



**MINISTRY OF AGRICULTURE, ANIMAL HUSBANDRY AND
FISHERIES**

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**MANAGEMENT PLAN FOR THE SEABOB SHRIMP (*Xiphopenaeus
kroyeri*) TRAWL FISHERY IN SURINAME**

2019 - 2022



FISHERIES DEPARTMENT

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TRANSLATED FROM: “Visserij beheersplan voor de seabobgarnalen (*Xiphopenaeus kroyeri*) trawl visserij in Suriname 2019 – 2022”.

Note that the **Dutch version is the legal and binding version.**

Translation by T. Willems, January 2020.

This fisheries management plan is the adapted version of the previous seabob management plan (2016 – 2021). The changes have been made by the members of the Seabob Working Group. An important contribution to the current updated plan was made during the “*Meeting of CRFM Continental Shelf Fisheries Working Group (CRFM CSWG) on Atlantic Seabob, Xiphopenaeus kroyeri, fisheries of Guyana and Suriname, 20-22 August 2019*” (CRFM, 2019).

An electronical version of this document will be shared with all stakeholders. The Ministry of Agriculture, Animal Husbandry and Fisheries retains the right to change fisheries regulations, after consultations with the Fisheries Advisory Committee (Dutch: RVO).

Picture cover: seabob trawler in Surinamese waters (c) T. Willems

DEFINITIONS

Stakeholders	This refers to the main stakeholders in the Suriname seabob trawl fishery, i.e. the catch and processing companies (Heiploeg Suriname NV, Surinam American Industries Ltd (SAIL), NAMOONA N.V.), the artisanal seabob fisheries, the FD and WWF Guianas
Bycatch	All catch except the target species <i>Xiphopenaeus kroyeri</i> . This includes both landed and discarded bycatch.
Inspector	Person or institution that executes inspections and is certified to do so by the MAAFH
Participant	Person or institution working in the fishery sector or corporation (legal entity) with a license for the seabob fishery and members of recognized organizations
Primary species	Species in the catch, other than the target catch, that are defined as 'primary' bycatch species in the MSC standard V. 2.0
Secondary species	Species in the catch, other than the target catch, that are defined as 'secondary' bycatch species in the MSC standard V. 2.0
Seabob	Atlantic seabob shrimp <i>Xiphopenaeus kroyeri</i>
Seabob fishery	This usually refers to the industrial seabob (trawl) fishery

ABBREVIATIONS

BRD	Bycatch Reduction Device (in this document, BRD usually refers to the Square Mesh Panel BRD as used in the seabob fishery)
CPUE	Catch-Per-Unit-Effort
CRFM	Caribbean Regional Fisheries Mechanism
ETP	Endangered, Threatened and Protected (species)
FAO	Food and Agriculture Organization of the United Nations
HCR	Harvest Control Rule
ILO	International Labour Organization
IMO	International Maritime Organization
IUU	Illegal, Unreported and Unregulated (fisheries)
MAAHF	Ministry of Agriculture, Animal Husbandry and Fisheries (i.e. Ministry of LVV)
MAS	Maritime Authority of Suriname
MSY	Maximum Sustainable Yield
MSC	Marine Stewardship Council
NGO	Non-Governmental Organization
FD	Fisheries Department of the MAAHF (i.e. ODVIS)
PRI	Point where Recruitment would be Impaired
SIS	Seafood Industries Suriname
SSB	Spawning Stock Biomass
SWG	Seabob Working Group
R&D plan	Research & Development plan
TED	Turtle Excluder Device
VMS	Vessel Monitoring System
WECAFC	Western Central Atlantic Fisheries Commission
WWF	World Wildlife Fund

CONTENTS

SUMMARY.....	8
1 VISION, OBJECTIVES and STRATEGY.....	9
1.1 VISION.....	9
1.2 OBJECTIVES.....	9
A. Status of the seabob stock.....	9
B. Ecosystem impact.....	9
C. Fisheries governance.....	10
D. Socio-economic aspects.....	10
1.3 STRATEGY.....	10
B. Ecosystem impact.....	11
C. Fisheries governance.....	12
D. Socio-economic aspects.....	13
2 LEGAL FRAMEWORK.....	14
3 FISHERY and ECOSYSTEM.....	15
3.1 GENERAL.....	15
3.2 SEABOB.....	15
3.4 STOCK ASSESSMENT.....	16
4 MANAGEMENT MEASURES.....	17
4.1 REGULATIONS ON FISHING GEAR AND FISHING METHODS.....	17
4.1.1 Allowable fishing gear.....	17
4.1.2 Allowable fishing methods.....	17
4.1.3 Netspecifications.....	17
4.2 SPATIO-TEMPORAL RESTRICTIONS.....	17
4.2.1 Fishing area.....	17
4.3 FISHING EFFORT AND CATCH MANAGEMENT.....	18
4.3.1 Input control.....	18
4.3.2 Output control.....	18
4.3.3 The Move-on rule.....	20
5 IMPLEMENTATION.....	22
5.1 Consultation and decision making.....	22
5.1.1 Pilot HCR.....	22
5.2 MONITORING, CONTROL and SURVEILLANCE.....	23
5.2.1 Operational standards.....	23
5.2.2 Vessel Monitoring System.....	23
5.2.3 Landings.....	23
5.2.4 Other control.....	23

5.2.5	Surveillance.....	24
5.2.6	Enforcement.....	24
5.2.7	Waste and pollution.....	24
5.2.8	Research.....	24
5.3	COMPLIANCE	25
5.3.1	Sanctions	25
5.3.2	Objection procedures	26
5.4	EVALUATION	26
	REFERENCES.....	27
	ANNEXES.....	28
	Annex I	28
	Annex II	30
	Annex III	31
	Annex IV	32
	Annex V.....	33
	Annex VI.....	35
	Annex VII.....	36

SUMMARY

Atlantic seabob shrimp *Xiphopenaeus kroyeri* (further referred to as 'seabob') is a relatively small shrimp species that occurs abundantly in the coastal waters of Suriname. While an artisanal fishery catches seabob with fyke nets in the river estuaries, trawlers target the species further offshore. The current plan defines the management of the seabob trawl fishery in Suriname.

The seabob fishery has been certified by the Marine Stewardship Council (MSC) since 2011, an international standard for ecologically sustainable fisheries. The goal of the seabob fisheries management is to continue compliance with the MSC standard, ensuring a sustainable fishery. As such, the three pillars of the MSC standard (stock status, ecosystem impact and fisheries management) form the basis of the management objectives and measures that are defined in the current plan, in addition to the socio-economic objectives.

The implementation of the seabob management plan is overseen by the Fisheries Department (FD) of the Ministry of Agriculture, Animal Husbandry and Fisheries (MAAHF). All stakeholders in the fishery, however, are responsible for the correct implementation of the plan. Each month, or whenever it is deemed necessary, stakeholders convene in a meeting of the Seabob Working Group (SWG). The SWG discusses Catch-Per-Unit-Effort (CPUE) and implementation of the Harvest Control Rule (HCR), management measures, monitoring and research, and any other matter of interest. The stakeholders have agreed to pursue a continuous improvement in the management of the fishery and scientific knowledge on the fishery. This is being done through a Research and Development (R&D) plan, which is monitored by the SWG.

The current seabob management plan reflects the policy and vision of the MAAHF and the management objectives are in line with the national fisheries management plan for Suriname (2014 – 2018). As stipulated by the Sea Fisheries Act (1980), the seabob fishery is also subject to regulations contained in the License Conditions Decree, which is issued each year by the MAAHF. The current management plan will be reviewed and updated every three years, or earlier if necessary.

1 VISION, OBJECTIVES and STRATEGY

1.1 VISION

The seabob fishery is an ecologically, economically and socially responsible fishery, that is managed in compliance with the Marine Stewardship Council (MSC) standard. Continuing MSC-certification has the highest priority in the management of the fishery, to ensure both sustainability and market access.

To achieve this, the seabob fishery:

1. is based on a productive and sustainably managed stock of seabob shrimp;
2. has limited impact on the ecosystem of the target species and other species in the ecosystem;
3. has limited impact on other fishery types;
4. has a good understanding with the stakeholders of other (artisanal and industrial) fisheries;
5. ensures a good cooperation between all executing agencies and between public and private partners;
6. is aiming for a continuous development of the fishery and an improvement of the scientific basis for fisheries management.

1.2 OBJECTIVES

In support of the general vision, a number of management objectives are formulated for the seabob fishery. These are in line with the three pillars of the MSC standard, i.e. P1 – stock status, P2 – ecosystem impact and P3 – fisheries management (MSC, 2018). Additional socio-economic objectives are formulated in a fourth pillar.

A. Status of the seabob stock

- The seabob stock is at a level which maintains high productivity and has a low probability of recruitment overfishing.

B. Ecosystem impact

B1 – Primary species

- The seabob fishery aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI.

B2 – Secondary species

- The seabob fishery aims to maintain secondary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of secondary species if they are below the PRI.

B3 – Endangered, Threatened and Protected (ETP) species

- The seabob fishery complies with all national and international requirements related to the protection of ETP species and does not hinder recovery of ETP species.

B4 – Habitats

- The seabob fishery does not cause serious or irreversible harm to habitat structure and function in the areas where the fishery operates.

B5 – Ecosystem

- The seabob fishery does not cause serious or irreversible harm to the structure and function of important ecosystem elements (e.g. breeding and nursery grounds of fish and shrimp).

C. Fisheries governance

- The seabob fishery management has clear objectives, in line with the MSC-standard, and adopts a precautionary approach.

D. Socio-economic aspects

- The seabob fishery is an economically sustainable and responsible fishery which:
 - is economically viable and cost-effective;
 - maintains and improves the economic position of the fishermen through coordinated self-regulation of the fishery;
 - stimulates efficiency increase in the fishery;
 - ensures decent and safe working conditions, in compliance with international ILO and IMO standards;
 - delivers shrimp, fish and fishery products of the highest quality.
- The seabob fishery supports a large number of families and ensures income and employment in some rural areas. Maintaining this source of income and livelihood is important.
- The way in which fishers execute their activities can be considered a way to ensure maximum economic efficiency of the fishery.
- Fresh and dried seabob shrimp are traditional supplies to the local market and constitute a significant contribution to national protein supply.
- Frozen seabob is exported by the processing industry, while dried seabob might have export potential. In this way, the sector is an important source of foreign currency.

1.3 STRATEGY

The **general strategy** for the management of the seabob fishery is based on dialog between the stakeholders and further development of the knowledge base for fisheries management, embracing a precautionary approach. Two important instruments are used to ensure correct implementation of this strategy: the R&D plan and the SWG.

1. The Research & Development (R&D) plan

The R&D plan is a stepwise plan for research and development in the seabob fishery. It includes all developments and studies that are deemed beneficial or necessary for the fishery, linked to the management objectives (see 1.2). Conditions and recommendations of MSC-audits are often main drivers for the inclusion of certain elements in the R&D plan. Further, it is important that the plan considers the MSC-standard itself, its development and requirements. The R&D plan can also incorporate elements that certain stakeholders want to see included. See annex 1.

The R&D plan is constructed according to the so-called SMART principle: it should be *specific, measurable, acceptable, realistic and time-bound*. In other words, the R&D plan should clearly state *who* should do *what* by *when*. Progress against the R&D plan is discussed in each meeting of the SWG.

2. The Seabob Working Group (SWG)

The SWG is a meeting of stakeholders in the seabob fishery that is officially installed as a commission of the MAAHF. The permanent SWG members include representatives of the catch and processing companies (Heiploeg Suriname NV, Surinam American Industries Ltd. (SAIL), NAMOONA N.V.), the artisanal seabob fishery and the FD under the MAAHF. WWF Guianas participates in the SWG as observer. Fixed agenda items of the SWG are CPUE and HCR performance and the progress against the R&D plan.

Next to the **general strategy**, there are specific strategies to pursue the various management objectives (A, B, C and D).

A. Status of the seabob stock

- There is a robust catch strategy in place based on the precautionary principle and aimed at a long term exploitation in line with Maximum Sustainable Yield (MSY).
- There is a well-defined and effective Harvest Control Rule (HCR) in place that regulates fishing effort. The HCR is based on an adequate stock assessment.
- Relevant information is being collected to support the harvest strategy
- There is an adequate assessment of the seabob stock

B. Ecosystem impact

Similar to the limits that imposed to the catch of the target species (see A), measures are also implemented to protect certain species (primary, secondary and ETP), habitats and ecosystems. It is being accepted that some bycatch and discards in this fishery are unavoidable. All efforts should be made to minimize bycatch, e.g. by the use of TEDs and BRDs. Further, high-risk species should be protected. Mortality of dolphins, manatees and marine turtles due to seabob trawling is deemed negligible due to the use of TEDs. Still, other ETP species can be observed in the fishery and this should be monitored to ensure action can be taken comply with the management objectives. Seabed habitats in areas where seabob trawling takes place are not considered as vulnerable and the fishing gear is expected to have limited impact. Nevertheless, because habitats are not adequately mapped, there is a chance that some undesirable interactions take place. If this would be the case, it should be reported so further action can be taken.

The “move-on-rule” (see further) is applied to address direct impact on species and fishing grounds. This rule will minimize direct impact and allow for the stakeholders to assess the risk and judge whether further management action is required.

To minimize and monitor the impact of the seabob fishery on species (primary, secondary and ETP) and fishing grounds (i.e. habitats and ecosystems), each of these are being treated separately in the management strategy.

B1 – Primary species

- There is a strategy that aims to maintain primary species and does not hinder their recovery. The seabob fishery implements adequate measures (e.g. changes to the fishing gear) to minimize unwanted bycatch of primary species.
- The information that is collected on primary bycatch species is adequate to assess the impact of the seabob fishery on these species and to evaluate the effectiveness of management measures.

B2 – Secondary species

- There is a strategy that aims to maintain secondary species and does not hinder their recovery. The seabob fishery implements adequate measures (e.g. changes to the fishing gear) to minimize unwanted bycatch of primary species.
- The information that is collected on secondary bycatch species is adequate to assess the impact of the seabob fishery on these species and to evaluate the effectiveness of management measures.

B3 – Endangered, Threatened and Protected (ETP) species

- There is a strategy that aims to comply with national and international requirements to protect ETP species (Annex II) and ensures that their recovery is not hindered. The seabob fishery implements adequate measures (e.g. changes to the fishing gear) to minimize mortality of ETP species.
- The information that is collected on the impact of the seabob fishery on ETP species (Annex III) is suitable to construct a management strategy and to evaluate the effectiveness of management measures.

B4 – Habitats

- There is a strategy that ensures that the seabob fishery does not cause serious or irreversible harm to habitat structure and function in the areas where the fishery operates.
- The information that is collected on the impact of the seabob fishery on habitats is adequate to assess the risk of damage to these habitats and to evaluate the effectiveness of management measures.

B5 – Ecosystem

- There is a strategy that ensures that the seabob fishery does not cause serious or irreversible harm to important elements of the ecosystem.
- The information that is collected on the impact of the seabob fishery on the ecosystem is adequate to assess the risk of damage to the ecosystem.

C. Fisheries governance

- There are effective decision-making processes in place that results in measures and strategies to attain management objectives and there is an adequate approach to conflicts in the seabob fishery
- There are monitoring, control and surveillance (MCS) mechanisms in place that ensure management measures are being observed and enforced

- There is system of monitoring and evaluation of the fisheries management in relation to the management objectives. There is effective and timely evaluation of the management strategies.
- There is a modern and effective surveillance system in place (e.g. based on Vessel Monitoring System, sea patrols, etc.). Lack of surveillance allows for IUU fisheries in Surinamese waters.

D. Socio-economic aspects

- License conditions are linked to requirements that should lead to a reduce pressure on other marine resources, exploited by other fishery types. The seabob fishery should minimize its impact on other fishery types.
- National entrepreneurs and employees should be stimulated to take part in the seabob fishery (notably the catch activities).
- Value-adding activities should be stimulated. Seabob is a *low value* product and does not have competition from the aquaculture production. Value-adding could be an important strategy to maximise profits from the seabob production in Suriname.

2 LEGAL FRAMEWORK

The Sea Fisheries Act (Zeevisserijwet SB 1980 no. 144) and the annual Fisheries License Conditions Decree (Visserij Vergunningsvoorwaarden Beschikking) apply to the seabob fishery. Further, international guidelines (e.g. FAO Code of Conduct for Responsible Fisheries) should be observed. All stakeholders in the seabob fishery should undersign the current management plan and are responsible to comply with the rules and regulations as specified in this document.

In addition, the following regulations apply:

- Decree of the Minister of Public Works and Traffic dated 24 March 1981, including the execution of some articles of the Sea Fisheries Act 1980 (SB 1980 no. 144) (SB 1981 no.64)
- Decree of the Minister of Agriculture, Animal Husbandry and Fisheries dated 6 July 1992 on the execution of article 17 paragraph 2 of the Sea Fisheries Act 1980 (SB 1980 no. 144), including general provisions regarding the issuing of licenses for 1992 (SB 1992 no. 66). According to article 1 sub d of this decree, the use of the Turtle Excluder Device (TED) is mandatory.
- Law of 21 December 2001 (SB 2001 no. 120) to adapt the Sea Fisheries Act 1980 (SB 1980 no. 144)
- Decree of 24 June 1981 including the definition of new rules regarding the port authority (Decree on Port Authority 1981) (SB 1981 no. 86)
- Decree of the Minister of Agriculture, Animal Husbandry and Fisheries dated 30 January 2008 no. 581, including rules related to the Vessel Monitoring System (VMS Decree).
- Law of 8 September 1947, including provisions on labour safety, and the subsequent changes that were made to it through GB 1962 no 109 and SB 1980 no 116
- Law of 10 September 1947, including provisions on the damage compensation obligation of the employer toward the employee in case of accidents or sickness in certain companies, and the subsequent changes that were made to it through GB 1949 no. 90, GB 1950 no. 62, SB 1975 no. 164d, SB 1980 no. 116, SB 1983 no. 8 and SB 2001 no. 66.
- Law of 19 December 1963 on the definition of provisions related to labour (GB 1963 no. 163), and the subsequent changes that were made to it through SB 1980 no. 116, SB 1983 no. 91, SB 2001 no. 71.
- Law of 24 October 1981, including provisions related to labour executed by foreigners (Law on Labour Permit for Foreigners) (SB 1981 no. 162), and the subsequent changes that were made to it through SB 2002 no. 23
- Law of 31 July 2018, including provisions against child labour and labour by youngsters (Law on labour by Children and Youngsters)
- The Suriname Seabob Trawl Industry: Fleet and On-board Vessel Code of Practice, Version 4 – January 2012 Revised January 2015.

3 FISHERY and ECOSYSTEM

3.1 GENERAL

The coastal waters of Suriname are part of the North Brazil – Guianas Shelf, which is characterized by an enormous seasonal freshwater, sediment laden river outflow. This riverine input mainly originates from the Amazon in the East, and to a lesser extent from the Orinoco in the West. The Suriname shelf is characterized by a gently sloping substrate of mud and sandy mud, shifting to sandy and coral-derived sediments when going offshore. The habitats that are created by this inshore – offshore gradient support four main fish communities (Lowe-McConnell, 1962; Aizawa *et al.*, 1983).

	Depth	Substrate type	“zone”	finfish	shrimp
Zone I	<30m	silt, mud	“brown” fish zone	catfishes, rays	seabob
Zone II	30-80m	mud, sandy mud	“golden ” fish zone	croakers, weakfish	<i>P. subtilis</i>
Zone III	80-100m	sandy mud, sand	“silver” fish zone	carangids, grunts	<i>P. brasiliensis</i>
Zone IV	100-200m	sand, coral	“red” fish zone	snappers	<i>P. brasiliensis</i>

Next to the seabob fishery, the industrial fishery fleet of Suriname includes *Penaeus* shrimp trawlers, demersal fish trawlers, red snapper, mackerel and large pelagic line fisheries. The trawlers are mainly owned and operated by trawling companies. The *Penaeus* shrimp fishery had declined over the years and several outrigger shrimp trawlers have been converted to catch demersal fish. Larger stern-trawlers have been introduced since 1993. The catch of fish trawlers includes species that were previously little-exploited by other fishery types. Seabob trawling has been introduced since 1996.

The artisanal fishery can be defined as multi-species and multi-gear and fishery types are defined as a combination of the vessel and fishing gear that is used. There is a distinction between inland water and coastal artisanal fisheries. The inland water fishery operates in the river estuaries and uses smaller, open canoe-type boats which operate gill nets, fyke nets, lines, etc. to target finfish and shrimp (seabob and “wit-bere” *Nematopalaemon schmitti*). The coastal fishery uses both open and decked “Guyana-type” boats, mainly operating gill nets (so-called drift-seines). In contrast to the trawl fisheries, the coastal fishery is viewed as a selective fishery, due to the relatively large mesh size that is used (5” to 8”) compared to trawlers. A number of boats still practice pin-seine fisheries on coastal mudbanks. This type of fishery is disputed due to the use of small mesh size in nursery areas. Further research and evaluation should take place to evaluate their impact on fishery stocks.

3.2 SEABOB

The Atlantic seabob shrimp *Xiphopenaeus kroyeri* (simply referred to as ‘seabob’) is a relatively small and short-lived shrimp species living in the shallow coastal waters on fine silt and muddy substrates, reaching commercial densities up to a depth of 33m in the Guianas. The species occurs along the Eastern coasts of North and South America, from 33°N to 33°Z. There are indications that the species reproduces year-round, with peaks in the rainy seasons (August and December). Observations indicate that seabob favours shallower, less saline near-shore waters in the dry season.

3.3 SEABOB FISHERY

The seabob industry uses 'twin-rig' shrimp trawlers which land the shrimp on ice to both Surinamese processing companies. The shrimp are peeled mechanically and frozen for export to Europa and the USA. Artisanal fishermen catch seabob in the river mouths using fyke nets (so called 'Chinese seines'). Their catch is marketed fresh or dried for the local market. This fishery lands about 500 tons per year, while the industrial fishery catches between 8,000 and 10,000 tons/year.

3.4 STOCK ASSESSMENT

Stock assessment of the seabob potential is done with the assistance of an international consultant and the CRFM. The most recent stock assessment was executed in 2019, using data over the period 2007 – 2017. It is an integrated stock assessment that uses all available data to construct a model that simulates the stock dynamics and estimates the stock potential. The assessment outcome is transferred to an HCR that is used to regulate output control in the fishery (see section 'Management measures'). All data for the assessment are supplied by the seabob trawl companies and include landings, effort, random sampling data and size grade compositions of the landed seabob shrimp. The 2019 assessment was done simultaneously for Suriname and Guyana (Medley, 2019a, b).

Some main outcomes from the 2019 seabob stock assessment were (Medley, 2019a, b):

- Both Suriname and Guyana stocks are fluctuating at or above their MSY level.
- However, both stocks are low compared to the unexploited state and on average is below the 40% SSB_0 (virgin Spawning Stock Biomass), although this is precautionary for finfish rather than shrimp.
- There is some evidence of seasonality in spawning stock biomass. Although seasonality is present in the recruitment, this pattern is weaker. The seasonality is opposite between Suriname and Guyana.
- There is no evidence that recruitment has been reduced significantly by fishing.
- Fishing mortality has tended to be higher than F_{MSY} for Suriname but fluctuating around or lower than F_{MSY} for Guyana in recent years.
- Suriname has dome-shaped, but highly uncertain, selectivity. Guyana selectivity is logistic in shape and appears more typical for trawl.

4 MANAGEMENT MEASURES

4.1 REGULATIONS ON FISHING GEAR AND FISHING METHODS

4.1.1 Allowable fishing gear

Nets in accordance with the standard twin-rig method (two trawls on either side of the vessel), equipped with a Turtle Excluder Device (TED) and Bycatch Reduction Device (BRD), approved by the FD are allowed in the seabob fishery.

Research is being conducted on different types of BRDs. At the moment, a Square Mesh Window (Annex IV) is being used. Further studies should indicate whether this is the most suitable type of BRD for this fishery in the coastal waters of Suriname. Tests have also been conducted with alternative TEDs, so called TTEDs (Trash and Turtle Excluder Devices): flat-bar TEDs with reduced bar spacing. The final regulations regarding the specifications of mandatory TEDs and BRDs will be published in the yearly Ministerial Decree of the MAAHF. The artisanal seabob fleet uses fixed fyke nets where no TEDs/BRDs are applied.

4.1.2 Allowable fishing methods

The seabob fishery is bottom-trawl fishery using 'Florida-type' outrigger trawlers. The nets are similar to the ones used to catch brown shrimp but are used in a top-off position. The artisanal seabob fleet uses fixed fyke nets near the river mouths.

4.1.3 Netspecifications

The minimum required mesh sizes of the trawl nets in the seabob fishery are:

Body:	minimum 57 mm stretched mesh;
Wings:	minimum 57 mm stretched mesh;
Corner pieces:	minimum 57 mm stretched mesh;
Codend:	minimum 45 mm stretched mesh.

4.2 SPATIO-TEMPORAL RESTRICTIONS

4.2.1 Fishing area

The seabob fishery is allowed to operate in Surinamese waters from the line nominal to 10 fathoms water depth to the line nominal to 15 fathoms water depth in the western part. From Matapica to the east, the fishery is allowed between the lines nominal to 10 fathoms up to the line nominal to 18 fathoms. The artisanal seabob fishery operates near the river mouths.

1. Het area from the coastline to the line nominal to 10 fathoms water depths is **closed for seabob fisheries**.
2. There is currently **no closed season** for seabob fisheries. Further research should confirm whether the installation of a closed season will be adequate in the future.

4.3 FISHING EFFORT AND CATCH MANAGEMENT

4.3.1 Input control

Maximum allowable vessels/licenses

The MAAHF is in charge of the management of the fishery. A fishing license, issued by the MAAHF, is required to be able to fish in Suriname waters. In 2010, the number of fishing licenses for the seabob fishery was reduced from 30 to 22. Later, the council of Ministers has increased it again to 26 licenses¹.

The MAAHF has decided to keep the maximum number of seabob trawl licenses at 26, at least for the lifetime of the current management plan. The ground for this decision is the updated seabob stock assessment, which advises a reduction in fishing effort (Medley, 2019b). When a stakeholder in the fishery wishes to use new fishing gear and/or methods that are more effective than the existing gear/methods, the use of this gear/method will only be allowed with written permission from the MAAHF.

Engine power

Seabob trawl vessels should have a main engine with a maximum power of 500 hp.

4.3.2 Output control

Effort limitations

Effort limitations in the seabob fishery are monitored under the Harvest Control Rule (HCR). The stock assessment has resulted in a HCR, which should be revised periodically (at least every three (3) years). The HCR defines catch limits for seabob, the target species, and is part of a two-fold strategy in relation to the multi-species nature of the fishery. Catch limitations for non-target (primary, secondary and ETP) species should further be defined in the future. Further, impact of the seabob fishery on other fishery types should be taken into account. For more details, refer to the section 'Research' of this management plan.

In applying the HCR, the following should be taken into account:

- In case the HCR Index passes the trigger reference point, fishing effort should decrease linearly as defined by the HCR
- When research and data analysis should indicate that the HCR is not valid, it should be reviewed and adapted.

The current HCR is based on the 2019 stock assessment (Medley, 2019) and takes MSY as its reference point for sustainable exploitation.

¹ RvM missive d.d. 12 april 2017 no. 288/RvM

The HCR is defined as follows (Figure 1):

1. The HCR index is calculated as a moving average of the catch rate each month so:

$$I_t = ma \frac{C_t}{f_t} + (1 - ma)I_{t-1}$$

where I_t = HCR index in month t , C_t = monthly catch associated with effort f_t , m = moving average parameter.

2. The maximum fishing effort of X trips/days-at-sea are set for each quarter (Jan-Mar, Apr-Jun, Jul-Sep, Oct-Nov). Vessels may use that fishing effort as they see fit during the quarter, but the maximum effort must not be exceeded in any quarter. $X = 3 * f_{max}$ which is the monthly effort set at a value consistent with MSY. Effort is calculated as the nominal days at sea plus one day (to avoid 0 day trips).

3. If I_t falls below the trigger reference point I_{trig} but above I_{lim} , the monthly effort in the second month after the index has fallen will be limited according to the following:

$$f_{t+2} = f_{max} \frac{I_t - I_{lim}}{I_{trig} - I_{lim}}$$

4. If I_t falls below the limit reference point I_{lim} , the effort in the second month after the index has fallen will be limited according to the following:

$$f_{t+2} = f_{min}$$

5. The rule will apply strictly on a monthly basis when $I_t < I_{trig}$ and vessels will not be able to carry over unused effort to the following month.

6. If no effort is applied, then a “natural” recovery rate will be applied to the HCR index of $R\%$:

$$I_{t+1} = I_t (1 + R/100)$$

and the resulting index used in the HCR rule above.

The following parameters are used as default values when applying the HCR (Medley, 2019):

HCR Parameter	Value
f_{max}	f_{MSY}
f_{min}	0
Ma	0.75
R	15%
I_{trig}	$0.8 I_{MSY}$
I_{lim}	$0.5 I_{MSY}$

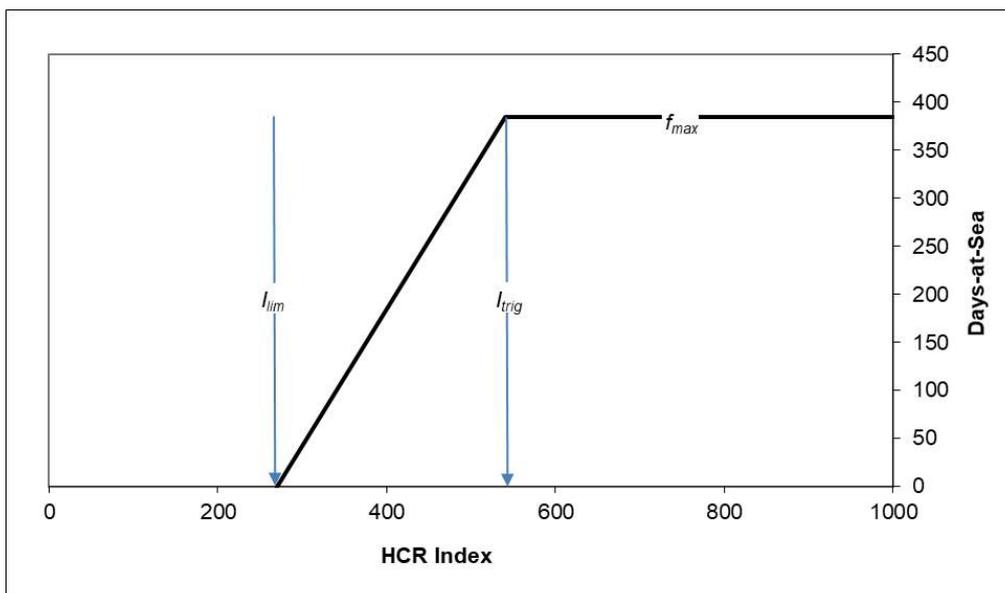


Figure 1. Diagram illustrating HCR with parameters: I_{trig} = HCR Index trigger point below which there is a reduction in the exploitation rate, I_{lim} = HCR Index limit below which effort is minimised and f_{max} = the maximum average effort spent each month, equivalent to the MSY exploitation level.

Bycatch (primary, secondary and ETP species)

Bycatch of Endangered, Threatened and Protected (ETP) species should be monitored in order to assess the impact of the fishery on these species. ETP bycatch should be recorded on ETP log sheets (Annex III). ETP bycatch reports should be sent monthly to the FD and will be discussed at the SWG. The SWG might take mitigation measures regarding (ETP) bycatch.

4.3.3 The Move-on rule

The move-on rule is put in place to minimize impact of the fishery on vulnerable species and habitats. The rule should be applied at a 'major interaction' and can be applied in case of a 'minor interaction'. Every interaction should be reported by the captain.

Minor interaction: these are cases where there is potential risk, but no physical harm to vulnerable species and habitats. These include potential risks that are observed by the fishermen:

- The presence of ETP species at the water surface on the fishing grounds;
- Any situation in which the catch of seabob is less than 20% of the total catch weight.

When these circumstances occur, the captain should make a report which is submitted to his superiors at the end of the trip. No further action is required but the captain is free to apply the move-on rule if he judges that the situation can lead to a serious risk.

Major interaction: these are cases where physical damage is being done to the environment, species or habitats or unacceptable interactions between the vessel or the fishing gear and the species or habitats take place. This includes the presence is the catch of:

- Any habitat-building species: seagrass, hard and soft corals
- Marine mammals, sea turtles and sea horses (see ETP species list, Annex III)
- Vulnerable bycatch species (Annex III), making up more than 5% of the total estimated catch weight.

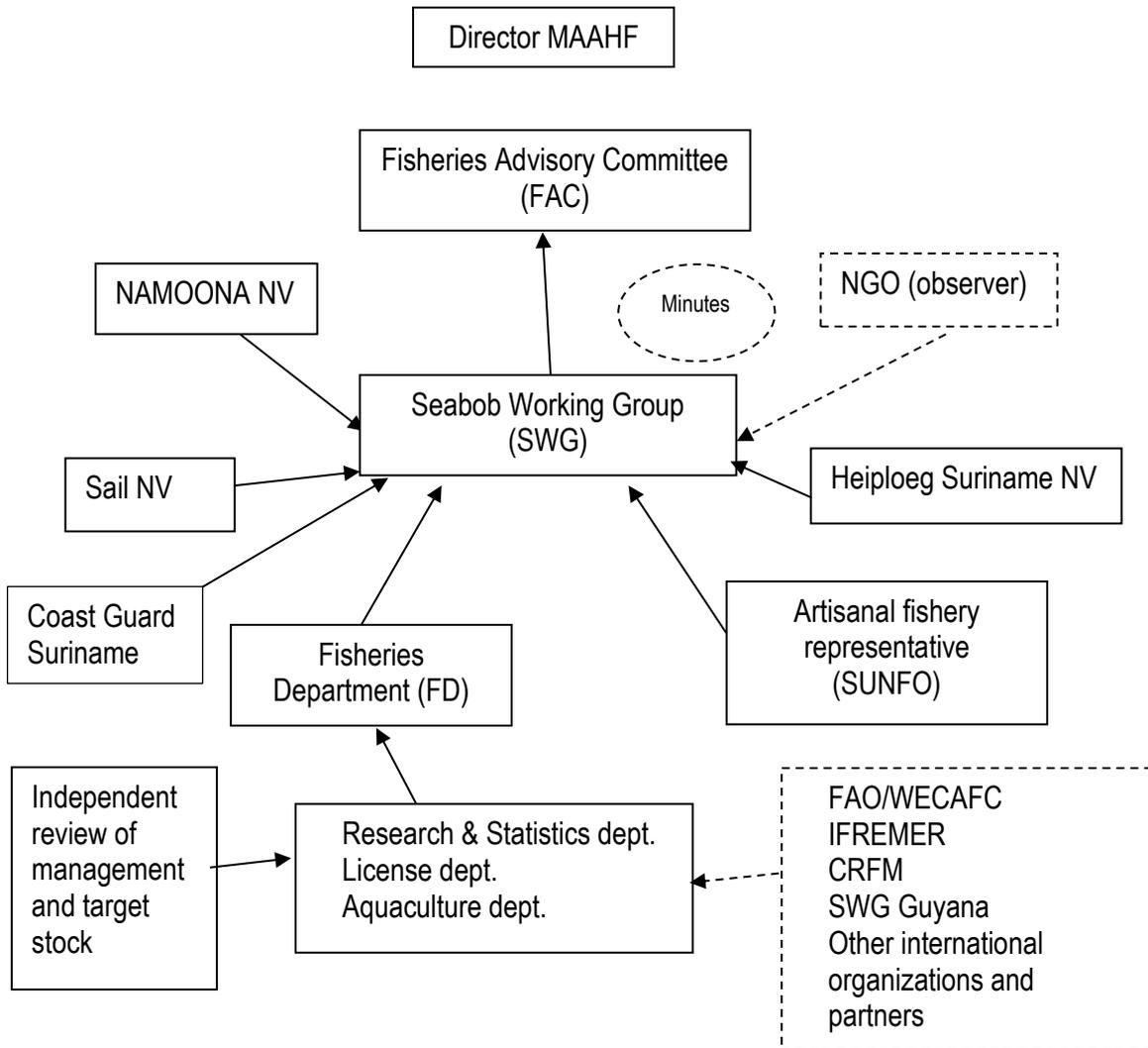
When these circumstances occur, the captain should make a report which is submitted to his superiors at the end of the trip. The captain is required to move the vessel according to the move-on rule:

“Move on rule”: the fishing vessels should steam to another location, at least 1 nautical mile away from the location where the interaction took place. The vessel should not return to location where the interaction took place for at least three (3) days. All other vessels should be informed and should avoid the location for three days as well. In case the interaction took place with the trawl net during fishing, the location to be avoided will be defined as the line limited by the point where the gear was set till the point of haulback. In case the interaction took place at the known point location, this location will be used.

5 IMPLEMENTATION

5.1 Consultation and decision making

The Seabob Working Group (SWG) is established to support the Fisheries Advisory Committee (FAC). The SWG will be involved in decision making in relation to the seabob fishery. The structure of consultation and decision making are depicted below. The institute responsible for independent review will be defined by the FD whenever review is due.



5.1.1 Pilot HCR

The effort at MSY as defined by the new stock assessment and HCR would require a 16% effort reduction. As this is not economically feasible for the seabob companies, the HCR will be piloted from 2020 onwards with a 5% reduction based on the maximum effort of 2018. In 2018, 23 boats were active out of the 26 licenses and 4,800 DAS were completed (i.e. on average 400 DAS per month). A 5% reduction equals a maximum 380 DAS per month. This effort will be applied from 2020 onwards, in quarterly effort quota as the HCR prescribes (i.e. 1,140 DAS per quarter). This strategy will be evaluated very six (6) months and amended as necessary.

5.2 MONITORING, CONTROL and SURVEILLANCE

The MAAHF is responsible for control and surveillance on compliance with the relevant rules and regulations as defined in the legal frameworks (see section 2 above).

Further, the captain and crew should comply with the regulations included in the 'Suriname Seabob Trawl Industry Fleet and On-board Vessel Code of Practice (Version 4 – January 2012, Revised January 2015)'.

5.2.1 Operational standards

The Suriname seabob fishery will operate in accordance with the FAO Code of Conduct for Responsible Fisheries, as well as the MSC certification standard. Each seabob trawlers has a practical manual containing advices from the following documents:

- a. FAO Technical Guidelines for Responsible Fisheries 1 – *FAO (1996a) Fishing Operations*
- b. FAO Technical Guidelines for Responsible Fisheries 2 – *FAO (1996b) Precautionary Approach to Capture Fisheries and Species Introductions*
- c. FAO Technical Guidelines for Responsible Fisheries 3 - *FAO (1996c) Integration of Fisheries into Coastal Area Management*
- d. FAO Technical Guidelines for Responsible Fisheries 4 – *FAO (1997) Fisheries Management*
- e. FAO Technical Guidelines for Responsible Fisheries 4: Supplement 2 – *FAO (2003) Fisheries Management. Supplement 2 – The Ecosystem Approach to Fisheries*

5.2.2 Vessel Monitoring System

Each vessel should have a Vessel Monitoring System (VMS) on board, approved by the FD. The data on geographic position, heading and speed of the vessels should be available to the FD at all times, free of cost. The VMS should be used in accordance with the regulations from the MAAHF which are contained within the VMS regulations.

Routine and random inspections should be carried out by the competent authorities. The VMS is used to check whether vessels comply with the fishing area restrictions. In case of violations, the FD will be informed, and appropriate measures will be taken. A seabob license cannot be issued without a working VMS on the vessel.

5.2.3 Landings

All seabob shrimp and bycatch should be landed only at landing sites in Suriname, appointed by the FD, i.e. Heiploeg Suriname N.V. and SAIL N.V. To change a landing site, approval of the FD should be sought. Landing data should be submitted to the FD on a standard reporting sheet (Annex V). De data (catch in kg) should be send electronically upon every landing. ETP species bycatch should also be reported. The above regulations are also specified in the license conditions.

5.2.4 Other contol

The FD will execute routine inspections of compliance with TED and BRD regulations and application of the Code of Practice for the seabob trawlers. Further, a yearly TED-inspection is conducted by officials of the US government (NOAA NMFS).

The Maritime Authority of Suriname (MAS) inspects the seaworthiness of the vessels, paying special attention to crew safety. A MAS certificate is a prerequisite to obtain a fishing license. The MAS is also responsible to register the vessels in the central fishing vessel registry.

5.2.5 Surveillance

The Coast Guard (established by law SB 2017 no. 32), the Navy of the National Army and the Maritime Police are responsible for control and surveillance at sea and in the river mouth. They have authority in the territorial waters and the Exclusive Economic Zone and will inspect compliance with the fishery license conditions.

5.2.6 Enforcement

Violation of the regulations in this management plan by any stakeholder will be sanctioned (see section 5.3 on compliance). Conform the Fisheries Act, the MAAHF is entitled to implement sanctions to stakeholders that violate the rules.

5.2.7 Waste and pollution

It is forbidden to release or dump plastic goods, glass and other substances that are potentially harmful for humans and the aquatic environment. The legal framework concerning waste and pollution from vessels is contained in the Decree on Port Authority 1981. Further, waste management is covered in the MSC certification standard and the Fleet and On-board Vessel Code of Practice.

5.2.8 Research

Each year, the FD, together with the stakeholders, will compile a monitoring and research plan which is presented to the head of the MAAFH for approval. In this plan, the following areas should be given attention:

1. Stock assessment
2. Breeding and nursery grounds
3. Morphological data
4. Benthic impact
5. Cost and benefits of different management measures
6. Bycatch, including
 - a. Impact on other fishery types (from the observer program data)
 - b. Processing and analysing data from the observer program

In relation to the definition of a catch/effort strategy for non-target (i.e. bycatch) species, a few conditions should first be met:

- An unequivocal definition of bycatch relevant to the context should be agreed upon;
- The type of research to be conducted and data to be collected should be defined;
- Data analysis strategies should be identified;
- A timeline for the strategy should be set.

The FD collects data using landing site data recorders, on-board observers and research associates. Data from the artisanal fishery are gathered by data recorders at the landing sites. This is done using template sheets from the FD (Annex VI). In this way, the artisanal seabob catches are recorded.

The on-board observers use a random sampling strategy to select a boat of one of the three seabob companies. Companies are obligated to allow a maximum of two observers on board, upon instruction from the FD. On board, the observer has the same privileges as the person with the highest command on the vessel. During the trip, the observer fills in the template data sheet of the FD (Annex VII). The geographic position, time, date and fishing area should be filled in. Further, the catch composition of each haul is recorded, separate for landed and discarded catch. Further, the on-board observers of FD have the following tasks:

1. Gathering information on the fish stock and fishing techniques, in order to collect information that is useful for stock assessment, total allowable catch, the number of fishing licenses, population dynamics, the impact of fishing gear, etc.;
2. To study the interactions between different fishery types, e.g. between the seabob and *Penaeus* shrimp trawl fishery;
3. Gathering information and experience that might be useful to support a sustainable fishery management.

To gather biological data on seabob shrimp, the on-board observer randomly selects ca. 1kg of seabob from different hauls and brings it to the docks. Research associates from the FD analyse the sample to define composition by size, weight and sex. These morphological measurements will be done on a monthly basis. This will allow to get insights on the population composition, growth of the seabob shrimp, potential benefits of a closed season, etc.

The FAO REBYC-II LAC project (2016 – 2020) has the aim to reduce unsustainable bycatch in trawl fisheries, e.g. using different net designs and BRDs. The results from this project are expected have an impact on the use of BRDs and TEDs in the fishery. The goal is to use gear that is most selective in catching the target species. Further, it should be assessed whether a portion of the inevitable bycatch can be landed and marketed.

The Research and Statistics division of the FD reports the following information to the SWG on a monthly basis:

1. The updated HCR
2. Data from the seabob industry
 - a. processed seabob weight;
 - b. landed seabob weight;
 - c. landed bycatch species by weight;
 - d. ETP species interactions.

Next to the general research and monitoring tasks of the Research and Statistics division, the SWG has its own Research and Development (R&D) plan. This plan contains activities (e.g. specific studies) that will be conducted under supervision of the SWG. Conditions and recommendations that are formulated during MSC audits reflected in the R&D plan. Further, the R&D plan will have to consider the requirements of the updated MSC 2.0 certification standard. Using the plan, the SWG should ensure that all information is available when the fishery will be scored against the updated standard.

5.3 COMPLIANCE

All stakeholders should monitor the compliance with the agreements in the current management plan. The same goes for the Fleet and On-Board Vessel Code of Practice. Stakeholder compliance with all regulations in the management plan will also be monitored through compulsory reporting to the FD. Stakeholders also accept that unannounced inspections by inspectors can take place.

5.3.1 Sanctions

When a stakeholder violates the rules and regulations of the current management plan, the minister of MAAHF can sanction this stakeholder, based on the Sea Fisheries Act.

5.3.2 Objection procedures

In case a fishing license will be withdrawn by the MAAHF, stakeholders can appeal to the Court of Justice based on article 20 paragraph 2 of the Sea Fisheries Act. The appeal should be done within 30 days from the data of signature of the registered letter with notice of withdrawal of the fishing license.

5.4 EVALUATION

This management plan will be evaluated by the SWG at least on a yearly basis. The MAAHF can accept changes to the management plan based on new scientific results, based on evaluation by MSC audits or based on own insights. Whenever circumstances require, a intermediate evaluation of the management plan can be conducted. The seabob fishery management plan should always be in line with the national fisheries management plan.

REFERENCES

Aizawa, M., T. Arai, T. Inada, T. Miyake, K. Sasaki, Y. Sato, and T. Shimizu. 1983. Fishes trawled off Suriname and French Guyana. Japan Marine Fishery Resource Research Center (JAMARC), Tokyo.

CRFM 2019. Report of Meeting of CRFM Continental Shelf Fisheries Working Group (CRFM-CSWG) on Atlantic Seabob, *Xiphopenaeus kroyeri*, fisheries of Guyana and Suriname. *CRFM Fishery Report – 2019/x*. 66p.

Lowe-McConnell, R.H. 1962. The fishes of the British Guiana continental shelf, Atlantic coast of South America, with notes on their natural history. *Zoological Journal of the Linnean Society* 44:669-700.

Medley, P. A. H., 2019a. Guyana/Suriname Seabob Stock Assessment: Method Summary. 21st September 2019

Medley, P. A. H., 2019b. Guyana/Suriname Seabob Stock Assessment: Results Summary. 31st October 2019

MSC, 2018. Marine Stewardship Council's MSC Fisheries Standard v2.01. Date of publication: 31 August 2018

ANNEXES

Annex I

Research and Development Plan 2019

Condition I					Responsible
I.1 Estimate Seabob IUU fishing	Provide catch estimates for the main species of IUU fishing for inclusion in stock assessments. Note that the estimate may be zero.	High	LVV	Estimation in SWG by LVV	S&O Chairperson of the SWG
I.2 Review and Evaluate the Seabob Harvest Control Rule Conduct morphological sampling	Carry an management strategy evaluation (MSE) review and test the HCR based on available data.	High	LVV	The current HCR is under review by an external consultant. The outcome might lead to a new HCR. Bring Seabob Size composition info to SWG	
I.3 Improved seabob catch estimates from seabob trawlers	Review current data and HCR evaluation	Med	LVV	Data collection & procedures in SWG by LVV	S & O

I.4 Improved seabob catch estimates from artisanal fisheries	develop procedures to improve catch estimates of seabob from other fleets so that they can be included in the seabob stock assessment	Med	LVV	Observers-programmes Catch data artisanal	S & O
Condition II Review Seabob FMP	The amendment of the Seabob FMP 2018-2022	High	SWG	The Seabob FMP needs to be updated and reviewed by external consultant	LVV & SWG
ETP encounter report	Identify main sources of ETP mortality and relevant mitigation measures. Sharks/Rays	High	SWG WWF LVV	Report ETP encounters to SWG	S&O / WWF
ETP Reference Points	Develop a country-wide plan to monitor and achieve mortalities below the limit for designated ETP species and then estimate acceptable limits on ETP mortality	High	SWG; WWF; LVV	Technical assistance	SWG/ WWF

Annex II

List of Endangered, Threatened and Protected (ETP) species and vulnerable habitats

A) Endangered, Threatened and Protected (ETP) species

SHARKS		
1	Blacknose Shark	<i>Carcharhinus acronotus</i>
2	Spinner Shark	<i>Carcharhinus brevipinna</i>
3	Silky Shark	<i>Carcharhinus falciformis</i>
4	Bull Shark	<i>Carcharhinus leucas</i>
5	Blacktip Shark	<i>Carcharhinus limbatus</i>
6	Dusky Shark	<i>Carcharhinus obscurus</i>
7	Caribbean Reef Shark	<i>Carcharhinus perezii</i>
8	Tiger Shark	<i>Galeocerdo cuvier</i>
9	Daggernose Shark	<i>Isogomphodon oxyrinchus</i>
10	Smalleye smooth-hound	<i>Mustelus higmani</i>
11	Lemon Shark	<i>Negaprion brevirostris</i>
12	Whale Shark	<i>Rhincodon typus</i>
13	Caribbean sharpnose shark	<i>Rhizoprionodon porosus</i>
14	Scalloped hammerhead	<i>Sphyrna lewini</i>
15	Great hammerhead	<i>Sphyrna mokarran</i>
16	Bonnethead	<i>Sphyrna tiburo</i>
17	Smalleye hammerhead	<i>Sphyrna tudes</i>
RAYS		
18	Spotted Eagle Ray	<i>Aetobatus narinari</i>
19	Variiegated Electric Ray	<i>Diplobatis pictus</i>
20	Sharpsnout stingray	<i>Fontitrygon geijskesi</i>
21	Giant Manta Ray	<i>Manta birostris</i>
22	Caribbean Electric Ray	<i>Narcine bancroftii</i>
23	Smalltooth Sawfish	<i>Pristis pectinata</i>
24	Largeetooth Sawfish	<i>Pristis pristis</i>
25	Chola (Southern) Guitarfish	<i>Pseudobatos percellens</i>
26	Cownose Ray	<i>Rhinoptera bonasus</i>
27	Smalleyed Round Stingray	<i>Urotrygon microphthalmum</i>
SEA TURTLES		
28	Loggerhead Turtle	<i>Caretta caretta</i>
29	Green Sea Turtle	<i>Chelonia mydas</i>
30	Leatherback Turtle	<i>Dermochelys coriacea</i>
31	Hawksbill Turtle	<i>Eretmochelys imbricata</i>
32	Olive Ridley Turtle	<i>Lepidochelys olivacea</i>
FISHES		
33	Goliath Grouper	<i>Epinephelus itajara</i>
34	Warsaw grouper	<i>Hyporthodus nigritus</i>
MARINE MAMALS		
35	Rough-toothed Dolphin	<i>Steno bredanensis</i>

B) Vulnerable habitats

Seagrass	
Molluscs / Shells	
Hard coral	
Soft coral	
Other substrate attached organisms	

The Square-Mesh Window

Excluded Species



Figure 1

Description

The square-mesh window is designed to allow fish to voluntarily swim from the trawl (Figure 1). This BRD is simply a panel of large meshes hung on the bar so they remain open during the tow (Figure 2). This is in contrast to diamond meshes which tend to close under tension. The following details describe the construction of a 150 mm (75 mm bar length) square-mesh window measuring 6 bar lengths long by 6 bar lengths wide to fit a codend with a 45 mm (1¾") mesh size.

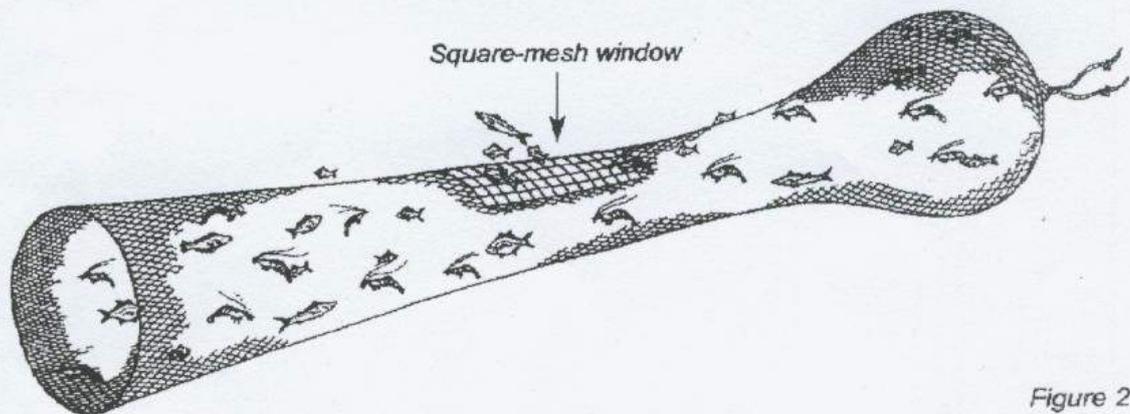


Figure 2

Construction

- Cut out a rectangular hole in the top of the codend measuring 40 meshes wide by 12 meshes long (Figure 3).
- Cut out the square-mesh window from 150 mm (6") netting measuring 6 bar lengths wide by 6 bar lengths long.
- Reinforce the edges of the window with 4mm rope.
- Secure the window to the codend at desired location ensuring codend meshes are distributed evenly between the bars.

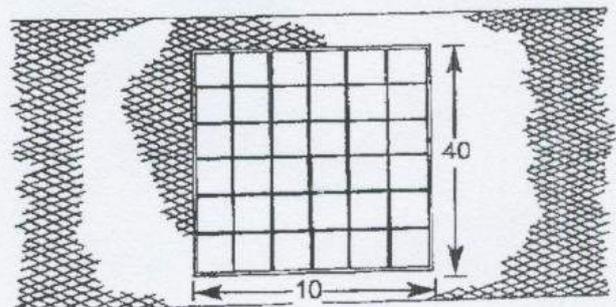


Figure 3

Trouble Shooting

Shrimp loss: This may be due to knot slippage, incorrect mesh or window size selection and poor window location. To prevent knot slippage the window may need to be replaced with knotless netting or netting made from thicker twine. Reducing mesh or window size will reduce shrimp loss, as will relocating the window further forward of the catch.

Poor exclusion rate: The mesh size may be too small, however, careful selection of a larger mesh size is required to prevent shrimp loss. Relocating the window closer to the accumulated catch may increase fish loss, but may increase the risk of shrimp loss particularly when large catches are taken.

LANDINGSNUMMER	1	2	3	4	5	6
VANGST (vervolg)						
Koema koema						
Pani						
Barbaman						
Overig gladvis	Heel					
	Gegut					
Paoema						
Makreel						
Trapoen	Heel					
	Gegut					
Snoek						
Aarder						
Dagoe fisie						
Haai	Heel					
	Gegut					
Sparie						
Zeezalm						
Batjauwvis						
Trie						
Overige zeevis	Heel					
	Gegut					
Koebie						
Tilapia						
Soke kwie kwie						
Plata hede kwie kwie						
Catrina kwie kwie						
Krobia						
Overige zoetwatervis						

Annex VII

Formulier zeegaande waarnemer

NAAM VAN DE BOOT

DATUM VERTREK

DATUM AANKOMST:

WAARNEMER(S)

TREK	DATUM	TIJD	DIEPTE (M)	POSITIE	GARNAAL (KG)		VIS				ANDERE ORGANISMEN (WEGGEGOOD)			
					SEA-BOB	ANDERE	BEWAARD SOORT	KG	WEGGEGOOD SOORT	KG	SOORT	KG		
	In			Lat	BE WAARD									
				Long										
	Uit			Lat			GE GOOID							
				Long										
	In			Lat										
				Long										
	Uit			Lat										
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