



## TECHNICAL PAPER SERIES

### Determination of National Harvest Quotas for twenty-four (24) selected species

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#### SUMMARY:

Changes in local law in Guyana brought the country's legislation into compliance with CITES category 1 and provided for the Guyana Wildlife Conservation and Management Commission to assume responsibility for all aspects of the harvest and trade in wildlife. Consequently, the GWCMC has sought to determine a methodology for the establishment of harvest quotas within specified harvest zones, and to use that methodology to establish quotas for 24 selected species.

The method developed was based on the concept of maximum sustainable yield, the precautionary principle and CITES concept of non-determent and utilized available data on the species. Quotas above zero could only be determined for 21 species. A lack of data and conservation concern related to the other 3 species resulted in a zero quota. Data availability was the major limitation. Careful monitoring of the implementation of these quotas is recommended.

**Key Words:** Quota, CITES, harvest zones, method, sustainable yield, precautionary principle

#### Background

With the enactment of the Wildlife Conservation and Management Act of 2016 Guyana's national CITES legislation became [CITES](#) Category 1 compliant. This brought virtually all aspects of the management of wildlife species under a singular legislation. It especially brought all aspects of the trade in wildlife species under this new law. The Guyana Wildlife Conservation and Management Commission (GWCMC), which was established under the act, has since had the responsibility for implementing the provisions of the act. The legislative framework provides for licences to be issued to operators in the trade from trappers and hunters to local retailers and international exporters.

To achieve the goal of sustainable management of all species through an effective licencing system, the GWCMC has decided that a national system of harvest zones will be established and that harvest quotas will be determined for each zone which together will constitute a national quota. It has further been determined that the existing Administrative Regions will constitute the harvest zones in the piloting of the decision, such that, Guyana's Administrative Region #1 will be Harvest Zone 1 and so forth.

As a first step to the implementation of these decisions, this project aimed to determine a scientific basis for harvest zone and national level quotas and to apply that method to



establish quotas for twenty-four (24) species of interest for domestic utilization.

## Methodology

The approach to the determination of quotas utilized the concept of maximum sustainable yield (MSY) (Weinbaum et al., 2012) which is the absence of detailed longitudinal ecological data was implemented as sustainable yield. This required information for the computation of an estimated net annual population growth was only possible for some species. In other cases, categorical data on abundance, current or previous quotas for the species from Guyana or neighboring Suriname, local utilization and conservation status were taken into account to determine a quota. Considering the limited data available, the precautionary principle (Kriebel et al., 2001) was applied in all cases in keeping with the cites concept of non-detriment (Rosser & Haywood, 2002).

Harvest zones and national quotas for each species was determined based on data available on the species and suitable habitats at the national and harvest zone levels. Literature searches were conducted for data on each species using online sources and at the Guyana Wildlife Conservation and Management Commission. Data gathered from literature was inputted into a spreadsheet under the headings described below.

- **Local names** - Names by which the animal is known locally as far as possible.
- **Population** - Population size or density assessment and trends for the species in specific places in Guyana (Local) or anywhere in its

natural range (Global/Regional). As many references as found.

- **Biology** - A description of the general reproductive biology of the species including data on reproductive strategy and rates. Any data that could be used to determine reproductive rate was also included, including, population sex ratio, age structure, age at first reproduction, number of offspring produced per reproductive season. This also included lifespan (overall and reproductive) and ecological niche occupied by the species.
- **Biogeography** - Data on the habitat and ecosystems occupied by the species. Including species distribution globally, at least to the level of biogeographical zones or significant biogeographical regions such as the Guiana Shield of Amazon region, and nationally, with greatest accuracy.
- **Conservation status** - Any listing of the species on the Appendices of the Convention on the International Trade of Endangered Wild Species of Fauna and Flora (CITES), the Red List of the International Union for the Conservation of Nature (IUCN) and in local law. Data on known threats and pressures faced by the species.
- **Harvest and management** - Data on the local harvest of the species if available as well as data on existing or past export quota and actual trade in the species for Guyana or Suriname. Description on local management measures in place for the species.

Data on Guyana's ecosystems was collected from literature including national documents



and scientific publications. This included information on the total area (City Population, 2020), area under various land use or land cover (Guyana Lands and Surveys Commission [GLSC], 2013), area covered by protected areas (Protected Areas Trust (Guyana) [PAT], 2021), area allocated as Amerindian lands (Guyana Forestry Commission [GFC], 2018), area available for mining (GLSC, 2013) and area listed as state forest (GFC, 2018). Human population and deforestation were considered as pressures. Data on human population at the regional level was pulled from Bureau of Statistics (Guyana) (2014) and converted to a measure of area of forest (km<sup>2</sup>) by calculating the area of forest needed to sequester the CO<sub>2</sub> exhaled by the regional population annually. For this computation the average daily exhalation of CO<sub>2</sub> per human is taken as 1.05 kg (PALMER, 2009; WITHERS, n.d.) and 1 acre of forest was estimated to sequester 2.6 tonnes of carbon annually. Deforestation was considered as the average percentage change in forest cover per annum 2011-2018 based on data from Mongabay (2020). As far as possible, these data were broken down at the regional level.

Where a species was listed on CITES Appendix I and/or on the IUCN Red List as vulnerable or worst, specific data on local populations were sought in order to determine a quota. In the absence of such data, the recommendation was for a zero quota.

Where sufficient data was available, an estimate of local population of the species was computed. This population estimate was computed as the product of the most conservative estimate of population density for the species and the estimated harvestable area. The estimated harvestable

area was computed, only at the national level, by deducting the areas listed as built area, arable lands and tree crops, bare land, water bodies, area available for mining, protected areas and Amerindian lands in GLSC (2013) from the total country area. The resulting national level harvestable area was 65,510 km<sup>2</sup>. This was used for species which are not confined to a very specific habitat or ecosystem. Where species were restricted in distribution, this area was further reduced by the known area of the country covered by habitats considered unsuitable for the species as listed in GLSC (2013, pp. 67-68).

Information on the age structure of the population was used to estimate the size of the reproductive population and sex ratio data was used to determine the number of females in the population. The annual recruitment by births in the population was estimated as the product of the estimated number of reproductive females and the most conservative estimate of the number of offspring produced by each female per annum. This number was then reduced based on known, hatching success and neonatal mortality rates. It was recognised that there was a lack of comprehensive data from Guyana on any one species, data on reproductive success of females and juvenile mortality rates. Consequently, the final recommended quota was taken as 10% to 25% of the net recruitment of juveniles as an application of the precautionary principle.

Where the reproductive rate was estimated in literature as the number of offspring per adult females per annum this was used to compute the annual recruitment once the population of adult females was estimated.

In few cases data and decision on one species was used to guide the decision on another closely related species. These are



explained in the quota determination rationale provided.

For all birds, data was deficient for the computation of an estimated harvestable population. A Field Checklist of the Birds of Guyana 2<sup>nd</sup> Edition (Braun et al, 2007) was used as the main reference for the local abundance of the species and the habitats in which they are found. Consideration was also given to any estimate of global population, and existing export quota and data on its utilisation over a 10-year period, the conservation status of the species and local demands in order to determine a quota.

Harvest zone quotas were determined by subdividing the national quota across the zones from which the species is known, or which has suitable habitat for the species. To determine this distribution, the total area of the Administrative Region/Harvest Zone was reduced by one year of deforestation, the area of forest needed to sequester the CO<sub>2</sub> produced by respiration of the population of the region and any area under the National Protected Areas System. The relative area for each zone being considered was then determined and the quota for each zone was computed by multiplying the national quota by the relative area for the region.

The Bahamian white-jawed pintail (*Anas bahamensis*) is restricted only to the coastal regions (#1 - #6). The Black-bellied whistling duck (*Dendrocygna autumnalis*) could be found in all administrative regions/ harvest zones except region #7/ harvest zone # 7. Additionally for this species, because of the

affinity for rice cultivations on the coast and the relatively small sizes of the coastal regions with high human populations, the quota assignments to harvest zones #2 - #4 are biased by multiplying the areas by a factor of 2 and harvest zone #5 by a factor of 4.

## Output

Of twenty-four species, sufficient appropriate data could be found on eight in order to compute an estimated net productivity for a national population. Seven of these species were mammals and one reptile. For the remaining five mammalian species: the White-lipped peccary (*Tayassu pecari*) quota was determined on its sympatric relationship with the Collared Peccary (*Pecari tajacu*); the Nine-banded armadillo (*Dasypus novemcinctus*) quota was determined largely based on existing quota and conservation status; the Greater long-nosed armadillo (*Dasypus kappleri*) quota was determined based on its relatedness to *D. novemcinctus* and its conservation status; and, zero quotas were determined for the Giant Armadillo (*Prionomys maximus*) and the Southern Naked-tailed Armadillo (*Cabassous unicinctus*) because of their conservation status and a lack of specific local data.

Seven of the eleven bird species had existing export quotas in Guyana or Suriname which were used to guide quota determination, along with other information on local abundance, conservation status and general ecology.

**Table 1. National Quota for selected species**

No	Scientific Name	English Name	Recommended quota
1	<i>Cuniculus paca</i>	Labba / pacca or Lowland paca	37,631
2	<i>Dasyprocta leporina</i>	Agouti	37,631
3	<i>Mazama americana</i>	Deer - red brocket	1,582
4	<i>Odocoileus virginianus</i>	Deer - white tail	746
5	<i>Mazama gouazoubira</i>	Deer - grey brocket deer/brown brocket	2,690
6	<i>Tayassu pecari</i>	Peccary - white lipped	1,649
7	<i>Pecari tajacu</i>	Peccary - collared	3,054
8	<i>Hydrochoerus hydrochaeris</i>	Capybara	6,436
9	<i>Priodontes maximus</i>	Armadillo - giant	0
10	<i>Dasypus novemcinctus</i>	Armadillo - nine-banded	150
11	<i>Cabassous unicinctus</i>	Southern naked tail Armadillo	0
12	<i>Dasypus kappleri</i>	Greater Long nosed Armadillo	75
13	<i>Crax alector</i>	Powis	156
14	<i>Tinamus major</i>	Great Tinamou/ Maam	50
15	<i>Actitis macularius</i>	Sandpiper	250
16	<i>Cairina moschata</i>	Ducks- Muscovy	100
17	<i>Dendrocygna autumnalis</i>	Duck - Black-bellied Whistling-Duck	1,000
18	<i>Anas discors</i>	Blue winged teal duck	0
19	<i>Dendrocygna viduata</i>	White faced whistling duck	1,500
20	<i>Anas bahamensis</i>	The bahama white jawed pintail	50
21	<i>Psophia crepitans</i>	Grey-winged trumpeter	200
22	<i>Penelope marail</i>	Marudi - Marail guan	125
23	<i>Penelope jacquacu</i>	Marudi - Spix's guan	250
24	<i>Iguana iguana</i>	Iguana	246,204

### Conclusion/ Recommendation

The determination of quotas was greatly limited by the availability of relevant information. Where the species was of conservation concern that lack of information resulted in zero quotas. The establishment of quotas and proper monitoring of the harvest and its impact on specific local populations should reduce this limitation into the future for species with quotas above zero. For species with a zero quota but for which there

is interest in harvesting, focused studies will be required on local populations.

As these quotas are implemented data collection on efforts and harvest together with biological data (reproductive state for example) and ecological data should be collected and used to evaluate the quotas for the next cycle of implementation.



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