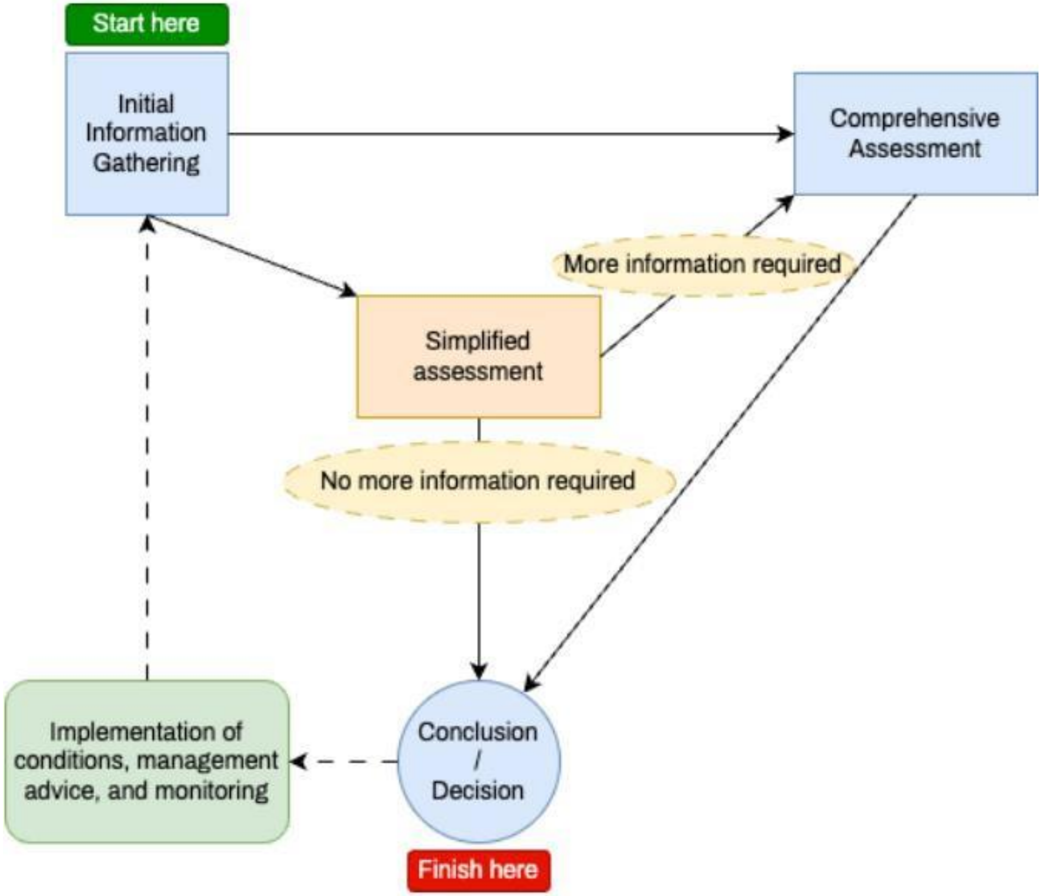
CITES Webinar on NDF guidance

Case studies

Comprehensive assessments

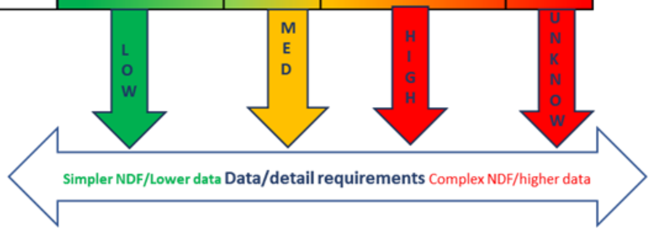


Initial information gathering	Background checks to review basic information about the specimens and its trade, and whether and what type of an NDF is necessary, such as a Simplified or Comprehensive Assessment
Simplified Assessment (optional)	Undertake where it is likely easy to establish whether harvesting for trade is non-detrimental
Comprehensive Assessment (where needed)	Undertake when it is not possible to determine non-detriment based on a Simplified Assessment (without first doing a Simplified Assessment, or after a Simplified Assessment)
Conclusion or decision	Conclusion or decision. The final NDF decision may also include conditions or management advice
Adaptive Management and Monitoring (optional)	Once management advice is implemented, their impact should be monitored and information should feed into future NDFs

Comprehensive Assessments

Risk Evaluation

Factor	Assessment may consider	Evaluation – example indicators			
Species' biology and life-history characteristics	Intrinsic vulnerability of species or population (reproductive capacity, niche width)	r-selected species (early maturity, short-lived, more offspring), adapts to various habitat types		**K-selected species (late maturity, long-lived, few offspring), specialist**	UNKNOWN
Species' range (historical and current)	Distribution and trends	Widespread, stable distribution over time, connected populations		Endemic, restricted, fragmented, declined over time, shared stocks	UNKNOWN
Population structure, status and trends	Population size / structure/ density and trends (harvest area and nationally)	Population size large, stable or increasing. Representative inventories/surveys over time		Low population size, declining trend, skewed populations (age classes or sex).	UNKNOWN
Conservation status	Status and trends (global, national, and local scales)	LC	VU, NT	CR, EN, DD / Ap. I	UNK
Threats	Other threats and threat trends	No other significant known threats		Subject to multiple threats (habitat loss, climate change, IAS)	UNK



Impact and Management Evaluation

Factor	Assessment may consider	Evaluation - example indicators (not exhaustive)		
Harvest impacts/total offtake impacts	Impact of harvest/total offtake on harvest area, national population and internationally. Consider total volume of harvest/offtake (both for domestic and export as well as any other offtake, or removal of specimens from the wild) and legal and illegal harvest. Consider harvest/offtake from harvest area in context of national level trade and trend.	Low impact (e.g., Non-lethal harvest* that does not imply removal of individuals from the wild. Harvest of life stages with low survival rate (source R). Harvest is in post-reproductive stages only - (e.g. older males) Harvest not impacting other areas.	Impacts severe (e.g., harvest doesn't take into account age/sex of specimens or is done at critical life stages for reproduction). Harvest area acting as sink for surrounding areas.	UNKNOWN
Trade impacts	Impact of trade on harvest area, national population and internationally. Consider total volume of trade (domestic and export) trade (known, inferred, projected, estimated).	Low levels of trade relative to population. Little illegal trade known.	High levels of trade in comparison with population. Illegal trade known.	UNKNOWN
Population monitoring	Is a monitoring program in place? Frequency of monitoring depending on species characteristics. Methods for monitoring.	Regular, using robust methods (changes in density, distribution, demography considered)	No/infrequent monitoring, unreliable methods	UNKNOWN
Management measures in place/proposed including adaptive management	Harvest management/ compliance / land and resource tenure	Measures in place (e.g. quotas, size/sex limits, protected/no-take areas, limits on effort/ gear. Tenure: strong long-term control	No or inadequate management measures in place. Tenure: Open access e.g. fisheries in ABNJ, no harvest controls	UNKNOWN
		LOW/MED No need for ecosystem Impact evaluation	HIGH	UKN

Ecosystem Impacts

Factor	Assessment may consider	Evaluation
Impacts on role in ecosystems and direct impact on other species and the ecosystem	Does harvesting impact other species or the ecosystem directly or the species' role in the species ecosystems resulting in: (Consider in detail only if high risk/ complex NDF needed)	*Evaluate the following for impacts on role in ecosystems and direct impact on the ecosystem based on best available information:* • *a significant change* in the abundance of another native species • an increase in the abundance of a non-native species or over-abundance of another species • a reduction in a demographic rate in any life stage of another native species (e.g., germination, seed production, nest success, natal dispersal, etc.) that has the potential to decrease its abundance or otherwise reduce its viability • change in any ecosystem process or structural feature • change in the typical patterns of behaviour (e.g., social interactions, patterns of aggregation, movement) among individuals of the species being assessed or other species • change in genetic structure or variability of the population that indicates that one or more of the ecological functions of the species'are, or will become, impaired

Module 13 – Comprehensive Assessment Template.

3. Comprehensive Assessment Template

Species name	
Range state name	
Report compiled by	
Date compiled	

Part One: Risk Evaluation

Factor	Assessment may consider	Evaluation – example indicators				Scientific Authority Assessment and relevant information/ data
Species' biology and life-history characteristics	Intrinsic vulnerability of species or population (reproductive capacity, niche width)	r-selected species (early maturity, short-lived, many offspring), adapts to various habitat types		K-selected species (late maturity, long-lived, few offspring), specialist	Unknown	
Species' range (historical and current)	Distribution and trends	Widespread, stable distribution over time, connected populations		Endemic, restricted, fragmented distribution, declined over time, shared stocks	Unknown	
Population structure, status and trends	Population size / structure/ density and trends (harvest area and nationally)	Population size large, stable or increasing. Representative inventories/surveys over time		Low population size, declining trend, skewed populations (age classes or sex).	Unknown	

Conservation status	Status and trends (global, national, and local scales)	Least Concern (LC)	Vulnerable (VU) and Near Threatened (NT)	Critically Endangered (CR), Endangered (EN), Data Deficient (DD), CITES Appendix I	Unknown	
Threats	Other threats and threat trends	No other significant known threats		Subject to multiple threats (habitat loss, climate change, invasive alien species)	Unknown	
Part Two: Impact and Management Evaluation						
Factor	Assessment may consider	Evaluation – example indicators (not exhaustive)				Scientific Authority Assessment and relevant information/ data
Harvest impacts/total offtake impacts	Impact of harvest/total offtake on harvest area, national population and internationally. Consider total volume of harvest/offtake (both for domestic and export as well as any other offtake, or removal of specimens from the wild) and legal and illegal harvest. Consider harvest/offtake from harvest area in context	Low impact (e.g., Non-lethal harvest that does not imply removal of individuals from the wild; Harvest of life stages with low survival rate (source R); Harvest is in post-reproductive stages only - (e.g. older males). Harvest not impacting other areas.	Impacts severe (e.g., harvest doesn't take into account age/sex of specimens or is done at critical life stages for reproduction). Harvest area acting as sink for surrounding areas.		Unknown	

	of national level trade and trend.				
Trade impacts	**Impact of trade on harvest area, national and international population. Consider total volume of (domestic and export) trade (known, inferred, projected, estimated).**	**Low levels of trade relative to population. Little illegal trade known.**	**High levels of trade in comparison with population. Illegal trade known.**	**Unknown**	
Population monitoring	**Is a monitoring program in place? Frequency of monitoring depending on species characteristics. Methods for monitoring.**	**Regular, using robust methods (changes in density, distribution, demography considered)**	**No/infrequent monitoring, unreliable methods**	**Unknown**	
Management measures in place / proposed including adaptive management	**Harvest management/ compliance / land and resource tenure**	**Measures in place (e.g. quotas, size/sex limits, protected/no-take areas, limits on hunting effort/ gear. Tenure: strong long- term control**	**No or inadequate management measures in place. Tenure: Open access e.g. fisheries in ABNJ, no harvest controls**	**Unknown**	

	LOW / MEDIUM risk of detrimental impacts **No need for ecosystem impact evaluation**	
Ecosystem Impacts		**Scientific Authority Assessment and relevant information/ data**

In the following two example case studies the template above has been adapted to adequately accommodate Scientific Authority Assessment and relevant information/ data, which is now under each factor rather than on the right of the table.

Case study 4: *Python regius* from Togo Comprehensive assessment (Module 2 and Module 9)

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Background.

Python regius from Togo has been selected for the RST. At AC33 recommendations were made (/https://cites.org/sites/default/files/documents/E-AC33-Com-07_0.pdf) and Togo submitted a comprehensive NDF report to SC78.

The following comprehensive NDF assessment is based on Togo's report to SC78. It was translated from French to English using DeepL and extracts are copied in verbatim. **Assessment of risk (colour rating) was not done in consultation with Togo and information in yellow has been added as additional references.**

Comprehensive Evaluation Template

Species name	*Python regius*
Range state name	Togo
Report compiled by	Gabriel H. SEGNIAGBETO[1], Delagnon ASSOU[1], Djafarou IDRISSOU[2] & Valentin Koffi MAWOUGNIGNA[1] 1. Laboratoire d'Ecologie et d'Ecotoxicologie, Faculté des Sciences (Autorité Scientifique CITES), Université de Lomé, 01BP 1515 Lomé Togo, 2. Direction des Ressources Forestières (Organe de Gestion CITES), Ministère de l'Environnement et des Ressources Forestières, B.P 355, Lomé-TOGO,
Date compiled	11/11/2024

Python regius de la forêt d'Amou Mono

Initial data gathering	
Species name	*Python regius*
Range state name	Togo
Report compiled by	From **SC78 Doc 34.2**

Date compiled	19/02/25
1. Is the species correctly identified and named?	Yes
2. Is the species or specimen listed in Appendix I or II?	Included in Pythonidae spp. listed in 1977 App II
3. Is the species exempted or excluded from CITES controls?	No
4. Have recommendations been issued to suspend trade in the species being exported?	No
5. What is the quantity of specimens exported?	**Total 64,000 (62,500 R and 1500 wild caught).**
6. Describe the specimen	Live individuals for pet trade (adult or juvenile??).
7. What is the source of the specimens?	62,500 ranched specimens and 1,500 wild caught specimens.
8. What is the purpose of exports?	Pet trade (commercial)
9. Where were (or will) the specimens (be) harvested from?	In the south, there are five main areas where live specimens collected: the Lake Togo area (Abobo, Lébé, Kpome, Sevagan, Togoville, Vogan Bame), the Bas Mono area (Afagnan, Agome Glozou, Agome Seva, Botonou, Aveve, Adame, Agbanakin), the Tsévié Tabligbo area(Adangbe, Gati, Gblinvie, Tsékpo, Zafi, Kouvé, Gboto, Sedome, Lakata, Mare Afito), the Azahoun Tovégan Kati area (Ando Kpome, Azahoun, Tovegan, Kati, Kologan, Kpando, Avetonou) and the Amou Mono area (Kpové, Tetetou, Tohoun, Tado, Ahassoume, Kpekpleme, Nangbeto).
10. What is the scale of the current NDF assessment (e.g., national, or area-specific)?	National – sustainability of quota for live specimens (both Wild and Ranched).
11. National legislation – can national regulations help to understand potential detriment from harvesting or extinction risks? Are there national stricter domestic measures?	

Factor	Assessment may consider	Evaluation – example indicators			
Species' biology and life-history characteristics	**Intrinsic vulnerability of species or population (reproductive capacity, niche width)**	**r-selected species (early maturity, short-lived, many offspring), adapts to various habitat types**		**K-selected species (late maturity, long-lived, few offspring), specialist**	**Unknown**

Ecology/ Life history traits

Reproduction: age at maturity, clutch size, viviparity: Data on the reproduction of *Python regius* in Togo are based on the work of De Buffrenill (1995) and Mawougnigan (2019). According to this work, based on data provided by Toganim, P. regius females mature 28 to 32 months of age (18 months for males), while *P. sebae* females begin reproducing at around 3 years of age (18 months for males). Females reach sexual maturity at 70 to 80 cm. For males, sexual maturity is reached between 2 and 3 years for males. This relatively long period before reproduction limits the species' ability to compensate quickly for excessive exploitation.

The Royal Python breeds oviparously, with clutch sizes generally ranging from 3 to 11 eggs. Observations in Togo sometimes show female individuals with clutches of up to 19 eggs. Although this clutch size is relatively small compared to other snakes, the *Python regius* has a high hatching success rate in captivity, mainly due to maternal care, with females actively incubating their eggs until they hatch. Data collected from breeders in Togo indicate an incubation rate of between 95% and 98% (Mawougnigan 2019). However, these factors do not fully compensate for excessive commercial exploitation in the wild. It is also relevant to note that *Python regius* can, in rare cases, reproduce by parthenogenesis, a phenomenon documented in some captive specimens. Although this mechanism could theoretically increase reproductive potential, it remains rare and is not a major survival strategy in the wild.

Lifespan and frequency of reproduction: In his report on *Python regius* production in Togo, at the Toganim breeding farm, females aged 15 years were reported (De Buffrenil 1995). Available literature indicates that the *Python regius* has a relatively long life expectancy, up to 20-30 years in captivity (Aubret et al. 2003 and 2005). In the wild, this lifespan may be shorter due to predation and other environmental pressures, but longevity remains an asset for the species the context of commercial exploitation. This allows it to have several opportunities to reproduce throughout its life. However, the frequency of reproduction is generally annual, and even biennial for some females, depending on the availability of resources and environmental conditions (Aubret et al. 2003 and 2005). This relatively low frequency limits the ability of wild populations to regenerate rapidly in the event of intensive harvesting.

Cryptic lifestyle and spatial distribution: According to the work of Trape (2022), the *Python regius* adopts an essentially nocturnal and cryptic lifestyle. It spends most of its time hidden in burrows, under rocks or in dense vegetation, which makes it difficult to detect for predators, but also for collectors. This behaviour may offer some protection against over-capture, but it is not a total guarantee, as capture methods are becoming increasingly sophisticated.

In terms of spatial distribution, the royal python is a very common species in Togo according to the work of Segniagbeto et al. (2011). Its range extends from the south to the north of the country. The specimens were collected in the Oti-Kéran National Park. These results show that the distribution area of the species in Togo is greater than 20 000 km2. In addition to this wide distribution in the country, there is a large population of the species in the southern part of the country, in particular around Togo's coastal lagoon system (Lake Togo), along the River Mono in all the ecological units of the Mono Transboundary Biosphere Reserve, the forests Amou Mono up to the latitude of the Abdoulaye Wildlife Reserve. There is also a significant population of the species in places such as Agbanakin, Agome Glozou, the Togodo protected area complex, the Tetetou area, Tohoun, Tado and Kpekpleme along the Mono. Areas with large populations have also been identified in the Anokpome, Azahoun and Kati regions. There is also a large population of the species in the wetlands along the Zio and Haho rivers. In the central part of the country, notably the Abdoulaye, Goubi and Koussountou areas, and even around the Fazao Malfakassa national park, the species is relatively common.

In addition to its wide distribution throughout the country, the species is highly adaptable to degraded ecosystems. Individuals can be found in cassava fields, fallow land, oil palms, degraded savannahs and degraded forests, particularly in ecological zone IV of the country (Segniagbeto et al. 2011 and 2022). In the south-east of the country, particularly in the relict forests of coastal wetlands, the species is practically anthropophilous. Individuals are sometimes found in human dwellings. The wide distribution of the species and its ability to adapt in degraded areas leads us to assign a score of 1 for its distribution area.

Dispersal and feeding: The *Python regius* has a relatively limited ability to disperse. It rarely travels long distances, preferring relatively small areas where resources are available, in particular rodent burrows, dead leaves, old abandoned termite mounds, etc. This low dispersal capacity limits its ability to recolonise areas after excessive exploitation or habitat degradation. This low dispersal capacity limits its ability to recolonise areas after excessive exploitation or habitat degradation. It can be found in fallow land, on oil palm plantations in more or less degraded vegetation, and sometimes even in human dwellings. Collectors in Togo a very good knowledge of the python's specific habitats, which makes hunting easy. It is very interesting to work with these collectors during field surveys.

In terms of diet, the *Python regius* is a generalist or opportunistic predator, feeding mainly on small mammals such as rodents. It can therefore also play a role in pest control in rural communities (Gorzula et al. 1997, Chippaux 2006). Birds are also an important component of the diet in some regions (Luiselli and Akani 2002, Toudonou 2015). This dietary generalisation allows the species to adapt to fluctuations in the availability of prey. However, this dietary flexibility only marginally influences its resilience in the face of intensive trade in live specimens. On livestock farms in Togo, Benin and Togo. In Ghana, pythons are fed live mice twice a week, according to Toudonou (2003), with one small mouse per snake and two large mice per adult.

Breeding season and seasonality: The *Python regius* breeding season is generally linked to the dry season, with mating taking place at the end of the dry season and the start of the rainy season. This seasonality has implications for the collection of specimens in the wild, as the breeding periods are also when individuals are more active and potentially more vulnerable capture. In Togo, work carried out as part of this mission and by Buffrenil (1995) and Mawougnigan (2019) indicates that the egg-laying period runs from the beginning of February to the end of March and the hatching period from April to May. All the farmers have a good knowledge of the P. regius breeding calendar: mating takes place from October to December, egg-laying in February-March and hatching in April-May. They are organised to better manage live specimens (breeding adults, eggs and newborns) during this breeding period.

Species' range (historical and current)	**Distribution and trends**	**Widespread, stable distribution over time, connected populations**		**Endemic, restricted, fragmented distribution, declined over time, shared stocks**	**Unknown**

Extant (resident)

Benin; Burkina Faso; Cameroon; Central African Republic; Chad; Congo; Congo, The Democratic Republic of the; Côte d'Ivoire; Gambia; Ghana; Guinea; Guinea-Bissau; Mali; Niger; Nigeria; Senegal; Sierra Leone; South Sudan; Togo; Uganda (IUCN Red List) .

Geographic distribution

The royal python is a very common species in Togo according to the work of Segniagbeto et al (2011 and 2022). Its range extends from the south to the north of the country. The specimens were collected in the Oti-Kéran National Park. These results show that the distribution range of the species in Togo is more than

20,000 km2. In addition to this wide distribution in the country, there is a large population of the species in the southern part of the country, particularly around Togo's coastal lagoon system (Lake Togo), along the Mono River in all the ecological units of the Mono Transboundary Biosphere Reserve, the forests of Amou Mono up to the latitude of the Abdoulaye Wildlife Reserve. There is also a significant population of the species in places such as Agbanakin, Agome Glozou, the Togodo protected area complex, the Tetetou area, Tohoun, Tado and Kpekpleme along the Mono. Areas with large populations have also been identified in Andokpome, Azahoun and Kati regions. There is also a large population of the species in the wetlands along the Zio and Haho rivers. In the central part of the country, particularly the Abdoulaye, Goubi and Koussountou areas, and even around the Fazao Malfakassa national park, the species is relatively common. Numerous individuals have recently been recorded along the River Kara, particularly in the localities of Sarakawa and Kpéssidè. On the basis of the available data, the Royal Python has a very wide distribution in the country.

Habitat area and characteristics of habitat

The royal python is not dependent on specific habitats. The species is highly adaptable to degraded ecosystems. Individuals can be found in cassava fields, fallow land, oil palms, degraded savannahs and degraded forests, particularly in ecological zone IV of the country (Segniagbeto et al. 2011 and 2022). In the south-east of the country, particularly in the humid and marshy forests of Avévé and Akissa, the species is practically anthropophilous. Individuals are sometimes found in human dwellings. Numerous populations have been recorded in mangrove areas, including the marshy savannahs of the mangrove hinterland. For the purposes of this assessment, all the individuals recorded were observed in fallow land in localities such as Ahassomé, Village de Petit Nouglo, Lebe and Abobo. The latter two localities are now suburbs of Lomé.

Population structure, status and trends	**Population size / structure/ density and trends (harvest area and nationally)**	**Population size large, stable or increasing. Representative inventories/surveys over time**		**Low population size, declining trend, skewed populations (age classes or sex).**	**Unknown**

Population abundance, density and size

The Royal Python is a very abundant species throughout its national range. This abundance is greatest in three areas of Togo: the first is Togo's coastal lagoon system (Lake Togo), along the Mono River in all the ecological units of the Mono Transboundary Biosphere Reserve. The Togodo protected area complex and the Tetetou, Tohoun, Tado and Kpekpleme areas along the Mono have a very high density of *Python regius*. The density of the python population is relatively high. The second zone, where the density is high, is made up of localities such as Agbanakin, Agome Glozou, Aveve, Akissa, Agomé Seva, Anfoin, Tsévié, Gati, Adangbe, Kouvé, Tabligbo, etc. This second zone probably contains a large population of the species. In these areas, the python population density can be as high as one individual for every kilometre travelled, especially in fallow land, along watercourses and so on. There is also a large population of the species in the wetlands along the Zio and Haho rivers.

Table 2: Population density of *Python regius* recorded during fieldwork

Locations/Zones	Lake Togo	Low Mono	Tsévié Tabligbo	Tovégan Kati	Amou Mono zone
Distance travelled (Km)	5	3	12	8	15

Kilometric index of abundance	0,5	0,75	0,81	0,36	0,93

Population structure

The structure of the different populations of *Python regius* has not been sufficiently documented. However, during fieldwork for this assessment, individuals of different age classes were recorded. adults, juveniles and even eggs were found on farms in the main localities. For example, in three localities (Saligbe, Tohoun and Kpovegan) during 2023, in the absence of demand, large numbers of newborns were released into wild. These newborns were produced by local people themselves, and did not come from captures in the wild. Examples include the following: Mr Agbegnon (Saligbe) released 3,500 pups, Mrs Abla (Tohoun) released 3,000 pups and Mr Kogbedji (Kpovegan) released 2,500 pups. The production of these newborns shows that within the different populations, there are individuals of different age classes. These results confirm that reproduction occurs in the wild within wild populations of the species

Distribution within Togo

In terms of spatial distribution, the royal python is a very common species in Togo according to the work of Segniagbeto et al. (2011). Its range extends from the south to the north of the country. The specimens were collected in the Oti-Kéran National Park. These results show that the distribution area of the species in Togo is greater than 20 000 km2. In addition to this wide distribution in the country, there is a large population of the species in the southern part of the country, in particular around Togo's coastal lagoon system (Lake Togo), along the River Mono in all the ecological units of the Mono Transboundary Biosphere Reserve, the forests Amou Mono up to the latitude of the Abdoulaye Wildlife Reserve. There is also a significant population of the species in places such as Agbanakin, Agome Glozou, the Togodo protected area complex, the Tetetou area, Tohoun, Tado and Kpekpleme along the Mono. Areas with large populations have also been identified in the Anokpome, Azahoun and Kati regions. There is also a large population of the species in the wetlands along the Zio and Haho rivers. In the central part of the country, notably the Abdoulaye, Goubi and Koussountou areas, and even around the Fazao Malfakassa national park, the species is relatively common.

In addition to its wide distribution throughout the country, the species is highly adaptable to degraded ecosystems. Individuals can be found in cassava fields, fallow land, oil palms, degraded savannahs and degraded forests, particularly in ecological zone IV of the country (Segniagbeto et al. 2011 and 2022). In the south-east of the country, particularly in the relict forests of coastal wetlands, the species is practically anthropophilous. Individuals are sometimes found in human dwellings. The wide distribution of the species and its ability to adapt in degraded areas leads us to assign a score of 1 for its distribution area.

Dispersal and feeding: The *Python regius* has a relatively limited ability to disperse. It rarely travels long distances, preferring relatively small areas where resources are available, in particular rodent burrows, dead leaves, old abandoned termite mounds, etc. This low dispersal capacity limits its ability to recolonise areas after excessive exploitation or habitat degradation. This low dispersal capacity limits its ability to recolonise areas after excessive exploitation or habitat degradation. It can be found in fallow land, on oil palm plantations in more or less degraded vegetation, and sometimes even in human dwellings. Collectors in Togo a very good knowledge of the python's specific habitats, which makes hunting easy. It is very interesting to work with these collectors during field surveys.

In terms of diet, the *Python regius* is a generalist or opportunistic predator, feeding mainly on small mammals such as rodents. It can therefore also play a role in pest control in rural communities (Gorzula et al. 1997, Chippaux 2006). Birds are also an important component of the diet in some regions (Luiselli and Akani 2002, Toudonou 2015). This dietary generalisation allows the species to adapt to fluctuations in the availability of prey. However, this dietary flexibility only marginally influences its resilience in the face of intensive trade in live specimens. On livestock farms in Togo, Benin and Togo.

However, as part of the work to assess the status of this species in Togo, D'Cruze et al (2020) raised a number of potential management (legislative, conservation) and animal welfare issues associated with current hunting practices in Togo (and neighbouring states) to supply reptile farms in Lomé and, ultimately, the international trade in exotic pets. The findings of this study suggest that the breeding methods applied in the field do not accurately reflect those declared to national authorities and international regulatory mechanisms such as CITES. According to the study, this trade may not be sustainable. Some hunters also suggest that pythons are becoming less and less rare in the wild.

Within the framework of the present assessments on behalf of the "Projet d'Aide pour le Respect de la Convention CITES ou projet PARC", numerous live specimens have been observed in the wild, particularly along the Mono in localities such as Agbanakin, Agome Glozou, the Togodo protected area complex, the Tetetou area, Tohoun, Tado and Kpekpleme. The abundance of this species in these areas was highlighted by the work of Segniagbeto et al (2022). Large populations were also observed in the Andokpome, Tovegan, Azahoun and Kati regions during fieldwork for this assessment. The wetlands of the Zio and Haho rivers are also important habitats for Royal Python populations. For example, in three localities (Saligbe, Tohoun and Tovegan) during 2023, in the absence of demand, large numbers of newborns were released into the wild. These newborns were produced by the local actors themselves and did not come from catches in the wild. Examples include the following: Mr Agbegnon (Saligbe) released 3,500 babies, Mrs Abla (Tohoun) released 3,000 babies and Mr Kogbedji (Kpovegan) released 2,500 babies. As a result of the poor sales, collectors and many small-scale producers have seen their income fall by an average of $2,000 as a result of the international trade in python specimens.

Conservation status	**Status and trends (global, national, and local scales)**	**Least Concern (LC)**	**Vulnerable (VU) and Near Threatened (NT)**	**Critically Endangered (CR), Endangered (EN), Data Deficient (DD), CITES Appendix I**	**Unknown**

Conservation status assessments

The conservation status of this species was recently assessed by D'Cruze et. al (2022) as Near Threatened (NT). This status was defined on the basis that despite its wide distribution in Africa, specimens of the species continue to be subject to high levels of exploitation throughout its range, to the extent that there is concern about the long-term survival prospects of this snake in West and particularly in Togo where the largest population of the species is found. The assessment recognised that there has been no systematic research into rates of decline, and that an assumption that the decline may have exceeded 30% over a three-generation period is considered overly conservative on the basis of available information. Declines have been reported in most West African range states, there are no mechanisms in place to ensure that harvesting is sustainable or systematic monitoring, and regulation of trade and enforcement of existing restrictions on harvesting are considered inadequate.

In response to the concerns raised in this assessment, Togo's CITES authorities are encouraging livestock to support hunters in the production live specimens. Hunters and farmers in many localities are working to produce live specimens on their farms, especially on fallow land, which is organised as part of agricultural production systems. Breeding adults are even bred in human habitations to ensure the availability of juveniles for export. Based on current practices in Togo, the live specimens available in the trade are in fact individuals born in captivity.

On the basis of the available data and with reference to the assessment criteria, the level of annual production and exploitation is not detrimental to the survival of the various wild populations of the species. The current trend (table 1) has no effect on the decline wild populations. In addition, the CITES Management Authority and Togo's CITES Scientific Authority are working with all stakeholders to ensure that this level of exploitation is not detrimental to the various wild populations.

<table>
<tr><td>Threats</td><td>Other threats and threat trends</td><td>No other significant known threats</td><td></td><td>Subject to multiple threats (habitat loss, climate change, invasive alien species)</td><td>Unknown</td></tr>
<tr><td colspan="6">Threats
The Python regius in Togo is a highly endemic species in the south. In the north, it is commonly poached for its meat. In Togo's "Fetish Market", many dried heads are displayed and sold for use in traditional medicine (Segniagbeto et al. 2013, D'Cruze et al. 2020). Secondary threats also exist due to habitat modification through processes such as agricultural intensification and pesticide use (Toudonou 2015, D'Cruze et al. 2020), and human population growth is expected to exacerbate all these pressures. The biggest threat, however, is most likely the international trade in exotic pets. Togo is the biggest exporter of live specimens of this species. As far back as 1998, it was suggested that in certain regions of West Africa, it is likely that the repeated loss of neonates to the pet trade could lead to the local extinction of the species (Walls 1998). Chippaux (2006) notes that the trade in this species puts it in serious danger of extinction, at least in some parts of its range. The work of Toudonou (2015), Auliya et al. (2020) and D'Cruze et al. (2020) indicates that harvesting targets the most vulnerable life stages, neonates and pregnant females.

However, current practices guarantee the sustainability of exploitation and the conservation of wild populations. The work of Ineich (2006) in Togo, Ghana and Benin confirmed this hypothesis. Although the hypotheses of Ineich (2006) have considered dubious by the work of Toudonou (2015), Auliya et al. (2020) and D'Cruze et al. (2020), who describe the link between legal hunting, ranching and/or breeding wood pythons and the illegal trade in wood pythons as bushmeat, the observations made in the various localities as part of this evaluation confirm the hypotheses of Ineich (2006).</td></tr>
<tr><td>Factor</td><td>Assessment may consider</td><td colspan="4">Evaluation – example indicators (not exhaustive)</td></tr>
<tr><td>Harvest impacts/total offtake impacts</td><td>Impact of harvest/total offtake on harvest area, national population and internationally. Consider total volume of harvest/offtake (both for domestic and export as well as any other offtake, or removal of specimens from the wild) and legal and illegal harvest. Consider harvest/offtake from harvest area in context of national level trade and trend.</td><td>Low impact (e.g., Non-lethal harvest that does not imply removal of individuals from the wild; Harvest of life stages with low survival rate (source R); Harvest is in post-reproductive stages only - (e.g. older males). Harvest not impacting other areas.</td><td colspan="2">Impacts severe (e.g., harvest doesn't take into account age/sex of specimens or is done at critical life stages for reproduction).
Harvest area acting as sink for surrounding areas.</td><td>Unknown</td></tr>
</table>

Distribution of commercial hunting

As part of this assessment, discussions with farm managers and hunters indicate that there are four major collection areas for live specimens of Python reguis in international trade. These are all areas close to Lomé where the population density of the species is relatively low. These include sites around Lake Togo (Abobo, Kpogame, Sevagan, Anfoin, etc.), areas in the lower Mono (Avévé, Agbanakin, Adamé, Agome Seva, Agome Glozou, etc.), the Tsévié Tabligbo area (Gati, Adangbe, Gblinvié, Kouvé, Gboto, Sedome, etc.) and the area from D'Andokpome, Tovegan, Kologan to Kati. What is interesting about these localities is that the local communities, especially the hunters, have gradually become python breeders.

Apart from these heavily sampled areas, areas further north are very little affected by the collection of live python specimens in international trade. These are the areas to the north of the Togodo protected area complex, notably Tohoun, Tado, Ahassome, Kpekple, Nangbeto and beyond. Beyond these areas, the population density of *Python regius* is very high.

Annual harvest for trade

The annual quota defined for the *Python regius* in Togo is 62,500 specimens from "R" sources and 1,500 specimens from "W" sources per year. In practice, the 62,500 live specimens defined as "R" source are actually specimens produced in captivity. These are local hunters and farmers who produce juveniles on their estates for the international trade. On this basis, "R" source individuals must not exceed 15 cm in length to prevent breeding adults from being collected for international trade.

The specimens actually collected in the wild for international trade are individuals from "W" sources, i.e. the quota of 1,500 live adult specimens. It is in fact this number that could be detrimental to the various wild populations of the species in Togo. However, if we consider the size of the populations of this species in the maritime region near Lomé, this quota would not be detrimental to wild populations of *Python regius* in Togo. The species is highly adaptable even in degraded habitats, including human settlements along the Mono and small forests in and around Togo's coastal lagoon system.

Harvest effort

For the purposes of this assessment, the fieldwork carried out in the various localities relates to data on population abundance (Table 2). However, hunters and collectors have specific affinities that are probably better at finding animals than our observation . Their ability to find animals is superior to the data on relative abundance that we obtained for the different sampling zones.

Domestic use and trade

The people of southern Togo are animists. Animist practices lead the populations to build religious convents that encourage and train their followers. These places are often set up as ceremonial places, decorated with statuettes, and depending on the case, use elements of nature as sacred objects (rocks, trees, forests, water, animals, etc.). Some convents are specifically dedicated to the Royal Python and some communities identify with this species of snake, which represents a divinity (the Pédah and Xla). In these localities in south-east Togo, live specimens of the python are often found in homes and cohabit with humans. As a result, pythons are not hunted but revered.

However, in recent decades, the influence of so-called monotheistic religions (Christianity and the Muslim region) has destroyed all the practices of the traditional Vodou religion. In these localities, people are hunting pythons for the international market. The pythons are not eaten, but they are hunted for international trade. In northern Togo, some communities eat python meat. However, there is no real hunt focused on the species. The diversity of communities in northern Togo, which are increasingly moving south, reinforces these practices. It is these communities that capture the pythons for the breeding farms set up in Lomé. In addition, during fieldwork for this assessment, reports of illegal trafficking of python specimens through Benin to Nigeria were noted in the Tohoun, Tado and Ahossomé regions. It is often the adults who are exploited in these practices, probably for consumption.

Impact of trade on natural populations: Live specimens of *Python regius* exported in international trade from Togo come from breeding farms with installation permits in Lomé and from farmers in various localities in areas where populations of the species are abundant. Exports from Togo are controlled by the management body, which works all stakeholders to set annual export quotas. Quotas for wild specimens are also set by all stakeholders. As a result, the impact of trade on wild populations of the species remains very limited.

However, when this activity began in the 70s and 80s, considerable quantities of wild and adult individuals were exported from Togo. This practice likely to put significant pressure on wild populations. The mass capture of specimens, particularly to meet demand from the pet market at the time, would have a direct impact on local populations, even if some of these specimens are now farmed. Recent work by Aulya (2020) indicates that the anthropogenic practices of breeding farms on individuals released into the wild have helped to maintain the genetic structures of populations. No absence of a distinct subdivision of the population was observed and this may be the result of anthropogenic mixing of populations associated with commercial wildlife trade activity in recent decades.

Trade impacts	**Impact of trade on harvest area, national and international trade (known, inferred, projected, estimated).**	**Low levels of trade relative to population. Little …**	**High levels of trade in comparison with population. Illegal trade known.**	**Unknown**

International trade
The royal python (*Python regius*) is the most widely exported CITES-listed reptile species from West Africa, with a large quantity coming from Togo through a system known as "ranching" (D'Cruze et al. 2020). The export quota regularly set for this species over the last ten years varies between 60,000 and 65,000 live individuals per year. The "R" Ranch sources of specimens are regularly between 60,000 and 62,500 specimens. Wild" sources of animals are regularly set at 1,500 specimens per year.

However, despite this large quantity of live specimens set for the quota, the breeding structures mainly operate according to the ranching method, on the one hand to involve the village populations in the conservation of the species and the sharing of income, but also because this production method is much more profitable and easier (Ineich 2006, Segniagbeto 2016) for the breeding farms. This method of production also means that animals can be kept in captivity for much shorter periods and in better conditions. In the villages, hunters collect pregnant females from the wild. They are then transported to the various breeding farms in Lomé, where they are placed in plastic boxes for better hygiene and easier management of the herd.

In some cases, hunters take only the eggs of incubating females from breeding sites and then leave these females directly at the collection site. This method seems much more productive and spares the adult females the stress of captivity. What's more, only the eggs are transported from the field to the farms, and hatching rates are much higher.

When pregnant females were transported from the field to the farm, the numerous shocks caused major losses in the eggs contained in their genital tract. This mortality is now limited. Today, only fully formed and laid eggs are carefully transported to the farms. This procedure allows adult females to remain in their natural habitat. Today, many hunters have become python breeders and regularly supply export farms with new quantities of semi-wild animals for the trade.

However, as part of the work to assess the status of this species in Togo, D'Cruze et al (2020) raised a number of potential management (legislative, conservation) and animal welfare issues associated with current hunting practices in Togo (and neighbouring states) to supply reptile farms in Lomé and, ultimately, the international trade in exotic pets. The findings of this study suggest that the breeding methods applied in the field do not accurately reflect those declared to national authorities and international regulatory mechanisms such as CITES. According to the study, this trade may not be sustainable. Some hunters also suggest that pythons are becoming less and less rare in the wild.

Within the framework of the present assessments on behalf of the "Projet d'Aide pour le Respect de la Convention CITES ou projet PARC", numerous live specimens have been observed in the wild, particularly along the Mono in localities such as Agbanakin, Agome Glozou, the Togodo protected area complex, the Tetetou area, Tohoun, Tado and Kpekpleme. The abundance of this species in these areas was highlighted by the work of Segniagbeto et al (2022). Large populations were also observed in the Andokpome, Tovegan, Azahoun and Kati regions during fieldwork for this assessment. The wetlands of the Zio and Haho rivers are also important habitats for Royal Python populations. For example, in three localities (Saligbe, Tohoun and Tovegan) during 2023, in the absence of demand, large numbers of newborns were released into the wild. These newborns were produced by the local actors themselves and did not come from catches in the wild. Examples include the following: Mr Agbegnon (Saligbe) released 3,500 babies, Mrs Abla (Tohoun) released 3,000 babies and Mr Kogbedji (Kpovegan) released 2,500 babies. As a result of the poor sales, collectors and many small-scale producers have seen their income fall by an average of $2,000 as a result of the international trade in *python* specimens.

These field observations contrast with the data available on the WCMC website regarding the quantity of live specimens of this species exploited in international trade over the last ten years (Table 1). To appreciate the disparities between the field data and the data available on the WCMC site, we examined the data provided by Togo's CITES Management Authority in 2021 and 2022.

Table 1: Data on international trade in *Python regius* specimens (2013-2022)

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Importing countries	76186	43961	34557	43162	61812	59842	59588	69531	77670	83630
Togo	62032	62802	41173	57605	18666	25808	31250	104636	96743	106936

Examination of the reports provided by the management body reveals that the reports regularly provided by the management body contain many irregularities. These irregularities include a. Reversals of CITES permits issued in previous financial years. Analysis of the report has shown that CITES permits from previous years have been reissued during the current financial year. This has contributed an increase in quantity of specimens declared for this species, whereas in practice this has not been the case.

b. There is no monitoring mechanism to ensure that the Management Body has the permits actually used in order to facilitate checks (between permits used and permits issued) and annual reporting.

All those involved, and especially those in charge of the CITES Management Authority and the agents, have become aware of the errors contained in the annual reports that are regularly sent to the CITES Secretariat.

On the basis of the available data and with reference to the assessment criteria, the level of annual production and exploitation is not detrimental to the survival of the various wild populations of the species. The current trend (table 1) has no effect on the decline wild populations. In addition, the CITES Management Authority and Togo's CITES Scientific Authority are working with all stakeholders to ensure that this level of exploitation is not detrimental to the various wild populations.

Production capacity for live specimens on breeding farms and in local communities

In Togo, several relatively old reptile breeding structures have been set up, most of which date back to 1992 (de Buffrénil, 1995). The pioneers in this field are TOGANIM, set up in 1970, and PAJAR since 1989. This type of reptile production was introduced in Togo in the 1960s by Jean- Pierre FOUCHARD, then Director of the TOGANIM Company in Lomé, Togo, and father of its current Director, Eric FOUCHARD (current Director of TOGANIM). These two organisations often acted as referees and advisers for their colleagues, but commercially profitable improvements were generally kept secret, as competition dictated. From these two structures, new structures were set up in the country and today, in addition to these two older structures, there are Reptiland, Adaptation, Fexas, Mare, etc.

Today, all the farms that have been set up have expertise in python breeding. They operate on a ranching basis, partly to involve village populations in the conservation of the species and the sharing of income, but probably also because this method of production is much more profitable and easier. This production method also means that the captive animals can be kept for much shorter periods and in better conditions. Chameleon and turtle eggs usually left in the ground where pregnant females deposit them, while monitor lion and python eggs are taken from pregnant ranching females and placed in natural or artificial incubators (photo 1). The technique most often used is to place the pregnant females in plastic boxes to ensure better hygiene and easier stock management.

In some cases, breeding farm managers take only the eggs of incubating females from ranching sites and then leave these females directly at the collection site. This method seems much more productive and avoids the stress of captivity for adult females. In addition, only eggs are transported from the field to the farms and hatching are much higher. During the transport of pregnant females from the field to the farm, the numerous shocks caused heavy losses in the eggs contained in their genital tract. This high mortality rate is now limited. Today, only fully formed and laid eggs are carefully transported to the farms. It is almost certain that all Togolese farms will move towards collecting eggs rather than pregnant females in the case of the Royal Python. The cost of operation is limited because adult females are no longer brought back to the farms where they used to stay for relatively long periods, there is no need to feed them, and hatching rates are much higher because the eggs are much 'healthier'. A possible disadvantage is that the egg clusters are heavily parasitised externally in the interstices by ticks, which wait for the young to hatch before attaching themselves to them. Pregnant females are easy to treat, so the eggs laid are free of parasites, whereas it would seem that treating the eggs directly is more difficult. In addition to the production of live specimens on the breeding farms, the farmers in the various animal collection areas are themselves involved in the production of the animals that are sold to the breeding farms. The data collected in the various production zones is as follows. The data collected from local stakeholders is shown in Table 3.

Table 3: Producers and number of adult females found at producers' premises in the various localities

Locations/Zones	Lake Togo	Low Mono	Tsévié Tabligbo	Tovégan Kati	Zone Amou Mono
Hunters	10	4	12	8	9
Breeders (Intermediates)	2	0	4	1	4
Number of adult females (per year)	610	0	2787	3130	2390

As can be seen, collectors and producers in the various localities have sufficient livestock to produce live specimens *of Python regius* for international trade.

Based on the species' reproductive parameters (Mawougnigan 2019), in a sample of 20 pregnant females, the average number of eggs laid per female was 8.3 ±1.41, i.e. 9 eggs were laid per female. Incubation success was 81%. Based on the results of Mawougnigan (2019), we present an estimate of the live specimens of *Python regius* regularly produced annually for trade and in different localities (Table 4).

Table 4: Potential annual quantity of live python specimens for international trade.

Locations/Zones	Lake Togo	Low Mono	Tsévié Tabligbo	Tovégan Kati	Zone Amou Mono

Number of adult females (per year)	610	0	2787	3130	2390
Number eggs	5 490	0	25 083	28 170	21 510
Reproduction rate	4 447	0	20 317	22 817	17 423

The data currently available indicates an estimated 65,004 specimens produced annually in the various localities by farmers (collectors and hunters). It is these farmers who supply the animals to the various breeding farms in Lomé. In addition to what the farmers produce, some farms produce animals themselves for international trade. Based on the available data, the players in the *Python regius* chain have the capacity to supply specimens for the 62,500 specimens per year for the export quota.

D'Cruze et al. *(2020a) note that "The* LEMIS *trade database documents the import of a total of 764,527 live ball pythons from Togo into the USA since the year 2000."*

D'Cruze et at (2020b) recommended that recommend that "additional scientific investigation (focusing on the size and status of the wild population), better management, and enforcement of regulations, are required to ensure that ball python populations are managed in a sustainable, legal and traceable way." A key stage of this ranching system involved releasing the females after they had laid their eggs and also a proportion of the juvenile ball pythons produced annually (stated to be 20% at that time, Ineich 2006; UNEP-WCMC 2014). However, Ineich (2006) also reported that hunters collected non-gravid and male ball python specimens, together with non-CITES listed reptile species for direct export via the farms (Ineich 2006).

Population monitoring	**Is a monitoring program in place? Frequency of monitoring depending on species characteristics. Methods for monitoring.**	**Regular, using robust methods (changes in density, distribution, demography considered)**	**No/infrequent monitoring, unreliable methods**	**Unknown**
Management measures in place/proposed including adaptive management	**Harvest management/ compliance / land and resource tenure**	**Measures in place (e.g. quotas, size/sex limits, protected/no- take areas, limits on hunting effort/ gear. Tenure: strong long- term control**	**No or inadequate management measures in place. Tenure: Open access e.g. fisheries in ABNJ, no harvest controls**	**Unknown**

Measures to address threats

Measures to manage threats to *Python regius* populations have been developed since the 1990s with De Buffrenill's mission Ghana, Benin and Togo on reptile breeding. De Buffrenill's report (1995) clearly indicated that the *Python regius* was a species whose reproduction in captivity was under control and that there was planning for breeding farms in Togo. At time, the results of this work indicated that breeding adults were obtained by acquiring the initial stock in the wild. Over time, this initial parental stock was increased or renewed both by the addition individuals taken from the wild and by the conservation of certain specimens born on the farm. It is clear that in the most recent 'farms' (Mare and Fexas), most of the parental stock comes directly from the wild. Conversely, in the older establishments, Toganim and Pajar, it is possible that a significant (but unquantified) proportion of the breeding stock was born on site (F1 generation in captivity). These two companies are the only ones among all the farms visited (16 in total) to which this remark can be applied.

The results of the De Buffrenill (1995) report were confirmed by the work of Harwood (2003) and Ineich (2006) ten years later. In his report, Ineich (2006) indicates that the Togo establishments all practise ranching and must therefore release a proportion of the juveniles produced annually (20%). This operation will have to be carried out more rigorously with precise counts, geographical locations defined on more solid and mapped bases, and monitoring over several years establish survival rates; these choices will have to be made by the CITES authorities in agreement with the exporters, but not by the exporters themselves. The impact of releases on exploited populations should be more clearly demonstrated by reproducible counts repeated several times a year. This assessment provides a framework for following up the recommendations made by Ineich (2006) and confirmed by the work of Segniagbeto (2016).

These measures, which have been adopted by all the breeding farms in Togo, have helped to reduce the threat to wild populations of the species. The application of these measures has helped to make the production of specimens of *Python regius* in captivity easier. These practices were adopted following the recommendations made in particular by Ineich (2006). The observations made as part of this assessment confirm the observations on the application of recommendations that were made following numerous assessment missions (CITES Secretariat, EU Commission) on the production of live specimens of this species in Togo.

Current quota for the species from Togo, namely 62,500 specimens from the "R" source and 1,500 specimens from the "W" source per year.

Ecosystem Impacts	**LOW / MEDIUM** risk of detrimental impacts No need for ecosystem impact evaluation

Impacts on role of the species in their ecosystems and direct impact on other species and on the ecosystem	Does harvesting/offtake impact other species or the ecosystem directly or the species' roles in their species ecosystems resulting in? (Consider in detail only if harvesting/offtake represents a high risk or if a complex NDF is needed)	Evaluate the following for impacts on role in ecosystems and direct impact on the ecosystem based on best available information: • a significant change in the abundance of another native species, • an increase in the abundance of a non-native species or over-abundance of another species, • a reduction in a demographic rate in any life stage of another native species (e.g., germination, seed production, nest success, natal dispersal, etc.) that has the potential to decrease its abundance or otherwise reduce its viability, • change in any ecosystem process or structural feature, • change in the typical patterns of behaviour (e.g., social interactions, patterns of aggregation, movement) among individuals of the species being assessed or other species, and • change in genetic structure or variability of the population that indicates that one or more of the ecological functions of the species' are, or will become, impaired.	

Conclusion / Decision

Positive decision – non-detrimental

Populations of *Python regius* are relatively common in Togo. The species is also distributed throughout the country. In the south, there are five main areas where live specimens collected: the Lake Togo area (Abobo, Lébé, Kpome, Sevagan, Togoville, Vogan Bame), the Bas Mono area (Afagnan, Agome Glozou, Agome Seva, Botonou, Aveve, Adame, Agbanakin), the Tsévié Tabligbo area(Adangbe, Gati, Gblinvie, Tsékpo, Zafi, Kouvé, Gboto, Sedome, Lakata, Mare Afito), the Azahoun Tovégan Kati area (Ando Kpome, Azahoun, Tovegan, Kati, Kologan, Kpando, Avetonou) and the Amou Mono area (Kpové, Tetetou, Tohoun, Tado, Ahassoume, Kpekpleme, Nangbeto). Most of the specimens traded internationally from Togo are produced by local farmers in areas where populations of the species are abundant. This method of production supports the sustainability of the trade in live specimens of this species in Togo. In addition, the life cycle of the species allows producers to organise the breeding of adult specimens, even in rural areas. Despite this system of producing live specimens of the royal python from Togo, fieldwork has identified several wild individuals, particularly in Amou Mono forest, the Togodo protected area complex and in small forest units along Mono. However, current assessments show that hunters and farmers often use the same populations for different production systems. There is very little diversification of these production zones. What should be noted is that breeding farms, after obtaining the newborns, release the pregnant females into the wild, sometimes not in their original habitats. This has probably led to genetic mixing within the different populations. Recent work by Auliya et al (2020) revealed a lack of distinct subdivision of the different populations of the royal python in Togo, probably due to the anthropogenic mixing of populations associated with commercial wildlife activities in recent decades. *Python regius* is not an IUCN Red List species. On the basis of the data available for this assessment, particularly with regard to production methods, trade in specimens of *Python regius* is not detrimental. We therefore recommend that the CITES Secretariat maintain the current quota for the species from Togo, namely 62,500 specimens from the "R" source and 1,500 specimens from the "W" source per year. For the CITES authorities, in particular the Management Authority, this means stepping up controls at land borders with neighbouring countries (Benin, Ghana), setting up a system for monitoring and controlling production at breeding farms, and drawing up a management plan for trade python specimens in order to guarantee the sustainability of this trade.
Conditions / Remedial Actions / Management Advice
a. End the export campaign at the end of year (31 December each year). This means that any licence not used during the year is automatically cancelled. Livestock farm managers are no longer authorised to use this licence in the form of a trade-in. b. The management authority is invited to draw up a management plan for international trade in specimens of *Python regius* to make the trade sustainable. c. Set up a system to monitor the production of specimens of this species by collectors and breeding farms. d. Set up a monitoring mechanism to ensure that the Management Body has the permits actually used in order to facilitate checks (between permits used and permits issued) and for annual reporting.

In discussion of the case of *Python regius* from Togo during the Review of Significant Trade agenda item AC33, the AC noted that Togo concluded that the NDF was positive, however AC members had particular concerns around how the current trade levels are considered sustainable, the practice of returning females and hatched juveniles to the wild, the application of source codes (particularly R), how to distinguish between ranched and wild specimens, illegal cross-border trade, quotas being exceeded, lack of monitoring, etc.

In discussion of Togo's progress and the NDF submitted SC78

i) acknowledged the progress that Togo has made in the implementation of the Animals Committee recommendations;
ii) requested Togo to establish, in consultation with the Chair of the Animals Committee and the Secretariat, an interim conservative annual export quota for source codes W and R within 90 days for *Python regius* and communicate the quota to the Secretariat; and

iii) invited Togo to provide an update on the implementation of recommendations b) to g) 90 days before the documentation deadline for AC34

Case study 5: *Strombus gigas from Turks and Caicos Islands (UK Overseas Territory) DRAFT Comprehensive NDF assessment (Module 2 and Module 5 particularly Box A)*

1. Pre-NDF check

Taxonomy	
Class	Gastropoda
Order	Mesogastropoda
Family	Strombidae
Genus, species	*Strombus gigas*
Common name	queen conch, pink conch
Synonyms (scientific)	
Notes	Whilst listed as *Stombus gigas* (Linnaeus 1758) on CITES, taxonomy for this group is evolving. The most recent classification places queen conch under the genus *Aliger gigas* (Maxwell et al., 2020), in the Class Gastropoda, Order Neotaenioglossa and Family Strombidae. Several synonyms are noted, although these are not listed on the Species+ database or the CITES Checklist. These include: *Lobatus gigas* (Linnaeus 1758); *Strombus lucifer* (Linnaeus 1758); *EuStrombus gigas* (Linnaeus 1758); *Pyramea lucifer* (Linnaeus 1758); *Strombus samba* (Clench 1937); *Strombus. horridus* (Smith 1940); *Strombus verrilli* (McGinty 1946); *Strombus canaliculatus* (Burry 1949); and *Strombus pahayokee* (Petuch 1994), cited in Horn et. al (2022).

CITES Listing	Annex, listing date, annotations
Appendix II	11/06/1992

Source
Wild

Scope of NDF	
Population level(s): global, regional, country,	Population of Turks and Caicos Islands (UK Overseas Territory)

or area	

CITES suspensions or processes	
Significant Trade:	*Strombus gigas* first entered CITES Significant Trade Review process (designed to identify species that may be subject to unsustainable levels of international trade), in 1994, with recommendations made in 1997 for all range States (CITES 2012). The species was included again in 2001, with recommendations made for 16 range States in 2003 (CITES 2012, CITES 2003). A trade suspension remains in place for Grenada (12/05/06) and Haiti (29/09/03).
Current (2023) CITES suspensions:	• Grenada – All exports (CITES Notif. No. 2023/034) • Haiti – All exports (CITES Notif. No. 2023/034) • Panama - [Stricter domestic measures] The issuance of export permits for all wildlife specimens harvested from the wild (W) for commercial purposes (T) has been suspended (CITES Notif. No. 2023/057) • Mexico – All commercial trade in specimens of CITES-listed species (CITES Notif. No. 2023/037)

2. Risk Evaluation

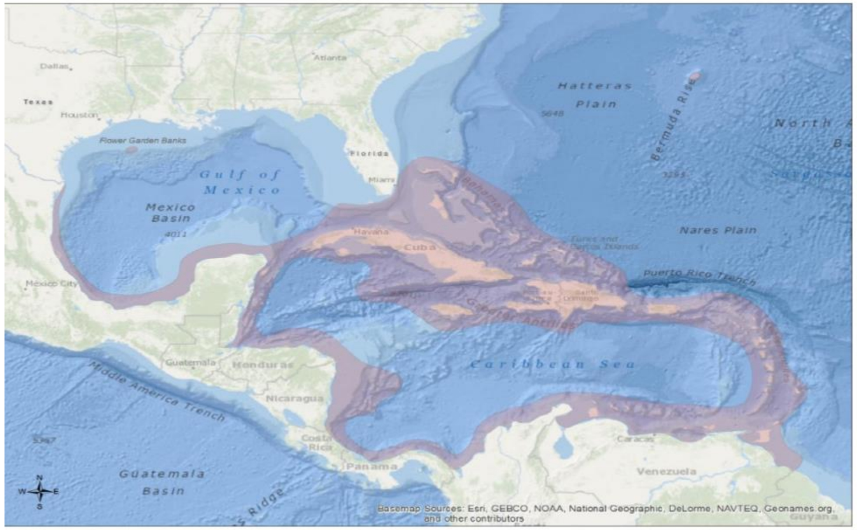
SPECIES BIOLOGY AND LIFE-HISTORY CHARACTERISTICS

a. Level of intrinsic biological vulnerability of the species		
Median age at maturity	Medium	The species has determinate growth and reaches maximum shell length before sexual maturation. Queen conch reach terminal shell length (maximum 140 to 300 mm) around 3.5 years after larval settlement, at which time the edge of the shell lip turns outward to form the characteristic flared lip of the “adult” form. However, it is estimated that queen conch do not reach sexual maturity for 5 or 6 years (Stoner et al. 2012a). After reaching terminal shell length, subsequent growth of the shell occurs only in thickness (i.e. not length) and therefore shell lip thickness can be used to provide an index of age. Stoner et al. (2018) recommends a minimum lip thickness of 15mm is permitted for harvest, as this level of maturity should allow for at least one mating season to occur for the individual prior to harvest. However, neither shell length, nor lip thickness perfectly determines whether conch are sexually mature, as maturity has been observed in the gonads of conch with relatively thin shell lips (Stoner et al. 2012a).
Maximum age/longevity	Low	Queen conch are estimated to have a lifespan of up to 30 years (McCarthy 2007), although some estimates suggest they could reach 40 years (Berg et al. 1992).
Natural mortality rate (M)	Medium	Natural mortality rates during the larval planktonic stages are thought to be quite high, as these stages are exposed to high rates of predation from stingrays, spiny lobster, octopus, nurse sharks, hermit crabs, predaceous snails and other predators (Chávez & Arreguín-Sánchez 1994, cited in Horn et al. 2022). Predation rates decrease considerably as

		conch increase in size, and their strong shells afford increasing protection. Iversen et al. (1986) estimated predation rates of juveniles (5-16cm) to be 60 percent annually, with a specific decrease in predation once they reached 10-15cm shell length. At this point predation is limited to organisms capable of destroying their shells, including sharks, rays, turtles, octopuses and large hermit crabs (Brownell & Stevely 1981, cited in Appeldoorn & Baker 2013). Stoner & Glazer (1998, cited in Appeldoorn & Baker 2013) demonstrated that short-term instantaneous annual natural mortality rates (M) ranged from 4.34 to 12.31 for out-planted hatchery raised juveniles. In southwest Puerto Rico, a decline in M from 2.12 to 0.52 in juveniles to adults was estimated for the natural population (Appeldoorn 1988, cited in Appeldoorn & Baker 2013). Mortality was estimated at 0.42 for individuals aged 4-10 (Tewfik et al. 2001, cited in Appeldoorn & Baker 2013) and 0.3 for Pedro Bank Jamaica (Tewfik 1996, Tewfik & Appeldoorn 1998, cited in Appeldoorn & Baker 2013). Whilst predation is not believed to be a major factor influencing the status of queen conch, severely reduced populations may be vulnerable to collapse with only slight increases in fishing or natural mortality rates (Horn et al. 2022). Climate change may also increase predation rates as warmer waters and increased acidification affect the ability of conch to form strong shells (Horn et al. 2022).
Maximum annual production of offspring (per mature female)	Low	It is estimated that females can lay up to 24 benthic egg masses per year (Stoner et al. 2023). Estimates for the number of eggs per mass vary, with between 100,000 and >900,000 eggs per mass reported (Stoner & Appeldoorn 2021). Appeldoorn (2020, cited in Stoner & Appeldoorn 2021), estimated production for a female conch could reach 22 million eggs per year. Reproduction usually occurs in the warmest months of the year (Aldana-Aranda et al. 2014), although reproductive strategies vary across the Caribbean, and year-round spawning has been observed in some locations including Mexico (Aldana-Aranda et al. 2014) and Puerto Rico (Stoner et al. 2023). The reproductive season for Turks and Caicos Islands extends from March to September (Davies et al. 1987, cited in Stoner et al. 2023).
Other relevant biological factors (behavioural / habitat / breeding requirements)	High	Queen conch are large and slow-moving and occur primarily in shallow bank and coastal environments (usually <30 m depth, although adult conch have been found at depths up to 59m), making them accessible to diving fishers (Stoner & Appeldoorn 2022). Queen conch make size-related migrations over a period spanning settlement to maturity in some locations, with the different life stages having specific habitat requirements. Juveniles live in nursery habitats that have medium seagrass density, depths of 2-4m, strong tidal currents and frequent exchange of clear seawater, often within backreef areas (Appeldoorn & Baker 2013). Adults are found in a variety of habitats that have adequate food and do not have soft, fine-grained sediment, which inhibits their locomotion (Stoner & Appeldoorn 2022), including seagrass meadows, rubble bottom typical of backreef areas, algae-covered hard-bottom, and coarse-grained sand flats. The diet of queen conch consists of native sea grass detritus, and red and green macroalgae, with the production of algae linked to juvenile conch growth (Stoner 2003; Stoner et al. 1994 cited in Horn et al. 2022). Organic material in the sediment and

		cyanobacteria may also be sources of nutrition to juvenile conch (Serviere-Zagaroza et al. 2009, Stoner et al. 1995). When conch first emerge from the sediment and migrate to nearby seagrass beds, they form aggregations in which densities can be as high as 200-2000/ha (Stoner 1989; Stoner & Lally 1994, cited in Appeldoorn & Baker 2013). This is thought to be strategy to reduce predation mortality but comes at a cost of lower growth rates (Stoner & Ray 1993, cited in Appeldoorn & Baker 2013). Successful reproduction is density dependent. Stoner et al. (2011) reported that no mating was observed in the Bahamas, where conch density was less than 47 adults/ha. An earlier study also reported a threshold of 50/ha (average density) under which very little reproductive activity occurred (Stoner & Ray-Culp 2000). Stoner et al. (2011) additionally found that mating frequency increased rapidly with adult density, with 99% probability of mating occurring at 100 adults/ha. However, no reproduction was observed in Florida under 200/ha (Glazer & Delgado 2012, cited in Appeldoorn & Baker 2013), suggesting other factors such as suitable habitat may also be important. Reproductive aggregations appear to occur in the same locations year after year, presumably because of suitable habitat, proximity to feeding habitats and water flow (Stoner & Appeldoorn 2021). It is likely that the Turks and Caicos Islands supplies larvae to the Bahamas, is unlikely to receive larvae from overfished populations up-current, and is largely self-recruiting (Vaz et al. 2022). Therefore, local reproduction is critical for sustaining queen conch populations in Turks and Caicos Islands, with potential knock-on effects for populations in the Bahamas (NOAA, 2022).
Summary of intrinsic biological vulnerability		
Medium		
The result of multiple egg masses being laid per year, each containing as much as 900,000 eggs, is high fecundity, particularly when considering the species longevity and a natural reproductive lifespan of 20 years or more (Stoner et al. 2023). However, the fact that queen conch are large, slow moving, form aggregations, and occur in shallow habitats, makes them highly vulnerable to fishing by divers. Their dependence on high densities for reproduction means that overfishing can rapidly reduce densities to the point that populations can no longer successfully reproduce.		

SPECIES DISTRIBUTION AND POPULATION STATUS

2.2 Distribution and population status		
Global / regional distribution & trends	Medium	*Stombus gigas* is one of six species of Strombidae that occur in the Western Atlantic Ocean (Thiele 2001). The species occurs from its northernmost range in the Florida Keys, and around Bermuda, throughout the Caribbean Sea and the Gulf of Mexico, and as far south as Panama and the northern coast of South America to Brazil. Barbados is at the eastern edge of its range and the Gulf coast of Mexico at its western edge (Thiele 2001; Appeldoorn & Baker 2013). Its range exceeds 2,500,000 km^2 (NatureServe Explorer 2023) (Figure 1).  **Figure 1**. Geographic distribution of queen conch *(Strombus gigas).* Map from Horn et al. 2022. Bonaire, Brazil, the British Virgin Islands, Curacao, Dominica, Trinidad and St Eustatius have never had large fisheries for queen conch (Apeldoorn & Baker 2013). The species is rare in Curacao and occurs at low densities in Bonaire (van Baren 2012; van Buurt 2001, cited in Apeldoorn & Baker 2013). No commercial export occurs in Brazil (at the southernmost extent of its range) and the British Virgin Islands (where landings have dropped significantly). Conch is the least harvested fishery resource in Dominica following previously overfished shallow water populations and limited suitable habitat (Brownell & Stevely 1981; CITES 2003, 2012). Low salinity and high turbidity from rivers and streams contribute to unsuitable conch habitat in Trinidad (Brownell & Stevely 1981) and the fishery in St Eustatius supports only two fishers, with no exports since 2010 (van Baren 2012). Populations on the outer edges of the geographic distribution of conch, including Florida, Barbados, and Bermuda, are thought to be limited by low reproductive stock and limited larval supply, yet conch in Florida and Barbados are slowly

		increasing in number (Apeldoorn & Baker 2013). The primary countries with industrial or extensive artisanal fisheries aimed at export are the Bahamas, Belize, Colombia, Cuba, Honduras, Jamaica, Nicaragua and the Turks and Caicos Islands (Apeldoorn & Baker 2013).
Estimated global / regional population	High	**Density estimates:** Horn et al. (2022) produced queen conch density estimates for each of the range countries and dependent territories, based on a comprehensive literature search for relevant data and additional information received during the public comment period for the listing of *S.gigas* on the US Endangered Species Act (ESA). They reported that density estimates were highest in the north-central to the southwestern Caribbean (Turks and Caicos Islands, southern Bahamas and Cuba, to Jamaica and Nicaragua), with most of the rest of the region having densities near or below 50 conch/ha, with a few exceptions (Horn et al. 2022). They concluded, based on available density estimates, that populations were below minimum thresholds necessary for reproduction in most jurisdictions (Horn et al. 2022). Nine Countries or territories had populations where density estimates exceeded 100 adult conch/ha, a density considered to support reproduction and population growth, including parts of the Bahamas (Cay Sal and Jumento and Ragged), Colombia (Serrana Bank), Costa Rica, Cuba, Jamaica, Nicaragua, Saba, Saint Lucia, and the Turks and Caicos Islands. Density estimates exceeded 50 conch/ha, a density associated with reduced reproduction, for a further five countries/territories, including the Cayman Islands, Honduras, Saint Kitts and Nevis, Saint Eustatius and Puerto Rico (mesophotic reef). All other populations had densities below 50 adult conch/ha, densities associated with likely Allee affects and limited viable reproduction (Stoner & Ray-Culp 2000; Stoner et al. 2011; UNEP 2012). **Abundance estimates:** Horn et al. (2022) estimated adult population abundance (individuals) for each jurisdiction within the species range, by extrapolating conch density estimates across conch habitat areas. Total estimated adult queen conch abundance was 743 million individuals (90% confidence intervals of 451 million up to 1.49 billion), with seven jurisdictions accounting for 95% of the population (Cuba, Bahamas, Nicaragua, Jamaica, Honduras, Turks and Caicos Islands and Mexico) (Horn et al. 2022). The median of the estimated population size in Cuba was estimated to exceed 400 million adults; adult conch was estimated to be between ten and 100 million individuals in six jurisdictions (Bahamas, Nicaragua, Jamaica, Honduras, Turks and Caicos Islands and Mexico); and 15 jurisdictions had median estimated abundances between one and 10 million adults. Estimated median population size was less than one million adults in a further 20 jurisdictions, with three of those jurisdictions (Barbados, Bermuda, Panama) estimated to have less than 100,000 adults (Horn et al. 2022). Bahamas, Cuba and Nicaragua accounted for half of the estimated conch habitat (55.6%) and most adult population abundance (84.1%). Whilst 23 jurisdictions made up 95% of the total estimated conch habitat area, only seven made up 95% of the total population, suggesting depletion of conch populations in several large suitable areas/jurisdictions (Horn et al. 2022). Estimates were associated with considerable uncertainty due to varying quality and quantity of data from different jurisdictions and noted to be conservative due to largely unaccounted estimates from deeper water habitats (>20m).

		Population trends: Historically, queen conch was reported to have been fished to near extinction in many locations including Bermuda, Florida, Cuba, Bonaire, Saba (Saba Bank), Venezuela and the US Virgin Islands (Schweizer & Posada 2006; Stoner & Schwarte 1994; Thiele 2001; van Baren 2012). Declines have also been reported for the Bahamas, Belize, Columbia, Dominican Republic, Guadeloupe, Haiti, Jamaica and Mexico (Acosta 2006; Aiken et al. 2006; Ardila et al. 2020; CITES 2012; Loop News 2020; Navarrete & Valencia-Hernández 2013; Stoner et al. 2012b; 2012c; 2019; Prada et al. 2009, Thiele 2001, Torres & Sullivan-Sealey 2002). Whilst temporary closures of the fisheries, and regulations including catch, size and age limits, gear restrictions, closed seasons and closed areas have been successful in allowing recovery of queen conch populations in some areas (e.g. Jamaica (Angus 2021), Serrana Bank in Columbia (Ardila et al. 2020)), in others populations have continued to decline, with sustained fishing pressure causing changes to age structure of populations. For example, the Bahamas have seen declines in their queen conch populations over the past 20 years, despite an extensive network of marine protected areas. Studies have reported that the average age of fished populations is getting younger whilst populations within parks are ageing (Stoner 2012b, 2012c, 2019), which has led to a recent (2021) national ban in exports (Lockhart & Henry 2023; Smith 2020). In Columbia, declines were reported up until 2003, when the fishery was closed for three years, after which a 2007 survey showed recovery at the northern atolls but not Columbia central or the southern atolls where artisanal fisheries continued (Prada et al. 2009). Horn et al. (2022) explored queen conch densities over time and noted that data were only sufficient to follow densities over several decades, for a small number of jurisdictions (Belize, Mexico, Puerto Rico, the Bahamas, and the US Virgin Islands), noting large heterogeneity in datasets (depending on where surveys were conducted etc). In Puerto Rico, Florida and the US Virgin Islands, densities were found to have increased in recent years (Horn et al. 2022). However, Horn et al. (2022) noted that some estimates presented in their review were outdated and/or extrapolated from nearby jurisdictions. Indeed, as indicated below, recent density estimates from the Turks and Caicos Islands demonstrate the population to have undergone a substantial decline.
National distribution & trends	Medium	**TCI distribution:** In the Turks and Caicos Islands, the majority of queen conch are found in the shallow Caicos Banks and the Turks Bank surrounding Grand Turk and Salt Cay. The Turks Bank is situated to the east of the Caicos Bank separated by a deep-water passage (Clerveaux 2003). Queen conch are found in a variety of habitats, including seagrass meadows rubble bottom typical of backreef areas, algae-covered hard-bottom, and coarse-grained sand flats (Stoner & Appeldoorn 2022), from depths of 1-30m (although mature adults can be found in deeper depths). Historically the queen conch fishery has mostly focussed on the Caicos Bank (Mokoro 1990, cited in Taylor & Medley 2003). The main locations have included east of West Caicos; southwest of Providenciales; southwest of South Caicos; and northeast of Grand Turk (Moran 1992, cited in Taylor & Medley 2003).

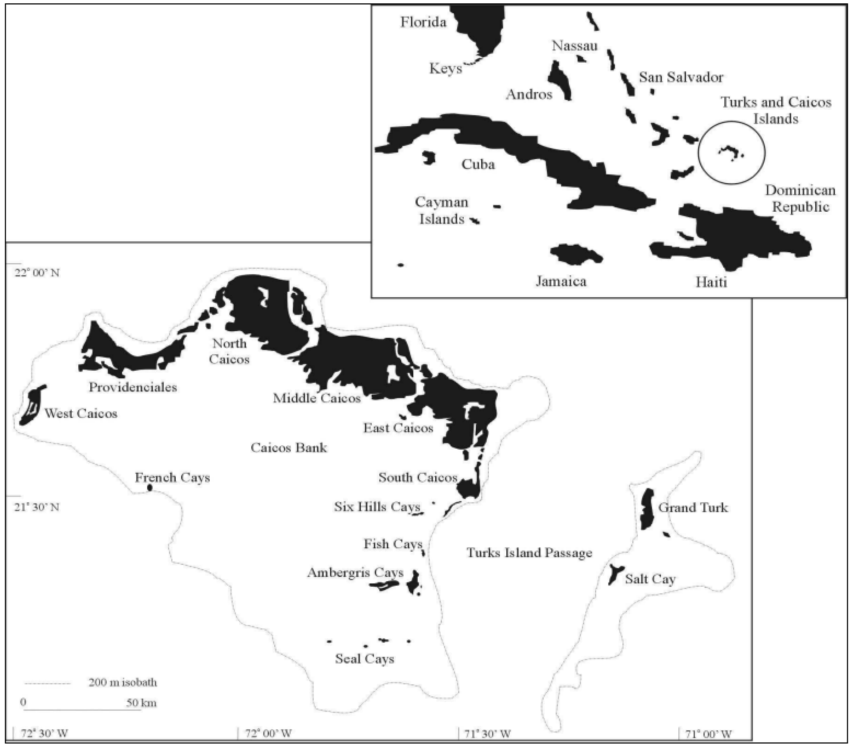
		 **Figure 2.** Location of Turks and Caicos Islands in the Caribbean region (inset) and the location of the fishing Banks (Caicos and Turks Banks) important for commercial fishing of queen conch (*Strombus gigas*) (map from Clerveaux 2003, cited in Taylor & Medley 2003). There are no specific data relating to trends in the distribution of queen conch in TCI, however there are indications that habitat destruction has affected the population in some areas (see 'habitat loss/change' in Section 2.4. Threats).
Estimated national population (e.g. size classes)	High	Horn et al. (2022) estimated population densities for the TCI to be 180.9 adult conch/ha, based on studies conducted in 2001-2015; and using area-weighted average between fished and unfished areas. Extrapolating density estimates by habitat areas they estimated the number of queen conch adults in TCI to be between 350 and 400 million (Horn et al. 2022). However, recent surveys indicate a substantial reduction in density estimates for queen conch across sites in TCI, suggesting these estimates are now outdated (see 'density estimates,' below). Recent calculations for queen conch abundance across fished sites in TCI, based on densities of 4.7 conch/ha (adults) and 4.7 conch/ha (juveniles), report an estimated total of 6,490,000 queen conch on the Caicos Bank (2,585,000 adults; 2,585,000 juveniles) (Lockart & Henry 2023) (Table 1).

Table 1. Estimates of abundance of queen conch present on Caicos Bank based on underwater visual survey densities across 100 (fished) sites, for the years 2020, 2021 and 2023. Calculations based on a Caicos Bank water coverage of 5500 km^2 (550,000 ha). Table adapted from Lockhart & Henry 2023.

Conch Size	Median Density/ha (±IQR)	Total Abundance on Caicos Bank	Source
Adult only (2023)	4.7 conch/ha (IQR=4)	2,585,000	Lockhart & Henry 2023
Juv. Only (2023)	4.7 conch/ha (IQR=5)	2,585,000	Lockhart & Henry 2023
All conch (2023)	11.8 conch/ha (IQR=16.75)	6,490,000*	Lockhart & Henry 2023
Adult only (2021)**	0 conch/ha	0	DECR 2021, unpublished data.
Juv. Only (2021) **	35.36 conch/ha	19,448,000	DECR 2021, unpublished data.
All Conch (2021) **	42.43 conch/ha	23,338,049*	DECR 2021, unpublished data.
Adult only (2020) **	0.0 conch/ha (IQR=14)	0	DECR 2020, unpublished data.
Juv. Only (2020) **	42.43 conch/ha (IQR=134)	23,338,049	DECR 2020, unpublished data.
All Conch (2020) **	63.65 conch/ha (IQR=162)	35,007,072*	DECR 2020, unpublished data.

*'All conch' includes adults and juvenile conch
**Data are from surveys conducted by the Department of Environment and Coastal Resources (DECR) at 38 and 20 shallow sites around South Caicos in 2021 and 2020, respectively.

The abundance estimates suggest a substantial reduction in the number of queen conch across the Caicos Bank over the past two decades. It is also notable that several of the surveys conducted in the last five years have reported adult density and abundance estimates to be zero. Whilst the abundance estimates reported here are based on surveys across shallower (5-30 ft), fished sites (where juveniles are known to reside), an additional survey using towed video array methodology, and focussing on deeper sites across the Caicos Bank, reported similar low densities (median adult density = 0 conch/ha, median juvenile density = 16.7 conch/ha) (Henry & Lockhart 2023). Alternative abundance calculations based on these surveys estimate the number of live queen conch on Caicos Bank to be 0 (adults) and 9,135,500 (juveniles) (Table 2).

Table 2. Estimates of abundance of queen conch present on Caicos Bank based on underwater towed video array survey densities across 100 (fished) sites, conducted in 2023. Calculations based on a Caicos Bank water coverage of 5500 km^2

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<td>(550,000 ha). Table adapted from Henry & Lockhart 2023.
<table>
<tr><th>Conch Size</th><th>Median Density/ha (±IQR)</th><th>Total Abundance on Caicos Bank</th><th>Source</th></tr>
<tr><td>Adult only</td><td>0.00 (IQR=29.07)</td><td>0</td><td>Henry & Lockhart 2023</td></tr>
<tr><td>Juvenile only</td><td>16.61 (IQR=66.45)</td><td>9,135,500</td><td>Henry & Lockhart 2023</td></tr>
<tr><td>Live Conch (juveniles and adults)</td><td>33.22 (IQR=99.67)</td><td>18,271,000</td><td>Henry & Lockhart 2023</td></tr>
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<td>Current population trend relative to historic abundance (regional / national)</td>
<td>High</td>
<td>Density estimates:
In 1998, studies reported an overall mean conch density of 677.4 (CI = 345.8) conch/ha in sites within, and outside the East Harbour Conch and Lobster Reserve, in the Caicos Bank, TCI, with significantly higher densities of conch observed within the reserve (Tewfik & Béné 2000). The authors reported that juveniles were in significantly higher densities than adults in the fished areas, with the opposite true in the protected area. From surveys conducted in the same areas, Tewfick & Béné (2003) subsequently reported mean densities of 277 conch/ha in the fished areas and 555 conch/ha in the reserve, adding that both adults and juveniles were significantly smaller in the reserve than in the fished areas, suggesting existence of a crowding effect within the reserve. It has been postulated that conch populations in the Caicos Bank may be negatively affected by a lack of habitat inside the reserve, and natural barriers to emigration outside of the reserve (Tewfick & Béné 2003, Schultz & Lockhart 2017).

Studies some years later (2015), reported an overall median density of 11.8 conch/ha and no difference in the median density of conch inside (26.7 conch/ha) and outside of the reserve (13.3 conch/ha), with most sites having densities under 88 conch/ha (Schultz & Lockhart 2017). The authors reported that only five of 96 sites surveyed outside of the reserve exceeded an adult density of 47 conch/ha (densities associated with limited reproduction), and only one exceeded an adult density of 100 conch/ha (densities associated with successful reproduction). These results suggest a substantial decrease in conch densities in the Conch Bank, both inside and outside the protected area, between 1998 and 2015.

Pilot surveys conducted by the Department of Environment and Coastal Resources (DECR) at 20 and 38 shallow sites around South Caicos in 2020 and 2021, respectively, reported adult densities of 0 conch/ha (both years), and juvenile densities of 42 conch/ha (2020) and 35 conch/ha (2021) (Table 1).

Recent underwater visual surveys (2022-2023) conducted by divers across 100 sites on the Caicos Bank estimated median conch density to be 11.8 conch/ha (Lockhart & Henry 2023). When broken down into age classes, median adult and median juvenile density was estimated at 4.7 conch/ha (IQR = 4) and 4.7 conch/ha (IQR = 5), respectively. As very few conch in this survey displayed a flared lip, it was determined that most were immature and not yet at a reproductive age. Further examination of the morphometric data recorded during the survey, created an estimated timeline for when the</td>
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		conch on the Caicos Bank would be mature enough for legal harvest. This analysis indicated that nearly 50% of the fishery is currently not mature enough for legal harvest; with 24% of the current population estimated to reach the required maturity in a minimum of 2-3 years; 15% in at least 3-4 years; and 10% in at least 4-6 years (Lockhart & Henry 2023). The authors noted that the study was constrained to fished sites (where adults may have been removed by fishers), and shallower sites (5ft-30ft), in which juvenile conch are known to reside following settlement from plankton stages. In addition to the underwater visual surveys reported above, towed video array surveys were also conducted across 100 sites on the Caicos Bank, focussing on the deeper areas within the common fishing grounds (15-60ft in depth) (Henry & Lockhart 2023). In this study, conch were categorised as ‘adult,’ ‘juvenile’, ‘dead’ and ‘live’. Total density was estimated at 33.22 live conch/ha (Table 2). When broken down into age classes, median adult density was estimated at 0 conch/ha and median juvenile density was estimated at 16.7 conch/ha (Table 2) (Henry & Lockhart 2023). The recent surveys demonstrate a further reduction in densities between surveys conducted in 2015 and in 2022-2023.

Summary of Distribution and population status
High
Whilst *Strombus gigas* occurs throughout the Caribbean Sea and the Gulf of Mexico, widespread declines have been reported regionally, with populations thought to be below minimum thresholds necessary for reproduction in the majority of jurisdictions (Horn et al. 2022). In the Turks and Caicos Islands, queen conch occurs in the Caicos and Turks Banks with most of the fishery focussed on the Caicos Bank. Surveys conducted in the Caicos Bank in 1998 and 2015 suggest a severe reduction in densities in this timeframe, from mean estimates of 677.4 conch/ha (across sites within and outside the East Harbour Conch and Lobster Reserve), and 277 conch/ha (fished areas) and 555 conch/ha (in the reserve) in 1998, to median estimates of 26.7 conch/ha (fished areas) and 13.3 conch/ha (in the reserve) in 2015. The most recent surveys conducted across common fishing grounds in 2022/2023 reported median densities of 4.7 adult conch/ha and 4.7 juvenile conch/ha (visual surveys) and 0 adult conch/ha and 16.7 juvenile conch/ha (towed video array surveys). These data suggest a continued collapse of the conch population across the Caicos Bank in TCI, and especially in relation to mature adults. In 2015, studies indicated that only five of 96 sites surveyed outside of the reserve exceeded an adult density of 47 conch/ha (densities associated with limited reproduction), and only one exceeded an adult density of 100 conch/ha (densities associated with successful reproduction). Given that population densities appear to have further decreased since this time, reproduction is likely to be severely compromised, affecting the viability of the population. Furthermore, studies have indicated that there are no longer significant differences in conch densities in the East Harbour Conch and Lobster Reserve and fished areas, indicating a failure of this reserve to preserve conch stocks.

CONSERVATION STATUS & THREATS

2.3 Conservation status		
IUCN Red List (Global, regional)	Medium	Queen conch is not currently evaluated on the IUCN Red List of Threatened Species. In 1994 however, the species was assessed by IUCN as “Commercially Threatened”, a category no longer used (CITES 2012). On 09/08/22, the United States National Oceanic and Atmospheric Administration (NOAA Fisheries) announced a proposed rule to list

		the queen conch as Threatened under the Endangered Species Act (ESA). They concluded that the species suffers from low population densities, continued decline and poor recruitment throughout much of its range; that remaining fisheries are likely to become unsustainable and close in the foreseeable future; poaching will likely continue or increase; and without adequate enforcement to halt illegal harvest of conch, it will face moderate risk of extinction over the next 30 years (Horn et al. 2022).
National and local conservation status and trends	High	Surveys conducted in 2022 across the Caicos Bank in TCI, indicated that queen conch densities were severely reduced to the point of collapse. In dive surveys and towed video array surveys, densities of adult conch were estimated at 4.7 conch/ha, and 0 conch/ha, respectively (See 2.2: Distribution and Population Status; Lockart & Henry 2023, Henry & Lockhart 2023). This is far below densities required for successful reproduction.
2.4 Threats		
Threats and threat trends (including habitat loss, fragmentation and degradation, disease, invasive species, environmental change)	High	**Overexploitation/fishing pressure:** The most significant threat to queen conch is overutilisation, through commercial, artisanal, and illegal, unreported or unregulated (IUU) fishing (Horn et al. 2022). The species is particularly vulnerable to overfishing because it occurs primarily in shallow bank and coastal environments (<30 m depth) accessible to diving fishers, it is large and slow-moving, and requires relatively high densities for mating (See 2.1: Behavioural factors) (Stoner & Ray-Culp 2000, Stoner et al. 2011, Stoner et al. 2022). Due to the depletion of shallow water stocks, fishing efforts have shifted over the years from near-shore to offshore areas (e.g. in Colombia, Dominican Republic, Mexico) (CITES 2003). The use of scuba and hookah gear (compressor diving) has become widespread and as near-shore areas are increasingly overfished, former deep-water refugia (>20 m) also became subject to intense exploitation (e.g. in parts of the Bahamas, Haiti, Dominican Republic) (CITES 2003). In many areas (e.g. Turks and Caicos Islands), the use of scuba and hookah gear is now prohibited when fishing queen conch. Fishing pressure may also lead to a genetic shift in response to strong selection pressure against larger individuals, leaving only smaller ones left to reproduce (Borrell 2013, cited in Appeldoorn & Baker 2013). Indeed, higher proportions of small adults have been observed in areas of high fishing pressure in the Bahamas (Stoner et al. 2011). IUU is also considered to be a threat in TCI (Wood 2012, cited in Appeldoorn & Baker 2013). **Climate change:** Increasing sea temperatures and acidification are likely to impact queen conch, particularly in relation shell production. Ocean acidification will require conch to invest more energy into shell production, at a potential cost to growth rate, or as an alternative, reduce the energy demand of shell production resulting in less dense, weaker shells, thereby making conch more susceptible to predation (Appeldoorn & Baker 2013). Further ocean acidification may result in direct dissolution of the shell and shifts to the depth at which conch can successfully form shells (Dooney 2006, cited in Appeldoorn & Baker 2013). Increasing temperatures may also affect conch directly through heat stress and indirectly through habitat modification or changes to growth and the length of reproduction periods (Appeldoorn & Baker 2013). Studies have shown that conch extend their spawning season in warmer years, but that there was a decrease in spawning at the highest temperatures (Appeldoorn & Reed, unpublished, cited in Appeldoorn & Baker 2013). Increased temperatures may also accelerate growth and larval development (Appeldoorn & Baker 2013).

Indirect effects of climate change including those caused by increased strength of hurricanes, habitat degradation, and regional changes in hydrography, are also likely to impact conch habitat and recruitment (Stoner & Appeldoorn 2022).

Habitat loss/change:
Changes to habitat particularly seagrass meadows, algal plains and or sandy substrate associated with coral reef systems (Horn et al. 2022) and water quality, based on factors such as agricultural, urban and industrial run off, infrastructure development (e.g., ports), trawling, dredging, oil spills, recreational boat damage, climate change, sea level rise, extreme weather events and competition with invasive vegetation, pose direct and indirect threats to conch populations (Horn et al. 2022).

Eutrophication can cause algal blooms in coastal areas, which use up localised supplies of oxygen and decrease light penetration to benthic habitats. This in turn can impact seagrass habitats that depend upon light and oxygen, in turn affecting juvenile conch survival (Appeldoorn & Baker 2013). Increased sedimentation as a result of coastal influxes can make breeding habitats unsuitable, and coastal development and recreational boat use can also directly destroy seagrass and impact juvenile habitat (Appeldoorn & Baker 2013).

In 2008, plans were approved in the Turks and Caicos Islands, for dredging of a deep-water channel and mega yacht marina (Wood 2014). This dredging is thought to have resulted in the destruction and sedimentation of critical conch habitats, which may have resulted in permanent reduced carrying capacity for the species (Wood 2014). Whilst not explicitly investigated, hurricanes are also thought to impact queen conch habitats and have at least short-term effects on reproductive behaviour (Stoner & Apeldoorn 2022). Indeed, it has been noted that hurricanes striking the Turks and Caicos Islands, also in 2008, were responsible for habitat destruction and poor recruitment of queen conch observed subsequently (Lockhart & Henry 2023). Hurricanes have also been associated with declining conch populations in St. Kitts/Nevis (CITES 2012). It seems likely that the habitat destruction caused by the combined effects of the dredging operation and the hurricane in 2008, contributed to the subsequent declines in queen conch populations in TCI observed since 2008/2009.

Contaminants:
Studies have demonstrated that queen conch reproductive capabilities in nearshore populations in Florida are reduced, with hypotheses including eutrophication, estrogen xenobiotics, hypoxia, increased temperature, chlorinated compounds, pesticides and heavy metals (Appeldoorn & Baker 2013). Conch have been found to be particularly susceptible to contaminants such as copper and tributyltin (TBT) (a compound in anti-fouling boat paint). TBT has been shown to be a causative agent for imposex in gastropods (Phillip 2000, cited in Appeldoorn & Baker 2013), and concentrations of TBT were correlated with the presence of female conch with external male sex organs in the British Virgin Islands. Concentrations of TBT were also found in the seagrass *Thalassia* and algae (primary nutrition sources for queen conch) in the boating areas (Titley-O'Neal et al. 2011).

Disease:
Queen conch have been shown to be impacted by an Apicomplexa parasite, which causes reproductive anomalies (Aldana Aranda et al. 2009, 2011). The presence of this widespread parasite was found to increase from west to east in the Caribbean, with Puerto Rico, Martinique and Guadeloupe most affected (Aldana Aranda et al. 2011). Negative correlation of parasite abundance and amount of maturity or spawning stages was observed in Colombia, as well as low percent of gametogenesis throughout the year (Aldana Aranda et al. 2009).

Summary of conservation status and threats
High
Whilst the species is not evaluated on the IUCN Red List of Threatened Species, the United States National Oceanic and Atmospheric Association (NOAA) has announced a proposed rule to list the queen conch as Threatened under the Endangered Species Act (ESA), predicting a moderate risk of extinction in the next 30 years. Queen conch are highly vulnerable to overfishing, which is thought to have been the main factor causing declines in conch populations across the region. Queen conch occur primarily in shallow bank and coastal environments (<30 m depth) accessible to diving fishers, they are large and slow-moving, and require relatively high densities for mating. Studies demonstrate that queen conch populations have been reduced to densities below what is required for successful reproduction in much of their range, with major conch fisheries and exports now limited to a small number of nations. Climate change, and habitat loss/destruction through development, recreation, contaminants, and severe weather events such as hurricanes, are also known to cause direct and indirect threats to conch populations. It is thought that habitat destruction caused by dredging of a deep-water channel, and the hurricane in 2008, have disturbed critical conch habitats in TCI and contributed to the declines of the population observed since 2008/2009.

HARVEST AND TRADE

2.5 Harvest and Trade overview		
National harvest levels and trends- (including types of specimens)	High	The Turks and Caicos Islands are one of the largest producers of queen conch meat, providing roughly 35 percent of the total landings reported for the Caribbean region from 1950–2016 (NOAA, 2022). Conch destined for export are shucked at sea, and then delivered to one of five processing plants in Providenciales or South Caicos (Tewfik & Béné 2000). The TCI queen conch fishery is current subject to a quota allowance, which is specified under legal notice number 15 of 2018 (Fisheries Protection Amendment Regulations 2018)[1]. This sets out a national conch harvest Total Allowable Catch (TAC, or quota) of 820,000 lbs (shell removed, but uncleaned), of which 500,000 lbs is granted for export and 320,000 lbs granted for local consumption. To convert these quantities to cleaned meat (i.e. digestive glands, operculum, etc. removed), a conversion of 60% of the landed quota is applied, equating to 300,000 lbs of cleaned meat for export and 192,000 lbs of cleaned meat for local consumption. Therefore, in total, the TAC equates to 492,000 lbs of cleaned meat (Table 3). **Table 3.** Total Allowable Catch (TAC) displayed as weight (lbs) of landed uncleaned meat (minus the weight of the shell) and the weight of fully cleaned meat (i.e. digestive glands, operculum, etc. removed- conversion of 60% of landed uncleaned meat weight). | | **TAC (lbs.)** |

[1] TCI Legal notice number 15 of 2018, Fisheries Protection Amendment Regulations 2018: https://www.gov.tc/agc/component/edocman/15-of-2018-fisheries-protection-amendment-regulations-2018/viewdocument/988?Itemid=

Type	Uncleaned	Cleaned (60% conversion)
Export	500,000	300,000
Domestic consumption	320,000	192,000
Total	820,000	492,000

Class "A" Processing facilities are locations that are licensed to purchase, process and export marine product such as queen conch and spiny lobster. There are also Class "B" Processing facilities which are locations that are licensed to purchase, process and export ONLY non-consumable products (shells, pearls, operculum) and sell locally (in country) consumable marine products. At Class "A" processing facilities, monitoring and reporting on commercial landings, export quantities and catch effort takes place. Reporting at Class "B" processing facilities is not always undertaken.

Commercial landings, export quantities and catch effort are monitored throughout the year through the primary processing facilities, however gaps in data collection exist through unreported local sale and consumption (such as receiving conch directly from fishers or personal capture), creating a discrepancy in monitored catch effort (Lockhart & Henry 2023).

Domestic consumption:
Efforts have been made to estimate unreported catch data through local consumption surveys. A survey of domestic consumption in TCI was conducted in 2022-2023 (Last et al. 2023). The results suggest that the sale of conch is highly unregulated in TCI. Only 15.6% of businesses and 6% of residents bought conch from processing plants (i.e. where monitoring and reporting occurs), whilst the majority of businesses purchased conch directly from fishers (63.6%), along with 35.8% of residents. Most residents and tourists purchased from restaurants (51.4% and 85.6%, respectively), and this conch could therefore also come from an unreported and unmonitored source, due to the high proportion of businesses which obtain conch from fishers.

The results suggest that the median conch consumption per resident per year is 12 lbs (cleaned conch), which is lower than most historical estimates (Table 4).

Table 4. A comparison of historical per capita conch consumption rates for TCI (Last et al. 2023).

Source	Timeframe	Value (lbs/person/year)
Rudd (2003)	1950-1960s	66.13
	1970s to 1990s	22.05
	1990s-2003	11.02
Hind (2013, unpublished data cited in Ulman et al. 2016)	2013	16.53 (adult) / 11.01 (child)

Last et al. (2023)	2022-2023	12

The 2022/2023 total domestic consumption rate of cleaned queen conch was estimated to be 468,190.46 lbs/year for residents (of which 450,954 lbs/year is likely to be unreported harvest of conch) and 71,085.25 lbs/year for tourists. Overall, this indicates a total domestic consumption value for TCI of 539,275.71 lbs/year of cleaned conch, which is less than the last estimate in 2011/2012 (Table 5). However, the latest estimate suggests that that queen conch harvest in TCI is currently exceeding the Total Allowable Catch (TAC) reserved for domestic consumption (192,000 lbs. of cleaned meat), as established in the Fisheries Protection Regulations 10.08. Furthermore, this domestic consumption rate alone is exceeding the TAC for the whole country (including both domestic consumption and exports) (Table 6).

Table 5. A comparison of historical total domestic consumption rates for TCI

Source	Timeframe	Consumption (cleaned conch lbs/year)
Rudd (2003)	1905-2001	617,294
Ulman *et al.* (2016)	Early 1950s	440,925
	2011-2012	771,618
Last *et al.* (2023)	2022-2023	539,275.71

Table 6. A comparison of 2022-2023 domestic consumption from Last et al. 2023, against the Total Allowable Catch (TAC) for TCI of cleaned queen conch.

Type	Timeframe	Consumption (cleaned conch lbs/year)
Resident	2022-2023	468,190.46
Tourist	2022-2023	71,085.25
Total Domestic Consumption	2022-2023	**539,276**
Total Allowable Catch (TAC)		
Export	2023	300,000
Domestic consumption	2023	192,000
Total TAC	2023	**492,000**

Commercial landings and export data:
Meat and trimmings
Mindful of the issues relating to unreported local sale and consumption, trends in catch data from the processing

plants, show consistent declines in total landings over the past 20 years (Lockhart & Henry 2023) (Figure 3).

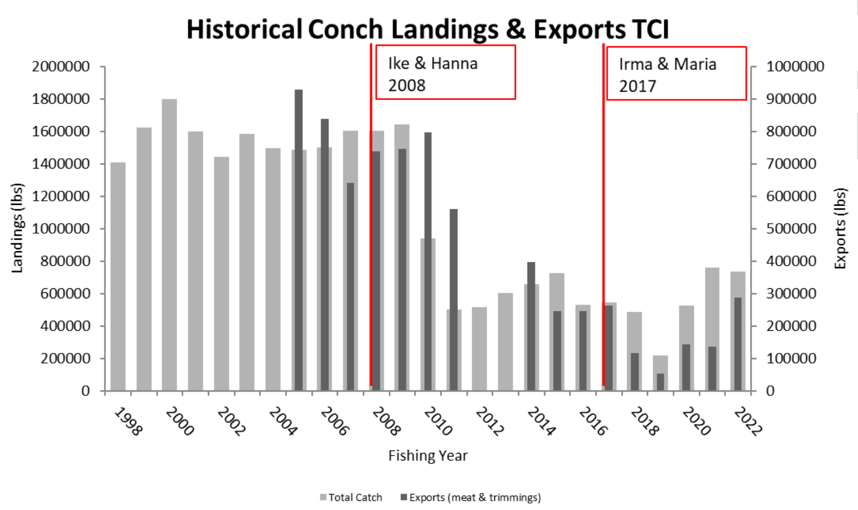


Figure 3. Reported landing (lbs) and exports (lbs) of queen conch in TCI for the period 1998-2022, based on TCI national data. From DFMRM 2023.

Substantial declines in landings between 2009-2011 were linked to major hurricanes Hanna and Ike (2008), which directly hit TCI. Anecdotal evidence suggested that these hurricanes caused substantial habitat destruction and changed the seabed topography in and around the Caicos Bank (Lockhart & Henry 2023).

It was in response to these declines that the (un-mandated) Scientific Authority for the TCI Government recommended a reduction in Total Allowable Catch (TAC) for the fishery to 1,000,000 lbs (2011), which was later reduced by the Management Authority to 500,000 lbs (for export) in 2014 in light of previous catch landings not meeting the accepted TAC quota (Lockhart & Henry 2023). This TAC remains in place today.

Whilst data on exports alone from TCI do not appear to have exceeded the TAC allocated to export (300,000 lbs, cleaned conch meat), when combining export data with estimates of local consumption (539,275.71 lbs/year, Last et al. 2023), it is evident that total TAC figures are being exceeded. For example, in 2022, total conch exports plus local consumption was 792,490 lbs of cleaned conch, which exceeded the TAC (492,000 lbs cleaned conch) by 61%.

Queen conch shells:
Queen conch shells are used and traded as curio and tourist souvenirs but are largely considered a by-product of the meat trade (CITES 2003). In the 2010-2011 conch season a quota of 100,000 shells was provided, which remained in place until 2012-2013 fishing season, where it raised to 1,000,000 shells for export (DFMRM 2023). According to national data, exports in conch shells have only once surpassed 100,000 in the 2012-2013 fishing season (Figure 4).

In the recent five years, exports in shells have remained below 130 per year (DFMRM 2023).

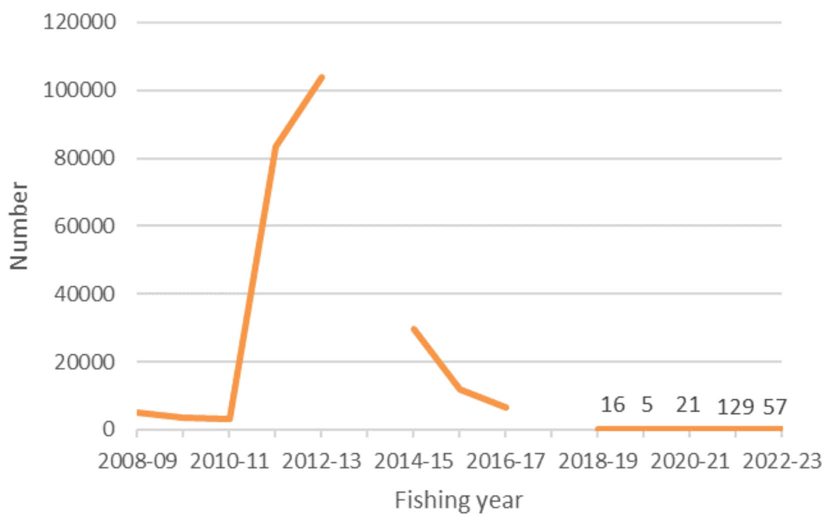
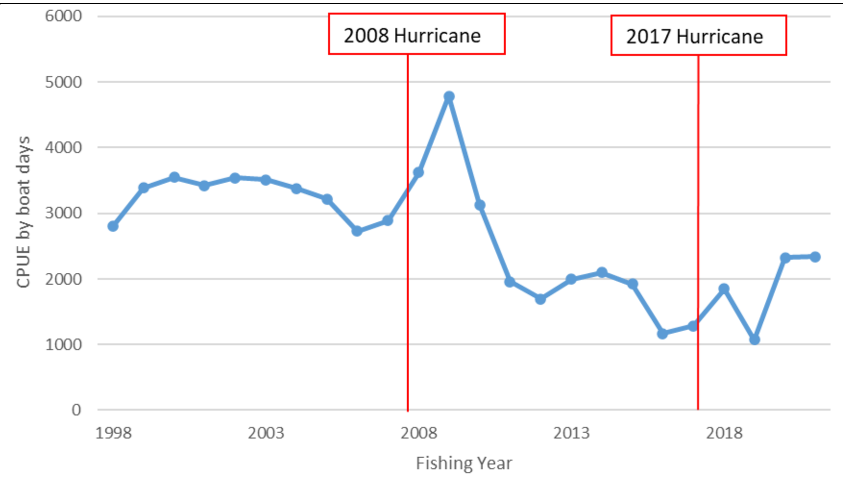


Figure 4. Number of wild queen conch (*Strombus gigas*) shells exported from TCI, according to national data (DFMRM 2023).

Catch per Unit Effort (CPUE) data:
Catch per unit of effort (CPUE), calculated by the Department of Marine Fisheries and Resource Management (DFMRM) of TCI, based on catch by number of boat days, shows a declining catch between 2009 and 2016 (Figure 5).

		 **Figure 5**. Catch per unit effort by boat days at Class A processing plants for the queen conch fishery in the TCI for the period of 1998-2021. From DFMRM 2023.
International trade levels and trends (including types of specimens)	Medium	*Strombus gigas* has been harvested for food for centuries, however, a large commercial fishery has developed mainly in response to the increased international demand for the meat (CITES 2003). The species is one of the most important fishery resources in the Caribbean with the wholesale value of the annual landings estimated to be USD 60 million in 2003 (CITES 2003). As TCI are a 'Non-Party' to CITES, export data is not reliably represented on the CITES trade database. However, according to trade reported by CITES importing countries, most trade of *S.gigas* from TCI over the 15 years from 2007-2021 has been in 'meat' and 'shells' (Figure 5), followed by smaller numbers traded as 'live' (n=773kg, n=2026 'specimens'), 'jewellery' (n=204, n=18 'specimens'), 'carvings' (n=17) and 'specimens' (n=13) (CITES Trade Database 2023). Trade in meat (kg) has decreased considerably over the period, whereas trade in shells has been more sporadic (Figure 6).

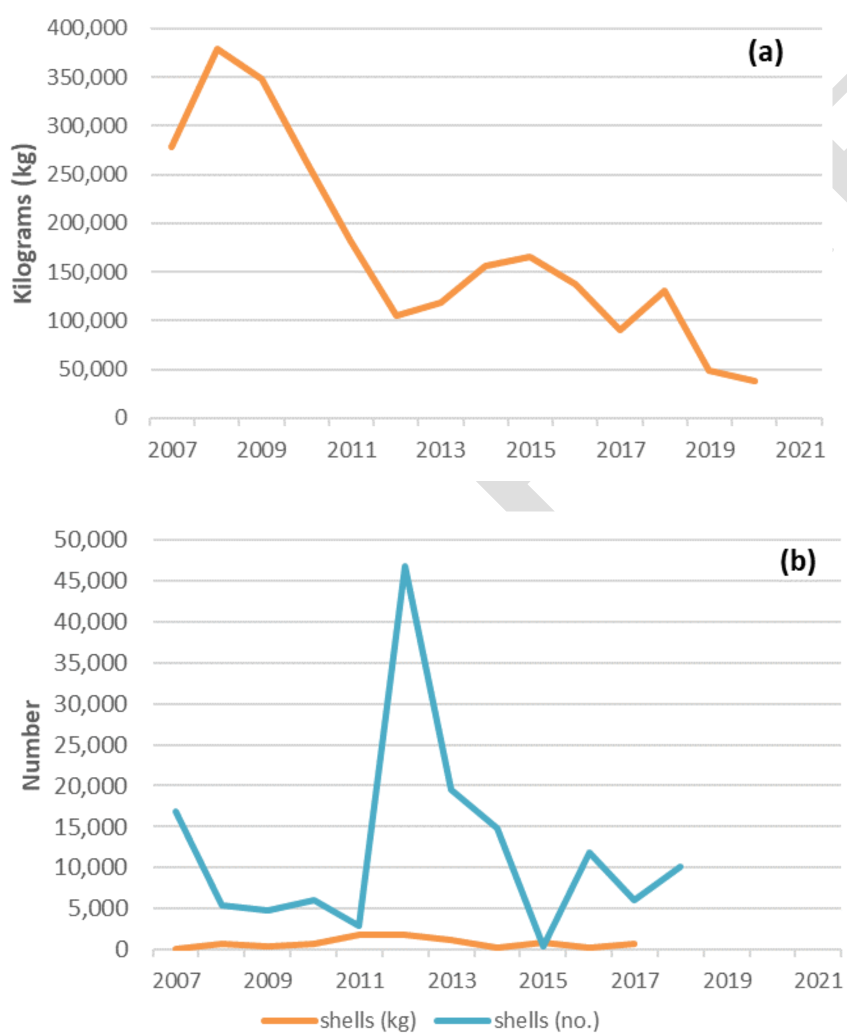


Figure 6. Importer-reported trade in *Strombus gigas* **a)** meat (kg) and **b)** shells from TCI between 2007 and 2021 (all sources, all purposes), according to the CITES Trade Database (CITES Trade Database 2023).

Ninety-eight (98.5) percent of trade in conch meat over the time period was recorded as source code 'W' (wild), with 1.2% as 'I' (seized), and the remaining 0.3% as 'F' (F1 or subsequent generations) and 'R' (ranched). Similarly, 83.8% of the trade in shells (no.) and 85.6% of the trade in shells (kg) was reported as 'W.' Indeed, there has been

		no trade in source ‘R’ or ‘F’ since 2012 (CITES Trade Database 2023). Ninety-nine (99.8) percent of trade in conch meat from TCI has been imported to the United States, with a small amount imported by Canada. The United States is also the biggest importer of conch shells, importing 98.3% (individuals) and 67.0% (kg) over the period from 2007-2021. Other importers of conch shells included Afghanistan, the Dominican Republic, Italy, Spain, the Republic of Korea and the United Arab Emirates (CITES Trade Database 2023).

Summary of Harvest and Trade
High
The TCI Government established a Total Allowable Catch (TAC) of 820,000 lbs (export quota of 500,000 lbs. and local consumption quota of 320,000 lbs.) (uncleaned conch) in 2014, which was made law in 2018. However, re-assessments of the queen conch fisheries’ Maximum Sustainable Yield have not been made in recent years due to data limitations, including around visual surveys and domestic consumption rates. New data (2022) on domestic consumption in TCI, estimate that 539,275.71 lbs/year of cleaned conch is consumed locally, which far exceeds the quota allocated for domestic consumption (192,000 lbs./year, when converted to ‘cleaned conch’), and in fact exceeds the TAC for both exports and domestic consumption put together. Although the national data demonstrate that exports in conch meat have not exceeded the TAC quota allocated for export, when export quantities are combined with estimated domestic consumption rates, the TAC was exceeded by 62% in 2022. National export data, as well as importer-reported data from the CITES Trade Database, show a large reduction in trade in queen conch meat from TCI from around 2008-2009, which is likely to be a result of declining landings due to a depleted population. Anecdotal evidence also suggests that hurricanes that hit TCI in 2008, caused widespread disturbance to conch habitat, likely affecting subsequent recruitment. CITES data demonstrate that the United States imported over 99% of conch meat from TCI over the period 2017-21, and over 98% of shells. In any case, it is evident that the TCI’s Caicos Bank queen conch population is unable to withstand current levels of harvesting and management measures require immediate consideration of both domestic consumption and export levels, to allow recovery of the population and ensure sustainability in the future.

3. Impact Evaluation

3.1 What is the severity of harvest pressure on the species concerned?		
Factors: **Magnitude of pressure** **Size/age/sex selectivity** **Offtake % of population at agreed spatial scale** **Illegal harvest (projected, estimated, inferred)**	High	Queen conch is highly vulnerable to overfishing and recent studies show the population is close to collapse in TCI. New estimates on domestic consumption (Section 2.5: Harvest and Trade) suggest that domestic consumption exceeded the Total Allowable Catch (TAC) allocated for domestic consumption by 181% in 2022.
	Level of confidence High	

Reasoning Recent estimates demonstrating critically low densities of queen conch on the Caicos Bank (particularly for adults), combined with new estimates suggesting that local consumption is much higher than was previously permitted under the Total Allowable Catch (TAC), demonstrate with a high level of certainty that the population has been overharvested.

3.2 What is the severity of international trade pressure on the species concerned?		
Magnitude of legal international trade	High	Export data from TCI, as well as the data reported by importers on the CITES Trade database show a decrease in trade of queen conch meat from TCI since 2008/2009. Furthermore, estimates for domestic consumption far exceed the quantities being exported, suggesting that management efforts will need to consider domestic consumption quantities in their sustainability efforts. However, given the declining status of the population in TCI, it is highly likely that any international trade will have negative impacts on the population in the wild.
	Level of confidence Medium	
Magnitude of illegal trade (projected, estimated, inferred)	Unknown	Whilst IUU is thought to be a factor affecting fisheries of queen conch in TCI, there is currently limited data on this. The fact that conch are not landed whole (they are removed from their shells at sea) makes monitoring and enforcement of current size limits difficult. Currently, data show that there are limited mature adults in TCI, which increases the risk that conch are being harvested before they reach legal size limits, and before they reach maturity and have opportunity to reproduce and replenish the stocks.
	Level of confidence Low	

4. Factors that may mitigate impacts (e.g. management measures, monitoring)

National measures		National legislation, PA coverage etc
National legislation	Medium	The Turks and Caicos Islands Fisheries Protection Ordinance (2009) and the Fisheries Protection (Amendment) Regulations 2018, contain laws concerning conch fishing in TCI. These include: • A closed season between July 15 and October 15 each year, when conch meat cannot be exported, but can still be fished and consumed locally. • A ban on fishing conch with a shell length smaller than seven inches or a total meat weight of less than eight ounces, after removal of the digestive gland. • A ban on artificial breathing devices (scuba and hookah) to harvest conch or any other seafood product, protecting deep water stocks. Additionally, the TCI Government has established a Total Allowable Catch (TAC) that has been made law in the Fisheries Protection Regulations in March 2018:

		Fisheries Protection Regulations Schedule 6 18(3): "*Conch Quotas, (1) The following conch quotas are established – (a) the national conch harvest quota of 820,000 pounds; (b) an export conch quota of 500,000 pounds; and (c) the local consumption conch quota of 320,0000 pounds. (2) No person shall export more than – (a) 500,000 pounds of landed unprocessed conch meat; (b) one million conch shells; or (c) 6,000 pounds of dried operculum. (3) The local consumption quota in paragraph (1)(c) shall be monitored by a fishery officer*." In legal notice (gazette) number 15 of 2018, signed on the 15th of March 2018, an export quota was established of 1,000,000 conch shells (DFMRM 2023). Shell length, flared lip and meat weight measurements are not considered to be reliable indicators of maturity (NOAA, 2022, also see 2.1 Intrinsic factors). It is therefore notable that TCI's requirements do not include a minimum lip thickness (which is considered to be a better measure of sexual maturity), and that they are not required to be landed whole (they are removed from their shells at sea); this undermines the effectiveness of the minimum size-based regulations (NOAA 2022). Additionally, while the closed season to exports may decrease demand during the species' reproductive season, it does not fully prohibit the harvest of spawning adult conch (NOAA 2022).
Protected Areas / Reserves	Medium	In 1998 the Turks and Caicos Islands government established a number of marine protected areas (MPAs) within the Caicos Bank. This included the ($28km^2$) specially designated marine protected area of the Caicos Bank (East Harbour Lobster and Conch Reserve, EHLCR) (Tewfik & Béné, 2000). The Fisheries Protection Ordinance prohibits removal of lobster and conch from this reserve (Legal Notice 5/2003). However, studies have demonstrated that the reserve is not effectively protecting the conch population (Béné & Tewfick 2003, Schultz & Lockhart 2007). Béné & Tewfick (2003) found that while adult density was six times higher inside the reserve than in fished areas, both adults and juveniles were significantly smaller within the reserve, suggesting the existence of a crowding effect (high density-induced reduction in growth rate). The authors postulated that there could be natural barriers that impede the emigration outside the reserve. In 2007, it was reported that densities of conch no longer differed within and outside the reserve (Schultz & Lockhart 2007), suggesting that previous high densities of conch within the reserve may have depleted the algal plain and led to a change in habitat type within the reserve. Interestingly, studies in the Bahamas have shown that conch populations within their (much larger) Exuma Cays Land and Sea Park ($364\ km^2$), are senescing (Stoner et al. 2019). The authors have suggested that the reserve is not large enough to hold a self-sustaining queen conch population, recommending that a network of protected areas is required to sustain long-term populations of queen conch (Stoner et al. 2019). There are also reports that dredging, linked to development activities in TCI, have negatively affected critical conch spawning and nursery areas within the Princess Alexandra National Park (a no-take area) through habitat destruction and sedimentation (Wood 2014).
Quotas / TAC / MSY	High	Data used to manage the queen conch fishery in TCI includes a Total Allowable Catch (TAC) based on calculated Maximum Sustainable Yield (MSY), catch per unit of effort (CPUE) and landings data (Clerveaux & Vaughn 2003, cited in Appeldoorn & Baker 2013).

		Following impacts of the hurricanes Hanna and Ike in 2008, the (unmandated) Scientific Authority for the TCI Government recommended a reduction in Total Allowable Catch (TAC) for the conch fishery, to 1,000,000 lbs (2011), which was again later reduced by the Management Authority to 500,000lbs (export) in 2014 in light of previous catch landings not meeting the accepted TAC quota. This TAC remained in effect until it was further served as amended under legal notice number 15 of 2018 (Fisheries Protection Amendment Regulations 2018), which stated an export quota for a national harvest TAC (quota) of 820,000 lbs., of which 500,000 lbs. is granted for export and 320,000 lbs. granted for local consumption. However, due to data gaps surrounding local consumption, it has not been possible for TCI to accurately establish a Total Allowable Catch (TAC) quota in recent years.

International and regional measures		Other Conventions and agreements
International and regional measures	Medium	U.S. Endangered Species Act: Proposed threatened (9/8/2022) Annex III of the Protocol concerning Specially Protected Areas and Wildlife (SPAW Protocol) for the wider Caribbean region, since 1991.
EU Wildlife Trade Regulations	Medium	Annex B since 01/06/1997

Other information

5. Ecosystem impacts (for High risk or complex NDFs only)

Factor	**Level of severity of trade pressure**	**Indicator/metric**
Role in ecosystem (does harvest impact the species' role in ecosystem)	Unknown	Queen conch, especially in juvenile stages, are prey to many species including stingrays, spiny lobster, octopus, nurse sharks, hermit crabs and predaceous snails (Chávez & Arreguín-Sánchez 1994, cited in Horn et al. 2022). As adults, predation is limited to organisms capable of destroying their shells, including sharks, rays, turtles, octopuses and large hermit crabs (Brownell & Stevely 1981, cited in Appeldoorn & Baker 2013). Therefore, a reduction in productivity of queen conch populations may affect predator populations and associated food webs, including threatened and near threatened species such as the green turtle (Endangered on the IUCN Red List), Hawksbill turtle (Critically Endangered) and spotted eagle ray (Near Threatened). Queen conch are known to feed on seagrass detritus and red and green macroalgae, with juveniles feeding on organic material in the sediment and cyanobacteria (Serviere-Zagaroza et al. 2009, Stoner et al. 1995). These feeding activities process substrate in nursery areas, keeping it clear of large algal overgrowth, which helps perpetuate habitat health and conch productivity.

	Level of confidence Low – There is not a large amount of information on the role of queen conch in the wider ecosystem	
Ecosystem impacts (does harvesting cause mortality to the species or damage habitat)	Unknown	Harvesting causes mortality to queen conch as the target species, but as most harvesting occurs by divers, there are limited other direct impacts of the harvesting process on other species. However, indirect effects of harvesting may include impacts to species which predate on conch, and associated disturbances to food webs and on habitat health and productivity (e.g. through algal overgrowth).
	Level of confidence Low - There is not a large amount of information on the role of queen conch in the wider ecosystem	

* Resulting in:

- reduction in the abundance of another native species;
- an increase in the abundance of a non-native species or over-abundance of another species;
- a reduction in a demographic rate in any life stage of another native species (e.g., germination, seed production, nest success, natal dispersal, etc.) that has the potential to decrease its abundance or otherwise reduce its viability;
- change in any ecosystem process or structural feature;
- change in the typical patterns of behaviour (e.g., social interactions, patterns of aggregation, movement) among individuals of the species being assessed or other species;
- change in genetic structure or variability of the population that indicates that one or more of the ecological functions of the species' are, or will become, impaired.

6. Non-detriment finding and related advice

Conclusion and Decision

The main conclusions are as follows:

a) Recent visual surveys (2022/23) of queen conch (*Strombus gigas*) on the Caicos Bank in TCI indicate a severely depleted population: median densities of 4.7 adult conch/ha and 4.7 juvenile conch/ha (visual surveys) and zero adult conch/ha and 16.7 juvenile conch/ha (towed video array surveys). Previous surveys in 2015, as well as more recent pilot surveys conducted by the Department for Environment and Coastal Resources in TCI (in 2020 and 2021), have demonstrated a continually declining population from density estimates in 1998.

b) These data indicate a concerning lack of mature adults and densities, far below the minimum required for successful aggregation and spawning (a minimum of ~50 conch/ha for limited reproduction, 100 conch/ha for successful reproduction), suggesting the reproductive capacity of the local population is already largely diminished.

c) TCI's national landings data, as well as international trade from TCI (CITES Trade data, reported by importers) demonstrate declining landings and exports since 2008/2009, largely in compliance with the reduced TAC implemented in 2014. However, it is worth noting that the TAC was reduced in response to declining landings between 2009-2011. Catch per Unit of Effort (CPUE) data, also demonstrate a declining catch between 2009 and 2019.

d) Recent data on domestic consumption (2022) estimate that 539,275.71 lbs/year of cleaned conch is consumed locally. The estimated levels of local consumption alone exceed the TAC allocated for both domestic consumption and export (the current TAC is 492,000 cleaned conch, of which 192,000 is allocated to domestic consumption).

e) The current levels of utilisation of queen conch in TCI are unsustainable and TCI's current measures do not appear to be adequately protecting conch populations. Minimum shell size and weights are not considered reliable indicators of sexual maturity, and conch are removed from their shells at sea, which makes monitoring of size limits challenging. Whilst TCI have a closed season for export between July 15 and October 15, this is likely to have limited effect given the high levels of fishing for local consumption that may continue during this period. There is also evidence that the East Harbour Conch and Lobster Reserve is failing to protect conch populations due to possible barriers to migration out of the reserve, historic overcrowding, and subsequent loss of habitat.

Decision:

There is currently a considerable risk that commercial trade in wild *S. gigas* would cause further negative impacts on the species and it is therefore not possible to make a Non-Detriment Finding for this species from the Turks and Caicos Islands. We recommend not accepting catch from this stock until the associated declines and trajectories are reversed and demonstrate stock recovery, and a queen conch management plan and harvesting strategy is in place for TCI. Exceptions may be permitted where trade is for scientific research purposes aimed at the conservation of the species which would involve a case-by-case assessment.

NEGATIVE OPINION and zero-export quota for wild-sourced and commercially traded Queen conch (*Strombus gigas*) from the Turks and Caicos Islands.

Recommendations:

1. **As a minimum, cease commercial export of queen conch and derivatives from TCI, to reduce the pressure on the fishery, until the associated declines and trajectories are reversed and demonstrate stock recovery. Extend the closed season for export to include harvesting for domestic consumption, to protect queen conch during the spawning period.**

2. **The Maximum Sustainable Yield (MSY) and associated Total Allowable Catch (TAC) set by the TCI government requires urgent reassessment based on new data concerning the status of the fishery and local consumption rates, to determine whether the fishery can support any/or limited domestic consumption. It may well be necessary and advisable to consider a complete moratorium on the fishery for a minimum period of five years, to allow stocks to reach maturity. The TCI's Department of Fisheries and Marine Resource Management estimate that it will take 10-12 years for existing stocks to mature and reach the densities required for successful reproduction and population recovery. Therefore, any reopening of the fishery would require reassessment and careful monitoring.**

3. **Enhance management of the legal-size limits. The queen conch should be landed as live weight (including the shell) to verify growth and allow for release of any undersized individuals. Introduce minimum lip thickness (e.g. LT>15mm), to ensure conch have at least one year of reproduction before harvest.**

4. **Enhance management of landing, processing, handling and sale/retail. This may require improving monitoring activities at processing plants, restricting conch harvest and purchase activities to only licensed commercial fishers; ending tour excursions that remove conch from marine habitats; and other measures as recommended and deemed appropriate by the TCI government.**

5. **Make the required legislative amendments based on the recommendations above and increase enforcement measures for illegal harvesting throughout the year, with particular emphasis on increased surveillance during the closed season.**

Case study 6: *Khaya anthotheca* from Ghana (module 10)

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The 9-step guidance for timber NDFs (9) has been shown to be fully compatible with the requirements of module 2 should Parties wish to follow this approach. The 9-step guidance (9) provides a framework for determining whether a detailed NDF is needed, evaluating conservation concern and biological risk in the context of harvest and trade, and evaluating the impacts of trade and the efficacy of the management measures in place to mitigate concerns. It is considered to be comprehensive, straightforward to follow and is already in wide use. Worksheets in an MS Excel spreadsheet are available to assist with the determination of an NDF based on low/medium or high-risk factors.

Table 10B. Factors in evaluation of risk and impact for development of an NDF showing links to the current module on tree species, module 2 guidance on general NDF making, and the 9-Step Guidance for Timbers

Factor	Module 2		Module 10	9-Step for Timbers (9)
	Risk	Impact		
Species biology & life history	Yes		Population size and structure, growth rate/annual increment	Steps 6 & 7
Habitat specificity & vulnerability				Step 5
Species range (historical & current)	Yes		Inventory	Step 5 Geographic distribution
Resilience of species populations			Adaptability of tree species to a range of stresses with ongoing regeneration	Step 5
Population structure, status and trends	Yes	Yes	Inventory – DBH, age class distribution	Step 5 Population size/size structure
Management Measures		Yes	Forest Management Plan	Step 8 Management measures
Conservation status	Yes		IUCN Red List & national	Step 4
Threats	Yes		IUCN Red List & national	Step 4
Harvest overview	Yes	Yes	AAC, permit information	Step 6 Impacts of harvesting
Trade Trends	Yes	Yes	Permit information, trade data	Step 7 Trade impacts

The following case study was compiled during a workshop in Ghana in December 2024 and is based on the 9-Step NDF Timber guidance.

Non-Detriment Finding (NDF)

Khaya anthotheca

Step 1: Review specimen identification

Key questions for step 1	Responses and outcome (Refer to Guidance for Step 1)					Information sources used
1.1 Is the Scientific Authority confident, that the timber or timber product concerned has been correctly identified, and that the right scientific name has been used for the timber?	The Scientific Authority is confident about the species identification or has corrected a simple error or out-dated name and taxonomic concerns have been resolved	**Yes**	**X**	Describe concerns or error(s) resolved below	Go to step 2	
	The species is not correctly identified and/or concerns cannot be resolved by the Scientific Authority or referral to the MA or an expert			Describe concerns or unresolved error(s) below	Go to Step 9: Decision 9.1	
	Concerns about clear identification :					
	There are trained foresters who are able to identify species in the field using features such as colour of slahsh, leaves, fruits, seeds, flowers, scent of exudates, among others. Currently Ghana has no problem with Taxonomy in respect of the four Khaya species listed by CITES in the field thus traceability is okay but the problem is with sawn lumber during identification. However an App called Xyloris for the processed wood such as Rosewood Afzelia spp using handheld device. Along the chain of custody there are series of monitoring from stock survey through the sawmill to the port for export.					

Step 2: Review compliance with requirements of artificial propagation

Key questions for step 2	Responses and outcome (Refer to Guidance for Step 2)					Information sources used
2.1 Is the permit application for artificially propagated specimens?					Go to Key Question 2.2	
		no	X		Go to Step 3	

Step 3: Review relevant exclusions and previously-made NDFs

Key questions for Step 3	Responses and outcome (Refer to Guidance for Step 3)					Information sources used
3.1. Are the timber specimens applied for covered by CITES Appendix II?		yes	X		Go to Key Question 3.2	
				Describe reason for exclusion of the specimen from CITES Appendix II (e.g. the relevant Annotation)	Go to Step 9: Decision 9.4	
	Reason for exclusion of the specimen from CITES Appendix II (and information for the Management Authority that an NDF and CITES export permit are not required)					
	The wood is exported as sawn wood.					

<table>
<tr><td rowspan="4">3.2. Is the harvest or the export of wild-harvested specimens of this species permitted by national or relevant sub-national legislation or regulation?</td><td></td><td>yes</td><td>X</td><td>Describe legislation or regulation and its relevance below</td><td>Go to Key Question 3.3</td><td rowspan="2"></td></tr>
<tr><td></td><td></td><td></td><td>Describe relevant legislation or regulation below</td><td>Go to Step 9: Decision 9.5</td></tr>
<tr><td colspan="6">Relevant national or relevant sub-national legislation or regulation (including concerns to be referred to the Management Authority or to the responsible authority for enforcement):</td></tr>
<tr><td colspan="6">All permits are availlable for applicants before harvesting.</td></tr>
<tr><td rowspan="4">3.3. Has the Scientific Authority previously made a science-based NDF for this species that is still valid and sufficient to evaluate the current export permit application?</td><td></td><td></td><td></td><td></td><td>Go to Step 9: Decision 9.6</td><td rowspan="2"></td></tr>
<tr><td></td><td>no</td><td>X</td><td>Record reasons that evidence used for a previous NDF is not valid and sufficient to evaluate the current permit application</td><td>Go to Step 4</td></tr>
<tr><td colspan="6">Previously made NDF:</td></tr>
<tr><td colspan="6">some work has been done using available information which dates back to over twenty years. However, an NDF is needed to come up with sustainable estimate.</td></tr>
</table>

Step 4: Conservation Concern

Conservation status assessments

Conservation status	International	Regional	National	Threats noted in assessment	Information sources used	Confidence level
Unknown – not assessed						

Severity of conservation concern relevant to harvest area

Refer to the factor table for step 4 in the Guidance document

High	Med	Low	Unknown	Information sources used
			Unknown	

Step 5: Potential Biological Risks

Refer to the factor table for step 5 in the Guidance document

Factor	Risks	High	Med	Low	Unk	Information sources used	Confidence level
Geographic distribution	Khaya anthotheca (Welw.) C. DC. occurs in lower rainfall regions of Africa. These regions can be found from Sierra Leone to south eastern Nigeria, as well as into Uganda and the Democratic Republic of the Congo.		**Med**				
National / sub-national population size and distribution	National population is small. Sub population are scattered across the country. Even in areas where growth is suitable in Ghana, the populations are still scattered.	**High**					

Size structure of national/sub-naitonal populations	Distribution of size classes discontinuos considering the 1988 and 2002 national inventories.	**High**					
Habitat specificity and vulnerability	Species is adapted to a few habitat type.		**Med**				
Resilience of tree species	Unknown reproductive pattern but in Ghana the growth rate is between 0.6 to 0.8cm per anum.		**Med**				
Summary of potential biological risks:	Geographic distribution		**Med**				
	National / sub-national population distribution	**High**					
	Size structure of national/sub-national populations	**High**					
	Habitat specificity and vulnerability		**Med**				
	Resilience of tree species		**Med**				

Step 6: Harvest Impacts

Refer to the factor table for step 6 in the Guidance document

Factor	**Impacts**	**High**	**Med**	**Low**	**Unk**	**Information sources used**	**Confidence level**
Impact of harvest on harvest population	The NDF for Ka failed to provide diameter class distribution to enable us make an informed decision about harvest impact on residual population.				**Unk**		
Seed production of the remnant stand is not influenced significantly either in quantities or in spatial coverage.	Considering the growth rate of Ka and the population of trees above or equal to 50cm dbh in the study area, there will be enough seeds to			**Low**			

Factor	Impacts	High	Med	Low	Unk	Information sources used	Confidence level
	sustain natural regeneration.						
Minimum cutting diameter (MCD) is (at minimum one size class) above the size at maturity and reproductive size classes are wel	The impact of minimum cutting diameter on harvest population is low because the felling diameter for Ka which is (110cm) is higher above the effective fruiting diameter of 70cm.			**Low**			
Spatial coverage of regeneration (natural or artificial e.g. enrichment planting	The impact of spatial coverage of regeneration on harvest population is medium because the regulation permit only 50% of trees within the felling limit bracket to be harvested. Additionally, the regulations provides that all seed trees within a compt. does not form part of the yield.		**Med**				
Impact of harvest on national and sub-national populations of target species	No data available on past inventories				**Unknown**		
Harvest impact on the ecosystem	Reduse impact of logging			**Low**			

Step 7: Trade Impacts

Refer to the factor table for step 7 in the Guidance document

Factor	Impacts	High	Med	Low	Unk	Information sources used	Confidence level

Trade level in relation to harvest area production	Impact on harvest population is low. Refer to first bullet of the case study			**Low**			
Magnitude and trend of national legal trade	Inventory data on all harvested population in the country is not available				**Unk**		
Magnitude of illegal trade	Low because there is robust traceability and safe guards in place along the chain of custody. There are good documentation of domestic and export trade.						

Step 8.1: Management measures in place

HARVEST Management measures	**Information sources used**	**Confidence level**
1. Government Gazetted Forest Reserve.		
2. Forestry Commission in collaboration with the TUC Holders and Forest Fringe communities.		
3.See Case Study page 15 for details. (EVALUATION RIGOUR OF MANAGEMENT MEASURES).		

TRADE Management measures	**Information sources used**	**Confidence level**
See page 16 of the case study for details		

Step 8.2: Evaluate Effectiveness of Management Measures

Which concerns, risks and impacts have been identified for the species?							
Step	Key	Factor	Conservation concerns & biological risks	High	Med	Low	Unkn
Step 4 Conservation concern		Severity of Conservation Concern					Unknown
Step 5 Intrinsic biological risk		Geographic distribution			Med		
		National / sub-national population distribution		High			
		Size structure of national/sub-national populations		High			
		Habitat specificity and vulnerability			Med		
		Resilience of tree species			Med		

Which management measures are in place for the species?

Step	Key	Factor	Harvest impacts & trade impacts	High	Med	Low	Unkn	Management measures	not applicable	don't exist or unknown	address this	appropriate	effectively implemented
Step 6 Harvest impact	—	*Impact of harvest on harvest population*	The NDF for Ka failed to provide diameter class distribution to enable us make an informed decision about harvest impact on residual population.				**Unk**	The appropriate rigour is available. However, periodic inventories to provide information on diameter class distribution and other growth variables are not available.				x	
	—		there are good management measures in place (e.g. 50% harvest rate, seed trees, minimum of 4 trees from 50 cm upwards, fine green conservation measures) it has till to be proven that these measures guarantee that regrowth at minimum equals harvest.				**Unk**	Though regrowth is equal to harvest and other conservation measures are in place, there is still the need for additional safeguards to offer protection to the species.		x		x	
			ensure that enough regeneration is in place				**Unk**	setting a threshold for regeneration capacity (inventories of forest reserves needed, general information on regeneration potential is needed)		x		x	

	Seed production of the remnant stand is not influenced significantly either in quantities or in spatial coverage.	Considering the growth rate of Ka and the population of trees above or equal to 50cm dbh in the study area, there will be enough seeds to sustain natural regeneration.			**Low**		all seed trees in a compartment at the time of the stock survey are exempted from harvest, at least four trees above 50 cm dbh will remain in any compartment. Controls are conducted by the FC before, during and after harvest to ensure compliance.					**x**
	Minimum cutting diameter (MCD) is (at minimum one size class) above the size at maturity and reproductive size classes are wel	The impact of minimum cutting diameter on harvest population is low because the felling diameter for Ka which is (110cm) is higher above the effective fruiting diameter of 70cm.			**Low**		MCD is 40 cm above EFD by regulation (MOP). (Controls as see above)					**x**
	Spatial coverage of regeneration (natural or artificial e.g. enrichment planting	The impact of spatial coverage of regeneration on harvest population is medium because the regulation permit only 50% of trees within the felling limit bracket to be harvested. Additionally, the regulations provides that all seed trees within a compt. does not form part of the yield.		**Med**			Spatial coverage is guaranteed by the compartments and the rules applied to them (see above). Additionally if the safeguards in the first two rows are in place no concern would be left.		**x (because of safeguards for future management)**			**x**

	Impact of harvest on national and sub-national populations of target species	No data available on past inventories				**Unknown**	As long as harvest in forest reserves is in line with the above listed conditions, (which are not all in place yet) the impact on the national population of this harvest would be low and effectively managed.					**x (potentially)**
	Harvest impact on the ecosystem	Reduce impact of logging			**Low**		RIL + controls and in addition if the safeguards from above apply, an excellent management is in place					**x (potentially)**
		Impact on harvest population is low. Refer to first bullet of the case study			**Low**		Traceability system and permitting system are robust					x
	Magnitude and trend of national legal trade	Inventory data on all harvested population in the country is not available				**Unk**	The appropriate Rigour is available. However, periodic inventories to provide information on diameter class distribution and other growth variables are not available.				x	
	Magnitude of illegal trade	Low because there is robust traceability and safe guards in place along the chain of custody. There are good documentation of domestic and export trade.			**Low**		Traceability system and permitting system are robust					x

Step 9: Non-Detriment Finding and Related Advice

Possible decisions of the NDF process based on this Guidance are listed in this worksheet. Each export permit application should have just one of the following outcomes/decisions. The Worksheet, together with more detailed information in the relevant Worksheets for previous steps, may be useful as a summary report of the NDF results and related advice to the CITES Management Authority.

Outcome of NDF Process	NDF Results and Related Advice	
9.7. Step 8, Key Question 8.2 is: Do existing management measures adequately mitigate harvest and trade impacts identified for the populations and sub-populations of the target species affected by the proposed trade?		
	x	Negative NDF pending additional information required to evaluate harvest impacts or trade impacts or management
	Justification for advice of Scientific Authority:	
	[Summary, or refer to Worksheet 8, Key Question 8.2]	
	Specific management procedures, precautions, other actions that need to be undertaken to ensure the survival of the species:	
	Inventories of forest reserves *Inventories regeneration* *other safeguards to be decided on by the SA and MA (FC)*	