



Application of CFMC Queen conch training modules in a European Union/FAO funded pilot program to improve Queen conch landings in Jamaica and CITES/WECAFC research priority definitions

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# Background on Pilot Project in Jamaica using CFMC Training Modules I, II and III

In response to the QC SSTAG recommendations, the **FAO-WECAFC Secretariat** submitted a proposal to the **European Union (EU)** seeking funds in support of the project entitled “*Advancing data collection efforts for sustainable queen conch fisheries and conservation management in the WECAFC region*”.

Proposal was approved by the **EU** and the **FAO-WECAFC Secretariat** entered into a cooperative agreement with the **Gulf and Caribbean Fisheries Institute (GCFI)** to act as the implementing agency of the pilot project in **Jamaica**. This country was selected by **FAO** considering that their queen conch artisanal and industrial fisheries may be representative of queen conch fisheries throughout the **WECAFC** region.

**GCFI** contracted Drs. **Nelson Ehrhardt** and **Alexander Tewfik** as consultants responsible for developing training materials, field protocols and analysis methods and the **National Fisheries Authority (NFA)** of **Jamaica** is the governmental institution responsible for the implementation of the pilot project.

**Implementation of the pilot project started in September 2022, and it is expected to finish in August 2023.**



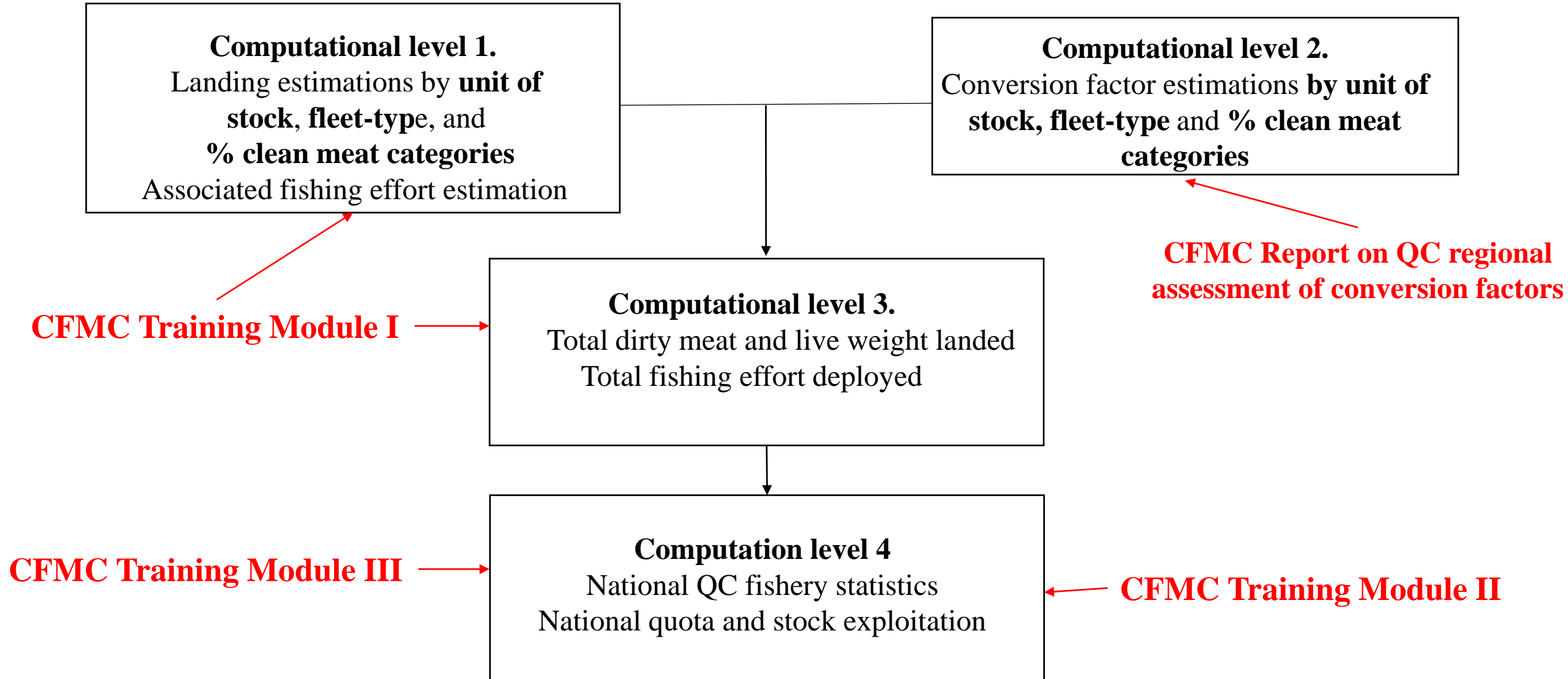
## Conceptual Framework

The **pilot project** is defined as **small-scale, short-term feasibility experiment** that should **help the NFA in Jamaica gain experience on how to improve queen conch fishery landings and fishing effort statistics.**

### Objectives of the Pilot project are:

1. To enhance the technical and strategic capacities of Jamaican queen conch fishery management authorities regarding the adoption of statistical processes that are **statistically valid** when collecting information about spatial and temporal fishery landings and fishing effort of a species that is listed in Appendix II of CITES; and
2. To generate a formal understanding on how to incorporate key queen conch population dynamic characteristics in statistical sampling experimental designs that could generate unbiased information about fishery statistics of the queen conch populations.

# General computational flow for national QC fishery statistics and annual QC quota estimations employed by the Pilot project



# CFMC Training Materials Used in the EU Pilot Project in Jamaica

1. Ehrhardt, N., and M. Perez. 2019. *Final report to the Caribbean Fishery Management Council on project “Priority 1 to improve understanding of Queen Conch conversion factors by reanalyzing existing data”*. 24 p.

Introduces a new regression method to estimate conversion factors based on the morphometrics of Queen conch, which allows application of conversion factors by size frequencies in the % clean meat categories of juvenile and adult Queen conchs. In English.

2. Ehrhardt, N. 2020. **Training Module I: Training on landings and fishing effort estimation in queen conch (*Aliger gigas*) fisheries.** Caribbean Fishery Management Council. 63p.

Offers an extensive review of statistical sampling designs applicable to landings and fishing effort estimations in artisanal and commercial fisheries with adaptations through examples to Queen conch fisheries. In Spanish and PPT in English

3. Ehrhardt, N. 2021a. **Training Module II: Population density estimation in queen conch fisheries (*Aliger gigas*).** 88p.

Reviews the diving technologies, operational procedures and experimental sampling designs needed for Queen conch direct stock assessments. Emphasis is on the conceptual validity of the population density and biomass estimates. In English and Spanish

4. Ehrhardt, N. 2021b. **Training Module III: Training on assessment methods for annual catch quota estimation in queen conch (*Aliger gigas*) fisheries.** Caribbean Fishery Management Council. 72p.

Contains a thorough review and assessment of the mathematical and statistical models historically applied in Queen conch catch quota assessments, highlighting the impact of assumptions on the statistical data required, the requirements of the data, and the validity of the results.

In addition, two important peer-reviewed papers on queen conch biology and ecology that support the statistical conceptual approaches adopted in the pilot project are:

1. Stoner, A. & R.S. Appeldoorn 2021. *Synthesis of Research on the Reproductive Biology of Queen Conch (Aliger gigas): Toward the Goals of Sustainable Fisheries and Species Conservation*. *Reviews in Fisheries Science & Aquaculture*, <https://doi.org/10.1080/23308249.2021.1968789>
2. Vaz et al., 2022. *Exploitation Drives Changes in the Population Connectivity of Queen Conch (Aliger gigas)*. *Frontiers in Marine Science*, doi: 10.3389/fmars.2022.841027

The two papers contribute to the **fundamental definitions of unit of stock** that should frame the origin and traceability of Queen conch landings and fishing effort

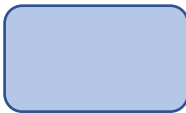
# Sequential implementation of the Pilot Project in Jamaica

## Project Activity

Main components



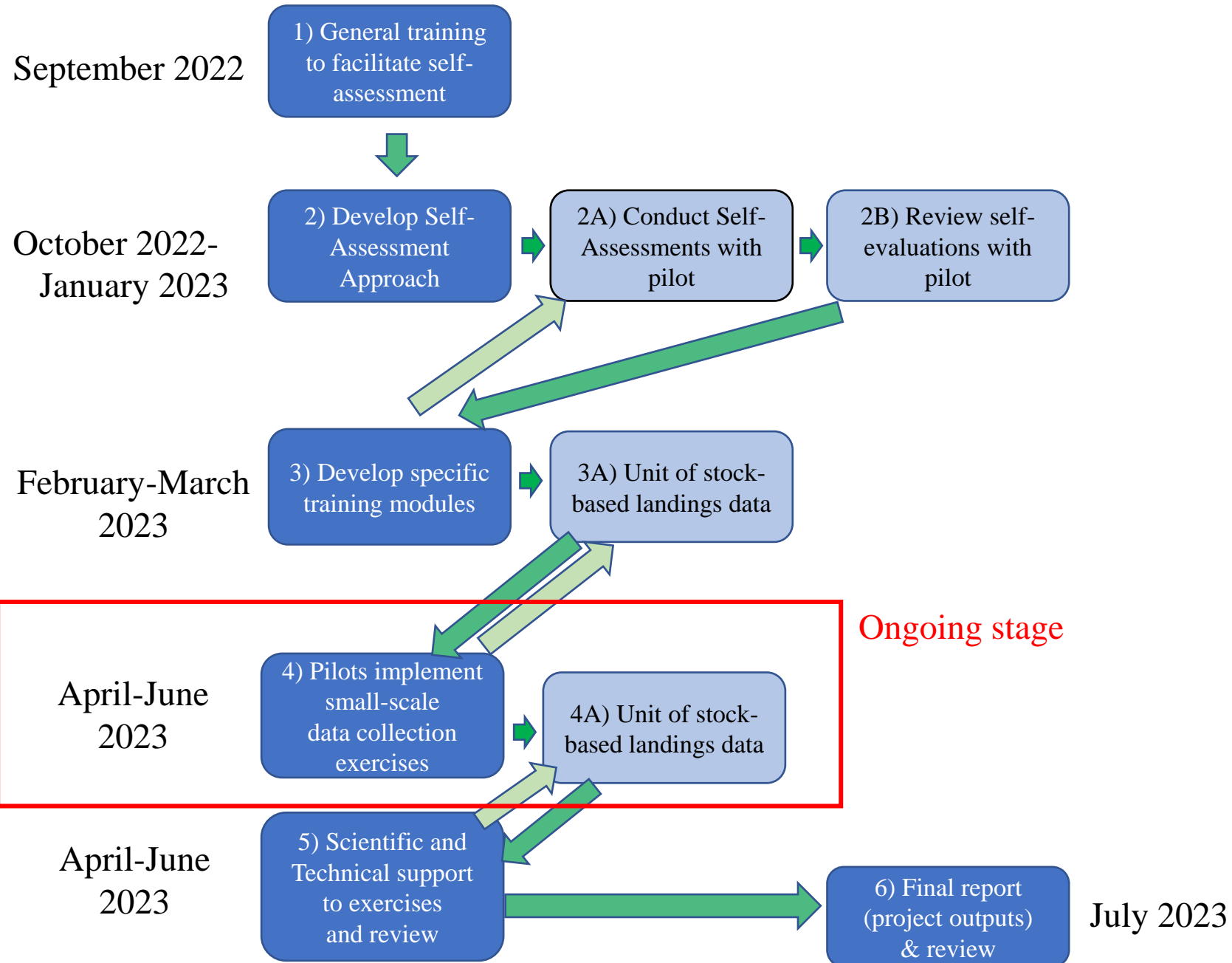
Sub-components



Main workflow



Technical support/review



The **QC fishery statistical system is statistically efficient** in that it intercepts the landings and fishing effort information according to predefined:

1. **Unit of stock**
2. **Fishing power** of fishing technologies used and **operational characteristics** (**when, where**) of fleets, and
3. **Product types** landed with different % clean meat categories from each of the above.

A census/frame survey approach adopted by the pilot project is expected to produce data with **known levels of accuracy and precision**



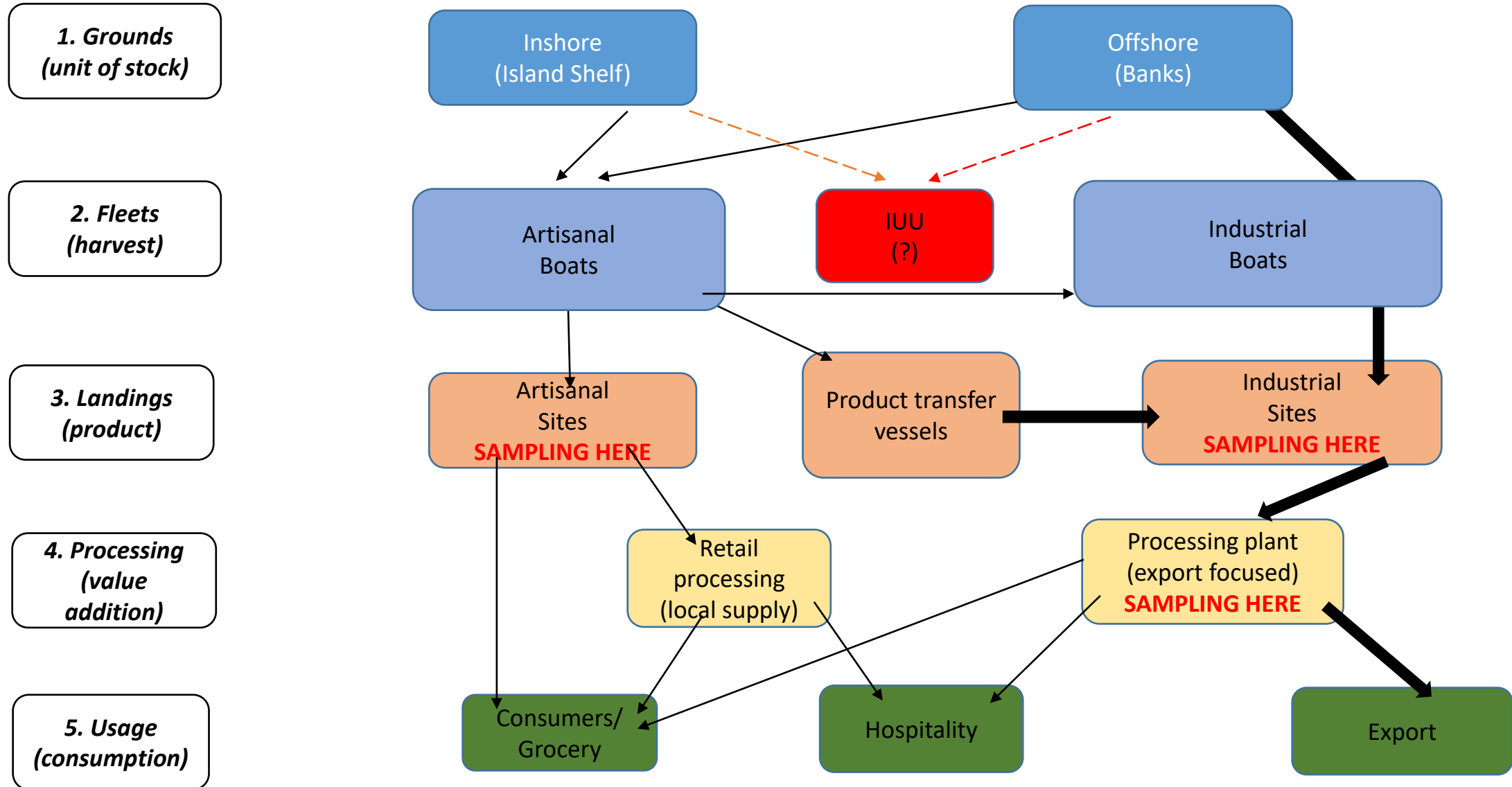
# Assessment of QC production chains were critical to the strategic sampling design

Product chains allow

- (1) **mapping** of product pathways,
- (2) illustrate **ways to intercept** QC products and,
- (3) to allocate proper **conversion factors**

# Jamaica QC production chain emerging from self-evaluation and to be corroborated from survey frame

**Survey site intercepts indicated in red**



# The pilot project uses different statistical sampling design methods dictated by operational fishing technologies

## 1. Artisanal fisheries

- (a) **Frame survey** to estimate average catch per trip from a sample of boats (i.e., for a few boats, over a few landing sites, and on a few occasions during the fishing season), and
- (b) **Fishery census** to expand average catch per trip to total statistical population (i.e., total fleets, all landing sites and across the fishing season).

## 2. Industrial fisheries

**Fishery census** approaches to classify all landings (i.e., total industrial vessels, all landing places and all fishing season).

The census approach uses:

1. Landing receipts by fishing trips,
2. Vessel Monitoring System (VMS) associated with each fishing trip and
3. Captain logbooks in randomly selected vessels to express catch per day fishing by dinghies fishing for the commercial vessel

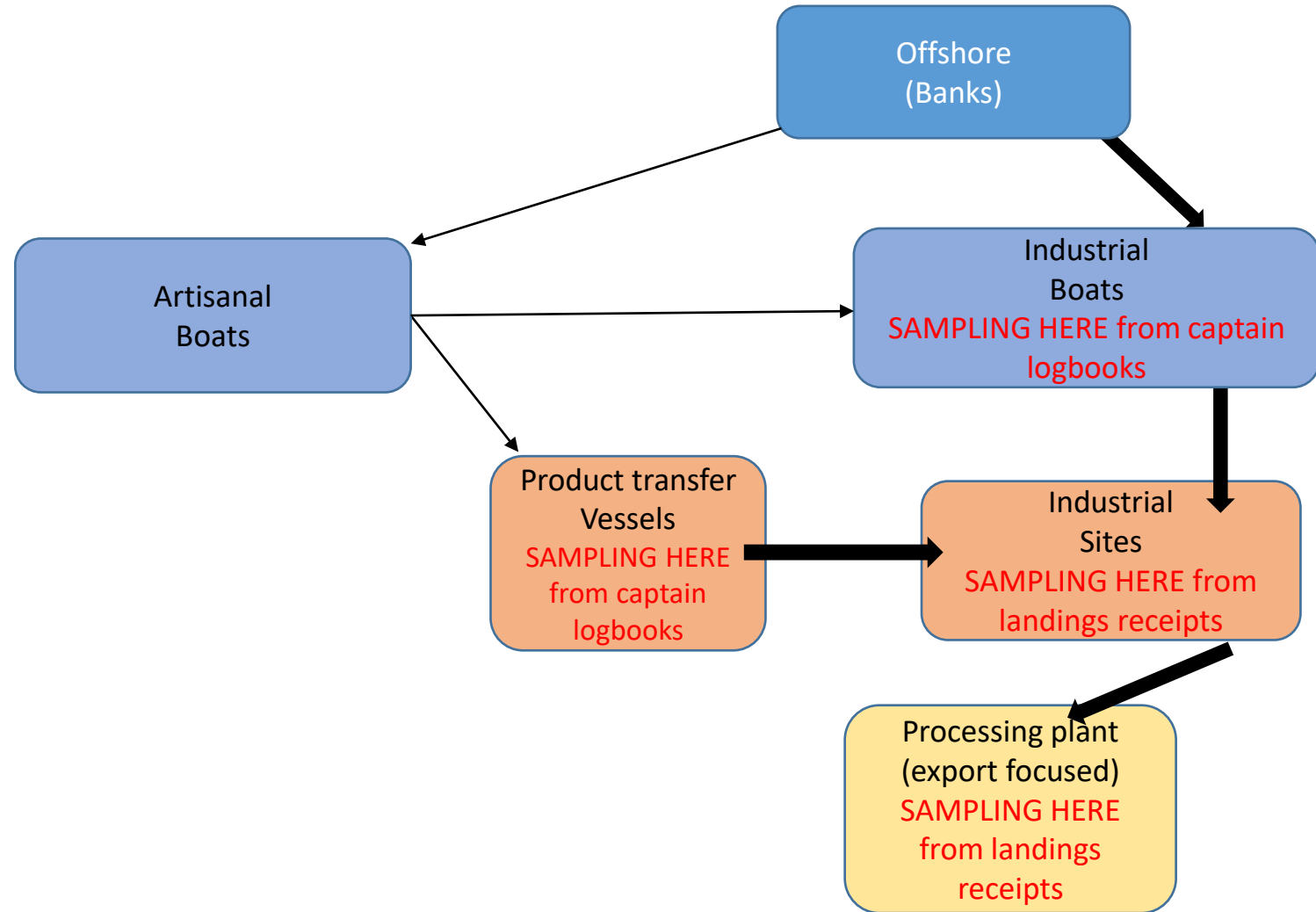
# Summary of data origins for the QC industrial fleets **from logbooks**

1. Grounds  
(unit of stock)

2. Fleets  
(harvest)

3. Landings  
(product)

4. Processing  
(value addition)



# Summary of statistical data on landings and fishing effort in **industrial QC fisheries**

## 1. Landings from industrial vessels

1.1 **Landing receipts at processing plants** for all industrial vessels with stated ground origin of catch

1.2 Catch brought aboard by dinghies of own vessel from **captain logbooks**

1.3 Catch brought aboard by artisanal boats from **captain logbooks**

## 2. Fishing effort by industrial vessels

2.1 Days of departure and arrival back to port from VMS of a few industrial vessels under special arrangements between the NFA and vessel captains/owners

2.2 Days fishing from VMS data and correlated with dates of catch brought aboard in 1.2, above

The landings and fishing effort statistics of a fraction of the industrial vessels with VMS is used to estimate an average catch per day fishing. This catch per unit of effort is used to estimate total fishing effort by the following formulation

$$\text{Total fishing effort industrial fleet} = \frac{\text{Total landings industrial vessels}}{\text{Average catch per day fishing of a sample of industrial vessels}}$$

**Results emerging from the Pilot Project will allow:**

1. To expand the statistical system tested in the Pilot Project to the QC fishery at the national level
2. To adopt similar approaches to improve QC landings and fishing effort in other countries in the Caribbean region

## **Queen conch Scientific and Statistic Advisory Committee (SSTAG) meeting in Miami 12-13 April 2023**

### **Recommendations on priority research to CITES and FAO**

- 1. Queen conch NDF Guidance.** Following SSTAG discussions on queen conch NDFs, **implement training regarding queen conch catch quota and conversion factor estimation.** The training will be based on statistically valid landings and fishing effort data **using Training Module III developed by the Caribbean Fishery Management Council.**
- 2. Improving Queen Conch landing and monitoring statistics in the WECAFC Region. Building on the EU funded pilot project “Advancing data collection efforts for sustainable queen conch fisheries and conservation management in the WECAFC region”**, conducted in Jamaica, expand to the host country level and other Queen Conch producing countries in the WECAFC region. This will build the capacity of fisheries monitoring and management institutions to improve conch production statistics.



THANK YOU