TABLE 1: Proposed Non-detriment Finding (NDF) Format for Queen Conch Producing and Trading Countries

Species: Queen Conch *(Strombus gigas)* **Country: _____**

Conservation status of the species: (IUCN Red List): _____ **National Status: _____**

Date of last NDF: _____ **Date of new NDF: _____**

Responsible Officer of Competent Scientific authority: _____ **Position in Organization: _____**

The 2008 updated IUCN Checklist (Cancun 2008) has served as base model and has been adapted as to summarize the most relevant elements that have a detrimental impact on the resource's sustainability.

The headings with a gray color are elements that have to be evaluated in a minimum evaluation. Those in sky blue are elements that should only be included in an optimum evaluation.

CATEGORIES	DESCRIPTION	INDICATORS	REFERENCE POINTS	REF.
1. General Considerations				
1.1 Species identity	Correct taxonomy and nomenclature. Checks for synonyms and local names.	Strombus species know locally. Local names		
1.2 Application data accuracy	Provide overall opinion of reliability, accuracy, consistency and comprehensiveness of data used.	Overall quality level of data: • Low • Medium • High		
1.3 Consideration of entire harvest	Not be reduced to international trade but has to consider all factors that contribute to mortality in a population.	Contributing factors: • Habitat loss/degradation • Harvesting activities • Natural predation • Others	Maps of exploitation rates, resource abundance and population densities.	
1.4 Global conservation status	According to the IUCN Red List	Conservation levels: 2. Critically endangered 3. Endangered 4. Vulnerable 5. Near threatened 6. Least concern 7. Data deficient		IUCN Red List
1.5 International status of resource	Queen conch is a regionally shared resource, where harvest areas overlap and population dynamics are influenced by actions by the parties. Provide information from national or regional population abundance and density studies	Regional resource status: • Increase • Healthy • Steady • Decline • Unknown		

2. Biological Characteristics				
2.1 Life history	Life history stages of a species are critical to determine adaptability to threats and resilience.	Biological aspects to be covered: • Life history • Feeding habits and preferences • Reproduction • Habitat requirements and adaptability; • Ability to naturally repopulate areas.		Cop 15, Doc. 16.2.2
2.2 Population density and adults per hectare	Density of adults per hectare is one of the most easily measured and monitored attributes for assessing the status of queen conch populations. Despite various expert opinions and regional differences, in addition to CITES indicator of 56 adults per hectare there appears to be a regional consensus.	- CITES: 56 adults/ha. - Provide population densities used on national level (average for entire area or per fishing bank)	- 100 adults/hectare - Protocol utilized	Appeldoorn et al., 2011)
2.3 Habitat	Depending on the life stage, queen conch has specific habitat requirements, most probably with food source and protection as major underlying factors. Indicate if the habitat is shared with other (competing) species.	- Inventory of sea bottom (<70 m) substrates in fishing areas. - Other (competing) species.	- Spatial substrate type map. - Species identification by substrate/habitat	
2.4 Regional resource enhancement	Regional extension and connectivity of resource should guide national use and management plans in order to maintain and enhance key “stepping stone” populations.	Studies on larval development and movements. Sea current studies. Genetics comparison studies.	Management measures and actions to protect larval production areas with regional dispersal potential.	
2.5 Ecological adaptability	The various life stages appear to have preferences for specific habitats based on protection, feed and reproductive characteristics. Provide information on species susceptibility to habitat disturbance.	Survey results.		
2.6 Migration	There is knowledge about high dispersal rate of larvae and limited mobility/migration of adult queen conch. The seasonal movements of adult queen conch are associated with mating and spawning.	Sea current studies. Field surveys.		Stoner and Sandt, 1992.
2.7 Significance for eco-system	Queen conch, particularly in the early life stages, is an important source of food for a large array of predators that occur naturally in the ecosystem. Queen conch are herbivores and benthic grazers that feed on diatoms, sea-grass detritus, macroalgae and epiphytes. Very limited scientific information is available on the subject.	Field surveys.		CFMC, 2005; Stoner et al., 1995.
2.8 Repopulation capacity	The natural capacity of the resource to recuperate from fishing effort, habitat degradation and devastation by natural phenomena.	Field studies.	Density per hectare	
2.9 Biological parameters in critical life stages	Queen conch change habitats and feeding habits as they grow. Morphometric characteristics are well defined for adult life stages.	Characteristics of larvae and juveniles. Morphometric measurements for adults. Development stages of whorlshaped shell.	Flared lip thickness for sexually mature specimen.	
3. National Status				
3.1 National distribution	There are generally substantial differences in the spatial distribution patterns as the result of such factors as depth, substrate, food requirements and factors which contribute to overall mortality.	- Field surveys. - Periodic stock assessments. - Sub-populations	- Resource distribution maps. - Protocol utilized. - Risk assessment for sub-populations.	

	Indicate if sub-populations are detected.			
3.2 National abundance	The spatial abundance by individual fishing banks should be included in stock assessment activities.	Baseline studies. CFMC Queen Conch Stock Assessment Manual Guidelines	- Standardized stock assessment methods. - Protocol utilized. - Resource abundance maps.	CFMC Manual on Stock Assessment
3.3 Habitat quality	The overall status and over-time morphological and quality changes in queen conch habitats. Habitat loss or degradation from anthropogenic or natural causes (e.g., hurricanes) should be included.	Habitat loss and degradation factors identified: • Human habitat infringement. • Human wastes. • Estuarine discharges. • Natural phenomena. • Climate change. • Others	Establish protocols for measurement of changes in habitat quality and area.	
3.4 National population trend	The national population trend should be monitored over a long period (three generations in queen conch terms). Information sources can include scientific analysis of periodic resource assessments, landings, export statistics, vessel logbooks and processing plant reports. Information can be complemented by local fishers', traders' and traditional knowledge. Indicate period over which trend is calculated	- Baseline based periodic assessments. - Trend period - Population trend status: • Increase • Decline • Stable / Steady • Unknown	Baseline dynamics benchmark	NMFS, 2014 Rose, 2008
3.5 Population age structure	Age structure of the population is related to specific habitats and the reproductive behavior of the species, which in turn are important determinants in exploitation and habitat protection measures.	Type of habitat preferences per age group. Gender structure in adult populations.	Map with relative abundance by age group per area.	
3.6 Main threats	Direct and indirect threats and the cumulative impact on the habitat and management. Predation is mainly during the early life stages of queen conch. Indicate severity of each threat on a scale from 1-5 (1=very limited; 5=severe).	Main threats identified: • Habitat Loss/Degradation (human induced). • Invasive alien species. • Harvesting. • Pollution. • Allee effect on reproduction. • Others. • No threats. • Unknown.		
3.7 Economic impact of resource utilization	Harvest for trade in percentage of total harvest of queen conch fishery and fishery sector in total. Income derived from harvest as percentage total income by fishers. Total employment generated by conch fishery (direct and indirect)	Economic performance data.		
3.8 Social impact of resource exploitation	Total number of artisanal fishers involved in fishery. Percentage of subsistence fishing in total harvest. Role of queen conch in food security. Physical disabilities as a result of fishing practices.	Figures and percentages on categories as indicated.		
3.9 Quality of queen conch sector related information	Provide overall opinion of reliability, accuracy, consistency and comprehensiveness of available sources and data. Take into consideration period covered and available volume of quantitative information.	Overall quality level of data: • Low • Medium • High		

4. Queen Conch Management Plans				
4.1 Management history	Information on when management of the queen conch resource was formally initiated, institutions involved, legal framework, international conventions subscribed to and type of management plan currently in place. Indicate presence and importance of informal feedback and stakeholders involvement.	Type of Management Plan: • Adaptive. • Co-management. • Eco-system. • Other:		
4.2 Management plan or equivalent	Describe the purpose/orientation of the management plan. Is there a specific management plan related to harvest and conservation of the queen conch fisheries or is it part of or secondary to another more important fishery (e.g. lobster). Inform on the general elements and how these are updated. Report on legal framework that supports management plan in terms of specific legislature.	Purpose of management plan: - Economic. - Socio-economic. - Commercial. - Ecological Type of management plan : • Species specific. • Part of management plan of another species. • Fisheries generic.		
4.3 Management measures	Indicate the restoration and alleviation measures in place to assure that harvest and trade is not detrimental. Measures are not mutually exclusive. Effort and quotas based on spatial abundance and density of specific areas within total area, or on basis of overall average density.	Measures in place: • Quotas for export. • TAC. • Precautionary principle is being applied. • MPAs • Specific quotas • Closed season • License system • Gears • Individual non transferable quotas. • VMS • Other	Setting thresholds. Establish total mortality protocol.	
4.4 Management plan elements	The management plan consists of various indispensible elements which are described to the level of comprehensiveness that available data and information allow.	Elements of management plan: • Species and habitat conservation strategy • Monitoring and control • Threats • Enforcement • Legal framework • Others		
4.5 Regular revision of the management plan	The management plan is reviewed at regular intervals on a timeframe as specified in the plan to ensure its continuing adequacy and effectiveness in meeting the objectives.	Review intervals: • Continuous • Every six months • Once a year • Others		
4.6 Confidence in	Factors that impact on the effectiveness of and confidence in the harvest	Effectiveness of management		

effectiveness harvest management	management.	hampered by: • Budget restrictions • Shortage of trained personnel • Lacking enforcement • Failing feedback • Limited stakeholders involvement • Others:		
5. Queen Conch Harvesting				
5.1 Harvest methods	The queen conch fishery consists of four sub-sectors: Industrial, artisanal, subsistence and recreational. Fishing gears are not sub-sector specific and the gear used is mainly determined by national legislation on the issue.	Harvesting methods: • Pole & hook • Free-diving. • Scuba. • Hookah. • Others.		Appeldoorn et al., 2011
5.2 Harvest quotas	Within the queen conch fishery a number of quotas options can be employed by the authorities. - Indicate if, in addition to the commercial harvest quota, a scientific harvest quota has been allotted to the country by CITES. - Harvest quotas are mostly voluntarily established by the authorities on the basis of population dynamics or in function of CITES sanctioned trade quotas. - Quotas can also be established per fishers' sub-group. - Quotas by fishing bank are mostly the result of spatial stock assessments.	Harvest quotas: -Type of quota • Scientific • Commercial - Type of quota regime: • Voluntary established based on population dynamics and CITES approved. • CITES imposed. - Per fishers' sub-group: • Recreational • Subsistence • Independent artisanal • Industrial - By fishing area:	Trend in harvest quotas over last of last 15 years, in life weight. Precautionary factor applied to commercial harvest quota (%).	
5.3 Closed harvesting seasons and areas	As part of queen conch conservation, the most commonly applied management measures to limit fishing effort consist of closed seasons and areas.	Closed seasons based on: • Biological factors. • Quota considerations • Other Closed areas based on: • Quota considerations • Life stage prominence • Population density figures • Reproduction • Regional resource conservation • Other	Results of closed season through feedback on population dynamics and/or catches.	

5.4 Definition of Total allowable Catch (TAC)	The definition of a TAC implies the introduction of the principle of precaution, which level depends on the state of the resource and the effective control over its preservation. The calculation of a TAC has to include all aspects that contribute to the overall mortality of the species, including provision for illegal and recreational fishing.	TAC for principle products Level of Precaution (%)	Protocol to define and calculate total mortality and TAC.	Ehrhardt, 2008
5.5 Illegal harvest	How significant is illegal, unreported and unregulated (IUU) harvest. Inform about traceability mechanisms to detect and control illegal fishing for conch. Check with local sources on history of illegal harvest practices.	Mechanisms to detect and curb IUU fishing: • Use of VMS (satellite). • Surveillance. • Co-management and tenure arrangements. • Inter-institutional collaboration. • Traceability protocols. • Others: • None. Levels of harvest: (H-M-L) • Illegal: • Unreported: • Unregulated:	(Estimated) IUU volumes of the last 15 years. Set short and medium term target percentages for IUU. Regional consensus on traceability protocols.	
5.6 Morphometric management indicators	Specific morphometric measurements of queen conch are applied to assist in conservation and sustainability of the species. There is general consensus on the specific characteristics that can be measured, although there appear to exist differences between the various fishing grounds.	Measurements: • Shell length: mm • Flared lip thickness: mm • Operculum rings: # rings • Other		
5.7 Effect of harvest compared to other threats	What is the effect of the harvest on the queen conch population when compared with or taken together with the threats that have been identified for the species?			
5.8 Total harvest volume and trend	Maintaining accurate and up to data factual information on exploitation are indispensible to comply with the established quotas and prevent excess exploitation.	Sources of information: • Log books from vessels • Processing plant records • Landing sites. • National statistics. • Producers' organizations. • FAO statistics • CITES • Others:		
5.9 Confidence in harvesting data	The different ways queen conch is harvested and processed complicate the uniform data collection.	Factors that influence in confidence in data: • No reporting • Processing at sea • Incongruity in live to meat conversion factors • Effectiveness of monitoring systems.		
6. Monitoring of	.			

harvest				
6.1 Monitoring methods used	The effectiveness of monitoring of biological characteristics is greatly enhanced if baseline information on population dynamics, age structure, distribution, abundance and densities is available. Monitoring activities can be separated in three categories: 1. Biological aspects: 2. Harvesting aspects: (Incl. IUU) 3. Trade aspects: (Incl. IUU)	Monitoring methods: 1. Biological aspects: • Direct stock assessment • Habitat and biodiversity observations. • Internet • Literature • Others: 2. Harvesting aspects: • Revision of logbooks Installation of VMS • On-board observers • Processing plant records • Landing sites (incl. atolls) • Surveillance • Others: 3. Trade aspects: • Export/import statistics • Market trend studies • Others:	- Establish and follow protocols. - Set baselines and targets/thres-holds in management plan and Measure effectiveness of feedback.	
6.2 Confidence in monitoring	Low levels of confidence in monitoring because of, among others, insufficient enforcement, low compliance levels, lack of personnel and financial resources and illegal fishing and trade will result in can cause gaps in information and Existence of database and links with other databases for surveillance and enforcement (e.g. navy), should be included. Peer reviews of biological and ecological surveys.	Confidence in monitoring supported by: • Periodicity of reviews • Quality of data sources used • Collaboration from private sector • Peer reviews • Inter-institutional collaboration • Effective enforcement • Positive feedback on adjustments • Others		McGowan and Hay, (2008)
7. Control of harvest				
7.1 Harvest in protected areas	What percentage of legal national harvest occurs in state controlled Marine Protected Areas (MPAs), sanctuaries or temporary closed areas under the scientific and/or commercial quota?			
7.2 % of harvest vs. % actually protected	What proportion of the potential total harvest is made up by the commercial harvest versus the protected share of the resource.			
7.3 Harvest in areas with strong tenure or ownership	Total harvest in areas with stakeholders' ownership arrangements; in percentage of total harvest quota.			
7.4 Exploitation of population by several states	Management and harvest arrangements with countries that share the resource. Include international arrangements/agreements on IUU issues.			

8. Trade Data

8.1 Trade history

Provide short history of queen conch processing industry and trade in the country, including the period before CITES.
The history preferably includes development of fishery in terms of major uses and destinations. The development of foreign markets and the intra-regional trade and their respective share of the total trade should be mentioned.
Other factors that will help to understand the mechanism that have lead to the current situation in the queen conch industry include:

- Trends in volumes and respective overall value.
- Identification of marketing channels.
- Sales price time series.
- The share of exports in total volume traded (incl. intra-regional trade).
- The importance of re-exports and IUU trade.

Baseline information for SWOT analysis.

8.2 Products & destination

Five products are generally produced on the basis of queen conch (for last year on record):

	Market share in volume and value		Destination				Estimated % IUU in total volume traded
	In volume (kilos)	In value (US$)	Export Countries	Local	Subsistence	**Total**	
• Meat (clean fillets)	%	%	%	%	%	100%	%
• Trimmings	%	%	%	%	%	100%	%
• Pearls	%	%	%	%	%	100%	%
• Operculum	%	%	%	%	%	100%	%
• Whole shells	%	%	%	%	%	100%	%
• Other	%	%	%	%	%	100%	%
Total	100%	100%					

8.3 Export quotas

Provide information on the type of quota:

- Voluntary export quota.
- CITES approved export quota based on scientific stock assessment.
- Export quota imposed by CITES.
- Historic development of quota(s).

Products with quota:

- Meat
- Trimmings
- Pearls
- Operculum
- Shells

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8.4 Quota compliance

The Scientific Authority is primarily responsible for overseeing and managing the regulatory compliance of the established export quota(s). Provide information on measures taken to assure compliance.

Established proceedings on quota compliance.

8.5 Illegal, unreported and unregulated trade

How significant is illegal, unreported and unregulated trade?
Measures to detect, curb and eradicate IUU trade.
Methodology how IUU is calculated and/or arrived at.

Levels of IUU per product (H-M-L):

- Meat:
- Pearls:
- Operculum:

8.6 Demand versus supply

The imbalance in supply and demand is of crucial importance for the price developments and the consequent level of interest in harvesting.
Over the last years, the limited supply and increasing demand have driven prices to unknown heights.
In addition to market demand prognosis for the respective queen conch products, provide also an estimate per market outlet: Export markets; Intra-regional trade; national market; tourist sector; IUU.

Demand trend at outlets: (up-down- stable- don't know):

- Meat
- Pearls
- Operculum
- Trimmings
- Shells

8.7 Trade volume	Maintaining accurate and up to data factual information on trade movements are indispensible to comply with the established quotas and prevent excess exploitation.	Information sources: • National statistics • Statistics importing countries • FAO statistics • CITES statistics • Exporters' records • Extrapolate landing data • Others:		
8.8 Confidence in trade data	Trade data are often subject to over or under reporting by traders depending on prevailing tax and incentive regimes. Information on the local market consumption is generally very poor, in part because of the many informal channels and outlets. The Scientific authority generally lacks (trained) personnel and financial resources to mount and maintain a data collection and dissemination service.	Reliability of trade data sources: (H-M-L): • National statistics • Statistics importing countries • FAO statistics • CITES statistics • Exporters' records • Local market information • Others		
9. Other factors				
9.1 Impact of climate change and natural phenomena	Future climates which could change the rate and direction of larval dispersal and population connectivity. Hurricane activity has been found to negatively impact queen conch populations.	Case studies on queen conch behavior under temperature variations Habitat changes under higher sea water temperatures. Post hurricane case studies related to queen conch.	Historic records on sea surface temperatures.	
9.2 Educational and outreach activities	Broad educational and outreach activities involving industrial and artisanal fishermen, teachers, students, politicians and general public.	Involvement of national educational system and NGOs.	Educational material for specific target groups.	
9.3 Legal framework	National and international legislation relating to the exploitation and conservation of the species. Effective implementation and compliance levels	Data base with relevant dispositions.		
10. Artificial production / culture				
10.1 Origin of stock	Important issues are the origin of the founder stock. .	Founder stock originates from: Larvae collected from the wild. Juveniles taken from the wild Adults taken from the wild for reproduction purposes.	Establish protocols for removal.	
10.2 Impact on *in situ* resource and conservation	Culture operations can impact on wild populations and conservation measures. The influence can be both positive, by potentially reducing pressure on wild populations, or negative, if wild-taken specimens are traded under the certificate of origin of the artificial source	Activities with impact: • Founder stock collection. • Culture operations • Ranching • Release of excess larvae and juveniles		Res. Conf. 11.11 Rev.15

		• Possible loss of habitat if outgrow facilities cover sea grass areas. • Commercial production. • Others:		
10.3 Traceability of Products	Highly significant that the species and specimens can be easily identified and distinguished from wild-taken specimens.	CITES has specific guidelines for cultured produce.	Traceability protocols	CoP16 Inf.11