National IUCN Red List for Threatened Avian Species - Belize

Belize Forest Department – Wildlife Programme

GITEC Project Number: 00050.01.06.3

Author: Zoe Walker, Wildtracks, 2020.

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Photo credit: Maye Guifarro

This project was supported by the GIZ Selva Maya Project for the support for the monitoring of biodiversity and climate change in the Selva Maya Region. GITEC-IGIP GmbH, Forest Department, Forest Drive, Belmopan City, Belize.

CONTENTS

ABBREVIATIONS

AOU	American Ornithologists' Union
BBC	Belize Bird Conservancy
BBR	Belize Bird Rescue
BRC	Belize Raptor Centre
BWRC	Belize Wildlife and Referral Clinic
CBD	Convention on Biological Diversity
CCVA	Climate Change Vulnerability Assessment
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CMP	Conservation Management Partnership
CR	Critically Endangered
DD	Data Deficient
EN	Endangered
FCD	Friends for Conservation and Development
FD	Forest Department
FWC	Foundation for Wildlife Conservation
IBA	Important Bird Area
IUCN	International Union for the Conservation of Nature
LC	Least Concern
NBIO	National Biodiversity Office
NBSAP	National Biodiversity Strategy and Action Plan
NEAC	National Environmental Advisory Committee
NT	Near Threatened
PfB	Programme for Belize
PIF	Partners in Flight
SACD	Sarteneja Alliance for Conservation and Development
SDG	Sustainable Development Goal
SEMARNAT	Secretaria de Medio Ambiente y Recursos Naturales
TIDE	Toledo Institute for Development and Environment
VU	Vulnerable
WCF	Wolf Creek Foundation
WPA	Wildlife Protection Act
WWF	World Wildlife Fund

J. Urbina

Acknowledgements: This report relied on the technical knowledge and input of experts from across Belize and internationally. My role was one of facilitation and consolidation, but the true authors are: Jamal Andrewin Bohn, Boris Arevalo, Abidas Ash, Philip Balderamas, Christian Bech, Nikki Buxton, Ray Cal, Francis Canto Jr., Sherman Cawich, Kirah Forman, Victor Gamez, Maye Guifarro, Said Gutierrez, Kayla Hartwell, David Hilmy, Lee Jones, Isael Mai, Sarah Mann, Roni Martinez, , Isaias Morataya, Mario Muschamp, Ryan Phillips, Vladimir Rodriguez, Eduardo Ruano, Leomir Santoya, and Jonathan Urbina….thank you to all for your enthusiasm and input. Thank you, too, to the Core team (Shanelly Carillo (Forest Department) and Rasheda Garcia (National Biodiversity Office), and Jan Meerman, as the Technical Advisor, for the Belize Component of the GIZ GITEC Selva Maya project.

EXECUTIVE SUMMARY

The Belize Forest Department is developing a National List of Threatened Species for terrestrial vertebrate species, based on the IUCN Red List framework, to strengthen Belize's ability to manage biodiversity at risk, for maintaining healthy ecosystems and towards achieving the NBSAP Target C3: of "Between 2016 and 2030, no species will become functionally extinct in Belize". This target specifically calls for updating, approving and socialization of Belize's threatened species list (Action C3.1), and integration of the list into the environmental impact assessment process, national planning and decision making. This report presents the outputs of a series of technical workshops conducted to complete the assessment for the birds of Belize, developed to assist in improved management of these species towards:

- Setting national conservation priorities
- Strengthening the revision of the Wildlife Protection Act
- Providing a starting point for national planning for threatened species
- Assisting in decisions on FD and NBIO input into national development and NEAC EIA evaluations
- Providing a national priority species list to be taken into account by developers in environmental impact assessments
- Assisting in FD and NBIO decisions on research permit applications
- Providing a prioritised list for improving national awareness
- Building the capacity of enforcement personnel towards prioritized application of the Wildlife Protection Act
- Guiding site level biodiversity monitoring in the National Protected Areas System
- Guiding prioritization of funding

The National Red List will assist in prioritized monitoring of the health of biodiversity, as well as national reporting to international conventions on specific biodiversity targets, such as the Convention on Biological Diversity (CBD) and Sustainable Development Goals (SDGs). It will also highlight priority areas for research, monitoring and improved management.

Eighteen species of birds are rated as Critically Endangered at the national level – at significant risk of national extirpation if conservation actions are not taken urgently to address threats. A further ten species rate as Endangered, and thirty-three as Vulnerable. One species rates as Near Threatened, seven as of Least Concern (but placed on the national list as a precautionary measure for re-evaluation in five years), and one as Data Deficient.

The majority of at-high-risk species declines are driven by:

- habitat loss (deforestation for agricultural and urban expansion, coastal / caye development for tourism demand),
- habitat degradation (fire in both broad-leaved and pine ecosystems, and pine bark beetle infestation in the submontane pine ecosystems of the Maya Mountain Massif)

For some species, however, such as the parrots, poaching for the illegal wildlife trade has also had significant impacts on national populations. Wide scale hunting has reduced populations of game species outside the protected landscape. Some species groups are considered particularly vulnerable to disturbance – including herons and egrets that nest in single and mixed-species colonies on mangrove cayes targeted for development. This is also true of terns and wading birds that nest on low-lying sand and gravel bars, elusive forest species dependent on the interior of large, intact forested areas with limited human disturbance, and several large raptor species that are only present in very low densities. The raptors are also very vulnerable to persecution as a danger to livestock or, in the case of the owls, as a result of cultural superstition.

Belize still has a low (though increasing) population, and retains large, intact forested blocks, including the upland plateau and foothills of the Maya Mountains Massif to the west, the lowland Belize Maya Forest (Yalbac / Laguna Seca / Gallon Jug properties) and Rio Bravo area to the north. It has a National Protected Areas System with a high level of ecosystem representation and (with the exception of the international border with Guatemala) low level of anthropogenic incursions. This has ensured that the country has been successful in being able to retain many avian species that have declined or even disappeared in other countries in the region. However, there are a number of critical gaps in the maintenance of at-risk bird species in Belize:

- the large, northern, connected forested blocks of private lands (Yalbac / Laguna Seca/ Gallon Jug) are not secure in the long term, with potential for sale and wide-scale clearance for industrialized agriculture and reduction of connectivity within the transboundary Selva Maya forest.
- there is an urgent need for the revision and strengthening of the Wildlife Protection Act to provide stronger legislative support for species protection.
- species protection is not fully integrated into Government priorities, with limited budget allocation.
- Identification and mapping of high priority areas for relevant at-risk species need to be integrated into national land use planning and the integrated coastal zone management plans.

A number of cross cutting and specific strategies have been identified to improve the long term viability of threatened avian species in Belize.

CROSS CUTTING STRATEGIES

- Revising and strengthening of the Wildlife Protection Act, with integration of the National Threatened Avian Species List, and increased penalties for offences.
- Strengthening protection and management of the National Protected Areas System.
- Establishing and protection of key national biological corridors.
- Support of initiatives to purchase large, private-held areas in key locations - Belize Maya Forest (Yalbac/ Laguna Seca / Gallon Jug properties), Peccary Hills (Hwatchy property), Maya Forest

Corridor) and northern coastal lagoons - to be placed in trust for conservation, towards the protection of priority forest nodes, corridors and coastal wetland areas.

- Developing Species / Species Group Conservation Plans for Critically Endangered and Endangered species, with species-specific strategies for improved long term viability.
- Strengthening of NEAC member recognition of Belize's threatened species and integration of the National Threatened Avian Species List into land use decision-making and the Environmental Impact Assessment / Environmental Compliance Plan process.
- Provide protection in Environmental Compliance Plans for key threatened species nesting, foraging and roosting sites in planned large, private development / agricultural projects through the Environmental Impact Assessment process.
- Identification, mapping and protection of the key coastal bird colony nesting cayes (CR and EN species) that still persist, with integration of cayes into the National Protected Areas System.
- Integration of mapping and protection strategies for key coastal bird colony nesting sites into the revision of the Integrated Coastal Zone Management Plan.
- Integration of threatened species into decision–making by the mining authority when issuing permits for quarrying and dredging.
- Integration of nationally Critically Endangered and Endangered species into the National Biodiversity Monitoring Plan.
- Engagement of protected area managers in monitoring Critically Endangered and Endangered species across the national protected landscape / seascape.
- Addressing identified biological and management information gaps through monitoring and research, both within and outside protected areas.
- Improve the awareness of key stakeholders and the general public of Critically Endangered, Endangered and Vulnerable avian species in Belize, the threats they face, and best practices for good stewardship.

NEXT STEPS

At the national level, the next key steps include implementation of high priority recommendations:

- Dissemination of the National Threatened Avian Species List to relevant authorities and protected area co-managers.
- Integration of the National Threatened Avian Species List into the revision of the Wildlife Protection Act.
- Mapping key known nesting / roosting / foraging sites Critically Endangered and Endangered species, and integration into national mapping and planning (whilst ensuring the security of the information on the location of key sites for priority species).
- Socialization of the threatened species list through a public awareness campaign
- Integration of the National Threatened Avian Species List into the Environmental Impact Assessment / Environmental Compliance Plan process, and strengthening of NEAC member recognition of Belize's threatened species.

I. INTRODUCTION

The Belize Forest Department is establishing a National Red List of Threatened Species for terrestrial vertebrate species in Belize, important for strengthening Belize's ability to improve management of these species, ensuring the country can meet the NBSAP Target C3: of "Between 2016 and 2030, no species will become functionally extinct in Belize". This initiative was started several years ago with the drafting of the provisional threatened species list in 2005, as part of the first National Protected Areas Policy and System Plan (Meerman, 2005). A Forest Department project in 2016 started the process of updating and strengthening the list, following the IUCN *Guidelines for Application of the IUCN Red List Criteria at Regional and National Levels*, with assessment of terrestrial mammals, reptiles and amphibians. However, as a consequence of external factors, the bird assessments were not included. This consultancy focuses on the facilitation of a series of technical workshops to complete the assessment for the birds of Belize and finalize.

Belize has approximately 591 bird species that are recorded regularly and can be considered part of Belize's biodiversity. Some of these are residents, others are migrants that appear on an annual basis to either pass through or become temporary resident in Belize. While it is recognized that for some migrant species, such as the Wood Thrush (*Hylocichla mustelina*), Belize forms a considerable part of their overwintering range, threats to these species were largely beyond the control of Belize, with the majority occurring in other parts of the species ranges. it was decided to focus specifically on the resident species, their current status and the threats that are impacting their populations, with recommendations for improving future species viability.

For many species the immediate threats are anthropogenic – but many of these anthropogenic threats are exacerbated by climate change. The increasing fires, for example, are exacerbated by drought conditions, and by the post-hurricane build-up of dead material, leading to pine and broad-leaved forest degradation. The impacts of increasing sea level rise are exacerbated by the clearance of coastal and caye ecosystems, particularly mangroves, leading to destabilization of coastlines and cayes important as nesting sites. As a country highlighted as most at risk from the adverse impacts of climate change, Belize is already facing more frequent heat waves, less predictable rainfall patterns with increased droughts and excessive flooding, increasingly intense tropical storms, increasing sea temperatures impacting the health of the reefs, and rising sea levels (Annex 7). At the global level, evidence points to climate change becoming one of the major drivers of species extinction (IUCN, 2008). Some species will adapt, whilst for others, climate change will push them into local or even global extinction.

Criteria to assess vulnerability to climate change have been included to provide information on the susceptibility of each species, to inform future species-specific planning. This assessed the vulnerability, sensitivity / adaptive capacity and current exposure to climate variability, based on the Climate Change Vulnerability Assessment framework developed by the World Wildlife Fund (Advani, 2014), and focusing on five traits identified as linked to susceptibility (IUCN, 2008):

- Specialized habitat and/or microhabitat requirements
- Narrow environmental tolerances or thresholds that are likely to be exceeded due to climate change at any stage in the life cycle.
- Dependence on specific environmental triggers or cues that are likely to be disrupted by climate change.
- Dependence on interspecific interactions that are likely to be disrupted by climate change.
- Poor ability to disperse to or colonize a new or more suitable range.

Species status rankings follow the IUCN Red List classifications (IUCN, 2020) of Critically Endangered, Endangered, Vulnerable, Near Threatened and Least Concern. Whilst there are many avian species of Least Concern in Belize, only a small number appear on the Threatened Species List in recognition that the status of these species should be monitored for further decline, and be reassessed in five years' time.

Threats have been aligned with the IUCN – CMP Unified Classification of Direct Threats (ver. 3.2).

Taxonomy follows the American Ornithological Society (AOS – formerly AOU) Northern Classification and Nomenclature Committee (7th edition / 20th supplement).

II. METHODOLOGICAL PROCESS

The assessment was guided by a National Steering Committee composed of representation from the Belize Wildlife Programme and National Biodiversity Office (Belize Forest Department), Wildtracks and the GIZ GITEC Selva Maya project.

This species assessment is designed to provide information on national status, national extinction risk / vulnerability, population trends, conservation value and priority, as well as the regional and global importance of the national population, resilience to climate change and cultural importance. IUCN identifies two options for the development of national lists:

1. To publish an unaltered subset of the global IUCN Red List encompassing those species that reproduce in the region or at any stage regularly visit the region or
2. To assess species' extinction risk and publish Red Lists within the specific region (in this case, Belize).

As the assessment will be supporting informed decision-making on prioritised conservation management and threat mitigation at the national level, this assessment used the second option (Schmeller et al., 2008). The national assessment includes ratings of the importance of species populations at regional and global levels, placing the national population within the larger regional and global context.

There is also recognition of the limitations in data, though in recent years, there has been increasing information availability, including georeferenced data on avian species distributions through the eBird platform, peer reviewed by an expert group in Belize. There are still challenges in using this data, with mapping in some cases reflecting popular birding areas, and information gaps in more inaccessible areas, highlighting the importance of integrating technical experts into the assessment process, bringing knowledge of the species themselves into the assessment, and a national perspective on distribution to the assessment.

2.1 PREPARATORY ACTIVITIES

A regional avian assessment conducted by Partners in Flight (PIF; Rosenberg et al., 2016)) in 2016 provided the starting point for the current national avian assessment, with development of a prioritized species list for Belize based on:

- Population Trend
- Threats to Breeding Population
- Threats to Non-Breeding Population
- Population Size

An initial meeting was held with the National Bird Working Group on 11th April, 2017, with 18 participants representing the Forest Department, Wildtracks (as facilitator), and representatives from the Toledo Institute for Development and Environment, Friends for Conservation and Development, Birds Without Borders / Runaway Creek, The Belize Zoo, Corozal Sustainable Future Initiative, Ya'axché Conservation Trust, Belize Raptor Centre, The Peregrine Foundation, Belize Bird Rescue, Toucan Ridge Ecology and Education Society, Environmental Research Institute (University of Belize), and Black Rock Lodge. The National Bird Working Group recommended the inclusion of the first 40 species on the PIF prioritized national list, with the addition of a further 24 species considered as globally or nationally important, or particularly vulnerable based primarily on the vulnerability of colony nesting sites.

Due to external circumstances, it was not possible for the assessment to continue at that time. This consultancy was designed to move the initial initiative forward, to provide a validated, finalized list based on expert assessment of the national set of criteria.

On 16th November, 2020, the Avian Technical Working Group was convened for the purpose of this assessment, to review the 2017 Partners in Flight outputs and the recommendations from the National Bird Working Group, to identify the species to be assessed. 86 species were prioritized, with 70 being included on the final list. A short justification was documented as to why each species should be included in the assessment.

2.2 NATIONAL ASSESSMENT WORKSHOPS

Five half-day assessment workshops were conducted over a three-week period (Table 1) using a Zoom platform, with facilitation of the discussion and documentation of the key discussion points for the completion of the assessment matrix per species (Annex Five: Example: Assessment for the orange-breasted falcon (*Falco deiroleucus*)).

DATE (TIME)	SPECIES GROUP	NUMBER OF PARTICIPANTS
20th October (9:00 am – 12:00 pm)	Parrots	13
22nd October (9:00 am – 12:00 pm)	Game Species	11
26th October (2:00 pm – 5:30 pm)	Raptors	15
27th October (1:00 pm – 5:30 pm)	Sea and Coastal Species	9
29th October (9:00 am – 12:00 pm)	Endemic / Specialist Species	8

TABLE 1: ASSESSMENT WORKSHOPS

Twenty-six Belize-based avian experts participated in the workshops, each considered to have the knowledge on the distribution and trends of avian species in Belize. A sub-set of these participants was identified for each workshop, based on their specific areas of knowledge. Additional input was also provided by specialists in the field based outside of Belize.

Each workshop opened with an introductory presentation (Annex Four) that summarised the:

- background to the assessment,
- reasons for the assessment
- IUCN Red List
- links to national goals through the National Biodiversity Strategy and Action Plan.
- assessment criteria to be used for each species

Each working group was then tasked with completion of the assessment tables for the species allocated to their group. The assessment criteria were based on the IUCN criteria, following IUCN guidelines for regional assessments (IUCN, 2010), with the addition of climate change criteria (Advani, 2014) and national criteria used in the initial 2005 assessment. Each species was evaluated using a standard format that included:

- review of the global distribution (as mapped by Birdlife International, downloaded 2020)
- review of eBird map of distribution of reports from Belize (downloaded, 2020)
- IUCN and CITES status (IUCN, 2020; Species+, 2020),
- status on the Mexican Species at Risk List, (SEMARNAT, 2019)
- primary ecosystem / habitat requirements,
- the relative importance of Belize's population to regional and global populations
- the current distribution per species and potential range
- the importance of habitat connectivity
- the current level of fragmentation of habitat
- population size, condition and landscape context
- population trend in the region and in Belize
- rate of decline in Belize
- the primary, secondary and tertiary threats to the species (exclusive of climate change)
- tolerance to climate change and exposure to climate variability (Advani, 2014)
- whether the species meets any of the following criteria:
    - exploited, of economic importance
    - colony breeder,
    - requires large, connected range,
    - has specialized requirements,
    - charismatic species of touristic value,
    - persecuted as a perceived pest,
    - genetically different from regional population

Following the discussions and review of the outputs, participants were requested to recommend a national rating per species based on the IUCN categories and guidelines, and provide a justification.

- **Critically Endangered:** species considered to be facing an extremely high risk of extinction in the wild
- **Endangered:** species considered to be facing a very high risk of extinction in the wild
- **Vulnerable: species** considered to be facing a high risk of extinction in the wild.
- **Near Threatened**: species close to the threatened thresholds or that would be threatened without ongoing conservation measures.
- **Least Concern**: species evaluated with a lower risk of extinction.

Where information gaps occurred, these were filled by the participants after the workshop, and submitted to the facilitator for inclusion in the assessment.

2.3 VALIDATION PROCESS

The outputs from the five workshops were compiled and presented for review to the Core Team on the 5th November, 2020, and then to all workshop participants in a validation workshop held on 16th November, 2020 to review the final list of 70 species. Participants were requested to review the outputs per species groupings and provide justification for any rating alterations (Annex Six). They were also asked to provide input on remaining gaps in species ratings. The validated list was then sent to the Avian Technical Working Group members for final review.

III. OUTPUTS

3.1 AVIAN SPECIES AT RISK

Of the 70 species selected from the prioritized PIF list, 61 were assessed as either Critically Endangered, Endangered, or Vulnerable. These were spread across the five different species groupings: Game Species, Parrots, Raptors, Coastal / Wetland Species, and Endemics and Specialists, with the largest representation being from the Coastal / Waterbirds, making up 30% of identified threatened species list (Figure 1). Raptors, too, were also demonstrated to be at high risk, with 29% of species included on the threatened species list.

18 species (26% of the 70 species included on the threatened species list) rated as Critically Endangered, with a further 10 species (14%) rating as Endangered, and 33 species (47%) as Vulnerable. 9 were assessed as Least Concern or Data Deficient. (Figure 2).

SPECIES GROUP	NO. SPECIES
Game Species	6
Parrots	8
Endemics and Specialists	15
Raptors	20
Coastal / Waterbirds	21

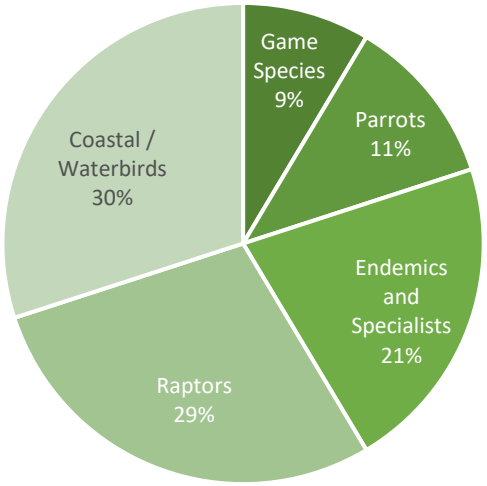


FIGURE 1: BREAKDOWN OF SPECIES GROUP REPRESENTATION ON BELIZE'S NATIONAL THREATENED AVIAN SPECIES LIST

NATIONAL RATING		NO. SPECIES
CR	Critically Endangered	18
EN	Endangered	10
VU	Vulnerable	33
NT	Near Threatened	1
LC	Least Concern	7
DD	Data Deficient	1

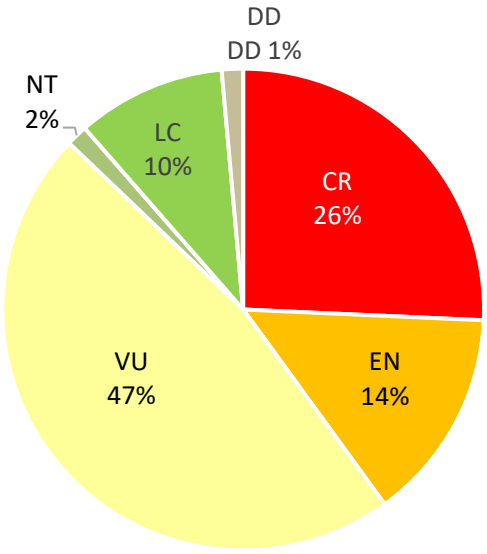


FIGURE 2: BREAKDOWN OF SPECIES RATINGS FOR BELIZE'S NATIONAL THREATENED AVIAN SPECIES LIST

NATIONAL LIST OF CRITICALLY ENDANGERED AVIAN SPECIES OF BELIZE

CR

SPECIES		FAMILY	NATIONAL RATING	IUCN 2020	PRIMARY HABITAT	PRIMARY THREAT
Solitary Eagle	*Buteogallus solitarius*	Accipitridae	CR	NT	Submontane Pine Forest	Persecution
Crested Eagle	*Morphnus guianensis*	Accipitridae	CR	NT	Broadleaved Forest	Habitat loss
Harpy Eagle	*Harpia harpyja*	Accipitridae	CR	NT	Broadleaved Forest	Habitat loss
Reddish Egret	*Egretta rufescens*	Ardeidae	CR	NT	Coastal / Cayes	Habitat Loss
Collared Plover	*Charadrius collaris*	Charadriidae	CR	LC	Coastal / Cayes	Habitat Loss
Orange-breasted Falcon	*Falco deiroleucus*	Falconidae	CR	NT	Broadleaved Forest	Habitat loss
Red Crossbill	*Loxia curvirostra*	Fringillidae	CR	LC	Submontane Pine Forest	Habitat loss
Bridled Tern	*Onychoprion anaethetus*	Laridae	CR	LC	Coastal / Cayes	Habitat Loss
Sooty Tern	*Onychoprion fuscatus*	Laridae	CR	LC	Coastal / Cayes	Habitat Loss
Brown Noddy	*Anous stolidus*	Laridae	CR	LC	Coastal / Cayes	Habitat Loss
Least Tern	*Sternula antillarum*	Laridae	CR	LC	Coastal / Cayes	Habitat Loss
Roseate Tern	*Sterna dougallii*	Laridae	CR	LC	Coastal / Cayes	Habitat Loss
Sandwich Tern	*Thalasseus sandvicensis*	Laridae	CR	LC	Coastal / Cayes	Habitat Loss
Ocellated Turkey	*Meleagris ocellata*	Phasianidae	CR	NT	Broadleaved Forest	Hunting
Scarlet Macaw	*Ara macao*	Psittacidae	CR	LC	Broadleaved Forest	Illegal wildlife trade
Yellow-headed Parrot	*Amazona oratrix*	Psittacidae	CR	EN	Pine savanna	Illegal wildlife trade
Great Horned Owl	*Bubo virginianus*	Strigidae	CR	LC	Coastal / Cayes	Persecution
Greater Pewee	*Contopus pertinax*	Tyrannidae	CR	LC	Pine savanna	Habitat loss

IUCN Ratings: CR: Critically Endangered; **EN:** Endangered; **VU:** Vulnerable; **NT:** Near Threatened; **LC:** Least Concern; **DD:** Data Deficient

TABLE 2: NATIONAL LIST OF CRITICALLY ENDANGERED AVIAN SPECIES

NATIONAL LIST OF ENDANGERED AVIAN SPECIES EN

SPECIES		FAMILY	NATIONAL RATING	IUCN 2020	PRIMARY HABITAT	PRIMARY THREAT
Red-tailed Hawk	*Buteo jamaicensis*	Accipitridae	EN	LC	Submontane Pine Forest	Fire
Black-and-white Hawk-Eagle	*Spizaetus melanoleucus*	Accipitridae	EN	LC	Broadleaved Forest	Persecution
Ornate Hawk-Eagle	*Spizaetus ornatus*	Accipitridae	EN	NT	Broadleaved Forest	Persecution
Muscovy Duck	*Cairina moschata*	Anatidae	EN	LC	Wetland	Hunting
Crested Guan	*Penelope purpurascens*	Cracidae	EN	LC	Broadleaved Forest	Hunting
Great Curassow	*Crax rubra*	Cracidae	EN	VU	Broadleaved Forest	Hunting
Osprey	*Pandion haliaetus*	Pandionidae	EN	LC	Coastal / Cayes	Habitat loss
Yellow-lored Parrot	*Amazona xantholora*	Psittacidae	EN	LC	Broadleaved Forest	Illegal wildlife pets
Mealy Parrot	*Amazona farinosa*	Psittacidae	EN	LC	Broadleaved Forest	Illegal wildlife pets
Red-footed Booby	*Sula sula*	Sulidae	EN	LC	Coastal / Cayes	Coastal / caye development

IUCN Ratings: CR: Critically Endangered; **EN:** Endangered; **VU:** Vulnerable; **NT:** Near Threatened; **LC:** Least Concern; **DD:** Data Deficient

TABLE 3: NATIONAL LIST OF ENDANGERED AVIAN SPECIES

NATIONAL LIST OF VULNERABLE AVIAN SPECIES **VU**

SPECIES		FAMILY	NATIONAL RATING	IUCN 2020	PRIMARY HABITAT	PRIMARY THREAT
Swallow-tailed Kite	*Elanoides forficatus*	Accipitridae	VU	LC	Submontane Pine Forest	Habitat loss
Snail Kite	*Rostrhamus sociabilis*	Accipitridae	VU	LC	Wetland	Habitat loss
Hook-billed Kite	*Chondrohierax uncinatus*	Accipitridae	VU	LC	Broadleaved Forest	Habitat loss
Bicolored Hawk	*Accipiter bicolor*	Accipitridae	VU	LC	Broadleaved Forest	Habitat loss
Common Black Hawk	*Buteogallus anthracinus*	Accipitridae	VU	LC	Coastal / Cayes	Habitat loss
Black-collared Hawk	*Busarellus nigricollis*	Accipitridae	VU	LC	Wetland	Habitat loss
Black Hawk-Eagle	*Spizaetus tyrannus*	Accipitridae	VU	LC	Broadleaved Forest	Habitat loss
Agami Heron	*Agamia agami*	Ardeidae	VU	VU	Wetland	Habitat loss
King Vulture	*Sarcoramphus papa*	Cathartidae	VU	LC	Broadleaved Forest	Habitat loss
Wilson's Plover	*Charadrius wilsonia*	Charadriidae	VU	LC	Coastal / Cayes	Habitat loss
Wood Stork	*Mycteria americana*	Ciconiidae	VU	LC	Wetland	Habitat loss
Jabiru	*Jabiru mycteria*	Ciconiidae	VU	LC	Wetland	Habitat loss
White-crowned Pigeon	*Patagioenas leucocephala*	Columbidae	VU	NT	Coastal / Cayes	Habitat loss
Caribbean Dove	*Leptotila jamaicensis*	Columbidae	VU	LC	Secondary / Edge Forest	Habitat loss
Lovely Cotinga	*Cotinga amabilis*	Cotingidae	VU	LC	Broadleaved Forest	Habitat loss
Grasshopper Sparrow	*Ammodramus savannarum*	Emberizidae	VU	LC	Pine savanna	Habitat loss
Magnificent Frigatebird	*Fregata magnificens*	Fregatidae	VU	LC	Coastal / Cayes	Habitat loss

IUCN Ratings: CR: Critically Endangered; **EN:** Endangered; **VU:** Vulnerable; **NT:** Near Threatened; **LC:** Least Concern; **DD:** Data Deficient

TABLE 4: NATIONAL LIST OF VULNERABLE AVIAN SPECIES

NATIONAL LIST OF VULNERABLE AVIAN SPECIES **VU**

SPECIES		FAMILY	NATIONAL RATING	IUCN 2020	PRIMARY HABITAT	PRIMARY THREAT
Strong-billed Woodcreeper	*Xiphocolaptes promeropirhynchus*	Furnariidae	VU	LC	Broadleaved Forest	Habitat loss
Keel-billed Motmot	*Electron carinatum*	Momotidae	VU	VU	Broadleaved Forest	Habitat loss
Singing Quail	*Dactylortyx thoracicus*	Odontophoridae	VU	LC	Broadleaved Forest	Habitat loss
Black-throated Bobwhite	*Colinus nigrogularis*	Odontophoridae	VU	LC	Pine savanna	Habitat loss
Brown Pelican	*Pelecanus occidentalis*	Pelecanidae	VU	LC	Coastal / Cayes	Habitat loss
Brown-hooded Parrot	*Pyrilia haematotis*	Psittacidae	VU	LC	Broadleaved Forest	Habitat loss
Red-lored Parrot	*Amazona autumnalis*	Psittacidae	VU	LC	Secondary Forest	Illegal wildlife pets
White-crowned Parrot	*Pionus senilis*	Psittacidae	VU	LC	Broadleaved Forest	Habitat loss
Stygian Owl	*Asio stygius*	Strigidae	VU	LC	Submontane Pine Forest	Habitat loss
Crested Owl	*Lophostrix cristata*	Strigidae	VU	LC	Broadleaved Forest	Habitat loss
Black-throated Shrike-Tanager	*Lanio aurantius*	Thraupidae	VU	LC	Broadleaved Forest	Habitat loss
Roseate Spoonbill	*Platalea ajaja*	Threskiornithidae	VU	LC	Coastal / Cayes	Habitat loss
Speckled Mourner	*Laniocera rufescens*	Tityridae	VU	LC	Broadleaved Forest	Habitat loss
Sedge Wren	*Cistothorus platensis*	Troglodytidae	VU	LC	Pine savanna	Habitat loss
Plumbeous Vireo	*Vireo plumbeus*	Vireonidae	VU	LC	Submontane Pine Forest	Habitat loss
Yucatan Vireo	*Vireo magister*	Vireonidae	VU	LC	Coastal / Cayes	Habitat loss

IUCN Ratings: CR: Critically Endangered; **EN:** Endangered; **VU:** Vulnerable; **NT:** Near Threatened; **LC:** Least Concern; **DD:** Data Deficient

TABLE 4b: NATIONAL LIST OF VULNERABLE AVIAN SPECIES

NATIONAL LIST OF NEAR THREATENED / LEAST CONCERN SPECIES

SPECIES		FAMILY	NATIONAL RATING	IUCN 2020	PRIMARY HABITAT	PRIMARY THREAT
Fulvous Whistling-Duck	*Dendrocygna bicolor*	Anatidae	LC	LC	Wetland	Hunting
Tricolored Heron	*Egretta tricolor*	Ardeidae	LC	LC	Coastal / Cayes	Habitat loss
Great Egret	*Ardea alba*	Ardeidae	LC	LC	Coastal / Cayes	Habitat loss
Boat-billed Heron	*Cochlearius cochlearius*	Ardeidae	LC	LC	Coastal / Cayes	Habitat loss
Aplomado Falcon	*Falco femoralis*	Falconidae	LC	LC	Pine savanna	Habitat loss
Black Catbird	*Melanoptila glabrirostris*	Mimidae	NT	NT	Coastal / Cayes	Habitat loss
White-fronted Parrot	*Amazona albifrons*	Psittacidae	LC	LC	Secondary Forest	Illegal wildlife pets
White Ibis	*Eudocimus albus*	Threskiornithidae	LC	LC	Coastal / Cayes	Habitat loss

IUCN Ratings: CR: Critically Endangered; **EN:** Endangered; **VU:** Vulnerable; **NT:** Near Threatened; **LC:** Least Concern; **DD:** Data Deficient

TABLE 5: NATIONAL LIST OF NEAR THREATENED / LEAST CONCERN AVIAN SPECIES

3.2 CAUSES OF POPULATION DECLINES

The primary, secondary and tertiary threats were identified for each species, to enable identification of recommendations for cross-cutting interventions across all species (Figure 3). The four primary causes of decline across all avian species were identified as:

- Habitat Loss,
- Illegal Captive Wildlife,
- Hunting
- Persecution.

Human disturbance and Habitat Degradation are also both significant, though are generally identified as secondary causes of decline associated with habitat loss.

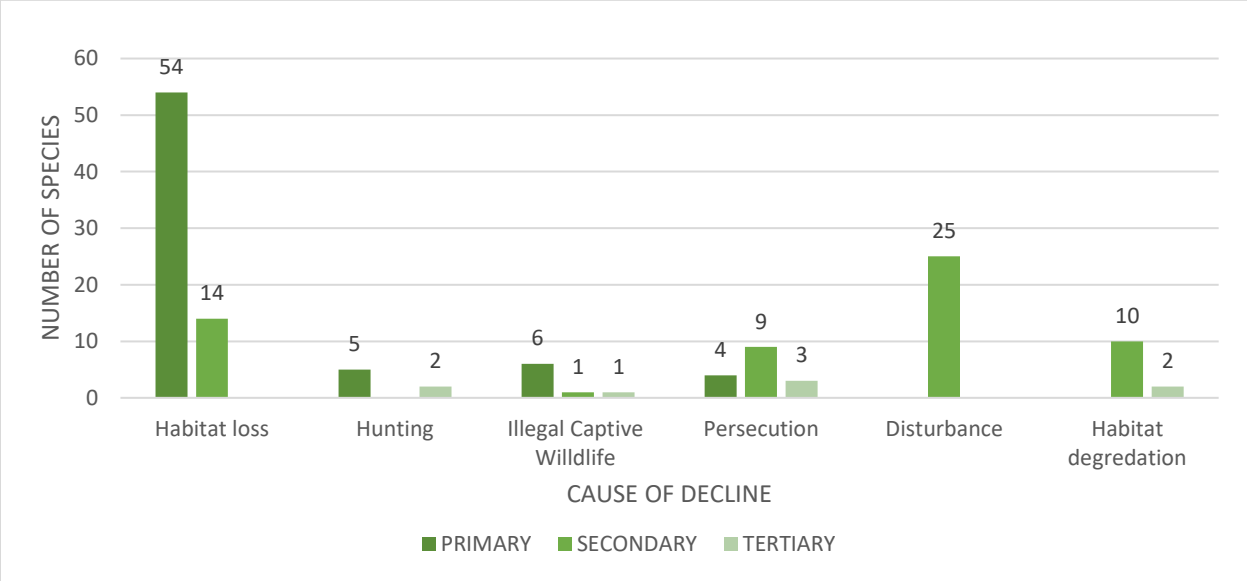


FIGURE 3: PRIMARY, SECONDARY AND TERTIARY CAUSES OF DECLINE FOR BELIZE'S AT-RISK BIRD SPECIES

Habitat Loss: The greatest cause of decline for threatened avian species in Belize is habitat loss, identified as the primary cause for 54 (77.1%) of the 70 listed species, and associated with 66 (94.3%) of species as either the primary of secondary cause. Habitat loss is defined as the anthropogenic conversion of three critical ecosystem complexes (tropical broad-leaved forest, upper elevation / lowland pine forests and savannas, and mangrove / littoral forest and beaches). Drivers of habitat loss are identified as expanding agriculture (both agro-industrial and small holder), coastal and caye development, and urban expansion.

Illegal Captive Wildlife: The illegal wildlife trade has had a significant impact on many of Belize's (and the region's) parrot species - particularly the larger, more talkative and interactive Amazon species. Parrots are protected under the Wildlife Protection Act (1982), but limited resources for enforcement have led to the continued culture of capture of parrot nestlings from the wild for sale as household pets across the country, or for illegal trafficking across the Guatemala and Mexican borders. In recent years, a captive

parrot registration and permitting system has been introduced by the Forest Department for birds currently kept in captivity, with enforcement of the no-take legislation to prevent new birds entering captivity, as a strategy towards ending the illegal trade. However, the sheer scale of captive parrots and the limited resources available to implement the permitting system is a challenge to stopping the illegal trade.

The species at highest demand for the captive wildlife trade in Belize and regionally / internationally is the yellow-headed parrot (*Amazona oratrix*). It is reported as present in nine protected areas, either roosting, nesting or transiting. However, six of these protected areas rate the population as FAIR, requiring significant investment if this species is to recover at site level (Walker, 2020). Six protected areas protect nationally and regionally important nesting sites, but even protected areas that are effectively managed and target their surveillance and enforcement activities at addressing poaching report significant losses. It is also recognized that many nests are located outside of the protected areas, where they are at higher risk of poaching, and there is general agreement that these face a loss of nestlings near 100% (Workshop Outputs, 2020).

There is also increasing concern of an emerging trend over the last four to five years in the illegal capture of raptors for amateur falconry, with young birds being taken from nests and hand reared. This is reflected in an increasing number of raptors rescued across Belize that enter rehabilitation facilities with clipped wings and tethers wrapped round legs. It is thought that this may be a result of increasing exposure to the concept of falconry and practices of taming, tethering and training raptors (Workshop Outputs, 2020). Target species appear to be opportunistic, linked more to the discovery of active nests than to suitability of the birds for training, with species ranging from roadside hawks to common black hawks, barn owls and even ferruginous pygmy owls (Buxton, pers. comm.). Whilst the emphasis is on common species that nest near urban areas, this threat covers all raptors.

Hunting: Game meat is considered culturally important in many communities across Belize, and in some is also an important supplement for subsistence diets. Whilst habitat loss has been largely responsible for the contracting ranges of game species, hunting (primarily illegal hunting) is considered the current most significant driver in the disappearance of game species from non-protected forests, and has led to species such as the ocellated turkey, great curassow and crested guan largely disappearing from the non-protected landscape (Workshop Outputs, 2020). There are impacts on game species populations in protected areas as well, with increasing illegal hunting incursions reported, with 97.1% (thirty-three of the thirty-four) terrestrial protected areas included in a recent national threat assessment being impacted by illegal hunting in 2019 (Walker, 2020).

Disturbance: Human disturbance is flagged as a threat that can lead to birds being displaced and the disruption of key nesting sites. Colony nesting waterbirds are perhaps one of the most vulnerable, generally reliant on mangrove cayes and the coastal strand for nesting, a key target for coastal development. The sheer level of activity at nesting colonies, often with large numbers of herons, egrets, cormorants, pelicans and frigatebirds, also encourages tourism interest, adding the risk of over visitation and poor tourism practices leading to nest and colony abandonment. Secretive forest species associated

with the interior of large tracts of intact broadleaved forest are also highlighted as at risk, moving deeper into the forest if human presence from tourism or logging increases. This increases the importance of large, intact forested protected areas for maintaining these species, where access can be controlled.

Habitat Degradation: Habitat degradation, more specifically as a result of the increased frequency of anthropogenic fires and pine bark beetle infestations, is considered a significant impact on species associated with both the submontane and lowland pine savannas and forests, and listed as the primary cause of decline in 14.3% of at-risk species, impacting not only the birds themselves, but also food availability and other niche requirements.

Threats classification and terminology is aligned to the standardized IUCN-CMP threat classification scheme (Version 3.2), to provide consistency for integration into regional and global impact studies (Table 6).

NATIONAL THREAT	IUCN-CMP THREATS (Version 3.2)			
	LEVEL 1	**LEVEL 2**	**LEVEL 3**	**SPECIES GROUPS**
Habitat Loss	Residential and Commercial Development	Housing and urban areas	City and rural community settlement and expansion	All species groups
		Tourism and recreation areas	Tourism resorts, infrastructure	Coastal / Caye / Wetland species Endemic / Specialist Species
	Agriculture and Aquaculture	Annual and perennial non-timber crops	Small holder farming	All species groups
			Agro-industry farming	
		Livestock farming and ranching	Small holder grazing / ranching	
			Agro-industry ranching	
Loss of ecosystem connectivity	Transportation and Service Corridors	Roads		All species groups
Poaching for the illegal wildlife trade	Biological Resource Use	Hunting and collecting	Intentional use	Parrots Game Species Raptors
Hunting for meat				Game Species
Loss of nest sites		Logging	Unintentional effect	Parrots
Fishing by-catch		Fishing aquatic resources	Unintentional effect	Coastal / Caye / Wetland Species
Persecution		Persecution / Control	Intentional impact	Parrots Raptors
Loss of ecosystem connectivity	Transportation and Service Corridors	Roads		Game species Raptors Endemic / Specialist Species
Increased human disturbance	Human Intrusion / Disturbance	Recreational activities	Tourism	Coastal / Caye / Wetland species Endemic / Specialist Species
		Work	Logging	
			Transboundary incursions	

TABLE 6: KEY THREATS TO AVIAN SPECIES AT RISK IN BELIZE (BASED ON IUCN-CMP THREATS, VER. 3.2

NATIONAL THREAT	IUCN-CMP THREATS (Version 3.2)			SPECIES GROUPS IMPACTED
	LEVEL 1	LEVEL 2	LEVEL 3	
Habitat Degradation	Natural System Modification	Fire and fire suppression	Increase in fire frequency / intensity	Parrots Raptors Game Species Endemic / Specialist Species
	Invasive and other Problematic Species	Problematic native species/ invasive species	Pine Bark Beetle Infestation	Parrots Raptors Game Species Endemic / Specialist Species
	Pollution	Domestic and urban waste water	Nutrient load / Eutrophication Agrochemicals	Coastal / Caye / Wetland Species Raptors
		Industrial effluents		
		Agricultural and forestry effluents		
Climate Change	Climate Change	Habitat shifts and alteration	Sea level rise	Coastal / Caye / Wetland Species
		Drought	Limited water availability	All species groups
		Storms	Increased intensity of hurricanes	

TABLE 6B: KEY THREATS TO AVIAN SPECIES AT RISK IN BELIZE (BASED ON IUCN-CMP THREATS, VER. 3)

3.3 SPECIES GROUP 1: PARROTS (PSITTACIDAE)[1]

Of the nine species of parrot / parakeet listed for Belize, eight are included on the list of national concern. Of these, two are considered to be Critically Endangered at the national level, two Endangered and three Vulnerable, with one rated as of Least Concern. The olive-throated parakeet (*Eupsittula nana*) is not considered as at risk, as it has been able to adapt to both the agricultural and urban landscapes (Table 7; Workshop Outputs, 2020).

SPECIES		BELIZE 2020	MEXICO 2019	IUCN 2020
Scarlet Macaw	*Ara macao*	CR	P	LC
Yellow-headed Parrot	*Amazona oratrix*	CR	P	EN
Yellow-lored Parrot	*Amazona xantholora*	EN	A	LC
Mealy Parrot	*Amazona farinosa*	EN	P	LC
Brown-hooded Parrot	*Pyrilia haematotis*	V	P	LC
Red-lored Parrot	*Amazona autumnalis*	V	A	LC
White-crowned Parrot	*Pionus senilis*	V	A	LC
White-fronted Parrot	*Amazona albifrons*	LC	Pr	LC

Belize / IUCN Ratings: CR: Critically Endangered; E: Endangered; V: Vulnerable; LC Least Concern
Mexico ratings: P: En peligro de extinción (Endangered); A: Amenazada (Threatened); Pr: Sujeta a protección especial (Conservation Dependent) (SEMARNAT, 2010)

TABLE 7: RATINGS FOR *PSITTACIDAE* SPECIES

The primary threat for the majority of the Psittacidae is poaching for the illegal wildlife trade (Figure 4), with removal of live nestlings for sale on both the local and international markets. In Belize, it has been considered to be part of the culture to have parrots as household pets across the country, even though they are protected under the Wildlife Protection Act (1982). Poaching of parrot nestlings for economic gain is a biologically significant source of nest failure, with substantial impact on those species targeted – generally the larger Amazons, and especially those able to mimic sounds and words. In 1994, it was estimated that poaching had reduced yellow-headed parrots (*Amazona oratrix*) in the region by 90% over twenty years (Birdlife International, 2020; Wright et. al., 2001). In Mexico, the overall mortality rate for trapped parrots has been estimated to exceed 75% before reaching a purchaser (Guzman et al., 2007).

The Belize Government declared a moratorium on the keeping of pet parrots in 2016 and introduced a registration and permitting system for parrots already in captivity, with enforcement of the legislation to prevent new birds being kept as a means of ending the trade. However, the sheer scale of pet parrots and

[1] *Group 1 Assessment Team (Parrots): B. Arevalo (FCD), C. Bech, D. Hilmy (The Keep), J. Andrewin Bohn (the Belize Zoo), J. Urbina (BBC/WCF), M. Muschamp (TIDE), K. Hartwell and R. Cal (FWC), V. Rodriguez (PfB). Core Team: J. Meerman (IUCN / GITEC), S. Carillo Balan (Forest Department), R. Garcia (NBIO), Z. Walker (Consultant)*

the limited resources available to implement the permitting system has been a significant challenge to addressing the national trade. There is limited information on the supply to the international trade, though it is known that parrots are being transported across the borders into Mexico and Guatemala.

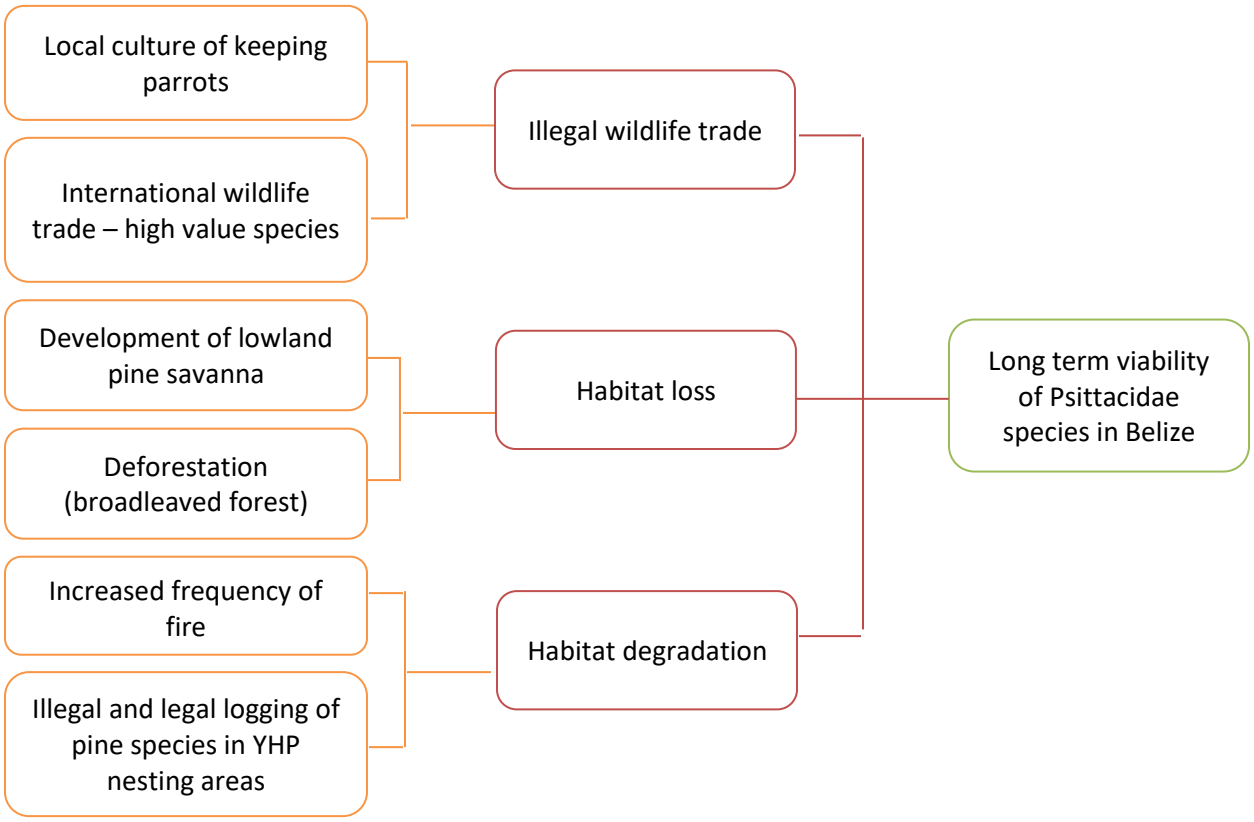


FIGURE 6: THREAT ASSESSMENT FOR PSITTACIDAE SPECIES

Habitat loss ranks as the second highest threat, with many of the Psittacidae species requiring intact pine, broadleaf forest and / or riparian forest for nesting and foraging. Conversion to agriculture, dam construction and urban expansion has resulted in the loss of core areas and mature trees suitable for nesting.

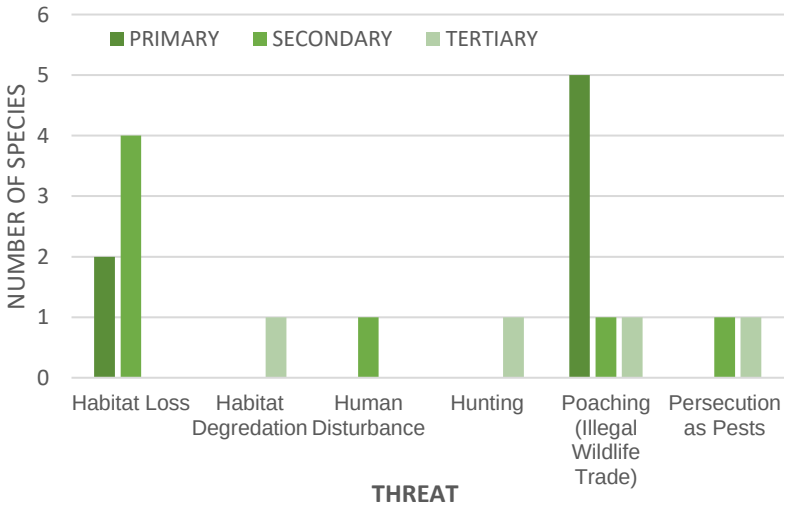
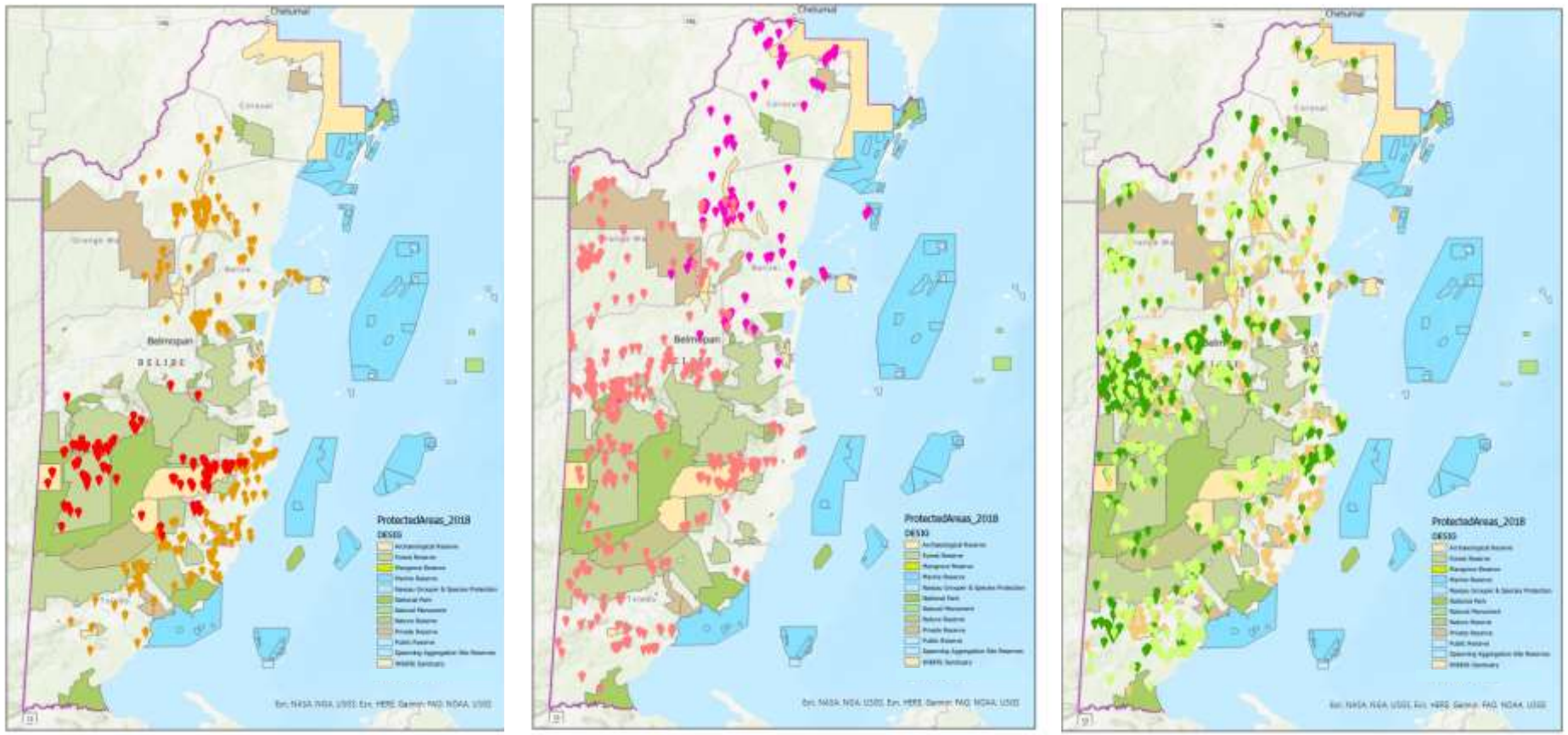


FIGURE 4: PRIMARY, SECONDARY AND TERTIARY THREATS FOR PSITTACIDAE SPECIES OF NATIONAL CONCERN



Critically Endangered

Scarlet Macaw (*Ara macao*)

Yellow-headed Parrot (*Amazona oratrix*)

Endangered

Yellow-lored Parrot (*Amazona xantholora*)

Mealy Parrot (*Amazona farinosa*)

Vulnerable

White-crowned Parrot (*Pionus senilis*)

Brown-hooded Parrot (*Pyrilia haematotis*)

FIGURE 5: DISTRIBUTION OF KEY PSITTACIDAE SPECIES OF NATIONAL CONCERN (eBird, DOWNLOADED 2020)

Two Psittacidae species are assessed as **Critically Endangered** at the national level - the yellow headed parrot (*Amazona oratrix*) and scarlet macaw (*Ara macao*), and have a similarly high 'at risk of extinction' rating in Mexico (SEMARNAT, 2019). Both are high value species in the illegal wildlife trade, have very small population sizes, and are very specialized in their selection of nesting sites. A significant number of nests of both species are poached each year for the illegal wildlife trade, and with the high level of nest fidelity, some nests are poached on an annual basis. There is concern that the high take of young birds and the long life span of the adults of these two charismatic species is resulting in a skew towards an aging population with limited recruitment, potentially reducing long term viability of the species in Belize (Workshop Outputs, 2020).

Amazona oratrix is a regional endemic, present in Mexico and northern Central America, with the sub-species, *A. o. belizensis*, endemic to Belize and possibly the Peten, in north eastern Guatemala. Belize is thought to have the highest concentration of this species in the region (Britt, 2016), with over 75% of the global population. The global population is considered to have declined by as much as 90% between the mid-1970s and mid 1990s (Birdlife International, 2020), and continues to decline both in Belize and across the region as a result of a combination of threats. Today, the population is thought to be largely restricted to the coastal pine savannas in southern Belize, and the pine-oak forests/ savanna complexes of north western Belize.

This species nests in mature pine and oak trees in lowland pine savannas, and as well as being the primary target of the illegal wildlife trade, is also impacted by a combination of other threats including expansion of the urban and agricultural landscapes into the pine savannas (only an estimated 22-27% of the remaining lowland savannas in Belize lie within protected areas (Meerman, 2005)), legal and illegal logging of the mature nest trees, and the increasing frequency of anthropogenic fires, driving this species towards extinction. It should be noted that there are a number of verified reports of yellow-naped parrots (*Amazona auropalliata*), including that of an individual in a flock of yellow-headed parrots (Rodriguez, pers. comm.) and of a breeding pair (Hilmy, pers. comm.), suggesting potential hybridization of the two species. This species is currently considered a vagrant in Belize, thought to originate from the Bay Islands of Honduras, so is not included in the threatened species list at this time.

Whilst the global population of the scarlet macaw (*Ara macao*) is considered to be of Least Concern (IUCN, 2020), there is significant fragmentation across its range. The regional population is estimated at around 4,000 (Collar et al, 2020), with the Mexico-Belize-Guatemala sub-species (*A. m. cyanoptera*) thought to be below 500 birds (Arevalo, pers. comm.), largely confined to the upper Raspaculo and Macal basins in Belize, and restricted to the Lacandón Forest in Mexico, and the Petén in Guatemala (Collar et al. 2020). Of these, Belize's population is estimated at 330 individuals, and restricted to a single population with a range largely limited to the Maya Mountains Massif (Figure 5; Workshop Outputs, 2020). The Belize population is thought to be genetically distinct from the Guatemalan / Mexican population, suggesting very limited, or possibly no interchange between the two (Arevalo, pers. comm.).

This species nests in tall trees on flood plains deep, primarily within the Chiquibul forest. As a single population, it is very vulnerable to external impacts on its nesting and foraging sites. Despite the remote

nesting locations and significant efforts in protecting the known nesting sites, the nests are targeted each year by transboundary 'guacamalleros', originating from Guatemala, and crossing the border illegally, specifically to poach nestlings for the illegal wildlife trade in Guatemala. The protected population, with an average of eleven known active nests, is considered relatively stable, but there is heavy poaching pressure outside of the scope of protection, with at least 25 nestlings known to have been taken from the Chiquibul forest in 2020 for sale in Guatemala (Arevalo, pers. com.). With the continued loss of youngsters from the breeding population, there is concern that Belize has an aging population of these long-lived birds. As a result, the impacts of the high percentage loss of nestlings each year may not be reflected in the population health until the medium to long term, with older birds dying and not being replaced, and the loss of genetic variability, potentially important in the facilitation of adaptation to future climate change.

Two species are rated as **Endangered** at the national level – the yellow-lored parrot (*Amazona xantholora*) and mealy parrot (*Amazona farinosa*). Both are targeted by poachers, though the mealy parrot less so. The yellow-lored parrot is a Yucatan endemic, listed as 'threatened' in Mexico (SEMARNAT, 2019), with Belize at the southernmost part of its range, where it is restricted to the drier northern forests and the cayes (Figure 5). As well as poaching, it has also been impacted by extensive deforestation for agriculture (primarily for sugar cane, industrialized farmlands and cattle) and caye development across its range, removing much of its primary habitat. It is also persecuted as a crop pest.

The mealy parrot prefers undisturbed humid tropical lowland forest, and is suspected to be undergoing a moderately rapid population decline owing to on-going habitat loss and poaching pressure. This species is now restricted primarily to the protected areas of central and southern Belize (from Rio Bravo southwards) (Figure 5). It is listed as 'Endangered' in Mexico as a result of its restricted range and unsustainable levels of poaching (SEMARNAT, 2019). In Belize, it is less popular as a captive as it is not a 'talking' species, and it is more challenging to locate the nests in the broadleaf forest. This species therefore accounts for only 1.7% of the confiscated / surrendered birds that enter rehabilitation (Buxton, pers. comm.).

Three species are rated as **Vulnerable** at the national level – the red-lored parrot (*Amazona autumnalis*), brown-hooded parrot (*Pyrilia haematotis*), and white-crowned parrot (*Pionus senilis*). As with the other *Amazona* species, *Amazona autumnalis* is targeted by the illegal pet trade, representing 28.2% of confiscated / surrendered parrots that arrive in rehabilitation (Belize Bird Rescue, pers. comm.). It is considered a regional sub-species (*A. a. autumnalis*), with a distribution from eastern Mexico to north east Nicaragua, and is widespread in Belize, preferring the edges of topical and semi-deciduous lowland and foothill forest, gallery woodland and semi-open areas with scattered trees. It has therefore been able to adapt well to the increasingly fragmented agricultural landscape (Workshop Outputs, 2020). Whilst this species does not require species-specific conservation interventions in Belize at this point, it has recently been rated as 'Threatened' in Mexico (SEMARNAT, 2019), and would benefit from overall increased efforts to reduce illegal trade of this and other parrot species.

P. haematotis and *P. senilis*, the two non-Amazon species, are not specifically targeted by the illegal wildlife trade, other than opportunistically, with the primary threats to the populations being habitat loss. The brown-hooded parrot is considered a regional sub-species (*P. h. haematotis*) with a distribution from south east Mexico through northern Guatemala to Panama. It is restricted to taller, intact tropical moist forest with limited human disturbance, and is thought to move away from high levels of human activity or presence (e.g. tourism or logging) (Workshop Outputs, 2020). This has resulted in it being increasingly limited to the larger, forested protected areas, and to its rating of 'Endangered' in Mexico (SEMARNAT, 2019). The white-crowned parrot, too, prefers tropical forest habitat, though is more adaptable to edge habitats and even urban areas. The rate of decline of this species in the region is tied to the rate of deforestation of suitable habitat in Belize and regionally, leading to its rating as 'Threatened' in Mexico (SEMARNAT, 2019). Poaching for the pet trade is considered a secondary threat, with only 2.9% of parrots entering rehabilitation were of this species in Belize, as it is more aggressive and shows no ability to mimic words (Buxton, pers. com.).

The white-fronted parrot (*Amazona albifrons*) rates nationally as of **Least Concern** – this species has been able to adapt to the agricultural and human landscape and is thought to be increasing. However, it has been included on the list because of the high level of poaching. 32.0% of parrot confiscations / surrenders are of *A. albifrons*, resulting in it being the primary species in the local captive parrot trade, as the nesting sites are easy to locate, and the nestlings are attractively priced for the local market (Buxton, pers. com.). There have also been significant declines in the number of parrots visiting corn fields, with foraging flocks falling from hundreds to tens of birds, as a result of persecution as a pest, with historical reports of shooting and current reports of use of sorghum laced with poison along the edges of the corn fields (Workshop Outputs, 2020).

KEY RECOMMENDATIONS: PARROTS (PSITTACIDAE)

Illegal Wildlife Trade

- Review, revise and strengthen the Wildlife Protection Act, with increased penalties for offenders
- Implement a one-year investment in issuing permits under a grandfather clause for captive parrots, followed by zero-tolerance enforcement of laws protecting parrots.
- Map key *A. oratrix* and *A. macao* nesting sites inside and outside protected areas, with increased targeted surveillance and enforcement where possible during the nesting season.
- Strengthen public outreach and awareness on parrots, wildlife crime and the Wildlife Protection Act.
- Strengthen efforts at reducing the illegal transboundary trade of parrots to Guatemala and Mexico through capacity building of border enforcement authorities for recognition of wildlife crime, increased transboundary communication, and collaboration with the relevant authorities in Mexico and Guatemala.
- Support and strengthen rehabilitation and reintroduction of confiscated / rescued parrot species.

- Continue and strengthen head-start programmes for *A. oratrix* and *A. macao,* with extraction of identified at-risk nestlings for captive rearing, pre-release husbandry and release as part of a protected area / rehabilitation partnership, where applicable and approved by the relevant authority.

Habitat Loss

- Provide protection for key *A. oratrix* nesting sites in private development / agricultural projects through Environmental Compliance Plans.
- Support installation of artificial nest boxes for *A. oratrix* in secure nesting sites to address limitations in nest site availability.
- Strengthen protection and effective management of protected areas identified as key to long term viability of Critically Endangered species.
- Support initiatives to purchase large, private-held areas in key locations – the Belize Maya Forest (Yalbac / Laguna Seca /Gallon Jug properties), Peccary Hills (Hwatchy property), and Maya Forest Corridor) to be placed in trust for conservation, towards the protection of key forest nodes and corridors.
- Establish and protect key national biological corridors.

Habitat Degradation

- Targeted fire management at key *A. oratrix* nesting sites during nesting season.
- Surveillance and enforcement for illegal logging in identified key yellow-headed parrot nesting sites

3.4 SPECIES GROUP 2: GAME SPECIES[2]

Six game species were assessed, with one rating as Critically Endangered at the national level (the ocellated turkey (*Meleagris ocellata*), three as Endangered (great curassow (*Crax rubra*), crested guan (*Penelope purpurescens*) and the muscovy duck (*Carinea muschata*). One species is considered Vulnerable (the black-throated bobwhite (*Colinus nigrogularis*) and one of least concern (fulvous whistling duck (*Dendrocygna bicolor*)) (Table 8)

SPECIES		BELIZE 2020	MEXICO 2019	IUCN 2020
Ocellated Turkey	*Meleagris ocellata*	CR	P	LC
Crested Guan	*Penelope purpurascens*	EN	A	LC
Great Curassow	*Crax rubra*	EN	P	LC
Muscovy Duck	*Cairina moschata*	EN	P	EN
Black-throated Bobwhite	*Colinus nigrogularis*	V	P	LC
Fulvous whistling duck	*Dendrocygna bicolor*	V	A	LC

Belize / IUCN Ratings: CR: Critically Endangered; E: Endangered; V: Vulnerable; LC Least Concern
Mexico ratings: P: En peligro de extinción (Endangered); A: Amenazada (Threatened); Pr: Sujeta a protección especial (Conservation Dependent) (SEMARNAT, 2010)

TABLE 8: RATINGS FOR GAME SPECIES

The primary threat for five of the six is identified as hunting, with the sixth (*Colinus nigrogularis*) impacted more by habitat loss (Figure 7).

The ocellated turkey, great curassow and crested guan are all forest-dependent species that are heavily hunted in Belize.

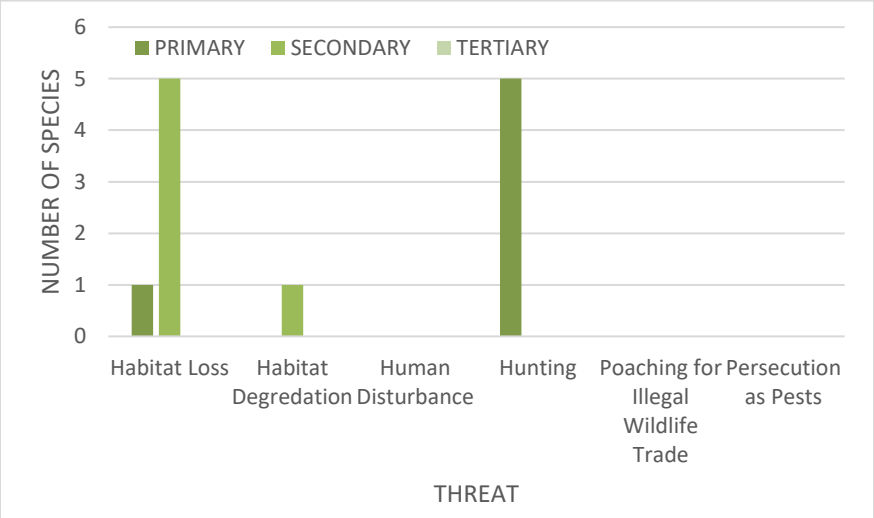


FIGURE 7: PRIMARY, SECONDARY AND TERTIARY THREATS FOR GAME SPECIES OF NATIONAL CONCERN

[2] *Group 2 Assessment Team (Game Species): D. Hilmy (The KEEP), F. Canto (Mayawalk), L. Jones (BBC), R. Cal (FWC), V. Rodriguez (PfB). Core Team: J. Meerman (IUCN / GITEC), C. Carillo (Forest Department), H. St. Luce Martinez and R. Garcia (NBIO), Z. Walker (Consultant)*

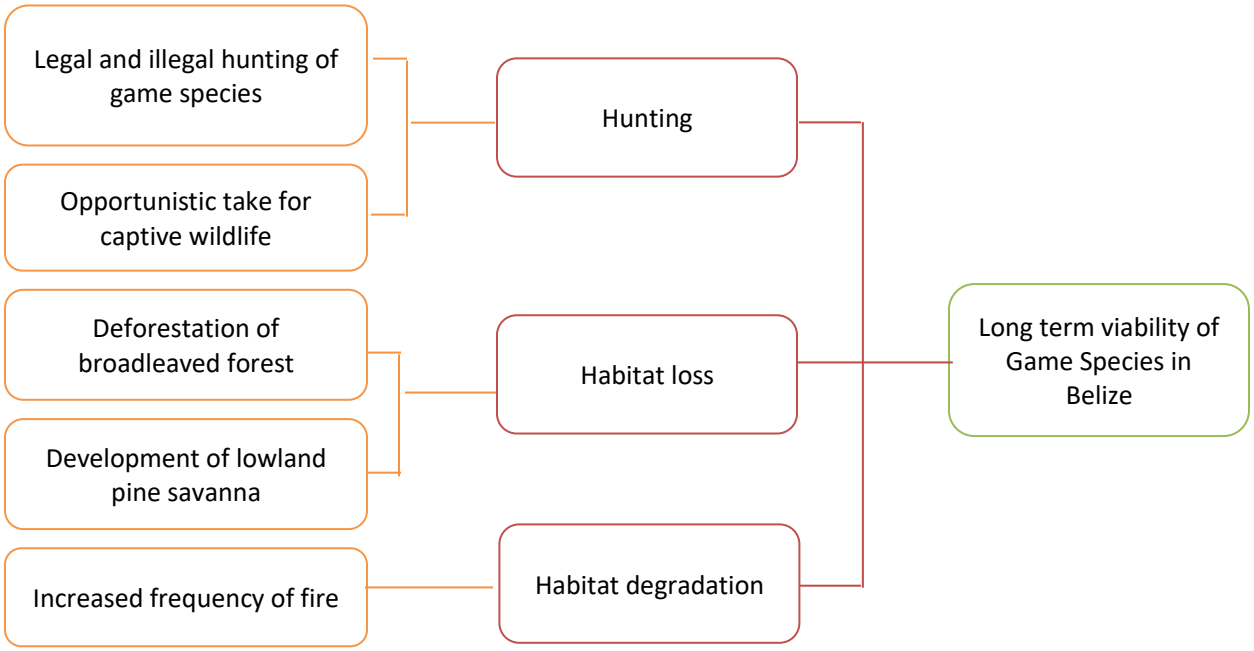
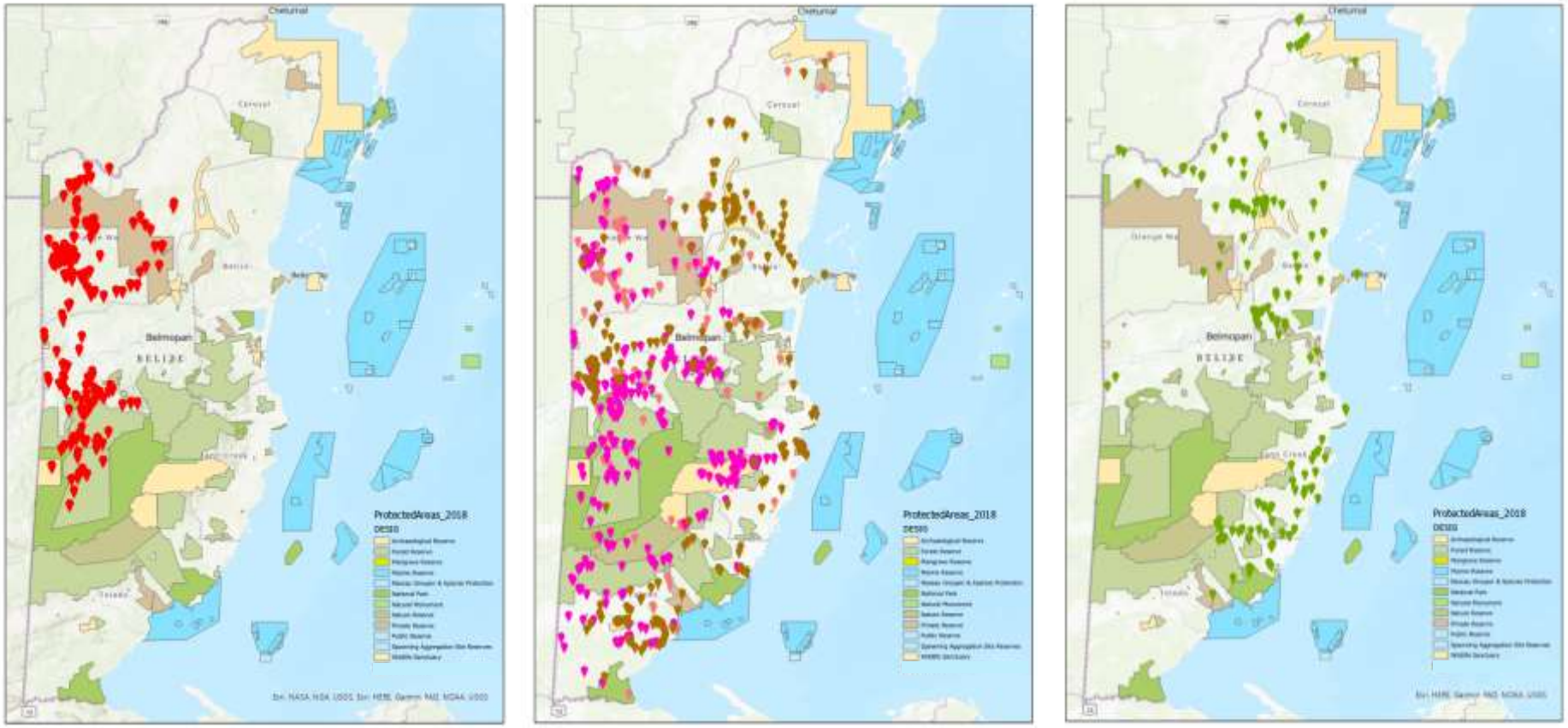


FIGURE 9: THREAT ASSESSMENT FOR GAME SPECIES

With extensive deforestation over the last twenty years and the cultural demand for game meat, these species are now largely confined to the National Protected Areas System and large, forested, privately protected areas. Even here, they are hunted illegally, with the majority of protected areas where they are present reporting a decline in populations (Walker, 2020).

The ocellated turkey *(Meleagris ocellata*), a Yucatan endemic, is thought to have been extirpated from north Yucatán, west Campeche, east Tabasco and north-east Chiapas, Mexico, and numbers and habitat quality are presumed to be declining elsewhere (Birdlife International, 2020). Over 50% of the global population is thought to be in Belize, where the population is fragmented into two by the expanding human footprint associated with the George Price Highway. To the north, it is restricted to the forested Belize Maya Forest (Yalbac / Laguna Seca / Gallon Jug properties) and Rio Bravo, where numbers are considered to have remained stable over the last twenty years (Meerman, 2020; Rodriguez, pers. comm.). To the south, it is found in the Chiquibul forest, where it was hunted almost to extinction over the last fifteen years as a result of transboundary incursions from Guatemala. It has, however, shown some signs of recovery over the last three years, with the increasing presence of armed patrols and Conservation Posts along the western border (Manzanero, pers. com).

The great curassow (*Crax rubra*) and crested guan (*Penelope purpurascens*), both considered Endangered at the national level, are also largely restricted to the protected areas, though are relatively widespread across the forested protected landscape. Whilst curassow are found throughout Belize, crested guans are restricted to the taller, more moist forests, and are not reported in the most northern, drier forests, despite the regional range extending into the Yucatan. The populations of both have the potential to face a decline of 20% over two generations as incursions by Illegal / subsistence hunters into protected areas



Critically Endangered

Ocellated Turkey (*Meleagris ocellata*)

Endangered

Crested Guan (*Penelope purpurescens*)

Great Curassow (*Crax rubra*)

Muscovy Duck (*Cairina moschata*)

Vulnerable

Black-throated Bobwhite (*Colinus nigrogularis*)

FIGURE 8: DISTRIBUTION OF KEY GAME SPECIES OF NATIONAL CONCERN (eBird, DOWNLOADED 2020)

with no on-site presence steadily increases, targeting these favoured game species (Workshop Outputs, 2020).

The muscovy duck (*Carinea muschata*) is considered to be more common in southern Belize, where it is found particularly in the riparian forests and nearby pine savanna pools. However, it is reported to have almost disappeared from the Monkey River area, a former southern stronghold, primarily as a result of land use change, with most waterholes near riparian forest now under cattle pasture (Bech, pers. comm.). The key location for this species in the north is Crooked Tree Wildlife Sanctuary, where it is heavily hunted (Canto, pers. comm.). The combined impacts of unregulated hunting and habitat loss, the potential for contamination of waterbodies from agrochemical and urban pollution, and the perceived declines across its range, are cause for concern at the national level, leading to its rating as Endangered.

The black-throated quail (*Colinus nigrogularis*), listed nationally as Vulnerable, is a distinct geographical sub-species, isolated from other populations in the region. Whilst associated with the pine savannas, it is also able to adapt to edge habitat in agricultural areas, and has been expanding into the agricultural landscape of sugar cane fields and cattle farms in the north of Belize. As a ground-nesting species, it is highly susceptible to fires, which destroy both the nesting and foraging habitat. The fulvous whistling duck (*Dendrocygna bicolor*), rated as of Least Concern, has been included based on the precautionary principle as this species was originally known only from a small number of reports from Crooked Tree Wildlife Sanctuary. In more recent years, however, the population has expanded rapidly to several hundred individuals, and is now occasionally reported outside of the protected area.

GAME SPECIES: KEY RECOMMENDATIONS:

Hunting

- Review, revise and strengthen the Wildlife Protection Act, with review of those avian species classed as game species, greater protection for nationally Critically Endangered and Endangered species, and increased penalties for illegal hunting.
- Develop and implement a national permit system and traceability mechanism for improved regulation of hunting and monitoring / enforcement of the game meat supply chain, to improve management of game species.
- Strengthen public outreach and awareness on the Wildlife Protection Act, hunting legislation, hunting seasons and species.

Habitat Loss

- Strengthen protection and effective management of the National Protected Areas System.
- Support initiatives to purchase large, private-held areas in key locations – Belize Maya Forest (Yalbac /Gallon Jug / Laguna Seca properties), Peccary Hills (Hwatchy property), Maya Forest Corridor - to be placed in trust for conservation, towards the protection of key nationally-important forest nodes.
- Establish and protect the key national biological corridors.

Habitat Degradation

- Continue strengthening fire management at both protected area and national level.

3.5 SPECIES GROUP 3: RAPTORS[3]

Twenty raptor species were included in the national assessment, five of which are considered nationally as Critically Endangered – the orange-breasted falcon (*Falco deiroleucus*), solitary eagle (*Buteogallus solitarius*), harpy eagle (*Harpia harpyja*), crested eagle (*Morphnus guianensis*) and the great horned owl (*Bubo virginianus*). Four species are assessed as Endangered nationally, and a further ten species as Vulnerable (Table 9).

SPECIES		BELIZE 2020	MEXICO 2019	IUCN 2020
Solitary Eagle	*Buteogallus solitarius*	CR	P	NT
Crested Eagle	*Morphnus guianensis*	CR	P	NT
Harpy Eagle	*Harpia harpyja*	CR	P	NT
Great Horned Owl	*Bubo virginianus*	CR	A	LC
Orange-breasted Falcon	*Falco deiroleucus*	CR	P	NT
Osprey	*Pandion haliaetus*	EN	-	LC
Red-tailed Hawk	*Buteo jamaicensis*	EN	Pr	LC
Black-and-white Hawk-Eagle	*Spizaetus melanoleucus*	EN	p	LC
Ornate Hawk-Eagle	*Spizaetus ornatus*	EN	p	NT
Swallow-tailed Kite	*Elanoides forficatus*	VU	Pr	LC
Snail Kite	*Rostrhamus sociabilis*	VU	Pr	LC
Hook-billed Kite	*Chondrohierax uncinatus*	VU	Pr	LC
Bicolored Hawk	*Accipiter bicolor*	VU	A	LC
Common Black Hawk	*Buteogallus anthracinus*	VU	Pr	LC
Black-collared Hawk	*Busarellus nigricollis*	VU	Pr	LC
Black Hawk-Eagle	*Spizaetus tyrannus*	VU	P	LC
Stygian Owl	*Asio stygius*	VU	A	LC
Crested Owl	*Lophostrix cristata*	VU	A	LC
Aplomado Falcon	*Falco femoralis*	LC	A	LC

Belize / IUCN Ratings: CR: Critically Endangered; E: Endangered; V: Vulnerable; LC Least Concern
Mexico ratings: P: En peligro de extinción (Endangered); A: Amenazada (Threatened); Pr: Sujeta a protección especial (Conservation Dependent) (SEMARNAT, 2010)

TABLE 9: RATINGS FOR RAPTOR SPECIES

The highest threat to raptors in Belize is identified as habitat loss (Figure 11), with the majority of these generally highly mobile, at-risk species being reliant on either large tracts of intact tropical broadleaved

[3] *Group 3 Assessment Team (Raptors): J.E. Ruano (BBC), I. Morataya (Black Rock Lodge), J. Urbina (BBC/WCF), P. Balderamas (E-bird reviewer), R. Martinez (E-bird reviewer). R. Phillips (BBC), V. Gamaz (BBC), V. Rodriguez (PfB), S. Cawich (Peregrine Fund), S. Mann (BRC). Core Team: Core Team: J. Meerman (IUCN / GITEC), S. Carillo (Forest Department), Z. Walker (Consultant)*

forest or lowland / upland pine savanna. There is also an increasing trend in raptors (both hawks and owls) being taken opportunistically for amateur (and illegal) falconry.

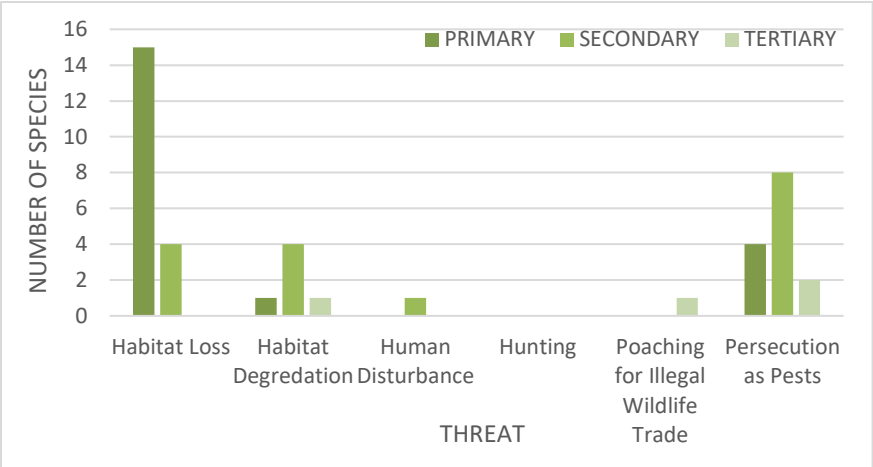


FIGURE 10: PRIMARY, SECONDARY AND TERTIARY THREATS FOR RAPTOR SPECIES OF NATIONAL CONCERN

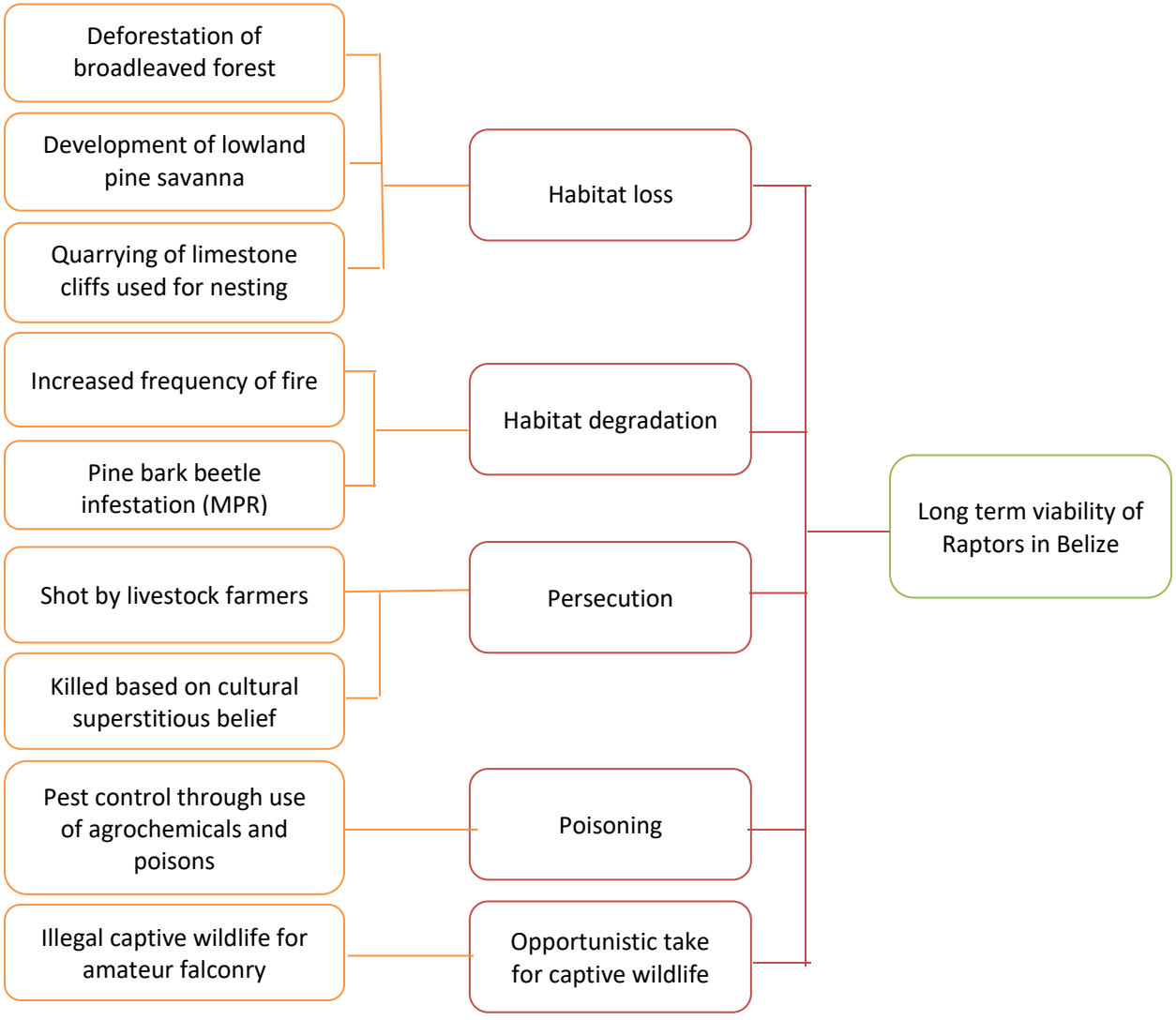
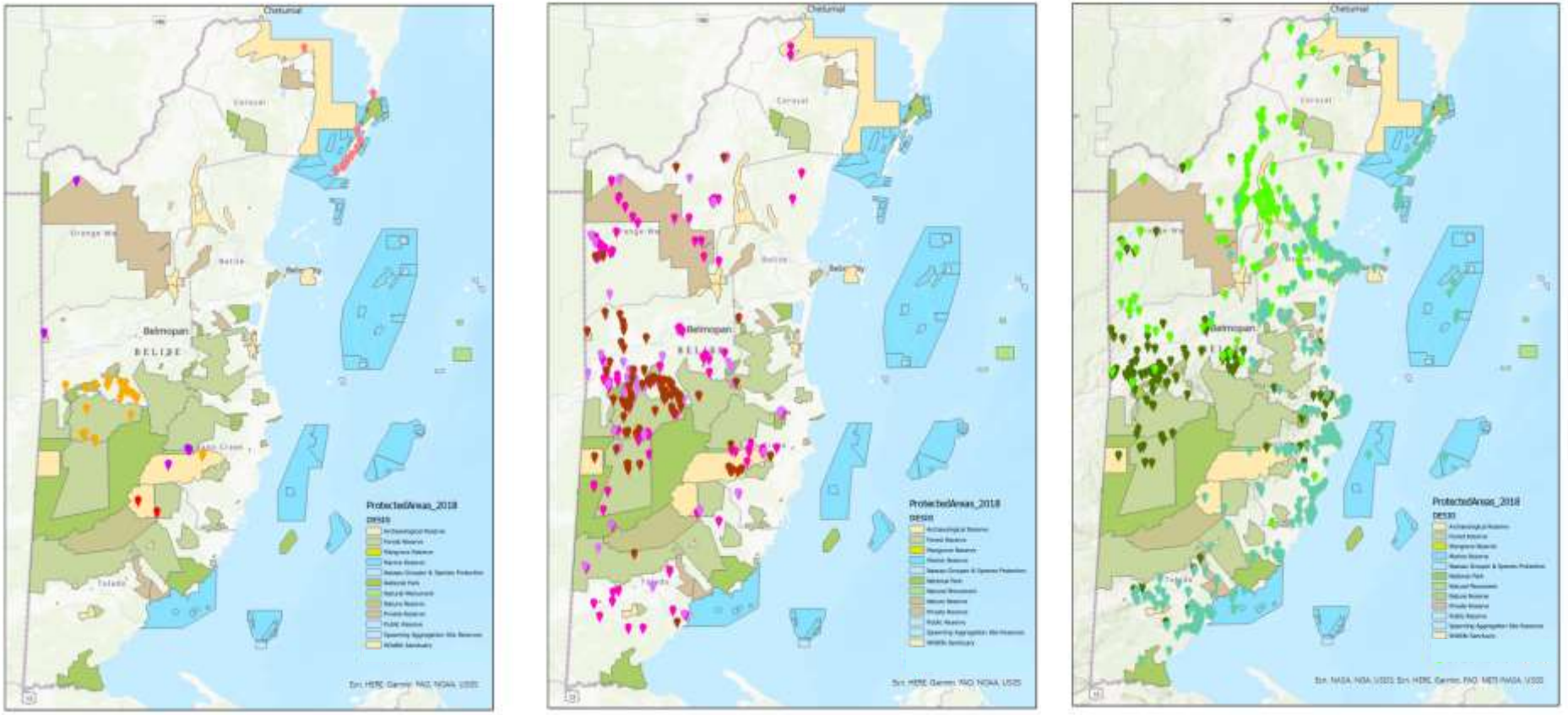


FIGURE 11: THREAT ASSESSMENT FOR RAPTORS



Critically Endangered

- Harpy Eagle (*Harpia harpyja*)
- Crested Eagle (*Morphnus guianensis*)
- Solitary Eagle (*Buteogallus solitarius*)

Endangered

- Ornate Hawk-Eagle (*Spizaetus ornatus*)
- Red-tailed Hawk (*Buteo jamaicensis*)
- Black-and-white Hawk-Eagle (*Spizaetus melanoleucus*)

Vulnerable

- Hook-billed Kite (*Chondrohierax uncinatus*)
- Snail Kite (*Rostrhamus sociabilis*)
- Common Black Hawk (*Buteogallus anthracinus*)

FIGURE 12: DISTRIBUTION OF KEY RAPTOR SPECIES OF NATIONAL CONCERN (eBird, DOWNLOADED 2020)

Three of the five Critically Endangered species (solitary eagle (*Buteogallus solitaries*), harpy eagle (*Harpia harpyja*) and crested eagle (*Morphnus guianensis*)) are landscape species…large eagles that require large expanses of intact habitat. They are found at very low densities, with even lower nest densities and with slow reproductive rates, increasing their vulnerability to threats. Both crested and harpy eagles hunt beneath the forest canopy, and therefore require well-structured, mature tropical broadleaved forest with a relatively open understory. Increasing deforestation and forest degradation from hurricane and post hurricane fires has had significant impacts on the known ranges of these species in Belize. The solitary eagle soars above the canopy, covering large areas of forest, and whilst it may enter edge habitat, generally hunts from perches above the forest floor. Two large hawk-eagle species (ornate hawk-eagle (*Spizaetus ornatus*) and black-and-white hawk eagle (*Spizaetus melanoleucus*)), whilst not considered Critically Endangered, are listed as nationally Endangered – both are large forest species present at low densities, and impacted by the increasing loss of broadleaved forest. Their adaptability to foraging over or adjacent to agricultural lands puts them at high risk, as any large raptor is generally shot on sight for allegedly taking chickens and other livestock.

The orange-breasted falcon (*Falco deiroleucus*) is the smallest of the raptors to rate as Critically Endangered in Belize. This species is considered rare across its range, with a regional population that has contracted to just Belize and the Peten region of Guatemala, and is now isolated from the closest, more southerly population in Panama (Berry et al., 2020). Belize currently hosts the largest known nesting population in Central America, with 13 known, active nests (Cawich, pers. comm.). *F. deiroleucus* was reported to have declined by approximately 30% from 1997 to 2009, with declines in both territory occupancy and fecundity – the latter suggesting a potential for reduced fitness as a result of inbreeding (Berry et al., 2010). The species is still considered to be in sharp decline, though due to its large range, which encompasses the massive forest blocs in the Amazon, is rated as Near Threatened globally. Whilst it can adapt to foraging in the human landscape, it is an obligate cliff nester, preferring karst cliffs overlooking undisturbed tropical broadleaved forest. In Belize, observations indicate that these nest sites are at threat from black vultures, which have adapted fully to both urban and rural landscapes, increasing in numbers and expanding their nesting range to include the karstic nesting cliffs used by *F. deiroleucus*. The black vultures take over falcon nest sites and / or consume their eggs and young. With such a low population, and with limitation on nesting site availability, this is considered to be having detrimental impacts on an already pressured population. Nesting cliffs are also potentially threatened by noise pollution and disturbance from quarrying activities (Urbina, pers. comm., Cawich, pers. comm.).

Thinning of eggshells, identified in the decline of several raptor species as a result of pesticide accumulation in the landscape, may also be an issue. Analysis of egg shell fragments for DDE from the Guatemala *F. deiroleucus* population show similar levels of contamination as peregrine falcons (*Falco peregrinus*), and demonstrating the associated 10% thinning of egg shells, reducing hatch success (Peter et al., 1986; Arrona-Rivera et al., 2016; Cawich, pers. comm.) Whilst the species is rated as globally Near Threatened, based on its population in South America (Birdlife International, 2016), if current trends continue, the remaining Central American population may occur in less than a decade (The Peregrine Fund, 2020). Despite efforts to reinforce the population through an introduction of 56 genetically similar

individuals from Panama, with released birds successfully entering the reproductive population, numbers have not increased significantly over recent years (Berry et al., 2020).

Bubo virginianus, whilst globally relatively common, is represented in Belize as a Yucatan endemic subspecies (*B. v. mayensis*), and considered the rarest of the eleven owl species resident in Belize (Jones and Meerman, 2015). 90% of the nesting population is thought to occur in north eastern Belize (Corozal District and the northern cayes), where it is locally common (Jones, pers. comm.). In Mexico, it is thought to be declining, and rates as 'threatened' (SEMARNAT, 2019), primarily from habitat loss, but also as a species targeted by the wildlife trade (Enriquez and Vasquez Perez, 2015). It is adaptable to living in human landscapes, though this leads to persecution from a combination of cultural superstition surrounding owls, and protection of livestock. Whilst it is thought to be extending its range southwards in Belize, its very small population, persecution as a result of superstitious beliefs, and the clearance of littoral forest for coastal and caye development places this species at high risk of extinction. Only 11% of the species range is thought to fall within protected areas (Jones and Meerman, 2015), and with Belize being at the southern-most part of its range, and with it being present in such low numbers, with uncertainty as to whether there is sufficient interchange with the Mexican population it would be very slow to rebound if the population falls too low, with concerns for long term viability (Workshop Output, 2020).

The nationally Endangered red-tailed hawk (*Buteo jamaicensis*) is known to breed in open submontane pine forest restricted to the Mountain Pine Ridge Forest Reserve. Rarely seen, and therefore thought to be present in very low numbers, it is unknown whether the population is isolated as a sub-species, or connected to the population in western Guatemala. The key threat to its viability is habitat degradation as a result of pine bark beetle infestation impacts and an increased frequency of fire. Whilst nesting within a protected area, the designation as a Forest Reserve supports sustainable logging activities, which may overlap with the nesting sites. There are also concerns of future dereservation and development of the pine ridge, which would put this species at risk of extinction nationally.

Belize supports a small nesting population of the osprey (*Pandion haliaetus*), represented by the resident sub-species *P. h. ridgwayi,* which is considered nationally Endangered. Whilst there is an annual migration of osprey (*P. h. carolinensis*) from North America each year that pass through the area, *P. h. ridgwayi* is uncommon, and is restricted to the east coast of the Yucatan Peninsula and islands in the western Caribbean. Nesting on cayes along the coast, on the atolls and in coastal lagoons, this species is highly vulnerable to coastal and caye development, though it has been able to adapt to using human structures to support its nests in some places. As a large raptor, it also faces persecution, and when nesting in or near caye and coastal-based communities, has been targeted by youths with slingshots (Phillips, per. comm.). The anthropogenic impacts are exacerbated by the increasing intensity of tropical storms, resulting in potential for mortality and structural damage to nesting trees, with concerns that should the population fall too low, it will be very slow to rebound, with limited resilience to additional impacts.

Ten raptors are considered Vulnerable as a result of the combined impacts of habitat loss, habitat degradation and persecution. Several of these are highly specialized in their food requirements – the snail

kite (*Rostrhamus sociabilis*), and hook-billed kite (*Chondrohierax uncinatus*) are both adapted to diets consisting only of snails, and therefore vulnerable to changes in freshwater ecosystems such as pollution or altered waterflow. *R. sociabilis* is dependent on freshwater snails, particularly apple snails in the Crooked Tree wetland system. Any ecological disaster in this wetland would be a significant impact to Belize's population, as seen with the contamination of the New River in 2019, which resulted in large scale mortality of apple snails, limiting food availability (Ruano, pers. comm.). *Chondrohierax uncinatus* is also highly dependent on snails, though on terrestrial species. Belize represents only a small proportion of the broad distribution of this species but is significant at the regional level as there are still large tracts of intact tropical broadleaved forest under protection, providing secure breeding habitat. Belize is also an important part of the migration route, hosting the largest observed migratory population as it moves through Central America. Snails are one the first taxa to disappear from changes in the environment, greatly impacting kites that prey on them. The risk level to both these snail-dependent species may then increase with increasing climate change impacts on their food sources (particularly decreased precipitation and increased droughts), and anthropogenic impacts on their habitats (Phillips, pers. comm.).

The common black hawk (*Buteogallus anthracinus*) is also restricted by its dietary preference for crabs, being found primarily in the coastal zone, utilizing coastal and estuarine habitats for nesting and foraging. Increasing coastal and caye development is having local impacts on the population, though this species is able to adapt to an urban environment as long as its food source is available. It's increasing presence in these urban areas, however, has the potential to increase persecution, particularly for sport from sling shot and pellet gun users. In recent years, there have also been reports of illegal capture for falconry, with birds entering rehabilitation with clipped wings and tethers (Belize Bird Rescue, pers. comm.).

The black-collared hawk (*Busarellus nigricollis*) is also a habitat specialist, but of freshwater. This species is primarily piscivorous, so reliant on lagoons and pools of central northern Belize. Whilst 90% of total distribution for this species is in South America, Belize is important in the maintenance of the northern population. The national population is based primarily in the Crooked Tree wetland system and New River, though little is known about numbers. A eutrophication event in the New River in 2019 resulted in a fish die-off that impacted the entire food chain, demonstrating the vulnerability of this species to impacts on water quality, especially as Belize urban and agricultural landscapes continue to expand, agrochemical use increases and black and grey water waste management is insufficient to cope with the waste from current and future populations.

Two species are habitat specialists of the upland pine savanna – the stygian owl (*Asio stygius*) and the swallow-tailed kite (*Elanoides forficatus*). *Asio stygius* has a fragmented global population that stretches from northern Mexico to South America and is considered a rare resident in Belize. Belize represents the northern extent of the breeding range of this strictly Neotropical species, but is thought to be isolated from other populations, being recognized as a regional sub-species (*E. f. yetapa*), with the potential for reduced genetic variability and flow into the population (Phillips, pers. comm.). The largest national breeding population is reported from sub-montane pine forest, with a small number of breeding records

from lowland pine forests. Only 32% of the species range falls within protected areas (Jones and Meerman, 2015), increasing concerns for long term viability. *Elanoides forficatus* migrates through Belize in relatively large numbers, though the global population is thought to be declining rapidly (Phillips, pers. comm.). Both these species are impacted by ecosystem degradation of the upland pine ecosystems by logging, pine bark beetle and the increasing frequency of fire. There are also concerns that whilst this ecosystem is protected within the Forest Reserve, logging concessions may overlap critical nesting and roost sites - direct observations of logging of roost sites of *A. stygius* have been observed (Phillips pers. comm), and there have been past dereservations of portions of the range area, with land use change resulting in loss of habitat. There have also been proposals for potential infrastructure development, including wind and solar farms, in sub-montane pine forest areas that would result in increased impact to the ecosystems.

The remaining four vulnerable species (crested owl (*Lophostrix cristata*), king vulture (*Sarcoramphus papa*), bicolored hawk (*Accipiter bicolor*) and black hawk-eagle (*Spizaetus tyrannus*)) are all associated with tropical broadleaved forest. *Lophostrix cristata* has a very restricted range in Belize, with over 91% of the population thought to be in inaccessible forests of the southern Maya Mountains and foothills, protected within the National Protected Areas System (Jones and Meerman, 2015). Restricted to intact, undisturbed mature broadleaf forest, this species is considered stable, and with little if any overlap with the human landscape, it is not considered to be threatened by persecution. However, there are concerns of encroachment into the remote Chiquibul forest by agricultural incursions from Guatemala, resulting in disturbance, illegal deforestation for cattle farming and agriculture, and the potential take of nestlings for the illegal wildlife trade (Phillips, pers. comm.).

The bicolored hawk (*Accipiter bicolor*) is a non-soaring forest raptor that relies on habitat connectivity for movement and maintaining viable populations. Belize is important in the maintenance of the northern range population, which may be a unique sub-species. The population is currently considered stable, though it is also acknowledged that there is limited data on the population size and distribution.

Both *Sarcoramphus papa* and *Spizaetus tyrannus* are large, wide-ranging and highly visible species, though with low abundances. *S. papa* is reported throughout the entire country, though it is thought to be restricted in its choice of nesting sites to upper elevations. As a large vulture with a foraging range that includes farmlands, it is shot on sight by farmers on the suspicion that it kills young calves (Bech, pers. comm.). There is also concern that vultures coming to carcasses may also be poisoned deliberately by farmers (Meerman, pers. comm.). *S. tyrannus* has been observed across all areas from Crooked Tree southwards, and whilst requiring large, intact forested areas, it also uses more open, degraded habitat than the other hawk-eagles. This leads to human conflict, and higher levels of persecution. The combination of increasing deforestation, reduced forest connectivity, degradation of forest ecosystems by fire and increasing overlap with the human landscape (and therefore increased risk of persecution) raises concerns of the potential for rapid population decline of both these species in the future.

The aplomado falcon (*Falco femoralis*) is included on the list as of Least Concern as a precautionary measure. This species has a broad geographic distribution and flexible habitat preferences, adapting from its natural habitat of lowland pine savanna and wetlands to expansion into the agricultural landscape. The population is thought to be a regional sub-species, though the systematics are uncertain. Key threats are to the habitat, with habitat loss to agricultural and urban expansion, and habitat degradation as a result of the increased frequency of fires. It is also thought to be susceptible to pesticides, with exposure from hunting prey in agricultural areas.

3.6 SPECIES GROUP 4: COASTAL / CAYE / WETLAND SPECIES[4]

30% (twenty-one) of the birds on Belize's threatened species list are Coastal, Caye and / or Wetland species, the majority of which rely on mangrove cayes, beaches and sand bars as nesting sites. These slightly higher elevation coastal and caye sites are often the primary targets for increasing coastal development, to meet demands for scenic views and access to the sea, particularly for tourism. In a small country highly dependent on its coastal tourism, this makes these key habitats extremely vulnerable to disturbance.

FIGURE 13: PRIMARY, SECONDARY AND TERTIARY THREATS FOR COASTAL / CAYE / WETLAND SPECIES OF NATIONAL CONCERN

Eight species are rated as Critically Endangered in Belize. All are significantly impacted by habitat loss, primarily from coastal and caye development, but also from increased tropical storm activity and other climate change impacts (Figure 13).

Seven of these species are ground nesting terns, five of which (brown noddy (*Anous stolidus*), roseate (*Sterna dougallii*), sooty (*Onychoprion fuscatus*), least (*Sternula antillarum*) and sandwich (*Thalasseus sandvicensis*) terns) nest in dense colonies on sandy beaches and have high site fidelity. Whilst terns are generally widespread globally, the number of nesting colonies in the Caribbean / Mesoamerican region has declined to a handful of known nesting sites. In Belize, the known historical breeding sites of *A. stolidus* have been developed for tourism or fishing camps, and have been abandoned by the birds following disturbance, though there may be remote cayes that still support nesting colonies. The other species, whilst still reported as nesting in the Tobacco Range, are in much lower numbers than historical records report.

The bridled tern (*Onychoprion anaethetus*) and the very rare collared plover (*Charadrius collaris*) are both solitary nesters using gravel beaches / stone cayes. All are very vulnerable to any form of human disturbance (including unregulated tourism and egg collecting) and to habitat loss from coastal / caye

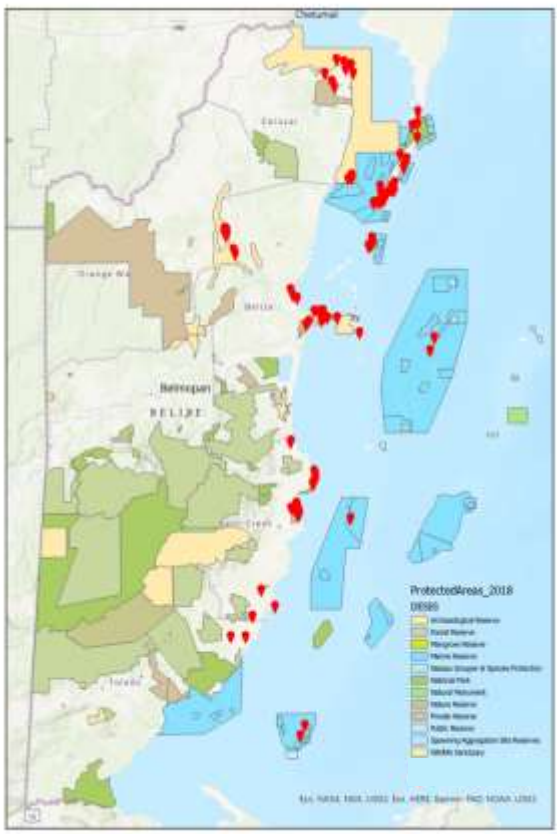
[4] *F. Canto (E-bird reviewer), L. Jones (BBC), L. Santoya (SACD), M. Guifarro, R. Martinez (E-bird reviewer), K. Forman (HCMR), E. Greer, M. Tellez (CRC), R. Castellanos. Core Team: S. Carillo (Forest Department), Z. Walker (Consultant)*

development. Any disturbance occurring at the wrong time can result in the eradication of entire colonies and the loss of key nest sites. The vulnerability of these seven ground-nesting species is exacerbated by increasing sea level rise, already leading to the inundation and loss of low-lying beaches and cayes, and by the increasing intensity of storms, which redistribute or remove cayes entirely. There is currently insufficient knowledge of tern nesting sites in Belize on which to base management decisions, putting any potential or existing colonies at risk.

The reddish egret (*Egretta rufescens*), a colony nester that uses mangrove cayes, is limited to three known nesting sites in northern Belize between Ambergris Caye and the mainland, and in the associated northern coastal lagoon systems. Northern Belize is at the southern-most part of the global breeding range of this species, and is significantly threatened by unregulated coastal / caye development. Many of the cayes associated with historical nesting colonies have either been cleared for caye development in the past, with mangroves removed and the colonies no longer active (Cayo Rosario) or are the focus of potential future development plans (Cayo Frances). Whilst the cayes lie within a protected landscape (the Northern Belize Coastal Complex), protection is limited to the water and doesn't include the cayes. There is a focus on improved species monitoring and management under the local NGO Sarteneja Alliance for Conservation and Development (SACD) as part of a regional coordinated effort, with high nesting success and 253 adults of both normal and white phase birds reported in 2020 (SACD, 2020). However, two of the three key nesting colonies (Cayo Frances and Round Caye) are being actively targeted for development. Development of Round Caye would impact more than 70% of the known nesting population in Belize (Santoya, pers. comm.). The mangrove cayes are also vulnerable to hurricanes, which can destroy both nesting and foraging habitat, with very slow recovery if a shift to a new nesting caye is possible. Unregulated tourism during the nesting season would potentially have the same impact.

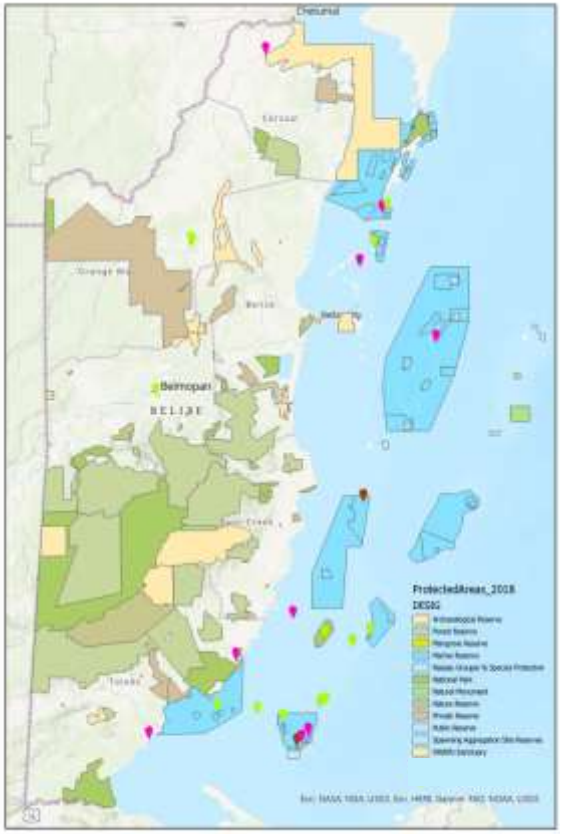
One coastal / marine species is rated as Endangered – the iconic white-phase red-footed booby (*Sula sula*). There is only one known nesting colony in Belize, located on Half Moon Caye Natural Monument on Lighthouse Reef Atoll, the furthest caye from the mainland. Half Moon Caye was declared a Crown Reserve in 1928, and is now effectively protected by the Belize Audubon Society, with active conservation management to reduce threats. Whilst the nesting colony is vulnerable to tropical storms, it appears to be very resilient, surviving even Category Five hurricanes since it was first reported in 1864 (Salvin, 1864). Whilst reports indicate that the colony size was stable between 1958 and 1991, anecdotal information suggests that the colony is half the size it was originally, before the 1931 hurricane (Cross, 1992), and in 1961, it was almost completely decimated by Hurricane Hattie, with significant impacts to the littoral forest, reducing the average height from 8 m to 4.5 m, and moving the littoral forest edge back by 23 m (Stoddart, 1963). Despite this, the colony continues to thrive, with recent estimates placing the population at approximately 3,700 birds (BAS, 2015).

Seven species are considered vulnerable – four of these – roseate spoonbill (*Platalea ajaja*), brown pelican (*Pelecanus occidentalis*), magnificent frigatebird (*Fregata magnificens*) and the wood stork (*Mycteria americana*) – are colony nesters, using mangrove cayes. with. As with the reddish egret, there are only a few known nesting colonies, all of which are vulnerable to disturbance, and at threat from coastal and



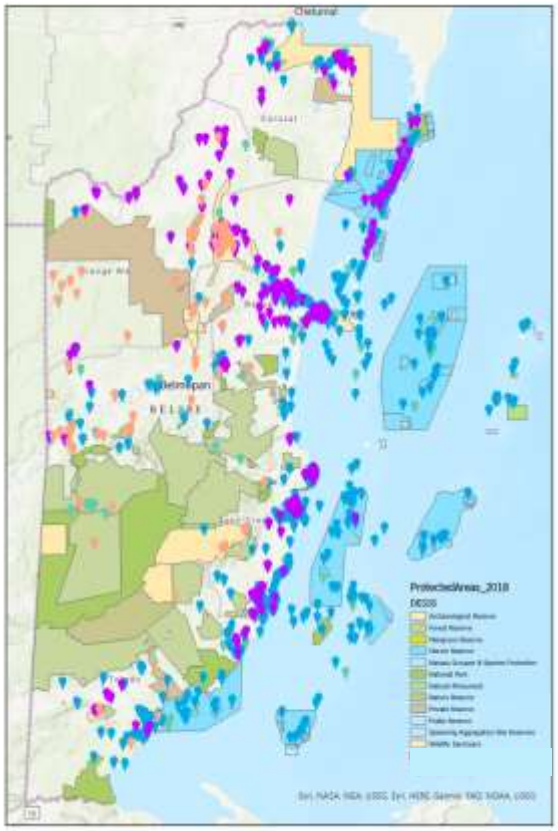
Critically Endangered

- Reddish Egret (*Egretta rufescens*)



Critically Endangered

- Brown Noddy (*Spizaetus ornatus*)
- Roseate Tern (*Sterna dougallii*)
- Sooty Tern (*Onychoprion fuscatus*)



Vulnerable

- Magnificent Frigatebird (*Fregata magnificens*)
- Brown Pelican (*Pelecanus occidentalis*)
- Roseate Spoonbill (*Platalea ajaja*)
- Agami Heron (*Agamia agami*)

FIGURE 14: DISTRIBUTION OF KEY COASTAL / CAYE / WETLAND SPECIES OF NATIONAL CONCERN (eBird, DOWNLOADED 2020)

caye development, as well as impacts from hurricanes and sea level rise. Key nesting colonies of *P. ajaja* have disappeared over recent years from Cayo Rosario, Shipstern Caye and Savanna Caye as a result of human disturbance and / or development, but this species is more adaptable than *E. rufescens*, as it is able to persist in smaller colonies on cayes in the northern lagoon systems. The population is also thought to be reinforced by a two-way flow of birds from Mexico.

In Belize, *P. occidentalis* and *F. magnificens* form multi-species nesting colonies together on mangrove cayes, though these colonies are not common and, as with the previous species, are very vulnerable to disturbance from excessive visitation, caye development, or in the case of Man O' War caye, from erosion of the nesting caye itself. These species are reliant on the health of the coastal fish populations, with some individuals known to become habituated to fish traps and fish cleaning stations, where they forage on scraps and by-catch thrown away by fishers. There are multiple incidences of rescued pelicans, frigatebirds, terns and other coastal species that become unintentional bycatch, having ingested fishing hooks.

Many of the herons and egrets forage in the shallow coastal lagoons along the northeast coast of the mainland and northern Ambergris Caye after disbursing from nesting sites. In dry season, they then congregate in large numbers in the wetlands at Crooked Tree lagoon, along with *M. americana* and a non-colony nesting wetland bird, the Jabiru (*J. mycteria*).

J. mycteria is considered to be uncommon but stable to increasing, being seen consistently in large numbers at Crooked Tree. However, the Central American population of this species is thought to be genetically isolated from that of South America, resulting in limited gene pool availability for long term viability (Figueroa, 2005). It is also possible that a large proportion of the regional population may travel to Belize specifically to forage in the Crooked Tree lagoon when the water drops to the required depth in the dry season. Reliance on a small number of bodies of water such as Crooked Tree increases the vulnerability of the population to potential ecosystem degradation or unseasonal shifts in rainfall patterns, though shrimp farms in the coastal zone are also opening up new foraging habitat for this species (though this leads to potential conflict with aquaculturalists). Nests are generally in large trees in savannas or other open areas, with only one nest known from inside a protected area - in the newly declared North-eastern Biological Corridor (Castellanos, pers. comm.). This limited protection of nest sites, coupled with increasing frequency of savanna fires, removal of large nesting trees and agricultural and urban expansion into the lowland pine savannas may result in a decrease of this resident species in Belize over time.

The agami heron (*Agamia agami*) and Wilsons plover (*Charadrius wilsonia*) are both listed as Vulnerable. *A. agami* is a colony nester associated with undisturbed freshwater systems in lowland forested areas, foraging in still pools in creeks. The population is limited primarily to rivers, creeks and pools in forested areas, and is thought to have shrunk over the last ten years as a result of deforestation outside of the National Protected Areas System. Only a few nesting colonies are known in Belize, and at least one has been abandoned as a result of excessive visitation. This species is rated globally as Vulnerable by IUCN (IUCN, 2020) and is listed as in need of special protection (conservation dependent) in Mexico (SEMARNAT, 2019), but the importance of Belize's population to the regional and global populations is unknown.

Charadrius wilsonia is present in low numbers in Belize and considered uncommon. It is closely associated with coastal areas, nesting on sandy beaches on the cayes and mainland. Nesting sites come under heavy pressure from coastal and caye development, and disturbance from beach recreation, resulting in contraction of its range.

Four other caye nesting species are listed as of Least Concern (white ibis (*Eudocimus albus*), tricolored heron (*Egretta tricolor*), great egret (*Ardea alba*) and boat-billed heron (*Cochlearius cochlearius*), but are flagged as a precautionary measure as there is limited information on their nesting sites in Belize, and as cayes across the coastal zone are increasingly targeted for development, with the potential to wipe out whole colonies. One species, the snowy egret (*Egretta thula*) is flagged as Data Deficient.

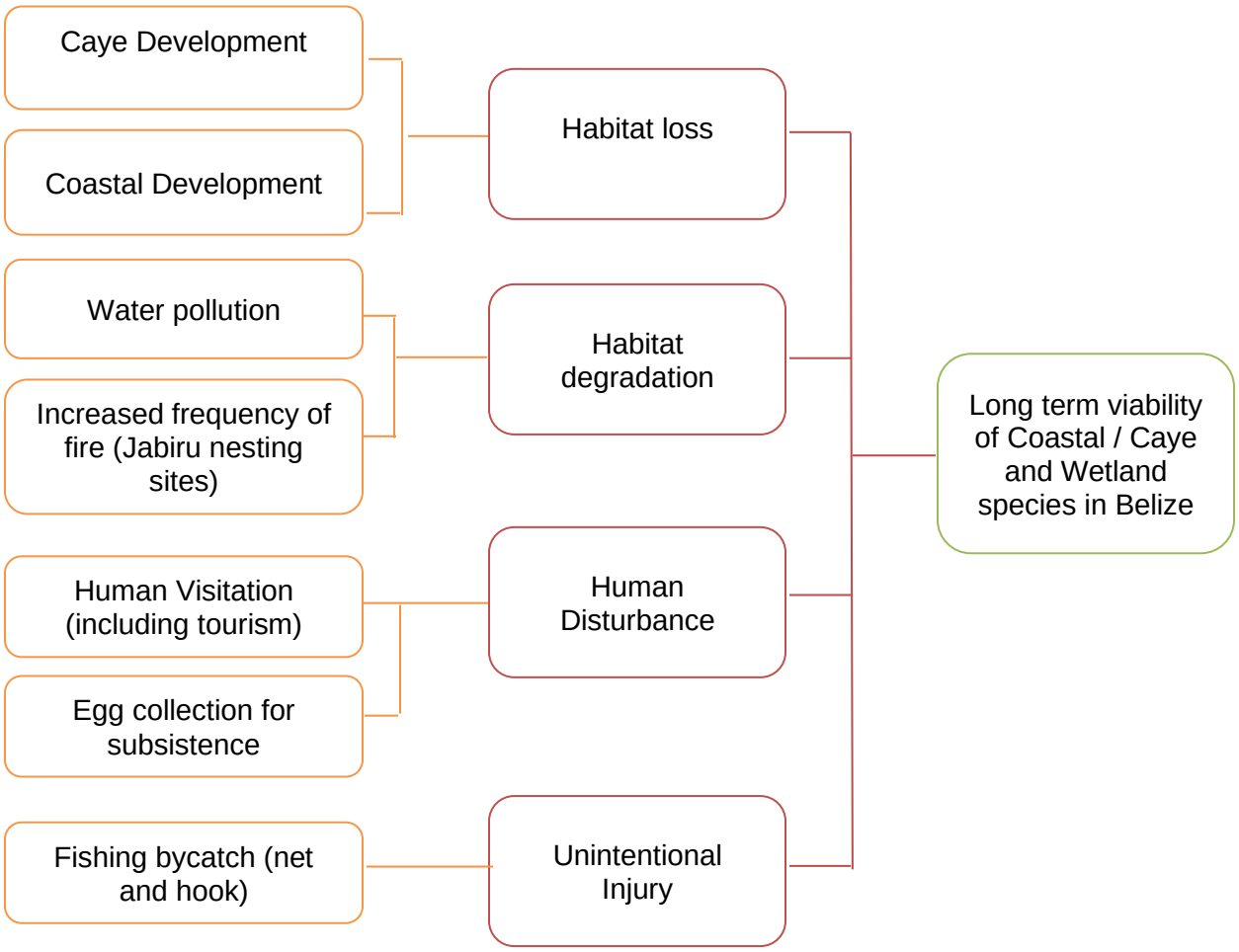


FIGURE 15: THREAT ASSESSMENT FOR COASTAL / CAYE / WATERBIRD SPECIES

COASTAL / CAYE / WATERBIRD SPECIES: KEY RECOMMENDATIONS:

Habitat Loss

- Identification, mapping and protection of the key CR or EN species colony nesting cayes and beaches that still persist.
- Integration of colony nesting sites into mapping by Lands Information Centre, and the Environmental Impact Assessment / Environmental Compliance Plan process to flag potential coastal and caye development threats to these sites
- Integrate mapping and protection strategies into the revision of the Integrated Coastal Zone Management Plan
- Support initiatives for strengthening protection of northern coastal lagoons through completion of expansion of Corozal Bay Wildlife Sanctuary (started under the MCCAP project), land purchase or other mechanisms

Habitat Degradation

- Strengthen management of Crooked Tree Wildlife Sanctuary and other important wetlands in Belize's National Protected Areas System.
- Strengthen fire management of lowland pine savannas at both protected area and national level, particularly around jabiru nesting sites
- Support reduction of agro-chemicals and poisons in the landscape through the Pesticide Control Board and Department of the Environment

Human Disturbance

- Improve awareness of protected area managers, tour guides and the general public of tourism best practices around bird colonies and bird foraging areas
- Improve awareness in coastal and caye fishing communities of the Wildlife Protection Act and fines for disturbance of nest sites and extraction of eggs

Unintentional Injury

- Improve awareness of the importance of hook and net retrieval during fishing activities and coastal clean-ups
- Improve awareness of protected area managers, fisherfolk and sport fishing guides of the potential injuries that can result from feeding and habituating seabirds, and encourage best practices
- Disseminate information on what to do if a bird is accidentally hooked, and emergency contact details for reporting injured seabirds

3.7 SPECIES GROUP 5: ENDEMICS AND SPECIALISTS[5]

This group pulls together those threatened species that are either endemic to Belize or the region, or are highly specialized in their habitat requirements. All are threatened by habitat loss and habitat degradation, and in some cases y increasing human disturbance (Figure 16).

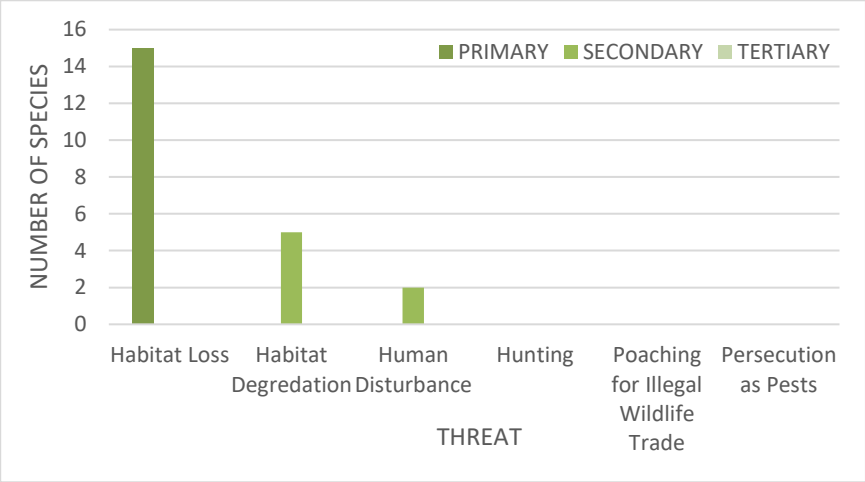


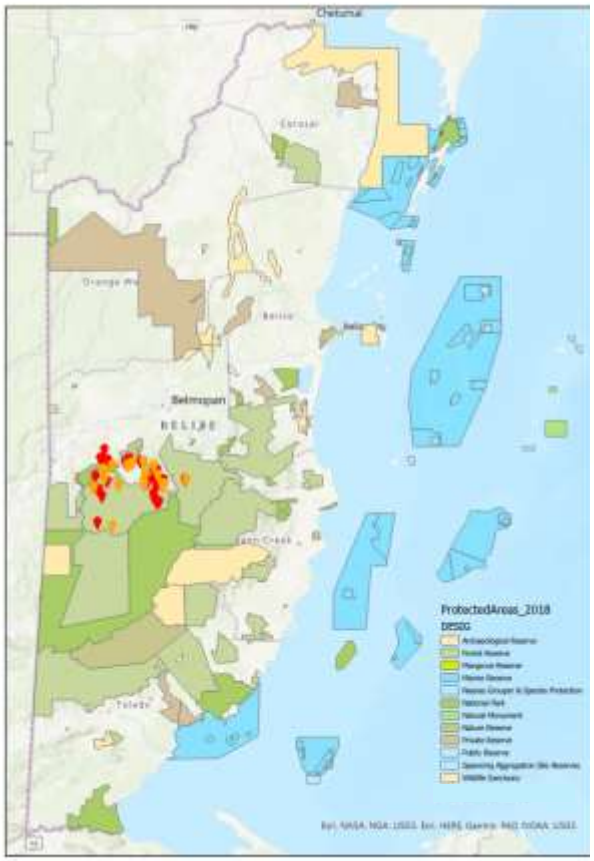
FIGURE 16: PRIMARY, SECONDARY AND TERTIARY THREATS FOR ENDEMIC / SPECIALIST SPECIES OF NATIONAL CONCERN

Two species are considered Critically Endangered – the greater pewee (*Contopus pertinax*) and the red crossbill (*Loxia curvirostra*). In Belize, *C. pertinax* is limited to the high elevation open pine woodland of the Mountain Pine Ridge, with tall mature pine trees providing the structure it requires for foraging, with nesting occurring in adjacent riparian vegetation. Whilst this species is doing well globally, the population in Belize occurs at very low densities, is isolated, and has no connectivity to similar habitat, and is therefore at high risk of national extinction. This risk is increased by habitat degradation in the Mountain Pine Ridge area as a result of pine bark beetle infestations, resulting in mortality of 80% of the pines, and increasing frequency of fires (Jones, pers. comm.)., the Mountain Pine Ridge population.

The red crossbill is in a similar situation – the sub species in Belize (Type 11) is pine-dependent (and more specifically, thought to be dependent on a diet restricted to *Pinus patula tecunumanii* pine seeds) (Jones, pers. comm.). The regional population is resident in higher elevations from Guerrero (Mexico) and Belize, south to northern Nicaragua, though much of the upland pine forests outside Belize are being transformed into agricultural lands. In Belize, this species is thought to be restricted to higher elevations such as the Baldy Beacon area. As a potentially isolated population, it is vulnerable to even small disturbances.

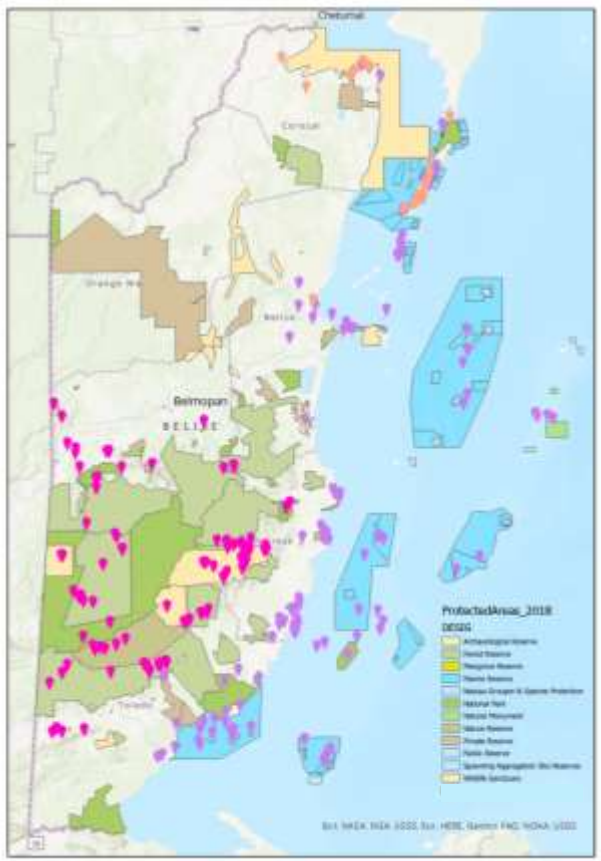
Twelve species are listed as Vulnerable, primarily as a result of low numbers, restricted in-country ranges and habitat specialization. One, the plumbeous vireo (*Vireo plumbeus*), is considered a near-endemic sub-species (*V. p. notius*), known from a small number of locations in the coastal and upper elevation pine/ oak savannas, broadleaved forests of the Maya Mountain foothills, and a small contiguous area in the Peten, Guatemala. The sedge wren (*Cistothorus platensis*) and

[5] F. Canto (E-bird reviewer), L. Jones (BBC), L. Santoya (SACD), M. Guifarro. *Core Team: Core Team: J. Meerman (IUCN / GITEC), S. Carillo (Forest Department), R. Garcia (NBIO), Z. Walker (Consultant)*



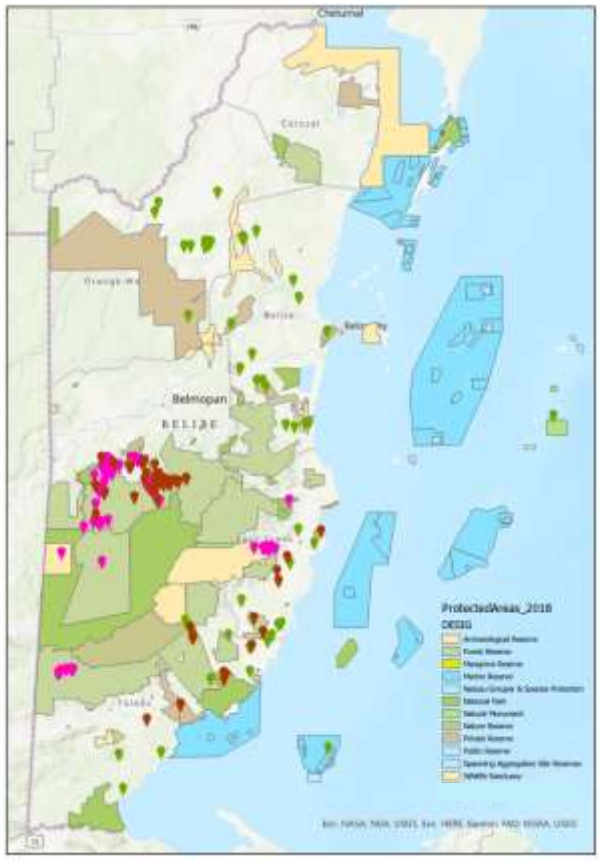
Critically Endangered

- Greater Pewee (*Contopus pertinax*)
- Red Crossbill (*Loxia curvirostra*)



Vulnerable

- Keel-billed Motmot (*Electron carinatum*)
- Yucatan Vireo (*Vireo magister*)
- Caribbean Dove (*Leptotila jamaicensis*)



Vulnerable

- Plumbeous Vireo (*Vireo plumbeus*)
- Sedge Wren (*Cistothorus platensis*)
- Grasshopper Wren (*Ammodramus savannarum*)

FIGURE 17: DISTRIBUTION OF KEY ENDEMIC / SPECIALIST SPECIES OF NATIONAL CONCERN (eBird, DOWNLOADED 2020)

grasshopper sparrow (*Ammodramus savannarum*) are also pine savanna specialists occurring in the pine savanna of both the Maya Mountains and the coastal plains. The sedge wren sub species *C. p. russelli* is thought to be endemic to Belize, with the next known population some 75 km to the west, in Guatemala, with no ecosystem connectivity linking the two. The range of *A. savannarum* overlaps with that of *Cistothorus platensis* (Figure 17), but it is also reported from the pine savannas of northern and central Belize. The upland pine forests and savannas have been heavily impacted by pine bark beetle, and all pine savannas are being degraded by logging (both legal and illegal), the increasingly frequent fires and agricultural and urban expansion.

Three vulnerable species, the Yucatan vireo (*Vireo magister*), white-crowned pigeon (*Patagioenas leucocephala*), and have similar regional breeding ranges, stretching along the Yucatan coastline from Mexico to central Belize, though *P. leucocephala* is more frequently reported from the cayes in Belize (including the atolls), and also occurs on the Caribbean islands.

The Caribbean Dove (*Leptotila jamaicensis*), also a Yucatan endemic, is restricted to the Yucatan dry forest and littoral forest of north east Belize and Ambergris Caye. The black catbird (*Melanoptila glabrirostris*), with a similar range, is another mangrove / littoral forest specialist, is considered nationally Near Threatened, as a precautionary measure based on rapid habitat loss in the coastal zone a rating that aligns with its global rating (IUCN, 2020). However, this species is thought to be expanding southwards in Belize, and has been recorded inland in recent years, and therefore not considered Vulnerable at this time.

These three species are associated with littoral forest and mangroves, both ecosystems at high risk from coastal development, driven by Belize's coastal and marine based tourism, an important component of the country's economy. Littoral forest, in particular, is considered at very high risk, being located on the most desirable coastal and caye ridges, with very little of the remaining ecosystem present in the National Protected Areas System. Mangroves, too, are considered under-represented within protected areas.

Six vulnerable species are associated with the interior of large tracts of undisturbed tall, humid broadleaved forest with good forest structure. The keel-billed motmot (*Electron carinatum*), black-throated shrike-tanager (*Lanio aurantius*), speckled mourner (*Laniocera rufescens*), lovely cotinga (*Cotinga amabilis*), strong-billed woodcreeper (*Xiphocolaptes promeropirhynchus*) and the singing quail (*Dactylortyx thoracicus*)

Two of these (*E. carinatum* and *D. thoracicus* (represented by the Yucatan subspecies *D. t. sharpie*)) are limited to primarily the Maya Mountains Massif and its foothills. *E. carinatum*, rated globally as Vulnerable (IUCN, 2020), is considered at risk of extinction in Mexico, and has not been reported from the adjacent border areas in Guatemala (eBird, 2020), suggesting the population is isolated. This species extends into the karst hillslopes in the Blue Creek area of Toledo District, south of Santa Cruz and the Rio Blanco. This population, however, is rapidly becoming isolated from the Maya Mountains by agricultural expansion, and being impacted by increasing clearance for agriculture.

C. amabilis is also reported from this outlying area, and has a wider range, occurring in both the Maya Mountains and the northern Belize Maya Forest block (Yalbac / Laguna Seca / Gallon Jug

properties) and Rio Bravo Conservation and Management Area. *L. aurantius*, *L. rufescens*) and *X. promeropirhynchus* are also found in this northern forested block. Whilst these properties protect a significant area of intact forest, recent hurricane impacts have degraded some of the forest structure, and, with much of the land lying outside the National Protected Areas system, the security of the forest cannot be guaranteed in the long term.

Even in the Maya Mountains Massif, the level of disturbance is increasing with logging roads (both legal and illegal) cutting into the forest and logging activities creating levels of disturbance that may be more than these species can adapt to, causing further contraction of their ranges.

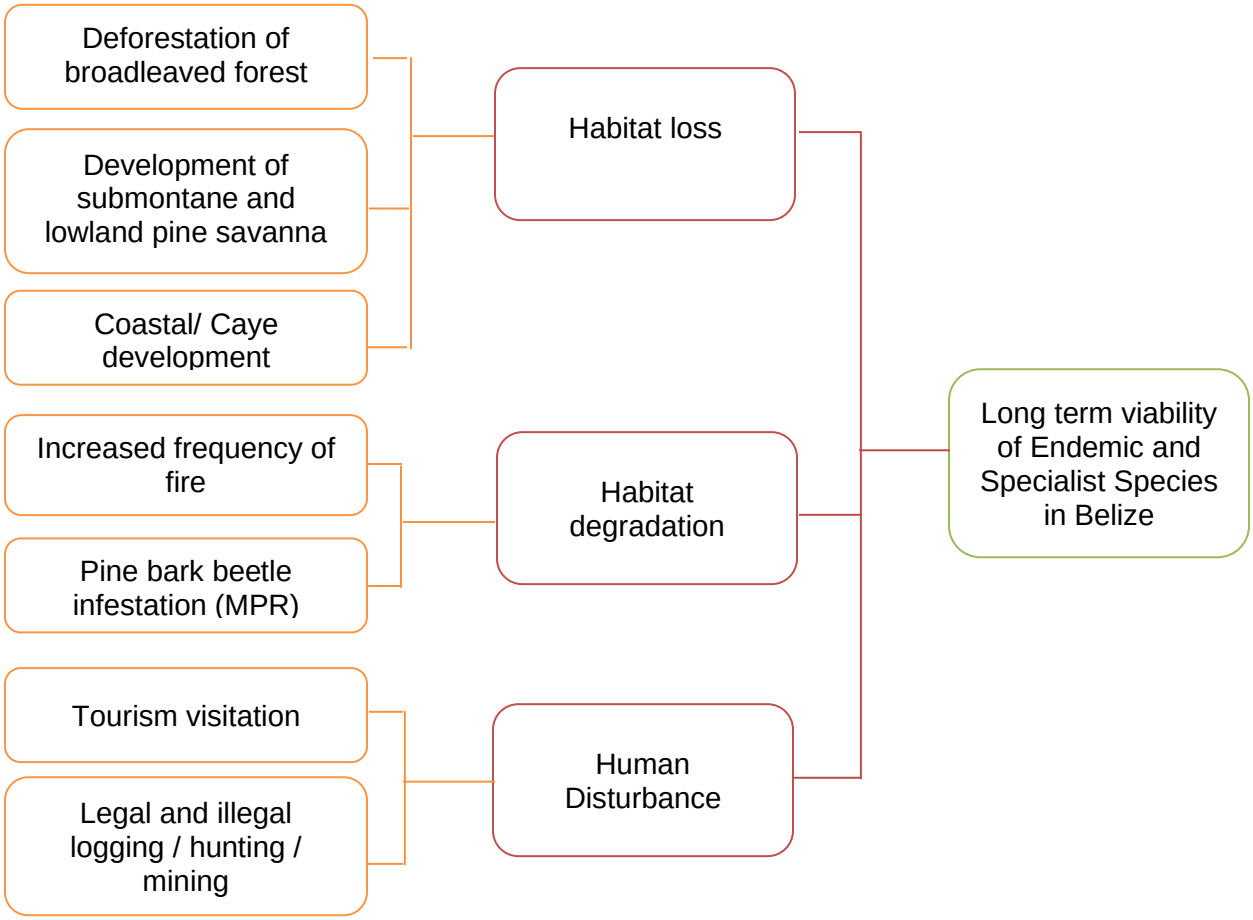


FIGURE 18: THREAT ASSESSMENT FOR ENDEMIC /SPECIALIST SPECIES

ENDEMIC / SPECIALIST SPECIES: KEY RECOMMENDATIONS:

Habitat Loss

- Strengthened protection and effective management of the National Protected Areas System
- Support initiatives to purchase large, private-held areas in key locations – Belize Maya Forest (Yalbac / Laguna Seca / Gallon Jug properties), Peccary Hills (Hwatchy property), and Maya Forest Corridor- to be placed in trust for conservation, towards the protection of key forest nodes and corridors
- Support initiatives for strengthening protection of northern coastal lagoons and mangroves through land purchase or other mechanisms
- Establish and protect the key national biological corridors

Habitat Degradation

- Strengthened fire management at both protected area and national level
- Effective management of MPR pine forests for reduction of threat of pine bark beetle

Human Disturbance

- Improve protected area manager and tour guide awareness of best practices around threatened bird species
- Ensure requirements for key threatened species are integrated into logging concession agreements where relevant
- Strengthen efforts at reducing illegal transboundary incursions in the Chiquibul from Mexico

3.8 SPECIES AT HIGHEST RISK

There are concerns that a number of avian species may be reaching a point where intervention will be important if Belize is to meet its national target C3: “Between 2016 and 2030, no species will become functionally extinct in Belize” (NBSAP, 2016). Eighteen species rate as Critically Endangered at the national level, with five of those considered in urgent need of interventions at the national level as a high priority to ensure populations do not continue to fall as a result of direct threats (Level One). For those at Level Two, species either occur primarily in protected areas, or strategies are limited by gaps in information, with no immediate identified threat impacting the populations. However, this should be reviewed as information becomes available that may elevate one or more of these species to Level One.

AT HIGHEST RISK (LEVEL ONE)

Scarlet macaw (*Ara macao*): Any unguarded nests are targeted by transboundary 'guacamalleros', with more than 50% of nestlings being lost each year across the border, heading for the illegal wildlife trade.

Yellow-headed parrot (*Amazona oratrix*) Targeted poaching of nestlings for the illegal national and international wildlife trade. It is thought that any nest not guarded during the nesting season will be poached (Muschamp, pers. comm.). Poaching is considered to have already reduced the population by 90% between the mid-1970's and mid 1990's (Birdlife International, 2020).

Reddish egret (*Egretta rufescens*): 70% of Belize's known breeding population of fewer 254 adults form a nesting colony each year on Round Caye (Santoya, pers. comm.). Round Caye is currently under threat of imminent development.

Orange-breasted Falcon (*Falco deiroleucus*): Restricted to thirteen active known nesting sites on cliff faces, 80% of which are in protected areas (Urbina, pers. comm.). The karstic limestone forests where this species occurs are very vulnerable to fires, with some nestlings being lost to smoke inhalation in 2020 season (Cawich, pers. comm.).

Crested Eagle (*Morphnus guianensis*): This species relies on the large intact Belize Maya Forest (the Yalbac / Laguna Seca / Gallon Jug properties), and the Rio Bravo Conservation and Management Area – all large, adjoining private properties, only one of which is under long-term protection as part of the National Protected Areas System. The others are under threat of sale for clear-felling for industrialized agricultural lands.

AT HIGHEST RISK (LEVEL TWO)

Accipitridae (Eagles): Two critically endangered eagle species (solitary and harpy) both nest in Belize, but in critically low numbers. Nest sites are within the Maya Mountains Massif, and are therefore protected from habitat loss, though are still impacted by habitat degradation, persecution and human disturbance.

Laridae (Terns): There is currently insufficient knowledge of tern nesting sites in Belize on which to base management decisions - a knowledge gap that is putting any potential or existing colonies at risk. This vulnerability is exacerbated by increasing sea level rise, which is already leading to a loss of low-lying beaches and cayes, and the increasing intensity of storms impacting the area, which remove or redistribute cayes entirely.

Great Horned Owl (*Bubo virginianus*): A Yucatan endemic sub-species that is disappearing from Mexico. There is little information on this species, but it is thought that 90% of the population is in Corozal District or Ambergris Caye, outside the National Protected Areas System.

IV. CONCLUSIONS AND RECOMMENDATIONS

Belize has an estimated 590 avian species, including migrants and incidentals / vagrants, with 574 recorded reliably year after year (Jones, 2003), considered part of Belize's biodiversity. Some of these species are residents, others are migrants that appear on an annual basis to either pass through or become temporary resident in Belize. This consultancy looked specifically at the assessment of resident species, their current status and the threats that are impacting their populations, with recommendations for improving their future viability.

With its low populations density and its large, intact forested blocks (the upland plateau and foothills of the Maya Mountains Massif to the west, the lowland Belize Maya Forest (Yalbac / Laguna Seca / Gallon Jug properties) and Rio Bravo area to the north, and the National Protected Areas System, with its high level of ecosystem representation), Belize has been successful in ensuring that it has been able to retain many avian species that have declined or even disappeared in other countries in the region. However, there are a number of critical gaps in the maintenance of at risk bird species in Belize:

- the large forested blocks of private lands are not secure in the long term, with potential for wide-scale clearance for industrialized agriculture and reduction of connectivity within the transboundary Selva Maya forest.
- there is an urgent need for the revision and strengthening of the Wildlife Protection Act to provide stronger legislative support for species protection.
- species protection is not fully integrated into Government priorities, with limited budget allocation.
- high priority areas for relevant at-risk species need to be integrated into national land use planning and the integrated coastal zone management plans.

Belize's National Threatened Avian Species List provides a critical indicator of the health of the seventy avian species identified as at risk of disappearing from Belize. A number of cross cutting and specific strategies have been identified to improve the long term viability of these species in Belize.

CROSS CUTTING STRATEGIES

- Revision and strengthening of the Wildlife Protection Act, with integration of the National Threatened Avian Species List, and increased penalties for offences.
- Strengthened protection and effective management of the National Protected Areas System.
- Support of initiatives to purchase large, private-held areas in key locations - Belize Maya Forest (Yalbac/ Laguna Seca / Gallon Jug properties), Peccary Hills (Hwatchy property), Maya Forest Corridor) and northern coastal lagoons - to be placed in trust for conservation, towards the protection of key forest nodes and corridors.
- Establishing and protection of key national biological corridors.

- Identification, mapping and protection of the key coastal bird colony nesting cayes (CR and EN species) that still persist, with integration into the National Protected Areas System.
- Developing Species / Species Group Conservation Plans for Critically Endangered and Endangered Species, with species specific strategies for improved long term viability.
- Integration of the National Threatened Avian Species List into land use decision making and the Environmental Impact Assessment / Environmental Compliance Plan process, and strengthening of NEAC member recognition of Belize's threatened species.
- Integration of mapping and protection strategies for key coastal bird colony nesting sites into the revision of the Integrated Coastal Zone Management Plan.
- Provide protection in Environmental Compliance Plans for key threatened species nesting, foraging and roosting sites in planned large, private development / agricultural projects through the Environmental Impact Assessment process.
- Integration of threatened species into decision–making by the mining authority on issuing permits for quarrying and dredging.
- Integration of nationally threatened Critically Endangered and Endangered species into the National Biodiversity Monitoring Plan and engagement of protected area managers in monitoring of critically endangered and endangered species across the protected landscape / seascape.
- Address identified information gaps through monitoring and research both within and outside protected areas.

Habitat Degradation

- Surveillance and enforcement for illegal logging in identified key nesting and roosting sites.
- Integration of known nesting sites into logging concession plans and agreements where relevant.
- Strengthened fire management at both protected area and national level, with targeted fire management at key yellow-headed parrot, solitary eagle and critically endangered pine forest specialist nesting sites.
- Effective management of submontane pine forests for reduction of the threat of pine bark beetle infestation.
- Strengthened management of Crooked Tree Wildlife Sanctuary and other important wetlands in Belize's National Protected Areas System.
- Support initiatives towards the reduction of agro-chemicals and poisons in the landscape through the Pesticide Control Board and Department of the Environment.

Hunting

- Review of level of protection for national Critically Endangered and Endangered avian game species in Wildlife Protection Act, and increased penalties for illegal hunting.
- Develop and implement national hunting permit system and traceability throughout the game meat supply chain.
- Strengthen public outreach and awareness on hunting legislation, hunting seasons and permitted species, and the Wildlife Protection Act.

Illegal Wildlife Trade

- One-year investment in issuing captive parrot permits under a grandfather clause for those parrots already in captivity, followed by zero-tolerance enforcement of laws protecting parrots.
- Strengthen public outreach and awareness on the Wildlife Protection Act, and legislation relevant to captive parrots and other species.
- Strengthen efforts at reducing the illegal transboundary trade of parrots to Guatemala and Mexico, through capacity building of border enforcement authorities for recognition of wildlife crime, and increased transboundary communication and collaboration with the relevant authorities.
- Support and strengthen rehabilitation and release of key confiscated / rescued avian species.
- Extraction of identified at-risk nestlings (yellow-headed parrots / scarlet macaws) for captive rearing and pre-release husbandry as part of protected area / rehabilitation partnerships, where applicable and where approved by the relevant authority.
- Ensure clear guidelines for display of raptors that ensure activities do not encourage illegal opportunistic take.

Human Disturbance

- Improve awareness of protected area managers, tour guides and the general public of tourism best practices around bird colonies, waterbird flocks and foraging areas, and other threatened bird species.
- Improve awareness in coastal and caye fishing communities of the Wildlife Protection Act and fines for disturbance of colony nest sites and extraction of eggs.
- Strengthen efforts at reducing illegal transboundary hunting, logging and agricultural incursions into the Chiquibul forest from Guatemala.

Persecution

- Improve farmer awareness of the benefits of raptors in reducing pests.
- Address cultural superstitions resulting in targeting of owls.

Unintentional Injury

- Improve awareness of the importance of hook and net retrieval during fishing activities and coastal clean-ups.
- Improve awareness of protected area managers, fisherfolk and sport fishing guides of the potential injuries that can result from feeding and habituating seabirds, and encourage best practices.
- Disseminate information on what to do if a bird is accidentally hooked, and emergency contact details for reporting injured seabirds.

NEXT STEPS

At the national level, the next key steps include implementation of high priority recommendations:

- Dissemination of the National Threatened Avian Species List to relevant authorities and protected area co-managers.
- Integration of the National Threatened Avian Species List into the revised Wildlife Protection Act.
- Mapping key known nesting / roosting / foraging sites of CR and EN species and a mechanism for integration in national planning that retains protection of information on the location of sites until threats are identified.
- Integration of the National Threatened Avian Species List into the Environmental Impact Assessment / Environmental Compliance Plan process, and strengthening of NEAC member recognition of Belize's threatened species.

The planning process brought bird experts together from across Belize, bringing to the table information on past and ongoing initiatives, and providing space for discussion and identification of information gaps and defining future research and monitoring needs. This includes:

Ongoing Activities

- Ongoing monitoring and protection of submontane pine forest / savanna bird species by Wolf Creek Foundation in the Bull Run privately protected area

- Wolf Creek Foundation management of orange-breasted falcon

- Belize Bird Conservancy facilitates yellow headed parrot nest monitoring and protection, Hawk Watch and Raptor Certification program, and educational outreach.

- Friends for Conservation and Development provide protection and monitoring for scarlet macaw nests during nesting season against take by Guatemalan 'Guacamalleros,' in the Chiquibul forest.

- Hawk Watch annual monitoring of raptor migrations through Belize.

- Wildlife Office (Forest Department) / Belize Bird Rescue / Belize Bird Conservancy / protected area manager (TIDE / PfB) partnership focused on extraction of identified at-risk yellow-headed parrot nestlings for captive rearing and pre-release husbandry at Belize Bird Rescue, their return to the wild and post-release monitoring of released birds by TIDE and PfB.

- Wildlife Office (Forest Department) / Belize Wildlife and Referral Clinic / Belize Bird Conservancy / Friends for Conservation and Development partnership focused on extraction of identified at-risk scarlet macaw nestlings for captive rearing and pre-release husbandry at Belize Bird Rescue, their return to the wild and post-release monitoring of released birds by FCD.

- Wildlife Office (Forest Department) / Belize Raptor Centre partnership for raptor rehabilitation

- Belize Zoo ongoing education activities.

Future / Potential Activities

- Binational project proposal currently under review for improving information on reddish egrets in Belize and Mexico and improving collaboration in conservation of this species (Sarteneja Alliance for Conservation and Development), towards a binational / regional Species Conservation Plan.

- Collaboration between protected area management partners in the Northern Belize Coastal Complex for mapping and monthly monitoring bird nesting colonies in the seascape (Corozal Bay Wildlife Sanctuary, Bacalar Chico Marine Reserve and National Park, Hol Chan Marine Reserve) - project proposal currently under review.

- Interest in improving the information available on the distribution and status of eagles and other large raptors in Belize towards a Species Conservation Plan.

- Discussion between the Wildlife Office (Forest Department) Wildtracks on facilitation of workshops for completion of threatened species assessments for other key vertebrate groups (mammals, reptiles, and amphibians) managed under the Forest Department.

MONITORING AND EVALUATION

It is recommended that the species list be revisited every five years, with review of the status of those species on the list, the threats threat need to be addressed and revision of the recommendations to adapt to changes in the context and environment.

A Measures of Success framework has been developed to assist in the review process, identifying indicators to track implementation of key recommendation outcomes and impacts (Table 7).

MEASURES OF SUCCESS FRAMEWORK

RECOMMENDATION	INDICATORS	BASELINE (2020)
CROSS CUTTING		
Revision and strengthening of the Wildlife Protection Act, with integration of the National Threatened Avian Species List, and increased penalties for offences.	▪ Revised Wildlife Protection Act is revised ▪ Integrated National Threatened Species List ▪ Increased penalties for offences	Wildlife Protection Act (1982) is outdated and in need of revision Penalties are considered too low
Strengthened protection and effective management of the National Protected Areas System	▪ Increased management effectiveness score for NPAS	NPAS average Management Effectiveness is 59.4% (2020), ranging from 29.5% to 83.5%
Support of initiatives to purchase large, private-held areas in key locations - Belize Maya Forest (Yalbac/ Laguna Seca / Gallon Jug properties), Peccary Hills (Hwatchy property), Maya Forest Corridor) and northern coastal lagoons - to be placed in trust for conservation, towards the protection of key forest nodes and corridors.	▪ % of Belize Maya Forest that is under long term protection ▪ % Peccary Hills (Hwatchy Property) that is under protection ▪ % of northern coastal lagoons that are under protection	Belize Maya Forest properties (Yalbac, Laguna Seca and Gallon Jug) are private lands with no long-term protection, and with potential conversion to industrialized agriculture
Establishing and protection of key national biological corridors.	▪ Number of key national corridors that are established and have some form of legal and on-site protection	Northern Biological corridor is partly established, with the northeast biological corridor legislated as a Special Management Area. The Maya Golden Landscape portion of the southern corridor is established. Both have on-site surveillance and enforcement. There is ongoing work to establish the central Maya Forest Corridor
Mapping key known nesting / roosting / foraging sites of CR and EN species	▪ % of CR and EN species with key sites mapped	Information has not been compiled, and in some cases is unknown. Also issues of confidentiality for avoidance of impacts (e.g. poaching /disturbance from birding poor-practices)
Identification, mapping and protection of the key nesting /roosting / cayes (CR and EN species) that still persist, with integration into the National Protected Areas System	▪ Number of critical bird nesting colonies identified ▪ % identified colonies protected under the NPAS	Unknown – Bird Colonies declared under the Lands Act are no longer included in the NPAS shapefile.

TABLE 7: MEASURES OF SUCCESS FRAMEWORK

MEASURES OF SUCCESS FRAMEWORK

RECOMMENDATION	INDICATORS	BASELINE (2020)
CROSS CUTTING		
Developing Species / Species Group Conservation Plans for Critically Endangered and Endangered Species, with species specific strategies for improved long term viability.	▪ Number of Species Conservation Plans for Critically Endangered Species ▪ Number of Species Conservation Plans for Critically Endangered Species	No national avian species conservation plans
Integration of the National Threatened Avian Species List into the Environmental Impact Assessment / Environmental Compliance Plan process, and strengthening of NEAC member recognition of Belize's threatened species.	▪ EIA documents include requirement for more detailed status assessment and recommendations for threatened species ▪ Number of EIAs that adequately integrate threatened species ▪ Number of ECPs that adequately integrate threatened species	There is no officially recognized threatened species list to provide a framework for integration into EIAs and ECPs
Integration of mapping and protection strategies for key coastal bird colony nesting sites into the revision of the Integrated Coastal Zone Management Plan.	▪ Revised Integrated Coastal Zone Management Plans specifically integrate colony nesting species into the planning ▪ ICZMPs have recommendations for full protection of sites with CR / EN species	Known nesting colonies are mentioned but there is no real integration of knowledge and recommendations for protection based on presence of colony nesting birds
Provide protection in Environmental Compliance Plans for key threatened species nesting, foraging and roosting sites in planned large, private development / agricultural projects through the Environmental Impact Assessment process.	▪ Number of key nesting sites for CR and EN species adequately protected in large, private development / agricultural projects through the Environmental Impact Assessment process.	
Integration of threatened species into decision–making by the mining authority on issuing permits for quarrying and dredging	▪ Number of quarrying permits issued within 500 m of orange-breasted falcon nesting sites ▪ Number of dredging permits issued within 500 m of key heron / egret / tern colony nesting cayes (CR and EN species)	There is no officially recognized threatened species list

MEASURES OF SUCCESS FRAMEWORK

RECOMMENDATION	INDICATORS	BASELINE (2020)
CROSS CUTTING		
Integration of nationally threatened Critically Endangered and Endangered species into the National Biodiversity Monitoring Plan and engagement of protected area managers in monitoring of critically endangered and endangered species across the protected landscape / seascape.	▪ % of Critically Endangered avian species included in the National Biodiversity Monitoring Plan ▪ % of Endangered avian species included in the National Biodiversity Monitoring Plan ▪ % of Vulnerable avian species included in the National Biodiversity Monitoring Plan	There is no officially recognized threatened species list to provide a framework for integration into the National Biodiversity Monitoring Plan
HABITAT DEGRADATION		
Surveillance and enforcement of illegal logging in identified key nesting / roosting / foraging sites.	▪ Number of incidences of nesting / roosting trees removed / key nest sites / foraging sites disturbed by illegal logging	Key nesting / roosting / foraging sites have not been mapped outside of protected areas
Integration of known nesting sites into logging concession plans and agreements where relevant.	▪ Number of logging licences that take into account protection of key nesting / roosting / foraging sites	Key nesting / roosting / foraging sites have not been mapped outside of protected areas
Strengthened fire management at both protected area and national level, with targeted fire management at key yellow-headed parrot, solitary eagle and critically endangered pine forest specialist nesting sites.	▪ Number of fires per year at key yellow-headed parrot, solitary eagle and critically endangered pine forest specialist nesting sites	Key nesting / roosting / foraging sites have not been mapped outside of protected areas
Effective management of submontane pine forests for reduction of the threat of pine bark beetle infestation.	▪ % area impacted by pine bark beetle at key solitary eagle nesting sites and ranges of critically endangered pine forest specialist	Key nesting / roosting / foraging sites have not been mapped outside of protected areas
Strengthened management of Crooked Tree Wildlife Sanctuary and other important wetlands in Belize's National Protected Areas System	▪ Management effectiveness of IBA wetlands	Aguacaliente WS: 32.1% Crooked Tree WS: 66.1% Corozal Bay WS: 77.5% Gales Point WS: 41.82% Shipstern C&MA: 83.5%
Support initiatives towards the reduction of agro-chemicals and poisons in the landscape through the Pesticide Control Board and Department of the Environment.	▪ % large scale industrialized agricultural areas considered to be following best practices for agrochemical use	No baseline

MEASURES OF SUCCESS FRAMEWORK

RECOMMENDATION	INDICATORS	BASELINE (2020)
HUNTING		
Review of level of protection for national Critically Endangered and Endangered avian game species in Wildlife Protection Act, and increased penalties for illegal hunting.	▪ Level of protection for CR and EN game species in Wildlife Protection Act ▪ Fine for illegal hunting	No protection if people are hunting legally. Maximum fine: $1,000 or up to 6 months in prison (WPA, 1982)
Develop and implement national hunting permit system and traceability throughout the game meat supply chain.	▪ Number of permits issued for hunting (subsistence / commercial), dealing and retail ▪ Number of arrests of hunters /dealers / retailers without permits	No permit / traceability system in place
Strengthen public outreach and awareness on hunting legislation, hunting seasons and permitted species, and the Wildlife Protection Act.	▪ Number of persons surveyed who are familiar with the hunting legislation, seasons etc.	12.0% of people surveyed considered they knew a lot about hunting seasons, 26.8% had some knowledge, 37.5% had heard of it, but didn't know about and 22.8% didn't know about it (Yorke / Forest Department, 2017)
ILLEGAL WILDLIFE TRADE		
One-year investment in issuing captive parrot permits under a grandfather clause for those parrots already in captivity, followed by zero-tolerance enforcement of laws protecting parrots.	▪ Number of parrot permits issued ▪ Number of applications pending ▪ Number of confiscated parrots	Forest Department figures
Strengthen public outreach and awareness on the Wildlife Protection Act, and legislation relevant to captive parrots and other species.	▪ Number of persons surveyed who are familiar with the legislation relevant to captive parrots and other species.	9.3% of people surveyed considered they knew a lot about the WPA, 22.3% had some knowledge, 35.6% had heard of it, but didn't know about and 32.7% didn't know about it (Yorke / Forest Department, 2017)
Strengthen efforts at reducing the illegal transboundary trade of parrots to Guatemala and Mexico, through capacity building of border enforcement authorities for recognition of wildlife crime, and increased transboundary communication and collaboration with the relevant authorities.	▪ Number of border enforcement officers trained for recognition of wildlife crime ▪ Number of meetings with transboundary partners to discuss transboundary wildlife trade ▪ Number of birds confiscated at borders	Forest Department figures

MEASURES OF SUCCESS FRAMEWORK

RECOMMENDATION	INDICATORS	BASELINE (2020)
ILLEGAL WILDLIFE TRADE		
Support and strengthen rehabilitation and release of key confiscated / rescued avian species	▪ Number of birds in rehabilitation ▪ Number of birds released ▪ National investment in bird rehabilitation and release	BBR and BRC figures
Extraction of identified at-risk nestlings (yellow-headed parrots / scarlet macaws) for captive rearing and pre-release husbandry as part of protected area / rehabilitation partnerships, where applicable and where approved by the relevant authority.	▪ Number of nestling extracted per species ▪ Number of extracted nestling released per species	BBR, BWRC and FCD figures
Ensure clear guidelines for display of raptors that ensure activities do not encourage illegal opportunistic take.	▪ Guidelines for establishments using raptors ▪ Number of raptors entering rehabilitation with clipped wings / tethers	Over last 4 to 5 years, 10+ raptors with clipped wings and / or tethers have entered rehabilitation
HUMAN DISTURBANCE		
Improve awareness of protected area managers, tour guides and the general public of tourism best practices around bird colonies, waterbird flocks and foraging areas, and other threatened bird species.	▪ Printed guidelines ▪ Number of tour guides surveyed who are familiar with best practices around bird colonies and waterfowl. ▪ Number of protected area managers surveyed who are familiar with best practices around bird colonies and waterfowl.	No baseline data
Improve awareness in coastal and caye fishing communities of the Wildlife Protection Act and fines for disturbance of colony nest sites and extraction of eggs.	▪ Number of persons surveyed from coastal communities who are familiar with the legislation relevant to disturbance of nest colonies and harvesting of eggs.	No baseline data
Strengthen efforts at reducing illegal transboundary hunting, logging and agricultural incursions into the Chiquibul forest from Guatemala.	▪ Presence of incursions in key known nesting / roosting / foraging sites of CR / EN species in the Chiquibul	No mapping of key areas FCD data on incursions

MEASURES OF SUCCESS FRAMEWORK

RECOMMENDATION	INDICATORS	BASELINE (2020)
PERSECUTION		
Improve farmer awareness of the benefits of raptors in reducing pests	▪ Number of farmers surveyed from coastal communities who are familiar with the role of raptors in reducing pests ▪ % of farmers surveyed who have a neutral / positive attitude towards raptors	No data
Address cultural superstitions resulting in targeting of owls.	▪ % of general public surveyed in urban / rural areas who know of superstitions about owls ▪ % of general public in urban / rural areas surveyed who have a neutral / positive attitude towards owls	No data
UNINTENTIONAL INJURY		
Improve awareness of the importance of hook and net retrieval during fishing activities and coastal clean-ups.	▪ Reporting on hook / net removal from coastal clean-up activities	No data
Disseminate information on what to do if a bird is accidentally hooked, and emergency contact details for reporting injured seabirds.	▪ Printed / online information disseminated to tour guides / fishers on what to do and emergency contact ▪ Number of to tour guides / fishers aware of Belize Bird Rescue and how to contact them	No data

REFERENCES

Advani, NK, (2014). Climate Change Vulnerability Assessment for Species. World Wildlife Fund, Washington, DC.

Arevalo, B. (draft). Modelling the contemporary habitat suitability of the endangered scarlet macaw (*Ara macao cynoptera*) in the Selva Maya.

BirdLife International (2020) IUCN Red List for birds. Downloaded from http://www.birdlife.org on 2/10/2020.

Berry, R., C. L. Wood, and B. L. Sullivan (2020). Orange-breasted Falcon (Falco deiroleucus), version 1.0. In Birds of the World (T. S. Schulenberg, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.orbfal1.01

Berry, B. b., C.W. Benkman, A. Muela and Y. Sminario (2010). Isolation and Decline of a Population of the Orange-Breasted Falcon. The Condor, 112(3): 479-489

Billerman, S. M., B. K. Keeney, P. G. Rodewald, and T. S. Schulenberg (Editors) (2020). Birds of the World. Cornell Laboratory of Ornithology, Ithaca, NY, USA. https://birdsoftheworld.org/bow/home

Cherringtona, E. A., R. E. Griffin, E. R. Andersona, B. E. Hernandez Sandovala, A. I. Flores-Andersona, R. E. Muencha, K. N. Markert, E. C. Adams, A. S. Limaye, D. E. Irwin (2020). Use of public Earth observation data for tracking progress in sustainable management of coastal forest ecosystems in Belize, Central America. Remote Sensing of Environment 245 (2020) 111798

Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., D. F. Stotz, and K. Winker. 2019. Check-list of North American Birds (online). American Ornithological Society. http://checklist.aou.org/taxa

Collar, N., P. F. D. Boesman, and C. J. Sharpe (2020). Scarlet Macaw (Ara macao), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.scamac1.01

Cross W.E. (1992) Status of red-footed booby and magnificent frigatebird on Half Moon Caye Natural Monument, Belize: For Belize Audubon Society.

Curiel A. R. (2006). Conservation and Sustainable Use of Parrots in Mexico. NDF WORKSHOP CASE STUDY 6 Psittacidae, Country – MEXICO.

eBird (2020). Georeferenced data download.

Enriquez P. L. and J. R. Vasquez Perez (2015). Owls of Mexico. In: Los búhos neotropicales: diversidad y conservación, El Colegio de la Frontera Sur. Editor: Enriquez P. L.

Foden, W., Mace, G., Vié, J.-C., Angulo, A., Butchart, S., DeVantier, L., Dublin, H., Gutsche, A., Stuart, S. and Turak, E. (2008). Species susceptibility to climate change impacts. In: J.-C. Vié, C. Hilton-Taylor and S.N. Stuart (eds). The 2008 Review of The IUCN Red List of Threatened Species. IUCN Gland,

Switzerland.IUCN. (2012). Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0. Gland, Switzerland and Cambridge, UK: IUCN.

Foden, W., S. H. M. Butchart, S. N. Stuart, JJ-C Vié, H. Resit Akçakaya, A. Angulo, L. M. DeVantier, A. Gutsche, E. Turak, L. Cao, S. D. Donner, V. Katariya, R. Bernard, R. A. Holland, A. F. Hughes, S. E. O'Hanlon, S. T. Garnett, Ç. H. Şekercioğlu, and G. M. Mace (2013). Identifying the World's Most Climate Change Vulnerable Species: A Systematic Trait-Based Assessment of all Birds, Amphibians and Corals. PLoS ONE 8(6): e65427. doi:10.1371/journal.pone.0065427.

Gobbi, J., D. Rose, G. De Ferrari and L. Sheeline (1996). Parrot Smuggling Across the Texas-Mexico Border. TRAFFIC USA / WWF.

Guzman, J.C., M.E. Sanchez Saldana, Grosselet, M. J.S. Gamez (2007). The Illegal Parrot Trade in Mexico – A Comprehensive Assessment. Defenders of Wildlife, Mexico.

IUCN (2020). The IUCN Red List of Threatened Species. Version 2020-2. https://www.iucnredlist.org. Downloaded on 1 October, 2020.

IUCN. (2012). IUCN Red List Categories and Criteria: Version 3.1. Second edition. Gland, Switzerland and Cambridge, UK: IUCN. iv + 32pp

Jones J. and J. C. Meerman (2015). Owls of Belize. In: Los búhos neotropicales: diversidad y conservación, El Colegio de la Frontera Sur. Editor: Enriquez P. L.

Jones, H.L. (2003). Birds of Belize. University of Texas Press.

Macías Caballero, C. y E. E. Iñigo Elías. (2003). Evaluación del estado de conservación actual de las poblaciones de loro cabeza amarilla (*Amazona oratrix*) en México. Instituto Tecnológico y de Estudios Superiores de Monterrey. Centro de Calidad Ambiental. Informe final SNIB-CONABIO proyecto No. AS002. México D. F.

Meerman, J. (2020). Biodiversity Monitoring Yalbac Ranch & Cattle Corporation & Laguna Seca, Belize. 2019 Season. Report to Yalbac Ranch & Cattle Corporation and the Forestland Group

Meerman, J.C. & J. R. Wilson. 2005. The Belize National Protected Areas Systems Plan. http://biological-diversity.info/NPAPSP.htm

Miller B. W. and C. M. Miller (2006). Final Report: Waterbirds in Belize. Wildlife Conservation Society / Belize Audubon Society.

Panjabi, A. O., P. J. Blancher, R. Dettmers, and K. V. Rosenberg, (2012). Partners in Flight. Technical Series No. 3. Rocky Mountain Bird Observatory.

Peter J., J. Cade and T. J. Cade (1986). Observations on the Biology of the Orange-breasted Falcon *Falco deiroleucus*. Birds of prey Bulletin No. 3 (1986).

Phillips, R. (2012). Solitary Eagle Conservation Project, 2011 – 2012. Belize Raptor Research Institute. Report to the Belize Forest Department.

Rosenberg K. V., J. A. Kennedy, R. Dettmers, R. P. Ford, D. Reynolds, J.D. Alexander, C. J. Beardmore, P. J. Blancher, R. E. Bogart, G. S. Butcher, A. F. Camfield, A. Couturier, D. W. Demarest, W. E. Easton, J.J. Giocomo, R.H. Keller, A. E. Mini, A. O. Panjabi, D. N. Pashley, T. D. Rich, J. M. Ruth, H. Stabins, J. Stanton, T. Will. (2016). Partners in Flight Landbird Conservation Plan: 2016 Revision for Canada and Continental United States. Partners in Flight Science Committee. 119 pp.

Salvin O.(1864). A fortnight amongst the sea-birds of British Honduras. Ibis 6:373-387

Schmeller, Dirk S., B. Bauch, B. Gruber, R. Juškaitis, E. Budrys, V. Babij, K. Lanno, M. Sammul, Z. Varga and K. Henle (2008). Determination of conservation priorities in regions with multiple political jurisdictions. Biodiversity Conservation 17:3623-3630.

Secretaria de Medio Ambiente y Recursos Naturales (SEMARNAT) (2019), Modification of Annex III Protección ambiental-especies nativas de México de flora y fauna silvestres. Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio-Lista de especies en riesgo. NOM-059-SEMARNAT-2010

Secretaría de Medio Ambiente y Recursos Naturales / Comisión Nacional de Áreas Naturales Protegidas / Programa de Acción para la Conservación de las Especies (2009): Guacamaya Roja (*Ara macao cayanoptera*) y Loro nuca amarilla (Amazona auropalliata).

Secretaría de Medio Ambiente y Recursos Naturales / Comisión Nacional de Áreas Naturales Protegidas / Programa de Acción para la Conservación de las Especies (2012): Loro cabeza amarilla (*Amazona oratrix*) y Loro nuca amarilla (Amazona auropalliata). Eduardo Rendón Hernández y Patricia Oropeza Hernández (Eds.)

The Peregrine Fund (2020). Orange-breasted Falcon. https://peregrinefund.org/explore-raptors-species/falcons/orange-breasted-falcon

Vallely, A.C. and D. Dyer (2018). Birds of Central America. Princeton Field Guides.

Walker, Zoe (2020). Status of Protected Areas in Belize, 2019.

Wright, T. F., C. Toft, E. C. Enkerlin-Hoeflich, J. González-Elizondo, M. Albornoz, A. Rodríguez-Ferraro, F. Rojas-Suárez, V. Sanz, A. Trujillo, S. R. Beissinger, V. Berovides, X. Gálvez, A. T. Brice, K. Joyner, J. Eberhard, J. Gilardi, S. E. Koenig, S. Stoleson, P. Martuscelli, J. M. Meyers, K. Renton, A. M. Rodríguez, A. C. Sosa-Asanza, F. Vilella, and J. W. Wiley. 2001. Nest poaching in Neotropical parrots. Conservation Biology, 15: 710–720.

Yorke, V. (2017). Public Perspectives: A Study of KBA Forest-Dependent Communities Perspective on Sustainable Forest Management. Belize Forest Department.

ANNEX 1: PARTICIPANTS

NAME	ORGANIZATION	E-MAIL	WORKSHOP						
CORE TEAM			**T**	**1**	**2**	**3**	**4**	**5**	**V**
Jan Meerman	GITEC	meerman@gitec-consult.com							
Shanelly Carillo	Wildlife, Forest Department	wildlife.manager@forest.gov.bz							
Hannah St. Luce Martinez	National Biodiversity Office	director.nbio@environment.gov.bz							
Rasheda Garcia	National Biodiversity Office	GarciaRA@gobmail.gov.bz							
Zoe Walker	Wildtracks (Consultant)	office@wildtracksbelize.org							
TECHNICAL WORKING GROUP									
Abidas Ash	Environmental Research Institute-UB	aash@ub.edu.bz							
Francis Canto Jr.	Belize EBird reviewer	franciscanto@live.com							
Jonathan Urbina	Belize EBird reviewer	anibru.feathers@gmail.com							
Lee Jones	Belize EBird reviewer	bzbirdman@gmail.com							
Philip Balderamas	Belize EBird reviewer	pbala@btl.net							
Roni Martinez	Belize EBird reviewer	roni.a.martinez@gmail.com							
PARTICIPANTS									
Boris Arevalo	Friends for Conservation and Development	borisarevalo2008@yahoo.com							
Christian Bech	Stann Creek Birding Club	chr.bech@yahoo.com							
David Hilmy	The KEEP	david.hilmy@yahoo.com							
Eduardo Ruano	Lamanai Outpost Lodge	jorge_eduardo_ruano@hotmail.com							
Isael Mai	Gaia River Lodge	maiisael8@gmail.com							
Isaias Morataya	Black Rock Lodge	honeycreeper79@gmail.com							
Jamal Andrewin Bohn	The Belize Zoo	jandrbohn@gmail.com							
Kayla Hartwell	Foundation for Wildlife Conservation	kaylahartwell@gmail.com							
Kirah Forman	Hol Chan Marine Reserve	kirahforman@yahoo.com							

NAME	ORGANIZATION	E-MAIL	WORKSHOP						
PARTICIPANTS			**T**	**1**	**2**	**3**	**4**	**5**	**V**
Leomir Santoya	Sarteneja Alliance for Conservation and Development	nrpm.sacd@gmail.com							
Mario Muschamp	Toledo Institute for Development and Environment	mmuschamp@tidebelize.org							
Mayeli Guifarro	Sarteneja Alliance for Conservation and Development	mayeliguifarro1990@gmail.com							
Nikki Buxton	Belize Bird Rescue	belizebirdrescue@gmail.com							
Ray Cal	Foundation for Wildlife Conservation	raycalsm@gmail.com							
Ryan Phillips	Belize Bird Conservancy	norcalbirding@gmail.com							
Said Gutierrez	Ya'axché Conservation Trust	said.gutierrez@yaaxche.org							
Victor Gamez	Belize Bird Conservancy	gamez.victor82@gmail.com							
Sherman Cawich	Peregrine Fund	sherman.cawich@outlook.com							
Sarah Mann	Belize Raptor Centre	belizeraptorcenter@gmail.com							
CONSULTED									
Vladimir Rodriguez	Programme for Belize	freddieb78@hotmail.com							
Elbert Greer									
Marisa Tellez	Crocodile Research Centre	marisa.tellez@crcbelize.org							
Christina Manzi	American Crocodile Education Sanctuary	tinamanzi17@icloud.com							

WORKSHOP DETAILS						
T **Technical Meeting**	**1** **Parrots**	**2** **Game Species**	**3** **Raptors**	**4** **Sea and Coastal**	**5** **Endemics**	**V - Validation Workshop**
16th October	**20th October**	**22nd October**	**26th October**	**27th October**	**29th October**	**16th November**
9:00 - 12:00	**9:00 - 12:00**	**9:00 - 12:00**	**5:00 - 7:30 pm**	**1:00 - 5:00**	**9:00 - 12:00**	**2.00 - 5:30**

ANNEX 2: IUCN CRITERA

CRITICALLY ENDANGERED
These species will become extinct in the near future unless we work harder to protect them.

ENDANGERED
These species are declining fast, and are at risk of becoming critically endangered in the near future unless we work hard to protect them.

VULNERABLE
These species are declining but not yet endangered. However, they will continue to decline unless we work to protect them.

CRITICALLY ENDANGERED

Population size reduction. Population reduction of ≥ 80 to 90% (measured over the longer of 10 years or 3 generations)

Geographic range – either extent of occurrence (<100km²) AND/OR area of occupancy (<10km²), significantly fragmented population or only found in 1 location, continuing to decline or extreme fluctuations in any of these

Small population size and decline
Number of mature individuals < 250
A continuing decline (25% in 3 years / 1 generation) AND / OR extreme fluctuations in the population

Very small or restricted population
< 50 mature individuals

Probability of extinction
≥ 50% in 10 years or 3 generations, whichever is longer

ENDANGERED

Population size reduction. Population reduction of ≥ 50 to 70% (measured over the longer of 10 years or 3 generations)

Geographic range – either extent of occurrence (<5,000km²) AND/OR area of occupancy (<500km²), significantly fragmented population or only found in fewer than 5 locations, continuing to decline or extreme fluctuations in any of these

Small population size and decline
Number of mature individuals < 2,500
A continuing decline (20% in 5 years / 2 generation) AND / OR ≤ 250 individuals in each sub-population

Very small or restricted population
< 250 mature individuals

Probability of extinction
≥ 20% in 20 years or 5 generations, whichever is longer

VULNERABLE

Population size reduction. Population reduction of ≥ 30 to 50% (measured over the longer of 10 years or 3 generations)

Geographic range – either extent of occurrence (<20,000km²) AND/OR area of occupancy (<2,5000km²), significantly fragmented population or only found in 1 location, continuing to decline or extreme fluctuations in any of these

Small population size and decline
Number of mature individuals < 10,000
A continuing decline (10% in 105 years / 3 generations) AND / OR ≤ 1,000 individuals in each sub-population

Very small or restricted population
< 1,000 mature individuals

Probability of extinction
≥ 10% in 100 years

ANNEX 6: CLIMATE CHANGE PREDICTIONS FOR BELIZE

CLIMATE CHANGE PREDICTIONS (B2 SCENARIO) FOR BELIZE

Climate Change Impacts	Current Status	25 – 50 yrs	100 yrs
Increased frequency of storms	Increased storm activity, with annual fluctuations. More storms during El Nina, fewer during El Nino. Stronger storms (more Cat 4 / 5).		
Decreased Precipitation	Mean annual rainfall over Belize has decreased at an average rate of 3.1mm per month per decade since 1960 (NCSP/UNDP)	Predictions suggest that 2020/2030 may show a slight increase in the early and late parts of the wet season (May and Oct-Nov). The dry season and the mid-wet season decreases in rainfall (June), on the other hand, will be characterized by further decreases. Between 2030/2040, the entire country will be characterized by reduced precipitation, with exceptions only in early and late parts of the wet season (May and Nov). 2050/2060 projections are for an enhancement of the 2030s pattern of reduced rainfall (-1 to -4 mm/day) in the dry season (December – April). Increased precipitation of 2-7 mm/day is projected during the early and late (Oct May - Nov) parts of the wet season (NCCPSAP 2015). These predictions are based on predictions for the mainland – Stann Creek District. Predicted ecological shifts may alter the catchment functionality important for maintaining rivers in dry season in the south of Belize, and providing nutrients to the reef environment.	During the 2070s and 2090s predictions suggest that the Belize landscape is marked by reduced rainfall from December through to September. The largest reduction of up to -7 mm/day is projected in the Stann Creek District during the mid-wet season dip in June. The end of the wet season (Oct - Nov) maintains increased rainfall of 2 – 5 mm/day in the western Toledo, Stann Creek, Orange Walk and Corozal Districts (NCCPSAP 2015)

		Increased concentration and seasonality of agrochemical delivery	

CLIMATE CHANGE PREDICTIONS (B2 SCENARIO) FOR BELIZE

Climate Change Impacts	Current Status	25 – 50 yrs	100 yrs
Air Temperature	Mean annual temperature has increased in Belize by 0.45°C since 1960, an average rate of 0.10°C per decade. Average number of 'hot' days per year in Belize (days exceeding 10% of current average temperature) has increased by 18.3% between 1960 and 2003 (NCSP/UNDP).	Warming is occurring throughout Central America; up to 1°C since the mid-1970s (IPCC, 2014). Both seasonal and annual air temperatures are predicted to increase by approximately 2°C.	Temperatures are expected to increase between 1.6°C to 4.0°C by 2100 (IPCC, 2014).
Sea Level Rise	Increased global average sea level rise rate of 1.8mm per year from 1961 – 2003 (IPCC, 2007). Current average increase in sea level rise in the Mesoamerican region is estimated at 3.1mm per year (IPCC, 2007).	The Hadley Centre's Unified Global Climate Model (GCM), HadGEM2-ES provides additional data to the IPCC reports (IPCC 2007, 2013) for the three Representative Pathways Projection scenarios[6]. In all three, the coastal sea level is projected to exceed 10 cm by the 2030s; 22, 23, and 38 cm respectively are projected for the low, medium and high emission scenarios by 2050 (NCCPSAP 2015).	By the end of the Century, the Hadley Centre's Unified GCM, HadGEM2-ES projects coastal seal level to rise by 34, 56, 120 cm respectively for the low, medium and high emission scenarios (NCCPSAP 2015).
Sea Surface Temperature Rise	Water temperature has increased by 0.74˚C between 1906 and 2005 Current levels of increase are estimated at 0.4˚C per decade (Simpson et al., 2009)		Predicted regional increase of temperature by up to 5˚C by 2080, with the greatest warming being experienced in the north-west Caribbean (including Belize) (WWF, 2009).
Increased Intensity and Frequency of Storms	Increased storms from 1999 onwards, with annual fluctuations. More storms during El Nina, fewer during El Nino. Stronger storms >Cat 4 / 5	Extreme precipitation events over most of the mid-latitude land masses and over wet tropical regions predicted to become more intense and more frequent.	Extreme precipitation events over most of the mid-latitude land masses and over wet tropical regions predicted to become more intense and more frequent.

[6] RCP 2.6 (low emission), RCP 4.5 (medium emission), and RCP 8.5 (high emission) scenarios

Climate Change Predictions (B2 Scenario) for Lighthouse Reef Atoll / 3

Climate Change Impacts	Current Status	25 - 50 yrs	100 yrs
Ocean acidification (molluscs and crustaceans)	Atmospheric CO_2 concentration has increased from 280 parts per million (ppm) in 1880 to 385 ppm in 2008 - 35% increase in hydrogen (Simpson et al., 2009). 48% of all atmospheric CO2 resulting from burning of fossil fuels has been taken up by the ocean (Hartley, 2010)	Predicted atmospheric CO_2 levels of 450 by 2040 (Simpson et al., 2009). Predicted 30% decrease in pH. Predicted decrease in calcification rate by 20 - 50% by 2050	Some experts predict a 35% reduction in coral growth by 2100 (Simpson et al., 2009) Decrease of between 0.3 and 0.5 units by 2100 (Hartley et. al. 2010).