.uk/belizemoths/belizehome.htm

This site pictures the “Macro-moths” (Lepidoptera) together with some distributional information.

Reichling, S. B. 2003. Tarantulas Of Belize *Krieger Publishing Company Melbourne FL, USA*

Boomsma, T. & S. W. Dunkle, 1996. Odonata of Belize. Odonatologica 25(1): 17-28

Flora

The most current and accurate checklist of the vascular flora of Belize is:

Balick, M. J., M. H. Nee & D. E. Atha (2000), Checklist of the Vascular Plants of Belize (246 pp).

The only real flora (with identification keys) strictly for Belize is:

Standley, P. C., and S. J. Record. (1936), The Forests and Flora of British Honduras.

But this work is very incomplete. More reliable (but outdated as well) is:

Standley, P. C., J. A. Steyermark & L. O. Williams (1946-1977) Flora of Guatemala. 13 vols

This checklist reports 3408 vascular plants for Belize. Unfortunately there is no information on distribution or status of the plants.

There are no other monographic publications on the flora of Belize. There are four keys to individual families:

McLeish, I., N. R. Pearce & B. R. Adams. 1995. Native Orchids of Belize. 278 pp.

Meerman, J. C. (1996). Vegetative Key to the Passionflowers of Belize. 4 pp.

Meerman, J. C. (2005) *Base Line and Distribution Assessment of the Zamia plants in Belize* Report to: Head-Project Execution Unit, Ministry of Public Works, Transport & Communications 22 pp.

Brewer, S.W. 1999. The palms of Belize. Species richness and a key based on vegetative characters. *Palms* 43(3): 109-113.

Ecosystems

Meerman, J. and W. Sabido. 2001. Central American Ecosystems: Belize. Programme for Belize, Belize City. 2 volumes 50 + 88 pp.

With an 2005 update Meerman, 2005. Report and GIS files for both can be downloaded from;

http://biological-diversity.info/Ecosystems.htm

and http://www.biodiversity.bz

9. Literature

Baroni, T. J., D. J. Lodge, D. L. Lindner Czederpiltz (in print): Preliminary Report on macrofungal collections obtained from Doyle's Delight, Maya Mountains in southern Belize. In: Meerman J. C. (ed): Doyle's Delight; the August 2004 Expedition.

Boomsma, T. & S. W. Dunkle, 1996. Odonata of Belize. Odonatologica 25(1): 17-28

Brewer, S.W. 1999. The palms of Belize. Species richness and a key based on vegetative characters. *Palms* 43(3): 109-113.

Brokaw, N. V. L., and E. W. Sabido 1998. Vegetation of the Rio Bravo Conservation and Management Area, Belize. Manomet Bird Observatory, Manomet, Massachusetts, U.S.A.

Carter. J. 2004. Preliminary fish list for Belize. Informal publication Wildlife Conservation Society.

Cornec, J. H. 2003. Geology map of Belize. Private Publication.

Davidse et al. 1995. Flora Mesoamericana. 2 volumes. Missouri Botanical Gardens.

Emmons, L. H. and F. Feer. 1990. Neotropical rainforest mammals a field guide. The University of Chicago Press, 281 p.

Greenfield, D.W. & J.E. Thomerson 1997. Fishes of the continental waters of Belize. University Press of Florida. 311 pp.

Iremonger, S., and N. Brokaw. 1995. Vegetation classification for Belize. Pp. 3-19, *in: Towards a national protected area systems plan for Belize, synthesis report* (J. R. Wilson ed.)., U. S. Agency for International Development, Programme for Belize in collaboration with the Inter-America Development Bank

Jones, H. L. 2003. Birds of Belize. 2003. University of Texas. Austin, Texas

Lee, J. C. 1996. The amphibians and reptiles of the Yucatan Peninsula. Cornell University Press, Ithaca, and London. xii + 500 p.

McCarthy, T. J., and E. Méndez. (1998) Mammals of Belize: A Checklist. (19 pp) Published by Belize Audubon Society.

Meerman, J. C. & J. R. Wilson (eds.) 2005. The Belize National Protected Areas System Plan. 61 pp.

Meerman, J. C. & W. Sabido. 2001. Ecosystems Map of Central America: Belize. 2 vols + map. Programme for Belize.

Meerman, J. C. (2005) *Base Line and Distribution Assessment of the Zamia plants in Belize* Report to: Head-Project Execution Unit, Ministry of Public Works, Transport & Communications 22 pp.

Meerman, J. C. 1999. Lepidoptera of Belize: 1). Butterflies, 2)Emperor-moths and Hawk Moths, Tropical Lepidoptera 10. Supplement 1.

Meerman, J. C. 2005. Ecosystems Map of Belize – 2004 edition: http://biological-diversity.info/Ecosystems.htm

Meerman, J. C. 2005. National List of Critical Species: 1st draft. National Protected Areas Policy and Systems Plan. 8pp.

Meerman, J. C. 2005. Site Scoring System. National Protected Areas Policy and Systems Plan. 12pp.

Meerman. J. C. 2005. Belize Protected Areas Policy and System Plan: Result2: Protected Area System Assessment and Analysis.

Mumby, P. J. & A. R. Harborne, 1999. Classification Scheme for Marine Habitats of Belize. 5th Draft. UNDP/GEF Belize Coastal Zone Management Project. 45 pp + GIS shapefiles.

Murray, M. R., S. A. Zisman & C. D. Minty, 1999, Soil-plant relationships and a revised vegetation classification of Turneffe Atoll, Belize., Atoll Research Bulletin, 464, 32 pp.

Penn, M. G., D. A. Sutton & A. Munro. 2004. Vegetation of the Greater Maya Mountains, Belize. *Systematics and Biodiversity* 2(1): 21-44.

Platt, S. T. Rainwater and S. Nichols 2004. A recent population assessment of the American crocodile (Crocodylus acutus) in Turneffe Atoll, Herpetological Bulletin 89: 26-32.Reichling, S. B. 2003. Tarantulas Of Belize *Krieger Publishing Company Melbourne FL, USA*

Reid, F. A. 1997. A fiel guide to the mammals of central America and Southeast México. Oxford University Press, New York, 334 p.

Stafford, P. J. and J. R. Meyer. 2000. A guide to the reptiles of Belize. Academic Press, San Diego, California, 356 pp.

Standley, P. C., J. A. Steyermark and L. O. Williams. 1946-1978 Flora of Guatemala. Fieldiana Bot. V. 24. part 1-13.

Wo Ching, E. A. Chun (Editor), L. Alamilla, R. Morales and A. M. Camacho., 2005. *Belize's Policy on Protected Areas*.

Wright A. C. S., D. H. Romney, R. H. Arbuckle, and V. E. Vial. 1959. *Land in British Honduras*. Report of the British Honduras Land Use Survey Team. London: Colonial Office, Colonial Research Publications No. 24. 327 pp. Her Majesty's Stationary Office: London 471 pp.

Appendix 1

Transcript of proceedings of a fish-biodiversity workshop held at the Coastal Zone Management Institute on Tuesday October 25, 2005. This meeting was organized through assistance of the Fisheries Department.

List of participants at Fish Biodiversity Workshop at the Coastal Zone Management Institute Conference Room (3rd floor) Tuesday October 25, 2005 9 AM – 1 PM.

Azueta, James	Fisheries Dept (principal organizer of the workshop)	species@btl.net
Boomsma, Tineke	Belize Environmental Consultancies	tboomsma@gmail.com
Cherrington, Emil	Coastal Zone Management Institute	e_cherrington@yahoo.com
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McField, Melanie	WWF (provided on-line information)	mcfield@wwfca.org
Meerman, Jan	Belize Tropical Forest Studies	meerman@biological-diversity.info
Myvett, George	Fisheries Department	georgemyvett@yahoo.com
Neal, Dwight	Toledo Institute for Development and the Environment (provided on-line information)	dwightneal@gmail.com 722-2274 / 622-5067
Perriott, Lloyd	PREPAC	bigfootdimension@yahoo.com
Pott, Wilfredo	Fisheries Dept	wilpott@gmail.com

The meeting started with a presentation of the interim report produced in October 2005.

Secondly a presentation was shown of the fish species listed on Fishbase and those on listed in BERDS. The latter includes the lists produced by Greenfield and Thomerson (1997). Most of the participants admitted that this list was longer than they expected. Nevertheless, there appeared to be an additional list in circulation (Jacques Carter. Preliminary fish list for Belize. WCS 2004). This list is also based on Fishbase but seems to have additional species. The two need to be checked against one another.

Dwight Neal led an effort some years ago (1998 – 2001) gather fish data for the region (including Belize) for Fishbase. There were two workshops, one in Belize and one in Barbados where they collected collect fish, identified them and preserved the specimens. The specimens were initially stored at the St. Johns College in Belize City but as the person responsible for the collection, a Mr. Young, left, the specimens were moved to the Fisheries department where they remain without any curation. Many labels have apparently been lost. The actual data however, appear to have been entered into Fishbase.

Additional sources of data that were discusses include management plans for the various protected areas. These management plans should contain fish data but also data on important invertebrates such as corals.

Some Environmental Impact Assessments also contain biodiversity information. Unfortunately, most of these are only available as hardcopy and there is no system to manage the data collected in this way. BECOL is carrying out fish studies in the Macal River, but these data are considered “confidential”. Permission to obtain these data should be requested through NEAC.

Many marine studies were carried out by Ecosur is the Chetumal Bay which is shared with Mexico. These data are available at Fisheries

One of the most valuable sources of data is the work conducted by the Smithsonian Institute (Mostly at Carrie Bow Caye). The papers are (also) published on CD.

Further points of discussion were:

Status of collection at the fisheries department: At current, the collection is not attended. Fisheries would like to see this collection used for educational purposes, but funds and training lacks to actually manage the collection for this purpose.

PREPAC is currently assessing the New River Lagoon. Programme for Belize is also involved with this. A lot is to be learned from an intimate study of this ecosystem.

Invertebrates remain largely unknown. While they are in many ways more important than the vertebrates for ecosystem functioning. Many of them have commercial value such as shrimps, crayfish and mollusks. The fisheries department has an interest in these groups, but the level of knowledge is next to non-existent.

There is no resident Ichthyologist in Belize. There is a need for such. Possibly a task here for the University of Belize?

WCS at Glovers Atoll apparently has discovered a new shark for Belize: The Galapagos Shark(?)

Others have reported killer whales (?). The CCA (Caribbean Conservation Association) is monitoring whales in the eastern Caribbean.

There is little known about introduced species. A study on Tilapia in the region is underway.

There appears to be a report on shallow water fish fauna of Port Honduras (GCFI information?). Document downloadable through TNC?

Many of the participants were of the opinion that there is little need for spatially defined collection data, if it occurs in the water is could be found all over. When deep sea fishes were discussed, it was agreed that this “ubiquitous” presence obviously does not apply to all species. The deep sea fauna is poorly understood by the way.

NGO's and researchers should make any important observations known to GOB/fisheries. When it was inquired whether Fisheries was incorporated in the Belize Biodiversity Clearing House Mechanism, it turned out that this was not the case. Other options for reporting marine Biodiversity data would be through BERDS.

At the end of the workshop we entered the Fisheries department to retrieve some of the data sources discussed. The various management plans proved to have scant biodiversity data and were of little immediate use. The Smithsonian data CD was missing in action, but a 1997 copy was available at Coastal Zone Management Institute. Fisheries will request the most recent version from Smithsonian.

Following the workshop, the various species lists were combined and checked against each other. The total list for Belize now stands at 669 species (Marine and inland fish combined).