Training modules on Queen Conch sustainable catch quota estimation critical to species' successful management

Standing conditions governing the need of defining Non Detrimental Findings (NDF) through annual catch quotas framed by proper sustainability criteria

1. CITES does not have sustainability criteria adopted for Queen Conch (QC). Until now it is up to the Parties to define such criteria

2. The QC Working Group has discussed and recommended development of sustainability criteria concepts and has requested annual catch quota formulations to guide NDF

3. In principle, fundamental concepts driving QC population sustainability criteria are:
   a. Internal reproduction system requires male-to-female encounters to mate
   b. Slow mobility of the species limits rates of male-to-female encounters, which becomes critical at lower population density levels
   c. Habitat fidelity of the species conditions growth and maturation

4. There is agreement that population density of reproductive aggregations is core to mating success; therefore, **sustainability criteria should be framed by population density concepts**. NDF should be guided by regionally agreed criteria

Nature of equation to estimate Queen conch annual quotas

Quota = F_{ref} * Population Biomass

Population Biomass = Average Density * Habitat Range * Average individual weight

Average Density: function of habitat quality, recruitment, and exploitation

Habitat Range: function of species ecology and population dynamics

Average individual weight: function of habitat fidelity effects on growth and exploitation

F_{ref} = fishing mortality reference. It is the fishing mortality rate that, if applied, it will generate a catch that will modify population abundance that will reduce reproductive population density to levels that must be above a threshold that is not detrimental to the survival of the species.

FUNDAMENTAL ISSUES: **HOW TO LINK CATCH TO REPRODUCTIVE POPULATION DENSITY** AND HOW TO OBTAIN INFORMATION THAT IS STATISTICALLY UNBIASED

Purpose of training on annual catch quota estimation MODULES

Training is centered on the concept of a full-circle flow of concepts encompassing:

a) **Concepts** on NDF that could be adopted regionally, thus armonizing regulations
a) **Assumptions** on **statistical procedures** adopted **to estimate NDF, and**
b) **Protocols for data collections** according to agreed **unbiased quota estimation procedure**

To achieve the training purpose a **strategic frame** is offered consisting of a sequence of three MODULES containing concepts, assumptions and protocols that are integrated much along lines of academic learning:

WHAT is the problem to be resolved via training
WHY there is a need to resolve such problem
HOW to resolve the problem via training on unbiased statistical
    and quantitative methods

INTEGRATED TRAINING CONCEPT

INFORMATION PROVIDED FOR QUOTA ESTIMATION

TRAINING MODULE I.
How to estimate landings and fishing effort by fishing grounds (a per area concept)
COMPLETED JULY 2020

Fraction of population density retrieved from fishing grounds estimated with catch in numbers and fishing effort implemented

TRAINING MODULE III.
How to estimate annual quotas with information provided
SUGGESTED START SEPT. 2020

TRAINING MODULE II.
How to estimate reproductive population densities, abundance, spatial distribution (habitat range)
SUGGESTED START JULY 2020

Habitat range
Population densities by fishing ground (area)
Population size structures by fishing ground
Population abundance by maturity stages and fishing grounds

PROPOSED TRAINING VIA DISTANCE TRAINING WITH WEBSITE SPECIFIC ORIGIN IN THREE LANGUAGES: ENGLISH, SPANISH AND FRENCH. COST OF TRAINING INCLUDED IN BUDGET TO DEVELOP THE THREE TRAINING MODULES