

Fisher self-sampling program in the Suriname coastal driftnet fleet

Preliminary results on bycatch of marine mammals and marine turtles: Updated Report

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1 Introduction

1.1 The marine fisheries sector in Suriname

Suriname's marine fisheries sector is a vital component of its economy, contributing significantly to employment, food security and export revenues.

Based on the area of operation, Suriname's fishing sector can be subdivided into inland, coastal and offshore fisheries. These refer to the areas where they take place, either in the river mouths (estuaries), close to the coast (up to 10 fathoms – 18 meters depth) or further at sea (beyond 10 fathoms – 18 meters depth) (Figure 1). Inland and coastal fisheries could be considered artisanal, while the offshore fisheries are rather industrial. Each of these three types are described in further detail below.

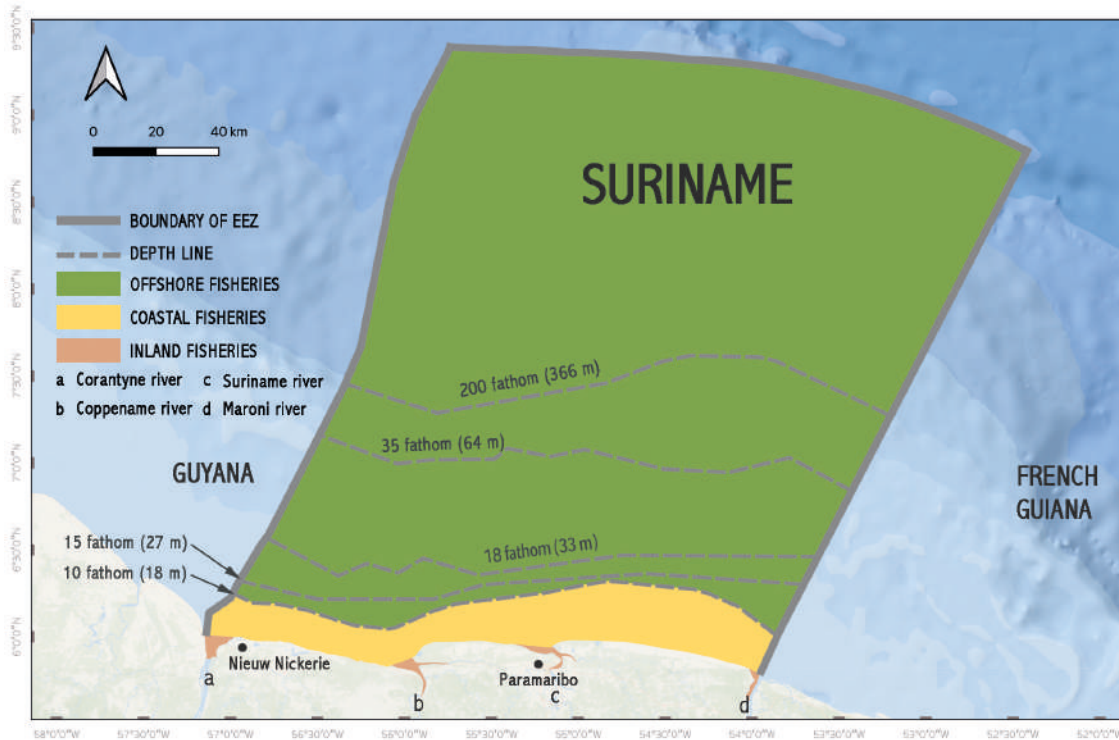


Figure 1: Map of the Suriname Exclusive Economic Zone (EEZ) with delineation of the operational areas for inland, coastal and offshore fisheries as well as the various depth lines as established in the fisheries legal framework of Suriname.

1.1.1 Inland fisheries

Inland fisheries mainly take place in the estuaries: the river mouths that form the transition between the sea and freshwater section of the rivers, characterized by muddy, brown waters. They occur in the estuaries (from west to east) of the Corentyne & Nickerie River, the Coppename & Saramacca River, Suriname & Commewijne River and the Marowijne River. Inland fisheries use rather small (5 – 10 meters long) open wooden boats powered by an outboard engine and deploy a variety of active and passive fishing gears. Fixed fyke nets (also called Chinese seine, jagi-jagi or kraka) are widely used to catch both fish and shrimp. Inland fisheries also use drifting of fixed gillnets, lines and hooks, encircling nets and dragnets. Fishers

usually stay out no longer than a day, sometime just a few hours, before landing the catch fresh. Temporary fishing camps might be constructed as a basis for fishing operations in more remote locations. In that case, the catch is often sun-dried (e.g., seabob shrimp or small fish, locally called *trie*) or smoked (e.g., catfish species).

Working at the interface between marine and fresh waters, inland fisheries catch a variety of species. While some species are typical for the brackish-water estuarine environment (e.g., *Centropomus parallelus*), depending on the season or location, typical marine species (e.g., *Cynoncion virescens*) or primarily freshwater species (e.g., *Plagioscion squamosissimus*) might dominate the catches. Further, seabob (*Xiphopenaeus kroyeri*) and whitebelly shrimp (*Ne-matopalaemon schmitti*) are import target species, together with ghost crabs (*Ucides cordatus*) which are caught by hand in the mangroves. Most forms of inland fisheries are licensed by the Suriname government as BV fisheries (Binnenwater Visserij).



Figure 2: An inland fisher use a fyke in the estuary of the Coppename River

1.1.2 Coastal fisheries

Coastal fisheries operate in the nearshore waters, from the coastline down to a depth of 10 fathoms (18 meters) along the Suriname coast. This zone is characterized by the transition

from brown to green waters. Various types of (mostly wooden) boats are used. Most of the boats are undecked and use outboard engines. Larger boats are decked and powered by an inboard diesel engine. The coastal fishery predominantly uses gillnets that are set near the seafloor and allowed to drift with the tides and currents. The mesh sizes range from 3 to 8 inch (7.6 to 20.3 cm) depending on the license type. While nets are traditionally retrieved by hand, the use of hydraulic winches has increased in recent years. Only a limited number of boats in the coastal fishery uses other fishing methods such as pin seine (locally called njawarie) or hook-and-line. Depending on their size and distance to the fishing ground, coastal fishing boats spent anywhere from a single day up to 20 days at sea, with most boats staying 10 to 14 days. So-called bangamary-boats usually stay out a few days only. The catch is always stored on ice.

The coastal fishery's main target species are *Cynoscion acoupa* and *C. virescens*. Various other Sciaenidae species are also landed, together with catfishes (e.g., *Sciades proops*), sharks (e.g., *Rhizoprionodon lalandii*), tarpon (*Megalops atlanticus*), etc. Stingrays (Dasyatidae spp.) are common in the catches but mostly discarded. Some boats working close to the shore target the smaller weakfish species *Macrodon ancylodon* and *Nebriis microps*. Coastal fisheries are licensed as SK fisheries (Surinaamse Kustvisserij), with various sub-types depending on the size of the boat, gear and target species (e.g., SK-B = SK fishery for bangamary).



Figure 3: A coastal gillnet fishing boat off the coast of Suriname

1.1.3 Offshore fisheries

Offshore fisheries include the fishery types occurring beyond the depth of 10 fathoms (18 meters). These are mostly considered industrial fisheries and include bottom-trawl and line fisheries for demersal fish and shrimp, and longline fisheries for large pelagic species. Most offshore fisheries take place in or near the green-water zone, at depths below 35 fathoms (64 meters). The blue waters further from the coast are less productive: only pelagic longliners and a few deep-sea shrimp trawlers operate in this area.

1.1.3.1 Bottom trawl fisheries

Four types of bottom-trawl fisheries operate in Surinamese waters. Seabob trawl fisheries target Atlantic seabob shrimp (*Xiphopenaeus kroyeri*) up to a maximum of 18 fathoms (33 meters) depth. In the deeper waters, marine shrimp trawlers target larger shrimp of the genus *Penaeus* (*P. subtilis*, *P. brasiliensis*, *P. schmitti* and *P. notialis*). In the same area (between 15 and 35 fathoms water depth – 27 to 64 meters) fish trawlers target a wide range of demersal fish species including croakers and weakfishes (Scianidae), grunts (Haemulidae)

snappers (Lutjanidae), etc. Finally, a few boats fish for deep-sea shrimp species such as royal red shrimp (*Pleoticus robustus*), scarlet shrimp (*Aristaeopsis edwardsiana*) and orange shrimp (*Solenocera* spp.). They operate in deep water beyond the isobath of 200 fathoms (366 meters).

Most of the seabob, marine and deep-sea shrimp trawlers are so-called Florida-type vessels: steel-hulled boats with two outriggers that are used to deploy two sets of single or twin otter trawl nets with a minimum codend meshsize of 45 mm. Fish trawlers are more diverse in size and shape, including converted shrimp trawlers and former European stern- and beam trawlers. Most are rigged for stern trawling, deploying a single or twin trawl with a minimum codend meshsize of 80 mm from the rear of the boat. All trawlers use inboard diesel engines with a maximum allowable power output of 500 Hp.

Seabob and fish trawlers stay at sea for a maximum of 10 days, before landing their catch on ice. Marine and deep-sea shrimp trawlers might spend more than four weeks, freezing the catch onboard. Trawl fisheries are licensed per category (seabob shrimp, marine shrimp, deep-sea shrimp or fish) and specific conditions (related to fishing area, gear, etc.) apply for each type.



Figure 4: A seabob shrimp trawl vessel off the coast of Suriname

1.1.3.2 Demersal line fisheries

From a depth of 15 fathoms (27 meters), line fisheries targeting Southern red snapper (*Lutjanus purpureus*) occur. This fishery is primarily executed by boats of Venezuelan origin, that are required to land their catch in Suriname. Typically, the fishery uses decked wooden boats with an inboard engine and a maximum length of 30 meters. The boats deploy handlines or demersal longlines with baited hooks. The use of cages is prohibited. While the primary target species is *L. purpureus*, landings also include *Rhomboplites aurorubens*, *Scomberomorus cavalla* and various snapper and grouper species. Boats generally spend two to three weeks at sea, landing the catch on ice. The licensing of red snapper boats is subject to a special agreement between the governments of Suriname and Venezuela, specifying the conditions under which the fishery should operate.



Figure 5: A demersal line fishing vessel off the coast of Suriname

1.1.3.3 Pelagic line fisheries

Far offshore, in blue waters beyond the continental shelf, a longline fishery for large pelagic fish operates. Target species of this fishery include yellowfin (*Thunnus albacares*) and other tuna species (*Thunnus* spp.), wahoo (*Acanthocybium solandri*), common dolphinfish (*Coryphaena*

hippurus), Atlantic sailfish (*Istiophorus albicans*) and blue shark (*Prionace glauca*). The boats fish both in the Suriname EEZ and in the high seas, i.e., waters beyond national jurisdiction.

The artisanal fleet operates in both near-shore coastal waters and estuaries, and accounts for more than half of the total fish catches. A majority of the artisanal fleet fishing in the near-shore coastal waters uses driftnets. These SK driftnet vessels are not covered by an onboard observer program and landed catches are randomly sampled by data collectors of the fisheries department at the different official fishery landing sites.

1.2 Monitoring interactions with Endangered, Threatened and Protected species

As stated in the Suriname fisheries management plan (2021-2025), minimising interactions with (potentially) Endangered, Threatened and Protected (ETP) species, including marine turtles, marine mammals, shark and ray species, is a priority for all fishery subsectors, in order to ensure sustainable exploitation with minimal impact on the environment.

Monitoring interactions with ETP species is crucial to evaluate the effect of ETP bycatch mitigation measures, and to establish when and where interaction are occurring. This information will support management measures to minimize ETP species interactions such as spatio-temporal fishery closures or measures related to the allowed fishing gear.

The Suriname Fisheries Department under the Ministry of Agriculture, Animal Husbandry and Fisheries is responsible for the management of marine fisheries in the country. As it relates to interactions with ETP species, various monitoring programs are in place. Onboard observer programs are being implemented for the bottom trawl and pelagic line fisheries. In the coastal and inland fisheries, however, vessels are not suited to host onboard observers due to the limited space onboard. Therefore, a fisher self-sampling program is being implemented to monitor ETP species interactions in the coastal driftnet fleet. This report provides some preliminary results of this program, focussing on interactions with marine turtles and marine mammals.

2 Methodology

The self-sampling program was started in November 2023 by the identification and selection of 4 captains operating coastal drifnet boats in Suriname. The captains were selected based on their willingness and interest to participate in the program. Each captain received equipment including an ETP species identification guide, paper and pencils, a tablet and a waterproof bag. One-on-one training was provided to each captain to ensure accurate data collection onboard. Each captain received a small monthly stipend for their participation in the program, which is only paid after quality control of the data for that month has been completed by the Fisheries Department.



Figure 6: A training session in the docks onboard a coastal driftnet vessel



Figure 7: Equipment handed over to each captain participating in the self-sampling program for the driftnet fishery

The self-sampling program is based around a digital data collection form that was developed by the Fisheries Department in the open-source software KoboToolbox. The form is deployed on a digital device (in this case a tablet) and can be used offline. Upon return from a fishing trip and with internet access, completed forms are sent to the Kobotoolbox server, where they are accessed by the Fisheries Department.

Staff at the Statistical and Research Division of the Fisheries Department checks incoming data for mistakes and validates it. Regular meetings are held with the participating fishers to follow-up and to clarify any mistakes or uncertainties in the data. In case a tablet stops working at sea the captain will fall back on booking the data manually on paper, which is then entered in KoboToolbox by an employee of the Fisheries Department.

In order to get insight in the retained fish catches as well as interactions with ETP species (sharks, rays, sea turtle, marine mammals) in the coastal driftnet fishery, the form contains information on the fishing vessel (name and registration number), the fishing activity (time,

location, net soak time) and the catch. Both retained and discarded catch must be recorded. For marine mammals and marine turtles, the condition upon capture (dead or alive) is requested as well. To aid identification, all ETP species are displayed with a drawing within the form. Photo's of the catch can be taken with the tablet and attached to form. Captains are encouraged to take pictures of ETP species whenever they have any doubt about the identification.

Marine mammals		
Catch any marine mammals? ☒ Yes ☐ No		
Guiana dolphin <i>Palpao</i> 	Number dead	Number alive
Rough-toothed dolphin 	Number dead	Number alive

Figure 8: An extract of the digital data collection form created in the KoboToolbox platform

3 Results

Between January 2024 and December 2025 a total number of 2012 hauls in the coastal driftnet fishery were monitored under the self-sampling program by the 4 participating captain.

As seen in the maps below, the fishers in the program have their fishing ground on the eastern part of the Suriname shelf.

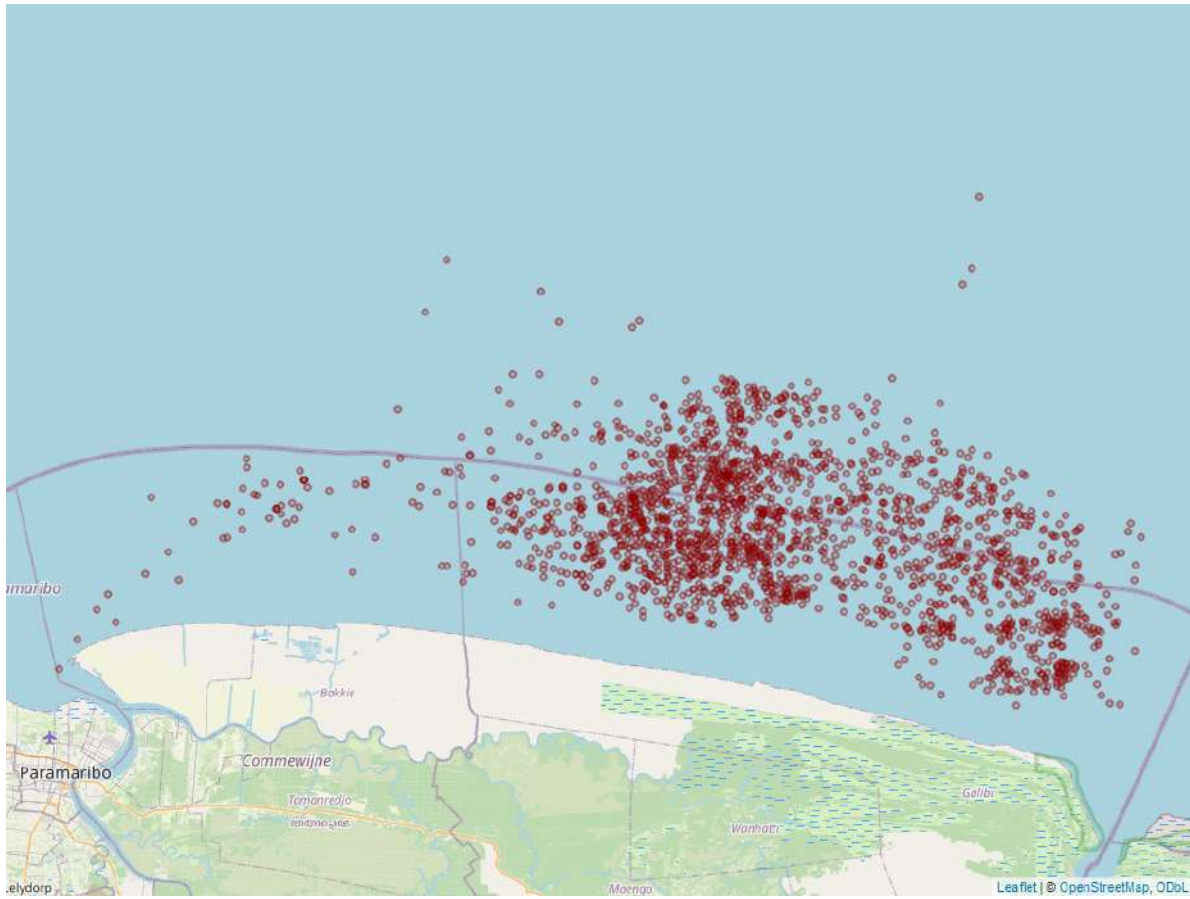


Figure 9: Pointmap of the self-sampling program. Each point represents the haulback location of a sampled haul.



Figure 10: Retrieving the net on a coastal driftnet vessel

3.1 Marine turtles

Between January 2024 and December 2025, 46 marine turtle interactions were recorded. 38 of them were alive upon capture, while 8 turtles were captured dead. Table 1 shows a breakdown of the number of turtles captured by species and by month (1 = January, 12 = December).

Table 1: Number of recorded marine turtle interactions in 2024 & 2025 by species and month

Month	Loggerhead turtle	Green turtle	Leatherback turtle	Olive ridley turtle
1	0	2	0	0
2	2	5	0	0
3	1	0	2	0
4	0	0	3	0
5	1	1	6	0
6	3	0	2	0
7	1	2	2	0
8	0	1	0	0
9	0	0	0	0
10	1	1	0	0
11	1	1	2	1
12	1	0	1	1

3.2 Marine mammals

Between January 2024 and December 2025, 29 marine mammal interactions were recorded. 16 of them were alive upon capture, while 13 mammals were captured dead. Table 2 shows a breakdown of the number of turtles captured by species and by month (1 = January, 12 = December).

Table 2: Number of recorded marine mammal interactions in 2024 & 2025 by species and month

Month	Guiana dolphin	Rough-toothed dolphin
1	1	0
2	1	0
3	1	0
4	0	0
5	9	0
6	5	1
7	0	1
8	2	0

Month	Guiana dolphin	Rough-toothed dolphin
9	2	0
10	3	0
11	2	0
12	1	0

4 Discussion

The current report presents a preliminary analysis of some of the data that has been gathered through a self-sampling program for the coastal driftnet fishery, implemented by the Suriname Fisheries Department.

The findings confirm that this fishery is interacting with both marine turtles and marine mammals. In the 2012 hauls that were monitored in 2024 and 2025, 46 marine turtle interactions and 29 marine mammal interactions were reported.

Interactions with marine turtles in this fishery were previously documented (e.g., Sys, 2019). Four different turtle species were reported to occur in the bycatch, and interactions seem to occur year-round. While anecdotal information suggested that the fishery also interacts with marine mammals (e.g., Hankinson, 2019), this is confirmed by the results of the self-sampling program which documented 27 occurrences of Guiana dolphin *Sotalia guianensis* and 2 Rough-toothed dolphin *Steno bredanensis* for 2024 and 2025. The survival rate upon capture was higher for marine turtles (83%) as compared to marine mammals (55%).

These results give a first indication of the magnitude of interaction of this fishery with marine mammals and turtles. Further work will include data on sharks and rays, as well as more detailed analyses to uncover any spatio-temporal patterns in the data. This is crucial to inform mitigation measures that are based on spatial and/or temporal restriction to fishing.

The results presented here are representative only for the vessels that participated in the program. Future analysis should also consider raising the results of this sample to the total fishing effort exerted by the coastal driftnet fleet in Suriname. This will give an indication of the total potential mortality of ETP species caused by this fleet. Unfortunately, population size estimates are currently not available for any of the monitored ETP species. So, even with the absolute numbers that will be provided by such a raising exercise, actual impact on the populations of the various ETP species will be difficult to estimate.

Apart from spatio-temporal restrictions to fishing, gear modifications should also be considered to mitigate ETP species interactions in the coastal driftnet fishery. In the context of the regional REBYC-III CLME+ project, potential gear modification for bycatch mitigation in the driftnet fishery in Suriname have been reviewed (Sala, 2024) and trials with modified gear have been proposed (Sala, 2025). To address marine mammal bycatch, the Fisheries

Department has started the implementation of acoustic pingers in the coastal driftnet fishery in December 2025.

A good relationship has been built with the captains participating in the self-sampling program, which is crucial to obtain reliable and trustworthy reporting. On the other hand, verification methods for the self-reported data are being considered. Under the REBYC-III CLME+ program e-monitoring systems will be implemented in the fleet, which might provide a useful alternative for the self-sampling program, or at least a independent means of verification by recording onboard footage.

After more than two years of implementation, the fisher self-sampling program proves to be a cost-effective and reliable way to obtain detailed information on the bycatch in the coastal driftnet fishery in Suriname. The Fisheries Department plans to proceed with this program to continue collecting information on ETP species interactions. In addition, once spatio-temporal and/or gear-related mitigation measures are put in place, the program allows for monitoring of their effectiveness. The Fisheries Department plans to expand the coverage of the program, with the intention to also include fishers that operate on the western part of the Suriname shelf.

5 Acknowledgments

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