



Vottunarstofan Tún ehf.

Sustainable Fisheries Scheme

Marine Stewardship Council Fisheries Assessment

Guyana Seabob Fishery

Final Report

Report on the 1st full assessment of the fishery

Conformity Assessment Body: Vottunarstofan Tún ehf.

Fishery Client Guyana Association of Trawler Owners and Seafood Processors

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Glossary

B_{lim}	Limit biomass reference point below which recruitment of stock is expected to be impaired
B_{MSY}	Biomass corresponding to the maximum sustainable yield (biological reference point); the peak value on a domed yield-per-recruit curve
BRD	Bycatch Reduction Device
B_{trigger}	The point when management intervention should be taken to avoid the stock falling below the limit reference point.
CAB	Conformity Assessment Body
CARICOM	Caribbean Community and Common Market
CCTV	Closed Circuit Television
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CL	Carapace Length
COC	Chain of Custody
CPUE	Catch per unit of effort
CRv.2.0	MSC Certification Requirements and Guidance version 2.0
CFRAMP	CARICOM Fisheries Resource Assessment and Management Program
CRFM	Caribbean Regional Fisheries Mechanism
CSA	Consequence Spatial Analysis
CV	Coefficient of Variation
EEZ	Exclusive Economic Zone
ETP	Endangered, Threatened and Protected species
F	Fishing Mortality
FAC	Fisheries Advisory Committee
FAO	Food and Agriculture Organization of the United Nations
GATOSP	Guyana Association of Trawler Owners and Seafood Processors
GCR	Guidance to the MSC Certification Requirements
GT	Gross Tonnage
HCR	Harvest Control Rule
HR	Harvest ratio (Harvest rate)
ICES	International Council for the Exploration of the Seas
IPI stock	Inseparable or practically inseparable stocks
ISBF	Introduced Species Based Fisheries
IUCN	International Union for the Conservation of Nature
IUU	illegal, unreported and unregulated
LRP	Limit Reference Point

LTL	Low Trophic Level species
MCS	Monitoring, Control & Surveillance
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
mt	Metric tonne
NA	Not Applicable
NGO	Non-governmental organisation
nm	Nautical miles
PCR	Public Certification Report
PI	Performance Indicator
PRI	Point of recruitment impairment (stock reference point)
PSA	Product Susceptibility Analysis
RBF	Risk Based Framework
SDAS	Standardised Days at Sea
SG	Scoring Guidepost
SI	Scoring Issue
SWG	Seabob Working Group
t	Tonnes
TAC	Total Allowable Catch
TED	Turtle Excluder Device
TRP	Target Reference Point
UoA	Unit of Assessment
UoC	Unit of Certification
VME	Vulnerable Marine Ecosystem
VMS	Vessel monitoring system
WECAFC	Western Central Atlantic Fisheries Commission

1. Executive Summary

1.1 Scope of the Assessment

This report presents the results of the assessment of Guyana Seabob Fishery against the Marine Stewardship Council's (MSC) Fisheries Standard. The assessment and subsequent reporting have been carried out by an assessment team from Vottunarstofan Tún, an accredited Conformity Assessment Body (CAB), on behalf of the client fishery of The Guyana Association of Trawler Owners and Seafood Processors (GATOSP).

The report provides an account of the process undertaken by the assessment team during the stages of information gathering and the scoring of the fishery against the MSC Fisheries Certification Requirements and Guidance version 2.0 (CRv.2.0). The report also provides a description of the fishery. The report is not intended to follow standard editing norm of scientific journals, but intends to address the needs of both fisheries specialists and other interested parties e.g. consumers and/or other stakeholders. The report contains all the sections of the *Full Assessment Reporting Template* v2.0 appropriate to this assessment.

1.2 Assessment Team Members and Secretary

The assessment was conducted by a team of the following experts:

- a. Tristan Southall: Team leader and assessor responsible for Principle 3 issues;
- b. Julian Addison: Assessor responsible for Principle 1 issues and application of RBF;
- c. Bert Keus: Assessor responsible for Principle 2 issues and application of RBF;

Mr. Gunnar Á. Gunnarsson served as an Assessment Secretary on behalf of Vottunarstofan Tún.

1.3 Outline of the Assessment

Full assessment of the Guyana Seabob fishery was initiated in September 2018. Data used in the assessment was gathered by reviewing publicly available reports and scientific journals, and from interviews with representatives of the Client and several stakeholders. Full references and full details of the stakeholder consultation process are provided within this report.

The evidence provided, supported by an on-site assessment visit enabled a full scoring exercise against MSC principles to be undertaken. This was augmented by the use of the MSCs Risk Based Framework to enable scoring of secondary species outcome status and habitats outcome status.

1.4 Main Strengths and Weaknesses of the Assessed Fishery

Strengths:

The Guyana Seabob Fishery has a number of strengths:

- The fishery has implemented many management changes in recent years and in particular since the time of the MSC pre-assessment exercise was undertaken. Notable changes include:
 - establishing a Seabob Working Group which developed a Seabob Management Plan;
 - undertaking a stock assessment and developing and adopting a Harvest Control Rule;
 - implementing an inshore no trawl zone, initially out to 7 fathoms, but recently extended to 8 fathoms in response to scientific advice;
 - a legal requirement for all nets to be fitted with Bycatch Reduction devices (Turtle Excluder Devices were already a legal requirement);
 - the adoption of on-board CCTV cameras on-board all vessels;
 - the implementation of (and training on) an industry Code of Practice;

- improved scientific basis for decision-making.
- The stock assessment shows the seabob population to be at or above the target level.
- The shrimp trawl is a comparatively light trawl gear, with activity focused on dynamic sediments. Gear adaptations, zonal restrictions and use of 'try-nets' have all contributed to improved selectivity of the gear resulting in a reduced impact on bycatch species.
- The Seabob Working Group has brought together government, industry and other stakeholders (including artisanal representatives) to work together to improve the management within the fishery.

Weaknesses

- In total 6 conditions were raised; these are briefly summarised below and detailed in full in Appendix 1.3. These reflect the fact that whilst the overall level of performance was good, there were a small number of areas which are currently below best practice and where opportunities for improvement therefore exist.
- Four non-binding recommendations were also raised; these are detailed in full in Appendix 1.3. Recommendations do not indicate fishery performance below a level that meets the MSC Standard and the client is therefore not required to act on them. Nevertheless, they indicate that improvements may be possible and so the client is encouraged to take action as appropriate.

1.5 Overall Conclusion

The Guyana seabob fishery reached the average weighted scores for each of the three Principles as follows:

Principle	Score
Principle 1 – Target Species	83.3
Principle 2 – Ecosystem	81.7
Principle 3 – Management System	83.3

1.6 Determination, Conditions and Recommendations

On completion of the assessment and scoring process, the assessment team concluded that the Guyana Seabob Fishery meets the requisite MSC pass mark, across all 3 Principles. The assessment team therefore recommends that the fishery be certified against the MSC fishery standard.

It should be noted that 6 conditions were raised and put to the Client who then submitted a plan of action to address those over the period of potential certification. These are detailed within the report and are therefore only briefly summarized here. These relate to:

1. The need for an appropriate review of the Seabob stock assessment.
2. The need to demonstrate that the fishery does not pose a risk to Longnose stingray.
3. The need to improve Management in relation to ETP species
4. The need to improve data collection in relation to ETP species interactions.
5. The need to provide updated evidence of compliance since the latest changes to the fisheries regulations.
6. The need for a holistic review of overall fishery performance.

In addition, 4 non-binding recommendations were raised which are detailed in Appendix 1.3.

2 Authorship and Peer Reviewers

2.1 Team Members

Tristan Southall, team leader. Primarily responsible for Principle 3

Tristan Southall is an experienced marine and fisheries industry analyst with a range of professional experience in questions of sustainable marine resource exploitation, working with a wide spectrum of stakeholders but with particular focus and expertise on the management and evaluation of capture fisheries, both in the UK, EU and internationally. His consultancy expertise includes project management, fisheries liaison, feasibility studies, stakeholder consultation, policy analysis and management advice and draws on an extensive understanding of fishery management and operations, as well as strong experience and understanding of a number of other marine industries – notably aquaculture. This focus on management is supported by a solid understanding and appreciation of marine ecosystems and a practical understanding of working at sea.

Tristan has considerable professional experience of the EU Common Fisheries Policy and has coordinated EU fisheries training and promotion activities – covering all aspects of sustainable fisheries management and control. In addition, Tristan has excellent understanding of a range of non-EU fishery management systems in countries as diverse as Turkey, Suriname and the Gambia, meaning that his expertise and experience is applicable to a wide variety of situations, enabling valuable comparative analysis. In recent years Tristan has put his skills and extensive fisheries management experience to good use in undertaking a number of MSC sustainability assessments of fisheries around the world and typically serves as team leader on assessment teams. Tristan has recently been contracted by MSC to develop capacity building tools and deliver capacity building training for prospective fishery clients and stakeholders; a recognition of his excellent understanding of MSC Certification Requirements, its practical application and challenges.

Vottunarfstofan Tún confirms that Tristan Southall meets the fishery team leader qualification and competency criteria specified in Annex PC1, Table PC1, in particular:

- has a university degree in marine biology and in marine resource development and protection;
- has over five years' experience in the fisheries sector related to the tasks under his responsibility;
- has passed MSC team leader training;
- meets the qualifications and has the competencies specified in section 2 of Table PC1, taking into account MSC's 2018 clarification of requirement (b);
- has undertaken 2 MSC fishery assessments or surveillance site visits as team member in the last 5 years;
- has the experience in applying different types of interviewing and facilitation techniques and the ability to effectively communicate with the client and other stakeholders.

Furthermore, Tristan has the qualifications and competencies required for serving as an assessor as outlined in Annex PC3, Table PC3. Vottunarfstofan Tún confirms that Tristan Southall has no conflicts of interest in relation to the Guyana seabob fishery.

Bert Keus, team member. Primarily responsible for Principle 2

Bert Keus is an independent consultant based in Leiden, the Netherlands. He holds degrees in biology and law and has previously held the position of Head of the Environmental Division of the Dutch

Fisheries Board, and research fellow with the Netherlands Research Institute for Fishery Investigation (RIVO-DLO) and the fisheries division of the Agricultural Economics Research Institute of Holland (LEI-DLO).

Over the years 2003 and 2004 he managed fishing and processing companies in the Gambia handling fish from industrial and artisanal fisheries, and he maintains his contacts with the Gambian seafood industry.

In addition, however, he has long association with the shellfish fisheries of the Wadden Sea and neighbouring areas of northwest Europe, and he has been involved in efforts to achieve MSC certification of the North Sea brown shrimp fishery – acting as technical advisor to this multi-stakeholder initiative and sitting on the project’s management board.

Through this work and several other MSC certifications he has become particularly familiar with the MSC certification process. Between the years 1998 and 2003 he was a Member of the European Sustainable Use Specialist Group, Fisheries Working Group of IUCN. Currently a major part of his work as a fisheries consultant is the drafting of appropriate assessments of fishing activities in Natura 2000 sites.

Vottunarstofan Tún confirms that Bert Keus meets the fishery team member qualification and competency criteria specified in Annex PC2, Table PC2, in particular:

- has a university education in marine biology;
- has over five years’ experience in the fisheries sector related to the tasks under his responsibility;
- has passed MSC team member training;
- has undertaken 2 MSC fishery assessments or surveillance site visits as team member in the last 5 years;
- has the experience in applying different types of interviewing and facilitation techniques and the ability to effectively communicate with the client and other stakeholders.

Furthermore, Bert has the qualifications and competencies required for serving as an assessor as outlined in Annex PC3, Table PC3.

Vottunarstofan Tún confirms that Bert Keus has no conflicts of interest in relation to the Guyana seabob fishery.

Julian Addison, team member. Primarily responsible for Principle 1

Dr Julian Addison is an independent fisheries consultant with over 30 years’ experience of stock assessment and provision of management advice on shellfish fisheries, and a background of scientific research on shellfish biology and population dynamics and inshore fisheries. Until December 2010 he worked at the Centre for Environment, Fisheries and Aquaculture Science (Cefas) in Lowestoft, England where he was Senior Shellfish Advisor to Government policy makers, which involved working closely with marine managers, legislators and stakeholders, Government Statutory Nature Conservation Organisations and environmental NGOs. He has also worked as a visiting scientist at DFO in Halifax, Nova Scotia and at NMFS in Woods Hole, Massachusetts where he experienced shellfish management approaches in North America. For four years he was a member of the Scientific Committee and the UK delegation to the International Whaling Commission providing scientific advice to the UK Commissioner. He has worked extensively with ICES and most recently was Chair of the Working Group on the Biology and Life History of Crabs, a member of the Working Group on Crangon Fisheries and Life History and a member of the Steering Group on Ecosystems Function. He has extensive experience of the MSC certification process primarily as a P1 team member but also as a P2

team member and team leader. He has undertaken nearly 30 MSC full assessments of crustacean and mollusc fisheries worldwide which use a wide range of stock assessment methodologies and fishing gears. He has also undertaken MSC pre-assessments in Europe, North America and Australia and over 50 annual surveillance audits and technical reviews. He is a member of the MSC Peer Review College and has carried out peer reviews of MSC assessments worldwide of a wide range of fish and shellfish fisheries. Other recent work includes a review of the stock assessment model for blue crabs in Chesapeake Bay, USA, and an assessment of three Alaskan crab fisheries under the FAO-based Responsible Fisheries Management scheme.

Vottunarfstofan Tún confirms that Dr. Addison meets the fishery team member qualification and competency criteria specified in Annex PC2, Table PC2, in particular:

- has a university degree (Ph.D.) in Population Dynamics;
- has over five years' experience in the fisheries sector related to the tasks under his responsibility;
- has passed MSC team leader/member training;
- has undertaken 2 MSC fishery assessments or surveillance site visits as team member in the last 5 years;
- has the experience in applying different types of interviewing and facilitation techniques and the ability to effectively communicate with the client and other stakeholders.

Furthermore, Julian has the qualifications and competencies required for serving as an assessor as outlined in Annex PC3, Table PC3.

Vottunarfstofan Tún confirms that Dr. Julian Addison has no conflicts of interest in relation to the Guyana seabob fishery.

2.1.1 Other Special Qualifications Required for the Assessment

Current knowledge of the local and regional fishery context

Tristan Southall recently led a full re-assessment of the Suriname seabob fishery against the MSC standard and is therefore acquainted with the practices and management systems applied to the seabob fisheries in the region. Bert Keus has also previously worked in neighbouring Suriname, working alongside the Fisheries Department in a consultancy project to assist with drafting an updated Fisheries Management Plan.

Language

The meetings and interviews were conducted in English which is the official language of Guyana and is spoken and understood among client staff and stakeholders. No language difficulties were encountered on the site visit.

Understanding of the Chain of Custody Standard

Julian Addison has successfully completed Traceability module v2.0 of MSC's training seminar. Tristan Southall has completed Traceability module v2.1.

Application of the Risk Based Framework

Both Julian Addison and Bert Keus have successfully completed the Risk Based Framework (RBF) module for v2.0 of MSC online training seminar. All team members are familiar with the application of RBF for FAM v1.3.

2.2 Use of Risk Based Framework

The MSC's Risk Based Framework (RBF) was expected to be applied to the evaluation of Performance Indicators 2.1.1 (primary species outcome), 2.2.1 (secondary species outcome) and 2.4.1 (habitats outcome). See separate statement outlining reasons for this. However, during the site visit it was apparent that the 3 species initially considered to be 'Primary' did not meet the full MSC definition for Primary species. As a result, the RBF exercise was undertaken for 2.2.1 (secondary species outcome) and 2.4.1 (habitats outcome) only. A full description of the RBF process is described in report section 4.4 and the RBF scoring tables are presented in Appendix 1.2.

2.3 Peer Reviewers

The Peer Review College submitted a shortlist of potential peers to review the assessment report for this fishery. Of those listed the following two were selected to conduct the peer reviews.

Johan Groeneveld

Dr. Johan Groeneveld has over 20 years' experience as a fisheries scientist, with a focus on marine fisheries and their impacts on target and bycatch species. He obtained a PhD in 2001 at the University of Cape Town in South Africa, and is presently a Senior Scientist at the Oceanographic Research Institute (ORI) and an Honorary Associate Professor at the University of KwaZulu Natal. His experience-base includes 12 years of applied fisheries research and management of commercial spiny lobster fisheries in South Africa, 2 years as an advisor to the fisheries ministry in Oman, and 9 years as a senior scientist at ORI, with a portfolio targeting regional fisheries research and development projects. He regularly undertakes consulting projects, including for the fishing industry and clients such as the World Bank, UNEP and the FAO. He has worked extensively on collaborative fisheries development projects in the Western Indian Ocean region. He has also published regularly in the peer-reviewed literature, and is on the editorial boards of 'Fisheries Research', and 'Western Indian Ocean Journal of Marine Science'.

Dr. Groeneveld has been involved in fisheries certification based on Marine Stewardship Council principles since 2009, and has participated as team member or individually in pre-assessments, full assessments, auditing and peer-review of a range of fisheries, including Bahamas spiny lobster fishery, French Polynesia albacore and yellowfin longline fishery, South African hake trawl fishery, Normandy and Jersey lobster fishery and Tristan da Cunha lobster fishery.

Lester Gittens

Dr. Lester Gittens has worked as a fisheries officer in The Bahamas since 2002. He supervises the Science and Conservation Unit and has national responsibilities as co-Chair of a multi-stakeholder working group that provides management advice based on both science and stakeholder advice. Dr. Gittens has also functioned as chairman of Caribbean technical working groups. In these roles he is obligated to consider the ecosystem approach and has had to conduct and evaluate stock assessments, assist in the development of international fisheries agreements aimed at conservation and sustainable use.

Dr. Gittens is also involved in a lobster fishery improvement project aimed at attaining MSC certification of the Bahamian lobster fishery (under MSC assessment at the time of writing, March 2018). His experience is supported by strong academic qualifications including a PhD in Ecological Sciences. His dissertation focused on the sustainability of the Bahamian lobster fishery. Dr. Gittens also has MSC in Natural Resource Management with a specialty in Coastal and Marine Resources Management.

3 Description of the Fishery

3.1 Unit(s) of Assessment (UoA) and Proposed Scope of Certification

3.1.1 Units of Assessment and Proposed Units of Certification (UoC)

There is just a single Unit of Assessment (UoA) and resulting Unit of Certification (UoC) in the Guyana Seabob fishery as all vessels use the same gear type, operate in the same manner, under the same management regime within the same jurisdiction – the Exclusive Economic Zone (EEZ) of the Co-operative Republic of Guyana (hereafter referred to as Guyana) in FAO Fishery Area 31, Western Central Atlantic.

Figure 3.1.1: Maps showing the location of Guyana within the Western Central Atlantic

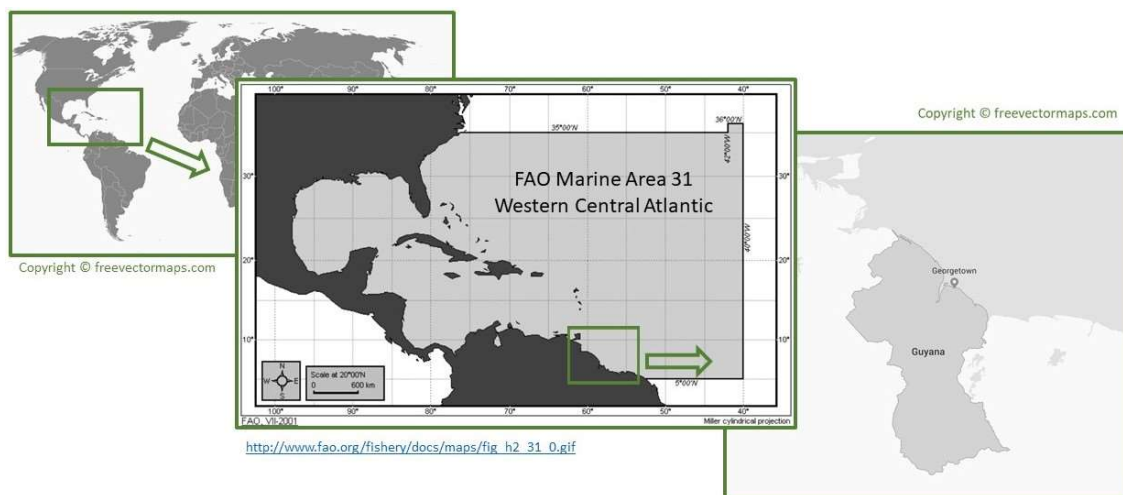


Table 3.1.1: Unit of Assessment and proposed Unit of Certification

Unit of Assessment	
Fish stock	Guyanese EEZ Seabob (<i>Xiphopenaeus kroyeri</i>)
Location of Fishery	FAO Statistical Area 31 (Western Central Atlantic); Guyana Exclusive Economic Zone, 8-18 fathoms ¹
Management	Managed by the Guyana Fisheries Department (with input from the Seabob Working Group). Fleet management by Guyana Association of Trawler Owners and Seafood Processors (GATOSP).
Fishing Methods	Shrimp Demersal Trawl
Fishery Practices	All Guyanese, commercially licenced, demersal shrimp trawl vessels, licenced to participate in the Guyanese Seabob Fishery. Vessel operations and gear specifications as set out in the Fishing Act (2002), the Fisheries Regulations (2018) and the Seabob Management Plan.
Rationale for choosing the UoA	This meets the requirements of the client fishery. It encompasses all commercial seabob trawl fisheries in Guyana and is the primary focus of seabob management within Guyana.

¹ 1 fathom = 6 feet = 1.8m

Proposed Units of Certification	
Fish stock	Guyanese EEZ Seabob (<i>Xiphopenaeus kroyeri</i>)
Location of Fishery	FAO Statistical Area 31 (Western Central Atlantic); Guyana Exclusive Economic Zone, 8 – 18 fathoms
Management	Managed by the Guyana Fisheries Department (with input from the Seabob Working Group). Fleet management by Guyana Association of Trawler Owners and Seafood Processors (GATOSP).
Fishing Methods	Shrimp Demersal Trawl
Fishery Practices	All Guyanese commercially licenced demersal shrimp trawl vessels, licenced to participate in the Guyanese Seabob Fishery. Vessel operations and gear specifications as set out in the Fishing Act (2002), the Fisheries Regulations (2018) and the Seabob Management Plan.
Eligible Fishers	There are no other eligible fishers.

3.1.2 Final Unit of Certification

The proposed Unit of Certification was clarified at the start of the assessment process in order to add further detail regarding the existence or otherwise of other eligible fishers. This clarification did not change the scope of the assessment. No material changes have been made to the Unit of Certification from the Unit of Assessment. The final Unit of Certification is therefore as set out in the table above.

3.1.3 Total Allowable Catch and Catch Data

There is no total allowable catch (TAC) applied in the Guyana Seabob fishery. Instead a total allowable annual effort is applied across the fleet. The Harvest Control Rule allows for a maximum annual effort of 15,000 fleet standardized days at sea and is set with a vessel cap of 225 days at sea. In the past 2 years the annual limits have been set at this maximum effort level.

Table 3.1.2: TAC and Catch Data for the Guyana Seabob fishery.

Total green weight catches by UoC	Year (2017)	Amount (t) Bottom trawl:	9,927mt
	Year (2016)	Amount (t) Bottom trawl:	8,210mt

3.1.4 Enhanced / Introduced Species Based Fisheries (ISBF)

The Guyana seabob is neither enhanced nor an introduced fishery, therefore these MSC policies are not applicable.

3.2 Overview of the fishery

3.2.1 Background to the Guyana Seabob Fishery

The Guyanese seabob trawl fishery began in 1984 and developed rapidly, with increasing vessel numbers and production capacity. Much of the early impetus for the development of the fishery followed the decline of the offshore penaeid fishery, with several of the penaeid vessels converting to join the seabob fleet. A 2004 overview of the fisheries sector in Guyana undertaken by US Aid (Greer 2004) noted that:

“Seabob, the major growing fishery over the past ten years, is now showing signs of distress. Vessels are staying 50% longer at sea, returning with 16% less catch. There is a marked increase in the level of smaller seabob in each catch. While this has been the high growth area for the sector, statistics also indicate that fishing effort (vessels and gear) have increased dramatically in the seabob fishery. The absence of any scientific or technical assessment of the state of the stocks or a correlation between effort and yield are of major concern”.

The 2005 FAO Fishery Country Profile of Guyana also highlighted similar concerns about the resource management and lack of data in the seabob fishery.

In 2009, an MSC pre-assessment was undertaken by Food Certification International on behalf of Morubel bv of Ostend, Belgium² for the Guyana Seabob fishery (a report which also pre-assessed the neighbouring Suriname Seabob fishery). This concluded that the Guyana seabob fishery was not in a position to proceed with MSC certification at that time, with gaps in either information or management practices identified in relation to all 3 MSC principles. Although some work had been undertaken since the 2004 review, the findings of the pre-assessment showed that further fisheries improvement work was still required.

Figure 3.2.1: Guyana Seabob vessels, showing the catch being unloaded (images by T. Southall).



In 2011, Heiploeg Group, which (at the time) owned Noble House in Guyana, initiated a Fishery Improvement Project (FIP) alongside partner companies within the Guyana Association of Trawler Owners and Seafood Processors (GATOSP). The FIP included wide-ranging actions to support further data collection and stock assessment, the development of plans to reduce bycatch and to work with

² At the time Morubel were part of the Heiploeg group of companies, which also included Noble House in Guyana.

other stakeholders to develop a fishery management plan. In 2012, the Seabob Working Group was established which provided a forum for the Fisheries Department of the Ministry of Agriculture to work in partnership with the seabob trawl fishing industry on the FIP. After a 5-year FIP the fishery formally entered the MSC assessment process on 20th September 2018.

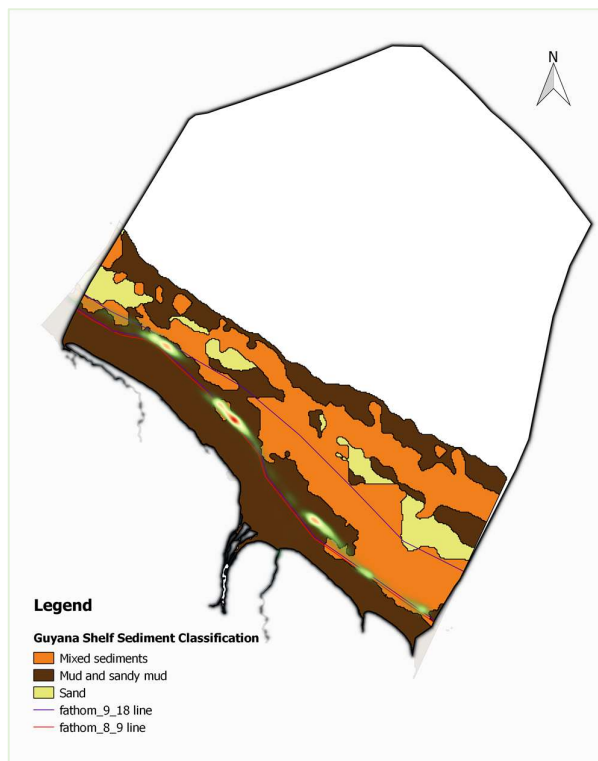
3.2.2 Fisheries Client Group

The Guyana Association of Trawler Owners and Seafood Processors (GATOSP) was formed on 15th September 1999. The Association is made up of Noble House Seafoods (which own vessels and a processing plant), Pritipaul Singh Investments (which also owns vessels and a processing plant) and Gopie Investments, who between them own nearly 90% of the active fishing vessels (the remaining vessels are owned by smaller companies and individuals).

3.2.3 Operational Characteristics

The fishery takes place entirely within the Guyana EEZ (FAO area 31 – Western Central Atlantic). Fishing occurs over sedimentary plains of sand and mud on the continental shelf, within a permitted trawl zone from 8 to 18 fathoms³.

Figure 3.2.2: Map of the fishing zone showing the 8 and 18 fathom line, habitat types and VMS intensity in the period April – October 2018



The commercial fleet operates from Georgetown and lands to three local processing companies, all located on the Demerara River. The industry harvests up to 20,000 mt a year, most of which is processed to frozen, shell-off tails. Seabob is Guyana's most valuable seafood export and ranks fifth in terms overall exports. Nearly all the seabob harvested in the Guyana EEZ is exported to the US and the European Union.

The seabob fishery occurs throughout the year with the exception of a short, closed season (see report section 3.3.3 for further details). Fishing trips typically last 4-7 days. Crews will have a 2-day turnaround, before the start of the next trip. A single boat is crewed by a single crew. When fishing, tow speed is around 3.5 knots, and the length of haul is around 3-4 hours. Prior to any tow a small try-net is deployed to test the likely nature of the catch. In addition, the try-nets can be deployed mid-way through a tow. If either of these showed a low catch rate, or a high by-catch rate then the vessels would move to new ground.

³ This seabob zone begins approximately 19nm from the coast line. At its narrowest it is just 10nm and at its widest the zone extends nearly 40nm.

3.2.4 Gear Characteristics

The fishery is prosecuted by a fleet of 87⁴ steel hull trawl vessels with an average length of 22m and a maximum engine power of 500 hp. The vessels have a forward superstructure and aft working deck. The towing winch is located just aft of the superstructure, with its axis along the centreline. Four trawls (two of each side) are towed at the same time, from the ends of two outriggers, on port and on starboard side of the vessel. There are a number of reasons for using twin rig, such as:

- more efficient - higher catch rate than a single trawl with a similar drag;
- a wider net opening is possible with less drag;
- multiple trawls work better on the bottom than one large trawl;
- easier to manoeuvre (and sort catch from) four small trawls.

The trawl nets have a low opening (less than 2 meters), with the wings of each pair of nets attached to the upper and lower edge of wooden otter boards and connected in the middle to a mid-trawl sledge (clump weight). The head rope length ranges from 14 to 17 metres. Trawls use 4 to 5 cm stretched mesh in the wings and body and 2.5 to 3.5 cm stretch mesh in the cod end (bag). The trawls are designed for use on flat and smooth bottom substrates and therefore there is no requirement for

Figure 3.2.3: a) A typical trawl door; b) the TED; c) the small try-net; d) assessors examine the BRD (images by T. Southall).



Figure 3.2.4: Images showing the on-board cameras and the CCTV review system: a) the hard drive coupled up, showing the six views from a single vessel; b) the camera installed on the trawl gantry; c) a member of the assessment team hearing how the CCTV footage is reviewed (images by T. Southall)



⁴ This is the maximum number allowed for within the Seabob Management Plan, however the number of active vessels at any one time may be less than this.

rock-hopper bobbins, meaning that the gear remains comparatively light, although there is a light ground chain.

All nets are fitted with turtle excluder devices (TED) and bycatch reduction devices (BRD) (these are also stipulated in the Fisheries Regulation and are therefore licence conditions). The TED is a metal grid positioned at an angle across the body of the net. The bar spacing allows the target catch to pass through into the cod end and larger animals, notably turtles, to be diverted through an escape hatch. This also allows the escape of larger fish and ray species. The BRD is a square mesh panel mounted in the roof of the net, designed to allow fish species to escape. The otter boards used by the trawl vessels are relatively light, manufactured from wood planking with a steel footing. In total, 4 otter doors are used with the twin rig configuration. When hauling the gear, the otter boards, the mid-trawl sledge and the nets remain suspended at the ends of the outriggers as the codends alone are taken aboard. This operation may be done by three or four men depending on the size of the trawls. The catch is sorted on deck before being stored in ice below deck.

All vessels are fitted with a tamper-proof Vessel Monitoring System (VMS). In addition, all vessels are now fitted with on-board cameras. The camera footage is downloaded after every trip and reviewed by staff members of the processing plant. Although the CCTV is primarily an internal control mechanism and is not formally reviewed as part of the government control and enforcement program, government inspectors do now request to see the CCTV footage as an additional spot-check tool to confirm that TEDs are in use.

3.3 Principle One: Target Species Background

3.3.1 3.3.1. Biology and Life History⁵

Taxonomy and distribution

The Atlantic seabob shrimp *Xiphopenaeus kroyeri* (Heller, 1862) is a decapod crustacean of the family Penaeidae distributed in the Western Atlantic from North Carolina in the United States to southern Brazil (Holthuis, 1980). Taxonomic studies of *Xiphopenaeus* spp. concluded that there are 2 indistinguishable species of *Xiphopenaeus* present in the region from Venezuela to Brazil, and that this could have important management consequences for stocks of *Xiphopenaeus kroyeri* in the region (Gusmão *et al.*, 2006). However, the paper states that whilst *Xiphopenaeus* sp. 1 was observed in all sampling sites ranging from Ubatuba (Brazil) to Caracas (Venezuela), and probably has a continuous distribution along the coast, and therefore is likely to be *X. kroyeri*, the other species, *Xiphopenaeus* sp. 2, was only observed in the Northern and Southernmost Brazilian sampling sites. On that basis, it seems reasonable to conclude that only *X. kroyeri* is present in Guyana waters.

There are major industrial fisheries for seabob off the coast of Guyana and Suriname, and artisanal fisheries off Venezuela to the north and French Guiana to the south. Based on the relatively small geographical scale over which the fisheries are distributed and the ocean circulation pattern in the region, particularly the North Brazil current, it is likely that the Guyana fishery may share a single stock with that in neighbouring countries. However, evaluation of biological and fisheries data – catch per unit effort (CPUE), morphometrics and size distribution data – provided no evidence that the Guyana and Suriname populations were a single stock (CRFM, 2009). The Institute for Agricultural and Fisheries Research in Flanders (ILVO) initiated a PhD project in 2016 in cooperation with Ghent University and KU Leuven which involved using genetic studies to evaluate population structure of the seabob shrimp in the Guianan Ecoregion, but at the current time (January 2019), the assessment team found no output of results from the study. In the absence of any genetic evidence and with no strong evidence from fisheries data or hydrographical patterns of single or multiple stocks across the main fisheries in Guyana and Suriname, separate monitoring, stock assessment and management regimes have been implemented for the two countries. It seems reasonable to consider that the Guyana fishery exploits a single stock within Guyanese waters, and to evaluate the fishery at a national rather than a regional level. A similar assumption was made for the MSC assessment of seabob in Suriname waters (Southall *et al.*, 2017). As the other neighbouring industrial fishery in Suriname has already achieved MSC certification, a similar conclusion for the Guyana fishery would confirm that the industrial fisheries in the area are not impacting on the regional seabob stock (or stocks) and relevant bycatch species, and therefore not compromising their sustainability. During the scoring of Principle 1 it was emphasised that the Guyana fishery may be exploiting only part of the overall regional stock.

Seabob are found in both brackish and marine waters in depths of up to 70 m, but usually in depths of less than 27m. Seabob are epibenthic with a preference for mud or sand and are most abundant in areas near river estuaries (Holthuis 1980). These areas are typically accompanied by high sedimentation and associated high nutrient introductions. Studies in Brazil showed that sediment type, salinity, and temperature are among the most important variables affecting the spatial and seasonal distribution of seabob (Costa *et al.*, 2007).

⁵ For the interested reader, further information on the biology and life history of seabob can be found at: <https://www.sealifebase.ca/summary/Xiphopenaeus-kroyeri.html>

Life History

Seabob are a fast-growing, short-lived species with a maximum size of approximately 32 mm carapace length (CL) with females significantly larger than males. Longevity is around 1.5 years for males and 2.0 to 2.5 years for females (Torrez, 2015; Castilho *et al.*, 2015). Size at 50% maturity in females varies geographically between approximately 13 and 24mm CL.

Sampling surveys in Suriname waters showed that early life history stages of seabob (post-larvae and juveniles) tend to be nearer to shore, with larger reproductive adult seabob found in deeper waters (Torrez, 2015). Commercial fisheries data from Guyana and Suriname corroborate the sampling information (Guyana Fisheries Department, *pers. comm.* at site visit; Perez, 2014). It is hypothesized that adults move offshore to spawn and planktonic larvae return to nearshore nurseries to settle and grow (e.g. Castro *et al.* 2005). Recruitment of post-larvae peaks in the summer months.

Feeding, predators and trophic status

Analysis of stomach contents showed that seabob feed on organic detritus, copepods and planktonic shrimp (Kerkhove, 2014), and juvenile seabob are an important component of the diet of the demersal fish community (Willens, 2016). It is necessary therefore to determine whether seabob is a 'key' Low Trophic Level (LTL) species⁶.

For species not listed in Box SA1 of the CR v.2.0 (i.e. including species in Family Ammodytidae, Family Clupeidae, Family Engraulidae, Family Euphausiidae, Family Myctophidae, etc.), the MSC stipulates that a species shall be considered as a key LTL stock if it meets at least two of the following criteria⁷:

- A large portion of the trophic connections in the ecosystem involves this stock, leading to significant predator dependency;
- A large volume of the energy passing between lower and higher trophic levels passes through this stock;
- There are few other species at this trophic level through which energy can be transmitted from lower to higher trophic levels, such that a high proportion of the total energy passing between lower and higher trophic levels passes through this stock (i.e. the ecosystem is 'wasp-waisted').

The species additionally must meet the following criteria⁸:

- The species feeds predominantly on plankton; has a trophic level of about 3 (but potentially ranging from 2 to 4); is characterised by small body size, early maturity, high fecundity and short life span (default values: <30cm long as adults, mean age at maturity <= 2, >10,000 eggs/spawning, maximum age <10 years respectively); and forms dense schools.

In a study in Suriname, Willens (2016) concluded that seabob is one of the species of the 'waist' through which energy is channelled up the benthic food web of the inner Suriname Shelf. However, seabob was only the third most important prey type, contributing 11% to the diet of demersal fish species, and therefore it cannot be concluded that "a high proportion of the total energy passing between lower and higher trophic levels passes through this stock", so that the third criteria above does not appear to be met. Catches of seabob in Guyana are around 20,000 tonnes per annum from a large wide, open ecosystem, and the diet of demersal fish comprises juveniles rather than adult seabob, and therefore it seems highly unlikely that seabob would meet the first two criteria above,

⁶ As defined by paragraphs SA2.2.8-SA2.2.10 of the MSC Fisheries Certification Requirements v2.0 (MSC, 2014)

⁷ as set out in SA2.2.9ai-iii

⁸ As set out in SA2.2.9bi

i.e. there is not significant predator dependency on the seabob stock, and a large volume of the energy passing between lower and higher trophic levels does not pass through this stock. There is currently no food web model of the Guyana or Suriname ecosystems to fully corroborate this conclusion.

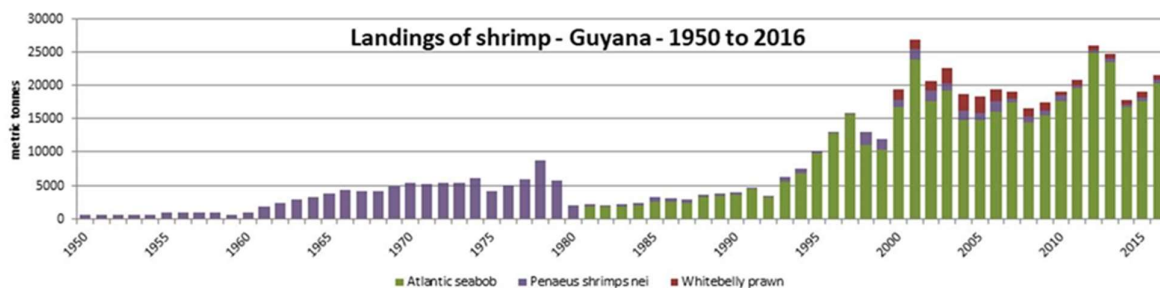
Whilst seabob may meet some of the life history characteristics of key LTL species, copepods form only part of its diet, and seabob does not form dense schools. It can be concluded that seabob does not meet all of these life history characteristics.

In summary, in terms of energy flow between trophic levels at the scale of the fishery in Guyana it is highly unlikely that seabob can be considered as a key LTL species. In terms of life history traits it can be concluded that seabob cannot be considered to be a key LTL species. A similar conclusion was reached for seabob in Suriname (Southall *et al.*, 2017).

3.3.2 Evolution of Seabob Management in Guyana

The seabob fishery in Guyana commenced in the early 1980s. Although there is some interaction between the seabob fishery and the penaeid fishery, targeting of seabob only occurred because of the decline in the penaeid fishery at the time, and there is no evidence therefore that the development of the seabob fishery caused the observed decline in the penaeid fishery. Landings of seabob were only a few thousand tonnes in the 1980s and early 1990s after which the fishery expanded and landings from 2000 until 2017 varied between 15,000 and 25,000 tonnes (Figure 3.3.1, Table 3.3.1).

Figure 3.3.1. Landings of shrimp (*Penaeus shrimps*, whitebelly prawn and Atlantic seabob) in Guyana from 1950-2013. (Source: Richardson, 2018)



In addition to the industrial trawl fishery, there is a very low level of bycatch in the artisanal Chinese seine fishery. There was relatively little management while the seabob fishery was developing, but in recent years the fishery has been strictly regulated through limited entry licensing, the implementation of reference points and harvest control rules (HCRs) to guard against overfishing, mandatory monitoring of fishing activity through Vessel Monitoring Systems (VMS) and completion of log books, restrictions on fishing areas to minimise bycatch of vulnerable species and habitats and the use of on-board cameras to monitor fishing practices.

Table 3.3.1. Landings in tonnes of seabob from the main industrial trawl fishery and from the artisanal Chinese seine fishery from 2013 to 2017. (Source: Guyana Fisheries Department)

Year	Industrial fishery	Artisanal fishery	Total
2013	23,024	377	23,401
2014	16,574	108	16,682
2015	17,476	165	17,641
2016	20,131	165	20,296
2017	21,659	106	21,765

3.3.3 Harvest strategy

Details of the High level national regulatory structures are described in section 3.5.2. The management objectives and regulations specific to the seabob fishery are set out in the Seabob Fishery Management Plan 2015-2020 which includes the objectives of the fishery, fishery goals and regulations, the harvest control rules and managing the impact of the fishery on ETP species. The Management Plan is an “evergreen” document, constantly under review. Although the Seabob Management Plan was initially adopted and operated under a Memorandum of Understanding (MoU) between the fishing industry and the Ministry, it was formally approved by the Minister of Agriculture in February 2019.

Stakeholder involvement with seabob fishery management is through the Seabob Working Group (SWG), which includes representatives from the processors, the seabob vessels, the artisanal fleet and eNGOs. SWG meets monthly and reviews all fisheries data provided by the Fisheries Department and makes recommendations on the operation of the fishery. The Ministry can accept or reject recommendations by the Seabob Working Group and can unilaterally modify the Management Plan if required.

Stock assessments have been carried out by an independent fisheries consultant, and previously have been reviewed by the Scientific Committee of the Caribbean Regional Fisheries Mechanism (CRFM) which is a regional fisheries body that supports and provides an overview of local stock assessments within the region. CRFM is a constituent organisation of the Western Central Atlantic Fishery Commission (WECAFC), which has a Shrimp and Groundfish Working Group that takes an ecosystem-based approach to fisheries management.

The Processing Companies of the client group also play an important role in the harvest strategy and management of the fishery as they can control the number of fishing vessels under their ownership and act as a conduit for fisheries information (such as logbooks) between fishing vessels skippers and the Fisheries Department. In addition, the companies thoroughly review images from the on-board camera systems to ensure compliance with both licence conditions and internal company requirements (i.e. related to quality and hygiene).

In addition to the Seabob Management Plan, there is also a Code of Practice (COP) in operation for the seabob fishery that was drawn up by the Seabob Working Group (Maison, 2015). This is further described in report section 3.5.2.

Elements of harvest strategy

The harvest strategy is characterised by a restriction of fishing effort through a limited entry licensing scheme, measures to minimise bycatch, restrictions to fishing areas, the implementation of reference points and harvest control rules to safeguard against overfishing, and a rigorous monitoring, control and enforcement regime.

Regulations

All vessels must be licensed to fish for seabob, and there is a maximum limit of 87 vessels in the fishery. Vessels are issued with an annual licence containing current licence conditions. Currently (November 2018) there are 87 vessels licenced to fish for seabob, of which 2 are currently inactive. There is maximum total fishing effort for the fishery set at 15,000 standardised days at sea, with each vessel limited to 225 days fishing per year. There is no Total Allowable Catch (TAC) set for the fishery and no individual vessel catch quotas.

There are some restrictions on the design of trawl used in the seabob fishery. Vessels generally use a trawl of mesh size 2.5 to 3.5 cm stretch mesh in the cod-end, but there is no formal regulation limiting mesh size in the fishery. There is no minimum legal landing size for seabob, and it is assumed that all seabob caught are landed. The trawls must contain a bycatch reduction device (BRD) which is a large-meshed (5-6 cm) panel which allows the escape of large fish bycatch. The BRD may cause some loss of commercial-sized shrimp, but fishers report that this is more than balanced by the benefits of a clean catch which requires little sorting. All vessels must incorporate Turtle Exclusion Devices (TEDs) in their trawl, rigged at a specific angle to minimise the risks of turtle injuries.

Fishing for seabob is restricted to the area between 8 and 18 fathoms (14.6 to 33 metres). This restriction provides protection to inshore habitats, reduces the likelihood of bycatch of ray species and minimises catch of penaeid shrimp species which occur mainly in deeper waters outside the 18 fathoms limit. As a result, other penaeid shrimps make up only 2-3% of the seabob catch. In addition, there are some areas closed to fishing.

There are “move-on” rules stipulated in the COP which require vessels to move on and fish in another area if the try-net catches significant numbers of stingrays.

There is a closed season of around 8 weeks based upon the time of the year when seabob are small and not marketable, although this closed season coincides with the spawning season and therefore also provides some protection for future recruitment. The closed season runs normally from August to October, but the exact timing of the closed season is agreed by the GATOSP based upon the size distribution and quality of the seabob catches. Processing factories are closed in addition to the fishing vessels being tied up on the quayside.

3.3.4 Data & monitoring

Fishing position and activity is monitored through mandatory use of a Vessel Monitoring System (VMS) on all vessels irrespective of size. The VMS transmits positional information (“pings”) every 60 minutes, and the records are downloaded each night by the Fisheries Department, allowing rapid contact with fishing vessels if the vessel has been fishing in prohibited areas.

The recording of catch data on logbooks is mandatory for all vessels. Catches of seabob and fishing effort are completed on a haul-by-haul basis. There are no discards of seabob catch and therefore the landings are equivalent to the catch. The log sheet also records the landings by weight of all retained bycatch species. There are separate sheets for the recording of bycatch of endangered, threatened and protected (ETP) species and interactions with vulnerable habitats. Whilst the seabob catch data are mandatory, recording of interactions with ETP species and vulnerable habitats are voluntary. Skippers must submit their logbooks to the vessel owners (in most cases the processors) at the end of the trip, and the owners will submit to the Ministry every month.

All vessels must provide records of landings, and Fisheries Officers will also collect additional information from vessel skippers 2 to 3 times each month. The processors also record the weight of landings and discards and submit their records to the Ministry. These landings figures from the processors are considered to be the official record of landings for which the overall catch per unit effort (CPUE) for the fishery is calculated.

The Fisheries Department carries out cross-checks of logbook records, landings declarations and processors' landings, and if necessary, export quantities. There is a tolerance threshold of 5% variation between the weight of seabob recorded on the electronic logbook and the landings declarations.

There are no fishery-independent surveys of the seabob stock, but there is an observer programme which is generally based upon a detailed recording of all catches in the last haul of the fishing trip. A major observer programme was funded by WWF between February 2016 and late 2017 with a target of observing 25% of the fleet, and the on-board observer recorded information from all tows and detailed information from the last haul. The Ministry took over the programme in December 2017, but the information is now based solely on an analysis of the catch from the last haul provided by the vessel's skipper. Data from the observer programme do not differentiate between retained and discarded catch, and it assumed that all seabob caught are landed. For further details, see the P2 section on bycatch information.

3.3.5 Stock Assessment Methodology

Stock assessments were undertaken in 2007 and in 2012/13, following which reference points were defined and harvest control rules implemented and ratified by CRFM. A new stock assessment commenced in 2018 for which some preliminary output is available.

The stock assessment model is a statistical catch-at-age model (Quinn and Deriso, 1999), implemented with the AD Model Builder software (Fournier *et.al.*, 2012). The model is based on a forward-projection design and is effectively a simplified version of Stock Synthesis. The model has a one-month time step and males and females are treated separately. Growth is described by the von Bertalanffy growth equation, selectivity is modelled as a logistic function based on length, and length-weight parameters are estimated from a log-linear model of morphometric data. Nominal catch and effort data from processors' landings data were used in the model, which incorporates data on size category and a maturity at weight ogive. Catches were converted from unpeeled tail weight to processed tail weight for use in the assessment. Fishing effort was measured in days at sea but corrected for asymptotic trip length as there was clear evidence of diminishing catches on longer trips possibly due to increased travel time to grounds, poor weather restricting fishing or lower catch rates necessitating longer trips. Fishing effort can be standardised using generalised linear models, but the only covariate available was vessel name, and there was not sufficient information on vessel characteristics to carry out such a standardisation.

The model uses a Beverton and Holt stock-recruitment relationship with a steepness parameter. The model calculates log-likelihood for each component (total catch, catch and effort, size composition by size and sex, average count per pound) and uses Markov Chain Monte Carlo (MCMC) simulations to investigate uncertainty. Model fits to the data were good.

Details of the assessment model, data input and diagnostics of model fit can be found in Medley (2013).

The stock assessment model was used as a basis for evaluating harvest control rules (HCRs). A range of harvest control rules were considered so that an HCR consistent with Maximum Sustainable Yield and the precautionary approach could be identified. Potential HCRs were evaluated based upon total catch or total effort in the fishery, and the best method was considered to be based on total effort (Medley, 2014). An overall control is placed on the days-at sea, which is linked to the number of seabob licences issued, so that each vessel is allocated a fixed number of operational days. An overall days-at-sea limit was proposed of 87 licences each with an allocated 225 days at sea. The most appropriate stock status indicator is the annual catch rate (CPUE) calculated as kilos per day fishing based upon processors' landings data. The only standardization used was to adjust effective days fishing from the days-at-sea. As noted above, there was a clear diminishing return in catch based on trip length. Days fishing are estimated on a per trip basis based on statistical analysis of the catch-per-

trip data. A conversion factor of 0.766 was used to convert nominal days-at-sea to standardised days-at-sea.

The model estimates that 15,000 standardised days at sea (equivalent to approximately 20,000 nominal days at sea) achieves an average spawning stock biomass (SSB) of 0.4 x the unexploited biomass, B_0 , which is an acceptable proxy for MSY for stocks of at least average productivity (GSA2.2.3.1, MSC 2014). The average catch rate at that level would be 630 kg / day and this is therefore defined as the target reference point (TRP). The fishing industry stated that catch rates of 600 kg/day would be a reasonable economic catch rate to target, and this is slightly below the TRP of 630 kg/day. The limit reference point (LRP) was set at 0.2 x B_0 , which is reasonable as an LRP proxy (see MSC reference as above). This corresponds to a catch rate of 315 kg / day, which industry has noted is the lowest commercially viable catch rate at the current time. In addition, a trigger reference was set at 540 kg/day (approximately 70% of the distance between the LRP and TRP) at which exploitation rates will be reviewed and reduced as the LRP is approached. These daily catch rate reference points are equivalent to 19,000, 17,000 and 10,000 lbs/trip respectively. A summary of the reference points is given in Table 3.3.2.

Table 3.3.2. Reference points for seabob used in the Harvest Control Rules (HCR).

Reference point	Value in kgs / standardised days at sea (kg / sdas)
Target Reference Point (TRP) as defined by HCR	630
Alternative TRP - commercial target	600
Intermediate trigger point	540
Limit reference point (LRP)	315

The HCR is therefore based upon 225 days at sea per vessel, assuming a fleet size of 87 vessels. The Total Allowable Effort (TAE) days-at-sea quota shall be set dependent on the value of the catch index as follows:

- when the catch index is at or above the TRP, a maximum of 225 days at sea per licenced vessel.
- when the current index is above the trigger reference point, but below the TRP a linearly declining value, according to the calculation (TAE in days at sea per vessel):

$$TAE = 205 + 20 * (\text{Current Index} - \text{Trigger ref. point}) / (\text{TRP} - \text{Trigger ref. point})$$
- when the current index is above the LRP, but below the trigger reference point, a linearly declining value, according to the calculation (TAE in days at sea per vessel):

$$TAE = 205 * (\text{Current Index} - \text{LRP}) / (\text{Trigger ref. point} - \text{LRP})$$
- if the current index is at or below the LRP, TAE is zero (there is an export moratorium).

The current index for each year shall be calculated as the average between the previous year's index value and the catch rate of the previous year (i.e. a moving average). The catch rate will be based on reported catch and effort data for all vessels. The catch rate is calculated as the total landings of seabob processed (peeled tail) weight in kilograms divided by the total number of standardised days-at-sea.

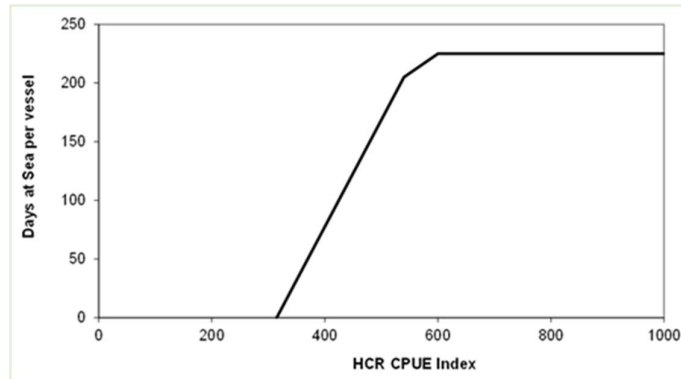
The HCR Index in any given year t (I_t) is calculated as (Equation 1):

$$I_t = 0.5 \left(I_{t-1} + \frac{C_{t-1}}{0.766 D_{t-1}} \right)$$

Where C_{t-1} =catch (kg processed tail weight) in the year t-1 and D_{t-1} = total nominal days-at-sea required to catch C_{t-1} . The index calculation should include all observed reliable catch and effort data. The calculation of the Total Allowable Effort (TAE) days-at-sea quota dependent on stock status is shown graphically in Figure 3.3.2.

Catch rates (CPUE) are regularly reviewed by the Seabob Working Group (SWG) and if there are signs of stock decline, as identified by a decline in annual CPUE below the reference points, then SWG will require the companies to reduce the number of days fishing per vessel for next year in line with the HCR shown diagrammatically in Figure 3.3.2. Whilst the HCR is triggered in response to a change in annual catch rates, there is also scope for SWG to recommend closing the fishery immediately if CPUE declines significantly mid-season as the SWG reviews CPUE on a monthly basis.

Figure 3.3.2. Guyana seabob. Graphical representation of the proposed harvest control rule, with the days-at-sea per vessel based on a maximum of 87 vessels. The HCR index is in kilograms of seabob processed tail weight per standardised day at sea. (Source: Medley, 2014)



3.3.6 Stock Status

The most recent full stock assessment was undertaken in 2013. The spawning stock biomass (SSB) estimated from the Medley (2013) model shows that following a decline from around 1995 to 2002/3, the stock was relatively stable at or just below the B_{MSY} proxy of $0.4 \times B_0$ in the early 2000s but has increased steadily such that by 2013 was well above the target reference point (Figure 3.3.3) suggesting that the stock is in a healthy state. The model estimates that fishing mortality fluctuates across months but has only rarely exceeded F_{MSY} since 2002 (Figure 3.3.4), providing further evidence that the stock is in a healthy state. Medley (2013) stresses that F_{MSY} is poorly estimated and therefore from a precautionary viewpoint, the exploitation rate should be kept below F_{MSY} . Additionally, there is some uncertainty underlying the way that selectivity is modelled and how size categories of seabob are interpreted.

Since the implementation of the HCRs, the key stock indicator has been the annual catch rate (CPUE) calculated as kilos per day fishing based upon processors' landings data. The most recent Fisheries Department analysis of catch and effort data for the seabob fishery was for 2017 (Richardson, 2018). Recorded processed catches in 2017 were approximately 10,000 tonnes. Overall effort in terms of standardised days at sea (sdas) was 13,888 days which is well below the level of fishing effort which should achieve MSY (Table 3.3.3) and is a lower level of fishing effort than that observed in 2016. The annual CPUE is calculated at 715 kg / sdas which is above the TRP of 630 kg / sdas (Table 3.3.3), and higher than the observed catch rate in 2016 (649 kg / sdas), so the stock can be considered to be healthy. Based upon Equation 1 above, the 2018 index will therefore be $0.5 \times (616 + 715) = 665.5$.

Figure 3.3.3. Guyana seabob. Monthly spawning stock biomass (SSB) as a proportion of unexploited SSB (SSB₀) estimated from the Medley (2013) stock assessment model. Horizontal line is a default provisional target reference point of 40% of SSB₀. (Source: Medley, 2013)

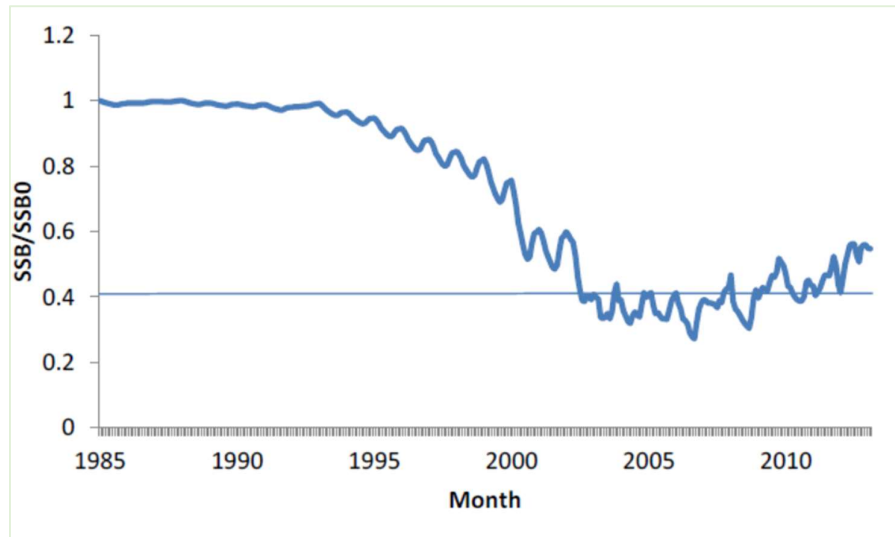
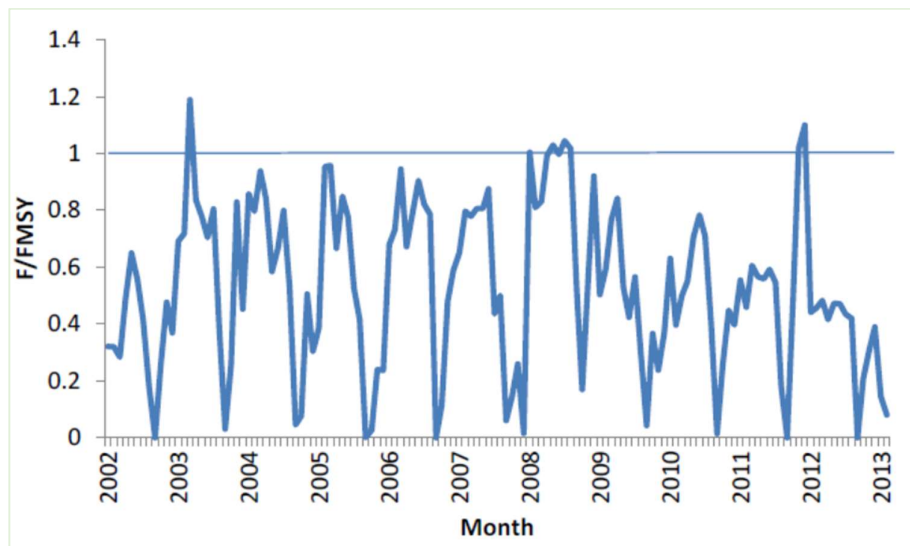


Figure 3.3.4. Guyana seabob. Monthly fishing mortality (F) as a proportion of the estimated fishing mortality at MSY (FMSY) estimated from the Medley (2013) stock assessment model. Horizontal line is estimated FMSY. (Source: Medley, 2013).



The monthly CPUE did decline below the target and intermediate reference points from July to October, and indeed fell below the LRP in September (Table 3.3.3), but this coincided with the closed season in August and September when the quality of the seabob is poor, and there was minimal fishing effort in these two months.

As noted above, the most recent full assessment of the seabob stock in Guyana was completed in 2013/14. A new stock assessment is currently underway (Medley, 2019), from which some preliminary results have been provided by the author. The latest stock assessment has considered in more detail some of the uncertainties identified in the 2013/14 assessment, in particular by modelling the grading of the shrimps directly.

The assessment used new MCMC software (RMarkdown/R using Stan, instead of AD Model Builder) and appeared to get a good fit to the data (Medley, *pers. comm.*). Preliminary results from the assessment suggest that biomass is currently fluctuating around B_{MSY} (Figure 3.3.5), there is no evidence of impairment of recruitment (Figure 3.3.6), and that fishing mortality has been fluctuating around F_{MSY} (Figure 3.3.7). It should be stressed that these are preliminary outputs from the stock assessment and the assessment requires formal review, but the general conclusion is that the stock appears still be in a healthy state with no evidence of overfishing. The new assessment should provide

Table 3.3.3. Summary of catches, fishing effort (standardised days at sea, sdas) and CPUE (kg / sdas) by month for the seabob fishery in 2017. (Source: Richardson, 2018)

INDUSTRIAL SEABOB CPUE 2017			
Months	Processed Weight (kg)	Standardised DAS (sdas)	Monthly CPUE (kg/sdas)
January	1,079,398	1,258.611	858
February	896,722	1,280.435	700
March	1,291,901	1,460.213	885
April	1,220,390	1,340.084	911
May	1,215,832	1,418.803	857
June	1,109,890	1,403.516	791
July	729,012	1,478.252	493
August	12,973	38.868	334
September	11,412	49.921	229
October	543,941	1,293.694	420
November	969,293	1,439.087	674
December	846,623	1,427.341	593
	9,927,387	13,888.825	715

a good testing platform for the currently-agreed HCR, so there may need to be some changes to the HCR when the new stock assessment is completed.

The Medley (2013) stock assessment underwent peer review by CRFM (2014). In addition, Cefas has recently provided advice on data collection, bycatch studies and habitat mapping. However, the most recent ongoing stock assessment (Medley, 2018) is yet to be fully evaluated through CRFM or through independent peer review. The previous peer review by CRFM primarily considered data inputs and model uncertainties, but as the new stock assessment uses essentially a bespoke piece of software, the peer review of the assessment should include the coding in the software in addition to data input and uncertainties within the model.

Figure 3.3.5. Guyana seabob. Estimates of biomass as a proportion of BMSY from the revised stock assessment model of Medley (2019).

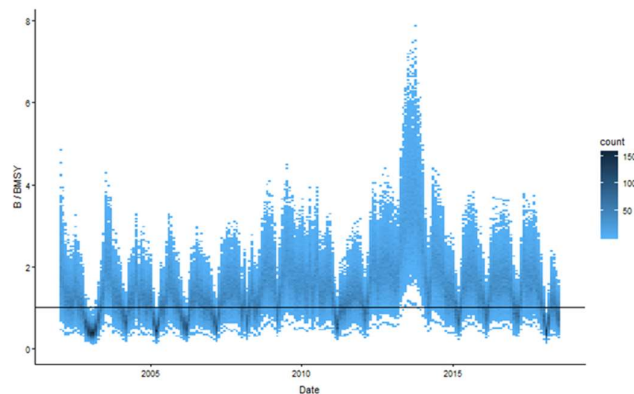


Figure 3.3.5. Guyana seabob. Estimates of biomass as a proportion of BMSY from the revised stock assessment model of Medley (2019).

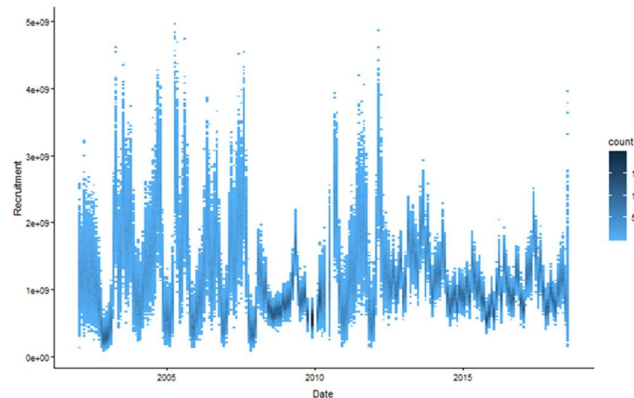
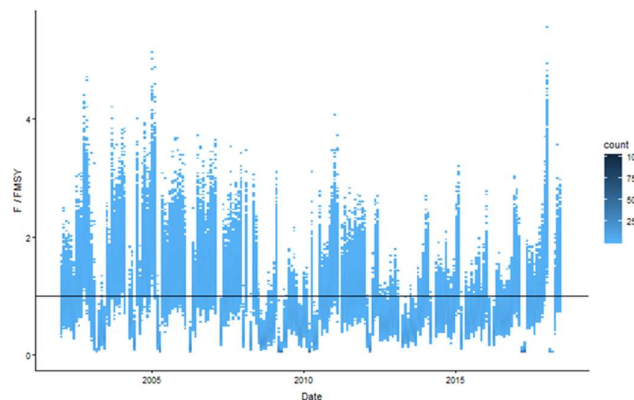


Figure 3.3.7. Guyana seabob. Estimates of fishing mortality (F) as a proportion of FMSY from the revised stock assessment model of Medley (2019).



3.4 Principle Two: Ecosystem Background

Principle 2 of the Marine Stewardship Council standard states that:

“Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent ecologically related species) on which the fishery depends”.

This section of the report outlines the potential impacts of the Guyana Seabob fishery on the wider ecosystem. Five components are considered to cover the range of potential ecosystem elements that may be impacted by the fishery⁹.

3.4.1 Primary Species

Primary species are those that are caught by the fishery but are not included in the UoA. Primary species are subject to management tools and measures which intend to achieve stock management objectives in relation to reference points. They are usually species of commercial value to either the UoA or fisheries outside the UoA, with management tools controlling exploitation as well as known reference points in place.

Primary species are further categorized into main and minor. Main primary species account for 5% or more of the total catch or for ‘less resilient’ species making 2% or more of the total catch. All other species are considered minor primary species.

Based on information on the Guyana fisheries management system, there are no species subject to management tools or measures to achieve stock management objectives in relation to reference points. Although some stock assessments have been undertaken or attempted (FAO, 2013; CEFAS, 2018a) for several species that are commercially important (Bangamary (*Macrodon ancylodon*), seatrout (*Cynoscion virescens*) and butterfish (*Nebris microps*)) the Guyana fisheries on these stocks are currently not managed with the use of TAC’s or quota and no reference points are defined. Therefore, it has to be concluded that there are currently no primary species in Guyanese waters and that the seabob fishery therefore does not catch primary species.

Under these circumstances, the RBF would also not be triggered (i.e. no species to assess) and on PI2.1.1 the fishery meets SG100 by default¹⁰.

3.4.2 Secondary Species

Like most trawling activity that takes place for shrimp in coastal waters of the tropics, the Guyana seabob trawl fishery captures a range of non-target organisms including fish, elasmobranchs and invertebrates along with the target species.

Of non-target bycatch species, a considerable quantity also has economic value and is retained onboard for landing. Three species of fish comprise in excess of 90% of the retained fish bycatch. These species are Bangamary (*Macrodon ancylodon*), Green weakfish, or Trout (*Cynoscion virescens*) and Butterfish (*Nebris microps*).

All species caught in the Guyana seabob fishery (that are not ETP species) are considered as secondary species; whether they are retained or discarded is not a point of consideration any longer under the latest MSC CRv2.0. Secondary species have to be assessed either as “main” secondary species or as

⁹ Major changes have been made in the assessment tree in assessing P2 components under MSC CR v2.0 compared with MSC CR v1.3. Under CR v1.3, the first two components of the P2 assessment tree address species retained by the fishery and discarded species. The first two elements now deal with ‘Primary’ and ‘Secondary’ species. There are complex rules to deal with these that are detailed in CR v2.0.

¹⁰ SA3.2.1 states that if there is no impact on a particular component it shall receive an outcome score of 100 under the outcome PIs

“minor” secondary species. Main secondary species are those that account for 5% or more of the total catch or for ‘less resilient’ species account for 2% or more of the total catch. Main secondary species also include all species that are out of scope (bird, mammal, reptile, amphibian, mammal). All other secondary species are considered minor.

Table 3.4.1. Catch profile based on “last haul” data bycatch for all data combined. Source: Medley, 2017

Common name	Scientific name	Weight (kg)	% of bycatch	% of catch (scaled)	Cumulative %
Bangamary / weakfish	<i>Macrodon ancylodon</i>	286,36	18,54	9,3	18,5
Longnose stingray	<i>Dasyatis guttata</i>	154,61	10,01	5,0	28,6
Smalleye/Rake stardrum	<i>Stellifer microps/rastrifer</i>	151,45	9,8	4,9	38,4
Banded croaker	<i>Paralichthys brasiliensis</i>	115,66	7,49	3,7	45,8
Green weakfish	<i>Cynoscion virescens</i>	86,14	5,58	2,8	51,4
Smalleye croaker	<i>Nebris microps</i>	79,46	5,14	2,6	56,6
Rake stardrum	<i>Stellifer rastrifer</i>	78,13	5,06	2,5	61,6
Largehead hairtail	<i>Trichiurus lepturus</i>	70,91	4,59	2,3	66,2
Rockhead/ shorthead drum	<i>Larimus breviceps</i>	64,72	4,19	2,1	70,4
Smooth butterfly ray	<i>Gymnura micrura</i>	55,73	3,61	1,8	74,0
Smalleye stardrum	<i>Stellifer microps</i>	47,87	3,1	1,6	77,1
Atlantic Spadefish	<i>Chaetodipterus faber</i>	41,58	2,69	1,3	79,8
Duskycheek tonguefish	<i>Symphurus plagusia</i>	35,7	2,31	1,2	82,1
River Pellona	<i>Pellona harroweri</i>	26,27	1,7	0,9	83,8
American Stardrum	<i>Stellifer lanceolatus</i>	24,95	1,61	0,8	85,4
Coco sea catfish	<i>Bagre bagre</i>	22,83	1,48	0,7	86,9
Shrimp Eel	<i>Ophichthus gomesi</i>	22,39	1,45	0,7	88,4
Blackfin croaker	<i>Lonchurus elegans</i>	20,92	1,35	0,7	89,7
Pacuma toadfish	<i>Batrachoides surinamensis</i>	16,15	1,05	0,6	90,8
Negli	<i>Anchoa mitchilli</i>	14,84	0,96	0,5	91,7
Cownose ray	<i>Rhinoptera bonasus</i>	11,81	0,76	0,4	92,5
Crab		9,66	0,63	0,3	93,1
Banded puffer	<i>Colomesus psittacus</i>	8,15	0,53	0,3	93,6
Spicule anchovy	<i>Anchoa spinifer</i>	6,97	0,45	0,2	94,1
Chola guitarfish	<i>Rhinobatos percellens</i>	6,95	0,45	0,2	94,5
Southern kingcroaker	<i>Menticirrhus americanus</i>	6,84	0,44	0,2	95,0
Spring Cuirass	<i>Cathorops spixii</i>	6,65	0,43	0,2	95,4
Whitemouth croaker	<i>Micropogonias furnieri</i>	5,74	0,37	0,2	95,8
Caribbean moonfish	<i>Selene browni</i>	5,63	0,36	0,2	96,1
Squid		5,37	0,35	0,2	96,5
Gillbacker sea catfish	<i>Sciades proops</i>	5,11	0,33	0,2	96,8
34 other species		49,23	3,19	1,6	100,0

In order to collect accurate data on bycatch in the Guyana seabob fishery WWF funded an observer program that resulted in 19 trips on 18 vessels from 18 February 2016 to 14 April 2017. From these trips 27 “last” haul catches were landed and then sorted, identified and measured (Medley, 2017). Ideally, the entire last haul would be preserved intact with the seabob, but in this case the seabob was sorted out and the bycatch was not well preserved. Nevertheless, the last haul data provides a good

indication of the typical catches before sorting and discarding takes place. The catch profile developed on the basis of all data combined is presented in table 3.4.1. Since the presented percentages are of the bycatch total and not the percentage of the total catch, some extra information is needed to determine which species form more than 5 % of the catch.

The MSC assessment team also asked the Fisheries Department for the available last haul data from 2018. Last haul data over 2018 as presented in table 3.4.2 which shows that seabob form approximately 55 % of the total catch. Assuming that on average at least 50 % of the catch is seabob the bycatch profile of the 2016-2017 observer program can be used to calculate bycatch percentages by dividing the percentages as shown in table 3.4.1 by 50%.

On the basis of the data presented in Table 3.4.1, Bangamary and Longnose stingray would be main. For Rake and Smalleye stardrum the table contains separate percentages (2,5 and 1,6 %) but also a combined percentage of 4,9 %. So together they form about 9 % of the catch. Since it is not clear which species would pass the 5 % threshold both species are considered as main. Smooth butterfly ray is close to the 2% threshold for less resilient species and is therefore also considered as a main. On the basis of table 3.4.2 Smalleye croaker and Green weakfish would also be main. On a precautionary basis, we have combined these two lists to create a final list of the following 7 main secondary species: Bangamary, Green weakfish, Smalleye croaker, Smalleye stardrum, Rake stardrum, Longnose stingray and Smooth butterfly ray.

Table 3.4.2: Detailed catch data for the seabob fishery (2018 Fisheries Department last haul data). No ETP species were recorded.

Common name	Scientific name	Scoring Area	Weight (kg)	% of Catch	Cumulative %
Seabob	<i>Xiphopenaeus kroyeri</i>	Target species	2718,76	55,21	55,2
Smalleye croaker	<i>Nebris microps</i>	Secondary main	347,16	7,05	62,3
Green weakfish	<i>Cynoscion virescens</i>	Secondary main	227,72	4,62	66,9
Bangamary	<i>Macrodon ancylodon</i>	Secondary main	190,39	3,87	70,7
Longnose stingray	<i>Dasyatis guttata/geijkesi</i>	Secondary main	171,51	3,48	74,2
Chinese butterflyfish		Secondary minor	115,57	2,35	76,6
Whitebelly shrimp	<i>Nematopalaemon schmitti</i>	Secondary minor	114,7	2,33	78,9
Rake stardrum	<i>Stellifer rastriker</i>	Secondary minor	98,01	1,99	80,9
Silverbelt / Largehead hairtail	<i>Trichiurus lepturus</i>	Secondary minor	77,31	1,57	82,5
Shrimp eel		Secondary minor	73,38	1,49	84,0
Tongue fish	<i>Symphurus plagusia</i>	Secondary minor	71,03	1,44	85,4
Catfish	<i>Bagre bagre</i>	Secondary minor	69,72	1,42	86,8
Banded puffer	<i>Colomesus psittacus</i>	Secondary minor	70,15	1,42	88,2
Banded croaker	<i>Paralichthys brasiliensis</i>	Secondary minor	38,46	0,78	89,0
Smalleye stardrum	<i>Stellifer microps</i>	Secondary minor	34,17	0,69	89,7
Jelly fish		Secondary minor	33,44	0,68	90,4
Other species			472,52	9,6	100,0

During the site visit the team conducted RBF workshops and for the species identified, to determine outcome status scores as no stock assessment was available. The procedures and outcome of this RBF are presented in Appendix 1.2 and a description of the RBF process is provided in report section 4.4.

Because this was not conducted for minor secondary species PI2.2.1 cannot be scored higher than 80¹¹

3.4.3 Endangered, Threatened and Protected Species

Endangered, threatened and protected (ETP) species are defined as species that are recognised by national ETP legislation, or as species listed¹² on Appendix 1 of the Convention on International Trade in Endangered Species (CITES), or listed in binding agreements under the Convention on Migratory Species (CMS), or as 'out of scope' species that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically (CE). Species listed in Appendix 1¹³ that can be found in Guyana waters are 7 species of marine mammals (6 cetaceans and 1 manatee species), 4 turtle species and 2 sawfish species. There are no interactions of the fishery with out of scope species (like birds).

Marine mammals

A list of whale, dolphin and seal species that are present in Guyana waters is presented in table 3.4.3. Concerning the whale species (Sei whale, Blue whale, Humpback whale and Sperm whale) it can be concluded that it is very unlikely that there is any significant interaction between these species and the seabob fishery considering the size of these species, the slow speed and limited size of the bottom shrimp trawls used. The Tucuxi is a *Sotalia* species that only lives in rivers so also for this species there is no likelihood of interaction.

The Guiana dolphin (*Sotalia guianensis*) is a riverine, estuarine and nearshore species, which ranges along the Western Atlantic coast from southern Brazil to Guatemala. There is little information on population structure and status for the Guiana dolphin; although the species appears relatively abundant in many parts of its range¹⁴. Incidental bycatches of this relatively small dolphin cannot be considered impossible. However, the species should be rather fast swimming and be able to avoid capture. When captured incidentally the use of the TED in many

Table 3.4.3: Whale, dolphin and seal species present in Guyana waters. Source: Sea Around Us (2005) (* = CITES Appendix 1).

Common Name	Scientific Name
Sei whale*	<i>Balaenoptera borealis</i>
Brydes whale	<i>Balaenoptera brydei</i>
Blue whale*	<i>Balaenoptera musculus</i>
Short beaked common dolphin	<i>Delphinus delphis</i>
North Atlantic right whale	<i>Eubalaena glacialis</i>
Pygmy killer whale	<i>Feresa attenuata</i>
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>
Rissos dolphin	<i>Grampus griseus</i>
Gray seal	<i>Halichoerus grypus</i>
Pygmy sperm whale	<i>Kogia breviceps</i>
Dwarf sperm whale	<i>Kogia simus</i>
Frasers dolphin	<i>Lagenodelphis hosei</i>
Humpback whale*	<i>Megaptera novaeangliae</i>
Blainvilles beaked whale	<i>Mesoplodon densirostris</i>
Gervais beaked whale	<i>Mesoplodon europaeus</i>
Trues beaked whale	<i>Mesoplodon mirus</i>
Melon-headed whale	<i>Peponocephala electra</i>
Sperm whale*	<i>Physeter macrocephalus</i>
False killer whale	<i>Pseudorca crassidens</i>
Tucuxi*	<i>Sotalia fluviatilis</i>
Guiana dolphin*	<i>Sotalia guianensis</i>
Pantropical spotted dolphin	<i>Stenella attenuata</i>
Clymene dolphin	<i>Stenella clymene</i>
Striped dolphin	<i>Stenella coeruleoalba</i>

¹¹ PF5.3.2.1; If the team has only considered "main" species in the PSA analysis, the final PI score shall not be greater than 80.

¹² Unless it can be shown that the particular stock of the CITES listed species impacted by the fishery under assessment is not endangered.

¹³ List downloaded on 10 December 2018 (valid from 4 October 2017).

¹⁴ <http://www.iucnredlist.org/details/181359/0>

occasions would lead to the escape of an animal caught in the net. No incidents of the capture of the Guiana dolphin have been reported in ETP bycatch forms in recent years. It is concluded that any significant interaction is highly unlikely.

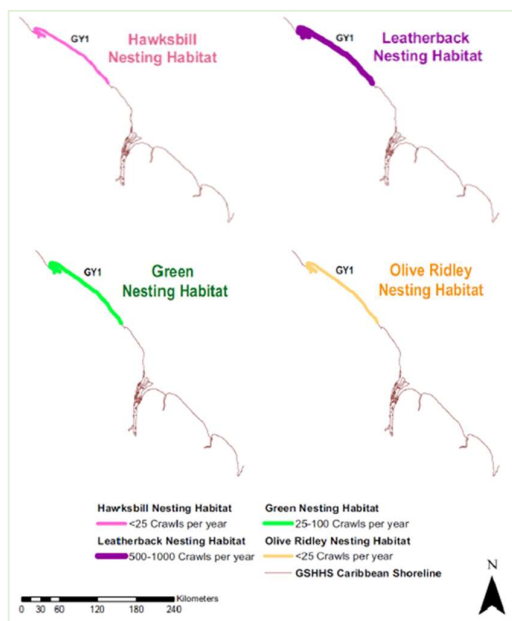
West Indian manatee (*Trichechus manatus*) has a range which extends across riverine and coastal systems from the Bahamas to Salvador, Brazil, including the Caribbean Sea and Gulf of Mexico. The population is estimated to be less than 2,500 individuals¹⁵. The main threats to this species include habitat degradation and loss and directed hunting, as well as accidental capture in fishing gears. The West Indian manatee is found predominantly in estuaries and lagoons and associated brackish water and freshwater areas where the plants on which it feeds are to be found. It can be found in association with mangrove and nearby coastal areas but is seldom found in open sea. Since the seabob fishery is carried out further offshore it can be concluded that there is no significant overlay of the fishery with the habitat of this species and it is concluded that interactions are highly unlikely. Capture of this species is more likely in set nets or fykes. There are no reports of bycatch of this species in shrimp trawls.

Fishes

Smalltooth and Largetooth sawfish (*Pristis pristis* & *Pristis pectinate*) are the only two sawfish species to be found in the western Atlantic Ocean. Both species once covered a wide range of habitats, stretching over the tropical and sub-tropical marine environments, as well as estuarine and contiguous freshwater habitats in the eastern Atlantic Ocean from the Caribbean to Central and South American as well as Africa. Sawfishes were once common throughout the tropical and subtropical waters of the Atlantic, Indian, and Pacific Oceans; they are thought to have been present in the waters of more than 90 countries. Over the past century, the populations of all five species have declined dramatically around the world, to the point where they can now only be reliably found in two remaining strongholds (where they are strictly protected): Florida, U.S. and Northern Australia. The presence of two sawfish species is confirmed in the Caribbean and Central American coastal seas: the Smalltooth and the Largetooth Sawfish. Sawfishes were once widespread throughout the coastal areas of the north, western, and central Caribbean and Gulf of Mexico, but it is likely that both species are now regionally extinct in many parts of the Caribbean and Central America, with the possibility of small populations remaining in the Bahamas, Cuba, Nicaragua, and to a lesser extent in Belize and Panama¹⁶.

During site visit consultations there were no indications of any sawfish being caught. Considering the fact that the chance of interaction is low because of the current distribution of these species and the size of these species which would, if caught, in many cases result in an escape through the TED (Brewer et al., 2006), it is concluded that any

Figure 3.4.1: Sea turtle nesting sites in Guyana. Source: Dow et al. 2007.



¹⁵ <http://www.iucnredlist.org/details/22103/0>

¹⁶ <http://baseline.stanford.edu/Harrison.Dulvy.2014FullReport.pdf>

significant interaction with sawfish species is highly unlikely.

Turtles

Four species of sea turtles can be found nesting on Guyana beaches from February through August. Leatherbacks (*Dermochelys coriacea*), green turtles (*Chelonia mydas*), hawksbills (*Eretmochelys imbricata*) and olive ridleys (*Lepidochelys olivacea*) utilize Guyana's nesting beaches. The primary turtle nesting beaches are located in remote North-western Guyana (see figure 3.4.1). Leatherback turtles and all sea turtles are listed in CITES Appendix 1.

The range of the Northwest Atlantic subpopulation of **leatherback turtle (*Dermochelys coriacea*)** extends north from a line between Natal on the coast of Brazil and Benin, Africa, to a line between Newfoundland Canada, and Scotland, including the Mediterranean. The Northwest Atlantic subpopulation overall is estimated to be increasing (20% over the last three generations) and is classified as 'Least Concern' by the IUCN¹⁷.

Hawksbill turtle (*Eretmochelys imbricata*) is found throughout the world's tropical waters, although there are genetic differences between populations in the Indo-Pacific and the Atlantic¹⁸. The shell of hawksbill turtle is prized as it can be polished and made into jewelry and decorative items, so the animals are targeted in some areas, and the global hawksbill turtle population appears to be declining.

Green turtle (*Chelonia mydas*) is found throughout the world's tropical and subtropical waters. Green turtles also nest in Suriname, although the proportion of the population which nests in any year is variable, complicating the assessment of population status¹⁹. Nevertheless, the data indicate that the green turtle population globally has declined, with egg poaching being a major issue, as well as mortality resulting from capture in different fisheries.

Olive ridley turtle (*Lepidochelys olivacea*) are the most abundant sea turtle and this species again has a circum-global range, with populations in the Western Atlantic extending along the coast of Brazil to central America and the Caribbean islands to Cuba²⁰.

Quantifying ETP impacts

Sea turtles are particularly vulnerable for catch and consequently drowning in fishing nets including shrimp trawls (Crowder *et al.* 1995). Already in 1987, the United States required all trawling shrimping boats to equip their nets with turtle excluder devices (TED). As a follow-up two years after, the shrimp-turtle law was implemented. This required all countries that the USA was importing shrimp from to certify that the shrimp they shipped were harvested by boats equipped with TEDs. Countries that cannot guarantee the use of the escape devices were banned from exporting shrimp to the USA. Consequently, the Guyana government was induced to seek an annual certificate from the USA approving the implementation of the TED regulation within Guyana. The use of TED and the correct fitting in the trawl is now compulsory within Guyana fisheries regulations. The use of TED is controlled regularly by a team of 4 staffs from the Fisheries Directorate. The use of TEDs significantly reduces the bycatch of turtles in the shrimp trawl (Brewer *et al.* 2006, Lewison *et al.* 2003).

During the site visit the team were informed by vessel captains and Fisheries Directorate staff that the use of TEDs has significantly reduced the bycatch of turtles. Captains have stated that although some turtles were caught in the past, this is now a very rare occurrence. Sometimes turtles will enter the

¹⁷ <http://www.iucnredlist.org/details/46967827/0>

¹⁸ <http://www.iucnredlist.org/details/8005/0>

¹⁹ <http://www.iucnredlist.org/details/4615/0>

²⁰ <http://www.iucnredlist.org/details/11534/0>

net but not pass through the net opening under the TED. This opening is covered with a flap and sometimes the turtles become entangled.

In order to estimate the impact of the fishery on ETP species vessel captains are requested to fill an ETP logsheet which are collated by the vessel owning / processing companies and delivered to the Fisheries Directorate where a database is maintained. Annually the ETP information is reported in an ETP report of the seabob fishery.

In the process of working toward MSC certification the GATOSP has drafted a Code of Practice for the Guyana seabob fishery (Maison, 2015). This code has been distributed to all seabob trawler captains. The code outlines what to do if a turtle is caught. For instance, it is explained that when a turtle comes on board it can appear to be dead, but it is only comatose. The turtle should be checked for reflexes of the eyelid and if alive it should be kept wet and shaded until it is vigorous again and can be released.

As stated, ETP reports are drafted on the basis of the ETP logsheet information provided by fishing captains. The most recent ETP report for the year 2017 (Husbands 2018) shows that not all vessels have provided the ETP sheets. In fact, only 18 vessels from the 2 largest companies have done so. Discussion with the fisheries directorate staff responsible for the ETP data collection have revealed that most ETP logsheets are filled in by some captains with zero interaction marks on all trips for all species, making the reliability of the information very questionable. Another problem with the current ETP interaction monitoring system is that the form that is used also asks for the recording of sightings. Although these sightings should be recorded separately, it seems that at least some captains have marked sightings as interactions (for instance two interactions with whales are reported in the ETP report, but captains confirmed that these were sightings). The ETP logsheet also contains a column where captains can state whether an animal caught was released alive or not. In most instances however, this column has not been filled in by the captains. The conclusion is therefore that the current system of ETP interaction monitoring does not produce reliable and therefore useful information.

The current weaknesses in the data collection system have recently also become apparent during a sea-going observer program funded by WWF in collaboration with the Guyana Association of Trawler Owners and Seafood Processors (GATOSP) and the Fisheries Department to characterize bycatch in industrial trawl fisheries off Guyana as well as a scoping study done on sharks and rays. It was noted that many species were misidentified due to lack of knowledge, experience and appropriate identification literature. In order to train fishermen on the different ETP species that occur in the coastal water of Guyana, and how they can be identified in the field and to raise awareness on the interactions of ETP species with fisheries, WWF Guianas with the help of a consultant (T. Willems) have organised 2 workshops (November 2017 and May 2018) with fishermen and Fisheries Department staff. The outcomes of both workshops have been reported (Willems 2018b; Willems 2018c).

Fishermen from the seabob fleet have responded (Willems, 2018b) that there is interaction with rays, sharks, dolphins and turtles. Kind of interactions were: "Rays: caught as bycatch, Sharks: juvenile sharks caught as bycatch, Turtles: observation, Dolphins: sightings. During the second workshop in May 2018 similar answers were given (Willems, 2018c). So, these responses of fishermen seem to confirm as assumed above that turtle sightings are considered by

Figure 3.4.2: Newly arrived resources to assist with the on-board identification of marine ETP species. (Source WWF)



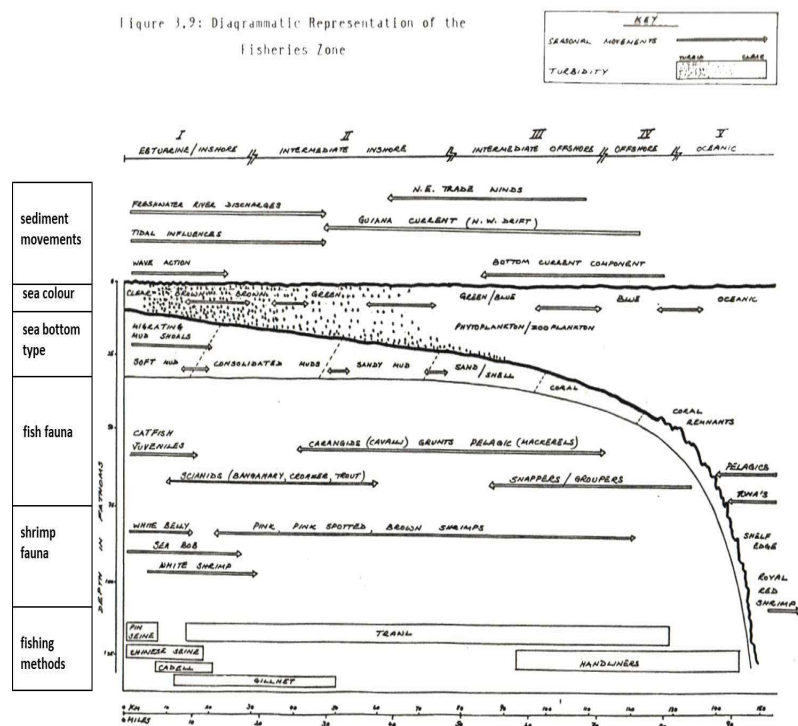
some fishermen to be interactions and have been noted as such on ETP logsheets.

The results of the observer program mentioned above which was organized and funded by WWF Guianas has been discussed with WWF staff during the site visit. The information that was collected on bycatch of fish was reported by Medley (2018). However, this report does not provide information on interactions with ETP species like turtles. WWF have been asked to supply further information on this observer program and this information was received by the team in a WWF letter dated 29th November 2018. In the letter it is stated that 19 observer trips have been carried out and that during these 19 trips no turtles were recorded as caught.

3.4.4 Habitats

The seabed habitats of the Guyana shelf waters are mainly sedimentary in nature, this being mainly the result of the settlement of suspended sediments that are carried into coastal waters by many large freshwater inflows that occur all along the Brazil-Guianas shelf. The shallow inshore areas adjacent to river mouths tend to be characterised by very soft accumulations of sediments that form banks of soft mud. These banks tend to shift around but are believed to generally move in a north-easterly direction with the prevailing oceanic current (Artigas et al., 2003). Areas further from the coast are generally

Figure 3.4.3: Diagrammatic section of continental shelf off British Guyana to show fish fauna zone, physical characteristics of the region. Source: ABCS, 1983 - adapted from Lowe-McConnell, 1962.



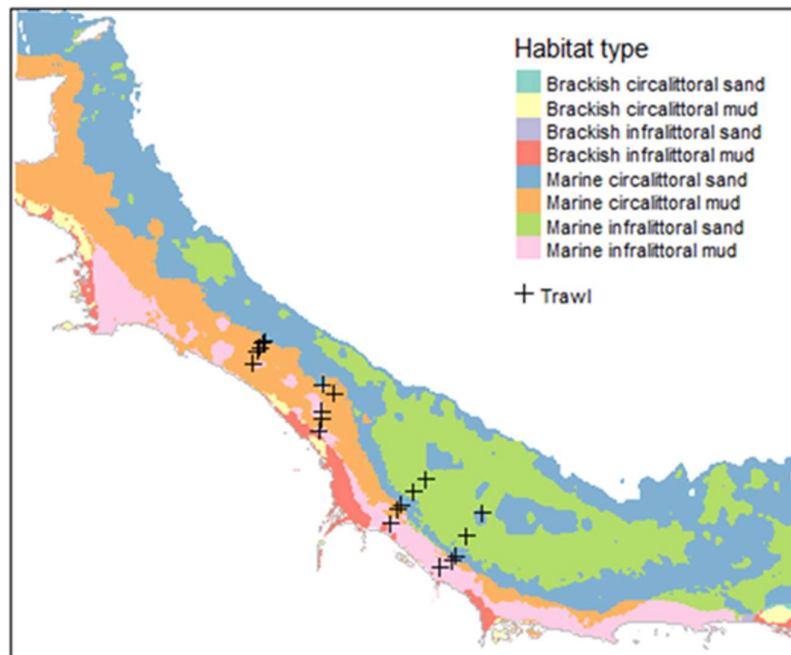
ABCS (1983) Shrimp and Fish Resources of the Cooperative Republic of Guyana Volumes I & II - EDF Technical Assistance in Fishery; Guyana Project No. 4100.036.29.14 / 4505.036.29.21 May 1983; Aquatic Biological Consultancy Services Ltd. - adapted from Lowe-McConnell 1962

characterised by firmer sediments and seabeds mainly comprise areas of sand, clay and clay with silt. A diagrammatic section of the continental shelf (see figure 3.4.3) is shown in Lowe-McConnel (1962). The figure shows that the sediment changes from soft mud, to mud and then sandy mud depending on the distance from the coast. In the zone nearer to the coast the colour of the water is brown as a consequence of the high silt content. From about 35 to 60 miles of the coast the sediment is sandy and the water colour is green. From about 60 miles from the coast also corals are found and the water

is blue. Looking at the depths where these different sediments occur, figure 3.4.3 shows that up to around 10 fathoms the sediment is mainly soft mud. From around 20-30 fathoms the sediment changes from muddy sand to sand.

More recent work done by Willems (2018) and CEFAS (2018) supports the findings of Lowe-McConnel (1962). CEFAS (2018) produced a basic physical habitat map by combining spatial data that are available from on-line databases with data on sediment grain size and taxon biomass and/or abundance (the latter collected by Willems in a trawl survey on 20 locations along a depth gradient from 6 to 34 m). The map that was produced (figure 3.4.4) shows the different sediments that have been distinguished and the 20 locations that have been sampled. The map shows that in the 6 to 34 m depth zone the sediment consists of marine infralittoral mud, marine circalittoral mud and marine infralittoral sand and marine circalittoral sand. So, it can be concluded that the main bottom habitats of the fishing area (8-18 fathoms) are mud or sand habitats.

Figure 3.4.4. Location of experimental benthic trawls in relation to mapped habitats. The fishing footprint is presented in figure 3.4.6b.



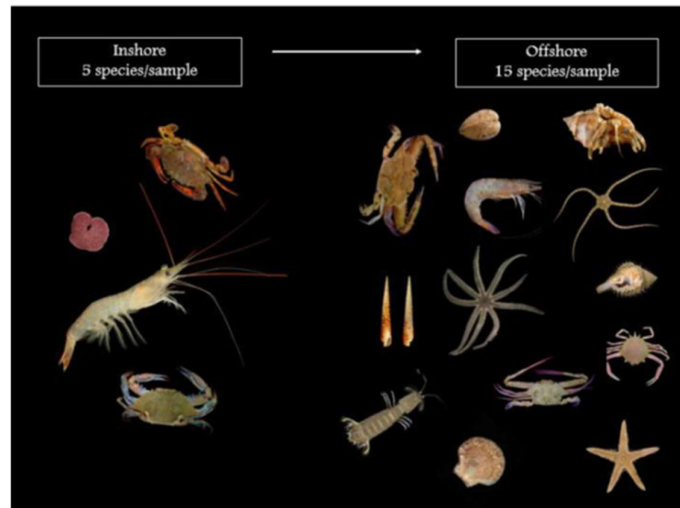
CEFAS also describes the benthos animals present in the different habitats:

*“Results show that sand habitats had on average a higher number of taxa, whilst abundance varied across both sediment types. Many species, such as the sea pansy (*Renilla muelleri*), Southern brown shrimp (*Penaeus subtilis*), and the crabs *Callinectes ornatus* and *Paradasygyus tuberculatus* were common to both sediment types. There were, however, some taxa highlighted by an indicator species analysis for sand and mud. The analysis calculates the indicator value of a species as the product of the relative frequency and relative average abundance in a given group. Mud was characterized by the Whitebelly prawn (*Nematopalaemon schmitti*) and Atlantic seabob (*Xiphopenaeus kroyeri*). Seabob is also present on sand but is found in much higher biomass in mud. The Tweezer crab (*Lupella forceps*), Lined seastar (*Luidia clathrata*), Nine-armed seastar (*Luidia senegalensis*) and Short-spined brittlestar (*Ophioderma brevispina*) are specific to the sand habitat and the Elegant brittlestar (*Ophiolepis elegans*) is present in higher abundance”.*

Willems (2018) concluded that:

“Coastal assemblages of epibenthos and fish occurred at 6, 13 and 20 m depth, in relatively turbid waters over muddy seabed sediments. From 27 m onward, offshore assemblages were discerned, characterized by higher epibenthic species richness, clearer waters and coarser sediments. These results show that the marine environment on the Guyana shelf is very similar to Suriname, and characterized by a major shift around the 30 m isobath between a coastal and offshore ecosystem.”

Figure 3.4.5: Key species found in inshore and offshore species assemblages (Source: Willems 2018 PPT)



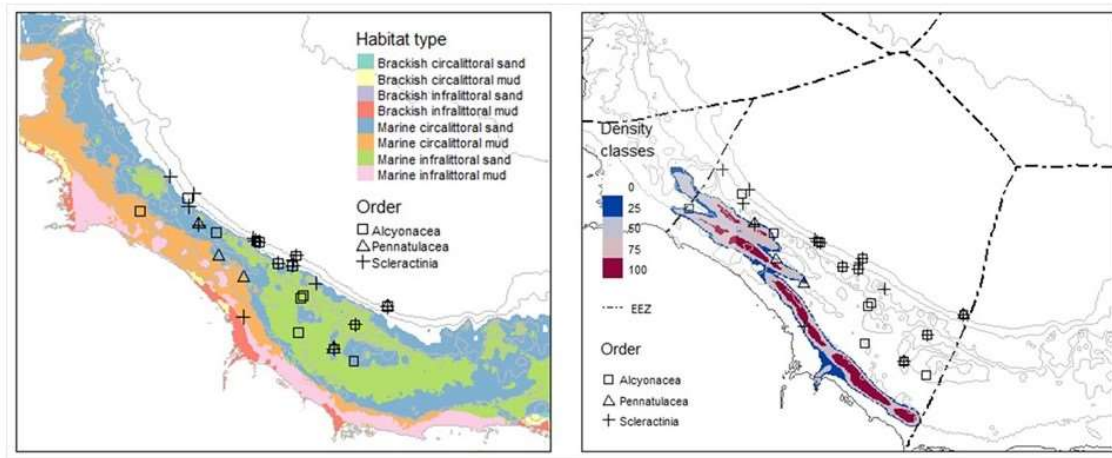
CEFAS (2018) have also collected available information (on the internet) on the possible existence of more sensitive habitats in the fishing area. Data on the occurrence of taxa that are especially sensitive to trawling impact was downloaded from the OBIS online repository²¹. The OBIS data was used to identify any known locations on the Guyanese shelf with sensitive taxa that could indicate the presence of vulnerable habitats. The following taxa were included in the dataset:

- *Alcyonacea* - soft corals
- *Scleractinia* - hard corals
- *Pennatulacea* - sea pens

An overlay map was produced showing the possible locations of more sensitive habitats (figure 3.4.6a). Another overlay map with the footprint of the seabob fishery shows that these locations of possible sensitive habitats are generally further offshore than the seabob fishing area (figure 3.4.6b). There was only one location with a *Scleractinian* observation inside the footprint but it was noted that this observation occurs in habitat unlikely for the reef forming hard corals of the genus *Madracis*, which was recorded, and therefore in CEFAS (2018) it is concluded that this observation is very likely a result of a position error.

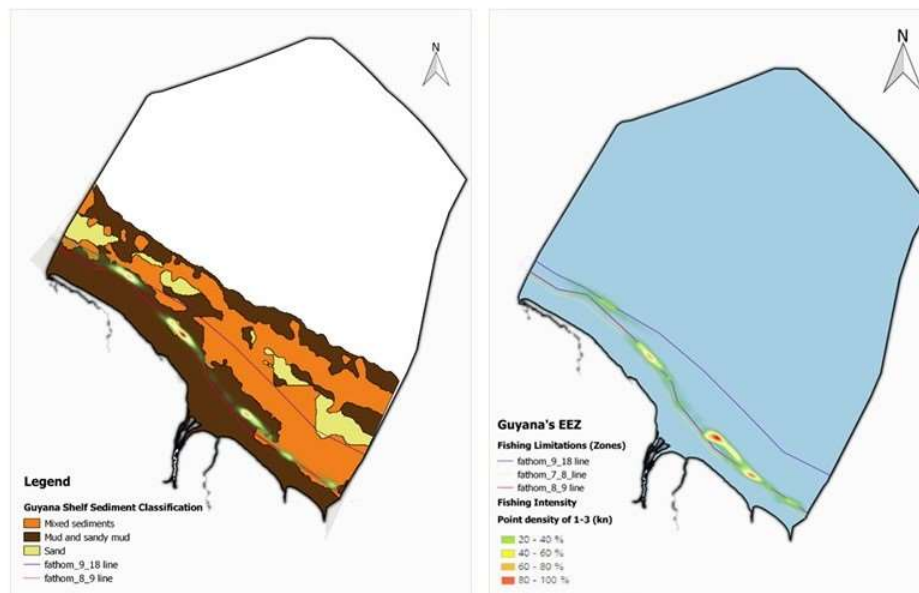
²¹ <http://www.iobis.org/>

Figure 3.4.6: a) Reported locations of observations for the three main sensitive taxonomic groups in OBIS; b) Location of observed sensitive taxa in relation to the fishing footprint. Source; CEFAS, 2018.



During the site visit the assessment team spoke to staff of the Fisheries Department that are responsible for the registration of VMS data. The team asked for the most recent VMS data that were available and received a map showing the fishing intensity in 2017 (figure 3.4.7b) and from April to October 2018 (figure 3.4.7a). Comparison of figure a and figure b shows that the fishery is basically concentrated in the same areas. Figure 3.4.7a shows that the fishery mainly takes place in the area with mud or sandy mud and close to the 8-fathom line.

Figure 3.4.7: a) Fishing footprint (April-October 2018) in relation to sediment types; b) Fishing footprint 2017 and 7, 8 and 18 fathom lines (Source: Fisheries Department).



During the site visit the team also spoke to fishermen who confirmed that there are also some rocky areas on the north-eastern edge of the seabob fishing area. Based on the information collected the team has distinguished 4 habitat types that could have an overlap with the seabob trawling zone:

- Muddy sediments with high clay fraction
- Course sediment with high sand fraction
- Possible spots with sensitive taxa

- Rock banks

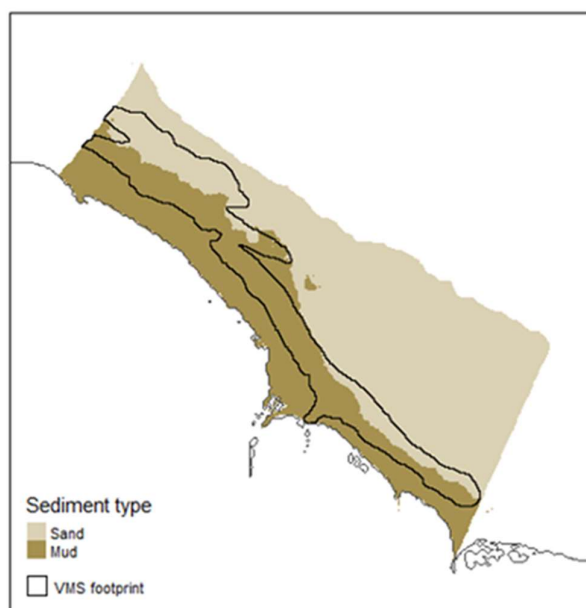
Since information on the distribution and sensitivity of possibly more vulnerable habitats is rather anecdotal the team conducted an RBF on the habitat-outcome performance indicator PI2.4.1. The procedures and outcome of this RBF are presented in Appendix 1.2.

During the RBF workshops (see report section 4.4.3 for a description of this process) habitats that are impacted by the fishery were identified. Based on the spatial maps and information provided by stakeholders during the RBF workshops the team concluded that “Muddy sediments with high clay fraction” and “Course sediment with high sand fraction” should be considered as commonly encountered habitats. Concerning “Possible spots with sensitive taxa” and “Rock banks” there is no information on the vulnerability of these habitat types and the team decided to consider these habitat types as a potential VME. Since there are no other habitat types identified than the ones mentioned it was decided to consider “main” habitats only which on the basis of PF7.1.5.1 means that the final PI score shall be adjusted downward according to clause PF7.6.4. (the final PI score shall not be greater than 95). The overlay of the fisheries footprint with the habitats identified was discussed during the RBF workshop and estimated using the CEFAS map in figure 3.4.8. From this it was initially concluded that the overlay of the fishery with mud habitats was around 50 % and with sandy habitats around 15 %. However, after conducting the CSA the team received more recent and detailed information as presented in figure 3.4.7a. As a result, the team have concluded that the fisheries footprint is smaller than apparent in figure 3.4.8. The team concluded that the overlay of the fishery with mud habitat is therefore below 50 % and more in the order of 15-30 %. In the RBF worksheet (Appendix 1.2) the team has estimated this areal overlap to lie below 30% resulting in a spatial attribute score of 1. The overlay with sand, possible spots with sensitive taxa and rock banks has been scored at less than 15 % which resulted in a spatial attribute score of 0.5. The CSA that has been conducted resulted in a score for PI2.4.1 of 85.

Comparison of this score to the score in the MSC certification of the seabob fishery in neighboring Suriname shows that in Suriname a score of 90 was given. The score was based on the work done by Willems (2016) that showed that the impact on marine habitats is limited, due to the naturally dynamic, muddy seabed in the areas trawled for seabob shrimp and the fact that the trawl that is used is relatively lightweight and the fishery is limited to water depths of between 18-30m, so any impacts are localized in nature.

The research concluded that communities of benthic invertebrates (epifauna) appeared to be dominated by seabob shrimp, with little other species present on seabob trawling grounds (Willems *et al.*, 2015b).

Figure 3.4.8: Fishing footprint in relation to sediment type
(Source: CEFAS 2018)



3.4.5 Ecosystem

The coastline of Guyana is 432km long and the EEZ encompasses 138 240 km². The average width of the continental shelf is 112.6km, being wider in the east and narrower in the northwest, giving a shelf area of 48 665 km². Guyana's marine environment lies within the area bounded by the Orinoco and Amazon rivers, and during the rainy season is greatly influenced by the heavy sediment load and discharge of fresh water from these huge rivers, and its own large rivers of Essequibo, Demerara and Berbice. The fresh water affects the salinity, while the sediments (and nutrients) create a series of shifting sand bars and mud

flats that cover the shelf out to about the 40m isobath. Sand gradually becomes dominant beyond this depth and is replaced by coral at about 100m depth. The mud supports a rich invertebrate fauna that nourishes a variety of demersal species (FAO, 2005).

The marine ecosystem of the Guyana EEZ is part of the North Brazil Shelf Large Marine Ecosystem (Figure 3.4.9) that owes its definition to the influence of North Brazil Current (NBC). The NBC and its extension, the Guianas Current (GC), flow north-westwards, carrying the low-salinity and nutrient and sediment-rich water coming from the Amazon along the shorelines of French Guiana, Suriname, Guyana and Venezuela. During the period of NBC retroflexion, more saline and less turbid surface waters cover most of the continental shelf. These two well differentiated hydroclimatic situations, together with a marked spatial and temporal variability, represent major constraints for the coastal ecosystems and their biota. Moreover, constant upwelling, that is not accompanied by a pronounced lowering of the sea surface temperature but provides additional nutrient enrichment, would be generated by the direction of the prevailing wind and the geostrophic slope of the isopycnals associated with the Guianas Current, which is enhanced by the outflowing Amazon water (Cadée, 1975, Artigas *et al.* 2003).

Near surface waters in this region show enhanced nutrient content (phosphate, silicate and nitrate) and their distribution confirm meanders of the NBC deduced from drifter experiments. Shelf topography and external sources of material, particularly the Amazon River with its average discharge of 180,000 m³s⁻¹, exert a significant influence on the marine ecosystem, with this being complemented by discharge from other rivers such as Tocantins, Maroni, Corentyne, and Essequibo. A wide continental shelf, macrotides and upwellings along the shelf edge are some other features of this LME. (Heileman 2009). The North Brazil Shelf LME is considered a highly productive ecosystem with the Amazon River and its extensive plume being the main source of nutrients. Primary production is limited by low light penetration in turbid waters influenced by the Amazon and other rivers, while it is nutrient-limited in the clearer offshore waters.

Research on the marine ecosystem in Guyana waters is rather limited. Recent work by Willems on benthic species assemblages (Willems 2018) and habitat mapping by CEFAS and early work by Lowe-

Figure 3.4.9: Fronts of the North Brazil Shelf LME. Acronyms: NBCF = North Brazil Current Front; SSL = Shelf Slope Front. Yellow Line = LME boundary. Source: Belkin *et al* 2009.



McConnel are the main sources of information the team has used in describing the habitat impacts of the fishery.

However more research has been done in neighbouring Suriname and in French Guyana. Since the EEZs of these countries are under the same influence of the North Brazil Current and its prolongation the Guyana current (see figure 3.4.9) it can be assumed that the ecosystems in Guyana, Suriname and French Guyana waters are rather similar.

From this work (Cadee, 1975, Artigas *et al.* 2003) it can be concluded that in turbid waters near the coast that are influenced by the Amazon and other rivers primary production is limited by low light penetration. Primary production is nutrient-limited in the clearer offshore waters. Research of Cadee (1975) in Suriname and French Guyana however showed that parallel to the coast outside the turbid coastal waters a zone of relatively high primary production is situated. This zone corresponds with water depths of 20 to 60m. Cadee concluded that the high primary production in this zone will form the base for the important shrimp fishery off the Guianas. Nutrients responsible for this relatively high primary production originate from 3 sources: upwelling, mineralization of terrestrial organic detritus in the coastal zone, and the Amazon river. Jaussaud (2007) studied the phytoplankton dynamics in French Guiana and describes a pronounced coast-wide gradient with three zones: a coastal area influenced by continental inputs, an intermediate zone under the influence of rivers, tides and Amazonian inflows, and finally a wide offshore area under oceanic influence.

In November 2009 a benthic sampling took place of the entire French Guyana continental shelf (Créocéan, 2011; Artigas *et al.* 2003). The study showed the lowest number of benthic species and biomass near the coast, where muddy inputs are stronger, the species richness increases and becomes more stable offshore. The highest values are observed between 80 and 100 m depth (see figure 3.4.11).

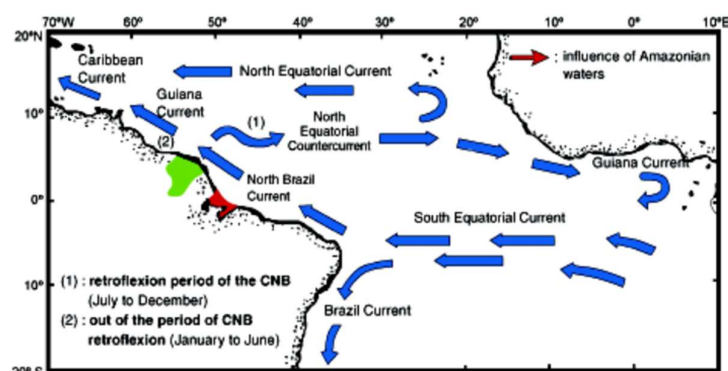
The findings described by Artigas *et al.* (2003) are supported by the work of Willems in both Suriname (Willems *et al.* 2015) and Guyana (Willems 2018a). Willems (2018a) concluded that in Guyana the coastal assemblages of fish and epibenthos, and the abiotic environment where they occur, are very similar to those observed in Suriname and that this this could be expected based on historical surveys (e.g. Lowe-McConnell, 1962).

For Guyana, Willems (2018a) found that coastal assemblages of both demersal fish and epibenthos could be discerned at 6, 13 and 20 m depth. The coastal epibenthos assemblage was very species poor (Table 3.4.4) and dominated by seabob shrimp *X. kroyeri*. The coastal fish assemblage, on the other hand was more diverse. The abiotic environment in the coastal assemblages was characterized by turbid waters and muddy sediments with a high clay fraction and low sand fraction. At 27 and 34m depth, very different species assemblages occurred. These offshore assemblages were more diverse in both fish and epibenthic species, and occurred in waters with lower turbidity, over coarser sediments with a higher sand fraction.

Concerning the impact of seabob trawling Willems (2018a) concludes:

“The shift between coastal and offshore assemblages around the 30m isobath seems to be the most important feature of the benthic ecosystem of the inner Guyana shelf, and corresponds to the

Figure 3.4.10. Surface circulation in the tropical Atlantic Ocean. Source: from Johns *et al.* 1998, in Artigas *et al.* 2003.



community structure observed in Suriname. This shift coincides with a transition between two principal ecosystems: a coastal, river influenced system fuel by detritus, versus an open shelf system based on primary production (Bianchi, 1992). Seabob trawl fisheries, both in Suriname and Guyana mainly operate below the 30m isobath, i.e. in the coastal ecosystem. Research in Suriname concluded that the impact of seabob trawl fisheries on marine habitats is limited, due to the naturally dynamic, muddy seabed in the areas trawled for seabob shrimp (Willems, 2016). The benthic invertebrate community in this ecosystem, both in Guyana and Suriname, is dominated by seabob shrimp, with few other species present on seabob trawling grounds. It seems therefore safe to conclude that in Guyana, like in Suriname, the impact of seabob trawling on marine habitats, defined as the 'chemical and bio-physical environment including biogenic structures, where fishing takes place' is limited."

Figure 3.4.11: Distribution of the most frequently encountered species according to depth zones. Source: Lampert, 2012.

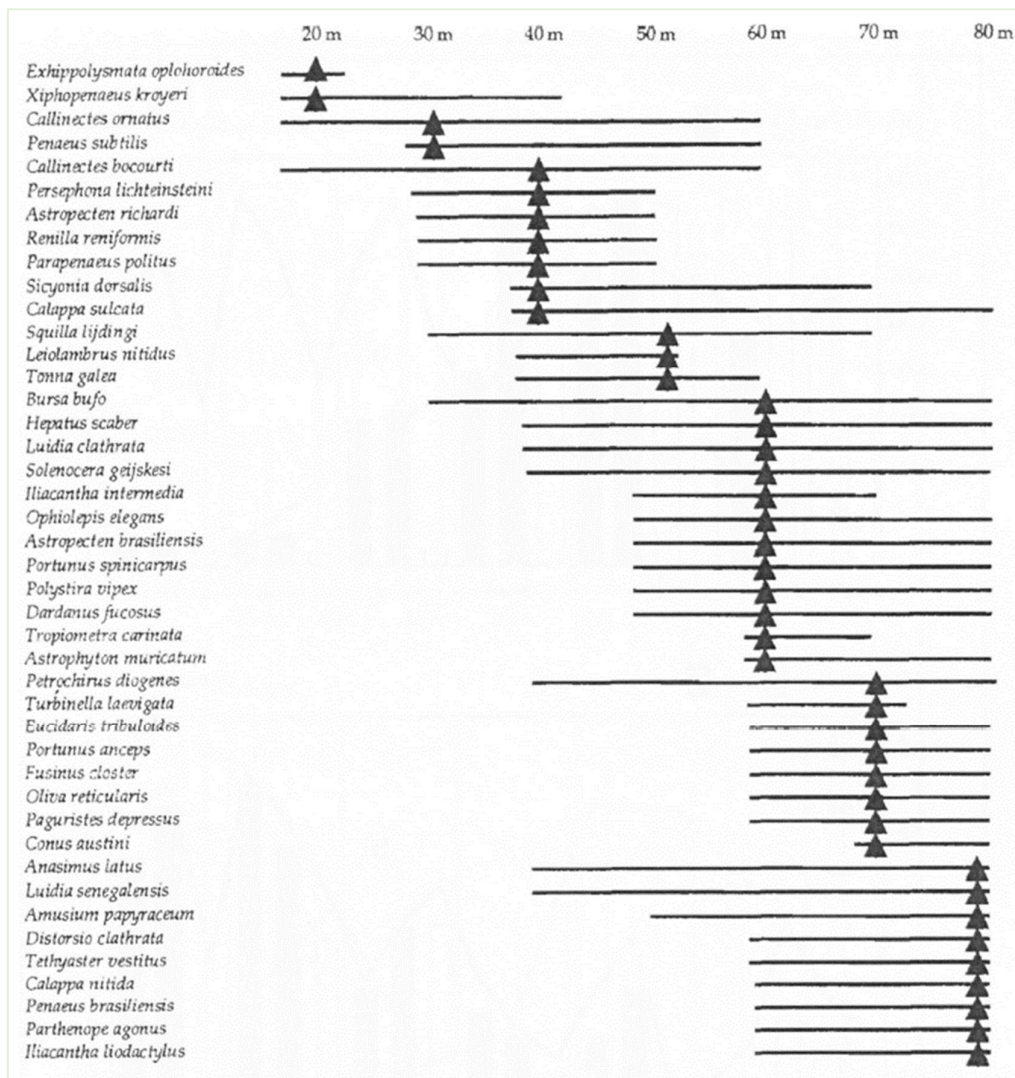


Table 3.4.4. Characterization of the two epibenthic species assemblages as defined by MDS and ANOSIM analyses, based on a one-way SIMPER analysis epibenthos abundance data. Species accounting for 90% cumulative contribution to 'within group' similarity are listed along with their contribution (Contrib%). Further, average (\pm SD) values of environmental variables are given per assemblage. SS = sub-surface, TSM = Total Suspended Matter. Source: Willems, 2018a.

Coastal assemblage		Offshore assemblage	
Species	Contrib %	Species	Contrib%
<i>Xiphopenaeus kroyeri</i>	76.8	<i>Penaeus subtilis</i>	14.5
<i>Callinectes ornatus</i>	8.9	<i>Callinectes ornatus</i>	14.2
<i>Penaeus subtilis</i>	6.2	<i>Ophioderma brevispina</i>	11.9
		<i>Ophiolepis elegans</i>	11.4
		<i>Xiphopenaeus kroyeri</i>	10.7
		<i>Luidia senegalensis</i>	8.8
		<i>Lupella forceps</i>	8.6
		<i>Renilla muelleri</i>	5.5
		<i>Loligo sp</i>	3.6
		<i>Luidia clathrata</i>	3.5

In the context of the North Brazil LME, the Guyana seabob fishery comprises a small, albeit locally significant fishery. In terms of protecting the ecosystem structure and function, the Guyana seabob fishery operates in a narrow, depth-limited band (8-18 fathoms) off the Guyana coast, up to the depth limit of the main seabob population (Willems 2015a); a considerable area of seabob habitat therefore occurs inshore of the fished area bordered by the 8-fathom line.

The role of seabob in the food-web has been studied by Quilez (2014) and Willems (2016) in neighbouring Suriname. These studies showed that seabob is one of the most abundant demersal organisms in the coastal system up to 30 m depth, and that it is an important prey item for many other organisms, including demersal fish species, having been found in 18.3% of examined fish stomachs in neighbouring Suriname (Quilez 2014). Willems *et al* (2015b) concluded that a significant amount of energy in the benthic food web of the inner shelf is channeled at an intermediate level through seabob.

Considering the fact that the benthic ecosystem in the seabob trawling zone is dominated by seabob and a very limited number of other species and the dynamic nature of the seabed with shifting mudbanks it can be concluded that the impact of the fishery on the benthic ecosystem is limited. This conclusion also supported by the fact that the seabob fishery is limited to a rather narrow zone and a large part of the zone where the inshore benthic community occurs lays within the non-trawling zone.

The bycatch of fish has been considered under the secondary species component. It was considered that the bycatch in the seabob fishery largely consists of juveniles of a limited number of species. Nine fish species account for over 70% of the bycatch (see table 3.4.1). As a result of the use of TEDs larger specimens of species like green weakfish (*Cynoscion virescens*) are not caught and the use of a BRD allows a significant part of smaller fish that are caught in the trawl to escape. Since these 'main' bycatch species inhabit the inshore zone that for a large part is closed for trawling as a consequence of the 8-fathom depth limit it must be considered unlikely that the bycatch of fish is an ecosystem impact that this bycatch could disrupt ecosystem structure and function.

This has significance with respect to the main bycatch species, which occur throughout this inshore area – with the use of TEDs and BRDs allowing most of the larger fish, and many of the smaller fish to escape the trawl nets. But this has still greater significance with respect to the several species of rays – which are found throughout this zone feeding on the invertebrate assemblages present, but which are most concentrated in the inner shallower areas of this inshore zone, tapering off through the transition zone between broadly the 20 and 30m contours (6 to 8 fathom lines) (Willems *et al*, 2015; further supported in the results of fishing surveys in Guyana and Suriname in the 1950s (McConnell &

Mitchell 1960) and 1980s (JMFRR 1983). For these species, use of TEDs tends to exclude larger ray specimens from the nets, but most smaller rays entering the nets are retained in the nets. Anecdotal information (including from species identification workshops held along the Guyana coast – Willems 2018b & c) suggests that bycatch of rays in artisanal fishing may be significant – though no clear survey or research evidence that this is so is available. This tapering off of ray concentrations was, however, picked up in the WWF Seabob Trawl Observer programme results (Medley 2017), which has prompted the precautionary movement of the inner line of the seabob trawl zone from the 7 to the 8 fathom contour.

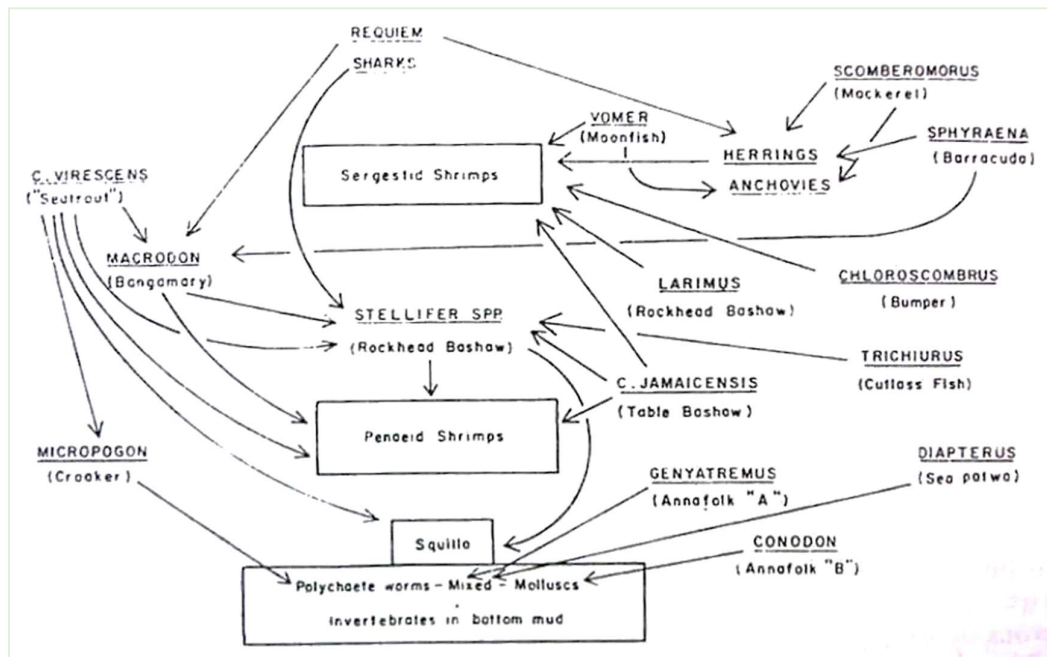
Role of Seabob in the ecosystem

Concerning the possible consequences of the removal of a considerable quantity of seabob from the ecosystem some scientific work has been done in Suriname on the trophic ecology of seabob (Kerkhove, 2014; Willems *et al.* 2016). Willems *et al.* found from the analysis of the stomach content of seabob that the food of seabob mainly consisted of detritus (50%), copepods and unidentified crustaceans (30%), plant material (6%) and sediment (7%). In the same study, Willems *et al.* (2016) concluded that:

“the benthic microalgae (BM) layer on (bare) intertidal mudflats subsidize secondary production in the subtidal water body and that seabob shrimp seem to play a crucial role in this process. Being the single abundant epibenthic species up to 30 m depth, it acts as a vector for energy from intertidal primary production to subtidal secondary production. Furthermore, the species is known to be a prey for commercially important demersal fishes (Camargo and Isaac, 2004). While the general importance of X. kroyeri as a prey for higher trophic levels on the Suriname Shelf is still to be assessed, it can be stated that X. kroyeri passes energy from offshore sedimentary organic matter (SOM), intertidal benthic microalgae (BM) and small hyperbenthic prey up the food chain.”

Based on the work done by Willems *et al.* it can be concluded that a significant amount of energy in the benthic food web of the inner Guyana shelf is channeled at an intermediate level through seabob. It can also be concluded that seabob are almost certainly an important prey species for many post juvenile fish species. The impact on the seabob fishery on the seabob stock should therefore be carefully managed (Willems *et al.* 2016).

Figure 3.4.12: The main food relationships of the commonest species caught in the trawl (Lowe-McConnel 1962)



A range of management measures which serve to protect the seabob resource, while also preventing serious harm to the ecosystem, have been implemented. The most important of these are contained in the seabob fishery management plan, which also contains a reasonably well developed and targeted research plan for seabob fisheries. Restrictions on the number of vessels that may operate within the fishery, and the number of days-at-sea allowed per year, as well as limiting the fishery to water depths of 8 to 18 fathoms, so preventing trawling in a significant area to the coastward side of the fishery (Willems 2015), serve to protect the seabob resource and prevent serious harm to the ecosystem. Additionally, the HCR as implemented by the Seabob Management Plan serves to limit the impact of the fishery on the stock to sustainable levels.

Management of the potential impacts of the fishery on other ecosystem components (bycatch species, ETP species, habitats) has been significantly enhanced in recent times through elements of the seabob fishery management plan as well as the fleet and on-board vessel Code of Practice, as discussed in greater detail elsewhere in this report.

3.5 Principle Three: Management System Background

3.5.1 Jurisdictional Category and Recognised Groups

The Guyana seabob fishery takes place within a single national jurisdiction. Although the *species* range extends beyond Guyana, the stock has been defined for management purposes as a Guyanese stock. This point is considered further under Principle 1 of this assessment. There is therefore no requirement for shared jurisdiction management. Although there is cooperation at a regional scale, in particular in relation to science there is no direct shared management at the regional level. It is therefore appropriate for the Principle 3 assessment to focus on Guyanese national fisheries the fisheries specific management applied to the Guyanese seabob fleet through structures such as the Seabob Fishery Management Plan, the Seabob Working Group and the fleet operational practices detailed in the Guyana Seabob Code of Practice. Further detail of each of these structures is provided below.

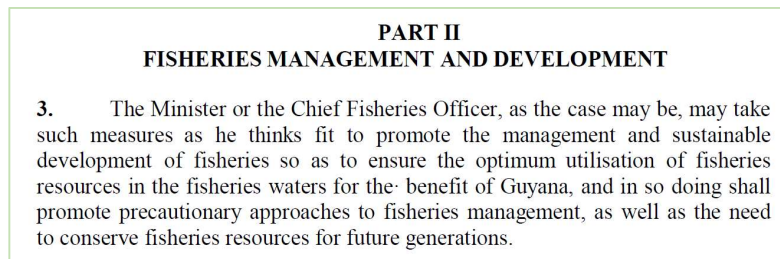
The UoA includes all Guyanese commercial trawl vessels which target the stock within the national jurisdiction. There are no other eligible fishers. An inshore artisanal fishery also has a small catch of seabob taken by canoes using dip-nets (Chinese seine / fyke net). Although this fishery is not part of the UoA (and their catch may not enter the MSC Chain of Custody), it is a recognized group with interest in the UoA. No other fleets have catches of Guyanese Seabob, however, the offshore trawl fishery (including for penaeid shrimp) is also a consultee in the Seabob fishery through the oversight provided by the National Fisheries Advisory Committee.

3.5.2 Legal Frameworks

The Fisheries Act 2002

Marine Fisheries in Guyana are managed by the Fisheries Department. This is a department of the Ministry of Agriculture and falls under the political leadership of the Minister of Agriculture. The Fisheries Act 2002 sets out the powers of the Minister and the Chief Fisheries Officer with respect to fisheries. Article 3 clearly spells out the scope of the Fisheries Act and makes explicit reference to the precautionary approach.

Fig 3.5.1: An extract from the Fisheries Act 2002 detailing the scope.



The Fisheries Act empowers the Minister to make appropriate regulations including technical measures and schemes for limiting entry into fisheries. It also establishes the Fisheries Advisory Committee and outlines its roles. The Act also details licensing procedures and enforcement powers.

The Fisheries Regulations

The current Fisheries Regulations came into force in May 2018 and add a number of clauses of direct relevance to the Seabob fishery. The new regulations establish the Fisheries Monitoring Centre and fisheries observers and sets out the requirements for Vessel Monitoring Systems, and technical measures such as TEDs. The fisheries regulations also explicitly detail the range of sanctions for a range of fisheries infringements including removal or tampering with TEDs or BRDs, non-functioning VMS or encroachment into closed areas.

Marine Fisheries Management Plan (2013-2018)

The Fisheries Act 2002 also provides the explicit legal foundation for fisheries-specific Fisheries Management Plans. The Act requires that the Chief Fisheries Officer:

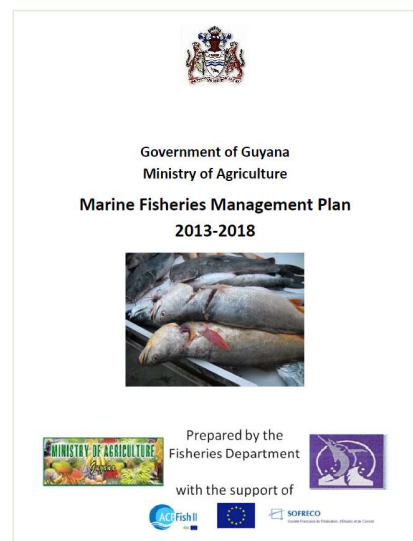
“shall progressively prepare and keep under review plans for the management and development of significant exploitable fisheries”.

In doing so, the Act also requires that objectives are set within the management plans and that consultation is undertaken with:

“local fishermen, local authorities and other persons affected by the fisheries plan”.

The current national fisheries management plan covers the period 2013-2018 and is therefore due for renewal. This clearly states the objectives which will guide the management of fisheries resources in Guyana. It also highlights issues of concern to address within the period of the plan. These are informed by stakeholder consultation. Finally, the management plan outlines more detailed management requirements and a number of key actions for a number of key fisheries, including the Seabob fishery.

Figure 3.5.2: Cover of the Guyana Marine Fisheries Management Plan



Guyana Seabob Fishery Management Plan

Perhaps the most significant framework governing the management of Seabob fisheries in Guyana is the “Seabob Fishery Management Plan (2015-2020)” (Fisheries Department 2015). The Seabob Management Plan was initially adopted and operated under a Memorandum of Understanding (MoU) between the fishing industry and the Ministry and formed the basis for decision-making. It was formally approved by the Minister of Agriculture in February 2019. This is the most recent fisheries-specific management document relating to the Seabob fishery and therefore updates and replaces the fisheries-specific seabob management contained within the national Marine Fisheries Management Plan. This latest Seabob Fishery Management Plan reflects the changes to the fishery that have taken place since the national Marine Fisheries Management Plan was written (in 2013). This includes the changes since the time of the 2009 MSC pre-assessment that are referred to in section 6.6 of this report. A number of these new management measures are reflected in the MSC scoring of this fishery, such as the HCR, the Seabob Trawl Zone, BRD requirements etc.

The Seabob Fisheries Management Plan also establishes the Seabob Working Group, detailing the composition of this group and outlining the role that the group will play in the management and development of the fishery. This makes clear that though the Seabob Working Group will be the main body for reviewing the performance of the fishery and developing management proposals, the underlying responsibility for management decision-making remains with the Chief Fisheries Officer and, above all, the Minister, as set out in the Fisheries Act (2002).

Guyana Seabob Code of Practice

Finally, the Guyana Seabob Code of Practice, which has been produced by the Seabob Working Group and which all skippers have received training on, includes some additional information governing the operations of the fishery. Although this is non-statutory, there is an expectation that vessels landing to GATOSP processors should be in compliance with both the letter and the spirit of the code of conduct. This includes:

- information on which species and habitats are regarded as vulnerable / ETP;
- avoidance strategies, such as move-on rules;
- record keeping, including ETP logs;
- Catch handling practices, including handling of any ETP catches;
- Other issues such as health and safety and food hygiene.

Control & Enforcement

There is a rigorous control and enforcement system in place. Enforcement officers will inspect the fishing gear on the quayside before every trip and again on landing. There are enforcement officers specifically trained to inspect the TEDs. The Coastguard may make at-sea boardings, but fishers report that such boardings are not regular. In addition, there is aerial reconnaissance of fishing activity and quayside monitoring of catches and fishing gear. Infringements related to prohibited fishing areas (e.g. within the 8 fathoms line) are identified through rigorous interrogation of VMS records.

As processing companies may be suspended if their vessels receive too many infractions, the companies themselves form the first layer of enforcement and may fine skippers for infractions or reward them for good practice. The processing companies have required that all vessels that land at their company must have on-board cameras which vessel owners use to monitor fishing practices and take action against skippers and vessels which commit infringements. TV records are checked to identify tow times, bycatch, performance of the BRDs and TEDs and any theft of catch by crew. Vessel owners and Ministry staff can use the TV images to count baskets of shrimp caught and cross-reference against logbooks and other records to ensure that all catches are being declared. Further details are provided in the evaluation table for Performance Indicator 3.2.3.

4 Evaluation Procedure

4.1 Harmonised Fishery Assessment

The MSC requires that the scoring outcomes of overlapping fisheries are harmonised. There is no other MSC certified (or assessed) fishery in the Guyana EEZ and the fleet of the UoA do not participate in any other MSC fishery. Although there is a fishery for Seabob, which has been MSC certified since November 2011 in neighbouring Suriname²², this is exploited by a different fleet, in a different jurisdiction, under different management conditions, targeting a Seabob stock which has been defined as the Suriname stock. The Guyana Seabob fishery therefore does not overlap with the Suriname Seabob fishery, therefore formal MSC harmonisation is not required.

That said, given the obvious similarities between the 2 fisheries, the MSC assessment team for the Guyana seabob assessment has given due regard to the findings and conclusions of the earlier Suriname assessments to ensure that findings are not contradictory. The assessment also recognises the importance of regional cooperation in relation to fisheries management and science. This is discussed further in PI 3.1.1.

In consideration of cumulative impacts of MSC certified fisheries, if the species range (of a primary or secondary species) extends beyond Guyana and into other countries in the North Brazil shelf Large Marine Ecosystem (i.e. where stock boundaries have not been defined), then cumulative impacts consideration may be required. Although this requirement was therefore a possible consideration during the scoring of this fishery, following the analysis of the catch profile it was concluded that this was not required in this case. Full justification for this decision is provided in the evaluation table for Secondary Species Outcome (PI2.2.1).

4.2 Previous assessments

There have been no previous assessments of the Guyana Seabob fishery.

4.3 Assessment Methodologies

The methodology and standard of the MSC Fisheries Certification Requirements (& Guidance) v2.0 was followed during this assessment. The setup of the report follows the “*MSC Full Assessment Reporting Template v2.0*”.

No comments or objections were received in response to the proposed use of the Default Assessment Tree and the Risk Based Framework.

4.4 Evaluation Processes and Techniques

4.4.1 Site Visits

Site visits and stakeholder meetings were conducted as announced in Georgetown, Guyana, during the period 29 October 2018 to 2 November 2018. At this time, vessels visits took place at Pritipaul Singh Investment processing facility and Noble House Seafoods. Meetings with client representatives and vessel skippers also took place at both facilities. The remainder of meetings were held at the Fisheries Department, within the Ministry of Agriculture. A small number of stakeholder calls were also conducted with the stakeholders remotely via an on-line conference call facility.

²² <https://fisheries.msc.org/en/fisheries/suriname-atlantic-seabob-shrimp/@@view>

4.4.2 Consultations

Stakeholders were invited to submit comments and to consult the assessment team from the onset of the assessment process. Public notification of the assessment, its scope, methodology and assessment team, was published in the Guyana Chronicle. This was chosen as being the most widely read local publication. An invitation to comment and consult the team, was also circulated by e-mail to a list of known stakeholders. Meetings were arranged with representatives of the client and key stakeholders, as summarized in tables below.

Table 4.1: Itinerary of site visit and stakeholder consultation in the Guyana Seabob fishery assessment.

Date	Name of organisation	Subjects of Consultation
29/10/18	Guyana Association of Trawler Owners and Seafood Processors (GATOSP).	The client fishery, background, current status, governance and decision-making processes. Management of other species. CCTV camera inspections facility.
	Vessel skippers of: Pritipaul Singh Investments	Vessel characteristics, operations, reporting requirements, enforcement, awareness of regulations and Codes of Conduct, interactions with other species, ETP and habitats.
	Vessel skippers of: Noble House Seafoods	As above.
	Fishery Department TED inspectors (at quayside)	Frequency of inspections, scope of inspections, findings, compliance.
	Representatives of GATOSP, vessel skippers and TED inspectors	RBF scoring exercise for Secondary species and habitats.
30/10/18	Department of Fisheries – VMS unit	VMS capacity, technical details, compliance.
	Ministry of Agriculture – Department of Fisheries; Guyana Coastguard; Marine Police; Fisheries Advisory Committee; Seabob Working Group	Legal foundations, control and enforcement, compliance, decision-making processes
	(remote) Caribbean Regional Fisheries Mechanism (CRFM)	Role of CRFM in previous Seabob stock assessments, future role of CRFM, local stock considerations.
	Guyana Wildlife Conservation & Management Commission	Role of the Commission in marine matters. Ecosystem impacts of the fishery.
31/10/18	WWF Guyanas	Involvement with the fishery and with the Seabob Working Group. Details of WWF observer programme. ETP interactions, TED compliance, habitat impacts RBF scoring exercise for Secondary species and habitats.
	(remote) Department of Fisheries – former VMS operative (on study leave)	Spatial data mapping.
1/11/18	(remote) Dr. Paul Medley, fisheries analyst and stock assessor	Background to stock assessment, progress with updated stock assessment, data quality issues, management of primary and secondary species, catch profile, PSA.
2/11/18	Fishery Department – Fishery Officers	RBF scoring exercise for Secondary species and habitats.

Table 4.2: Participants in assessment team meetings with the Client and stakeholders on the Guyana Seabob fishery.

Last name	First name	Name of Organisation	Position
Charles	Reuben	GATOSP	President
Maison	Dawn	GATOSP	Project Coordinator
Ramalho	Leslie	Noble House Seafoods	General Manager
Jodah	Dianne	Noble House Seafoods	Sales Manager
Jodah	Richard	Noble House Seafoods	Fleet Manager
Sampson	Marlon	Noble House Seafoods	Vessel Captain
Singh (Jnr)	Pritipaul	Pritipaul Singh Investments Inc	Managing Director
Gibbs	Brentnol	Pritipaul Singh Investments Inc	Health & Safety Officer
Persaud	Daleep	Pritipaul Singh Investments Inc	Vessel Captain
Persaud	Nerinanie	Pritipaul Singh Investments Inc	Vessel Captain
Sanichar	R	Pritipaul Singh Investments Inc	Vessel Captain
Gopie	Raoul	Gopie Investment Inc.	Managing Director
Bumbury	Randy	Seabob Working Group / Fisheries Department	Chair
Roberts	Denzil	Ministry of Agriculture - Fisheries Department	Chief Fisheries Officer
Peters	Ingrid	Ministry of Agriculture - Fisheries Department	Principal Fisheries Officer
Amsterdam	Mikhail	Ministry of Agriculture - Fisheries Department	Ex. VMS Officer
Bacchus	Olanna	Ministry of Agriculture - Fisheries Department	Fisheries Officer
Baird	Gary	Ministry of Agriculture - Fisheries Department	Head Legal & Inspection
Bollers	Akeem	Ministry of Agriculture - Fisheries Department	Fisheries Field Assistant
Browne	Terrence	Ministry of Agriculture - Fisheries Department	Fisheries Officer
Chow	Nicholas	Ministry of Agriculture - Fisheries Department	TED Inspector
D'Anjou	Corwin	Ministry of Agriculture - Fisheries Department	Fisheries Officer
Haynes	Vince	Ministry of Agriculture - Fisheries Department	TED Inspector
Jacobs	Kadeem	Ministry of Agriculture - Fisheries Department	Fisheries Officer
Marks	Andrew	Ministry of Agriculture - Fisheries Department	Fisheries Field Assistant
Spellen / (Husbands)	Desha	Ministry of Agriculture - Fisheries Department	Fisheries Officer
Tull	Saskia	Ministry of Agriculture - Fisheries Department	Fisheries Officer
Porter	Orin	Guyana Coast Guard	Commanding Officer
Watts	Errol	Guyana Police - Marine Wing	Senior Superintendent
Waldron	Johann	Guyana Wildlife Conservation & Management Commission	Research Officer
Edghill	Sopheia	World Wildlife Fund Guyanas	Marine Conservation Officer
Williams	Aiesha	World Wildlife Fund Guyanas	Country Manager
Singh-Renton	Susan	Caribbean Regional Fisheries Mechanism	Deputy Executive Director
Medley	Paul	Independent	Stock Assessment Scientist

4.4.3 Evaluation Techniques

The primary evaluation technique has been to seek documentary or published evidence in support of scores. Where quantitative evidence is available, assessors can draw more definitive conclusions and point to a clearer audit trail. In order to obtain the full range of relevant documentary or published evidence VTun requested that the client fishery submit a full list of relevant articles, papers, reviews and data across all areas of MSC scoring.

In addition, stakeholder consultations during the site visit play a vital role. These enable the assessment team to:

- Outline the MSC assessment process;
- Obtain any further reports or quantitative evidence which may not have been included with the client fishery's initial submission of evidence;
- Obtain full understanding of the operational characteristics of the fishery;
- Seek to get a full perspective on more qualitative aspects and local expert opinion.

Although no formal minute is kept of this meeting, a record of the areas discussed is kept. This is held by the CAB and forms part of the auditable evidence of the site visit. Table 4.1 above indicates the broad scope of the discussions held as part of this site visit.

Assessors will ask a broad range of questions. Sometimes these will be very focussed (perhaps to inform a particular PI or even SI, however, assessors will also allow opportunity for wider discussion so that more general or over-arching views will be obtained. Where opinions are expressed, the assessors will also explore whether there is additional evidence to support the claims made. In addition, specific examples will be sought to illustrate the point being made by a stakeholder. Throughout the site visit assessors review the evidence base against the scoring requirements. In this way, any outstanding gaps in evidence can be prioritised in subsequent meetings.

The outcomes of stakeholder engagement and their supporting rationale are referenced in the Evaluation Results section (Appendix 1.1).

The scoring Process

The scoring process is undertaken as a group consensus exercise with each member of the assessment team contributing. Although scoring of a particular principle is led by the team member responsible for that principle, there is considerable discussion and internal review of scores.

In order to make the assessment process as clear and transparent as possible, scoring of the fishery is divided across the 3 MSC principles. Within each principle the performance of the fishery is assessed across a number of Performance Indicators (PIs). A PI may be further divided into a number of Scoring Issues (SIs), which must each be scored to determine the PI score. For each SI Scoring Guideposts (SGs) are presented in the scoring table and describe the level of performance necessary to achieve 100 (represents the state of the art), 80 (best practice, or the unconditional MSC pass mark), and 60 (the minimum, conditional pass mark). Finally, where there are multiple elements – for example multiple different species in the catch composition, or different habitat types, these are scored in turn and their scores are then combined to obtain an overall score. In table 4.3, below, the scoring elements that have been considered in Principle 2 are set out. This also indicates which were data deficient and therefore requiring the use of the Risk Based Framework.

Table 4.3: The scoring elements in the Guyana Seabob fishery

Component	Scoring elements	Main/Not main	Data-deficient or not
Secondary species	Bangamary, <i>Macrodon ancylodon</i>	Main	Yes
Secondary species	Green weakfish, <i>Cynoscion virescens</i>	Main	Yes
Secondary species	Banded croaker, <i>Paralichthys brasiliensis</i>	Main	Yes
Secondary species	Smalleye croaker, <i>Nebris microps</i>	Main	Yes
Secondary species	Smalleye stardrum, <i>Stellifer microps</i>	Main	Yes
Secondary species	Rake stardrum, <i>Stellifer rastifer</i>	Main	Yes
Secondary species	Longnose stingray, <i>Dasyatis guttata</i>	Main	Yes
ETP species	Sei whale, <i>Balaenoptera borealis</i>	NA	No
ETP species	Blue whale, <i>Balaenoptera musculus</i>	NA	No
ETP species	Humpback whale, <i>Megaptera novaeangliae</i>	NA	No
ETP species	Sperm whale, <i>Physeter microcephalus</i>	NA	No
ETP species	Tucuxi, <i>Sotalia fluviatilis</i>	NA	No
ETP species	Guiana dolphin, <i>Sotalia guianensis</i>	NA	No
ETP species	West Atlantic Manatee, <i>Trichechus manatus</i>	NA	No
ETP species	Large-tooth sawfish, <i>Pristis</i>	NA	No
ETP species	Small-tooth sawfish, <i>Pristis pectinata</i>	NA	No
ETP species	Leatherback turtle, <i>Dermochelys coriacea</i>	NA	No
ETP species	Hawksbill turtle, <i>Eretmochelys imbricata</i>	NA	No
ETP species	Green turtle, <i>Chelonia mydas</i>	NA	No
ETP species	Olive ridley turtle, <i>Lepidochelys olivacea</i>	NA	No
Habitat	Muddy sediments	NA	Yes
Habitat	Coarse sediments	NA	Yes
Habitat	Sensitive taxa spots	NA	Yes
Habitat	Stony areas	NA	Yes

There are two, coupled, scoring requirements that constitute the Marine Stewardship Council's minimum threshold for a sustainable fishery:

- The fishery must obtain a score of 80 or more for each of the MSC's three Principles, based on the weighted average score for all Criteria and Sub-criteria under each Principle.
- The fishery must obtain a score of 60 or more for each Performance Indicator.

A score below 80 at the Principle level or 60 for any individual Performance Indicator would represent a level of performance that causes the fishery to automatically fail the assessment, whereas a score of 80 or above for all three Principles results in a pass.

The decision rule for reaching the final recommendation (e.g. aggregate category-level scores) must all exceed 80.

Risk-Based Framework (RBF)

At the time of the announcement of the assessment of this fishery, a notification was issued to stakeholders of the intention to apply the Risk Based Framework (RBF) to the evaluation of Performance Indicators PIs 2.1.1 (primary species outcome), 2.2.1 (secondary species outcome) and 2.4.1 (habitats outcome). However, at the site visit it was confirmed that although the species within the catch composition would all meet the criteria requiring the use of the RBF²³, none of these species met the definition of Primary species²⁴. As a result, RBF was conducted on secondary species outcome (2.2.1) and habitats outcome (2.4.1) only.

Because the RBF was used to inform scoring of some data deficient components some meetings set aside time to work through the RBF scoring exercise with a wide range of stakeholders. All stakeholders identified before the site visit were notified of the intention to use the RBF. In addition, the public announcements also specified that the RBF was to be used. Prior to arranged meetings with stakeholders, further detail was provided about the way the RBF process works, as well as providing the information available to support scoring. This included details about the catch composition (to inform the scoring of secondary species) and details about the habitat types (to inform the scoring of habitat impacts).

In total 21 stakeholders participated in the stakeholder RBF scoring exercise. Given the logistical complexity of getting all stakeholders together at one time and in one place for the RBF exercise, it was decided to conduct 3 separate RBF scoring exercises. This is also preferable in that it possibly allows for stakeholders to be more candid. The first scoring meeting took place at Noble House Seafood and included vessel captains, processing managers, members of the seabob working group, representatives of GATOSP and government TED inspectors. The second scoring meeting was with representatives of WWF Guianas and the 3rd scoring meeting was with members of the Fisheries Department. Although not every stakeholder participated in the RBF process, those that were unable to attend were given a brief explanation of the process and had to opportunity to highlight any risk factors.

The RBF scoring exercise covered firstly the Productivity Susceptibility Analysis (PSA) to score Secondary Species (2.2.1) and secondly the Consequence Spatial Analysis (CSA) to score habitat status (2.4.1). The initial task of the stakeholder exercise is to verify the available evidence. In the case of PSA

Figure 4.1: Members of the assessment team conduct the RBF exercise with a) members of the industry and b) Fishery Officers (images by T. Southall).



²³ According to criteria set out in FCR 7.7.6 and FCR Table 3

²⁴ According to criteria set out in FCR SA3.1.2

this required a verification of the catch composition and productivity attributes. In the case of CSA this required a verification of the habitat types. The subsequent focus of both RBF scoring exercises was on those scores within the RBF which were most data-deficient or where scores were most reliant on local expert knowledge. In the case of PSA, the focus is on the susceptibility attributes. In the case of CSA, the focus falls mainly on issues of spatial overlap and habitat range.

There was generally a good level of agreement on the RBF scoring and where a range in the scoring initially occurred, it was possible to reach consensus over scoring following further discussion. A summary of the information obtained from the stakeholder meetings including the range of opinions is detailed in Appendix 1.2. For the outcome of the RBF exercise, the final scores are presented in the evaluation tables for 2.2.1 and 2.4.1 in Appendix 1.1.

5 Traceability

5.1 Eligibility Date

The eligibility date (ED) for this fishery will be the date of publication of the first Public Comment Draft Report. The reason for selecting this date is that it is in accordance with the wishes of the fishery client and is in line with the MSC certification requirements (see FCRv2.0 7.6.1.2). The eligibility date and its implications for chain of custody were discussed with the client prior to the launching of the assessment and were further underlined in subsequent memos referring to the MSC chain of custody standard. The traceability and segregation systems described below are in place.

5.2 Traceability within the Fishery

Traceability up to the point of first landing has been scrutinised as part of this assessment and the positive results reflect that the systems in place are deemed adequate to ensure seabob is caught in a legal manner and is accurately recorded. Details of the control and enforcement system, which helps to ensure this are described in report section 3.5.2 and the evaluation table for performance indicator 3.2.3, but briefly traceability can be verified by:

- no transshipment;
- no on-board processing;
- a geographically restricted fishery enabling concentrated inspection effort;
- landing to designated processing facilities only (companies of the client group);
- single species processing facilities with no mixing of species at auction;
- accurate landings data (logbook records of catch are checked routinely against landed quantities);
- verified landings data (including data on other retained species) are collected and compiled;
- an effective system of at-sea monitoring, control and surveillance, including boarding and inspection and VMS (this is described more fully along with critical analysis in PI 3.2.3).

The above is considered sufficient to ensure shrimp invoiced as such by the fishery originate from within the evaluated fishery and no specific risk factors have been identified.

There are 2 possible sources of seabob from adjacent fisheries. We examined the risks to traceability posed by this in the table below. The 2 adjacent fisheries are:

1. The Guyana Artisanal seabob fishery, which takes place within the inshore zone.
2. The Suriname Seabob fishery, which takes place (on a separately managed stock) in neighbouring Suriname.

Although there are also artisanal catches of seabob in both Suriname and Venezuela, the risk of seabob from these sources entering the Guyana Seabob chain of custody is so negligible (because of the small quantities and large distances) that it warrants no further mention.

Table 5: Traceability Factors within the Fishery:

Traceability Factor	Description of risk factor if present. Where applicable, a description of relevant mitigation measures or traceability systems (this can include the role of existing regulatory or fishery management controls)
Potential for non-certified gear/s to be used within the fishery	The gear specification includes minimum mesh size, BRD and TED. These are regularly inspected. The level of inspection gives confidence that no gear modifications or alternative gears will be used. No other fishing gear is carried aboard the vessel, so there is no possibility of changing gear within a trip. These vessels are not rigged or licensed to undertake any other sort of fishing.
Potential for vessels from the UoC to fish outside the UoC or in different geographical areas (on the same trips or different trips)	The vessels from the UoC could, in theory, catch seabob in (i) the inshore zone, (ii) further off-shore (beyond the seabob zone) and (iii) within the jurisdictions of neighboring countries. The full adoption of tamper-proof VMS and the supporting inspection capacity at sea gives confidence that there is minimal likelihood of this occurring and high likelihood of detection and sanction if this did occur.
Potential for vessels outside of the UoC or client group fishing the same stock	All licensed seabob trawlers operating in Guyana are part of the client group and included in the UoA & UoC. The only vessels catching the same stock, outside the UoC are Guyanese artisanal vessels which fish the same stock in inshore waters. These catches have been considered as part of the stock assessment (and the P1 assessment). Because of both small catch volumes and differing routes to market, there is negligible potential for artisanal caught Guyana seabob entering the MCS Chain of Custody. Catch records show that off-shore trawlers (and penaeid trawlers) in Guyana do not catch seabob.
Risks of mixing between certified and non-certified catch during storage, transport, or handling activities (including transport at sea and on land, points of landing, and sales at auction)	All seabob which is commercially processed in Guyana comes from the UoC. There are no commercial volumes of seabob either transported, stored or handled within Guyana that does not originate from the UoC. Furthermore, no other tropical shrimp landed in the region resembles seabob. As a result, the risk of mixing between certified and non-certified catches (at least at the beginning of the Chain of Custody) is negligible.
Risks of mixing certified and non-certified catch during processing activities (at-sea and/or before subsequent Chain of Custody)	The statement above also applies.
Risks of mixing certified and non-certified catch during transshipment	No transshipment is permitted in the Guyana Seabob fishery.
Any other risks of substitution between fish from the UoC (certified catch) and fish from outside this unit (non-certified catch) before subsequent Chain of Custody is required	The only risk is that Seabob from neighboring Suriname is mixed with Guyanese seabob within the Chain of Custody. However, catch reporting systems (and the EU IUU certificate) means that this is both highly unlikely and highly likely to be detected. Furthermore, given that both fisheries are MSC certified, then there is no reason for this to occur. If one or other fishery were to lose certification, then the risk of substitution in theory increases, however the systems should mean that the likelihood remains small.

5.3 Eligibility to Enter Further Chains of Custody

The following catch will be eligible to enter further certified chains of custody and is eligible to be sold as MSC certified product and carry the MSC ecolabel:

- Guyana Seabob,
- landed by Guyanese registered seabob trawl vessels,
- which are signatories to the Guyana Seabob Code of Conduct and are in full compliance with the Guyana Seabob Management Plan,
- landed to and processed by any of the GATOSP member seabob processing, on the Demerara River.

Chain of custody should begin at the point of landing. Therefore, Chain of Custody certification is required for all GATOSP processing plants. The reason that start of the change of custody is defined as the point of landing, rather than the point of first sale is because some of the eligible vessels are wholly owned by the processing companies, so, in that instance, there is no change of ownership at the point of landing.

6 Evaluation Results

6.1 Principle Level Scores

Table 6.1: Final Principle Scores

Principle	Score
Principle 1 – Target Species	83.3
Principle 2 – Ecosystem	81.7
Principle 3 – Management System	83.3

6.2 Summary of PI Level Scores

Table 6.2: Final Performance Indicator Scores²⁵

Principle	Component	Performance Indicator (PI)		Score
One	Outcome	1.1.1	Stock status	90
		1.1.2	Stock rebuilding	
	Management	1.2.1	Harvest strategy	85
		1.2.2	Harvest control rules & tools	80
		1.2.3	Information & monitoring	80
		1.2.4	Assessment of stock status	75
Two	Primary species	2.1.1	Outcome	100
		2.1.2	Management strategy	80
		2.1.3	Information/Monitoring	100
	Secondary species	2.2.1	Outcome	75
		2.2.2	Management strategy	80
		2.2.3	Information/Monitoring	80
	ETP species	2.3.1	Outcome	85
		2.3.2	Management strategy	75
		2.3.3	Information strategy	60
	Habitats	2.4.1	Outcome	85
		2.4.2	Management strategy	80
		2.4.3	Information	80
	Ecosystem	2.5.1	Outcome	80
		2.5.2	Management	85
		2.5.3	Information	80
Three	Governance and policy	3.1.1	Legal &/or customary framework	80
		3.1.2	Consultation, roles & responsibilities	80
		3.1.3	Long term objectives	100
	Fishery specific management system	3.2.1	Fishery specific objectives	90
		3.2.2	Decision making processes	85
		3.2.3	Compliance & enforcement	75
		3.2.4	Monitoring & management performance evaluation	70

²⁵ Scores below 80 at the PI level, which result in conditions, are shown in bold red text.

6.3 Summary of Conditions

Table 6.3: Summary of Conditions

No.	Condition	Performance Indicator	Scoring Issue
1	It should be shown that the assessment of seabob stock status is subject to peer review.	1.2.4	e
2	It should be shown that main secondary species are highly likely to be above biologically based limits, or, if below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding.	2.2.1	a
3	Provide evidence that there is a strategy in place that can identify unacceptable impacts on ETP species.	2.3.2	a
4	Accurate quantitative information that is adequate to measure trends and support a strategy to manage impacts on ETP species should be collected.	2.3.3	b
5	Evidence should be provided to demonstrate fishers comply with the management system under assessment.	3.2.3	c
6	The fishery-specific management system should be subject to regular internal and occasional external review	3.2.4	b

6.4 Recommendations

Table 6.4: Summary of Recommendations

No.	Recommendation	Performance Indicator	Scoring Issue
1	To ensure that any changes in fishing capacity are taken into account when estimating fishing effort and CPUE	1.2.2	b
2	To more clearly define roles and responsibility for all areas.	3.1.2	a
3	To further improve the transparency (and therefore accountability) of the management system by improved information dissemination.	3.2.3	d
4	To participate in all opportunities to evaluate key parts of the fishery management system	3.2.4	a

6.5 Determination, Formal Conclusion and Agreement

On completion of the assessment and scoring process, the assessment team concluded that the Guyana Seabob Fishery meets the requisite MSC pass mark, across all 3 Principles. The assessment team recommends that the fishery shall therefore be certified against the MSC fishery standard.

(REQUIRED FOR PCR)

1. The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

6.6 Changes in the fishery prior to and since Pre-Assessment

It is evident that there have been considerable changes in the Guyana Seabob Fishery and associated management since the time of the MSC pre-assessment (Food Certification International 2009) and during the FIP. Although a rigorous comparative analysis has not been undertaken to compare the current assessment findings with those of the 2009 pre-assessment, and no assessment is given of more qualitative improvements, the following material / objective changes are clearly in evidence:

- A reduction in vessels numbers.
- The implementation of a closed inshore / artisanal area out to 8 fathoms (initially out to 7 fathoms).
- A stock assessment and Harvest Control Rule and further P1 data collection.
- Introduction and development of Bycatch Reduction Devices.
- A new Fishery Regulation, outlining legal requirements for Bycatch Reduction Devices, Turtle Excluder Devices, more explicit legal penalties.
- Formation of the Seabob Working Group and development of a Seabob Management Plan.
- Development of and training on an on-board Code of Conduct.
- Implementation of a VMS system on all seabob vessels.
- Implementation of CCTV cameras on board all seabob vessels.
- At least 2 observer programmes (1 by WWF, 1 by the Fisheries Department).
- Several other pieces of research, monitoring and consultancy seeking to address some of the gaps identified in the 2009 pre-assessment.

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Commission Regulation (EC) No 1010/2009 of 22 October 2009 laying down detailed rules for the implementation of Council Regulation (EC) No 1005/2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing

Appendices

Appendix 1: Scoring and Rationales

Appendix 1.1: Performance Indicator Scores and Rationale

PI 1.1.1 – Stock status

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guidepost	It is likely that the stock is above the point where recruitment would be impaired (PRI).	It is highly likely that the stock is above the PRI.	There is a high degree of certainty that the stock is above the PRI.
	Met?	(Y)	(Y)	(Y)
	Justification	The 2013 stock assessment and preliminary results from the current stock assessment show that biomass has been fluctuating around or above a proxy for B_{MSY} of 0.4 x the unexploited biomass (B_0). The Limit Reference Point below which recruitment is expected to be impaired is 0.2 x B_0 , and so the estimated stock biomass is currently well above this level. The key stock indicator used in interim years between full stock assessments, annual catch rate (CPUE), is currently above the target reference point, and the overall fishing effort in the last two years has been below the level which would achieve a biomass of 0.4 x the unexploited biomass, B_0 . Preliminary results from the current stock assessment show no evidence of any recruitment impairment from 2002 to 2017. There is a high degree of certainty that the stock is above the point where recruitment would be impaired. The SG60, SG80 and SG100 are met.		
b	Stock status in relation to achievement of MSY			
	Guidepost		The stock is at or fluctuating around a level consistent with MSY.	There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		(Y)	(N)
	Justification	The most recent full stock assessment concluded that spawning stock biomass (SSB) estimated from the Medley (2013) model has been above a proxy for B_{MSY} of 0.4 x the unexploited biomass (B_0) and that fishing mortality (F) was consistently below F_{MSY} , suggesting that the stock is in a healthy state. Preliminary results from the ongoing 2018/19 stock assessment (Medley 2019) provide a similar assessment of stock status with biomass fluctuating around B_{MSY} , although estimates of fishing mortality have fluctuated around F_{MSY} in recent years. With full stock assessments of fisheries data undertaken only every 4 to 5 years, the key stock indicators in interim years are the annual catch rate (CPUE) calculated as kilos per day fishing based upon processors' landings data, and overall fishing effort in terms of		

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
		<p>standardised days-at-sea (sdas). The observed annual CPUE for the whole fleet was 649 kg/day and 715kg/day respectively for 2016 and 2017, and so for the last two years the CPUE had been above the target reference point of 630 kg/day. The current HCR index for each year is calculated as the average between the previous year’s index value and the catch rate of the previous year (i.e. a moving average). The 2018 index will therefore be $0.5 \times (616 + 715) = 665.5$, which is above the target reference point. The overall fishing effort was 13,900 and 13,888 sdas for 2016 and 2017 respectively, well below the 15,000 sdas which is considered to be the level of fishing effort that would achieve an average spawning stock biomass (SSB) of $0.4 \times$ the unexploited biomass, B_0.</p> <p>The stock can be considered to be at or fluctuating around a level consistent with MSY and so SG80 is met. Preliminary results from the current stock assessment suggest that fishing mortality has been fluctuating around F_{MSY} in recent years, although appears to have increased in 2017, and estimates of biomass appear to be lower in 2016 and 2017 (Figures 3.3.5 and 3.3.7). The assessment team concluded therefore that, from a precautionary standpoint, there is not a high degree of certainty that the stock has been fluctuating around MSY. The SG100 is not met therefore.</p>		
References		Fisheries Department (2015); Medley (2013); Medley (2014); Medley (2019); Richardson (2018).		
Stock Status relative to Reference Points				
	Type of reference point	Value of reference point	Current stock status relative to reference point	
Reference point used in scoring stock relative to PRI (S1a)	Limit reference point (equivalent to $0.2 \times B_0$)	CPUE = 315 kg/day	CPUE in 2017 = 715 kg/day = $2.27 \times$ LRP	
Reference point used in scoring stock relative to MSY (S1b)	Target reference points (equivalent to $0.4 \times B_0$)	CPUE = 630 kg/day Maximum standardised days at sea = 15,000	CPUE in 2017 = 715 kg/day = $1.13 \times$ TRP HCR index for 2018 = 665.5 = $1.06 \times$ TRP Standardised days at sea in 2017 = 13,888 = $0.93 \times$ TRP	
OVERALL PERFORMANCE INDICATOR SCORE:				90
CONDITION NUMBER (if relevant):				

PI 1.1.2 – Stock rebuilding

PI 1.1.2		Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe					
Scoring Issue		SG 60		SG 80		SG 100	
a	Rebuilding timeframes						
	Guidepost	A rebuilding timeframe is specified for the stock that is the shorter of 20 years or 2 times its generation time . For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.			The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the stock.		
	Met?	NA				NA	
	Justification	The seabob stock in Guyana is not considered to be depleted, so there is no requirement to score PI 1.1.2					
b	Rebuilding evaluation						
	Guidepost	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.		There is evidence that the rebuilding strategies are rebuilding stocks, or it is likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.		There is strong evidence that the rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe.	
	Met?	NA		NA		NA	
	Justification	The seabob stock in Guyana is not considered to be depleted, so there is no requirement to score PI 1.1.2					
References							
OVERALL PERFORMANCE INDICATOR SCORE:							NA
CONDITION NUMBER (if relevant):							

PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guided post	The harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in PI 1.1.1 SG80.
	Met?	(Y)	(Y)	(Y)
	Justification	<p>The overarching legislation underlying the harvest strategy is the Fisheries Act (2002) which has the broad aim “.. to promote the management and sustainable development of fisheries so as to ensure the optimum utilisation of fisheries resources... and promote precautionary approaches to fisheries management... (and) ..to conserve fisheries resources for future generations.” There is an overall Marine Fisheries Management Plan 2013-2018 for fisheries in Guyana, and the management objectives and regulations specific to the seabob fishery are set out in the Seabob Fishery Management Plan 2015-2020 which includes the objectives of the fishery, fishery goals and regulations, the harvest control rules and managing the impact of the fishery on ETP species. Stakeholder involvement with seabob fishery management is through the Seabob Working Group (SWG), which meets monthly and reviews all fisheries data provided by the Fisheries Department and makes recommendations on the operation of the fishery in response to any changes in stock status. In addition to the Seabob Management Plan, there is also a Code of Practice (COP) in operation for the seabob fishery which contains guidance on handling practices, move-on rules, information on ETP species and vulnerable habitats, and provides for training for all vessel skippers and first mates.</p> <p>The harvest strategy includes regulations restricting fishing effort through a limited entry licensing scheme and a limit on days-at-sea, measures to minimise bycatch, restrictions on fishing areas which in particular reduces any negative effects of trawling on early life history stages and juveniles which are more abundant closer to shore, and a closed season when seabob are small and not marketable, and which coincides with the spawning season and therefore provides some protection for future recruitment. There are regular stock assessments undertaken by an independent consultant which have included the development of appropriate reference points and harvest control rules to safeguard against overfishing. There are sufficient data and information collected through log books and landings declarations to allow monitoring of the CPUE and days-at-sea stock indicators to assess stock status in relation to reference points, which ensures that the harvest strategy can be responsive to the state of the stock. There is an observer programme in place which provides verifiable information on seabob catch and catch rates and monitors bycatches, and a rigorous monitoring, control and enforcement regime, which ensures compliance of the fleet with the regulatory framework.</p> <p>The harvest strategy is clearly responsive to the state of the stock, and the Seabob Management Plan 2015-2020 has been designed to ensure that the stock is maintained at a level consistent with MSY and that the likelihood of recruitment impairment is minimised. The Guyana and Suriname fisheries are monitored, assessed and managed separately, but there is no clear genetic, biological or hydrographical evidence whether</p>		

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
		there is single or multiple stocks across the region, and so the Guyana fishery may be exploiting only part of the overall regional stock. However, there are similar harvest strategies in place for both the Guyana and Suriname fisheries that would ensure that a single regional stock would be maintained at a level consistent with MSY and that the likelihood of recruitment impairment would be minimised. The SG60, SG80 and SG100 are met therefore.		
b	Harvest strategy evaluation			
	Guidepost	The harvest strategy is likely to work based on prior experience or plausible argument.	The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	(Y)	(Y)	(N)
	Justification	A harvest strategy based upon limited entry licensing and limits on days-at-sea, bycatch reduction measures, a closed season, and effective monitoring of catch and effort data to assess stock status in relation to reference points is likely to work based on prior experience in other shrimp fisheries. Cross-checking of log books, landings declarations and processors' landings provide evidence that catch and effort data are recorded accurately, and regular stock assessments and evaluation of the CPUE stock indicator in relation to reference points provides evidence that the harvest strategy is achieving its objectives. The SG60 and SG80 are met. Whilst the harvest strategy appears to be achieving its objectives and maintaining stocks at target levels, it has not been fully evaluated through, for example, a Management Strategy Evaluation (MSE) and therefore the SG100 is not met.		
c	Harvest strategy monitoring			
	Guidepost	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	(Y)		
	Justification	There is an effective monitoring system in place incorporating VMS on participating vessels to monitor fishing activity in relation to closed areas, mandatory log books to record catch and fishing effort, detailed recording of landings including returns from processors, an observer programme, rigorous inspection of vessels before and after fishing trips, and monitoring of fishing operations through boardings by the Coastguard and through on-board camera systems to ensure that fishing gear is being deployed in compliance with regulations. The Fisheries Department carries out cross-checks of log book records, landings declarations and processors' landings, and if necessary, export quantities. Monitoring of CPUE and standardised days-at-sea in relation to reference points determines whether the harvest strategy is working. SG 60 is met therefore.		
	Harvest strategy review			

PI 1.2.1		There is a robust and precautionary harvest strategy in place			
d	Guidepost			The harvest strategy is periodically reviewed and improved as necessary.	
	Met?			(N)	
	Justification	Elements of the harvest strategy were reviewed during the development of the Seabob Management Plan 2015-2020, which is an “evergreen” document which is regularly reviewed by the Seabob Working Group. However, the overall harvest strategy including Harvest Control Rules (HCRs) has not yet been formally reviewed. An updated stock assessment is currently being carried out, and this assessment will include a review of whether the current reference points and harvest control rules are appropriate. SG100 is not met.			
e	Shark finning				
	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.	
	Met?	(Not relevant)	(Not relevant)	(Not relevant)	
	Justification	Sharks are not a target species and therefore this scoring issue is not scored.			
f	Review of alternative measures				
	Guidepost	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.	
	Met?	(Not relevant)	(Not relevant)	(Not relevant)	
	Justification	All seabob that are caught in the trawl are landed, and the fishery is closed at times of the year when the seabob are of poor quality and are not marketable. There is no unwanted catch of the target stock and so there is no requirement to score this scoring issue.			
References		Guyana Fisheries Act (2002); Marine Fisheries Management Plan 2013-2018; Fisheries Department (2015); Minutes of the Seabob Working Group. Maison (2015); Medley (2013); Medley (2014); Medley (2019); Richardson (2018).			
OVERALL PERFORMANCE INDICATOR SCORE:					85
CONDITION NUMBER (if relevant):					

PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guidepost	Generally understood HCRs are in place or available that are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	Well defined HCRs are in place that ensure that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time.
	Met?	(Y)	(Y)	(N)
	Justification	<p>The stock assessment model was used as a basis for evaluating harvest control rules (HCRs), and a range of HCRs consistent with Maximum Sustainable Yield and the precautionary approach were evaluated. An overall days-at-sea limit was implemented of 87 licences each with an allocated 225 days at sea. The most appropriate stock status indicator is the annual catch rate (CPUE) calculated as kilos per day fishing based upon processors' landings data. The model estimates that 15,000 standardised days at sea achieves an average spawning stock biomass (SSB) of 0.4 x the unexploited biomass, B₀, which is an acceptable proxy for MSY for stocks of at least average productivity (GSA2.2.3.1, MSC 2014). The average catch rate at that level would be 630 kg / day and this is therefore defined as the target reference point (TRP). The fishing industry stated that catch rates of 600 kg/day would be a reasonable economic catch rate to target, and this is slightly below the TRP of 630 kg/day. The LRP was set at 0.2 x B₀, which is reasonable as an LRP proxy (see MSC reference as above). This corresponds to a catch rate of 315 kg/day, which industry has noted is the lowest commercially viable catch rate at the current time. In addition, a trigger reference was set at 540 kg/day (approximately 70% of the distance between the LRP and TRP) at which exploitation rates will be reviewed and reduced as the LRP is approached.</p> <p>The HCR is therefore based upon 225 days at sea per vessel, assuming a fleet size of 87 vessels. The Total Allowable Effort (TAE) days-at-sea quota shall be set dependent on the value of the catch index as follows:</p> <ol style="list-style-type: none"> when the catch index is at or above the TRP, a maximum of 225 days at sea per licensed vessel. when the current index is above the trigger reference point, but below the TRP a linearly declining value, according to the calculation (TAE in days at sea per vessel): $TAE = 205 + 20 * (\text{Current Index} - \text{Trigger ref. point}) / (\text{TRP} - \text{Trigger ref. point})$ when the current index is above the LRP, but below the trigger reference point, a linearly declining value, according to the calculation (TAE in days at sea per vessel): $TAE = 205 * (\text{Current Index} - \text{LRP}) / (\text{Trigger ref. point} - \text{LRP})$ if the current index is at or below the LRP, TAE is zero (there is an export moratorium). <p>The current index for each year shall be calculated as the average between the previous year's index value and the catch rate of the previous year (i.e. a moving average). The catch rate will be based on reported catch and effort data for all vessels. The catch rate is</p>		

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place	
		<p>calculated as the total landings of seabob processed (peeled tail) weight in kilograms divided by the total number of standardised days-at-sea.</p> <p>The HCR Index in any given year t (I_t) is calculated as:</p> $I_t = 0.5 \left(I_{t-1} + \frac{C_{t-1}}{0.766 D_{t-1}} \right)$ <p style="text-align: right;"><i>Equation 1</i></p> <p>Where C_{t-1}=catch (kg processed tail weight) in the year $t-1$ and D_{t-1} = total nominal days-at-sea required to catch C_{t-1}. The index calculation should include all observed reliable catch and effort data.</p> <p>Catch rates (CPUE) are regularly reviewed by the Seabob Working Group (SWG) and if there are signs of stock decline, as identified by a decline in annual CPUE below the reference points, then SWG will require the companies to reduce the number of days fishing per vessel for next year. Whilst the HCR is triggered in response to a change in annual catch rates, there is also scope for SWG to recommend closing the fishery immediately if CPUE declines significantly mid-season as the SWG reviews CPUE on a monthly basis.</p> <p>There are therefore well-defined HCRs in place. The HCRs should ensure that the exploitation rate keeps the stock fluctuating around a target level consistent with MSY, and the use of the trigger reference point between the TRP and LRP should ensure that the exploitation rate is reduced as the point of recruitment impairment (PRI) is approached. The SG60 and SG80 are met.</p> <p>There is not sufficient certainty to conclude that the HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY most of the time therefore the SG100 is not met.</p>	
b	HCRs robustness to uncertainty		
	Guideline	The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties.
	Met?	(Y)	(N)
	Justification	<p>The development of the HCRs took into account the main uncertainties. Catch and effort data from processors' landings data are used in the HCR index, and so catches were converted from unpeeled tail weight to processed tail weight for use in the assessment. Fishing effort was measured in days at sea but corrected for asymptotic trip length as there was clear evidence of diminishing catches on longer trips possibly due to increased travel time to grounds, poor weather restricting fishing or lower catch rates necessitating longer trips. A conversion factor of 0.766 was therefore used to convert nominal days-at-sea to standardised days-at-sea. Fishing effort could also be standardised for vessel, but this was not carried out because of lack of information on vessel characteristics. <u>The assessment team recommends that information on vessel characteristics is obtained so that fishing effort can be standardised by vessel.</u> This should guard against any expansion of fishing capacity due to gear changes.</p> <p>The HCR index is based upon a rolling average of catch indices which ensures that any major fluctuations in catch rates due to unusual circumstances (e.g. very low fishing effort due to adverse conditions or unusual environmental conditions creating very high or low catch</p>	

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
		<p>rates in a single year) do not have an undue influence on how the harvest strategy responds to stock status.</p> <p>The assessment model was used to evaluate the performance of HCRs through simulation based upon either catch or effort limits. Effort based controls were more stable and more precautionary than catch-based controls, the limit of 225 days at sea per vessel was demonstrated to be consistent with attaining MSY and maintaining the stock above the limit reference point. The outcome of the simulations was shown to be relatively insensitive to small deviations from this limit of 225 days.</p> <p>The SG80 is met therefore.</p> <p>The HCRs do not take into account the ecological role of the stock, and as the HCRs have only recently been developed, and are being further reviewed as part of the ongoing stock assessment, there is not sufficient evidence to conclude that the HCRs are robust to the main uncertainties. The SG100 is not met.</p>		
c	HCRs evaluation			
	Guided post	There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.	Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	(Y)	(Y)	(N)
	Justification	<p>Reductions in overall fishing effort as measured by the total standardised days at sea through reducing the annual limit on days fished per vessel are appropriate ways to ensure that the exploitation rates required under the HCRs are achieved. The total number of standardised days at sea has remained below the threshold in 2016 and 2017 and therefore the SG60 and SG80 are met.</p> <p>Whilst there is no reason why the Seabob Working Group will not advise reductions in days at sea for the fleet (or alternative measures such as reduced numbers of vessels or longer closed season), to date there has been no occurrence of the CPUE stock indicator declining below the target reference point, and therefore it cannot be concluded that there is clear evidence that the tools in use are effective in reducing exploitation rate. The SG100 is not met.</p>		
References		Fisheries Department (2015); Minutes of the Seabob Working Group; CRFM (2014b); Medley (2013); Medley (2014); MSC (2014).		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				

PI 1.2.3 – Information and monitoring

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	Guided post	Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data is available to support the harvest strategy.	A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	(Y)	(Y)	(N)
	Justification	<p>There is detailed information available on catch rates and fishing effort from log books and processors' landings, VMS records of fishing activity, bycatch rates from the observer programme, size distribution information from processors records and on fleet composition from the limited entry licensing scheme, all of which is sufficient to support the harvest strategy. The seabob is a fast-growing species but there is sufficient information on size distribution and size categories, along with catch and effort data, and biological information on growth and size at maturity for use in the stock assessment model which assesses stock status in relation to reference points. All seabob caught in the trawl fishery are landed and therefore there is no requirement to estimate discard rates of seabob.</p> <p>There is no clear genetic, biological or hydrographical evidence whether there is a single stock or multiple stocks of seabob across the region. In the absence of such evidence, the Guyana and Suriname fisheries are monitored, assessed and managed separately. Under the scenario of separate stocks in Guyana and Suriname, there is clearly sufficient information on stock structure, stock productivity, fleet composition and other data to support the current harvest strategy including the harvest control rules for the Guyana fishery, and therefore the SG60 and SG80 are met.</p> <p>Detailed habitat maps have been produced by Cefas and there is some environmental monitoring that is not directly related to the harvest strategy. There are similar levels of relevant information available for both the Guyana and Suriname fisheries that should ensure that information is available for the whole stock under the scenario of a single regional stock, but there is still some uncertainty relating to stock structure, there are some gaps in information on stock productivity, and there is no fishery-independent estimate of stock abundance, so it cannot be concluded that the information base is comprehensive. The SG100 is not met therefore.</p>		
b	Monitoring			
	Guided post	Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with	All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the

PI 1.2.3		Relevant information is collected to support the harvest strategy			
			sufficient frequency to support the harvest control rule.	robustness of assessment and management to this uncertainty.	
	Met?	(Y)	(Y)	(N)	
	Justification	Stock abundance is not monitored directly through a fishery-independent survey, but catch per unit effort (CPUE) is considered to be a good index of stock abundance and is monitored on all vessels on all trips through a mandatory log book scheme. CPUE data are the key indicator used in the HCR, and are monitored with sufficient frequency to support that HCR. The HCR also uses an overall days-at-sea limit, and mandatory recording of fishing effort by the whole fleet provides accurate information consistent with the HCR. The fishing effort data can be ground-truthed using VMS records. UoA removals are accurately monitored through log book records, landings declarations and processors' landings records, the latter of which is used in the harvest control rule. Fisheries Department cross-checks of the log books, landings declarations and processors' records confirm that the landings are accurately recorded. Observer programme records provide an independent quantification of catch rates per tow of the trawl. The SG60 and SG80 are met therefore. Stock abundance is estimated through an index of catch per unit effort (CPUE) and whilst this is considered to be a good index of stock abundance, it cannot be concluded that stock abundance is monitored with a high degree of certainty as would be the case if there was a fishery-independent estimate of stock abundance through, for example, a regular stock survey. It is not clear that there is a good understanding of the uncertainties in the data or that the robustness of the assessment and management to this uncertainty is well understood. The SG100 is not met.			
c	Comprehensiveness of information				
	Guided post		There is good information on all other fishery removals from the stock.		
	Met?		(Y)		
	Justification	In addition to the trawl fishery for seabob, there are some small catches of seabob in the artisanal vessels which use Chinese seine or fyke nets. The landings from these vessels are recorded through the Ministry catch statistics system. Since 2014, catches from the artisanal fishers are around 100-150 tonnes per year in comparison with approximately 20,000 tonnes from the industrial fishery, representing 0.5-1.0% of the total catch of seabob. There is no recreational fishery. There is therefore good information on all other removals from the stock. The SG80 is met.			
References		Fisheries Department (2015); Minutes of the Seabob Working Group; CRFM (2009); Medley (2013); Medley (2014); Richardson (2018).			
OVERALL PERFORMANCE INDICATOR SCORE:					80
CONDITION NUMBER (if relevant):					

PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guidepost		The assessment is appropriate for the stock and for the harvest control rule.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		(Y)	(N)
	Justification	<p>The stock assessment has been designed specifically for the seabob fishery. The stock assessment model is a statistical catch-at-age model implemented with the AD Model Builder software with recruitment and fishing mortality estimated. The model is based on a forward-projection design and is effectively a simplified version of Stock Synthesis. Nominal monthly catch and effort data from processors’ landings data are used in the model, which incorporates data on size category and a maturity at weight ogive. The model uses a Beverton and Holt stock-recruitment relationship with a steepness parameter. The model calculates log-likelihood for each component (total catch, catch and effort, size composition by size and sex, average count per pound) and uses Markov Chain Monte Carlo (MCMC) simulations to investigate uncertainty. Model fits to the data were good.</p> <p>The assessment model estimates spawning stock biomass (SSB) as a proportion of unexploited SSB (SSB₀), fishing mortality (F) as a proportion of the estimated fishing mortality at MSY (F_{MSY}) and recruitment. The model was used as a basis for evaluating harvest control rules (HCRs), and a range of HCRs were considered so that an HCR consistent with MSY and the precautionary approach could be identified. The best method was considered to be based on total effort and an overall days-at-sea limit was implemented based on 87 licenses each with an allocated 225 days at sea, which would equate to maintaining the stock at a level consistent with MSY. The most appropriate stock status indicator is the annual catch rate (CPUE) calculated as kilos per day fishing based upon processors’ landings data. The stock assessment model is not applied to fisheries data every year, but in intervening years, CPUE and days-at-sea stock indicators are calculated from catch and effort data and compared with reference points.</p> <p>The stock assessment approach is clearly appropriate for the stock and the harvest control rule and therefore the SG80 is met. The Guyana and Suriname fisheries are monitored, assessed and managed separately, but there is no clear genetic, biological or hydrographical evidence whether there is single or multiple stocks across the region, and so the Guyana fishery may be exploiting only part of the overall regional stock. Further studies are required therefore on seabob stock structure in the region. The assessment approach does not take into account some of the major features of the biology such as predation on seabob, and the relationship between predator abundance and predation rates on seabob is not well understood. Assessments of other shrimp stocks (e.g. Kingsley, 2016) have shown that an assessment model including a predation component provided a better fit of the model to the data. The 2013 assessment could be improved by revisions to the way that selectivity is modelled and size categories of seabob are interpreted. The SG100 is not met.</p>		
b	Assessment approach			
	Guidepost	The assessment estimates stock status relative to generic reference points	The assessment estimates stock status relative to reference points that are	

PI 1.2.4		There is an adequate assessment of the stock status		
		appropriate to the species category.	appropriate to the stock and can be estimated.	
	Met?	(Y)	(Y)	
	Justification	The model estimates that 15,000 standardised days at sea achieves an average spawning stock biomass (SSB) of 0.4 x the unexploited biomass, B ₀ , which is a standard acceptable proxy for MSY. The average catch rate at that level would be 630 kg/day and this is therefore defined as the target reference point (TRP). The limit reference point (LRP) was set at 0.2 x B ₀ , which is reasonable as an LRP proxy. This corresponds to a catch rate of 315 kg / day, which industry has noted is the lowest commercially viable catch rate at the current time. In addition, a trigger reference was set at 540 kg/day (approximately 70% of the distance between the LRP and TRP) at which exploitation rates will be reviewed and reduced as the LRP is approached. Annual catch rate (CPUE) is calculated as kilos per day fishing based upon processors’ landings data, which therefore ensures that an assessment of stock status relative to reference point is made on an annual basis. The reference points are appropriate to the stock and can be estimated. The SG60 and SG80 are met.		
c	Uncertainty in the assessment			
	Guidepost	The assessment identifies major sources of uncertainty.	The assessment takes uncertainty into account.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way.
	Met?	(Y)	(Y)	(N)
	Justification	The major sources of uncertainty in the assessment are the lack of a clear stock-recruitment relationship, the seasonality of recruitment, the steepness of the selectivity curve, the estimate of natural mortality rate and the interpretation of size categories. The assessment uses Markov Chain Monte Carlo (MCMC) simulations to investigate uncertainty. The SG60 and SG80 are met. The 2013 assessment reports do not currently evaluate stock status relative to reference points in a probabilistic way and therefore SG100 is not met. Preliminary results from the 2018/19 assessment provide such an evaluation of stock status, but until the latest stock assessment has been completed and peer reviewed, the assessment team scored this PI in a precautionary way.		
d	Evaluation of assessment			
	Guidepost			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			(N)
	Justification	The data input and model uncertainties for the 2013 stock assessment were thoroughly reviewed and tested by CRFM, but the current ongoing stock assessment has not yet been fully tested and shown to be robust. Whilst alternative approaches have been considered, it cannot be concluded that they have been rigorously explored. The SG100 is not met.		
	Peer review of assessment			

PI 1.2.4		There is an adequate assessment of the stock status		
e	Guided post		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		(N)	(N)
	Justification	The data inputs and model uncertainties in the 2013 assessment were peer reviewed by CRFM. However, this assessment is now 5 years old, and a new updated stock assessment is in progress. The new assessment is using improved MCMC simulations within bespoke software, so at present there has been no peer review of this revised assessment approach. The assessment team concluded that whilst the 2013 stock assessment had been peer-reviewed, this assessment was now dated and the SG80 would not be met until the new assessment had been fully peer-reviewed. As the new stock assessment uses essentially a bespoke piece of software, the peer review of the assessment should include the coding in the software in addition to data input and uncertainties within the model. A condition is therefore raised.		
References		CRFM (2014b); Fournier et al (2012); Kingsley, 2016; Medley (2013); Medley (2014); Medley (2019); Richardson (2018); Quinn & Deriso (1999).		
OVERALL PERFORMANCE INDICATOR SCORE:				75
CONDITION NUMBER (if relevant):				1

PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.		
Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guided post	Main primary species are likely to be above the PRI OR If the species is below the PRI, the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are highly likely to be above the PRI OR If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoAs which categorise this species as main , to ensure that they collectively do not hinder recovery and rebuilding.	There is a high degree of certainty that main primary species are above the PRI and are fluctuating around a level consistent with MSY.
	Met?	(Y)	(Y)	(Y)
	Justification	There are no primary species in this fishery and therefore following SA3.2.1 a score of 100 is awarded. The assessment team submitted a formal Fishery Interpretation Query to MSC on 16.11.2018 to check that this interpretation should be applied in situations where there were no Primary Species in a jurisdiction. The MSC confirmed that SA3.2.1 still applies. Primary species are those that are caught by the fishery but are not included in the UoA. Primary species are subject to management tools and measures which intend to achieve stock management objectives in relation to reference points. Based on information on the Guyana fisheries management system, there are no species subject to management tools or measures to achieve stock management objectives in relation to reference points. Although some stock assessments have been undertaken or attempted (CRFM, 2007; Ribeira Santos <i>et al.</i> 2018) for three species that are commercially important: Bangamary (<i>Macrodon ancylodon</i>), seatrout (<i>Cynoscion virescens</i>) and butterfish (<i>Nebris microps</i>) the Guyana fisheries on these stocks are currently not managed with the use of TACs or quota and no reference points are defined (Fisheries Directorate staff: <i>pers. Comm.</i>). Therefore, it has to be concluded that there are currently no primary species in Guyana waters and that the fishery does not catch primary species. Under these circumstances, the RBF would also not be triggered (i.e. no species to assess) and on PI2.1.1 the fishery meets SG100 by default (SA3.2.1 states that if there is no impact on a particular component it shall receive an outcome score of 100 under the outcome PIs).		
	Minor primary species stock status			

PI 2.1.1		The UoA aims to maintain primary species above the PRI and does not hinder recovery of primary species if they are below the PRI.		
b	Guided post			<p>Minor primary species are highly likely to be above the PRI</p> <p>OR</p> <p>If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species</p>
	Met?			(Y)
	Justification	As described above, there are no primary species in this fishery and therefore following SA3.2.1 a score of 100 is awarded.		
References		Fisheries Department <i>pers. comms.</i> ; Guyana Fisheries Regulations 2018; Ribeiro Santos et al 2018; CRFM 2007		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				

PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guidepost	There are measures in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to above the point where recruitment would be impaired.	There is a partial strategy in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the point where recruitment would be impaired.	There is a strategy in place for the UoA for managing main and minor primary species.
	Met?	(Y)	(Y)	(N)
	Justification	Since there are no primary species, there is no requirement for primary species management. With reference to the “if necessary” statement within the SG80 scoring guidepost, SG60 and SG80 are achieved for this PI.		
b	Management strategy evaluation			
	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	(NA)	(NA)	(NA)
	Justification	Since there are no primary species there is no requirement for management.		
c	Management strategy implementation			
	Guidepost		There is some evidence that the measures/partial strategy is being implemented successfully .	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its overall objective as set out in scoring issue (a).
	Met?		(NA)	(NA)
	Justification	Since there are no primary species there is no requirement for management.		
	Shark finning			

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
d	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	(Not relevant)	(Not relevant)	(Not relevant)
	Justification	The are no shark primary species.		
e	Review of alternative measures			
	Guidepost	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	(Not relevant)	(Not relevant)	(Not relevant)
	Justification	As there are no primary species, it follows that there are no unwanted primary species.		
References		Fisheries Department pers. comms.; Guyana Fisheries Regulations 2018; Ribeiro Santos et al 2018; CRFM 2007		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				NA

PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impact on main primary species			
	Guidepost	Qualitative information is adequate to estimate the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is adequate to assess the impact of the UoA on the main primary species with respect to status. OR If RBF is used to score PI 2.1.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is adequate to assess with a high degree of certainty the impact of the UoA on main primary species with respect to status.
	Met?	(Y)	(Y)	(Y)
	Justification	Even in circumstances where there are no Primary Species, SA3.3.1 clearly states that the information PI should still be scored. The assessment team submitted a formal Fishery Interpretation Query to MSC on 16.11.2018 to check how this interpretation should be applied in situations where there were no Primary Species in a jurisdiction. The following scoring is based on the interpretation response from the MSC. All available information on the fisheries management system shows that there are no species that are managed using reference points (see Section 3.4.1) and (thus) that there are no primary species. This has been confirmed by the fisheries department. This information is adequate to assess with complete certainty that the fishery has no impact on main primary species. Therefore, SG60, SG80 and SG100 are met.		
	Information adequacy for assessment of impact on minor primary species			
b	Guidepost			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			(Y)
	Justification	The available information on the fisheries management system shows that there are no species that are managed using reference points (see Section 3.4.1) and (thus) that there are no primary species. This has been confirmed by the fisheries department. This		

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
		information is adequate to assess with complete certainty that the fishery has no impact on minor primary species. Therefore, SG100 is met.		
c	Information adequacy for management strategy			
	Guidepost	Information is adequate to support measures to manage main primary species.	Information is adequate to support a partial strategy to manage main Primary species.	Information is adequate to support a strategy to manage all primary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	(NA)	(NA)	(NA)
	Justification	See rational at SGa & SGb.		
References		Fisheries Department pers. comms.; Ministry of Agriculture (2013).		
OVERALL PERFORMANCE INDICATOR SCORE:				100
CONDITION NUMBER (if relevant):				NA

PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guided post	<p>Main Secondary species are likely to be within biologically based limits.</p> <p>OR</p> <p>If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.</p>	<p>Main secondary species are highly likely to be above biologically based limits</p> <p>OR</p> <p>If below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding.</p> <p>AND</p> <p>Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a, demonstrably effective strategy in place between those MSC UoAs that also have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding.</p>	<p>There is a high degree of certainty that main secondary species are within biologically based limits.</p>
	Met?	Y	N (Refer to RBF scoring table, below)	N
	Justification	<p>Like most trawling activity that takes place for shrimp in coastal waters of the tropics, the Guyana seabob trawl fishery captures a range of non-target organisms including fish, elasmobranchs and invertebrates along with the target species.</p> <p>Of non-target bycatch species, a considerable quantity also has economic value and is retained onboard for landing. Three species of fish comprise in excess of 90% of the retained fish bycatch. These species are Bangamary (<i>Macrodon ancylodon</i>), Green weakfish, or Trout (<i>Cynoscion virescens</i>) and Butterfish (<i>Nebris microps</i>).</p> <p>All species caught in the Guyana seabob fishery (that are not ETP species) are considered as secondary species (see Section 3.4.1). Whether they are retained or discarded is not a point of consideration any longer under the new CRv.2.0 standard. Secondary species have to be assessed either as “main” or as “minor”. Main secondary species are those that account for 5% or more of the total catch or for ‘less resilient’ species account for 2% or more of the total catch. Main secondary species also include all species that are out of scope but not ETP. All other secondary species are considered minor.</p>		

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.																	
		<p>In order to collect better data on bycatch in the Guyana seabob fishery, WWF funded an observer program that has resulted in 19 trips on 18 vessels from 18 February 2016 to 14 April 2017. From these trips 27 “last” haul catches were landed and then sorted, identified and measured (Medley, 2017). The team have also received last haul data collected during 2018. Combining the data as presented in table 3.4.1 and table 3.4.2 and being precautionary by also including Green weakfish and Smooth butterfly ray that respectively form nearly 5% and 2 % of the catch leads to the identification of the following 7 main secondary species: Bangamary, Green weakfish, Smalleye croaker, Smalleye stardrum, Rake stardrum, Longnose stingray and Smooth butterfly ray.</p> <p>Since no stock assessments on these species are done the team has conducted a Productivity Susceptibility Analysis (PSA) on these main secondary species. Because of the very large number of minor secondary species it was decided to restrict the PSA to only main secondary species. This means that the score shall be capped to 80 because only a subset of the total number of species was evaluated (PF5.3.2).</p> <p>The team has considered the fact that the Suriname seabob fishery is MSC certified and that according to PF4.4.3 when scoring susceptibility, the team shall take into account the impacts of fisheries other than the UoA. When scoring PI 2.2.1, if the UoA has main species with catches at 10% or more of the total catch by weight of the UoA, all MSC UoAs having a catch of the same species that is 10% or more of the total catch of the UoAs shall be identified and listed separately. However as described in paragraph 3.4.2 there are no main secondary species with catches at 10 % or more of the total catch. (In the Suriname seabob fishery only one main bycatch species was identified as a species with catches of over 10 % of the total catch (Smalleye stardrum; 11.9 %). Table 3.4.2 in paragraph 3.4.2 shows that this species accounted for only 0.69 % in the last 2018 haul data. Table 3.4.1 shows higher percentages for the 2 stardrum species combined but even the combined catch is (slightly) less than the total catch.) It was therefore concluded that the team did not need to take the catches of the Suriname seabob fishery into account when scoring susceptibility.</p> <p>The PSA resulted in the MSC PSA derived scores shown in the table below. Since the scores for Longnose stingray and Smooth butterfly ray are 78, an overall MSC score of 75 was derived for this performance indicator (Table PF8, MSC 2014). The score of 75 resulted in the setting of a condition for the outcome status of Longnose stingray and Smooth butterfly ray.</p> <table><tr><th>Scoring element</th><th>MSC PSA-derived score</th></tr><tr><td>Bangamary</td><td>95</td></tr><tr><td>Green weakfish</td><td>92</td></tr><tr><td>Smalleye croaker</td><td>92</td></tr><tr><td>Smalleye stardrum</td><td>92</td></tr><tr><td>Rake stardrum</td><td>92</td></tr><tr><td>Longnose stingray</td><td>78</td></tr><tr><td>Smooth butterfly ray</td><td>78</td></tr></table>		Scoring element	MSC PSA-derived score	Bangamary	95	Green weakfish	92	Smalleye croaker	92	Smalleye stardrum	92	Rake stardrum	92	Longnose stingray	78	Smooth butterfly ray	78
Scoring element	MSC PSA-derived score																		
Bangamary	95																		
Green weakfish	92																		
Smalleye croaker	92																		
Smalleye stardrum	92																		
Rake stardrum	92																		
Longnose stingray	78																		
Smooth butterfly ray	78																		
b		Minor secondary species stock status																	
	Guidepost		Minor secondary species are highly likely to be above biologically based limits.																

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit.		
				OR If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			(Not scored)
	Justification	A PSA was conducted only for main secondary species.		
References		Medley (2017); Fisheries Directorate, 2018. Last haul data (spreadsheet).		
OVERALL PERFORMANCE INDICATOR SCORE:				75
CONDITION NUMBER (if relevant):				2

PI 2.2.2 – Secondary species management strategy

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guidepost	There are measures in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a partial strategy in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be within biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a strategy in place for the UoA for managing main and minor secondary species.
	Met?	(Y)	(Y)	(N)
	Justification	<p>TEDs and BRDs are fitted to all trawls to reduce the incidence of bycatch of turtles, elasmobranchs and other fishes. Trawling is limited to the seabob trawl zone – between the 8 fathom and 18 fathom contours. The inshore no trawling zone has recently been shifted from the 7 fathoms line to the 8-fathom line in order to reduce the bycatch of elasmobranchs (Fisheries Department, 2018). The Move On rule as laid down in the Code of Practice prescribes that vessels move to another location at least 1 nautical mile distant of the location where 5% or more of the estimated total catch in weight consists of species occurring in the Vulnerable By-catch List.</p> <p>The team concludes that the measures in place form a partial strategy that limits the catches of main secondary species. Bangamary, Green weakfish and Smalley croaker are all commercial fish species that are targeted in the artisanal fishery. The catches of the main bycatch species form up to 9 % (Bangamary) of the total catch. The team concludes therefore that the catches of main bycatch species do not account as considerable bycatches.</p> <p>Concerning the more vulnerable Longnose stingray and Smooth butterfly ray it is considered that measures are in place to reduce the catch of these species (TEDs, no trawling zone) or to increase their survival when captured (Code of Practice). It is therefore concluded that the partial strategy in place for the Guyana seabob fishery is expected to maintain main secondary species at levels which are highly likely to be within biologically based limits or to ensure that the Guyana seabob fishery does not hinder their recovery. Therefore, SG60 and SG80 are met.</p> <p>Since the measures that are in place are considered as a partial strategy and not a strategy that also includes minor secondary species SG100 is not met.</p>		
b	Management strategy evaluation			
	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience,	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about	Testing supports high confidence that the partial strategy/strategy will work, based on information

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
		theory or comparison with similar UoAs/species).	the UoA and/or species involved.	directly about the UoA and/or species involved.
	Met?	(Y)	(Y)	(N)
	Justification	Information of the distribution of the main secondary species (Fishbase, information from fishermen at RBF workshops) shows that they inhabit the coastal mud and sand habitats in Guyana waters. As stated, a large part of these habitats is closed for the seabob fishery since the fishery is only allowed in the 8-18 fathom depth zone. Scientific research has shown that TEDs and BRD result in the reduction of bycatch in the seabob fishery (Brewer <i>et al.</i> 2006; Willems <i>et al.</i> 2016a; Garstin <i>et al.</i> 2018). Although the move-on rule should also be an effective measure if employed as intended, and as stated by vessel captains, there is less objective evidence of this. Overall, based on the measures that are clearly implemented it can be concluded that the measures in place form a partial strategy and that there is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved. Thus, SG60 and SG80 are met. SG100 is not met since the conclusion that the partial strategy will work is not supported by independent scientific research that supports the conclusion with high confidence.		
c		Management strategy implementation		
	Guidepost		There is some evidence that the measures/partial strategy is being implemented successfully .	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a).
	Met?		(Y)	(N)
	Justification	VMS data and regular inspections show that the 8-18 fathoms depth zone is generally respected well and the TEDs and BRDs are used consistently in the fleet. Therefore, it can be concluded that there is some evidence that the partial strategy is implemented successfully and SG80 is met. Since there is no clear evidence in the form of results of scientific research that the partial strategy is achieving its objectives as set out in scoring issue (a) SG100 is not met.		
d		Shark finning		
	Guidepost	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	(Y)	(Y)	(N)
	Justification	Very few sharks are found in seabob bycatch, and those that are found are very small since the TED prevents the retention of larger sharks. During the site visit it was further stated by vessel captains, processing companies and fisheries department staff that no shark finning takes place in this fishery. The Code of Practice prescribes that sharks when caught should be released as soon as possible. Video control enables the processing companies and fisheries inspectors to monitor whether correct handling of sharks takes place. The team concludes that it is highly likely that shark finning does not take place and therefore		

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.		
		that SG60 and SG80 are met. SG100 is not met since incidental bycatch of larger sharks might occur when larger specimens are entangled in the TED and the available evidence does not support a “high degree of certainty” that in some instances shark finning could occur.		
e	Review of alternative measures to minimise mortality of unwanted catch			
	Justification	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all secondary species, and they are implemented, as appropriate.
	Met?	(Y)	(Y)	(N)
	Guidenpost	<p>One of the fishery specific objectives formulated in the Seabob Management Plan (SMP: 2015) is: “To maintain or restore populations of marine species at levels that can produce the optimum sustainable yield as qualified by relevant environmental and economic factors, taking into consideration relationships among species”. The formulated strategy to reach this desired objective is: “Minimise the by-catch. Using the BRD and through research come up with innovative ways for the reduction through research.” The management plan further states that the Seabob Working Group will be primarily responsible for evaluating all parts of the management system through regular review. The SWG will review all issues identified through research, monitoring, evaluation and consultation and provide management recommendations taking into account wider implications of any decisions, to, for example, other users of the coastal zone.</p> <p>One of the tasks of the SWG is to review any research results and consider implications to the current management strategies, measures and controls. In response to reviews, and if necessary, the SWG must agree and then recommend appropriate management actions and measures that fit within the overall strategy of the fishery and which will seek to achieve the fishery objectives. Measures should include, <i>inter alia</i>:</p> <ul style="list-style-type: none">o Area and/or seasonal closureso Adjustments to the number of licenceso Adjustments and improvements to fishing gear and fishing methods <p>Based on the information above it can be concluded that there are procedures in place for the regular review of the effectiveness of measures to reduce the impacts of the fishery on bycatch species and the possibilities to further reduce bycatches with the use of alternative measures. An example is the shifting of the 7 fathoms depth line border to the 8-fathom line to reduce the bycatch of elasmobranchs. This measure shows that alternative measures are reviewed and implemented as appropriate. Furthermore, GATOSP and SWG have propagated research to test a modified TED, with smaller bar spacing and the addition of a horizontal brace bar, to determine whether this would further reduce the by-catch of elasmobranchs (Garstin <i>et al.</i> 2018). The team was further informed that Noble House Seafood has asked trawler captains to record the number of</p>		

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.
		<p>rays that were released dead and the number that were released alive. This clearly corresponds to the objective to see whether further measures to minimise mortality of rays were possible. Noble House has also conducted some tests with modified TEDs (called TTEDs) to investigate whether these could be used to improve the survival of rays. Similar work was done by Willems <i>et al</i> (2013) in Suriname. Also, the development of improved TEDs can be considered as an alternative measure that has been reviewed.</p> <p>The team concludes that regular review of measures to reduce the ecosystem impact of the fishery takes place via the SWG and that the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species forms part of that review. The Seabob Management Plan further requires that the precautionary approach is used in response to reviews and the SWG must agree and then recommend appropriate management actions which will seek to achieve the fishery objectives. Considering the fact that TEDs and BRDs have been implemented and the 7-fathom line has been moved as advised the team concludes that there is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species and alternative measures are implemented as appropriate. Therefore SG60 and SG80 are met.</p> <p>SG100 is not met since the review of alternative measures concerning unwanted catch is regular but not biennial. Additionally, the scoring issue for SG100 also includes minor secondary species and the focus of the review is on main species.</p>
References		Brewer <i>et al</i> (2006); Fisheries Department, 2018 (Letter of 6 April 2018 to GATOSP); Garstin <i>et al</i> (2018); Willems <i>et al</i> (2016)
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER (if relevant):		NA

PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guidepost	Qualitative information is adequate to estimate the impact of the UoA on the main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and adequate to assess the impact of the UoA on main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and adequate to assess with a high degree of certainty the impact of the UoA on main secondary species with respect to status.
	Met?	(Y)	(Y)	(N)
	Justification	Information to assess productivity attributes of main secondary are available ²⁶ in Fishbase and from other scientific literature. Susceptibility attributes have been assessed by the team with the help of fishermen and Fisheries Directorate staff. Some quantitative information on bycatch is available (Medley, 2017; Fisheries Directorate, 2018) and this information was used to identify main secondary species. VMS data showing the fishing footprint of the UoA are available and they are adequate to estimate the overlap of the fishery with the distribution (species concentration) of the main secondary species. Information from fishermen on the depth zone where species occur in the water column further allowed for the assessment of encounterability. The team therefore concludes that SG60 and SG80 are met. SG100 is not met since the RBF was used to score PI 2.2.1 for the UoA.		
b	Information adequacy for assessment of impacts on minor secondary species			
	Guidepost			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.

²⁶ For some species some attributes had to be derived from related species.

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species.		
	Met?			(N)
	Justification	Although there is some quantitative information on the bycatch of minor secondary there is insufficient information available on the status of stocks of minor secondary species. Therefore, the available information is not adequate to assess the impact of the UoA on minor secondary species with respect to status. Therefore, SG100 is not met.		
c	Information adequacy for management strategy			
	Guidepost	Information is adequate to support measures to manage main secondary species.	Information is adequate to support a partial strategy to manage main secondary species.	Information is adequate to support a strategy to manage all secondary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	(Y)	(Y)	(N)
	Justification	The available information is limited to some quantitative information on bycatch of secondary species, the effectiveness of TEDs and BRDs to reduce bycatch (elasmobranches, fish), landings of main secondary species with commercial value, VMS data and practical knowledge of fishermen and fishery managers. This information is sufficient to support a partial strategy to manage main secondary species and therefore SG60 and SG80 are met. The information is however not adequate to support a management strategy to manage all secondary species and evaluate with a high degree of certainty whether the strategy is achieving its objective. Therefore, SG100 is not met.		
References		Fisheries Department, 2018. Last haul bycatch data; Medley (2017).		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				NA

PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species																											
Scoring Issue		SG 60	SG 80	SG 100																									
a	Effects of the UoA on population/stock within national or international limits, where applicable																												
	Guidepost	Where national and/or international requirements set limits for ETP species, the effects of the UoA on the population/stock are known and likely to be within these limits.	Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population/stock are known and highly likely to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a high degree of certainty that the combined effects of the MSC UoAs are within these limits.																									
	Met?	(Not relevant)	(Not relevant)	(Not relevant)																									
	Justification	There are no national or international requirements that set limits for ETP species in Guyana.																											
b	Direct effects																												
	Guidepost	Known direct effects of the UoA are likely to not hinder recovery of ETP species.	Known direct effects of the UoA are highly likely to not hinder recovery of ETP species.	There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species.																									
	Met?	(Y)	(Y)	(N)																									
	Justification	The species listed in table 1. below have been identified as endangered ETP species listed in CITES Appendix 1 and present in Guyana waters (see paragraph 3.4.3). (There are no out of scope species that interact with the fishery.) <table><tr><td>Sei whale</td><td><i>Balaenoptera borealis</i></td></tr><tr><td>Blue whale</td><td><i>Balaenoptera musculus</i></td></tr><tr><td>Humpback whale</td><td><i>Megaptera novaeangliae</i></td></tr><tr><td>Sperm whale</td><td><i>Physeter macrocephalus</i></td></tr><tr><td>Tucuxi</td><td><i>Sotalia fluviatilis</i></td></tr><tr><td>Guiana dolphin</td><td><i>Sotalia guianensis</i></td></tr><tr><td>West Atlantic Manatee</td><td><i>Trichechus manatus</i></td></tr><tr><td>Large tooth sawfish</td><td><i>Pristis pristis</i></td></tr><tr><td>Small tooth sawfish</td><td><i>Pristis pectinata</i></td></tr><tr><td>Leatherback turtle</td><td><i>Dermochelys coriacea</i></td></tr><tr><td>Hawksbill turtle</td><td><i>Eretmochelys imbricata</i></td></tr><tr><td>Green turtle</td><td><i>Chelonia mydas</i></td></tr><tr><td>Olive ridley turtle</td><td><i>Lepidochelys olivacea</i></td></tr></table>			Sei whale	<i>Balaenoptera borealis</i>	Blue whale	<i>Balaenoptera musculus</i>	Humpback whale	<i>Megaptera novaeangliae</i>	Sperm whale	<i>Physeter macrocephalus</i>	Tucuxi	<i>Sotalia fluviatilis</i>	Guiana dolphin	<i>Sotalia guianensis</i>	West Atlantic Manatee	<i>Trichechus manatus</i>	Large tooth sawfish	<i>Pristis pristis</i>	Small tooth sawfish	<i>Pristis pectinata</i>	Leatherback turtle	<i>Dermochelys coriacea</i>	Hawksbill turtle	<i>Eretmochelys imbricata</i>	Green turtle	<i>Chelonia mydas</i>	Olive ridley turtle
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PI 2.3.1	<p>The UoA meets national and international requirements for the protection of ETP species</p> <p>The UoA does not hinder recovery of ETP species</p>
	<p>Concerning the whale species (Sei whale, Blue whale, Humpback whale and Sperm whale) it can be concluded that it is very unlikely that there is any significant interaction between these species and the seabob fishery considering the size of these species, the slow speed and limited size of the bottom shrimp trawls used. The Tucuxi is a <i>Sotalia</i> species (dolphin) that only lives in rivers so for this species there is no likelihood of interaction. It is concluded that there is a high degree of confidence that there are no significant detrimental direct effects of the UoA on the identified whale species and the Tucuxi and therefore these species meet the SG60, SG80 and SG100 level of scoring.</p> <p>The Guiana dolphin (<i>Sotalia guianensis</i>) is a riverine, estuarine and nearshore species, which ranges along the Western Atlantic coast from southern Brazil to Guatemala. There is little information on population structure and status for the Guiana dolphin; although the species appears relatively abundant in many parts of its range²⁷. Incidental bycatches of this relatively small dolphin cannot be considered impossible. However, the species should be rather fast swimming and be able to avoid capture. If an animal did enter the net, the use of the TED in many occasions should lead to the escape of the animal. No incidents of the capture of the Guiana dolphin have been reported to the team during the site visit. It is concluded that any significant interaction is highly unlikely and therefore it is also highly unlikely that the UoA would hinder the recovery of this species. Therefore, for this species the SG60 and SG80 level are met. SG100 is not met since the available information does not warrant a high degree of confidence.</p> <p>West Indian manatee (<i>Trichechus manatus</i>) has a range which extends across riverine and coastal systems from the Bahamas to Salvador, Brazil, including the Caribbean Sea and Gulf of Mexico. The population is estimated to consists of less than 2,500 individuals (http://www.iucnredlist.org/details/22103/0). The main threats to this species include habitat degradation and loss and directed hunting, as well as accidental capture in fishing gears. The West Indian manatee is found predominantly in estuaries and lagoons, and associated brackish water and fresh water areas where the plants on which it feeds are to be found. It can be found in association with mangrove and nearby coastal areas, but is seldom found in open sea. Since the seabob fishery is carried out further offshore it can be concluded that there is no significant overlap of the fishery with the habitat of this species and it is concluded that interactions are highly unlikely. Capture of this species is more likely in set nets or fykes. There are no reports of bycatch of this species in shrimp trawls in Guyana. It is concluded that any interaction is highly unlikely and therefore it is also highly likely that the UoA would hinder the recovery of this species. Therefore, for this species the SG60 and SG80 levels are met. SG100 is not met since the available information does not warrant a high degree of confidence.</p> <p>Smalltooth and Largetooth sawfish (<i>Pristis pristis</i> and <i>Pristis pectinate</i>) are the only two sawfish species to be found in the western Atlantic Ocean. Both species once covered a wide range of habitats, stretching over the tropical and sub-tropical marine environments, as well as estuarine and contiguous freshwater habitats in the eastern Atlantic Ocean from the Caribbean to Central and South American as well as Africa. However, it is likely that both species are now regionally extinct in many parts of the Caribbean and Central America, with the possibility of small populations remaining in the Bahamas, Cuba, Nicaragua, and to a lesser extent in Belize and Panama (http://baseline.stanford.edu/Harrison.Dulvy.2014FullReport.pdf). During site visit discussions it was never indicated that sawfishes were caught. The present distribution of</p>

²⁷ <https://www.iucnredlist.org/species/181359/50386256#assessment-information>

PI 2.3.1	<p>The UoA meets national and international requirements for the protection of ETP species</p> <p>The UoA does not hinder recovery of ETP species</p>
	<p>the species makes an encounter very unlikely. It is concluded that any interaction is highly unlikely and therefore it is also highly unlikely that the UoA would hinder the recovery of this species. Therefore, for this element the SG60 and SG80 levels are met. SG100 is not met since the available information does not warrant a high degree of confidence.</p> <p>Turtles</p> <p>Four species of sea turtles can be found nesting on Guiana beaches from February through August. Leatherbacks (<i>Dermochelys coriacea</i>), green turtles (<i>Chelonia mydas</i>), hawksbills (<i>Eretmochelys imbricata</i>) and olive ridleys (<i>Lepidochelys olivacea</i>) utilize Guyana's nesting beaches. The primary turtle nesting beaches are located in remote North-western Guyana (see figure 3.4.1). Leatherback turtles and all sea turtles are listed in CITES Appendix 1.</p> <p>Sea turtles are particularly vulnerable to catch and consequently drowning in fishing nets including shrimp trawls (Crowder <i>et al.</i> 1995). Since 1987, the United States has required all US shrimp trawling boats to equip their nets with TEDs. As a follow-up two years after, the US shrimp-turtle law was implemented. This required all countries that the USA was importing shrimp from to certify that the shrimp they shipped were harvested by boats equipped with TEDs. Countries that cannot guarantee the use of the escape devices were banned from exporting shrimp to the USA. Consequently, the Government of Guyana was induced to seek an annual certificate from the USA approving the implementation of the TED regulation within Guyana. The use of TED and the correct fitting in the trawl is now compulsory within the Guyana fisheries regulations. The use of TED is controlled regularly by a team of 4 staff from the Fisheries Department. The use of TEDs significantly reduces the bycatch of turtles in the shrimp trawl (Brewer <i>et al.</i> 2006, Lewison <i>et al.</i> 2003).</p> <p>During the site visit the team were informed by vessel captains and Fisheries Department staff that the use of TEDs has reduced the bycatch of turtles. Captains have stated that the bycatch of turtles was not unusual prior to the adoption of TEDs but is now a very rare occurrence. Sometimes turtles will enter the net but not pass through the net opening under the TED. This opening is covered with a flap and sometimes the turtles are entangled and stay in the net.</p> <p>In order to estimate the impact of the fishery on ETP species vessel captains are requested to fill an ETP logsheet which are collated by the vessel owning / processing companies and delivered to the Fisheries Directorate where a database is maintained. Annually the ETP information is reported in an ETP report of the seabob fishery.</p> <p>As stated, ETP reports are drafted on the basis of the ETP logsheet information provided by fishing captains. The most recent ETP report for the year 2017 (Husbands, 2018) shows that only 18 vessels have done so. Discussion with the fisheries directorate staff responsible for the ETP data collection have revealed that many ETP logsheets are filled in with zero interaction marks on all trips for all species and that sightings are recorded as interactions, making the reliability and usefulness of the information questionable. This concern is addressed in PI 2.3.3.</p> <p>The results of the observer program mentioned above which was organized and funded by WWF Guianas has been discussed with WWF staff during the site visit. The information that was collected on bycatch of fish was reported by Medley (2017). However, this report does not provide information on interactions with ETP species like turtles. WWF have been asked to supply further information on this observer program and this information was received by the team in a WWF letter dated 29 November 2018. In the letter it is stated</p>

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species	
		The UoA does not hinder recovery of ETP species	
		<p>that 19 observer trips have been carried out and that during these 19 trips no turtles were recorded as caught.</p> <p>A substantial number of measures are in place to ensure that the fishery does not have a negative impact on sea turtle species. Most important is the obligation to use TEDs which allow turtles caught to escape alive from the net. Another important measure is that seabob trawlers are not allowed to fish inshore in areas less deep than 8 fathoms. The consequence is that vessels are not allowed in a zone of around 9 miles of the coast. Since nesting turtles tent lay eggs several times and stay near the coast to mate the zone where the turtle concentrations are high are closed for the UoA. The inshore no trawling zone is also most likely to host beds of seagrass and other foraging grounds that attract turtles – in particular green turtles.</p> <p>Information on the protection of sea turtles in Guyana shows that the main threats to the conservation of sea turtles in Guyana are the poaching of eggs, the consumption of eggs by domestic and stray dogs on the beach by village dogs, the killing of turtles, debris and trees on beaches and drowning of turtles in set nets. Measures have been implemented like the implementation of the Shell beach sanctuary, a no fishing zone along this beach and the projects to raise awareness and prevent poaching (WWF-Guianas, 2014). There are indications that the measures and programs to protect the turtle populations in Guyana have had a positive effect and the populations are increasing slowly. (https://newsroom.gy/2016/08/07/shell-beach-hideout-endangered/, https://www.stabroeknews.com/2010/news/guyana/02/13/turtle-population-recovery-in-slow-curve-for-some-species/,)</p> <p>Direct impacts through net loss is also considered highly unlikely since entanglement of ETP in lost shrimp trawls is not considered to be a risk. Additionally, lost trawls will be quickly recovered in most cases. Concerning unobserved mortality of ETP species that pass through the TED it is considered unlikely that this mortality rate is high. For turtles, that are perhaps most likely to be caught, their shell greatly reduces the likelihood of mortal injury.</p> <p>On the basis of the information provided and the measures that are in place the team concludes that it is highly unlikely that the Guyana seabob fishery is hindering the recovery of sea turtle populations in the Guianas. Therefore, SG60 and SG 80 is met for all four turtle species identified. SG100 is not met since the available quantitative data are not of such quality that they warrant a high degree of confidence.</p>	
c	Indirect effects		
	Guidepost	Indirect effects have been considered and are thought to be highly likely to not create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the fishery on ETP species.
	Met?	(Y)	(N)

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species																																																								
		The UoA does not hinder recovery of ETP species																																																								
	Justification	Indirect impacts on other ETP species through an impact on their food supply can be considered very unlikely since the impact of the seabob fishery on fish stocks is limited (see paragraph 3.4.2). Therefore, an impact on the food supply of whales, dolphins and sawfishes, or turtles is highly unlikely. The ETP species do also not depend on seabob for food.																																																								
		Therefore, it can be concluded that for all elements identified it is highly unlikely that the fishery creates unacceptable indirect effects on ETP species and SG80 is met. SG100 is not met since the conclusions are based on plausible argument and therefore it cannot be concluded that there is a high degree of confidence.																																																								
		Overall Scoring PI2.3.1																																																								
		<table><tr><th></th><th>Sib score</th><th>Slc score</th><th>PI score</th></tr><tr><td>Sei whale</td><td>100</td><td>80</td><td>90</td></tr><tr><td>Blue whale</td><td>100</td><td>80</td><td>90</td></tr><tr><td>Humpback whale</td><td>100</td><td>80</td><td>90</td></tr><tr><td>Sperm whale</td><td>100</td><td>80</td><td>90</td></tr><tr><td>Tucuxi</td><td>100</td><td>80</td><td>90</td></tr><tr><td>Guiana dolphin</td><td>80</td><td>80</td><td>80</td></tr><tr><td>West Atlantic Manatee</td><td>80</td><td>80</td><td>80</td></tr><tr><td>Large tooth sawfish</td><td>80</td><td>80</td><td>80</td></tr><tr><td>Small tooth sawfish</td><td>80</td><td>80</td><td>80</td></tr><tr><td>Leatherback turtle</td><td>80</td><td>80</td><td>80</td></tr><tr><td>Hawksbill turtle</td><td>80</td><td>80</td><td>80</td></tr><tr><td>Green turtle</td><td>80</td><td>80</td><td>80</td></tr><tr><td>Olive ridley turtle</td><td>80</td><td>80</td><td>80</td></tr></table>		Sib score	Slc score	PI score	Sei whale	100	80	90	Blue whale	100	80	90	Humpback whale	100	80	90	Sperm whale	100	80	90	Tucuxi	100	80	90	Guiana dolphin	80	80	80	West Atlantic Manatee	80	80	80	Large tooth sawfish	80	80	80	Small tooth sawfish	80	80	80	Leatherback turtle	80	80	80	Hawksbill turtle	80	80	80	Green turtle	80	80	80	Olive ridley turtle	80	80	80
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Olive ridley turtle	80	80	80																																																							
All elements meet SG80; a few achieve higher performance, but most do not meet SG100. Therefore, a score of 85 is awarded.																																																										
References	Brewer <i>et al</i> (2006); Crowder <i>et al</i> (1995); Maison (2015); Garstin <i>et al</i> (2018); Griffiths <i>et al</i> (2006); Lewison <i>et al</i> (2003); Medley (2017)																																																									
OVERALL PERFORMANCE INDICATOR SCORE:		85																																																								
CONDITION NUMBER (if relevant):		NA																																																								

PI 2.3.2 – ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to:		
		<ul style="list-style-type: none">• meet national and international requirements;• ensure the UoA does not hinder recovery of ETP species.		
		Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guidepost	There are measures in place that minimise the UoA-related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	(Not relevant)	(Not relevant)	(Not relevant)
	Justification	National or international requirements for the protection and rebuilding of ETP species are not formulated, so this SI is not scored (SA3.11.2.1, MSC 2014).		
b	Management strategy in place (alternative)			
	Guidepost	There are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a comprehensive strategy in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species
	Met?	(Y)	(N)	(N)
	Justification	As described under PI2.3.1 any significant interactions with ETP species other than sea turtles are considered highly unlikely. Therefore, for whales and dolphins, the sawfish species and the manatee it can be concluded that the fishing method used and the measures in place (no trawling zone, use of TEDs) are measures in place that are expected to ensure the UoA does not hinder the recovery of ETP species. Therefore, SG60 is met for all ETP species identified. A substantial number of measures are in place to ensure that the fishery does not have a negative impact on sea turtle species. Most important is the obligation to use TEDs which allow turtles caught to escape alive. The use of TEDs is effectively monitored and enforced by a Fisheries Department team of inspectors. Another important measure is that seabob trawlers are not allowed to fish inshore in areas less deep than 8 fathoms. The consequence is that vessels are not allowed in a zone of around 9 miles of the coast. Since nesting turtles lay eggs several times and stay near the coast to mate the zone where the turtle concentrations are highest are closed for the UoA. The inshore no trawling zone is		

PI 2.3.2	<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> • meet national and international requirements; • ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.</p>		
	<p>also most likely to host beds of seagrass and other foraging grounds that attract turtles – in particular green turtles.</p> <p>In the process of working toward MSC certification the GATOSP has drafted a Code of Practice for the Guyana seabob fishery (Maison 2015). This code has been distributed to all seabob trawler captains and has to be kept on board. The code details what to do when a turtle is caught. For instance, it is explained that when a turtle comes on board it can appear to be dead but it is only comatose. The turtle should be checked for reflexes of the eyelid and when it is not dead it should be kept wet and, in the shade, until it is vigorous again and can be released. The vessel captains are requested to fill an ETP logbook sheet. However, the team has concluded that the logsheets are not filled in by many vessels and the quality of the current data from the ETP logsheets is poor. Additionally, the team did not receive any evidence from logsheets that the move-on rule is practiced when vulnerable species are caught or seen. Thus, it cannot be concluded that the move-on rule is expected to be an effective measure on the basis of current information. The team concludes that measures are in place but that the current measures do not form a strategy since currently there are no mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts. SG80 and SG100 are not met for turtles.</p> <p>For other ETP species than turtles the same conclusion can be drawn since interactions with these species should also be consequently reported and actions should be taken if there are any unacceptable impacts. Therefore, SG80 and SG100 are not met for all ETP species identified.</p>		
c	Management strategy evaluation		
	Guideline	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is an objective basis for confidence that the measures/strategy will work, based on information directly about the fishery and/or the species involved.
	Met?	(Y)	(N)
	Justification	Extensive scientific research on the effectiveness of the use of TEDs in shrimp fisheries (e.g., Brewer <i>et al.</i> , 2006; Crowder <i>et al.</i> , 1995; Griffiths <i>et al.</i> , 2006; Lewison <i>et al.</i> , 2003) has shown that TEDs effectively reduce the number of turtles or other large (ETP) species caught in shrimp trawls. VMS data show that seabob vessels do not fish in the inshore zone limited by the 8-fathom line. The results of scientific research on TEDs and VMS data show that there is an objective basis for confidence that the strategies described at Sla, will work, based on information directly about the fishery and species involved. Therefore, SG60 and SG80 are met	

PI 2.3.2		The UoA has in place precautionary management strategies designed to: <ul style="list-style-type: none">• meet national and international requirements;• ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.		
		SG100 is not met since the available information on impacts do not allow for a full quantitative analysis of these impacts on ETP species and support high confidence that the strategy will work.		
d	Management strategy implementation			
	Guidepost	There is some evidence that the measures/strategy is being implemented successfully.	There is clear evidence that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) or (b).	
	Met?	(Y)	(N)	
	Justification	From regular control and observer trips it is clear that TEDs are consistently used in the fishery and that the TED obligation is effectively monitored and enforced. VMS data show that the fishery does not take place in the inshore no-trawling zone. Cameras are now mandatory on board all vessels and videos can be checked by Fisheries Inspectors. It can therefore be concluded that there is some evidence that the strategy is implemented successfully and SG80 is met. The available information does not allow for the quantitative estimation of impacts of the UoA on ETP species and consequently is also not adequate to measure trends. (A Condition is set at PI2.3.3.). Additionally, there is no clear evidence that the move-on rule is implemented successfully. Therefore, it cannot be concluded that there is clear evidence that the strategy is achieving its objective and thus SG100 is not met.		
e	Review of alternative measures to minimize mortality of ETP species			
	Guidepost	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species, and they are implemented, as appropriate.
	Met?	(Y)	(Y)	(N)
	Justification	The Seabob Working Group, which meets at least 4 times a year, monitors management performance, information provision and requirements, identifies research requirements, and provides advice to the Fishery Advisory Council and the Minister on the sustainable management of this fishery. The Technical Committee of the Seabob Working Group meets on an <i>ad hoc</i> basis, as required, to commission and review research. This Committee originates, reviews and monitors the research plan.		

PI 2.3.2		<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none">• meet national and international requirements;• ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.</p>																																																																																				
		<p>The inshore no trawling zone has recently been shifted from the 7 fathoms line to the 8-fathom line in order to reduce the bycatch of elasmobranchs (Fisheries Department, 2018). This measure shows that the Seabob Working Group and the Fisheries Department review and implement alternative measures to reduce the impacts of the fishery.</p> <p>The use of TTEDs as an alternative measure to reduce UoA related mortality of ETP species has been recently investigated (Garstin <i>et al.</i>, 2018). During recent ETP workshops organized by WWF (Willems, 2018b&c) fishermen have been asked what other potential (alternative) measures could be taken to reduce ETP species interactions in the fishery. For the ETP species whales, dolphins. Saw-fishes and manatee there are no indications of any significant UoA related mortality and therefore this SI is not applicable for them.</p> <p>It can be concluded that there is a regular review of the potential effectiveness and practicality of alternative measures to minimise Guyana seabob fishery-related mortality of ETP species and they are implemented as appropriate. SG60 and SG80 are met.</p> <p>SG100e is not met since the timing of the review of alternative measures is not planned and it can therefore not be concluded that the review is biennial.</p> <table><tr><th></th><th>SIb score</th><th>SIc score</th><th>SId score</th><th>SIe score</th><th>PI score</th></tr><tr><td>Sei whale</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Blue whale</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Humpback whale</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Sperm whale</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Tucuxi</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Guiana dolphin</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>West Atlantic Manatee</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Large-tooth sawfish</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Smalltooth sawfish</td><td>60</td><td>80</td><td>80</td><td>NA</td><td>75</td></tr><tr><td>Leatherback turtle</td><td>60</td><td>80</td><td>80</td><td>80</td><td>75</td></tr><tr><td>Hawksbill turtle</td><td>60</td><td>80</td><td>80</td><td>80</td><td>75</td></tr><tr><td>Green turtle</td><td>60</td><td>80</td><td>80</td><td>80</td><td>75</td></tr><tr><td>Olive ridley turtle</td><td>60</td><td>80</td><td>80</td><td>80</td><td>75</td></tr></table>		SIb score	SIc score	SId score	SIe score	PI score	Sei whale	60	80	80	NA	75	Blue whale	60	80	80	NA	75	Humpback whale	60	80	80	NA	75	Sperm whale	60	80	80	NA	75	Tucuxi	60	80	80	NA	75	Guiana dolphin	60	80	80	NA	75	West Atlantic Manatee	60	80	80	NA	75	Large-tooth sawfish	60	80	80	NA	75	Smalltooth sawfish	60	80	80	NA	75	Leatherback turtle	60	80	80	80	75	Hawksbill turtle	60	80	80	80	75	Green turtle	60	80	80	80	75	Olive ridley turtle	60	80	80	80	75
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PI 2.3.2		<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none">• meet national and international requirements;• ensure the UoA does not hinder recovery of ETP species. <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species.</p>
		All elements receive a score of 75 and therefore a PI score of 75 is derived.
References		Brewer et al (2006); Crowder et al (1995); Maison (2015); Garstin et al (2018); Griffiths et al (2006); Lewison et al (2003);
OVERALL PERFORMANCE INDICATOR SCORE:		75
CONDITION NUMBER (if relevant):		3

PI 2.3.3 – ETP species information

PI 2.3.3	<p>Relevant information is collected to support the management of UoA impacts on ETP species, including:</p> <ul style="list-style-type: none"> • Information for the development of the management strategy; • Information to assess the effectiveness of the management strategy; and • Information to determine the outcome status of ETP species. 		
Scoring Issue	SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts		
Guidepost	<p>Qualitative information is adequate to estimate the UoA related mortality on ETP species.</p> <p>OR</p> <p>If RBF is used to score PI 2.3.1 for the UoA:</p> <p>Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.</p>	<p>Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species.</p> <p>OR</p> <p>If RBF is used to score PI 2.3.1 for the UoA:</p> <p>Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.</p>	<p>Quantitative information is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.</p>
Met?	(Y)	(N)	(N)
Justification	<p>Concerning the UoA related mortality and impact on ETP species there is some quantitative information available on interactions with sea turtles from ETP logsheets filled on board (Husbands, 2018) and from a bycatch survey organized by WWF (WWF, 2018). Information provided by WWF on the results of the bycatch survey shows that during 19 observer trips no sea turtles were caught. The results of the workshops with seabob fishermen suggest that interactions with sea turtles are mainly sightings (Willems 2018b; Willems, 2018c). ETP reports drafted by the Fishery Department on the basis of ETP logsheets make no distinction between sightings and capture or mortalities so this information is not considered useful to assess the impact of the UoA on ETP species.</p> <p>WWF Guianas with the help of a consultant (T. Willems) have organised 2 workshops (November 2017 and May 2018) with fishermen and fisheries department staff. The outcomes of both workshops have been reported (Willems, 2018b; Willems 2018c). The workshops have been attended by both artisanal and industrial (seabob fleet) fishermen. The fishermen have been asked about the kind and frequency of ETP interactions. Kind of interactions reported were: "Rays: caught as bycatch, Sharks: juvenile sharks caught as bycatch, Turtles: observation, Dolphins: sightings. During the second workshop in May 2018 similar answers were given (Willems 2018c).</p> <p>Considering all the information available the team concludes that some quantitative information is available on the UoA related impact and mortality and this information is supported by anecdotic information provided by fishermen. Furthermore, the fact that the use of TEDs is compulsory and that this obligation is actively enforced and controlled also</p>		

PI 2.3.3		Relevant information is collected to support the management of UoA impacts on ETP species, including: <ul style="list-style-type: none">• Information for the development of the management strategy;• Information to assess the effectiveness of the management strategy; and• Information to determine the outcome status of ETP species.		
		makes it highly likely that this information is adequate. SG60 is met. The information received is mostly qualitative and the quantitative information from the Observer program is limited to a very limited number of observer trips. The information available is not sufficient to assess with a high degree of certainty how many sea turtles and of which species are caught annually in the Guyana seabob fishery. It is also not exactly known how many of the turtles caught are released alive. Consequently, SG80 and SG100 are not met.		
b	Information adequacy for management strategy			
	Guidepost	Information is adequate to support measures to manage the impacts on ETP species.	Information is adequate to measure trends and support a strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
	Met?	(Y)	(N)	(N)
	Justification	As described under Sla above the available information points to a limited impact on sea turtles in Guyana waters also as a consequence of a consistent use of TEDs. The information is considered adequate to support measures to manage the impact on ETP species and thus SG60 is met. The information derived from the ETP logsheets and the other available information however is not adequate to measure trends. Therefore, SG80 is not met and a Condition is formulated.		
References		Husbands (2018); Willems (2018b); Willems (2018c); WWF (2018).		
OVERALL PERFORMANCE INDICATOR SCORE:				60
CONDITION NUMBER (if relevant):				4

PI 2.4.1 – Habitats outcome

PI 2.4.1	The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.		
Scoring Issue	SG 60	SG 80	SG 100
a	Commonly encountered habitat status		
Guidepost	The UoA is unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
Met?	(NA RBF used)	(NA RBF used)	(NA RBF used)
Justification	<p>The marine ecosystem in Guyanese waters is dominated by inputs of freshwater, from local rainfall but also from inputs from the Amazon River, as well as from the Orinoco and the many other rivers in Guyana. This freshwater is laden with silt and nutrients. Coastal waters are therefore highly turbid, nutrient-rich, and somewhat brackish – this is the ‘brown water’ zone.</p> <p>The shallow inshore areas adjacent to river mouths tend to be characterised by accumulations of sediments that form banks of soft mud. These banks tend to shift around but are believed to generally move in a north-easterly direction with the prevailing oceanic current (Artigas et al, 2003). Areas further from the coast are generally characterised by firmer sediments and seabeds mainly comprise areas of sand, clay and clay with silt. A diagrammatic section of the continental shelf (3.4.3 in Paragraph 3.4.4) is shown in Lowe-McConnell (1962). The figure shows that the sediment changes from soft mud, to mud or and then sandy mud depending on the distance from the coast. In that zone the colour of the water is brown as a consequence of the high silt content. From about 35 to 60 miles of the coast the sediment is sandy and the water is less turbid (and green). From about 60 miles from the coast, corals are found and the water has low turbidity (and is blue). Looking at the depths where these different sediments occur figure 3.4.3 shows that up to around 10 fathoms the sediment is mainly soft mud. From around 20-30 fathoms the sediment changes from muddy sand to sand.</p> <p>Recent work by CEFAS (2018) and Willems (2015, 2016, 2018a) seems to support earlier findings by Lowe- McConnell (1962). CEFAS has produced a basic physical habitat map using spatial data that are available on the internet and data consisting of sediment grain size and taxon biomass and/or abundance (the latter collected by Willems in a trawl survey on 20 locations along a depth gradient from 6 to 34 m). The map that was produced (figure 3.4.4 in Paragraph 3.4.4) shows the different sediments that have been distinguished and the 20 locations that have been sampled. The map shows that in the (6 to 34 meter) depth zone sampled by Willems the sediment consists of marine infralittoral mud, marine circalittoral mud and marine infralittoral sand and marine circalittoral sand. So, it can be concluded that the main bottom habitats of the fishing area (14,6x to 32,9 meters, 8-18 fathoms) are mud or sand habitats.</p> <p>Data on the occurrence of taxa that are especially sensitive to trawling impact was downloaded from the OBIS online repository (http://www.iobis.org/). The OBIS data was used to identify any known locations on the Guyanese shelf with sensitive taxa that could</p>		

PI 2.4.1	<p>The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.</p>						
	<p>indicate the presence of vulnerable habitats. The following taxa were included in the dataset:</p> <ul style="list-style-type: none"> • <i>Alcyonacea</i> - soft corals • <i>Scleractinia</i> - hard corals • <i>Pennatulacea</i> - sea pens <p>An overlay map was produced showing the possible locations of sensitive habitats (see figure 3.4.6a). Another overlay map with the footprint of the seabob fishery (figure 3.4.6b) shows that these locations of possible sensitive habitats are generally further off shore than the seabob fishing area.</p> <p>During the site visit the team spoke to fishermen and other stakeholders during meetings, and it was confirmed that there are also some rocky areas on the north-eastern edge of the seabob fishing area. Based on the information collected the team has distinguished 4 habitat types that could have an overlap with the seabob trawling zone:</p> <ul style="list-style-type: none"> • Muddy sediments with high clay fraction • Course sediment with high sand fraction • Possible spots with sensitive taxa • Rock banks <p>Since information on the distribution and sensitivity of possible spots with sensitive taxa and the presence of rocky areas in the seabob trawling zone is not based on comprehensive survey data, the team decided to conduct a CSA on the habitat-outcome performance indicator PI2.4.1.</p> <p>Based on the spatial maps and information provided by stakeholders during the RBF workshops the team concluded that “Muddy sediments with high clay fraction” and “Course sediment with high sand fraction” should be considered as commonly encountered habitats. Concerning “Possible spots with sensitive taxa” and “Rock banks” there is no information on the vulnerability of these habitat types and the team decided to consider these habitat types as a potential VME. Since there are no other habitat types identified than the ones mentioned it was decided to consider “main” habitats only which on the basis of PF7.1.5.1 means that the final PI score shall be adjusted downward according to clause PF7.6.4. (the final PI score shall not be greater than 95).</p> <p>The CSA resulted in MSC CSA derives scores for the commonly encountered habitats of:</p> <table border="1"> <thead> <tr> <th>Habitat type</th><th>MSC CSA derived score</th></tr> </thead> <tbody> <tr> <td>Muddy sediments with high clay fraction</td><td>82</td></tr> <tr> <td>Course sediment with high sand fraction</td><td>89</td></tr> </tbody> </table> <p>The procedures and outcome of this RBF are presented in Appendix 1.2.</p>	Habitat type	MSC CSA derived score	Muddy sediments with high clay fraction	82	Course sediment with high sand fraction	89
Habitat type	MSC CSA derived score						
Muddy sediments with high clay fraction	82						
Course sediment with high sand fraction	89						
	<p>VME habitat status</p>						

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates.			
b	Guided post	The UoA is unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	
	Met?	(NA RBF used)	(NA RBF used)	(NA RBF used)	
	Justification	CSA was used. The CSA resulted in MSC CSA derived scores for vulnerable habitats of:			
		Habitat type		MSC CSA derived score	
Possible spots with sensitive taxa		89			
Rock banks		93			
		The CSA resulted in scores of at least 80 for all scoring elements and a few achieve higher scores, but most do not approach 100. Consequently based on Table PF18 the final MSC score for PI2.4.1 is 85.			
c	Minor habitat status				
	Guided post			There is evidence that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.	
	Met?			(NA RBF used)	
	Justification	CSA was used. Minor habitats have not been scored and the final PI score shall not be greater than 95 (PF7.6.4).			
References		CEFAS (2018); Lampert (2012); Lowe-McConnell (1962); Willems (2018a).			
OVERALL PERFORMANCE INDICATOR SCORE:				85	
CONDITION NUMBER (if relevant):				NA	

PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guidepost	There are measures in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a partial strategy in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	(Y)	(Y)	(N)
	Justification	<p>The Guyana seabob trawl fishery is limited spatially to the seabob trawl zone which is bounded by the 8 fathom and 18 fathoms contours. Consequently, only a relatively narrow zone within the Guyana EEZ is fished. In this zone the prevalent habitat type is soft sediment (mud, sandy mud, sand). Habitats that would be more sensitive to trawling, like coral reefs or seagrass beds) are found either in deeper waters off-shore or in the no trawling zone inshore (Lowe-McConnel, 1962; Willems, 2018; CEFAS, 2018).</p> <p>Other measures in place that constrain impacts are the use of lightweight trawl gear, and limits on both the number of vessels in the fishery and the total number of days that may be fished.</p> <p>This Code of Practice incorporates a move-on rule, established to reduce fishing effects on vulnerable species, habitats and by-catch. The move-on rule shall be applied in the case of a “major interaction”, and may be applied at the discretion of the fleet manager in the case of a “minor interaction”. A major interaction concerning habitat is defined as the catch in a single trawl of any habitat building organisms: sea grass, hard coral, soft coral. Minor interaction is the presence of ETP species seen at the sea surface in an area where fishing is occurring or any situation where the catch of seabob is less than 20% of the total weight caught. So minor interactions are not concerned with habitats. The team has received no evidence that could warrant the conclusion that the prescribed move on rule is actually practiced by the fishermen.</p> <p>However, considering the fact that the seafloor in the seabob trawling zone predominantly consist of mud and sandy mud with limited sensitivity to trawling impacts and the very limited (no) overlap of the trawling zone with areas where VME habitats are known to be present the team concludes that the measures in place together constitute a (sufficient) partial strategy that is expected to achieve the Habitat Outcome 80 level of performance or above. Therefore, SG60 and SG80 are met. SG100 is not met because there is some uncertainty about the consequent practice of the move-on rule.</p>		
b	Management strategy evaluation			
	Guidepost	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or habitats involved.

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
	Met?	(Y)	(Y)	(N)
	Justification	<p>The habitats that have been identified present are highly unlikely to be impacted significantly by the gears used, and limiting the fished area to just the waters between 8-18 fathoms in any case minimises risk to habitats. These conclusions are supported by the recent field research on habitat mapping (CEFAS, 2018)d.</p> <p>Implementing a move-on rule to limit impacts on sensitive habitats adds to the overall partial strategy. This is included as part of Skippers' Code of Conduct and the environmental management strategy and provide further confidence in management outcome.</p> <p>There is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the Guyana seabob fishery and/or habitats involved. SG60 and SG80 are met. SG100 is not met since it cannot be concluded that the adequacy of the move on rule is tested.</p>		
c		Management strategy implementation		
	Guided post		There is some quantitative evidence that the measures/partial strategy is being implemented successfully.	There is clear quantitative evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		(Y)	(N)
	Justification	<p>The key component of the strategy that can be evidenced is the restriction of the Guyana seabob fishery to water depths between 8-18 fathoms and the use of relatively lightweight gears across the whole seabob fleet. VMS is used to monitor the areas fished by the seabob fleet and form quantitative evidence since the data allow for the estimation of the total area fished and the (percentage) overlay with habitat types. Captains are requested to fill habitat logs and submit them to the Fisheries Department on a monthly basis.</p> <p>The team concludes that there is some quantitative evidence that the partial strategy is being implemented successfully and therefore SG80 is met. SG100 is not met since there is no clear quantitative evidence that the move on rule is consequently practiced and achieving its objective.</p>		
d		Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs		
	Guided post	There is qualitative evidence that the UoA complies with its management requirements to protect VMEs.	There is some quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is clear quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats.		
	Met?	(Y)	(Y)	(N)
	Justification	VMS data form quantitative evidence that the UoA complies with the no trawling zone and that in general depth limits are respected. There are no measures in place for the protection of VMEs for other MSC UoAs or non-MSC fisheries. It is therefore concluded that SG60 and SG80 are met. SG100 is not met since the VMS data are not considered to provide sufficient (clear quantitative) evidence that fishermen fully comply with the management requirements.		
References		Lowe-McConnel (1962); Willems, (2018); CEFAS, 2018. Maison (2015)		
OVERALL PERFORMANCE INDICATOR SCORE:				80
CONDITION NUMBER (if relevant):				NA

PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guidepost	<p>The types and distribution of the main habitats are broadly understood.</p> <p>OR</p> <p>If CSA is used to score PI 2.4.1 for the UoA:</p> <p>Qualitative information is adequate to estimate the types and distribution of the main habitats.</p>	<p>The nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.</p> <p>OR</p> <p>If CSA is used to score PI 2.4.1 for the UoA:</p> <p>Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.</p>	<p>The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.</p>
	Met?	(Y)	(Y)	(N)
	Justification	<p>Basic habitat maps have been produced by CEFAS (2018) showing habitat distribution. The maps show that the prevalent habitat types in the area where the fishery takes place are mud, muddy sand and sand habitats. Coral habitats are found further off shore in deeper water (Lowe-McConnel, 1962). CEFAS (2018) have also collected available information (on the internet) on the possible existence of more sensitive habitats in the fishing area. Data on the occurrence of taxa that are especially sensitive to trawling impact was downloaded from the OBIS online repository (http://www.iobis.org/). The OBIS data was used to identify any known locations on the Guyanese shelf with sensitive taxa that could indicate the presence of vulnerable habitats.</p> <p>The habitats maps produced by CEFAS and additional habitat maps provided by the Fisheries Department (using the model/GIS developed by CEFAS) have been used to conduct a CSA. The maps provided sufficient quantitative information on the types and distribution of the main habitats. Therefore, SG60 and SG80 are met.</p> <p>The habitat maps produced show that spots with sensitive taxa do not overlap with the seabob trawling zone (CEAFS, 2018). However, the information used to develop this map is rather anecdotal and it is not completely certain that some limited spots with sensitive taxa are present within the seabob trawling zone. Consequently, it cannot be concluded that the distribution of all habitats is known over their range and SG100 is not met.</p>		
b	Information adequacy for assessment of impacts			
	Guidepost	<p>Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.</p>	<p>Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and</p>	<p>The physical impacts of the gear on all habitats have been quantified fully.</p>

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.		
		OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	location of use of the fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	
	Met?	(Y)	(Y)	(N)
	Justification	As described under SIa, overlay maps with the fishing footprint and main habitat types have been developed (see figure 3.4.6b & 3.4.7a). These maps provide some quantitative information that is adequate to estimate spatial attributes of the main habitats. Information on the sediment types in the trawling area (Lowe-McConnel, 1962) the presence of biota (Willems, 2018; CEFAS, 2018), seabed slope and fishing gear used are available (and have been used in the CSA) to estimate consequence attributes. For certain attributes however, the absence of data has resulted in the use of proxies provided in the CSA tables (see Appendix 1.2). The team concludes that for both consequence and spatial attributes of the main habitats sufficient information was available to estimate them and therefore SG60 and SG80 are met. SG100 is not met since the physical impacts of the gear on habitats have not been quantified.		
c	Monitoring			
	Guided post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in habitat distributions over time are measured.
	Met?		(Y)	(N)
	Justification	VMS data are collected on an ongoing basis. These data allow for the detection of any shifts in the fishing footprint of the fishery or an increase in fishing intensity. Additionally, the captains of seabob trawlers are requested to fill habitat logs and submit them to the Fisheries Department on a monthly basis. It can therefore be concluded that adequate information continues to be collected to detect any increase in risk to the main habitats and SG80 is met. Since there is no regular monitoring of habitat types or their distribution it cannot be concluded that changes in habitat distributions over time are measured. Therefore, SG100 is not met.		
References		CEFAS (2018); Willems (2018a).		
OVERALL PERFORMANCE INDICATOR SCORE:				
80				

PI 2.4.3	Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat.
CONDITION NUMBER (if relevant):	NA

PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.		
Scoring Issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guided post	The UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is evidence that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	(Y)	(Y)	(N)
	Justification	<p>Guyana's EEZ and the ecosystem therein is part of the North Brazil Shelf Large Marine Ecosystem (Figure 3.4.9) that owes its definition to the influence of North Brazil Current (NBC). The NBC and its extension, the Guianas Current (GC), flow north-westwards, carrying the low-salinity and nutrient and sediment-rich water coming from the Amazon along the shorelines of French Guiana, Suriname, Guyana and Venezuela.</p> <p>Research on the marine ecosystem in Guyana waters is rather limited. Recent work by Willems on benthic species assemblages (Willems, 2018a) and habitat mapping by CEFAS (2018) and early work by Lowe-McConnel (1962) are the main sources of information.</p> <p>However more research has been done in neighbouring Suriname and in French Guyana. Since the EEZ's of these countries are under the same influence of the North Brazil Current and its prolongation the Guyana current (see figure 3.4.10) it can be assumed that the ecosystems in Guyana's, Suriname and French Guyana waters are rather similar. From this work (Cadee, 1975, Artigas 2013) it can be concluded that in turbid waters near the coast that are influenced by the Amazon and other rivers primary production is limited by low light penetration. Primary production is nutrient-limited in the clearer offshore waters. Research of Cadee (1975) in Suriname and French Guyana however showed that parallel to the coast outside the turbid coastal waters a zone of relatively high primary production is situated. This zone corresponds with water depths of 20 to 60 m. Cadee concluded that the high primary production in this zone will form the base for the important shrimp fishery off the Guianas. Nutrients responsible for this relatively high primary production originate from 3 sources: upwelling, mineralization of terrestrial organic detritus in the coastal zone, and the inflow from the Amazon and other rivers. Jaussaud (2007) studied the phytoplankton dynamics in French Guiana and describes a pronounced coast-wide gradient with three zones: a coastal area influenced by continental inputs, an intermediate zone under the influence of rivers, tides and Amazonian inflows, and finally a wide offshore area under oceanic influence. In November 2009 a benthic sampling took place of the entire French Guyana continental shelf (Créocéan, 2011, Artigas et al, 2003). The study showed the lowest number of benthic species and biomass near the coast, where muddy inputs are stronger, the species richness increases and becomes more stable offshore. The highest values are observed between 80 and 100 m depth (see figure 3.4.11).</p> <p>The findings described by Artigas et al. (2003) are supported by the work of Willems in both Suriname (Willems et al., 2016b) and Guyana (Willems 2018a). Willems concluded (Willems, 2018a) that in Guyana the coastal assemblages of fish and epibenthos, and the abiotic environment where they occur, are very similar to those observed in Suriname and</p>		

PI 2.5.1	The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.
	<p>that this this could be expected based on historical surveys (e.g. Lowe-McConnell, 1962). For Guyana Willems (2018a) found that coastal assemblages of both demersal fish and epibenthos could be discerned at 6, 13 and 20 m depth. The coastal epibenthos assemblage was very species poor (see table 3.4.4), and dominated by seabob shrimp. The coastal fish assemblage, on the other hand (table 3.4.4) was more diverse. The abiotic environment in the coastal assemblages was characterized by turbid waters and muddy sediments with a high clay fraction and low sand fraction. At 27 and 34m depth, very different species assemblages occurred. These offshore assemblages were more diverse in both fish and epibenthic species, and occurred in waters with lower turbidity, over coarser sediments with a higher sand fraction. Concerning the impact of seabob trawling Willems (2018a) concludes: “The shift between coastal and offshore assemblages around the 30m isobath seems to be the most important feature of the benthic ecosystem of the inner Guyana shelf, and corresponds to the community structure observed in Suriname. This shift coincides with a transition between two principal ecosystems: a coastal, river influenced system fueled by detritus, versus an open shelf system based on primary production (Bianchi, 1992). Seabob trawl fisheries, both in Suriname and Guyana mainly operate below the 30m isobath, i.e. in the coastal ecosystem. Research in Suriname concluded that the impact of seabob trawl fisheries on marine habitats is limited, due to the naturally dynamic, muddy seabed in the areas trawled for seabob shrimp (Willems, 2016b). The benthic invertebrate community in this ecosystem, both in Guyana and Suriname, is dominated by seabob shrimp, with few other species present on seabob trawling grounds. It seems therefore safe to conclude that in Guyana, like in Suriname, the impact of seabob trawling on marine habitats, defined as the ‘chemical and bio-physical environment including biogenic structures, where fishing takes place’ is limited.”</p> <p>In the context of the North Brazil LME, Guyana’s seabob fishery comprises a small, albeit locally significant fishery. In terms of protecting the ecosystem structure and function, Guyana’s seabob fishery operates in a narrow, depth-limited band (8-18 fathoms) off Guyana’s coast, up to the depth limit of the main seabob population (Willems 2015a); a considerable area of seabob habitat therefore occurs inshore of the fished area bordered by the 8-fathom line.</p> <p>The role of seabob in the food-web has been studied by Quilez (2014) and Willems (2016) in neighbouring Suriname. These studies showed that seabob is one of the most abundant demersal organisms in the coastal system up to 30 m depth, and that it is an important prey item for many other organisms, including demersal fish species, having been found in 18.3% of examined fish stomachs in neighbouring Suriname (Quilez 2014). Willems et al. (2015b) concluded that a significant amount of energy in the benthic food web of the inner shelf is channelled at an intermediate level through seabob.</p> <p>Considering the fact that the benthic ecosystem in the seabob trawling zone is dominated by seabob and a very limited number of other species and the dynamic nature of the seabed with shifting mudbanks it can be concluded that the impact of the fishery on the benthic ecosystem is limited. This conclusion is also supported by the fact that the seabob fishery is limited to a rather narrow zone and a large part of the zone where the inshore benthic community occurs lays within the non-trawling zone. The main impact of the fishery therefore seems to be the removal of seabob shrimp biomass and the bycatch of fish.</p> <p>The bycatch of fish has been considered under the secondary species component in paragraph 3.4.2. It was considered there that the bycatch in the fishery for a very large part consists of juveniles of a limited number of species. Nine fish species account for over 70% of the bycatch (see table 3.4.1). As a result of the use of TEDs larger specimen of species like green weakfish (<i>Cynoscion virescens</i>) are not caught and the use of a BRD</p>

PI 2.5.1	The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.
	<p>allows a significant part of smaller fish that are caught in the trawl to escape. Since these 'main' bycatch species inhabit the inshore zone that for a large part is closed for trawling as a consequence of the 8-fathom depth limit it must be considered unlikely that the bycatch of fish could disrupt the key elements underlying ecosystem structure and function.</p> <p>This has significance with respect to the main bycatch species which occur throughout this inshore area – with the use of TEDs and BRDs allowing most of the larger fish, and many of the smaller fish to escape the trawl nets. But this has still greater significance with respect to the several species of rays – which are found throughout this inshore zone feeding on the invertebrate assemblages present, but which are most concentrated in the inner shallower areas of this inshore zone, tapering off through the transition zone between broadly the 20 and 30m contours (6 to 8 fathom lines) (Willems et al, 2015; further supported in the results of fishing surveys in Guyana and Suriname in the 1950s (McConnell & Mitchell 1960) and 1980s (JMFRR 1983). For these species, use of TEDs tends to exclude larger ray specimens from the nets, but most smaller rays entering the nets are retained in the nets.</p> <p>Anecdotal information (including from species identification workshops held along the Guyana coast – Willems 2018b & c) suggests that bycatch of rays in artisanal fishing may be significant – though no clear survey or research evidence that this is so is available. This tapering off of ray concentrations was, however, picked up in the WWF Seabob Trawl Observer programme results (Medley 2017), which has prompted the precautionary movement of the inner line of the seabob trawl zone from the 7 to the 8 fathom contour.</p> <p>Concerning the possible consequences of the removal of a considerable quantity of seabob from the ecosystem some scientific work has been done in Suriname on the trophic ecology of seabob (Kerkhove, 2014; Willems et al. 2016). Willems et al. found from the analysis of the stomach content of seabob that the food of seabob mainly consisted of detritus (50%), copepods and unidentified crustaceans (30%), plant material (6%) and sediment (7%). In the same study Willems et al. (2016) conclude that: “the benthic microalgae (BM) layer on (bare) intertidal mudflats subsidize secondary production in the subtidal water body and that seabob shrimp seem to play a crucial role in this process. Being the single abundant epibenthic species up to 30 m depth, it acts as a vector for energy from intertidal primary production to subtidal secondary production. Furthermore, the species is known to be a prey for commercially important demersal fishes (Camargo and Isaac, 2004). While the general importance of <i>X. kroyeri</i> as a prey for higher trophic levels on the Suriname Shelf is still to be assessed, it can be stated that <i>X. kroyeri</i> passes energy from offshore sedimentary organic matter (SOM), intertidal benthic microalgae (BM) and small hyperbenthic prey up the food chain.” Based on the work done by Willems et al. it can be concluded that a significant amount of energy in the benthic food web of the inner Guyana shelf is channelled at an intermediate level through seabob. It can also be concluded that seabob are almost certainly an important prey species for many post juvenile fish species. The impact on the seabob fishery on the seabob stock should therefore be carefully managed (Willems et al., 2016).</p> <p>A range of management measures which serve to protect the seabob resource, while also preventing serious harm to the ecosystem, have been implemented. The most important of these are contained in the seabob fishery management plan, which also contains a reasonably well developed and targeted research plan for seabob fisheries. Restrictions on the number of vessels that may operate within the fishery, and the number of days-at-sea allowed per year, as well as limiting the fishery to water depths of 8 to 18 fathoms, so preventing trawling in a significant area to the coastward side of the fishery (Willems, 2015), serve to protect the seabob resource and prevent serious harm to the ecosystem.</p>

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function.
		<p>Additionally, the HCR as implemented by the Seabob Management Plan serves to limit the impact of the fishery on the seabob stock.</p> <p>Management of the potential impacts of the fishery on other ecosystem components (bycatch species, ETP species, habitats) has been significantly enhanced in recent times through elements of the seabob fishery management plan as well as the fleet and on-board vessel Code of Practice, as discussed in greater detail in previous sections of the report.</p> <p>Based on the conclusion above that the main impact of the seabob fishery will be the removal of a substantial amount of seabob shrimp from the ecosystem and that this impact is limited by partial strategy to reduce this impact (no trawling zone, HCR, days at sea, maximum number of vessel) the team concludes that it is highly unlikely that the UoA disrupts the key elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm and therefore SG60 and SG80 are met.</p> <p>SG100 is not met since this conclusion is partly based on plausible argument and not solely on the results of scientific research (evidence).</p>
References		Cadée (1975); Jaussaud Ivaneide (2007); Kerkhove (2014); Lowe-McConnell (1962); WECAFC (2013); Willems et al (2016b); Willems (2018a).
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER (if relevant):		

PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guidepost	There are measures in place, if necessary, which take into account the potential impacts of the fishery on key elements of the ecosystem.	There is a partial strategy in place, if necessary, which takes into account available information and is expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a strategy that consists of a plan , in place which contains measures to address all main impacts of the UoA on the ecosystem, and at least some of these measures are in place.
	Met?	(Y)	(Y)	(Y)
	Justification	<p>There are a number of measures in place that restrain the impact on the ecosystem.</p> <ul style="list-style-type: none"> • There are limits to the maximum number of vessels and the number of days at sea and these limits put a maximum to the total fishing effort and thereby to the total impact on the seabob stock and the ecosystem. • The fishery is limited to the 8-18 fathoms depth zone confining the fishery to a relatively narrow zone within Guyana's EEZ. Thereby the total footprint of the fishery on bottom habitats and other ecosystem components is limited to this zone. • The no trawling zone from the coast up to the 8-fathom line contains a large area of seabob habitat inshore of the fished area. Consequently, a large part of seabob habitat and the seabob therein are excluded from the fishery impact. Thus, also this measure limits the total impact on the seabob stock. • The HCR as defined in the Seabob Management Plan limits the total impact to the seabob stock with the use of reference points. This measure ensures that the depletion of the seabob stock is prevented and the stock is maintained at a level in which it still can perform its ecosystem functions. • The use of TEDs and BRD is compulsory and thereby the impacts on ETP species and bycatch species are reduced. • Move on rules are defined in the Code of Practice that require vessels to move on when there are interactions with possibly sensitive habitats (coral, sponges), sensitive species (sea mammals, turtles, sharks, sting rays) or when 5% or more of the estimated total catch in weight consists of species occurring in the Vulnerable Species List²⁸. <p>The team concludes that the measures described together form a strategy and that this strategy is laid down in the Seabob Management Plan (and accompanying regulations) and therefore that the strategy in place consists of a plan. The plan addresses all main impacts</p>		

²⁸ The vulnerable species list is included in the Code of Practice. Besides ETP species it contains the Elasmobranchs Longnose stingray, Cownose ray and Sharpnose ray.

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function.		
		of the fishery on the ecosystem and the measures defined in the plan are in place. Therefore, SG100 is met.		
b	Management strategy evaluation			
	Guidepost	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/ecosystems).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or ecosystem involved
	Met?	(Y)	(Y)	(N)
	Justification	The restriction of the number of vessels and the days-at-sea for the fleet, the HCR which sets the Target Reference Point and the Trigger and Limit Reference Points, the use of TEDs and BRDs and the inshore no trawling zone are measures that result in the limitation of the impact of the fishery on the key ecosystem. This is supported by habitat and sampling work undertaken in the Guyana coastal area, supported by more in-depth research undertaken in the Suriname coastal zone. It is therefore concluded that there is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved and SG60 and SG80 are met. SG100 is not met since the scientific work on the ecosystem impact that has been conducted up to date in Guyana waters is rather limited and the results up to date don't warrant the conclusion that the effectiveness of the partial strategy is tested.		
c	Management strategy implementation			
	Guidepost		There is some evidence that the measures/partial strategy is being implemented successfully .	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective as set out in scoring issue (a) .
	Met?		(Y)	(N)
	Justification	VMS data are available for all vessels within the seabob fleet, and show that the fishing activity occurs in the area designated for fishing. The use of TEDs and BRDs is compulsory to prevent the catch of sea turtles and reduce the bycatch of undersized fish species. The implementation of these measures is controlled by regular inspections on board and results of inspections are reported in annual reports of the Seabob Working Group. The status of the Seabob stock status is monitored by CPUE monitoring. The available information provides some evidence that the measures that form the partial strategy are actually implemented successfully. Therefore, SG80 is met. SG100 is not met since the information described does not allow for the conclusion that the partial strategy is achieving its objectives.		
References		Maison (2015), Amsterdam (2016); Fisheries Department (2015)		
OVERALL PERFORMANCE INDICATOR SCORE:				85
CONDITION NUMBER (if relevant):				NA

PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guidepost	Information is adequate to identify the key elements of the ecosystem.	Information is adequate to broadly understand the key elements of the ecosystem.	
	Met?	(Y)	(Y)	
	Justification	The ecosystem in Guianas EEZ forms part of the North Brazil Shelf Large Marine Ecosystem. Although specific information on the marine ecosystem in Guyana waters is rather limited (Lowe-McConnel, 1962; Willems, 2018a; CEFAS 2018) more information can be found on the marine ecosystem in neighbouring Suriname and French Guyana and since the waters of these countries are under the same influence of the NBC and the Guyana current it can be expected that the key elements of these ecosystems are rather similar as well. Ecosystem research on the trophic role of seabob in the ecosystem has been undertaken in Suriname by Kerkhove (2014), Quilez (2014) and Willems et al. (2016b). Further information is available on the bycatch of elasmobranchs (Willems et al., 2013; Willems et al., 2016a) and the epibenthic community (Willems et al., 2015). Extensive ecosystem research has also been done in French Guyana (Cadee, 1975; CREOCEAN, 2011; Lampert, 2012). The information that is available is adequate to broadly understand the key elements of the ecosystem and therefore SG60 and SG80 are met.		
b	Investigation of UoA impacts			
	Guidepost	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail .	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and have been investigated in detail .
	Met?	(Y)	(Y)	(N)
	Justification	The information described in paragraph 3.4.5 and under PI2.5.1 above is sufficient to determine the main impacts of the fishery on key elements of the ecosystem. It has been concluded that the seabob stock itself is a key element of the ecosystem. Main impact on other key elements of the ecosystem (bycatch species, sea, turtles and bottom habitats) can be inferred from the existing information. The bycatch in the fishery (Medley, 2017) and the trophic ecology of seabob (Willems et al., 2016b) have been investigated in detail. Therefore, it can be concluded that Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail. SG60 and SG80 are met. SG100 is not met since not all main interactions between the UoA and ecosystem elements have been investigated in detail. For instance, the impact on bottom habitats have been inferred from existing information but they have not yet been studied in the field.		
c	Understanding of component functions			
	Guidepost		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.			
			Habitats) in the ecosystem are known .	and the main functions of these components in the ecosystem are understood .	
	Met?		(Y)	(N)	
	Justification	Work done by Lampert 2012 in French Guyana, and Willems 2016 in Suriname shows that seabob is a key prey species for a number of finfish species, and that a significant amount of energy in the benthic food web of the inner Guyana shelf is channeled at an intermediate level through seabob. Willems 2016 provides more detailed examination of the food web interconnections associated with seabob in the Suriname coastal zone. On the basis of this work it can be concluded that the main function of the P1 target species is known. Work done in Guyana, Suriname and French Guyana as described in paragraph 3.4.5 and under PI2.5.1 provides sufficient information on the role of secondary (bycatch) species, ETP species and habitats to conclude that their main function in the ecosystem are known. Therefore, SG80 is met. SG100 is not met since not all main functions of these components in the ecosystem are understood.			
d	Information relevance				
	Guidepost		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components and elements to allow the main consequences for the ecosystem to be inferred.	
	Met?		(Y)	(N)	
	Justification	There is information on the impacts of the UoA on the components of the Guyana marine ecosystem (Willems et al., 2016b; Medley, 2017; WWF, 2018). Augmented with information on the marine ecosystems in Suriname and French Guyana this information is considered adequate to allow some of the main consequences for the ecosystem to be inferred. Therefore, SG80 is met. SG100 is not met since there is no adequate information to determine impacts on all ecosystem elements.			
e	Monitoring				
	Guidepost		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.	
	Met?		(Y)	(N)	
	Justification	VMS data are collected on an ongoing basis. These data allow for the detection of any shifts in the fishing footprint of the fishery or any increase in fishing intensity. Additionally, the captains of seabob trawlers are required to fill habitat and ETP logs and submit them to the Fisheries Department on a monthly basis. Last haul data on bycatch are gathered on a regular basis. Data on CPUE are monitored on an ongoing scale and would also show an increase in fishing pressure on the stock or downward trends in the stock.			

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem.
		<p>It can therefore be concluded that adequate information continues to be collected to detect any increase in risk level concerning ecosystem impacts. Therefore, SG80 is met.</p> <p>Since there is no detailed information on the distribution of habitat types or information that allows for the determination of trends in the bycatch of sea turtles it cannot be concluded that information is adequate to support the development of strategies to manage ecosystem impacts. Therefore, SG100 is not met.</p>
References		Cadée (1975); Créocéan (2011); Jaussaud, Ivaneide (2007); Kerkhove (2014); Lowe-McConnell (1962). Medley (2017); Quilez (2014); Willems et al (2015); Willems et al (2016b); Willems (2018a); WWF (2018).
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER (if relevant):		NA

PI 3.1.1 – Legal and/or customary framework

PI 3.1.1	<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> Is capable of delivering sustainability in the UoA(s); and Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and Incorporates an appropriate dispute resolution framework. 		
Scoring Issue	SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management		
Guidepost	<p>There is an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2</p>	<p>There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.</p>	<p>There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.</p>
Met?	(Y)	(Y)	(N)
Justification	<p>The Guyana Ministry of Legal Affairs is at the center of the national legal system. When Guyana gained independence from Britain (1966) it enacted constitutional, judicial and legislative reforms and established a 3-tiered legal hierarchy (i. Magistrate's Court, ii. the High Court of the Supreme Court of Judicature, iii the Guyana Court of Appeal (since 2005 the Caribbean Court of Justice has become Guyana's final Court of Appeal). These constitutional arrangements and civil and political rights are enshrined in the Constitution. The Constitution (1980) and the Republic Act (1970) and all subsequent laws of Guyana can be viewed on the Ministry of Legal Affairs website: https://mola.gov.gy/information/laws-of-guyana</p> <p>The national legal system in relation to fisheries is enshrined in the Fisheries Act (2002) which sets out the powers of the Minister and the Chief Fisheries Officer with respect to fisheries. This empowers the Minister to make appropriate regulations including technical measures and schemes for limiting entry into fisheries and details licensing procedures and enforcement powers. This provides the explicit legal foundation for fisheries-specific Fisheries Management Plans.</p> <p>It can therefore be concluded that there is an effective national legal system. However, this Scoring Issue (SI) also requires consideration of the procedures in place for cooperation with other parties to achieve fisheries and ecosystem objectives of MSC P1 and P2.</p> <p>The Guyana Seabob fishery does not target a shared or straddling stock therefore cooperation with other parties (nations) is not necessary in the case of this fishery and the SG60 and SG80 requirements for cooperation with other parties is met (because the scoring guidepost says "if necessary"). However, there is organized and effective regional cooperation in relation to science through the Caribbean Regional Fisheries Mechanism (CRFM). Guyana is also an active member of FAOs Western Central Atlantic Fishery Commission (WECAFC). Although WECAFC is not actively involved in the management of the seabob fishery, Guyana has presented data about the fishery at workshops in relation to ecosystem management of shrimp and groundfish fisheries (FAO 2017b) and actively</p>		

PI 3.1.1	<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none">• Is capable of delivering sustainability in the UoA(s); and• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and• Incorporates an appropriate dispute resolution framework.			
	<p>participates in other relevant areas, such as collaborations to combat IUU fishing. Guyana is a signatory to UNCLOS (ratified in 1993).</p> <p>The Fisheries Act 2002 explicitly requires that fishery management plans prepared by the Chief Fisheries Officer “can be harmonized with fisheries plans or licensing laws or policies of states in the sub-region or region, particularly in respect of shared or straddling fish stock or highly migratory fish stocks”. Though these mechanisms are organised and effective they are not binding. Therefore, SG60 and SG80 are met but not SG100.</p>			
b	Resolution of disputes			
	Guidepost	The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes which is considered to be effective in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a transparent mechanism for the resolution of legal disputes that is appropriate to the context of the fishery and has been tested and proven to be effective .
	Met?	(Y)	(Y)	(N)
	Justification	The Fishery Act 2002 (Part IV. Art. 15) explicitly sets out the dispute resolution mechanism. This outlines the role of a conciliator and also states that “the proceedings before a conciliator or a committee of conciliators shall be conducted in public”. This is concluded to meet the requirements of both SG60 and SG80. Although it is understood that this has been tested and proven to be effective, no documented example of this was provided to support the MSC audit findings therefore SG100 is not met.		
c	Respect for rights			
	Guidepost	The management system has a mechanism to generally respect the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.
	Met?	(Y)	(Y)	(N)
	Justification	There are recognized indigenous peoples in Guyana, or Native Guyanese, comprising roughly 9% of Guyana's population. There are four main tribes, the Warraus, Arawaks, Wapisianas and the Caribs (with various further subdivisions) (ref Guyana Chronicle). All		

PI 3.1.1		<p>The management system exists within an appropriate legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none">• Is capable of delivering sustainability in the UoA(s); and• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and• Incorporates an appropriate dispute resolution framework.
		<p>are collectively referred to as Amerindians. Although most are inland in the interior of the country, at least 1 group, the Warraus, are coastal, occupying low-lying coastlands between the Barima and the Pomeroon Rivers in the North West of the country in administrative Region 1, up to the border with Venezuela.</p> <p>The Guyanese government has a Ministry of Indigenous Peoples’ Affairs (https://moipa.gov.gy/) with a published mission statement: “To enhance the social, economic and environmental well-being of Indigenous Peoples and their lands through collaboration, sustainable development and appropriate legislation, while at the same time ensuring the preservation of Indigenous culture and traditional knowledge”.</p> <p>The legal rights of Amerindians are recognized and in the Constitution of the Cooperative Republic of Guyana Act (1980) and set out in the Amerindian Act, 2006. The preamble to the Act states that it is an Act “to provide for the recognition and protection of collective rights of Amerindian villages and communities”. Whilst much of the focus of the act is land rights (including mining rights) and village governance structures, and whilst there is no explicit mention of coastal fisheries, it does empower village councils to make “rules governing the protection and sustainable management of wildlifeincluding restrictions on fishing”.</p> <p>Given the above, it is concluded that there is a legal mechanism to observe the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood. Furthermore, the 8 Fathom inshore line can be seen as a measure to safeguard the fishing opportunities of artisanal fishers. Therefore, SG60 and SG80 are met. However, given the that coastal fishing rights are not specifically mentioned within the Act, SG100 is not met.</p>
References		<p>http://guyanachronicle.com/2010/09/17/amerindian-tribes-of-guyana-2</p> <p>Ministry of Indigenous Peoples’ Affairs: https://moipa.gov.gy/about-us/</p> <p>Chackalall & Dragovich (1982); Hennessy (2013);</p> <p>Constitution of the Cooperative Republic of Guyana (1980). Laws of Guyana Chapter 1.01</p> <p>Republic Act (1970). Act no. 9 of 1970. Laws of Guyana. Chapter 1.02</p> <p>Fisheries Act (2002). Laws of Guyana. Chapter 78.01</p> <p>Amerindian Act (2006). Laws of Guyana. Chapter 29.01</p>
OVERALL PERFORMANCE INDICATOR SCORE:		80
CONDITION NUMBER (if relevant):		n/a

PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		<p>The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</p>		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guidepost	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are generally understood .	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for all areas of responsibility and interaction.
	Met?	(Y)	(Y)	(N)
	Justification	<p>The Fisheries Act 2002 clearly sets out the powers of the Minister and the Chief Fisheries Officer. It also establishes the Fisheries Advisory Committee and outlines its roles. Further roles, including the establishment of the Fisheries Monitoring Centre and fisheries observers are set out in the Fisheries Regulations (No.3 2018). The roles and responsibilities of the Fisheries Department are also detailed on the department's website. Although the information contained on the website is limited, it does define areas of responsibility and provide contact details. The Fishery Department also has a Facebook page, but this does not provide further information.</p> <p>Responsibility for fisheries patrol at sea lies with the Guyana Coastguard (which sits under the Guyana Defence Force). Although the fisheries department does not have any marine monitoring capacity, Fisheries Officers from the Fisheries Department undertake joint inspections at sea with the coastguard. The Marine Police (part of the Guyana Police Force) are responsible for bringing fisheries prosecutions on the basis of evidence provided by the Fisheries Department. The ability of both the Guyana Defence Force and the Guyana Police force to act as Fisheries Officers is explicitly stated in the Fisheries Act (2002).</p> <p>Responsibility for scientific research were less clearly defined – in part due to the low level of scientific infrastructure in Guyana. However, the Fisheries Department does have a Research and Development Unit with sub-units focussed on Statistics and Resource Assessment. In spite of this, much of the scientific work in marine environmental science or stock science has been funded by industry and undertaken according to industry need. In the past the relationship with the regional fisheries management organisation (CRFM) has been effective in ensuring application of appropriate science.</p> <p>Previous stock assessments (2013) have been coordinated at the CRFM level and funded by industry. At the time of the MSC audit a further stock assessment is underway (Medley 2019) which is again industry funded. This latest stock assessment will be valid for a number of years because it is designed to enable the fishery department to actively monitor trends in abundance and apply the HCR (determined at the time of the stock assessment) using CPUE as an abundance proxy. Responsibility for stock assessment at the time of this MSC audit is therefore explicitly defined and well understood, thus meaning that SG80 is met for this key area. However, it would be beneficial to more formally clarify</p>		

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties.		
		The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
		within management policy where responsibility will lie for commissioning and financing <i>future</i> stock assessments. This shortcoming does not appear to affect the current functioning of the management system; however, it does mean that Functions, roles and responsibilities are not explicitly defined and well understood for all areas so SG100 level is not met and a recommendation is raised.		
b	Consultation processes			
	Guidepost	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the information and explains how it is used or not used .
	Met?	(Y)	(Y)	(N)
	Justification	Section II of the Fisheries Act (2002), which focusses on fisheries management and development states that “In the preparation and review of each fisheries plan, the Chief Fisheries Officer shall consult with the local fishermen, local authorities and other persons affected by the fisheries management plan and with any Fisheries Advisory Committee”. This creates an explicit legal requirement to consult with all affected stakeholders. The Fisheries Advisory Committee (defined in the Fisheries Act 2002) also serves as an effective consultation process. The National Fisheries Management Plan (2013-2018) includes a description of the consultation process that was undertaken to inform its development. It states that consultations were held with a wide range of stakeholders including artisanal fishermen (from several regions), vessel owners and representatives, seafood processors, government agencies and NGOs. The Fishery Management Plan clearly shows the outcome of these consultations highlighting and rating the issues of concern and goes on to state that “ <i>The Fisheries Department has used this analysis as a basis for identifying for each fishery the issues to be address as a priority over the five-year period of the management plan</i> ”. This demonstrates ‘consideration of the information obtained’ (SG80) but perhaps falls short of the full SG100 requirement for an explanation of why certain information was not used. The Seabob Working Group forms an effective and on-going forum for stakeholder consultation enabling a wide range of stakeholder perspectives to be reflected in management decision-making. Where the Seabob Working Group produce documents, such as the Seabob Managment Plan, they undertake further consultations and outreach. This particular example is described in more detail below for SIc. Overall it is concluded that the requirements of SG80 are fully met but not the full intent of SG100 because it does not explain how information is used or not used.		

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties.	
		The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties	
c	Participation		
	Guidepost	The consultation process provides opportunity for all interested and affected parties to be involved.	The consultation process provides opportunity and encouragement for all interested and affected parties to be involved, and facilitates their effective engagement.
	Met?	(Y)	(N)
	Justification	A further example of consultation processes, was the April 2015 consultation that was carried out to contribute to the development of Seabob Management Plan. Minutes of five of these consultation meetings have been provided to the MSC assessment team. According to the minutes it is evident that the Fisheries Department encouraged artisanal fishers to participate in the consultation process and facilitated this involvement by holding meetings in several regions. On this occasion and for the artisanal fishermen the requirements of SG100 appear to have been met. However, for other stakeholders the opportunities for consultation are via representation at either the Seabob Working Group of the Fisheries Advisory Council in accordance with the requirements described above (3.1.2b). This more closely reflects the SG80 definition. To conclude, although there is some evidence of some consultation processes meeting the SG100 requirement, others more closely reflect SG80 level scoring, therefore SG100 is not met. In order for SG100 to be fully met, the sort of open consultation processes used to encourage and facilitate engagement with the artisanal fleet would be employed to engage a wider range of stakeholders.	
References		Fisheries Act (2002). Laws of Guyana. Chapter 78.01 Minutes from 2015 Fisherfolk consultations (unpublished). Guyana Fisheries Department Website: http://agriculture.gov.gy/fisheries/ Guyana Coastguard website: http://www.gdf.mil.gy/index.php/units/coast-guard/about-the-coast-guard.html Fisheries Regulations (No.3 2018). The Official Gazette OF GUYANA (26th May 2018). Published by the Authority of the Government. Willems (2018b & c)	
OVERALL PERFORMANCE INDICATOR SCORE:			80
CONDITION NUMBER (if relevant):			n/a

PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guidepost	Long-term objectives to guide decision-making, consistent with the MSC fisheries standard and the precautionary approach, are implicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach are explicit within management policy.	Clear long-term objectives that guide decision-making, consistent with MSC fisheries standard and the precautionary approach, are explicit within and required by management policy.
	Met?	(Y)	(Y)	(Y)
	Justification	<p>Earlier iterations (i.e. 1989-1993) of the National Development Plan placed considerable emphasis on the need to maximize output from fisheries, with less emphasis on the need for sustainability. However, more recent policies place considerably more emphasis on the need for any such development to be sustainable. This change has been influenced by the FAO "Code of Conduct for Responsible Fishing" (1995).</p> <p>Chapter 31 of the Guyana National Development Strategy (1996) focuses on fisheries policy. Whilst much of this still focused on the potential to develop fisheries it identifies the depletion of important fish stocks as threat to growth and there is clear recognition of the need to: <i>"Put the sector on a more sustainable basis, environmentally, by improving our knowledge of marine eco-systems and stocks, taking measures to reduce incidental catch and waste of non-targeted species, assuring that the fishing effort is commensurate with the sustainable productive capacity of the resources, and introducing other environmentally sound practices"</i>. The more recent "Framework of the Guyana Green State Development Strategy and Financing Mechanisms" goes further placing sustainability at the core of policy.</p> <p>The Fisheries Act (2002) requires the Minister of Chief Fisheries Officer to "promote precautionary approaches to fisheries management as well as the need to preserve fisheries resources for future generations".</p> <p>The Marine Fisheries Management Plan (2013-2018) explicitly spells out the long-term objectives and refers back to the National Policies (referred to above) that have contributed to the development of the plan. Whilst the Fisheries Management Plan still includes the objective of utilizing resources for the benefit of the nation, this is clearly balanced by the objectives:</p> <ol style="list-style-type: none"> 1. "To maintain or restore populations of marine species at levels that can produce the optimum sustainable yield as qualified by relevant environmental and economic factors, taking into consideration relationships among species; 2. To preserve rare or fragile ecosystems, as well as habitats and other ecologically sensitive areas, especially estuaries, mangroves, seagrass beds and other spawning and nursery areas". <p>The Marine Fisheries Management Plan (2013-2018) also restates the commitments within the FAO Code of Conduct for Responsible Fisheries including <i>"Applying a precautionary</i></p>		

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC fisheries standard, and incorporates the precautionary approach.
		<p><i>approach</i>". These long-term objectives are explicit and consistent with MSC fisheries standard. Thus, SG80 is met.</p> <p>The Marine Fisheries Management Plan (2013-2018) also outlines fisheries specific objectives for a number of key fisheries (including for Seabob, which is discussed in more detail below in 3.2.1). The fact that these objectives have been developed is as a result of a requirement in the Fisheries Act (2002) which states that each fisheries management plan shall include "a statement of the objectives to be achieved in the management of the fishery". This is an explicit requirement that objectives are set. Therefore, SG100 is also met.</p>
References		<p>Thorpe (2004); Ministry of the President (2017); Ministry of Agriculture (2013); Fisheries Act (2002)</p> <p>The National Development Strategy (Fisheries): http://www.guyana.org/NDS/chap31.htm</p>
OVERALL PERFORMANCE INDICATOR SCORE:		100
CONDITION NUMBER (if relevant):		n/a

PI 3.2.1 Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2.		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guided post	Objectives , which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery-specific management system.	Short and long-term objectives , which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.	Well defined and measurable short and long-term objectives , which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit within the fishery-specific management system.
	Met?	(Y)	(Y)	(Partial)
	Justification	<p>The Marine Fisheries Management Plan (2013-2018) states Fisheries specific Long-Term Objectives including "Sustainable and precautionary management of the seabob and bycatch stocks". It goes on to state shorter term objectives (for the management plan period) which includes "Implement harvest control rules and maintain the stock assessment process; Implement BRDs and VMS for the seabob fleet, and maintain the use of TEDs; Establish a fathom line for the seabob fishery which will minimise gear conflict with the artisanal fishery; Develop a policy for controlling the total finfish catch by trawlers; Develop a research plan for the fishery".</p> <p>The management plan period referred to above is now complete. The 2015-2020 Seabob Management Plan is now in force which replaces the Seabob Management Plan contained within the national Marine Fisheries Management Plan 2013-2018. This reflects the achievements of the last 5-year period of management and provides further detail. Notably the new management plan defines a target reference point (TRP) for the seabob fishery stock, which is equated to Maximum Sustainable Yield (MSY – see Principle 1 scoring for further detail). This is to be achieved through the application of effort limits. This represents a well-defined and measurable objective for Principle 1. Thus, for Principle 1 SG100 is met. However, the Principle 2 objectives contained within the management plan, although explicit, are not well defined and measurable. Therefore, for Principle 2 SG80 is met but not SG100. Partial scoring therefore means the overall score is 90.</p>		
References		Ministry of Agriculture (2013); Fisheries Department (2015)		
OVERALL PERFORMANCE INDICATOR SCORE:				90
CONDITION NUMBER (if relevant):				n/a

PI 3.2.2 – Decision-making processes

PI 3.2.2	The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
Scoring Issue	SG 60	SG 80	SG 100
a	Decision-making processes		
Guidepost	There are some decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are established decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
Met?	(Y)	(Y)	
Justification	<p>Decision-making processes are clearly set out in The Fisheries Act (2002). This makes clear that it is the responsibility of the Chief Fisheries Officers to prepare Fisheries Management Plans for key fisheries. This process operates on a 5-year cycle. The Fisheries Act also sets out the direction, scope and requirements for the decisions which inform management, linking clearly back to objectives, the precautionary approach and a requirement to consult with appropriate stakeholders. The Fisheries Act also outlines the important role of the Fisheries Advisory Committee in advising the Minister on the proposals in draft management plans, prior to their adoption.</p> <p>The Fisheries Act also requires fishing licenses to be issued annually and specifies that these will contain license conditions and that the Chief Fisheries Officer has the power to vary these license conditions. Finally, the Fisheries Act empowers the Minister to make regulations which set out the management requirements for fisheries. The Fisheries Act (2002) therefore clearly sets out the overall framework for decision-making.</p> <p>Moving on to the fisheries-specific decision-making in the Seabob Fishery; whilst the overall scope, approach and decision-making mechanisms are as described above for the national level, an additional important part of the decision-making process is the role played by the Seabob Working Group. The Seabob Fisheries Management Plan clearly describes the decision-making processes described above and clearly highlights where and at what stage of management decisions the Seabob Working Group engages. This makes clear that the Seabob Working Group plays a crucial role in the evaluation of the performance of seabob fishery (and therefore the seabob fishery management) and also in development of advice in relation to management proposals. In spite of this, the formal decision-making process remains as set out in the Fisheries Act (2002) and the decision-making power remains with the Minister and Chief Fisheries Officer.</p> <p>The Seabob Management Plan provides an accessible and readily understood document which sets out the decision-making process in the fishery and clearly sets out the objectives which shape decisions (as described in 3.2.1) and the requirements for consultation and supporting evidence.</p> <p>The assessment team conclude that the above clearly meets the SG80 requirement for an established decision-making process that results in measures and strategies to achieve the fishery-specific objectives.</p>		
	Responsiveness of decision-making processes		

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
b	Guideline	Decision-making processes respond to serious issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to serious and other important issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to all issues identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.
	Met?	(Y)	(Y)	(N)
	Justification	<p>The Guyana Marine Fisheries Management Plan (2013-2018) highlighted a number of important issues that needed to be addressed at the time of drafting in 2013. This included the need to implement harvest control rules, VMS, BRDs and the establishment of the seabob zone with the fathom-line restriction to safeguard artisanal fisheries. By 2018 all of these serious and other important issues have been addressed. This has been timely and transparent and has only been implemented after full consultation. A more recent example comes as a result of a recent paper (2018) by Tomas Willems on the “Impact of Guyana seabob trawl fishery on marine habitats and ecosystems”. This recommended moving the inshore limit of the seabob zone further out in order to reduce ray bycatch. A letter from Ingrid Peters (Chief Fisheries Officer) of the Fisheries Department to Mr Charles of GATOSP refers to the recommendations made in the Willems report and states that as a result of this that inshore limit of the seabob zone will be moved from 7 to 8 fathoms. SG60 and SG80 are therefore clearly met.</p> <p>The SG100 requirement that “all” issues must be responded to is difficult to meet. There are some issues identified in either the Guyana Marine Fisheries Management Plan (2013-2018) or more recent work (e.g. Garstin & Oxenford 2018) which have yet to be responded to. For example, whether and how to extend HCR constraints to the artisanal seabob fishermen (e.g. Chinese seine) or the adoption of further modifications of TEDs. However, in most cases there are reasonable logistical, financial or practical implementation constraints. Nonetheless, it is concluded that SG100 is not met.</p>		
c	Use of precautionary approach			
	Guideline		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		(Y)	
	Justification	<p>The Fisheries Act (2002) sets out the decision-making process and places an explicit requirement on the Minister or Chief Fisheries Officer to “promote precautionary approaches to fisheries management as well as the need to conserve fisheries resources for future generations”. The Guyana Marine Fisheries management Plan (2013-2018) makes clear that management is guided by the Principles in the FOA Code of Conduct for Responsible Fishing and the Management Plan explicitly states “<i>applying a precautionary approach widely to conservation, management and exploitation of living aquatic resources</i>”.</p>		

PI 3.2.2	The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.		
	<p><i>in order to protect them and preserve the aquatic environment, taking account of the best scientific evidence available”.</i></p> <p>Finally, the Seabob management Plan states that the “Fishery shall at all times be managed in accordance with the precautionary approach principle as stated by the FAO Code of Conduct for responsible fishing”. These explicit commitments meet the requirements of SG80.</p>		
d	Accountability and transparency of management system and decision-making process		
	Guidepost	Some information on the fishery’s performance and management action is generally available on request to stakeholders.	<p>Information on the fishery’s performance and management action is available on request, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p> <p>Formal reporting to all interested stakeholders provides comprehensive information on the fishery’s performance and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.</p>
	Met?	(Y)	(N)
	Justification	<p>Guyana is a country with a population of under 800,000 mostly concentrated around the coast. Although the fisheries sector is an important industry within the country, the overall sector is comparatively small with few major companies, concentrated around a few landing ports. As a result, simpler systems of information dissemination are likely to be more effective than would be the case in more complex and geographically dispersed fisheries sectors.</p> <p>That said, the consultation mechanisms that are built into the management system, in particular via the Seabob Working Group, the Fisheries Advisory Council and the statutory requirement (within the Fisheries Act 2002) to consult upon management measures, means that in practice information on the fishery’s performance and management is provided to all key stakeholders. This includes all relevant information listed in the MSC key guidance for SG60 and SG80, such as subsidies, allocation, compliance and the data and rationales which inform fisheries management decisions. Involvement with the Seabob Working Group also means that stakeholders are fully informed about the reasons for any management actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. It is therefore concluded that important information about the fishery’s performance and management action is available on request, thus meeting SG60 and SG80.</p> <p>There is a fishery website which provides some background information about the fishery http://www.guyanaseabobfishery.com/default.aspx . However, although a section of the website is dedicated to publications, a number of the important publications which have informed this assessment have not been uploaded. As a result, it is not possible for a wide range of stakeholders to easily see important documents such as the Seabob Management Plan, performance of the seabob CPUE index (i.e. annual reports), the latest stock assessment, the fishery specific P2 research or the Seabob Working Group minutes. Similarly, although there is a Fisheries Department website this contains limited information</p>	

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery.	
		and is not updated. There is therefore considerable potential to increase the overall accountability and transparency of the seabob management system by making further use of the Guyana Seabob Fishery Website, seeking to ensure that all key documents are available on-line, including documents that have informed the management decision-making process. A recommendation is therefore raised.	
e	Approach to disputes		
	Guided post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.
	Met?	(Y)	(Y)
	Justification	The management authority is not subject to continuing court challenges, therefore SG60 is met. No judicial decisions have arisen from legal challenge requiring the management system to comply, therefore SG80 is met. Both GATOSP and the Seabob Working Group can be seen as a proactive step to avoid legal dispute. This brings together the main seabob buyers (who may traditionally have been seen as rivals) under 1 management system, with defined goals set around ensuring the long-term sustainability of the fishery and environment on which it depends. In relation to the SG100 requirement to act proactively to avoid legal disputes, the Seabob Management Plan states that: “The SWG should provide an opportunity for stakeholders to resolve disputes and where appropriate, help arbitrate in conflicts that might occur between stakeholders. The SWG should seek to provide a friendly and constructive atmosphere to promote co-operation and compliance”. There are no judicial decisions arising from legal challenges. SG100 is therefore met.	
References		Ministry of Agriculture (2013); Willems 2018 (Guyana Impacts paper unpublished); Garstin & Oxenford 2018; Fisheries Department (2015)	
OVERALL PERFORMANCE INDICATOR SCORE:			85
CONDITION NUMBER (if relevant):			n/a

PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guidepost	Monitoring, control and surveillance mechanisms exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance system has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A comprehensive monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	(Y)	(Y)	(N)
	Justification	<p>All powers of Monitoring, Control and Surveillance (MCS) are set out in the Fisheries Act (2002). This also gives the Coastguard and Police force the powers to act as Fisheries Officers and exercise the powers set out in the Act. Fisheries Regulations (No.3 2018) sets out the requirements for Vessel Monitoring Systems, and technical measures such as TEDs. The Guyana Marine Fisheries Management Plan (2013-2018) sets out further detail on the approach to MCS and identifies risk areas and action points for the plan period.</p> <p>There is no quota on seabob and no minimum landing size. As a result, enforcement is less focused on these aspects, than would be the case if these applied. Instead the focus is more on enforcement of technical measures (Bycatch Reduction Devices, TEDs, minimum mesh size) and spatial measures (remaining in seabob zone). These are achieved by inspection at sea (in partnership with the Coastguard), aerial reconnaissance, inspections on landings and monitoring of VMS. The Coast Guard carry out strategic planning of inspection activities, which stipulate the level and focus of fisheries inspections, however outputs of this strategic planning have not been shared with the MSC assessors as Coast Guard patrols are not exclusively fisheries related.</p> <p>In addition, all seabob vessels are now fitted with onboard CCTV cameras. Although this is not a legal requirement (within the Fisheries Regulations), it is a requirement to land to the processing companies so is effectively a de facto condition of operation in the fishery. The CCTV footage is downloaded after every trip and is fully reviewed by staff within the processing plants. However, Fisheries Officers also now undertake spot checks of the CCTV footage. The CCTV helps to ensure that TEDs or BRDs are not removed or tampered with and that no catch is sold to other vessels. However, because the CCTV is a processing company requirement, rather than a regulatory requirement it is not a formal part of the MCS system. Furthermore, the CCTV system is not able to accurately determine catch composition to monitor compliance with the move-on requirements.</p> <p>Guyana seafood producers are expected to comply with the requirements of EU legislation on IUU (Illegal, Unregulated and Unreported) fishing meaning that all exports to the EU must be supported by a catch certificate showing that the catch has not originated from IUU fishing (Commission Regulation (EC) No 1010/2009).</p> <p>Taken together, the above represents an MCS system which has been implemented with a demonstrated ability to enforce relevant management measures, strategies and/or rules. Thus, SG60 and SG80 are met. However, the assessors conclude that the MCS system does not meet the “comprehensive” definition required to score at the SG100 level, primarily</p>		

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
		because a more state of the art system, with higher levels of coverage could be achieved with increased resources.		
b	Sanctions			
	Guidepost	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and demonstrably provide effective deterrence.
	Met?	(Y)	(Y)	(N)
	Justification	<p>The powers to prosecute fisheries offences and the scope of the prosecution process are set out in the Fisheries Act (2002). Considerable further detail is provided in the Fisheries Regulations (No.3 2018). For most offences the exact penalty is explicitly stated in the Fisheries Regulations. This includes:</p> <ol style="list-style-type: none">1. interfering with the Fishery Officer / equipment ("liable on summary conviction to a fine of (Guyanese) \$250,000);2. failure to use (or Tamper with) a BRD ("liable on summary conviction to a fine of (Guyanese) \$250,000);3. failure to use a TED (ranging from a 31-day suspension of licence, to revocation of licence or, where the TED regulation is contravened more than twice in a licence period, they shall be "liable on summary conviction to a fine of one million dollars (Guyanese)".4. Infringements with VMS operation, fishing outside of designated fishing zones or encroachment into a protected zone (an incremental sanction from notification, to written warning, to suspension and fine). The regulation gives scope for the penalty to apply to both the owner and the skipper. <p>The sanctions outlined above are in place and implemented. However, it is notable that this regulation is relatively recent (2018). During the site visit consultations with vessels skippers indicated a good level of understanding of the penalties (or incremental penalties) for the full range of infringements and a consistent understanding that penalties would be applied. This was corroborated with consultations from both the Coastguard and Fisheries Department.</p> <p>This enables the assessors to conclude that "sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence", thus meeting SG80, but because the regulation is relatively recent this does not yet meet the "demonstrable" test of SG100.</p>		
c	Compliance			
	Guidepost	Fishers are generally thought to comply with the management system for the fishery under assessment, including, when required, providing information of	Some evidence exists to demonstrate fishers comply with the management system under assessment, including, when required, providing information of	There is a high degree of confidence that fishers comply with the management system under assessment, including, providing information of

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with.		
		importance to the effective management of the fishery.	importance to the effective management of the fishery.	importance to the effective management of the fishery.
	Met?	(Y)	(N)	(N)
	Justification	<p>The Fisheries Department produces an annual VMS report (Amsterdam 2016). The 2016 report is the most recent seen by the assessment team. This states that there were 396 VMS related infringements from 15,416 nominal Days at Sea. These comprised 255 for entry into the No Trawl Zone and 141 where no beacon signal was recorded. Whilst this number is higher than expected it represents one VMS infringement per 40 fishing days. Furthermore, it should be noted that these figures precede the 2018 Fisheries Regulations which substantially increased and clarified the sanctions for infringements. It should also be noted that the “no beacon signal infringements” were influenced by the (at the time) recent installation of VMS systems and that these figures would be expected to fall once initial installation problems are overcome.</p> <p>There were some verbal reports of a small number of vessels having been found without TEDs in place, although the stakeholders that mentioned this (TED Inspectors, WWF and Coastguard <i>pers. comms.</i>) noted that this was a rare occurrence. This occurrence also predated the 2018 Fishery Regulations and the adoption of compulsory on board CCTV camera systems.</p> <p>Whilst the stakeholders interviewed (most notably the Fisheries Department, Coastguard and TED inspectors) all stated that the level of compliance is good and that it is likely to be further improved since the 2018 Fishery Regulation and the adoption of CCTV, there is not an updated report showing the effect of these changes to the MCS system. As a result, SG60 is met but evidential requirements of SG80 are not met. Therefore, a condition is triggered.</p>		
	d	Systematic non-compliance		
	Guided post		There is no evidence of systematic non-compliance.	
	Met?		(Y)	
	Justification	Although some infringements have been described above and reflected in scoring. None of these are persistent or repeated so would not be described as systematic, therefore SG80 is met.		
References		Amsterdam (2016), Ministry of Agriculture (2013); Fisheries Department (2015) TED Inspectors <i>pers. comms.</i> ; Coastguard <i>pers. comms.</i> ; Vessel Skippers <i>pers. comms.</i> ; Fisheries Act (2002); Fisheries Regulations (No.3 2018)		
OVERALL PERFORMANCE INDICATOR SCORE:				75
CONDITION NUMBER (if relevant):				5

PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system.		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guidepost	There are mechanisms in place to evaluate some parts of the fishery-specific management system.	There are mechanisms in place to evaluate key parts of the fishery-specific management system	There are mechanisms in place to evaluate all parts of the fishery-specific management system.
	Met?	(Y)	(Y)	(N)
	Justification	In the past there have been a number of reviews of key parts of the fishery management system, which are applicable to the specific fishery. For example, reviews have been undertaken of the Catch, effort and Biological Data Collection Systems (Mahon 1998; CFRAMP 2001; CRFM 2014). The Fisheries Department produces an annual VMS report (Amsterdam 2016), which reviews the performance of the seabob fleet against spatial restrictions and VMS requirements. Wider regional reviews of key parts of the fishery management system often include reviews of the Guyanese fisheries administration. This includes reviews of the institutional arrangements for fisheries governance (Chakalall <i>et al</i> 2007). These wider reviews can provide an important comparative review. Guyana did not participate in the recent WECAFC review of fisheries management performance and conservation measures (Singh-Renton & McIvor 2015). In preparation for the MSC assessment the Commonwealth Marine Economies Programme undertook a review of the legal documents and framework that underpin the fishery. Whilst the focus of this was mostly preparation for MSC assessment, rather than full review or evaluation of <i>performance</i> of the legal framework, it nonetheless provided recommendations which can contribute to future improvements. Taken in combination, the reviews referred to above meet the requirements of “key” parts of the management system, thus SG80 is met. A recommendation is also raised to encourage Guyanese participation in any wider comparative reviews.		
b	Internal and/or external review			
	Guidepost	The fishery-specific management system is subject to occasional internal review.	The fishery-specific management system is subject to regular internal and occasional external review.	The fishery-specific management system is subject to regular internal and external review.
	Met?	(Y)	(N)	(N)
	Justification	The Fisheries Act 2002 (Part II 5 (1)) requires that the Chief Fisheries Officer shall “progressively prepare and <i>keep under review</i> ” fishery management plans. The Seabob Management Plan (2015-2020) states that the plan “shall be evaluated at least every year by the Seabob Working Group in deliberation with other participants or their representatives”. The minutes of the Seabob Working Group show that some internal review activity is undertaken. In addition, the Fisheries Department produces an annual CPUE report for the fishery, which includes a review of the fishery relative to the HCR and reference points (Richardson 2018). This meets the requirements of SG60.		

PI 3.2.4		<p>There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives.</p> <p>There is effective and timely review of the fishery-specific management system.</p>
		<p>The review by Commonwealth Marine Economies Programme in 2016 of the legal frameworks that underpin the fishery included consideration of the fishery-specific management system (i.e. the Seabob Working Group and the Seabob Management Plan 2015-2020). This review was external and did focus on the fisheries specific management system but it mainly focused on the degree to which the Management Plan, as written, met the requirements of the MSC scoring guideposts. It was not therefore a review of the <i>performance</i> of the fishery specific management system.</p> <p>Since the Seabob Management Plan was first drafted (within the Guyana Marine Fisheries Management Plan (2013-2018)) and was since updated (within the Guyana Seabob Fisheries Management Plan (2015-2020)), no formal external review has been undertaken on the Fisheries Specific (i.e. Seabob) Management System. SG80 is therefore not met. Such a review should therefore be undertaken to inform the next 5-year period of the Seabob Fisheries Management System. A condition is therefore raised to reflect this.</p>
References		Mahon (1998); CFRAMP (2001); Chakalall <i>et al</i> (2007); CRFM 2014; Commonwealth Marine Economies Programme (2016); Amsterdam 2016; Fisheries Department (2015)
OVERALL PERFORMANCE INDICATOR SCORE:		70
CONDITION NUMBER (if relevant):		6

Appendix 1.2: Risk Based Framework (RBF) Outputs

Productivity Susceptibility Analysis (PSA)

Table 1.2.1.a. PSA Rationale Table

Productivity	Bangamary (main)		Green weakfish (main)	
	Rational	PSA Score	Rational	PSA Score
Average age at maturity	2.6 years ²⁹	1	3.8 years ³⁰	1
Average maximum age	10.6 years ²⁹	2	18 years ³⁰	2
Fecundity	>20.000 ²⁹	1	>20.000 ³⁰	1
Average maximum size	45 cm ²⁹	1	115 cm	2
Average size at maturity	23,7 cm	1	60.5 cm	2
Reproductive strategy	BS	1	BS	1
Trophic level	3.9 ²⁹	3	4.0 ³⁰	3
Susceptibility				
Availability	Also, outside Guyana EEZ, mainly inshore waters, overlap with stock distribution < 10 %.	1	Also, outside Guyana EEZ, inshore but also outside 18 fathom limit, overlap with stock distribution < 10 %.	1
Encounterability	Although a demersal species, occur higher in water column. Large catches in inshore artisanal fishery with drift seine which is high in water column. Rigging shrimp net upside down ³¹ means that species only on or at the seabed are retained.	2	Although a demersal species, occur higher in water column. Trawl rigging upside down reduces chance of encounter and means that species only on or at the seabed are retained.	2
Selectivity	Both elements a) and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Individ. < size at maturity are frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3	Both elements a) and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Individ. < size at maturity are frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3
Post capture mortality	Retained species or majority dead when released. Bangamary is a retained species and default score is 3..	3	Retained species or majority dead when released. Green weakfish is a retained species and default score is 3.	3

²⁹ <http://www.fishbase.org/summary/417>

³⁰ www.fishbase.org/summary/1178

³¹ This moves the position of the foot rope forward and the head rope backward which gives fish more time to escape.

Productivity	Smalleye croaker (Butterfish) (main)		Smalleye stardrum (main)	
	Rational	PSA Score	Rational	PSA Score
Average age at maturity	1.7 years ³²	1	1,0 ³³	1
Average maximum age	6.8 years ³²	1	3.5 years ³³	1
Fecundity	100-20.000 ³²	2	100-20.000 ³³	2
Average maximum size	40 cm ³²	1	20 cm ³³	1
Average size at maturity	23,8 cm ³²	1	12,9 cm ³³	1
Reproductive strategy	BS	1	BS	1
Trophic level	3,6 ³²	3	3.5 ³³	3
Susceptibility				
Availability	Also, outside Guyana EEZ, mainly inshore waters, overlap with stock distribution < 10 %.	1	Also, outside Guyana EEZ, mainly inshore waters, overlap with stock distribution < 10 %.	1
Encounterability	Demersal species, so high overlap with fishing gear	3	Demersal species, so high overlap with fishing gear	3
Selectivity	Both elements a) and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Indiv. < size at maturity frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3	Both elements a) and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Indiv. < size at maturity frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3
Post capture mortality	Retained species or majority dead when released. Smalleye croaker is a retained species and default score is 3.	3	Retained species or majority dead when released. Smalleye stardrum is a retained species and default score is 3.	3

³² <https://www.fishbase.de/summary/Nebris-microps.html>

³³ <http://www.fishbase.de/summary/Stellifer-microps.html>

	Rake stardrum (main)		Smooth butterfly ray	
	Rational	PSA Score	Rational	PSA Score
Productivity				
Average age at maturity	1.0 years ³⁴	1	5 to 15 y. ³⁵	2
Average maximum age	3,5 years ³⁴	1	10 to 25 y ³⁶	2
Fecundity	100-20.000 ³⁴	2	<100 ³⁵	3
Average maximum size	17 cm ³⁴	1	137 cm ³⁶	2
Average size at maturity	9,88 cm ³⁴	1	27/34 cm ³⁶	2
Reproductive strategy	BS	1	Live bearer	3
Trophic level	3,4 ³⁴	3	3.6 ³⁶	3
Susceptibility				
Availability	Also, outside Guyana EEZ, mainly inshore waters, overlap with stock distribution < 10 %.	1	Also, outside Guyana EEZ, mainly inshore waters, overlap with stock distribution < 10 %.	1
Encounterability	Demersal species, so high overlap with fishing gear.	3	Demersal (on bottom) species	3
Selectivity	Both elements a) and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Indiv. < size at maturity are frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3	Both elements a) and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Indiv. < size at maturity are frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3
Post capture mortality	Retained species or majority dead when released. Smalleye stardrum is a retained species and default score is 3. Rake stardrum is a retained species and default score is 3.	3	Evidence of some released post capture and survival. Fishermen are obliged to release the rays caught as prescribed in the Code of Practice. From the teams knowledge about species biology and fishing practice and backed up by scientific literature about post capture survival of ray species is was concluded that at least some rays survive the capture and release in the seabob fishery.	2

³⁴ www.fishbase.se/summary/Stellifer-rastrifer

³⁵ No data. Assumed on the basis information on other ray species

³⁶ www.fishbase.de/Summary/SpeciesSummary.php?ID=2579&AT=smooth+butterfly+ray

	Longnose stingray (main)	PSA Score
	Rational	
Productivity		
Average age at maturity	5 to 15 y. ³⁷	2
Average maximum age	10 to 25 y. ³⁵	2
Fecundity	<100 ³⁵	3
Average maximum size	200 cm ³⁸	2
Average size at maturity	65 cm ³⁸	2
Reproductive strategy	Live bearer	3
Trophic level	3.5 ³⁹	3
Susceptibility		
Availability	Also, outside Guyana EEZ, mainly inshore waters, overlap with stock distribution < 10 %.	1
Encounterability	Demersal (on bottom) species.	3
Selectivity	Both elements a0 and b) of PF5 indicate the same risk score of 3 for this species. From stakeholder input during RBF meeting it was concluded that Indiv. < size at maturity are frequently caught. Since the mesh size used is small indiv. < half the size at maturity are retained by gear which was also confirmed by stakeholders.	3
Post capture mortality	Evidence of some released post capture and survival. Fishermen are obliged to release the rays caught as prescribed in the Code of Practice. From the teams knowledge about species biology and fishing practice and backed up by scientific literature about post capture survival of ray species it was concluded that at least some rays survive the capture and release in the seabob fishery.	2

³⁷ No data. Assumed on the basis information on other ray species

³⁸ <https://www.fishbase.de/summary/Dasyatis-guttata.html>

³⁹ Fishbase states a trophic level of 2.6. Since this is considered too low by the team a trophic level of 3.5 is assumed based on information on other ray species.

Consequence Spatial Analysis (CSA) for habitats

The CSA was conducted on 4 habitat types. The following 4 tables set out the PSA scores and rationales.

Table 1.2.2a CSA Rationale Table

PI number	2.4.1	Habitat	Muddy sediments with high clay fraction SGB Table PF9: Fine-Flat-Small erect BSF Table PF10: Coast, Coastal margin, sediment plains
Consequence	Rationale		Score
Regeneration of biota	Using surrogate: epifauna small erect		1
Natural disturbance	Scored in absence of information: Coastal margin and shallow inner shelf (<60 m)		1
Removability of biota	Low, robust, small (<5 m), smooth, or flexible biota OR robust, deepburrowing biota. Score for Demersal trawl		1
Removability of substratum	Substratum < 6 cm. Score for demersal trawl.		3
Substratum hardness	Sediments (unconsolidated). Score for demersal trawl.		3
Substratum ruggedness	Flat, simple surface structure. Score for demersal trawl.		3
Seabed slope	Plains in coastal margin, inner or outer shelf or mid-slope. Score for demersal trawl.		1
Spatial	Rationale		Score
Gear footprint	Score for demersal trawl.		3
Spatial overlap	Figure 3.4.7a shows that over 50 % of the area with mud or sandy mud habitats is situated within the no-trawling < 8 fathom depth zone. Areas of mud and sandy mud are also located northward of the 18-fathom depth line. Figure 3.4.7a and 3.4.7b also show that the fishery is concentrated in smaller zones within the seabob trawling zone and that even within this zone the fishing footprint covers less than 50 % of the habitat. Therefore, it is concluded that the overlap of the fishing footprint with mud and muddy-sand habitats is less than 30%.		1
Encounterability	Mud and muddy-sand habitats are the target habitat to catch seabob. Therefore, the likelihood that the gear encounters this habitat is >75 %.		3

Table 1.2.2b CSA Rationale Table

PI number	2.4.1	Habitat	Coarse sediment with high sand fraction (Medium-Flat - Small erect) SGB Table PF9: Fine-Flat-Small erect BSF Table PF10: Shelf, Inner shelf, sediment plains
Consequence	Rationale		Score
Regeneration of biota	Using surrogate: epifauna small erect		1
Natural disturbance	Scored in absence of information: Coastal margin and shallow inner shelf (<60 m)		1
Removability of biota	Low, robust, small (<5 m), smooth, or flexible biota OR robust, deepburrowing biota. Score for Demersal trawl		1
Removability of substratum	Substratum < 6 cm. Score for demersal trawl.		3
Substratum hardness	Sediments (unconsolidated). Score for demersal trawl.		3
Substratum ruggedness	Flat, simple surface structure. Score for demersal trawl.		3
Seabed slope	Plains in coastal margin, inner or outer shelf or mid-slope. Score for demersal trawl.		1
Spatial	Rationale		Score
Gear footprint	Score for demersal trawl.		3
Spatial overlap	Figure 3.4.7a shows that the fishery predominantly takes place in areas with mud or sandy mud and that the overlap with fishing footprint and areas with coarse sediments (sand) is less than 15 %.		0.5
Encounterability	The fishery is predominantly directed at areas with mud and muddy sand. However, areas with (coarse) sand are present in the larger fishing footprint as presented in figure 3.4.8. Since the distribution of sediments is based on modelling (CEFAS, 2018) the team has taken a precautionary approach by concluding that the chance of encountering this habitat is larger than 75 %.		3

Table 1.2.2c CSA Rationale Table

PI number	2.4.1	Habitat	Sensitive taxa spots (Fine-Low relief-small erect) SGB Table PF9: Fine-Flat-Small erect BSF Table PF10: Shelf, Inner shelf, sediment plains
Consequence	Rationale		Score
Regeneration of biota	of	Using surrogate: epifauna large erect, coarse sediments in deeper inner shelf waters 25-100 m.	2
Natural disturbance		Scored in absence of information: Coastal margin and shallow inner shelf (<60 m)	1
Removability of biota	of	Erect, medium (<30 cm), moderately rugose, or inflexible biota. Score for demersal trawl	3
Removability of substratum	of	Substratum < 6 cm. Score for demersal trawl.	3
Substratum hardness		Soft (lightly consolidated, weathered, or <u>biogenic</u>). Score for demersal trawl.	2
Substratum ruggedness		Flat, simple surface structure. Score for demersal trawl.	3
Seabed slope		Plains in coastal margin, inner or outer shelf or mid-slope. Score for demersal trawl.	1
Spatial	Rationale		Score
Gear footprint		Score for demersal trawl.	3
Spatial overlap		Possible overlap of fishing footprint and spots with sensitive taxa is less than 15 %. An overlay map was produced showing the possible locations of sensitive habitats (see figure 3.4.6a). Another overlay map with the footprint of the seabob fishery (figure 3.4.6b) shows that these locations of possible sensitive habitats are generally further off shore than the seabob fishing area and that the overlay of the fishing footprint with the area where these sensitive taxa might occur is less than 15 %.	0.5
Encounterability		Habitats with sensitive taxa are predominantly found in deeper waters (Lowe-McConnel, 1962). The likelihood that the gear encounters these habitats in the managed area (Guyana EEZ) is considered less than 15 %.	0.5

Table 1.2.2d CSA Rationale Table

PI number	2.4.1	Habitat	Stony areas (Large-Outcrop-Small erect) SGB Table PF9: Fine-Flat-Small erect BSF Table PF10 (examples): Shelf, Inner shelf, stony areas
Consequence	Rationale		Score
Regeneration of biota	of	Using surrogate: epifauna small erect, stony areas in deeper inner shelf waters 25-100 m.	1
Natural disturbance		Scored in absence of information: Coastal margin and shallow inner shelf (<60 m)	1
Removability of biota	of	Erect, medium (<30 cm), moderately rugose, or inflexible biota. Score for demersal trawl	3
Removability of substratum	of	Stones 6 cm - 3m (removable). Score for demersal trawl.	3
Substratum hardness		Hard (igneous, sedimentary, or heavily consolidated rock types. Score for demersal trawl.	1
Substratum ruggedness		Low relief (<1.0 m), rough surface structure (rubble, small boulders, rock edges), subcrop, or low outcrop. Score for demersal trawl.	3
Seabed slope		Medium degree (1-10m), Score for demersal trawl.	2
Spatial	Rationale		Score
Gear footprint		Score for demersal trawl.	3
Spatial overlap		Fishermen avoid stony areas. Fishermen reported stony areas in north eastern side of seabob trawling zone near 18 fathom line (see sand area in figure 3.4.7a) Possible overlap of fishing footprint and stony areas is less than 15 %.	0.5
Encounterability		Likelihood that gear encounters stony areas is small since within the management area stony areas mainly exist in deeper waters outside the seabob trawling zone. Furthermore, fishermen will mark stony areas in their plotter and try to avoid these areas since the gear might be damaged. The likelihood that the gear will encounter this habitat is considered < 15 %.	0.5

RBF Calculation Tables

PSA

Family name	Scientific name	Common name	Species type	Fishery descriptor	Productivity Scores [1-3]							Susceptibility Scores [1-3]				Cumulative only				MSC PSA-derived score	Risk Category Name	MSC scoring guideline			
					Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependence	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score				Catch (tons)	Weighting	Weighted Total
Sciaenidae	Macrodon ancylodon	Bangamary	Non-invertebrate	Bottom trawl	1	2	1	1	1	1	3	1.43	1	2	3	3	1.43	2.02	8200	1.00	2.02	2.02	95	Low	≥80
Sciaenidae	Cynoscion virescens	Green weakfish	Non-invertebrate	Bottom trawl	1	2	1	2	2	1	3	1.71	1	2	3	3	1.43	2.23	2500	1.00	2.23	2.23	92	Low	≥80
Sciaenidae	Stellifer microps	Smalleye stardrum	Non-invertebrate	Bottom trawl	1	1	2	1	1	1	3	1.43	1	3	3	3	1.65	2.18	3900	1.00	2.18	2.18	92	Low	≥80
Sciaenidae	Stellifer rastifer	Rake stardrum	Non-invertebrate	Bottom trawl	1	1	2	1	1	1	3	1.43	1	3	3	3	1.65	2.18	3900	1.00	2.18	2.18	92	Low	≥80
Sciaenidae	Nebrius microps	Smalleye croaker	Non-invertebrate	Bottom trawl	1	1	2	1	1	1	3	1.43	1	3	3	3	1.65	2.18	2300	1.00	2.18	2.18	92	Low	≥80
Dasyatidae	Dasyatis guttatus	Longnose stingray	Non-invertebrate	Bottom trawl	2	2	3	2	2	3	3	2.43	1	3	3	3	1.43	2.82	4400	1.00	2.82	2.82	78	Med	60-79
Dasyatidae	Gymnura micrura	Smooth butterfly ray	Non-invertebrate	Bottom trawl	2	2	3	2	2	3	3	2.43	1	3	3	3	1.43	2.82	2000	1.00	2.82	2.82	78	Med	60-79

CSA

Only main habitats scored?		Yes									Consequence score [1-3]							Spatial score [0.5-3]				MSC CSA-derived score	Risk category	MSC scoring guidepost
Habitat details							Habitat productivity		Gear-habitat interaction					Consequence score	Gear footprint	Spatial overlap	Encounterability	Spatial score	CSA score					
Scoring element	UoA/Gear type	Biome	Sub-biome	Feature	Habitat type	Depth (m)	Regeneration of biota	Natural disturbance	Removability of biota	Removability of substratum	Substratum hardness	Substratum ruggedness	Seabed slope											
1	Shrimp trawl	Coast (0-25m)	Coastal margin	Sediment plains	Muddy sediments with high clay fraction	0-30m	1	1	1	3	3	3	1	1.67	3	1	3	2.08	2.67	82	Low	≥80		
2	Shrimp trawl	Shelf (25-200m)	Inner shelf (25-100m)	Sediment plains	Course sediment with high sand fraction	25+	1	1	1	3	3	3	1	1.67	3	0.5	3	1.65	2.35	83	Low	≥80		
3	Shrimp trawl	Shelf (25-200m)	Inner shelf (25-100m)	Sediment plains	Sensitive taxa spots	25-35	2	1	3	3	2	3	1	2.00	3	0.5	0.5	1.22	2.35	83	Low	≥80		
4	Shrimp trawl	Shelf (25-200m)	Inner shelf (25-100m)	Large rocky bank	Stony areas	25+	1	1	3	3	1	3	2	1.78	3	0.5	0.5	1.22	2.16	93	Low	≥80		

Appendix 1.3: Conditions, Recommendations and Client Action Plan

Condition 1

Performance Indicator	PI1.2.4e. The assessment of stock status is subject to peer review.
Score	75
Rationale	The data inputs and model uncertainties in the 2013 assessment were peer reviewed by CRFM. However, this assessment is now 5 years old, and a new updated stock assessment is in progress. The new assessment is using improved MCMC simulations within bespoke software, so at present there has been no peer review of this revised assessment approach. The assessment team concluded that whilst the 2013 stock assessment had been peer-reviewed, this assessment was now dated and the SG80 would not be met until the new assessment had been fully peer-reviewed.
Condition	It should be shown that the assessment of seabob stock status is subject to peer review.
Milestones	<p>Year 1: The current ongoing stock assessment should be completed, and an appropriate external peer review should be commissioned (no change to score).</p> <p>Year 2: An external peer review of the stock assessment should be completed (resulting PI score: 80).</p> <p>Year 3 & 4: No further action required.</p>
Client action plan	<p>Year 1 Action: Arrange peer review. The Guyana Government (Fisheries Department) will contact CRFM and Suriname Fisheries (Yolanda Babb) to arrange a joint review of seabob stock assessments.</p> <p>The SWG will commission and approve appropriate ToRs for the review. The review will, among other things, confirm that best scientific practice has been applied in carrying out the stock assessment, the results are valid (applying corrections if necessary), and how the results will be used for scientific advice taking account the uncertainty. The reviewers will, with the assessment team, prepare the scientific advice appropriate for the next 5 years, including a schedule of further work and recommendations.</p> <p>CRFM will arrange the review, employing independent external peer reviewers, and provide international support to Guyana and Suriname in conducting the review. The Shrimp and Groundfish Working Group (SGWG) will supply internal reviewers. External reviewer(s) will be provided by CRFM.</p> <p>The performance of the UoA is not expected to improve before the review itself is complete.</p> <p>Means of Verification: Emails, Approved ToRs, Review schedules, Final stock assessment reports.</p> <p>Year 2 Action: Complete peer review and respond to findings. The peer review will be conducted before August 2020 to allow time for the assessment team and SGWG response. The review will be organised by CRFM, Guyana Fisheries Department and Suriname Fisheries Department in either Suriname or Guyana. The meeting will convene the CRFM Shrimp and Groundfish Working Group, including 1 or more external reviewers. The meeting and the reviewers will complete separate reports based on their ToRs.</p>

	<p>With completion of the peer review report, 1.2.4 will meet SG80.</p> <p>Means of Verification: Final SA report. Peer review report. CRFM SGWG Meeting Report. Research plan</p> <p>Year 3-4 Action: No action required, but the peer review recommendations will be addressed.</p> <p>Means of Verification: Minutes of SWG</p>
Consultation on condition	<p>Letters of support from SWG, Fishery Department, CRFM and GATOSP.</p>

Condition 2

Performance Indicator	PI2.2.1a
Score	75
Rationale	The results of the RBF PSA exercise conclude that there is a potential risk to Longnose stingray and Smooth butterfly ray from the Seabob fishery (which have been identified as “main” secondary species in the fishery). Further evidence is therefore required to demonstrate that these species are above biologically based limits, or if below such limits there is evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding. Alternatively, it may be demonstrated that the species are not a “main” species in the fishery.
Condition	It should be shown that main secondary species are highly likely to be above biologically based limits, or, if below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding.
Milestones	<p>Year 1: Provide evidence that there is a plan in place to gather information about the status of the Longnose stingray and Smooth butterfly ray stocks and effect that the fishery may have on these stocks. Or a plan to ensure that the Longnose stingray and Smooth butterfly ray are demonstrated to no longer be considered as “main” secondary species (no change to score).</p> <p>Year 2: Provide evidence of progress against the plan presented at the first audit, including evidence that research into an evaluation of the direct effect of the fishery on the Longnose stingray and Smooth butterfly ray stocks or research has commenced on reducing catch rates (no change to score).</p> <p>Year 3: Provide report evaluating the direct effect of the fishery on the Longnose stingray and Smooth butterfly ray stocks or demonstrating that these species no longer meet the MSC definition of “main”. In case the report concludes that the stocks are not above biological based limits then there should be evidence of recovery or evidence that the client is taking further steps to develop a demonstrably effective partial strategy that the UoA does not hinder recovery and rebuilding of these stocks (no change to score).</p> <p>Year 4: (if concluded necessary at year 3) provide evidence for the implementation of a demonstrably effective partial strategy such that the UoA does not hinder recovery and rebuilding of the Longnose stingray and Smooth butterfly ray stocks (resulting PI score: 80).</p>
Client action plan	<p>Year 1 Action: Development of a plan to assess distribution, abundance and status of rays in the inshore zone. Develop a research proposal to sample demersal fin fish in the inshore no trawl zone using a standard commercial seabob trawler, sufficient to allow assessment of species distribution, abundance, and stock condition.</p> <p>The Fishery Department will the extent to which artisanal fisheries catch rays, and continue independent observer coverage of the seabob industrial fleet activities.</p> <p>Means of Verification: Research proposal for fishing survey presented to the SWG. Plan for sampling of artisanal fisheries</p> <p>Year 2 Action: Implementation of the monitoring / sampling research plan.</p>

	<p>Means of Verification: Reports on implementation of these research projects in the minutes of the SWG</p> <p>Year 3 Action: Analysis of data with focus on risk to Longnose stingray and Smooth butterfly ray stocks. Report analysing the information collected and evaluation of the direct effect of artisanal and industrial fisheries on the Longnose stingray and Smooth butterfly ray stocks – or demonstration that these species no longer meet the MSC definition of “main”.</p> <p>Means of Verification: Report on fin-fish abundance and distribution.</p> <p>Year 4 Action: If necessary, respond to conclusions and recommendations from report and provide evidence for the implementation of a demonstrably effective partial strategy such that the UoA does not hinder recovery and rebuilding of the Longnose stingray and Smooth butterfly ray stocks.</p> <p>Means of Verification: Minutes from SWG</p>
Consultation on condition	Letters of support from SWG, Fishery Department and GATOSP.

Condition 3

Performance Indicator	PI2.3.2 (a)
Score	75
Rationale	Fishermen are requested to report on ETP interactions through ETP logsheets. The team has concluded that the data collected are insufficient to support a management strategy that can identify possible unacceptable impacts. Furthermore, a move-on rule is in place, but it is unclear whether fishermen actually practice the prescribed actions in case of interactions with ETP species. Therefore, it cannot be concluded that there is a strategy in place that is expected to ensure the UoA does not hinder the recovery of ETP species. SG80a is not met.
Condition	Provide evidence that there is a strategy in place that can identify unacceptable impacts on ETP species.
Milestones	<p>Year 1: Provide evidence of the development of a plan to strengthen the monitoring of impacts on ETP species. (no change to score).</p> <p>Year 2: Provide evidence of progress against the plan presented at the first audit (no change to score).</p> <p>Year 3: Provide evidence for the implementation of a demonstrably effective strategy that enables the identification of unacceptable impacts on ETP species. Score 80.</p>
Client action plan	<p>Year 1 Action: Development of a plan to strengthen monitoring and data collection of ETP sightings and interactions. Preparation of a plan to determine the impacts of fishing on ETP species – strengthening ETP reporting, application of the move-on rule, monitoring of application of the move-on rule, oversight of ETP interactions via CCTV monitoring.</p> <p>Means of Verification: Presentation of a plan. Presentation of a review of effectiveness over previous 12 months</p> <p>Year 2 Action: Report on progress in implementation of the plan. Review and updating of the adequacy of the plan.</p> <p>Means of Verification: Progress report, including plan review</p> <p>Year 3 Action: Review report. Critical review of the nature and scale of fishery / ETP interaction and the effectiveness of the ETP reporting, monitoring and oversight systems.</p> <p>Means of Verification: Review report</p>
Consultation on condition	Letters of support from SWG, Fishery Department and GATOSP

Condition 4

Performance Indicator	PI2.3.3
Score	60
Rationale	<p>The available information points to a limited impact on sea turtles in Guyana waters also as a consequence of a consistent use of TEDs. The information is considered adequate to support measures to manage the impact on turtle species and thus SG60 is met.</p> <p>The information derived from the ETP logsheets and the other available information however does not allow for an accurate quantitative estimation of impacts of the UoA on sea turtle species and consequently is also not adequate to measure trends. Therefore, SG80b is not met and a Condition is formulated.</p>
Condition	Accurate quantitative information that is adequate to measure trends and support a strategy to manage impacts on ETP species should be collected.
Milestones	<p>Year 1: Improvements to the current system of monitoring interactions with ETP species should be implemented (no change to score).</p> <p>Year 2: Collate and analyse data on the interactions with ETP species (no change to score).</p> <p>Year 3: Collate and analyse data on the interactions with ETP species (no change to score).</p> <p>Year 4: Demonstrate that information is adequate to measure trends and support a strategy to manage impacts on ETP species (resulting PI score: 80).</p>
Client action plan	<p>Year 1 Action: Strengthen fishery interaction reporting. Prepare proposals for improvement in the collection and collation of information on ETP interactions on-board and later on-shore, and support and further build on the monitoring and reporting work forming part of the actions with regard to addressing Condition 2.</p> <p>Means of Verification: Report – review of current systems and areas for improvement.</p> <p>Year 2 Action: Review of adequacy of data collection for assessing impact of fishing on ETP species. Interrogate available data and data streams to review the effectiveness of data collection and reflect on how this might be improved.</p> <p>Means of Verification: Report demonstrating the nature of and changes in the interaction between fishing and ETP species.</p> <p>Year 3 Action: Further review of adequacy of data collection for assessing impact of fishing on ETP species. Use the outputs of this analysis to review the effectiveness of data collection and reflect on how this might be improved.</p> <p>Means of Verification: Report collating and analysing the available data demonstrating the nature of and changes in the interaction between fishing and ETP species.</p> <p>Year 4 Action: Demonstration that data systems working effectively. Report demonstrating the adequacy of data gathering and collation practices to measure trends and support a strategy to manage impacts on ETP species</p> <p>Means of Verification:</p>

	Report demonstrating the nature of and changes in the interaction between fishing and ETP species.
Consultation on condition	Letters of support from SWG, Fishery Department and GATOSP

Condition 5

Performance Indicator	PI3.2.3(c):
Score	75
Rationale	Whilst the stakeholders interviewed (most notably the Fisheries Department, Coastguard and TED inspectors) all stated that the level of compliance is good and that it is likely to be further improved since the changes in the 2018 Fishery Regulation and the adoption of CCTV, there is not an updated VMS compliance report showing the effect of the 2018 Fishery Regulations on compliance. An updated VMS report showing the compliance of the fishery following the adoption of the 2018 Fishery Regulations would meet the evidential requirements of SG80.
Condition	Evidence should be provided to demonstrate fishers comply with the management system under assessment.
Milestones	<p>Year 1: Consider scope and plan for the provision of evidence to demonstrate fishers comply with the management system under assessment (since the 2018 Fishery Regulation). (no change to score)</p> <p>Year 2: Collate and analyse all relevant compliance evidence (no change to score)</p> <p>Year 3: Complete report (resulting score: 80)</p>
Client action plan	<p>Year 1 Action: Summary report of MCS systems and industry compliance. Critical review of annual fleet performance and VMS records across the fleet for several years to demonstrate extent of compliance / non-compliance – and conformity with management plan and management objectives.</p> <p>Means of Verification: report to SWG</p> <p>Year 2 Action: Updated report and review. Updated report, but with focus on whether or not any impact from increased penalties for non-compliance arising from the 2018 Fishery Regulations can be identified.</p> <p>Means of Verification: progress report to SWG</p> <p>Year 3 Action: Updated report and review. Particular focus on demonstrating that fishers are or are not complying with the management system in place.</p> <p>Means of Verification: progress report and review</p>
Consultation on condition	Letters of support from SWG, Fishery Department and GATOSP

Condition 6

Performance Indicator	PI3.2.4(b):
Score	70
Rationale	Since the Seabob Management Plan was first drafted (within the Guyana Marine Fisheries Management Plan (2013-2018) and was since updated (within the Guyana Seabob Fisheries Management Plan (2015-2020), no formal external review has been undertaken on the performance of the Seabob Management System. SG80 is therefore not met. Such a review / evaluation should therefore be undertaken to inform the next 5-year period of the Seabob Fisheries Management Plan.
Condition	The fishery-specific management system should be subject to regular internal and occasional external review.
Milestones	<p>Year 1: Undertake preparations for an external review / evaluation of the Seabob Management Plan (no change to score).</p> <p>Year 2: Commission an external review (no change to score).</p> <p>Year 3: External review to be in process (no change to score).</p> <p>Year 4: External review to be completed (resulting PI score change to 80).</p>
Client action plan	<p>Year 1 Action: Prepare ToR for external review of the Seabob Management Plan and approach potential service providers and funding agencies (potentially in alignment with the ToR for peer review of the Seabob Stock Assessment – Condition 1).</p> <p>Means of Verification: proposal to the SWG and minute of the decision taken</p> <p>Year 2 Action: Implementation of the proposed option. Approach to one or more bodies to fund and undertaken the external review, and commissioning of the work.</p> <p>Means of Verification: relevant minutes of the SWG</p> <p>Year 3 Action: External review in process</p> <p>Means of Verification: relevant minutes of the SWG</p> <p>Year 4 Action: External review completed.</p> <p>Means of Verification: external review report presented to the SWG</p>
Consultation on condition	Letters of support from SWG, Fishery Department and GATOSP.

Recommendations

Recommendation 1	
Performance Indicator	PI1.2.2b: HCRs robustness to uncertainty
Purpose	To ensure that any changes in fishing capacity are taken into account when estimating fishing effort and CPUE
Recommendation	The assessment team recommends that information on vessel characteristics is obtained so that fishing effort can be standardised by vessel.
Client Action Plan	<p>A review of how changes in technology might impact variation in / changes to fishing capacity, and in turn how this might affect the adequacy of the current HCR and the estimation of fishing effort and CPUE will be an element included within the Terms of Reference provided to those undertaking the Peer Review of stock status (Condition 1).</p> <p>At the appropriate time – assumed to be during and following the external peer review of the stock assessment – this issue will be revisited by the SWG, and potentially raised as an issue with the Shrimp and Groundfish Working Group (SGWG) of the CRFM.</p>
Consultation on Recommendation	Letters of support from SWG, Fishery Department and GATOSP

Recommendation 2	
Performance Indicator	PI3.1.2a: Explicit definition of roles and responsibility
Purpose	To more clearly define roles and responsibility for all areas.
Recommendation	It has been concluded that functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction. It has also been concluded that these roles and responsibilities are enabling the management system to function well. At the time of assessment, a stock assessment has been effectively undertaken and a further stock assessment is being undertaken which will provide an update on stock status and inform the Harvest Control Rule and management of the fishery in the years ahead. However, the responsibility for who will undertake (and pay for) future stock assessments is not explicitly defined. Because the current system in relation to stock assessment appears to be working and the lack of explicit definition is unlikely to be an issue until the next scheduled stock assessment update (which may not be during this period of certification), this has not triggered a condition. However, it is strongly recommended that the future role is given explicit consideration.
Client Action Plan	<p>A review of who will undertake (and pay for) future stock assessments will be included within the Terms of Reference provided to those undertaking the Peer Review of stock status (Condition 1).</p> <p>At the appropriate time this issue will be tabled and discussed by the SWG, and outcomes specified in the meeting minutes.</p>
Consultation on Recommendation	Letters of support from SWG, Fishery Department and GATOSP

Recommendation 3	
Performance Indicator	PI3.2.3d: Accountability and transparency of management system and decision-making process
Purpose	To further improve the transparency (and therefore accountability) of the management system by improved information dissemination.
Recommendation	The website www.guyanaseabobfishery.com is an excellent potential resource to enable all stakeholders and others interested in the fishery to provide information about the management and performance of the fishery. In order to maximise this potential and increase the utility of the resource, a more comprehensive range of information about the fishery should be included on the website. Consideration should be given to how best to structure this in order to provide a useful directory of information. Key documents such as the stock assessment, the Seabob Management Plan, CPUE annual reports should certainly be made available and a wider range of documents (P2 research, VMS annual reports, working group minutes) could also be added. This should also be updated in a timely manner. This would improve the apparent transparency and accountability within the management system.
Client Action Plan	<p>The SWG will commission a report to the SWG proposing a programme of improvements to the Guyana seabob fishery website, including detailed plans for arrangement of document library, uploading protocols, and site visibility / accessibility – with decision on how to take this forward.</p> <p>Evidence of improvement to the website (scale and nature of content, accessibility, number of visitors to the site).</p>
Consultation on Recommendation	Letters of support from SWG, Fishery Department and GATOSP

Recommendation 4	
Performance Indicator	PI3.2.4a: Monitoring and Management Performance Evaluation: Evaluation coverage
Purpose	To participate in all opportunities to evaluate key parts of the fishery management system
Recommendation	There are frequently reviews of key parts of the fishery management system undertaken at a regional scale in the wider Caribbean or at the scale of the North Brazil Shelf LME. Both CRFM and WECAFC undertake reviews of certain aspects of fisheries management, capacity or governance in the region. A wider regional evaluation provides a valuable comparative review and enables best practice to be shared. Where possible every opportunity should be taken to participate in these reviews / evaluations.
Client Action Plan	<p>SWG will support and participate fully, as necessary, in the external peer review of the seabob fishery management plan (part of closing out Condition 1)</p> <p>SWG will review representation of its members at regional / international forums, and participation in regional projects, and discuss how it (and the Fishery Department) can step up its representation and its influence in such forums.</p>
Consultation on Recommendation	Letters of support from SWG, Fishery Department and GATOSP

Evidence of Consultation on Conditions with Relevant Entities

Fisheries Department



Ministry of Agriculture

Fisheries Department
Regent & Vlissengen Roads
Bourda, Georgetown

28th March, 2019

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Iceland

S/T: +354 511 1330 & +354 820 4130


Fax: +354 511 1331

Subject: Declaration

Annex(es): 1.3

The Seabob Working Group (SWG) held its first quarterly meeting on March 20th, 2019 and discussed the agenda item for the Preliminary report of the Guyana Seabob Fishery which is under MSC assessment.

The SWG wishes to state that it will comply and support all the necessary actions within the Client Action Plan that is needed to ensure that the fishery reaches the score of 80 in each SI.


For The Chair of the Seabob Working Group
Mr. Randy Bumbury

Tel: (592) 226-4398, 225-9551, 225-9552 fisheriesguyana@gmail.com



Ministry of Agriculture

Fisheries Department
Regent & Vlissengen Roads
Bourda, Georgetown


25th March, 2019

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S/T: +354 511 1330 & +354 820 4130
Fax: +354 511 1331

Subject: Declaration

Annex (es): 1.3

The Fisheries Department hereby declares that we have no objections to the proposed conditions and recommendations as mentioned in the annex and that we will comply with the conditions and recommendations.


Chief Fisheries Officer
Mr. Denzil Roberts

CHIEF FISHERIES OFFICER
Ministry of Agriculture

Tel: (592) 226-4398, 225-9551, 225-9552 fisheriesguyana@gmail.com

Guyana Association of Trawler Owners & Seafood Processors

Area "K" Houston, East Bank Demerara, Guyana.

Telephone: 592-231-7384 or 592-225-2111 or 592-226-7173 or 592-623-6649

Email: charliereub@gmail.com

25th March, 2019

To Whom It May Concern

The Guyana Association of Trawler Owners and Seafood Processors agrees with the proposals and recommendations contained in the Preliminary Draft Report for Client review and supports the view that if executed, the scoring in particular areas will increase.

GATOSP pledges to comply with the proposals and recommendations.

Yours respectfully,

A handwritten signature in dark ink, appearing to read 'Reuben Charles', written over a horizontal dotted line.

Reuben Charles

PRESIDENT

Request from Fisheries Department to CRFM



Ministry of Agriculture
Fisheries Department
Regent & Vlissengen Roads
Bourda, Georgetown

Executive Director
Mr. Millington Houghton
CRFM Secretariat
Princess Margaret Drive
P.O. Box 642
Belize City,
Belize
Date: 27/03/2019
Subject: External Review

Guyana is currently undergoing MSC assessment and as such the preliminary results has recommended a pass with six (6) conditions. These conditions are as follows;

- To conduct external peer review of the assessment of the stock status.
- To conduct an assessment of the main secondary species
- To develop a management strategy (national and international requirements) to strengthen monitoring of fishing impact on ETP species.
- Provide evidence to demonstrate fishers comply with the management systems
- To conduct effective and timely review of fishery specific management systems: external /or internal review

The Fisheries Department is requesting your commitment to perform an external review of the following;

- a) Stock Assessment
- b) The Seabob management plan
- c) Roles and responsibilities of each stakeholder within the seabob fishery

We thank you in anticipation of your cooperation.

Denzil Roberts

Chief Fisheries Officer

CHIEF FISHERIES OFFICER
Ministry of Agriculture

Response from CRFM



2 May 2019

Mr. Denzil Roberts
Director of Fisheries
Fisheries Department
Government of Guyana

Dear Mr. Denzil Roberts:

SUBJECT: Request for External Review of the Fisheries Pursuant to MSC Certification

The Caribbean Regional Fisheries Mechanism (CRFM) Secretariat presents its compliments and refers to your letter dated 27 March 2019 regarding the subject at caption. I am pleased to confirm that the CRFM Secretariat will conduct a review of the documents as requested. We will submit our review, which will be done by Mr. Peter A. Murray, Programme Manager, Fisheries Management and Development (email: Peter.A.Murray@crfm.int), by Friday May 10, 2019.

Sincerely,

Milton Haughton
Executive Director

Copied: Dr. Susan Singh-Renton, Deputy Executive Director, CRFM Secretariat
Mr. Peter A. Murray, Programme Manager, FMD, CRFM Secretariat

Appendix 2: Peer Review Reports

Report from Peer Reviewer 1

General Comments

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	The scoring is consistent with the MSC standard and is based on the evidence presented, with some caveats. (1) A key question is whether seabob in Guyana should be considered a single stock, or whether it is a regional stock shared with neighbouring countries. No evidence is provided to justify its treatment as a single stock in Guyana - and indeed, based on the small geographical scale and ocean circulation pattern, particularly the North Brazil Current, it is more likely a shared stock in the region. (2) More evidence required in some of the scoring rationales - for example in PI 3.2.2 and PI 3.2.3. (3) Some of the PI scores (i.e. 1.2.2; 2.1.2; 3.1.2) may have been higher, based on the evidence provided and interpretation.	(1) The assessment team agrees that based on the relatively small geographical scale over which the fisheries are distributed and the ocean circulation pattern in the region, it is likely that the Guyana fishery may share a single stock with that in neighbouring countries. However, there is no genetic or biological evidence available to support or refute that conclusion, and as there is a separate monitoring, stock assessment and management regime in each country, it is appropriate to consider the fishery at a national rather than a regional level. As the other neighbouring industrial fishery in Suriname has already achieved MSC certification, a similar conclusion for the Guyana fishery would confirm that the industrial fisheries in the area are not impacting on the regional seabob stock or stocks and relevant bycatch species, and therefore not compromising their sustainability. A comment to that effect has been incorporated in section 3.3.1 and revisions have been made to the relevant Principle 1 scoring rationales to emphasise that the Guyana fishery may be exploiting only part of the overall regional stock. (2 & 3) Comments addressed at the appropriate PI.

Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes	Conditions are clearly supported by Rationales, well specified, and clear Milestones are provided towards closing them out at SG80.	No comment required.
Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	Yes	Year-by-year action plans are provided by the client, supported by a means of verification at each step. Action plans are targeted towards closing the conditions out over the certification period.	No comment required.
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)	N/A	The report is comprehensive and clear. The background information was satisfactory, but may have been slightly more detailed in P3. The single stock issue has not been adequately supported in the report. Information may not exist to resolve the issue at present - in which case a precautionary approach may have been to assess it as a shared stock, given seabob life history and oceanographic information related to the NBC? Nevertheless, scoring was well-supported throughout the draft report, but perhaps overly punitive in some cases (see PI comments). Use of RBF for PI 2.2.1 and 2.4.1 was well-motivated. From a peer-reviewer perspective, the report was well-structured, clear and a pleasure to review.	In relation to P3 background - we have sought to ensure that all of the normative requirements stated in the template are met within the report (including within some of the earlier report sections) and the scoring tables, avoiding unnecessary duplication. Much of the detail which specifically relates to scoring thresholds is contained in the scoring tables, rather than the descriptive chapter. The issue in relation to stock structure is responded to above.

PI Comments

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1	Yes	Yes	NA	Scoring agreed.	No comment required	
1.1.2	Yes	Yes	NA	Agreed. Stock not depleted - therefore PI was not scored.	No comment required	
1.2.1	Yes	Yes	NA	Scoring agreed.	No comment required	
1.2.2	Yes	No (score increase expected)	NA	Scoring Issue (a): At SG100, the HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY. If the team acknowledges that this is achieved, then SG100 is fully met. The rest of the SG100 requirement follows on 'OR', which implies a different (or alternative) measure, which does take the ecological role of the stock into account. In Scoring Issue (b) the ecological role is explicitly included, and SG100 is therefore not met.	The peer reviewer considers that the SG100 can be met for scoring issue (a) if "the HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY", and that the ecological role of the stock does not necessarily need to be taken into account. On that basis, the SG100 requirement is essentially the same as the SG80 requirement which is that "HCRs are expected to keep the stock fluctuating around a target level consistent with (or above) MSY". Other assessment teams and peer reviewers have previously considered that the ecological role of the stock is explicitly included in this scoring issue, but the assessment team accept the peer reviewer's interpretation. However, referring to MSC CRv2.0, GSA2.5 requires that at the SG100 level, greater certainty is required that the HCR will ensure that the stock will fluctuate around or above a level consistent with MSY, and that to achieve the 100 the stock is more likely to be above than around a level consistent with MSY. The score has not been changed, but the rationale for not achieving the SG100 has been revised.	Accepted (no score change)

1.2.3	No (scoring implications unknown)	Yes	NA	Scoring agreed. Even though, I am not convinced by the argument that several sets of biological and fisheries data "...provided no evidence that the neighbouring Guyana and Suriname populations are a single stock". At the limited geographical scale of these fisheries, and given that the habitats are under the same influence of the North Brazil Current, a single regional stock should be assumed, except if the hypothesis is rejected with some confidence.	The peer reviewer's comment about the likelihood of a single regional stock is noted and a detailed response was given above in relation to General Comment No. 1. The following text has been added to the rationale for this PI: "The Guyana and Suriname fisheries are monitored, assessed and managed separately, but there is no clear genetic, biological or hydrographical evidence whether there is a single or multiple stocks across the region, and so the Guyana fishery may be exploiting only part of the overall regional stock. However, there are similar levels of relevant information available for both the Guyana and Suriname fisheries that would ensure that information is available for the whole stock under the scenario of a single regional stock."	Accepted (no score change)
1.2.4	Yes	Yes	Yes	Scoring agreed. Condition 1 appropriate.	No comment required	
2.1.1	Yes	Yes	NA	Agreed. No Primary species identified and therefore a default score given.	No comment required	
2.1.2	Yes	No (score increase expected)	NA	There are no Primary species identified. The strategy to maintain this outcome is to continue fishing in the same way and without changing the gear. Is SG100 not met in this case?	(The team has received guidance from MSC on this issue.) The score is based on the "if necessary" statement in the scoring guidepost, because Primary Species Management is not necessary since Primary species do not exist in the jurisdiction. The fact that there are no primary species is not the result of the fishing practice but the result of the management tools and measures in place. Therefore, the suggestion of the peer reviewer is not taken over.	Not accepted (no score change)
2.1.3	Yes	Yes	NA	Scoring agreed	No comment required	
2.2.1	Yes	Yes	Yes	Scoring agreed. RBF used. Condition 2 appropriate	No comment required	
2.2.2	Yes	Yes	NA	Scoring agreed	No comment required	
2.2.3	Yes	Yes	NA	Scoring agreed	No comment required	
2.3.1	Yes	Yes	NA	Agreed. Scoring Issue (a) considered not relevant when the alternative (b) is scored (SA3.11.2)	No comment required	
2.3.2	Yes	Yes	Yes	Scoring agreed. Condition 3 appropriate.	No comment required	

2.3.3	Yes	Yes	Yes	Scoring agreed. Condition 4 appropriate.	No comment required	
2.4.1	Yes	Yes	NA	Scoring agreed. RBF used.	No comment required	
2.4.2	Yes	No (scoring implications unknown)	NA	SI(c) is scored at SG100 in the document, but in the rationale, it states that 100 is not met since there is no clear quantitative evidence that the move on rule is consequently practiced and achieving its objective. Probably just a typo, but an important one.	SI(c) should have been marked (N) since as the rational states SG100 is not met. It was a typo. The overall score of 80 does not change since this score is correct.	Accepted (no score change)
2.4.2	Yes	No (scoring implications unknown)	NA	SI(b) is scored at 80 in the document, but in the rationale, it states that 100 is not met since there is no clear quantitative evidence that the move on rule is consequently practiced and achieving its objective. Probably just a typo, but an important one.	Indeed SI(b) is scored at 80 since as the rational states SG80 is met and SG100 is not met.	Accepted (no score change)
2.4.3	Yes	Yes	NA	Scoring agreed.	No comment required	
2.5.1	Yes	Yes	NA	Scoring agreed	No comment required	
2.5.2	Yes	Yes	NA	Scoring agreed	No comment required	
2.5.3	Yes	Yes	NA	Scoring agreed	No comment required	
3.1.1	Yes	Yes	NA	Scoring agreed	No comment required	
3.1.2	Yes	No (score increase expected)	NA	SI(b): It is very hard to see why SI(b) do not meet SG100. The team states that SG100 is not met because "it does not explain how information is used or not used." But this contradicts the statement in the justification that says:"The Fishery Management Plan clearly shows the outcome of these consultations highlighting and rating the issues of concern and goes on to state that "The Fisheries Department has used this analysis as a basis for identifying for each fishery the issues to be address as a priority over the five-year period of the management plan".	This relates mostly to the fact that SG100 must include an explanation of why certain information was <i>not</i> used. The following sentence has been added. "This demonstrates 'consideration of the information obtained' (SG80) but perhaps falls short of the full SG100 requirement for an explanation of why certain information was not used".	Accepted (no score change)

3.1.2	Yes	No (score increase expected)	NA	SI(c): As above, it is hard to see why SI(c) do not meet SG100. Both encouragement and facilitation are clearly provided, at different levels.	The following statement has been added to try to further clarify: "In order for SG100 to be fully met, the sort of open consultation processes used to encourage and facilitate engagement with the artisanal fleet would be employed to engage a wider range of stakeholders".	Accepted (no score change)
3.1.3	Yes	Yes	NA	Scoring agreed	No comment required	
3.2.1	Yes	Yes	NA	Scoring agreed. SG100 partially met because it is met for P1 but not for P2.	No comment required	
3.2.2	No (scoring implications unknown)	No (scoring implications unknown)	NA	SI(b): The team needs to provide more information to show why SG100 is not met. It is not sufficient to simply say: "There are some issues identified in either the Guyana Marine Fisheries Plan (2013- 2018) or more recent work (e.g. Garstin & Oxenford 2018) which have yet to be responded to". What are these issues??	SG100 requires all issues to be addressed over and above those which are "serious and important" which must be addressed at SG80. This is a high bar! Further text and example have been added to clarify why SG100 is not met: "For example, whether and how to extend HCR constraints to the artisanal seabob fishermen (e.g. Chinese seine) or the adoption of further modifications of TEDs".	Accepted (no score change)
3.2.2	Yes	Yes	NA	Scoring agreed for the other SIs in 3.2.2. Recommendation in (d) is appropriate.	No comment required	
3.2.3	Yes	Yes	Yes	Scoring agreed but may be overly punitive in SIa and SIc. In (a), use of video cameras and VMS suggests that 'state of the art' methods are being used? In (c), it is clear that "Some evidence exists...", in the form of 15000 VMS records, with few infringements. The condition is nevertheless appropriate - an updated report on compliance is needed.	SIa: because the CCTV is a processing company requirement, rather than a regulatory requirement it is not a formal part of the MCS system. This statement has been added. SIc: The "some evidence" requirement of SG80 is not fully met (thus triggering a condition). As the reviewer notes it could be partially met, but there is no scope for partial scoring in this instance, so this would not change the score.	Accepted (no score change)
3.2.4	Yes	Yes	Yes	Scoring agreed. Condition 6 is appropriate	No comment required	

Risk Based Framework

PI	RBF Scoring	RBF Info	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
2.2.1	Yes	Yes	Scoring agreed. Only 'main' secondary species scored, and overall score therefore adjusted downwards.	No Comment Required	
2.4.1	Yes	Yes	Scoring agreed. CSA rationales provided for 4 habitat types for trawling.	No Comment Required	

Report from Peer Reviewer 2

General Comments

Question	Yes/ No	Peer Reviewer Justification (as given at initial Peer Review stage).	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	Each relevant scoring issue was thoroughly considered and scores were adequately justified based on the information available, including information gathered through RBF consultations.	No comment required
Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes	The wording of the 6 conditions and resulting milestones were appropriate and should raise the scores to 80 within the required timeframe.	No comment required
Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	No	Condition 1 relies on the CRFM to arrange the external peer review. There is no evidence that the CRFM has agreed to fulfil such a role among the letters of support. Evidence that the CRFM has agreed to undertake this role should be provided. Otherwise, an alternative course of action for the external peer review should be developed. All other aspects of the client action plan were adequate.	A positive response has been received from CRFM, which is now included in the report along with other relevant letters of support for conditions.

Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	No	For Condition 4, the means of verification is not likely to be achievable for Year 2. " <u>Changes</u> in the interaction between fishing and ETP species" won't be able to be determined after only 1 year of improved data. At least one more year of data is needed. The means of verification for Year 2 should simply focus on providing a more accurate estimate of interaction with ETP species. A change in interaction could possibly be reported after Year 3.	The means of verification that the client clearly intends to provide are annual reports describing interaction between the fishery and ETP species. The Condition also requires that the information is adequate to measure trends. Therefore, the client has added that trends (changes in interactions) will also be described in these reports. It is clear that it is unlikely that trends can be detected within one year of data collection. However, a report describing and analysing the interactions with ETP species is a sufficient means of verification for the year 2 milestone.
Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	No	For Condition 4, consider that no change in interaction with ETP species could be observed or eventuate within a short time frame of 2-3 years. The client should not obligate itself to report changes when it is possible, or even likely, that no meaningful change may occur.	The action that client will take for year 4 is a report demonstrating the adequacy of data gathering and collation practices to measure trends and support a strategy to manage impacts on ETP species. It is true that the data might not show clear trends but the actions described are considered sufficient to close the condition. Even if the data do not show clear trends the data can be adequate to demonstrate that information is adequate to measure trends and support a strategy to manage impacts on ETP species and the Condition can be closed.
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)	N/A	The CAB appropriately used the background information available on stock structure, however, the region (Venezuela - Brazil) could benefit from more work identifying stock structure considering there are 2 indistinguishable species of <i>Xiphopenaeus</i> present as identified in the paper: Gusmão, Jaqueline & Lazoski, Cristiano & Monteiro, Fernando & Solé-Cava, Antonio. (2006). Cryptic species and population structuring of the Atlantic and Pacific seabob shrimp species, <i>Xiphopenaeus kroyeri</i> and <i>Xiphopenaeus riveti</i> . Marine Biology. 149. 491-502.	The peer reviewer cites the paper by Gusmão et al. that notes that there are 2 indistinguishable species of <i>Xiphopenaeus</i> present in the region from Venezuela to Brazil, and that this could have important management consequences for stocks of <i>Xiphopenaeus kroyeri</i> in the region. However the paper states that whilst <i>Xiphopenaeus</i> sp. 1 was observed in all sampling sites ranging from Ubatuba (Brazil) to Caracas (Venezuela), and probably has a continuous distribution along the coast, and therefore is likely to be <i>X. kroyeri</i> , the other species, <i>Xiphopenaeus</i> sp. 2, was only observed in the Northern and Southernmost Brazilian sampling sites. On that basis, it seems reasonable to conclude that only <i>X. kroyeri</i> is present in Guyana waters. A statement to that effect has been added to section 3.3.1.

PI Comments

PI	PI Info.	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1	Yes	Yes	NA	scoring agreed	No comment required.	
1.1.2			NA	agreed that 1.1.2 should not be scored	No comment required.	
1.2.1	Yes	Yes	NA	scoring agreed	No comment required.	
1.2.2	Yes	Yes	NA	scoring agreed	No comment required.	
1.2.3	Yes	Yes	NA	scoring agreed	No comment required.	
1.2.4	Yes	Yes	Yes	scoring, conditions and milestones handled appropriately based on the information available, however, the implications of the possibility that there is a cryptic species that is morphologically indistinguishable from <i>Xiphopenaeus kroyeri</i> could have been mentioned pertaining to stock structure. See paper: Gusmão, Jaqueline & Lazoski, Cristiano & Monteiro, Fernando & Solé-Cava, Antonio. (2006). Cryptic species and population structuring of the Atlantic and Pacific seabob shrimp species, <i>Xiphopenaeus kroyeri</i> and <i>Xiphopenaeus riveti</i> .	The peer reviewer cites the paper by Gusmão et al. that notes that there are 2 indistinguishable species of <i>Xiphopenaeus</i> present in the region from Venezuela to Brazil, and that this could have important management consequences for stocks of <i>Xiphopenaeus kroyeri</i> in the region. However the paper states that whilst <i>Xiphopenaeus</i> sp. 1 was observed in all sampling sites ranging from Ubatuba (Brazil) to Caracas (Venezuela), and probably has a continuous distribution along the coast, and therefore is likely to be <i>X. kroyeri</i> , the other species, <i>Xiphopenaeus</i> sp. 2, was only observed in the Northern and Southernmost Brazilian sampling sites. On that basis, it seems reasonable to conclude that only <i>X. kroyeri</i> is present in Guyana waters. A statement to that effect has been added to section 3.3.1.	Accepted (no score change)
2.1.1	Yes	Yes	NA	scoring agreed	No comment required.	
2.1.2	Yes	Yes	NA	scoring agreed	No comment required.	
2.1.3	Yes	Yes	NA	scoring agreed	No comment required.	
2.2.1			Yes	scoring in RBF agreed; Conditions and milestones appropriate	No comment required.	
2.2.2	Yes	Yes	NA	scoring agreed	No comment required.	
2.2.3	Yes	Yes	NA	scoring agreed	No comment required.	

2.3.1	Yes	yes	NA	scoring agreed	No comment required.	
2.3.2	Yes	Yes	Yes	scoring agreed, Conditions and milestones appropriate	No comment required.	
2.3.3	yes	yes	Yes	scoring agreed, Conditions and milestones appropriate	No comment required.	
2.4.1			NA	scoring in RBF agreed	No comment required.	
2.4.2	Yes	Yes	NA	scoring agreed; Based on the rationale given, note that "Y" wrongly entered at "100" for 2.4.2c on page 116 but overall score for 2.4.2 correctly calculated using "80"	The comment is correct. The "Y" was wrongly entered at SG100 since SG100 is not met. The overall score is correct.	Accepted (no score change)
2.4.3	Yes	Yes	NA	scoring agreed	No comment required.	
2.5.1	Yes	Yes	NA	scoring agreed	No comment required.	
2.5.2	Yes	Yes	NA	scoring agreed	No comment required.	
2.5.3	Yes	Yes	NA	scoring agreed	No comment required.	
3.1.1	Yes	Yes	NA	scoring agreed	No comment required.	
3.1.2	Yes	Yes	NA	scoring agreed	No comment required.	
3.1.3	Yes	Yes	NA	scoring agreed	No comment required.	
3.2.1	Yes	Yes	NA	scoring agreed	No comment required.	
3.2.2	Yes	Yes	NA	scoring agreed	No comment required.	
3.2.3	Yes	Yes	Yes	scoring agreed; Conditions and milestones appropriate. However, for 3.2.3a, state whether more advanced CCTV will improve monitoring of compliance with move-on rule; If it doesn't, lack of ability to monitor compliance with this rule should also be cited as a reason a score of "100" was not achieved.	The following statement is now included: "Furthermore, the CCTV system is not able to accurately determine catch composition to monitor compliance with the move-on requirements".	Accepted (no score change)
3.2.4	Yes	Yes	Yes	scoring agreed; Conditions and milestones appropriate	No comment required.	

Risk Based Framework

PI	RBF Scoring	RBF Information	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1			n/a	n/a	
2.1.1			n/a	n/a	
2.2.1	Yes	Yes	scoring agreed; Condition and milestones appropriate and should also raise the score to 80	No comment required	
2.3.1			n/a	n/a	
2.4.1	Yes	Yes	scoring agreed	No comment required	
2.5.1			n/a	n/a	

Appendix 3: Stakeholder Submissions

No written submissions were made by stakeholders as part of the assessment process. A summary of subjects discussed with stakeholders during the sight visit is provided in table 4.1. An informal record of all site visit meetings is held by VTun. Where verbal submissions contributed towards material outcomes of the scoring process these are specifically referred to as *pers. comm.* in the scoring tables in Appendix 1.1. The Marine Stewardship Council did provide a Technical Oversight as part of the review process, which is appended below, along with the assessors' response.

Sub ID	Page Ref. ⁴⁰	Grade	Requirement Version	Oversight Description	Pi	CAB Comment
29323	140	Guidance	FCR-7.10.6.1 v2.0	PI 3.2.2 SI d. From the rationale, it is not clear whether the critical guidance associated with this Scoring Issue has been considered in the scoring.	3.2.2,	The critical guidance was considered in scoring and scoring was correct. The following statement has been added "This includes all relevant information listed in the MSC key guidance for SG60 and SG80, such as subsidies, allocation, compliance and the data and rationales which inform fisheries management decisions".
29324	147	Minor	PF 4.4.6.1 v2.0	PI 2.2.1 - PF 4.4.6 and associated sub-clauses. Table 1.2.1.a. (All species) From the rationale provided, it is unclear what evidence has been used to consider the species distribution overlap with the fishing effort in order to conclude the score. Eg. consideration of PF 4.4.6.5 and 4.4.6.6 are not referenced in the rationale.	2.2.1,	Rationale has been added with reference to the figures 3.4.6a and 3.4.6b. The figures show that that locations of possible sensitive habitats are generally further off shore than the seabob fishing area and that the overlay of the fishing footprint with the area where these sensitive taxa might occur is less than 15 %.
29325	147	Minor	PF 4.4.8.4 c. v2.0	PI 2.2.1 - PF 4.4.8 and associated sub-clauses. Table 1.2.1.a. (All species) It is not clear from the rationale provided what evidence was used to conclude the final risk score.	2.2.1,	Since table PF4.4.8 is mentioned it is assumed that the comment concerns the risk scores for selectivity. Rationale is now provided how the risk scores have been derived.

⁴⁰ Note – the page numbers referred to here are prior to edits at the review stage, so may differ from the page numbers of the final document.

29326		Guidance		RBF - The MSC RBF worksheets used to calculate final risk scores and MSC scores have not been included in the report.		These have been added. MSC CSA derived scores for spots with sensitive taxa and stony areas mentioned in scoring table 2.4.1 have been corrected since they were not in line with the amended (see sub ID 20329 below) MSC RBF worksheet that is now included in the report. The amendment of the worksheet involved the change of the score for stony areas (regeneration of biota) and including the correct scores for encounterability as mentioned in tables 1.2.2.c and d.
29327	147	Minor	PF 4.4.9.1 v2.0	PI 2.2.1 - PF 4.4.9 and associated sub-clauses. Table 1.2.1.a. (All species) It is not clear from the rationale provided, what evidence has been used to determine the PCM risk scores. See GPF 4.4.9.1	2.2.1,	Rationale has been added. Concerning the species that are retained it is added that for these species the default risk score is 3. For the two ray species it was added that from the team's knowledge, and stakeholder comment about species biology and fishing practice and backed up by scientific literature about post capture survival of ray species it was concluded that at least some rays survive the capture and release in the seabob fishery.
29328	151	Minor	PF 7.3.3 v2.0	PI 2.4.1 - PF7.3.3 and Table PF10. Table 1.2.2.a., b., c., and d. CSA Rationale Table - The biomes, sub-biomes and features have not been listed as described in Table PF10.	2.4.1,	Biomes, sub-biomes and features have now been added to the tables 1.2.2a, b, c and d.
29329	154	Minor	PF 7.4.1 v2.0	PI 2.4.1 - PF 7.4.1 and associated sub-clauses. Table 1.2.2.d. CSA Rationale Table. It is not clear from the rationale why a risk score of 2 has been assigned for this attribute when Table PF12 indicates a score of 1 would be appropriate for 'small, erect / encrusting' and 'Inner shelf (25-100m)' as specific in the rationale.	2.4.1,	The score for regeneration of biota in table 1.2.2.d has been amended from 2 to 1 to reflect changes in the most recent published CSA tables. Other CSA scoring tables were also checked for errors.
29330	153	Minor	PF 7.5.2 v2.0	PI 2.4.1 - PF 7.5.2 and associated sub-clauses. Table 1.2.2.c. CSA Rationale Table - It is not clear from the rationale provided what evidence has been used to support the score of <15% spatial overlap.	2.4.1,	Rationale has been added with reference to the figures 3.4.6a and 3.4.6b. The figures show that locations of possible sensitive habitats are generally further off shore than the seabob fishing area and that the overlay of the fishing footprint with these areas is less than 15 %.

29331	21-22, 45-46	Guidance		It is not clear that the rationale for why this stock does not meet the KLTL requirements takes into account SA2.2.9.c and its subclauses. In particular since the team has evidence that the ecosystem is potentially wasp-waisted (Willems, 2016).	1.1.1,	Further explanatory information has been added to section 3.3.1. Whilst Willens (2016) considered that seabob may be one of the species that contributes to the 'waist' through which energy is channelled up the benthic food web, seabob was only the third most important prey type, contributing 11% to the diet of demersal fish species, and therefore it cannot be concluded that "a high proportion of the total energy passing between lower and higher trophic levels passes through this stock". In addition there is evidence that seabob is highly unlikely to meet any of the criteria in SA2.2.9.a.i–iii. To be designated as a key LTL, seabob must also meet all the life history characteristics listed in SA2.2.9bi, and evidence is provided that this is not the case.
29332	79	Major	FCR-7.10.6.1 v2.0	<p>PI 1.2.3 scoring issue a: The assessment team has provided a rationale that SG80 is met. However, an aspect of the scoring guidepost at SG80 is that teams assess "sufficient relevant information related to stock structure."</p> <p>SA2.6.2 states that "Teams shall interpret "sufficient information" at the SG80 level to mean that all information required to implement the harvest strategy is available."</p> <p>Within the rationale for PI 1.2.3 scoring issue a, the assessment team state that "The Guyana and Suriname fisheries are monitored, assessed and managed separately, but there is no clear genetic, biological or hydrographical evidence whether there is single or multiple stocks across the region, and so the Guyana fishery may be exploiting only part of the overall regional stock."</p> <p>Given that stock structure appears to be unknown, at present the rationale does not justify the score.</p>	1.2.3,	As noted in the background information and scoring rationale for PI 1.2.3, there is no clear genetic, biological or hydrographical evidence whether there is a single stock or multiple stocks of seabob across the region. In the absence of such evidence, the Guyana and Suriname fisheries are monitored, assessed and managed separately. Under the scenario of separate stocks in Guyana and Suriname, there is clearly sufficient information on stock structure, stock productivity, fleet composition and other data to support the current harvest strategy including the harvest control rules, and therefore the SG80 is met. MSC CRv2.0 GSA 2.6.1 states that " <i>The intent behind the consideration in SG100 that additional information should be available that may not be directly relevant to the current harvest strategy, is that the information monitoring system should take into account information relevant to a wider set of possible stock hypotheses than addressed by the current harvest strategy.</i> " The assessment team considered that the hypothesis of a single regional stock needs to be considered at the SG100 level. As the rationale for PI 1.2.3 notes, there are similar levels of relevant information available for both the Guyana and Suriname fisheries that should ensure that information is available to support the

						harvest strategy for the whole stock under the scenario of a single regional stock, but there is still some uncertainty regarding stock structure and this uncertainty was part of the reason for the fishery not meeting SG100. Some minor changes to the rationale for PI 1.2.3 have been made to clarify the situation.
29333	88-89	Major	FCR-SA3.3.2 v2.0	PI 2.1.3, is unclear how the information available goes beyond the immediate short-term management needs and create a strategic body of research relevant to the long-term fishery-specific management system. Furthermore, it is unclear how SG100 is justified for Sia and Sib (see SA 3.6.3 and GSA 3.6.3.2.)	2.1.3,	The key point underlying the conclusion that SG100 is met is that there are no primary species and that the information on which this conclusion is based is 100 % secure. SIc has not been scored since the scoring issues mentioned are not considered applicable to this situation. Information on primary species cannot be scored. As stated in the rationale under SIa the team has submitted a formal Fishery Interpretation Query to MSC on 16.11.2018 to check how this interpretation should be applied in situations where there were no Primary Species in a jurisdiction. The scoring of PI 2.1.3 follows the interpretation response from the MSC.
29342	60	Minor	FCR_7.12.2.1 v2.0	Please confirm the list of GATOSP member processing companies that handle product from the UoC and are eligible to sell product into certified chains of custody.		The report clearly states that “Chain of custody should begin at the point of landing. Therefore, Chain of Custody certification is required for all GATOSP processing plants”.

Appendix 4: Surveillance Frequency

Table A4.1: Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1 & 3	Off-site audit	2 (required as this is initial certification period) as per FCR7.23.4.1	Relatively few of the conditions require material changes in operation or physical changes which must be verified by site visit. By contrast, documentary evidence of actions undertaken may provide an objective basis to assess progress against milestones. In most cases milestone in year 1 requires review, and milestone in year 3 relates to commencing the process of implementation. No score changes are anticipated in years 1 and 3.
2 & 4	On-site audit	2 (required as this is initial certification period) as per FCR7.23.4.1	By year 2 actions to address all conditions should be well underway and initial review and work to address gaps should be largely complete and moving into the implementation phases. An on-site surveillance will be useful at this point to verify progress. Final implementation and completion of all conditions is scheduled for year 4. As a result, score changes are anticipated to occur in year 4. Therefore, an on-site surveillance will be important at this point to verify implementation. This also coincides with meetings to commence recertification (if the client wishes to continue).

Table A4.2: Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
All years	Month	Month	No annual scientific advice, so timing of surveillance expected to be in-line with the anniversary of certification.

Table A4.3: Fishery Surveillance Program

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 4	Off site surveillance audit	On-site surveillance audit	Off-site surveillance audit	On-site surveillance audit & re-certification site visit

Appendix 5: Objections Process

(REQUIRED FOR THE PCR IN ASSESSMENTS WHERE AN OBJECTION WAS RAISED AND ACCEPTED BY AN INDEPENDENT ADJUDICATOR)

The report shall include all written decisions arising from an objection.

(Reference: FCR 7.19.1)