CRFM Fishery Report - 2013

VOLUME 1, Suppl. 2-

**Report of the Inter-Sessional Meeting of the CRFM Shrimp and
Groundfish Fishery Resource Working Group (SGWG)
Guyana, 19 – 20 February 2013**

Report of Ninth Annual CRFM Scientific Meeting -
Kingstown, St. Vincent and the Grenadines
10-14 June 2013

CRFM Secretariat
Belize

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CRFM FISHERY REPORT - 2013. Volume 1, Suppl. 2 – Report of Ninth Annual CRFM Scientific Meeting – Kingstown, St. Vincent and the Grenadines, 10-14 June 2013 - Report of the Inter-Sessional Meeting of the CRFM Shrimp and Groundfish Fishery Resource Working Group (SGWG), Guyana, 19 – 20 February 2013.

FOREWORD

The Ninth Annual CRFM Scientific Meeting took place during 10 to 14 June 2013 in Kingstown, St Vincent and the Grenadines. During this Meeting, the five CRFM Resource Working Groups met. The CLWG, LPWG and RSWG each reviewed the relevant components of the 2013 Strategic Action Programme (SAP) for the Sustainable Management of the Shared Living Marine Resources of the Caribbean and North Brazil Shelf Large Marine Ecosystems (CLME$^+$), taking into account the need for incorporation of the precautionary approach, ecosystem and global environmental change considerations. Each Resource Working Group also developed an inter-sessional work plan. The CLWG reviewed the regional management options papers prepared and validated under the ACP FISH II Programme and proposed sub-regional regulations for the Queen Conch (*Strombus gigas*) in accordance with the request by the CFMC/OSPESCA/WECAFC/CRFM Working Group on Queen Conch. The LPWG reviewed the regional billfish conservation plan proposed by the WECAFC/OSPESCA/CRFM/CFMC Working Group on Recreational Fisheries and the sub-regional blackfin tuna management plan prepared by the CRFM under the CLME Project and provided guidance and recommendations on the way forward for implementation in the region. The LPWG also identified critical research needs to improve the quality of fisheries resource assessments and management recommendations and discussed data collection and reporting requirements for ICCAT in 2013-2014. The RSWG reviewed the regional lionfish strategy and status of implementation, as well as the performance of Marine Protected Areas in some countries and provided suggestions for the way forward. The RSWG also undertook a preliminary analysis of data on landings, effort and fishing operation costs for the fisheries in Anguilla and it prioritized data collection needs for improved fisheries management advice. The SGWG conducted separate assessments of the seabob (*Xiphopenaeus kroyeri*) fishery for Suriname and Guyana, discussed the proposed new methodological approach and the draft fisheries management plans for Guyana, Suriname and Trinidad and Tobago being developed under the ACP Fish II Programme. The SCPWG, together with the CRFM/WECAFC Working Group on Flyingfish in the Eastern Caribbean, provided guidance on the implementation, monitoring and evaluation of the sub-regional management plan and agreed management actions for the Eastern Caribbean Flyingfish and reviewed the related Draft Resolution of the respective Ministerial Sub-Committee. In addition to review of Working Group reports, the plenary session received updates on several ongoing and planned regional activities: (1) the status of the CLME SAP endorsement by countries and development of the PIF for CLME+; (2) the Caribbean Regional Strategic Program for Climate Resilience being led by CCCCC; (3) the Sanitary and Phytosanitary Project in the Fisheries Post Harvest Sector being executed in collaboration with IICA; (4) two queen conch projects supported by the ACP Fish II Programme and focused on strengthening scientific capacity; and (5) a subset follow-up project to the Study on the Formulation of a Master Plan on the Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean completed in collaboration with JICA.

The Report of the Ninth Annual Scientific Meeting is published in one volume instead of the usual two volumes published for such meetings. This volume (Volume 1) contains the report of the plenary sessions and the full reports of the CRFM Conch and Lobster, Large Pelagic Fish, Reef and Slope Fish and Shrimp and Groundfish Resource Working Groups for 2013. Nine national reports were submitted and these are published as Supplement 1 to Volume 1. The report of the inter-sessional meeting of the Shrimp and Groundfish Working Group, which was convened in February 2013 in Georgetown, Guyana, is published as Supplement 2 to Volume 1. The report of the combined meeting of the SCPWG, and CRFM/WECAFC Working Group on Flyingfish in the Eastern Caribbean is published as Supplement 3 to Volume 1. Volume 2 usually contains part A (Overview), and the fishery management advisory summaries of individual fishery reports comprising part B of each Working Group report. However, only one detailed assessment was conducted in 2013, and hence there was insufficient material to warrant publication of a separate Volume 2.

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LIST OF ACRONYMS AND ABBREVIATIONS

ACP	-	African, Caribbean and Pacific states
CCCCC	-	Caribbean Community Climate Change Centre
CFMC	-	Caribbean Fishery Management Council
CLME	-	Caribbean Large Marine Ecosystem
CLWG	-	Conch and Lobster Resource Working Group
CPUE	-	Catch Per Unit Effort
CRFM	-	Caribbean Regional Fisheries Mechanism
DAS	-	Days-at-Sea
FMP	-	Fisheries Management Plan
GAPTOSP	-	Guyana Association of Private Trawler Owners and Seafood Processors
GLM	-	General Linear Model
HCR	-	Harvest Control Rule
ICCAT	-	International Commission for the Conservation of Atlantic Tunas
IICA	-	Inter-American Institute for Cooperation on Agriculture
JICA	-	Japan International Cooperation Agency
LPWG	-	Large Pelagic Fish Resource Working Group
MSC	-	Marine Stewardship Council
NGO	-	Non Governmental Organization
OSPESCA	-	Organization of Fishing and Aquaculture in Central America (Organización del Sector Pesquero y Acuícola de Centroamerica)
PIF	-	Project Identification Form
PSI	-	Pritipaul Singh Investments Inc.
RSWG	-	Reef and Slope Fish Resource Working Group
SAIL	-	Suriname American Industries Ltd
SAP	-	Strategic Action Programme
SCPWG	-	Small Coastal Pelagic Fish Resource Working Group
SWG	-	Seabob Working Group
SGWG	-	Shrimp and Groundfish Working Group
VMS	-	Vessel Monitoring System
WECAFC	-	Western Central Atlantic Fishery Commission

1.   WELCOME AND INTRODUCTION

The Programme Manager, Fisheries Management and Development, CRFM Secretariat, served as the Chairperson for the meeting. In keeping with the Agenda (Appendix 1), he welcomed the participants and invited them to introduce themselves. A full list of participants is given at Appendix 2.

2.   OBJECTIVES AND CONTEXT OF THE MEETING

The Consultant/Facilitator, Dr. Paul Medley, briefly explained the objectives and context of the meeting. Dr. Medley stated that the purpose of the meeting was to provide guidance on the development and completion of a new stock assessment approach that would take advantage of the size information available from the seabob fishery. The new assessment was considered by the SGWG to be particularly important for Guyana which may be applying a higher level of exploitation than Suriname. The stock assessment will be prepared before the CRFM Annual Scientific Meeting due to take place in June 2013, where it will be completed and reviewed. He also indicated that the presentations and discussions would be guided by the terms of reference (TOR) for the inter-sessional meeting, which had been distributed prior to the meeting. The TOR is provided as Appendix 3. The purpose of this report is to document the meeting and what has been agreed among SGWG members in terms of model structure and a work plan for preparing the stock assessment for completion and review at the CRFM Annual Scientific Meeting in June.

3.   STOCK ASSESSMENT APPROACH AND AVAILABLE DATA

3.1   Review the proposed size and age structured population model for seabob, determining any changes required to ensure that it is appropriate for the fisheries stocks and available data

The stock assessment model was reviewed. Full documentation of the model will be produced for the CRFM Annual Scientific Meeting, at which time the model will be completed. No age data was available, so the model will be designed to fit to size information, which consists of tail weight data. The population model will be a standard age-structured model such as is used to fit to catch-at-age data. The agreed model will have the following attributes:
- 12 age classes: seabob are generally thought not to live beyond 12 months. A 12+ group will also be defined.
- Age (month) – Tail Weight (0.2g) conversion by growth model. The growth will be described by the von Bertalanffy growth model for the mean weight and a standard deviation for the normal probability.
- Logistic selectivity (non-domed) for selectivity at age. A curve describing selectivity at weight class will be developed if possible.
- A fitted exploitation rate by month.
- A Beverton and Holt stock recruitment model with log-normal recruitment deviations by month. Alternative steepness of 0.7, 0.8 and 0.9 will be considered for the projections.
- Maturity ogive for females tail weight fitted separately from the morphometric data for the calculation of spawning stock biomass
- Growth b parameter estimates taken from the morphometric data for length-weight conversion ($W = aL^b$)

It was noted that changes to the model may be made based on diagnostics from the fit, and therefore the above model would only initiate the stock assessment modelling process.

3.2   Review the software platform and any alternatives for fitting the model

Given the number of parameters which had to be fitted, it was decided to develop the model in AD Model Builder (Fournier, 2011). This software was technically advanced and not easy to use because the coding was written in variant of the computer language C. However, it should be able to cope with the non-linear fitting and the number of parameters.

To verify the coding and help understand the model, an MS Excel spreadsheet will also be developed which will calculate the likelihood for a particular parameter set.

3.3   Outline the outputs expected from the stock assessment to determine whether it can provide appropriate scientific advice

The following minimum diagnostics and indicators will be reported by the stock assessment:
- Observed-Expected, Residual-Expected, Outliers, Likelihood contribution by data source
- Standard biomass statistics: total biomass ($Bt/B0$), and spawning stock biomass ($SSBt/SB0$, $SSBmsy$, $SSBt/SSBmsy$)
- Fishing mortality statistics ($F/Fmsy$, $F/Fspr40\%$)
- Probability projection under current effort and recruitment for 2 years
- Probability projection under current effort and recruitment reduced by 20% for 2 years

The output will be loaded into R and Excel for easier plotting and analysis.

4.   AVAILABLE DATA AND REQUIREMENTS FOR ANALYSIS AND INACCURACIES

4.1   Review the available fisheries data, making special reference to the main uncertainties and how the data will be used in the stock assessment

Three data sources were identified:
- Total catch by month for 1983-2012, where:
  - Annual catches would be divided by 12 to get the approximate monthly catch, which might be necessary for the early part of the time series.
  - Provided by Government (Fisheries Department)
- Catch-effort data, as trip data, were available from Heiploeg. Trip data will be requested from SAIL, BEV and PSI, although this was not critical information for this first stock assessment. At least some trip data was expected for the period 2000-2012.
- Random Size sampling from Heiploeg and others for the period 2009-2012.

A number of problems in the data were identified and discussed. These included consistent units to record weights, the interpretation of commercial size categories, the way fishing effort might be measured, and the seabob sex recorded as unknown in some Guyana random sampling data. The following decisions were made on how the data will be treated and will be documented in the final report:
- Sex recorded as "Unknown" will be treated as "Female" as this was found most consistent with the available size information.
- Effort will be measured as Days-at-Sea (DaS)
- Trips with lengths of greater than 12 days will be discarded as unreliable. Since seabob was stored on ice, longer trips were not possible and therefore the data as a measure of effort would be unreliable.
- Based on the fitted GLM, a correction will be applied to effort for the abundance index:

- o trip length accounting for the non-linear relationship between expected catch and DaS;
- o individual vessel fishing power.

The commercial size categories need to be interpreted within the model so that catches lie between size limits (defined as peeled tail count per pound). The reported commercial size categories were allocated to such size limits based on observations and on expert judgement of the group (Table 1).

The SGWG considered that the main uncertainties in the data and modelling would be:
- interpretation of the commercial size categories (how the size categories were interpreted in the model),
- the growth model (converting between weight and age), and
- the measure of effort and use of CPUE as an abundance index.

The decisions above were taken to minimise the effect of these uncertainties in the data.

Table 1: Size categories will be allocated as lying within the limits defined, which allows some categories to be combined. The size is given as the peeled tail count per pound which is converted to grams as: tail weight (g) = 1000/(2.20462*Count). The count range is based on the name given to the size category (e.g. 70 to 90)

	Limits from Count Range		Limits assumed in model	
	Min	Max	Min	Max
70/90	70	90	1[a]	90
90/110	90	100	90	100
100/130	100	110	100	110
110/130	110	130	110	130
130/150	130	150	130	150
100/150	100	150	100	150
150/200	150	200	150	200
180/210	180	210	150	300
100/200	100	200	200	400
130/200	130	200	200	400
200/300	200	300	200	400
250/350	250	350	300	1000[a]
300/350	300	350	300	1000[a]
300/400	300	400	300	1000[a]
300/500	300	500	300	1000[a]
300/500BK	300	500	300	1000[a]
300/900	300	900	300	1000[a]
Broken				
Other			0	1000[a]

[a]1 and 1000 represent the maximum count covering "all larger" and "all smaller" shrimp respectively, since counts do not reach these values.

**4.2	Develop an agreed plan and schedule to assemble all available data for inclusion in the final stock assessment**

It was agreed that the following data will be assembled:
- Total catch by month for 1983-2012
    - Guyana Responsibility: Ingrid Peters, Senior Fisheries Officer
    - Suriname Responsibility: Ranjitsing Soekhradj, Research Coordinator
    - By 31st March 2013
- Catch-Effort from Heiploeg
    - Heiploeg: Done
    - Explore possible PSI, BEV and SAIL trip data (Catch and DaS by trip)
    - Responsibility: Dawn Maison, GAPTOSP representative
    - By 31st March 2013
- Size sampling from Heiploeg
    - Complete data for all processors
    - Responsibility: Dawn Maison, GAPTOSP representative
    - By 31st March 2013

# 5.	OUTLINE OF HARVEST CONTROL RULES

Outline possible Harvest Control Rules that might be tested in projections for consideration of stakeholders

It was suggested that the main consideration should be given to the same HCR as used by the Suriname seabob fishery. While technically this HCR could be improved and based on better indices of abundance and of fishing mortality, it was considered by the Suriname management authority to be a robust and simple rule which can be implemented without external support and with low costs. The simplicity aided compliance and allowed greater participation in the management system by more stakeholders.

The Suriname rule was based upon a simple nominal CPUE index and Days-at-Sea, both of which can be verified by checking exports and using the VMS. The rule contains an implicit economic target to make sure fishing vessels were operating with high economic efficiency. The rule was regularly evaluated by the Suriname Seabob Working Group.

Other more formal rules based on fishing mortality, spawning stock biomass and size needed to be considered, but it was believed that their complexity may prevent implementation.

# 6.	WRAP-UP AND RECOMMENDATIONS FOR FURTHER WORK

It was important to share experiences between Suriname and Guyana, particularly with respect to the MSC certification. Among other things, it was recommended that:
- formal links should be created between the two Fisheries Departments based on a full understanding of their internal structure; and
- the Seabob Working Groups in both Guyana and Suriname should seek to share information and experience. This could start with sharing meeting reports.

Concern was expressed that too heavy focus on MSC certification may reduce resources for the management of other fisheries. Initial focus for Guyana should be to implement a plan to meet the MSC

certification requirements for seabob. However, it was suggested that Suriname might seek to extend the experience and successes in the seabob management system to other suitable fisheries.

Although the fishing industry may initiate the new management systems, it was strongly recommended that Government must take over responsibility as soon as possible.

The Seabob Working Groups should ensure that they had good representation from all important stakeholders. There should be artisanal representation in the working group, for example. Other interested groups might include NGOs or representatives from other affected fisheries.

A fisheries management plan (FMP) was required to effectively promote management initiatives. Stakeholder outreach and education was required to allow full engagement of stakeholders in the management initiatives. With a larger numbers of stakeholders, as in Guyana, additional activities may be required to implement the management system. It was noted that strong fisherfolk organisations were particularly valuable in promoting stakeholder engagement.

Based on the national FMPs being developed, the CRFM needed to help to identify and develop the research agenda/plans for the seabob and other fisheries. Links between the CRFM SGWG and the national SWG would allow them to have some influence on the national and regional research agendas and project initiatives. It was pointed out that fishery interactions in Suriname were not well understood and should be subjected to more research. However, more specific recommendations will be needed to guide the CRFM process.

A capacity building plan was required to support the management system. Opportunities should be taken to build capacity in the region wherever possible. However, it was difficult to achieve progress unless a more direct approach was applied with direct training on skills required. A general problem had been reported with recruiting people for fieldwork or work based on fishing vessels (e.g. the Suriname observer programme), which might be at least partially addressed by increasing the pool of appropriately trained persons (e.g. marine biologists) and the incentives.

The current development of updated/revised Draft Fishery Management Plans for both Suriname and Guyana, under the ACP Fish II Project, offered an opportunity to address some of these concerns and recommendations. Fishery Management Plans needed to be defined with a built-in review and evaluation process, and resource mobilisation and communication components.

7.   REFERENCES

Fournier, D. (2011) An Introduction to AD MODEL BUILDER for Use in Nonlinear Modelling and
        Statistics. Version 10.0 (2011-01-18). admb-project.org

APPENDIX 1: Agenda

19th February 2013		
0900-0930	Welcome and introduction to meeting Objectives and context of the meeting	Chairperson Paul Medley
0930-1100	Presentations on "Overview of Available Data and the Stock Assessment Approach" General discussion	Paul Medley
1100 – 1130	Coffee break	
1130 – 1230	Technical presentation on the new proposed stock assessment, including data requirements Discussion/questions	Paul Medley WG members
1230-1330	Lunch	
1330 - 1700	Discussion of available data, requirements for the analysis and inaccuracies Discuss on the strategy for obtaining complete and accurate data as possible for the end of April 2013 when stakeholders will develop the HCR.	WG members

20th February 2013		
0900-1230	Discuss candidate harvest control rules (HCR) Identify main uncertainties to test robustness of possible HCRs. These will be used to define scenarios for projections.	WG members
1230-1330	Lunch	WG members
1330 - 1500	Discuss and agree final assessment model requirements for fitting, outputs, and harvest control rule testing scenarios	WG members
1500 - 1700	Finalise SGWG meeting report with findings, conclusions and recommendations	WG members

Public participation is encouraged, but this is a technical meeting. Advice on interpretation of data may be particularly valuable from stakeholders.

APPENDIX 2: List of Participants

Name	Role	Contact
Ingrid Peters	Senior Fisheries Officer, Fisheries Department, Guyana	ingrid.o17@hotmail.com
Rabani Gajnabi	Fisheries Officer Region 6, Fisheries Department Guyana	rgajnabi@yahoo.com
Seion Richardson	Fisheries Officer, Guyana	Seion_richardson2000@yahoo.com
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Zojindra Arjune	Policy Officer Department of Fisheries Suriname	zojinar@yahoo.com
Paul Medley	Consultant	paulahmedley@yahoo.co.uk
Chris Meskens	Heiploeg	
Jo Gascoigne	FMP consultant – ACP Fish II Program	j.gascoigne@orange.fr
Terrence Philips	CRFM Secretariat Kingstown St. Vincent & the Grenadines	terrencephillips@vincysurf.com

APPENDIX 3: Terms of Reference for CRFM Shrimp and Groundfish Working Group Inter-sessional Meeting, Georgetown, Guyana, 19-20 February 2013

Size Structured Seabob Stock Assessment

1. Review the proposed size and age structured population model for seabob, determining any changes required to ensure that it is appropriate for the fisheries, stocks and available data.
2. Review the software platform and any alternatives for fitting the model.
3. Outline the outputs expected from the stock assessment to determine whether it can provide appropriate scientific advice.
4. Review the available fisheries data, making special reference to the main uncertainties and to how the data will be used in the stock assessment.
5. Develop an agreed plan and schedule to assemble all available data for inclusion in the final stock assessment.
6. Outline possible harvest control rules that might be tested in projections for consideration of stakeholders.

Data Requirements

Time Step

The basic time step will be calendar month. Given the fast growth and high mortality, longer time steps (e.g. annual) are not likely to capture dynamics and it is unlikely that sufficient time series would be available for a shorter time step (e.g. week).

Total Catch Weight by Month

The total catch weight in kilos (that is all removals including artisanal and industrial catches) by month are required for as long a time period as possible. For early years, only data may be available. A decision is required whether to include this and if so how it should be distributed among months. Catches need to be defined as either live weight or processed weight, whichever is measured and is most accurate.

Catch Weight by Commercial Size Category by Month

As much as possible of each month's total catch (in kilos) needs also to be provided by size category. This breakdown provides information on the size composition of the catch which not only helps understand the size composition of the population, but also the fishery's effect on that size composition.
Commercial size categories are available from the main processors. However, the size categories these relate to may have changed among processors and over time in some cases. Some simplification of categories to allow interpretation by the model will be necessary and decisions from the SGWG will be required on the most appropriate way to treat these data.
The following issues will need to be considered:
- Whether following categories may or may not contain size information which might be interpreted: SM, MM, Sour, BK, BK 100/200, BK 200/300, Ov 400, Ov 900. These categories will need to be explained.
- How to interpret the size information in the count-per-pound categories: 70/90, 90/110, 100/130, 110/130, 130/150, 100/150, 150/200, 180/210, 200/300, 250/350, 300/350, 300/400, 300/500, 300/900. Note that where the category boundaries overlap (e.g. 200/300 and 250/350) some further simplification may be required.

Catch Weight by Commercial Size Category and Fishing Effort by Month

As above, but with additional days-at-sea (fishing effort). These catches only need to be complete for each trip that is included, and they do not have to cover the whole fishery. However, a significant

proportion of the fleet needs to be covered. Also, data may need to be split by different vessel types depending on fishing power.

Data are available currently only from Noble House / Heiploeg Suriname and the time series is limited. Other data of this type needs to be identified.

Random Sampling of Landings
These data are already available, but updates will be sought at least to December 2012.
This data collection programme will be reviewed by the SGWG, particularly with respect to information it provides, costs, sustainability and efficiency.