



---

# Frame Survey Curaçao's fishing fleet 2016

Author: Marloes Kraan

Wageningen University &  
Research Report C022/17  
Confidential

---

# Frame Survey Curacao's fishing fleet 2016

Author(s): Marloes Kraan

Publication date: 20-2-2017

This research project was carried out by Wageningen Marine Research at the request of and with funding from the Ministry of Economic Affairs for the purposes of Policy Support Research Theme '*Visserij Caribisch Nederland*' (project no. BO-11-019.02-055).

Wageningen Marine Research  
IJmuiden, February, 2017

---

Wageningen Marine Research reportC022/17

---

*Marloes Kraan, 2016. Frame Survey of Curacao's fishing fleet. Wageningen, Wageningen Marine Research (University & Research centre), Wageningen Marine Research report C022/17 39 pag.*

Keywords: Frame Survey, Curacao, Fisheries

The frame survey was conducted as part of Ms. Bitter's internship at WMR.

Name	Lonneke Bitter
Students registration number	000009618
Programme	Coastal and marine management
Specialisation	Marine policy
Department	Van Hall Larenstein
Supervisors	Marloes Kraan and Martin de Graaff
Place	Wageningen Marine Research, IJmuiden
Date	September – December 2016

Client: Ministerie van Economische Zaken  
Attn.: G. Nader  
P.O Box 20401  
2500 EK Den Haag

BAS code (applied to projects funded by the Ministry of Economic Affairs (EZ, previously known as EL&I)) BO-11-019.02-055

Wageningen Marine Research is ISO 9001:2008 certified.

© 2017 Wageningen Marine Research Wageningen UR

Wageningen Marine Research  
institute of Stichting Wageningen  
Research is registered in the Dutch  
traderecord nr. 09098104,  
BTW nr. NL 806511618

The Management of Wageningen Marine Research is not responsible for resulting damage, as well as for damage resulting from the application of results or research obtained by Wageningen Marine Research, its clients or any claims related to the application of information found within its research. This report has been made on the request of the client and is wholly the client's property. This report may not be reproduced and/or published partially or in its entirety without the express written consent of the client.

A\_4\_3\_2 V24

---

# Contents

<b>Summary</b>	<b>4</b>
1.1 Fisheries in Curacao	6
2.1 The frame survey	8
2.1.1 Landing beaches and harbours	9
2.1.2 Vessel characteristics, gear use, vessel use	9
2.2 The interviews	10
2.3 Possible limitations of the research	11
3.1 Frame Survey 2016	14
3.1.1 Number of vessels per harbour / landing beach	14
3.1.2 Number of vessels per length category	16
3.1.3 The larger fleet of Curacao	19
3.1.4 The smaller fleet of Curacao	19
3.2 Historical trends	20
3.2.1 Harbours and landing beaches	20
3.2.2 Frame surveys 2001 and 2016	24
3.3 Interviews with the fishermen	27
3.3.1 About the vessels	27
3.3.2 Social demographics	28
4.1 Recommendations	33
<b>Acknowledgements</b>	<b>35</b>
<b>References</b>	<b>36</b>
<b>Justification</b>	<b>37</b>

---

# Summary

A brief inventory of the current fishing capacity (frame survey) of the insular fishing fleet of Curacao was conducted. Curacao is part of the Kingdom of the Netherlands. It lies in the southern Caribbean, approximately 60km off the coast of Venezuela.

Currently no systematic data on fishing intensity nor landings exists of the artisanal fisheries. This data is not only needed for domestic fisheries management purposes but will also contribute to nature conservation. In addition both the FAO as ICCAT have made data requests for the artisanal catches and catch composition to Curacao which cannot be adequately answered currently.

A frame survey was conducted (between September and December 2016) at all homeports and landing sites listed by the Curacao' Ministry of Health, Environment and Nature, whereby all vessels were counted and described up to a relevant number of characteristics, such as length, use of motors, sails etc. In addition to the frame survey, interviews were held with fishermen, to get some extra information about their vessels, gear and fishery.

In total 294 fishing vessels were recorded. 238 of these vessels were assessed as 'in use'. Eight-five percent of the vessels (in use) were motorised – either with inboard motors (110) or with outboard motors (96). The 32 remaining vessels were propelled with oars. Most vessels were located in the two main harbours of the island: Caracasbaai and Piscadera. Most vessels (164 of 294) were smaller than 7m .

The data gathered in this frame survey was compared with previous research whereby several developments appear evident:

- the total number of landing beaches has declined,
- the number of fishing vessels has declined compared to 2001 (from 322 – 294),
- the fleet (vessels larger than 5m) is back to the level of the 1980s (in the 1990s the fleet was larger),
- a concentration has taken place of vessels in the 2 main harbours of the island Caracasbaai and Piscaderabaai.

Based on 32 interviews held with fishermen we found that the average age of the fishermen was 55 years old. Most of the fishermen indicated to have 'always' been fishing. Twenty of the fishermen said to have more fishers in the family. The fishermen we spoke fished on average 2.8 times a week. For 19 fishermen fishing is their primary source of income, yet amongst them are some whom go only once a week or only in weekends. It is most likely that the latter men also have another source of income, such as a pension (considering their relative high age). The fishermen on average go to sea alone or with 1 assistant.

The average age of the vessels was 24.5 years old. The vessels were motorised, with inboard motors (average of 161 HP - range between 15-400) and outboard motors (average of 18.6 HP - range between 8-48). Thirteen fishermen (all having inboard motorised vessels) indicate to have either a GPS, fishfinder, electric reel or winch on board (or a combination thereof).

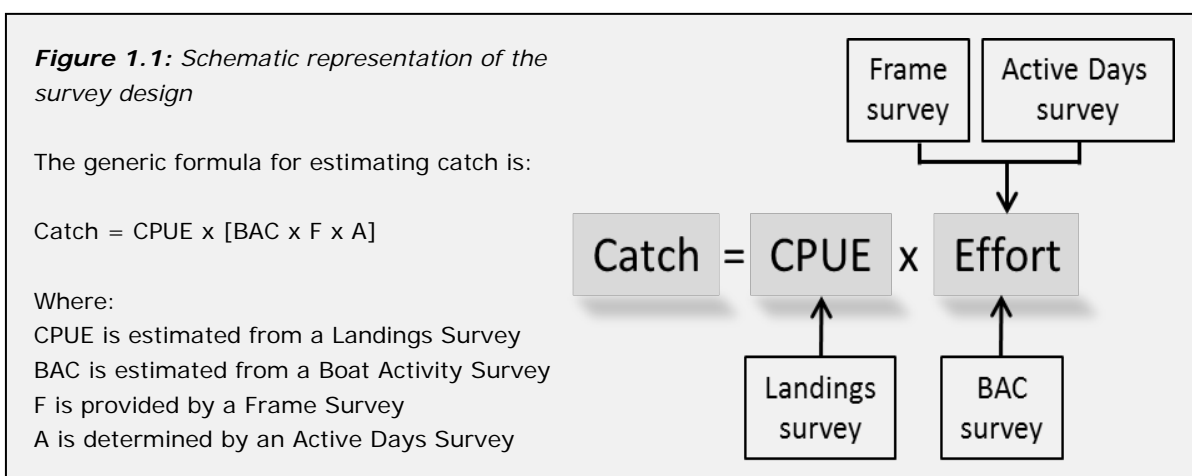
The main possible limitations of the research were the timing of the research. As it took place right after the hurricane season it is possible that many smaller vessels would still be stored on land (not in the harbour or at the landing beaches). In addition we have only been able to interview 32 fishers which is a relative low number.

It is recommended to keep the frame survey data up to date, by doing a yearly update. In addition it is recommended to do the next steps (boat activity survey and landings survey) as soon as possible, making sure that the data of the three surveys can be validly combined.

# 1 Introduction

The Dutch Ministry of Economic Affairs asked Wageningen Marine Research to conduct a brief inventory of the current fishing capacity of the insular fishing fleet of Curacao, also known as a frame survey. In this frame survey we have not included all vessels fishing under Curacao' flag – such as the industrial tuna fleet mainly operating on the high seas and in West African waters, but all (artisanal) fishing vessels fishing off the coast of the island itself.

The frame survey can serve as the basis for the following steps, such as a boat activity survey and a catch survey. These three surveys together will contribute to the improved ability of Curacao to assess the landings and will contribute to a better understanding of the fish stocks (see figure 1.1 below).



Currently no systematic data on fishing intensity nor landings exists. This data is not only needed for fisheries management purposes but will also contribute to nature conservation. In addition both the FAO as ICCAT have made data requests to Curacao which cannot be adequately answered currently (personal communication Faisal Dilrosun).

A Frame Survey is a census-based approach in which data is collected on all fishing vessels and gear (at all homeports/fishing sites), which could be potentially operating as fishing vessel at sea. A frame survey is conducted at all homeports and landing sites, whereby all vessels are counted and described up to a relevant number of characteristics, such as length, use of motors, sails etc. What is relevant depends on the context. Often the vessels are further categorised in boat/gear categories, based on criteria in relation to known or assumed significant differences in: species composition or size, catch rates, fishing trip patterns, fishing methods<sup>1</sup>.

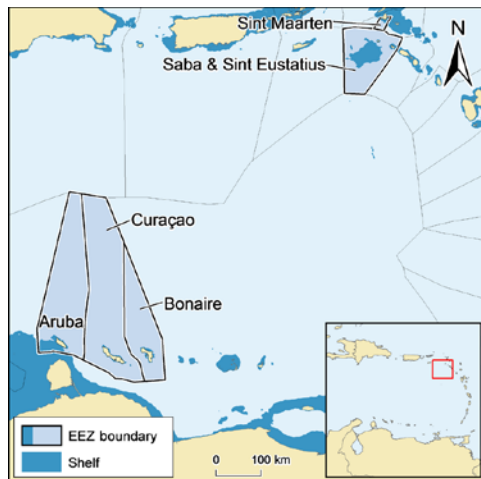
In addition to a frame survey additional information can be collected. In this study we have held an additional interview survey with fishermen<sup>2</sup> to get some more information about the vessels, the fishers and their fishery. This report starts with a short introduction about fisheries in Curacao, describes the method used to do the frame survey, describes the results and ends with a conclusion and recommendations.

<sup>1</sup> <http://www.fao.org/docrep/004/y2790e/y2790e07.htm>

<sup>2</sup> In this report we will use the gender neutral 'fisher' unless we refer to fishermen to whom we have spoken. All interviews held were with fishermen.

## 1.1 Fisheries in Curacao

Curacao lies in the southern Caribbean approximately 60km off the coast of Venezuela (see figure 1.2). Together with the small island Klein Curacao, it is, since 2010, as an autonomous country part of the Kingdom of the Netherlands. Before it was the largest island of the Netherlands Antilles (with Aruba, Bonaire, Saba, St Eustatius, St Maarten), with its capital Willemstad being the capital of the Netherlands Antilles. Curacao has a population of about 150.000 people (2011). With a size of 444 km<sup>2</sup>, population density is quite high (337 inh./km<sup>2</sup>)<sup>3</sup>.



**Figure 1.2:** Map of Curacao and its EEZ, also showing the neighbouring countries and the other islands of the former Netherlands Antilles (Source: Lindop et al 2015).

Fisheries in Curacao are predominantly artisanal with reef fishing (mostly handline) for demersal species and trolling (handline dragged through the water) for pelagic species, being the two main types (Van Buurt 2001). More industrial forms of fishing, such as trawlers (around 1955) and longlining (around 2000) have been tried but this did not prove to be successful (Lindop et al 2015 and Zaneveld 1961). It should be noted that traps, spearfishing (illegal on Curacao since 1976), beach seines and gill netting (illegal gear) for reef species are used as well (Lindop et al 2015:3, Van Buurt 2001). Fisheries take place in the bays and lagoons of Curacao, on the reefs and in the open water up to Klein Curacao (Boeke 1907) and far offshore. Formerly, and until 2010, these even took place eastwards towards and beyond Bonaire and around the Aves atolls.

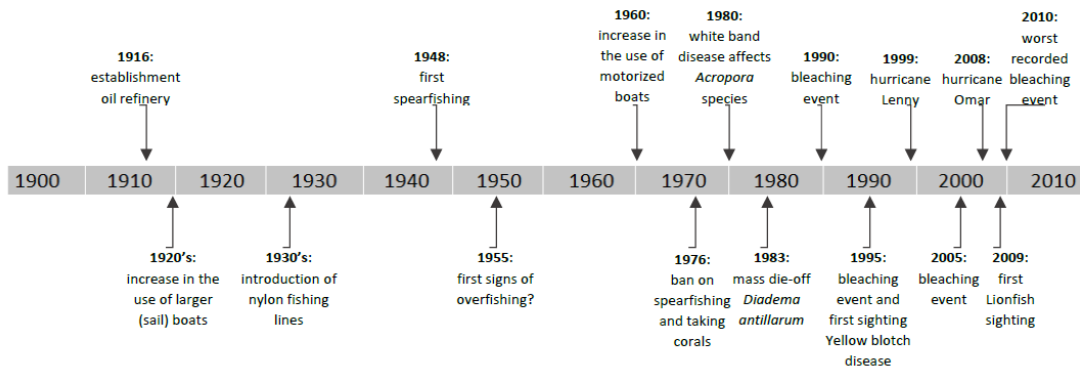
Around 1900 the most common fishing vessel was a canoe ('kanoa'), operated by one or two fishers (Boeke 1907). By 1955 the canoes had mostly been replaced by wooden rowing boats ('Yola' for use in protected waters), sail boats (called 'kanoa' and 'boto di bela' depending on the construction), with also some motorised boats ('boto') starting in fisheries (Zaneveld 1961). These larger and often faster vessels, together with the nylon thread, made that fishers could go further out and catch larger pelagics. Currently most fishing vessels (86%) are motorised (206 of the 238 vessels in use) (see chapter 3).

The total contribution of the fishing sector to the economy of Curacao has been qualified as small (Van Buurt 2001). Yet, although the fishing sector can be qualified as insignificant in terms of its size and contribution to the economy of the island, quite some people acquire some extra income thanks to the fishing sector – including those people indirectly profiting from fisheries (in sales, boat building, etc.). Money that apparently is not easily earned otherwise (Van Buurt 2001).

The marine ecosystem of Curacao can be characterised by its nearshore coral reefs, productive and biologically diverse ecosystems and – all together - important for global marine life (Vermeij 2012). Coral reefs worldwide face degradation due to natural and human impacts. Also in Curacao the reefs are in a state of decline, yet from a Caribbean perspective, Curacao harbours some of the best reefs in the region and represents a biodiversity hotspot centre by itself (Vermeij 2012). Next to the fringing reefs, Curacao also has large inland bays with mangrove and seagrass communities that serve as

<sup>3</sup> <https://nl.wikipedia.org/wiki/Cura%C3%A7ao>

nursery areas for many species of reef fish (Vermeij 2012). Even though the size of the fishing fleet is limited, fishing pressure has been severe. The state of overfishing has been documented (Debrot and Nagelkerken 2000, Vermeij 2012) and acknowledged by the government (DLVV 1979; Van Buurt 2001). In combination with rapid ecological degradation of the reefs (Debrot and Nagelkerken 2000) caused by other natural and human pressures such as tourism, pollution, agricultural runoff, sewage discharge, the oil refinery on the island, climate change, white band disease, coral bleaching events and hurricanes, the health of the reefs is under pressure (Debrot and Sybesma 2000; Latijnhouwers 2015, Vermeij 2012). Latijnhouwers made an overview of these events:



**Figure 1.3:** Timeline of major natural and anthropogenic events that may have impacted fish stocks and coral reef habitats in Curacao (Source: Latijnhouwers 2015).

Apart from the importance of coral reefs for marine life, the coral reefs are also crucial to the economy of the island, as tourism (cruise tourism and diving) is one of the main income deriving activities and a major contributor to the islands GDP (Debrot and Nagelkerken 2000). Considering the importance of the reefs for the island (Van Buurt 2001) as well as the global importance of coral reefs (Vermeij 2012), maintaining their health is of great importance. Managing fisheries around the island therefore is important, as it is one of the aspects that can contribute to the health of the reefs. Next to that it is important for the fishers (full- and part-time) and people indirectly profiting from fisheries, as well as the contribution of fish for food security on the island.

The next chapter will discuss the methods used for the frame survey and the interviews with the fishermen as well as discuss the possible limitations of the research.



---

## 2 Materials and Methods

The fieldwork has been carried out by Lonneke Bitter between September 2016 and December 2016. She did this as part of her internship, being a student from Van Hall – Coast and Sea Studies (Leeuwarden). Marloes Kraan visited the island for one week (12-16 December) to supervise Lonneke and to get an understanding of the field in order to be able to do the data analysis. The analysis and report writing was done by her.

For the **frame survey** multiple harbours and landing places around Curacao were visited at different times and days during this three month period. This was to make sure that as many boats as possible could be counted. The visits mostly took place between 8.00 and 13.00 hours, but occasionally at 7.00 or 16.00 hours. Often Mondays were used, as many fishers don't fish on Monday, resulting in most vessels lying in the harbours and on the landing beaches. On many of the visits Ms. Bitter was accompanied by Sigfried Constancia, he works at the Ministry of Health, Environment and Nature, knows many fishers and speaks Papiamentu.

In addition to the frame survey **interviews** have been held with fishermen, to get some extra information about their vessels and gear and their fishery. The interviews were always held with Mr. Constancia, whom acted as liason (as a well-known person in many landing sites) and as interpreter (Papiamentu – Dutch).

### 2.1 The frame survey

The datasheet that has been used contained the following variables:

1. Date: date that this vessel has been observed
2. Harbour / Landing beach: harbour / landing beach that this vessel was when observed
3. Informer: investigator or informant (Informant is used when the fisher or someone otherwise related to the vessel was interviewed)
4. Boat reg.: boat registration number
5. Boat name: name of the vessel
6. Length: (often estimated) length of vessel in foot
7. Cabin: does the vessel have a cabin?
8. Sail: does the vessel have a sail (or the possibility to have a sail – a mast)
9. Oar: does the vessel have oars (or the possibility to have oars – rings or holes for rings at the sides of the vessel)
10. Inboard motor: does the vessel have an inboard motor?
11. Outboard motor: does the vessel have an outboard motor (or the possibility to have an outboard motor / signs of use of an outboard motor)
12. HP: what is the HP of the outboard motor
13. Motor brand: what is the brand of the (in or outboard) motor?
14. In use: Is the vessel in use?
15. In repair: is the vessel in repair?
16. Not in use: is the vessel not in use?
17. Comments: comments are often used to comment on the use status.

---

### 2.1.1 Landing beaches and harbours

At the start of the research a list of harbours and landing beaches was compiled by Ms. Bitter, Mr. Constancia and Mr. Dilrosun. The list was later on compared to previous research (i.e. Zaneveld 1959), to add harbours / landing places if needed (i.e. Sta Cruz). It became clear that more harbours and landing beaches were mentioned then, most of them were currently out of use – they had become a closed beach for tourism, or the lagoons had become land.

The harbours and landing beaches were visited a number of times. The list of dates that the harbours and landing beaches were visited are 34 times (see table 2.1):

**Table 2.1** *The harbours and landing beaches visited with the days they were visited in 2016.*

Playa Kanoa: 17-10, 18-10  
Playa Lagun: 12-10, 19-11, 15-12  
Playa Piskadó, Westpunt: 12-10, 13-10, 15-12  
Santa Martha: 16-11, 20-11  
Caracasbaai rotonde: 22-11  
Caracasbaai: 6-10, 11-10, 18-10, 1-11, 23-11  
Piscadera: 10-10, 21-10, 31-10, 2-11, 23-11  
Koredor: 21-10, 15-12  
Bati Paña: 17-9, 12-10  
Kurá Buriku: 12-9, 28-9  
Marie Pampoen: 17-9, 19-10, 21-10  
St. Michiel: 4-10, 17-10, 25-11  
Sta Cruz: 15-12

### 2.1.2 Vessel characteristics, gear use, vessel use

All the visible aspects about the vessels were written down on paper, making use of abbreviations. The data were entered in the database (Excel) as soon as possible, and are indicated in the Excel-file by yes (present) or no (not visibly present). Some aspects were hard to judge: many fishers take their gear (kanasters, hook and line) or vessel attributes (oars, gps, sail, outboard motor) out of their vessel after fishing to prevent theft.

In order to deal with these uncertainties, different categories were used:

- No; there are no signs that gear is being used / the characteristic is present
- Maybe; there are indications that the gear is being used / the characteristic is present
- Yes; gear is clearly being used / the characteristic is present <sup>4</sup>
- X; Not applicable
- ?; cannot be observed

As an example – the outboard motor: when there were hooks to put the motor or when there were scratches on the vessel where the motor is normally placed, the indication 'maybe' was used. When data was not visible, for example when a boat was upside down, a question mark was used. Most of the lengths of the boats were estimated by the surveyors, unless a fisherman has been interviewed, then the length mentioned is used in the file.

The use of the vessel was assessed by looking at the bottom of the vessel in the waterline. In case of, visible damage preventing the vessel to go to sea, many growth of shells and algae, or the vessel being full of water (unless this was clearly from the latest rain shower), (half) sunken or lying on the

---

<sup>4</sup> When answering the cabin question, an extra category was made for this characteristic: yes, guard. Some vessels did not have a cabin but a kind of windscreen or some kind of protection from water/waves when speeding. This has been analysed as no in the analysis.

---

shore, the vessel was assessed as 'not in use'. In case of clear signs of repair taking place – such as the vessel being lifted and propped – 'in repair' was used (see also section 2.3).



**Figure 2.1:** Vessel in repair in Caracasbaai (Photo: Kraan)

## 2.2 The interviews

The interviews were held in the harbours and landing beaches whilst being there for the frame survey. Fishermen on their vessels or at the piers, the beach or quay were approached and asked to be interviewed. Mr. Constancia acted as translator for the interviews held in Papiamentu. Some interviews were held in Dutch. With all interviews Mr. Constancia started the conversation, introducing Ms. Bitter to the fishermen in Papiamentu. He explained who she was, that she just wanted to ask a couple of questions about their vessels and fishery and often emphasised that these questions had nothing to do with taxes (as many fishermen thought was the case). Most of the interviews took about 10 minutes.

The interview sheet (see figure 2.2) contained the following questions:

1. Date
2. Harbour
3. Source of information; the investigator, an informant or the captain
4. NC-number of the boat
5. Name of the boat
6. Year that the vessel was built
7. Length of the boat
8. Presence of a cabin
9. Presence of an auxiliary sail
10. Presence of an oar
11. How big is the crew when fishing
12. Engine specifics: outboard or inboard, brand and horsepower
13. Presence of: GPS, fish finder, winch or an electric reel
14. The condition the boat is in; in use, being repaired or not in use
15. Which fishing gear was used; trolling, handline, kanaster, seine, gillnet or other
16. How often the gear was used
17. Target species
18. "How often do you go fishing?"
19. "Is fishing your primary source of income?"
20. "Are you the owner of the boat?"
21. "Do you ever take tourists with you?"
22. "How old are you?"
23. "How long have you been a fishers?"
24. "Are there more people in the family who fish? Who?"

Datum:	Haven:	<input type="checkbox"/> Kapitein <input type="checkbox"/> Omstander <input type="checkbox"/> Onderzoeker	
		Relatie: _____	
<b>BOOT</b>			
Nummer:	Naam:	Bouwjaar: _____	
Lengte (m):	Kajuit: <input type="checkbox"/> ja <input type="checkbox"/> nee	Hulpzeil: <input type="checkbox"/> ja <input type="checkbox"/> nee	Roeispaan: <input type="checkbox"/> ja <input type="checkbox"/> nee Crew: _____
Aandrijving: <input type="checkbox"/> binnenboord	GPS: <input type="checkbox"/> ja <input type="checkbox"/> nee	Conditie: <input type="checkbox"/> in gebruik	
<input type="checkbox"/> buitenboord	Fishfinder: <input type="checkbox"/> ja <input type="checkbox"/> nee	<input type="checkbox"/> ter reparatie	
pk: _____	Winch: <input type="checkbox"/> ja <input type="checkbox"/> nee	<input type="checkbox"/> ongebruikt	
merk: _____	Electric re: <input type="checkbox"/> ja <input type="checkbox"/> nee		
<b>TUIG</b>			
	Reef	Deepwater	Other
	Trolling	Handline	Trap
	PAP	Handline	Seine
		kanaster	Reda
Welk vistuig gebruik je?			
Welk vistuig gebruik je het vaakst?			
Verdeling tuig over vistrups%			
Wat is je belangrijkste doelsoort?			
<b>SOCIAL</b>			
Hoe vaak ga je vissen?		Wat is uw leeftijd?	
Is de visserij je primaire bron van inkomen? _____		Hoeveel jaar vist u al?	
Bent u ook eigenaar van de boot?		Vissen er meer mensen in de familie?	
Neem u wel eens toeristen mee?		Wie?: _____	

Figure 2.2: The interview data sheet used in the field (in Dutch).

## 2.3 Possible limitations of the research

The research has been conducted by Dutch researchers and an employee of the Ministry of Health, Environment and Nature at Curacao. The combination of a young (female) student from the Netherlands and a local (male) employee of the Ministry whom is well known and with good rapport with the fishers seems to have been a good combination. Nevertheless Mr. Constancia works at the ministry and has acted as translator of the interviews, so *possibly* fishermen have not always been completely open (for instance about how often they go fishing or the gears they use).

The research has been done during a particular period of the year (September – December), this might affect the outcomes of the research, in positive (more vessels lying at the harbour, not in use) or negative ways (some vessels at sea a lot and thereby missed). As a large fraction of fishing boats were destroyed during hurricanes Lenny (1999) and Omar (2008), consequently, out of precaution, many fishers remove their boats from the water for the hurricane season. Our frame survey coincided with the end of the hurricane season. Even more so the third quarter is a poor fishing season, so it is possible that we have missed smaller boats as for them there is little fishing lost by putting the boat in a safe place on land.

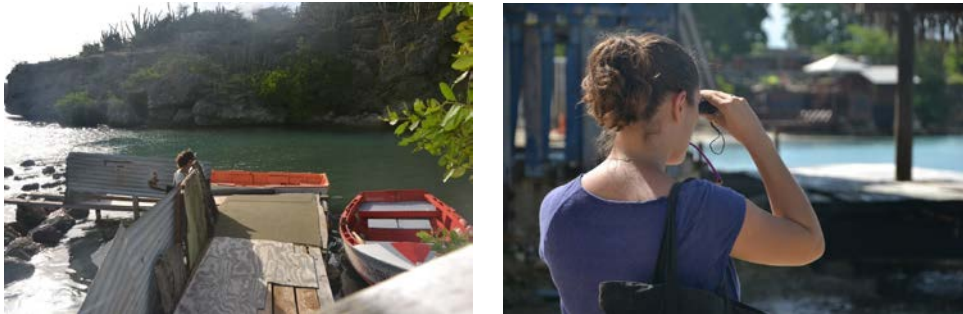
And the research has been done at specific places – landing beaches and harbours. It is known that many fishers, keep their (small) vessels at home; or take them home for repairs. It is therefore likely that we have missed a number of vessels especially in the smallest category.

The method chosen to interview fishers, was to look for them at the harbours and landing sites during different parts of the day. It has proven difficult to find them, only 32 interviews have been held. If another method was used, such as snowball sampling, probably more fishers would have been found.

Or if this method (looking for fishers at landing sites) was used during the main fishing season, possibly more fishers would have been found.

The answers to the questions 15 (which fishing gear was used, trolling, handline, kanaster, seine, gillnet or other), 16 (how often the gear was used) and 17 (target species) could unfortunately not be used as the questions had not been asked consistently. From the data it became clear that the categories such as 'trolling' or 'handline' had been differently interpreted by fishers and interviewer. Also many fishers had chosen the category 'I target everything' which strongly reduced the usefulness of the data.

The characteristics of the vessels were described based on direct observation. As many fishers take all the extra's off their vessel when away, sometimes it was difficult to assess whether a vessel for instance used an outboard motor (see section 2.1). Also sometimes the angle from where vessels were spotted did not allow for a full description of the vessel (i.e. vessel nr. could not be seen or length could not be estimated, or fishing gear attributes were not on board – see figure 2.3). This has been addressed by revisiting the harbours, to try to get a new improved sighting of those vessels. In some cases status of vessels was not clear – was it used for fishing; or was it in use?



**Figure 2.3** These vessels in Santa Cruz and St. Michel are difficult to assess, lying behind screens or lying far in the bay (Photo's: Kraan).

The use of the vessel was also assessed by observing the state of the vessel and by making use of the knowledge of Mr. Constancia. As he is a frequent visitor of the harbours, he has quite accurate knowledge of vessels being not in use since a long time. In some cases bystanders in the harbour were asked if vessels were in use or not. Possibly the use of vessels has in some cases been mis-assessed. In all cases this is snapshot in time. Vessels not in use now, can be repaired in the following months and re-join the fishery again.



**Figure 2.4** In some cases the use of a vessel is quite clear, this is in Baai Macola (Photo: Kraan).

It was the intention of the project to compare the data with data from previous research. Especially the research done by LVV in the 1980ies and 1990ies was deemed useful. Unfortunately it was not

---

possible to access this data, as since 2010 the archive of the Ministry of Health, Environment and Nature had been relocated. The staff of the Ministry deemed it impossible to find the hard copies of these previous studies. This means that we were not able to check the method used to do the frame survey; which harbours and landing beaches were visited, how often were the harbours and landing beaches visited, in which period of the year, which categorisations were made – based on what etc. This methodological uncertainty impacts on the comparability of the data presented. The digital files of the 2001 study however could be shared.

---

# 3 Results

In this chapter we will present the results of the Curacao Frame Survey 2016 (3.1). In section 3.2 the data of this survey is compared with previous datasets. In section 3.3 the interviews held with the fishermen will be presented.

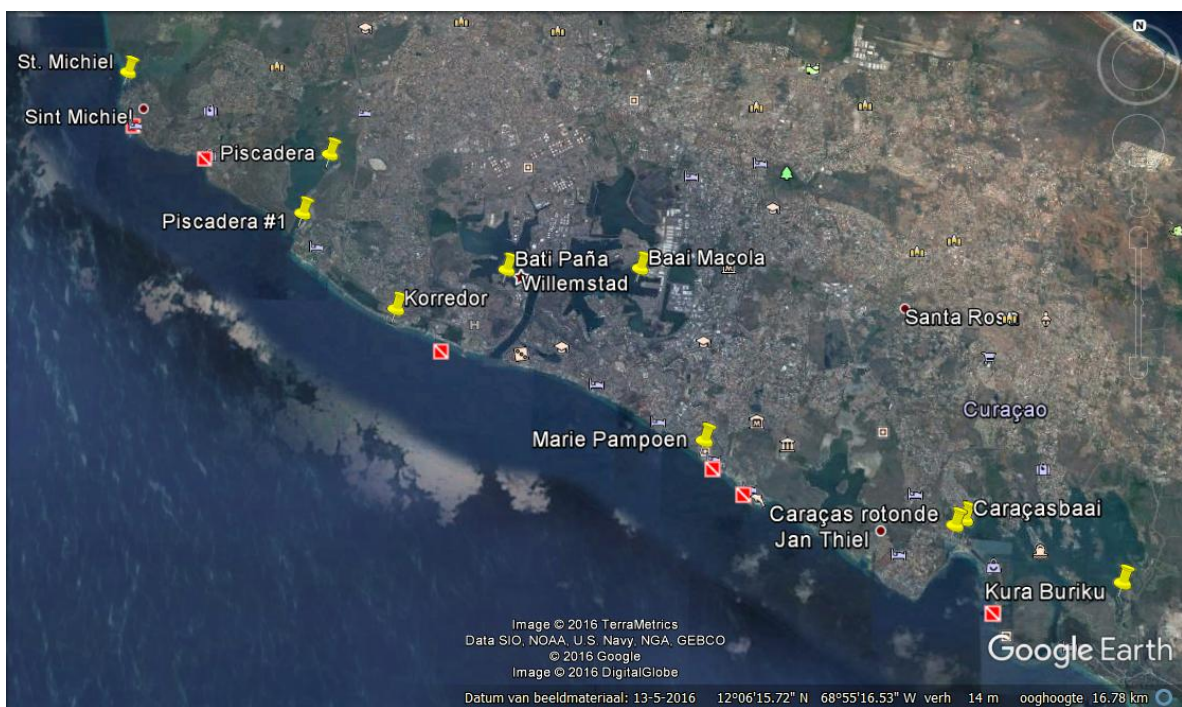
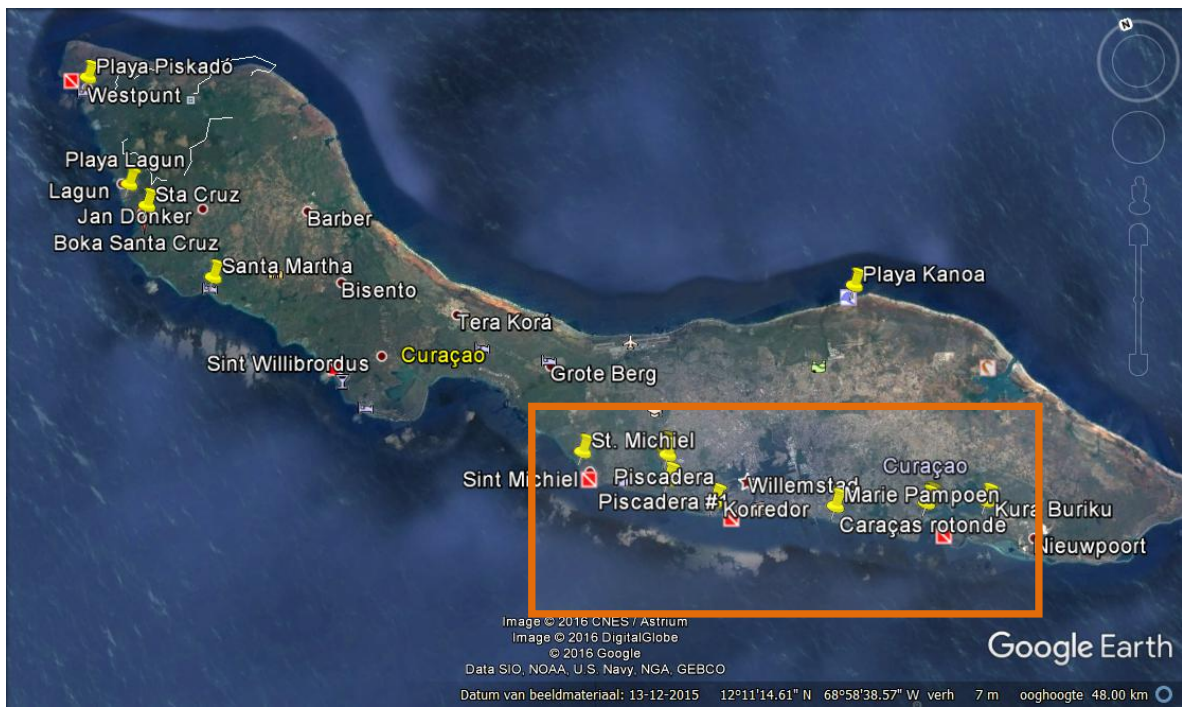
## 3.1 Frame Survey 2016

### 3.1.1 Number of vessels per harbour / landing beach

The harbours and landing beaches that have been visited were:

1. Bai Macola
2. Caraçasbaai
3. Caraçasbaai rotonde
4. Hala Kanoa
5. Koredor
6. Kurá Buriku
7. Marie Pompoen
8. Piscadera #1
9. Piscadera #2
10. Playa Lagoen
11. Playa Piskadó
12. Santa Martha
13. St. Michiel
14. Sta Cruz

Their locations are indicated on the map in figure 3.1.



**Figure 3.1:** Top: map of Curaçao with harbours and landing beaches indicated with a yellow pin. The yellow square indicates the area which is enlarged in the bottom figure. Bottom: map of the south eastern part of Curaçao; where most fishing harbours and landing beaches lie.



The total number of fishing vessels in Curacao in 2016 was 294. Almost 81 percent of the fleet (238), appeared to be in use at the time of the survey (including the categories maybe (#3) and probably (#9)). Of the 238 vessels in use, 110 had an inboard motor and 96 had an outboard motor. 32 vessels were non-motorised (86% of the fleet is thus motorised). The number of vessels per harbour / landing beach is listed in table 3.1 below.

Harbours / landing beaches	Nr of fishing vessels	Nr of vessels <i>not</i> in use
Bai Macola	15	2
Caraçasbaai	70	14
Caraçasbaai rotonde	30	5
Hala Kanoa	6	4
Koredor	15	5
Kurá Buriku	24	1
Marie Pompoen	14	0
Piscadera #1	10	1
Piscadera #2	50	17
Playa Lagoen	10	0
Playa Piskadó	4	0
Santa Martha	13	1
St. Michiel	24	4
Sta Cruz	9	2
<b>Total</b>	<b>294</b>	<b>56</b>

**Table 3.1:** the total number of fishing vessels per harbour and landing beach of Curacao, and the number of vessels per harbour and landing beach of Curacao not in use at the moment of the survey.

The harbours Caraçasbaai (70) and Piscadera #2 (50) contained most of the fleet of Curacao. Caraçasbaai rotonde (30) is at the other side of Caraçasbaai, and contains mainly small vessels. Piscadera #1 is nearby Piscadera #2 and harbours 10 mostly smaller vessels without cabin. All in all this is more than half (160) of all fishing vessels of Curacao (294).

### 3.1.2 Number of vessels per length category

The length of the vessel is seen as an important indicator for the type of fishing that the vessel will be active in (personal information Dilrosun) (see 3.1.2.3). Fishermen just starting in fisheries often begin with a smaller vessel and over the years work towards buying a larger vessel.

In previous frame surveys four length categories were used (REF): >9 meters , between 9 and 7meter, between 7 and 5 meter ) and <5 meter . In table 3.2, the total number of vessels per length category is shown. The unknown category (39 vessels) are vessels of which the length could not be estimated (see section 2.3).

Category	Length in m	Length in feet	Nr of vessels
Category 1	> 9	>29.52	63
Category 2	Between 7-9	22.96 - 29.52	28
Category 3	Between 5-7	16.4 - 22.96	66
Category 4	<5	<16.4	98
Unknown			39

**Table 3.2:** the total number of fishing vessels per length category

#### 3.1.2.1 Largest vessels (Category 1; >9m)

Most of the larger boats were seen in Caracasbaai (38), Piscadera #2 (8), Bai Macola (8) Santa Martha (7). St Michiel and Koredor also each had 1 large vessel. All of the larger boats had a cabin and almost all had an inboard motor (1 maybe and 4 no). None of these vessels (without inboard motor) were in use, 2 of them (both in Caracasbaai) in repair – they had been on the shore for more than 8 years so we were told (source from harbour). In general 8 of the large boats were not in use.

### 3.1.2.2 Smallest vessels (Category 4; <5m)

The smallest vessels, about one third of all vessels, can be found to be much more spread over the island. Most of the smaller boats were seen in Piscadera #2 (26), Caracasbaai rotonde (18) and St. Michiel (10) (see table 3.3). 18 of the vessels were not in use, of which 3 were in repair.

Harbours / landing beaches	Nr of small vessels (Category 1 <5m (16.4 feet))	Nr of vessels <i>not</i> in use
Bai Macola	0	0
Caracasbaai	5	2
Caracasbaai rotonde	18	5
Hala Kanoa	0	0
Koredor	2	0
Kurá Buriku	9	0
Marie Pompoen	1	0
Piscadera #1	8	1
Piscadera #2	26	9
Playa Lagoen	9	0
Playa Piskadó	4	0
Santa Martha	2	0
St. Michiel	10	0
Sta Cruz	4	1
<b>Total</b>	<b>98</b>	<b>18</b>

**Table 3.3:** the spread of small vessels (Category 4) over the harbours and landing beaches.

### 3.1.2.3 Relevant categorisation

From the literature and from discussing this with the Ministry of Health, Environment and Nature in December 2016 it has become clear that there are two main types of fishery on Curacao; trolling (dragging a handline through the water whilst sailing) aiming for highly migratory pelagic species and handline fishing at the reef (from an anchored vessel). Trolling is mostly done by larger vessels (>7m) with a cabin and an inboard motor. Reef fishing is mostly done by smaller vessels (<7m) without a cabin and an outboard motor. Therefore from looking at the characteristics of the fishing vessels – length, cabin and motor, can be helpful in assessing which type of fisheries are done. This differentiation between larger and smaller vessels has also proven to be useful in understanding the fishery on Bonaire (de Graaf et al 2016). Therefore this differentiation will be made in this report as well. This is however not a strict divide, as smaller vessels can also be seen trolling their lines through the water aiming for pelagic species, as well as larger vessels fishing on the reef.

Category	Length in m (feet)	Nr of vessels	Inboard	Outboard	Comment
Category 1	> 9m (29.52feet)	63	59		04 have neither in or outboard, they are not in use (2 in repair)
Category 2	Between 7-9m (22.96 - 29.52 feet)	28	24		13 have neither an in or outboard motor, they are not in use (2 in repair)
Category 3	Between 5-7m (16.4 - 22.96 feet)	66			
With cabin		27	23		13 have neither in or outboard, they are not in use (3 in repair)
Without cabin		39	1	30	Of 5 it is unknown if they have an outboard motor; 3 have neither in or outboard motor, they are not in use
Category 4	<5 (16.4 feet)	98			
With cabin		9	8		01 vessel with cabin has no inboard motor, and it is unknown if it has an outboard motor or oars.
Without cabin		89	0	70	9 vessels have no outboard motor; one has oars and is in use, the others (8) are not in use (2 in repair). Of 10 vessels it is unknown whether they have an outboard motor. One has oars.
Unknown		39			

**Table 3.4:** Table showing the number of vessels per length category indicating how many have an inboard or outboard motor and are with or without cabin and indicating how many are out of use and

---

*whether they are in repair or not (in this overview the vessels without length are not taken into account).*

When looking at the data presented in table 3.4, it becomes clear that there is a strong link between length and inboard motors: of the 91 larger vessels (>7m) 91% has an inboard motor. When there is no inboard motor, vessels are often not in use (87,5%).

Of the smaller vessels (164) only 21,9% has a cabin. Most of these smaller vessels with a cabin (36) also have an inboard motor (87%). When there is no cabin, there often is no inboard motor (with 1 exception).

The question is what is the best way to present the data, dividing between small and large vessels? Or is a division between with or without cabin (and inboard motor) more relevant? We assume that having a cabin and inboard motor facilitates faster, safer and more comfortable trolling than being without cabin and inboard motor. As neither categorisation is 100% waterproof and as it seems that the aspect of having a cabin (or not) is a relevant addition to the group of smaller vessels, we will include it in the analysis. We will present the data in the next section on the basis of length (larger than or smaller than 7m); and if smaller than 7m we will also add the aspect of having a cabin with inboard motor.

### 3.1.3 The larger fleet of Curacao

The larger fleet of Curacao (>7m) consists of 91 vessels. Sixteen vessels were not in use at the time of the survey, of which 10 in repair. The length varies between 24 and 45 feet (7-14 m), with an average of 32.5 feet (10m). 61 vessels also have a sail. These are mainly used as a safeguard against malfunction of the inboard motor.

### 3.1.4 The smaller fleet of Curacao

The smaller fleet of Curacao (<7m) consists of 164 vessels. Twenty-seven vessels were not in use at the time of the survey, of which 8 were in repair. Of the 137 vessels in use, 2 were categorised as maybe in use and 9 as probably. The length varies between 7 and 22 feet (2-7m), with an average length of 15 feet (4.5m).

#### 3.1.4.1 The smaller fleet with cabin

31 of these vessels have a cabin **and** an inboard motor of which 21 also have a sail. Twenty-eight of the 31 vessels are in use, of those not in use (1 from Caracasbaai and 2 from Piscadera #2), 2 are in repair. Five vessels have a cabin but not an inboard motor.

Most of the 36 smaller vessels with cabin lie in Caracasbaai (17) and Piscadera #2 (9).

#### 3.1.4.2 The smaller fleet without cabin

Of the vessels without cabin (128), 23 have a small guard from the waves (and sun sometimes, depending on the construction) at the front of the vessel, these differ a lot in height and construction (see figure 3.2). All of these (except 2 of which it is unknown) have an outboard motor (of which 10 probably).



**Figure 3.2:** Two smaller vessels with 'a guard', protecting the fishers at sea against the waves.

Of the remaining 105 vessels without cabin and guard, 74 have (including probably and maybe) oars on board, in most cases with also an outboard motor (72). Seven vessels also have outboard motor but no oars.

Twenty-one of the 128 smaller vessels without cabin were not of use at the time of the survey, three of which were in repair.

## 3.2 Historical trends

Frame surveys have been held before on Curacao. In fact data on the fleet can already be found from the beginning of the twentieth century in the reports of Boeke (1907). In 1961 Zaneveld also did in-depth research on Curacao, the FAO did a study in 1968 and in particularly the 1980ies and 1990ies a couple of frame surveys have been held by the Ministry. The latest research was done by Mr. Dilrosun in 2001. All these data sets can be used to compile an overview of the developments of the Curacao' fleet.

Unfortunately in most cases we were not able to obtain the original data sets (see section 2.3), especially of the LVV data. This means that we were not able to check the method used to do the frame survey; which harbours and landing beaches were visited, how often were the harbours and landing beaches visited, in which period of the year, which categorisations were made – based on what etc. This methodological uncertainty impacts on the comparability of the data presented.

### 3.2.1 Harbours and landing beaches

In the table below (table 3.5) we have compiled the data from Zaneveld 1961 which is based on his frame survey in 1959, data from the frame survey held in 1994 (Van Buurt, 2001) which shows all vessels per harbour longer than 5m, the data of LVV 2001 and the data of our research (2016). What becomes clear when we compare the harbours and landing beaches listed is that many of the landing beaches of 1959 were not in use anymore in 1994, 2001 and 2016, either because they are not a bay or lagoon anymore (such as St Annabaai in 1994 and Riffort (RIF) in 2016); or because the beaches have become closed or private beaches (Daaibooibaai, Cas Abao, St Jan, Djeremi, Wacao); or the landing beaches, bays are not used by fishing vessels anymore (St Pedro, St Catharina and St Jorisbaai, Bati Paña). Some landing beaches and harbours are also new such as Kurá Buriku, Bai Macola (also there in 1994)

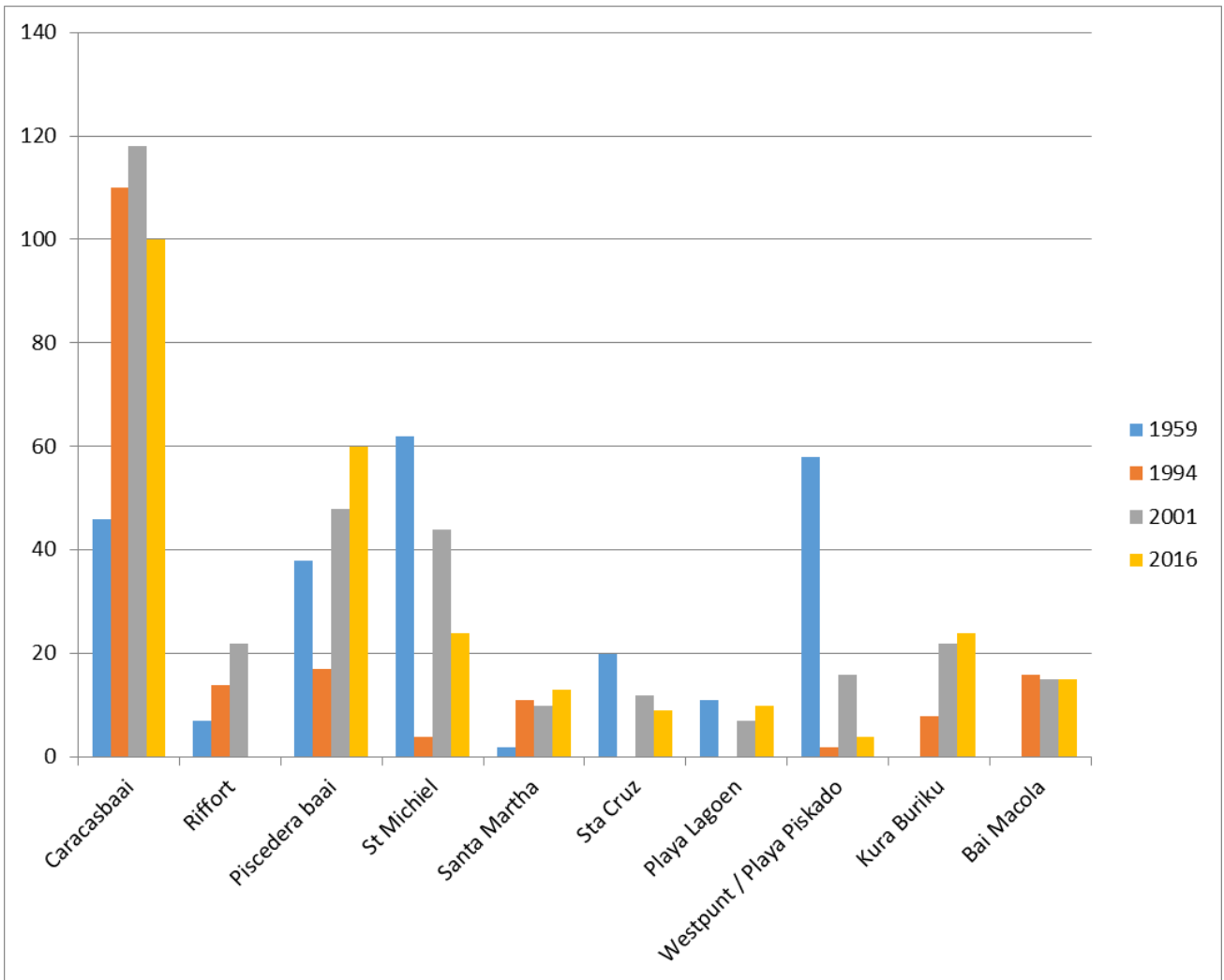
Zaneveld 1959	1959	LVV 2001	1994	LVV 2001	2001	Kraan	2016
All fishing vessels		Vessels > 5m		All fishing vessels		All fishing vessels	
Spaanse Water	46	Caracasbaai vissershaven, Caracasbaai	110	Vissershaven LVV and Caracasbaai and Caracasbaai Playa	118	Caracasbaai and Caracasbaai rotonde	100
Hala Canoa	10	Playa Canoa	2	-	-	Halo Kanoa	6
St Annabaai	35	-	-	-	-	Not a bay anymore	-
Riffort	7	Rif (K.A.E.)	14	RIF	22	Not a lagune anymore	-
Piscaderabaai	38	Piscaderabaai	17	Piskadera	48	Piscadera #1 (new harbour) and #2	60
St Michielsbaai	62	Sint Michiel (Boca)	4	Boca St Michiel / Boca Slangenbaai	44	St Michiel	24
Daaibooibaai	11	-	-	Daaibooi	9	Closed beach	-
Port Marie	6	-	-	-	-	Marie Pompoen	14
Cas Abao	5	-	-	-	-	Closed beach	-
St Jan	3	-	-	-	-	Private beach	-
St Pieter	4	-	-	-	-	St Pedro? Not a landing beach	-
St Marthabaai	2	Santa Martha Binnenbaai	11	Santa Martha	10	Santa Martha	13
St Kruis	20	-	-	Santa Cruz	12	Sta Cruz	9
Lagoen	11	-	-	Lagoen	7	Playa Lagoen	10
Djerimi	4	-	-	-	-	Closed beach	-
Westpunt	58	Westpunt	2	Westpunt	16	Playa Piskadó	4
Wacao	2	-	-	-	-	Private beach	-
St Catharina	7	-	-	-	-	Lies in the St Jorisbaai – no fishing vessels	-
St Jorisbaai	1	-	-	-	-	No fishing vessels	-
		Cura Burico	8	Kurá Buriku	22	Kurá Buriku	24
		Baai Macola	16	Baai Macola	15	Bai Macola	15
		-	-	-	-	Koredor	15
		Bati Paña	4	Bati Panja	7	-	-
		Harbour variable or unknown	67				
	322		255		330		294

**Table 3.5:** The number of vessels per harbour / landing beach in 1959 (Zaneveld 1959), 1994 (Lvv 2001), 2001 (unpublished report 2001, obtained from Mr. Dilrosun) and 2016 (this report).

The data suggest that the number of vessels have decreased between 2001 and 2016. As in 1994 only the vessels larger than 5m were taken into account, the overall number of 255 is a bit misleading. That makes it difficult to make a good comparison. From this dataset it remains a bit unclear what happened over time between 1959 and 2001).

When we compare the number of vessels per harbour/ landing beach for those that have been in use in at least 3 years we get the following picture (see figure 3.3 below). Where in 1959 effort was quite spread over the island, in later years a concentration has taken place in Caracasbaai and Piscaderabaai. The eastern part of the island has become more important than the western part (Westpunt / Playa Piskado).

**Figure 3.3:** The harbours and landing beaches that harboured fishing vessels in at least 3 years from



the datasets of 1959 (Zaneveld 1959), 1994 (LVV 2001), 2001 (Unpublished report, obtained from Mr. Dilrosun) and 2016 (this report) showing the changes over time in nr. of vessels per year per harbour / landing beach.

Going further back in time, Boeke made an estimation of 311 vessels. 11 open vessels, only used for fisheries at sea ('open booten, die uitsluitend voor de visscherij op zee worden gebruikt'), and 300 canoes ('cano's'). He explains that 'as the canoes do not need to be registered, the number of 300 is just an estimation'(Boeke 1907: 65). He also presents a list of vessels per harbour / landing beach (tabel 3.6).

Boeke	1907
Westpuntbaai	17
Daibaai	6
Piescaderabaai	12
't rifwater (Otrabanda)	43
Pietermaai	8
Schottegat	25
Caracasbaai	5
Spaansche Haven	21
de Pen	16
Willemstad	11
Total	164

**Table 3.6:** Number of vessels per harbour / landing beach in 1907 (Boeke 1907).

It is not clear how these data relate to the estimation of 311, except for the 11 open vessels, which are all birthed in Willemstad. About these open vessels he explains that 8 are used on a regular basis for fisheries, the remaining 3 (a bit larger also) are more often used for transport of products and goods from the plantations to the city and vice versa (Boeke 1907).

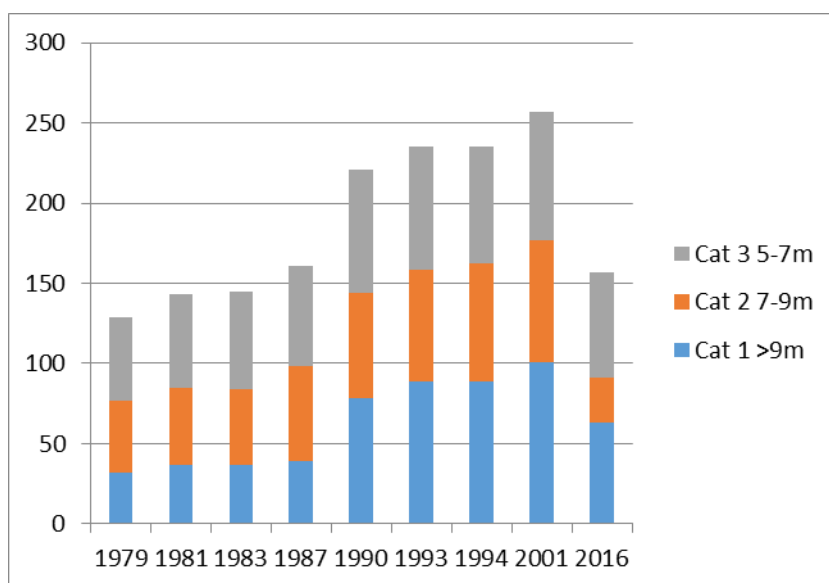
When looking at the data we found in the literature on the frame surveys of 1979, 1981, 1983, 1987, 1990, 1992, 1993, 1994, and 2001 we see the following trend (table 3.7).

	1979	1981	1983	1987	1990	1992	1993	1994	2001	2016
Cat 1 >9m	32	37	37	39	78		89	89	101	63
Cat 2 7-9m	45	48	47	59	66		69	73	76	28
Cat 3 5-7m	52	58	61	63	77		77	73	80	66
Cat 4 <5m									178	98
Length unknown										39
Total	129	143	145	165	221	219	235	255	435	294

**Table 3.7:** Data from previous frame surveys done by LVV and ours from 2016. (Data sources: 1979, 1981, 1983, 1987, 1990, 1993, 1994 Van Buurt 2001; 1992 Van't Hof et al 1995; 2001 Verslag Monitoring Visserij Curaçao 2002-2003; 2016 this report).

In figure 3.4 we have presented number of vessels larger than 5m in three length categories from 1979 till 2016. The figure suggests that the fleet is back to the level of the 1980ies. With still a significant higher number of large vessels compared to the 1980ies, but much less than in the 1990ies. The next size level (cat 2; 7-9m) is much smaller than before; it was around 50 in the 1980ies and around 70 in the 1990ies now around 30 in 2016. It should be noted however that the 39 vessels we counted in the frame survey of 2016, of which we could not estimate a length, have not been included in this overview.





**Figure 3.4:** Trend of the number of vessels (>5m) in the years 1979 – 2016 based on LVV data (sources: 1979, 1981, 1983, 1987, 1990, 1993, 1994 Van Buurt 2001; 1992 Van't Hof et al 1995; 2001 Verslag Monitoring Visserij Curaçao 2002-2003) and the data of this report (2016).

### 3.2.2 Frame surveys 2001 and 2016

From Mr. Dilrosun we obtained an unpublished document with data from 2001 with number of vessels per length category per harbour / landing beach. As we also have collected this data in 2016, we can compare the two datasets (see table 3.8). The total number of vessels in this study is 330 for 2001<sup>5</sup>, compared to the 294 we found in 2016.

	2001	2016	2001	2016	2001	2016	2001	2016	2001	2016	2001	2016
	Cat IV	Cat IV	Cat III	Cat III	Cat II	Cat II	Cat I	Cat I				
Lengtecat 2016	1 (<5)	1 (<5)	2 (5-7)	2 (5-7)	3 (7-9)	3 (7-9)	4 (9-12) and	4 (9-12) and 5 (>12)	No length	No length	Totaal	Totaal
Plaats												
Westpunt	6		6		1		3				16	0
Playa Piskado		4									0	4
(Playa) Lagoen	7	9		1							7	10
Santa Cruz	12	4		5							12	9
Daaibooi	9										9	0
Santa Martha	6	2	1	1	1	3	2		7		10	13
St Michiel		10		7		3			1		3	0
Boca	26		6		3		6				41	0
Boca Slangen Baai	3										3	0
Piskedera #2	20	26	8	8	14	3	6		8		5	48
Piscedera #1		8		2								0
RIF	7		8		3		4					22
SHT / Baai Macola			3		4	5	8		8		2	15
SHT / Bati Panja			3				4					7
SPW / Kura Buriku	6	9	5	9	6	3	5			3	22	24
SPW / Vissershaven	6	5	11	15	17	10	38		38			72
SPW / Caracasbaai												
(Caracasbaai)	18	18	11	11	8	1	3				2	40
Caracasbaai Playa	5		1									6
hala Kanoa				1							5	0
Mari Pampoer		1									13	0
Koredor		2		6					1		6	0
												0
Totaal	131	98	63	66	57	28	79		63		39	330

**Table 3.8:** Comparing the number of vessels per length category and harbour / landing site between 2001 and 2016. (Source: data 2001 Faisal Dilrosun).

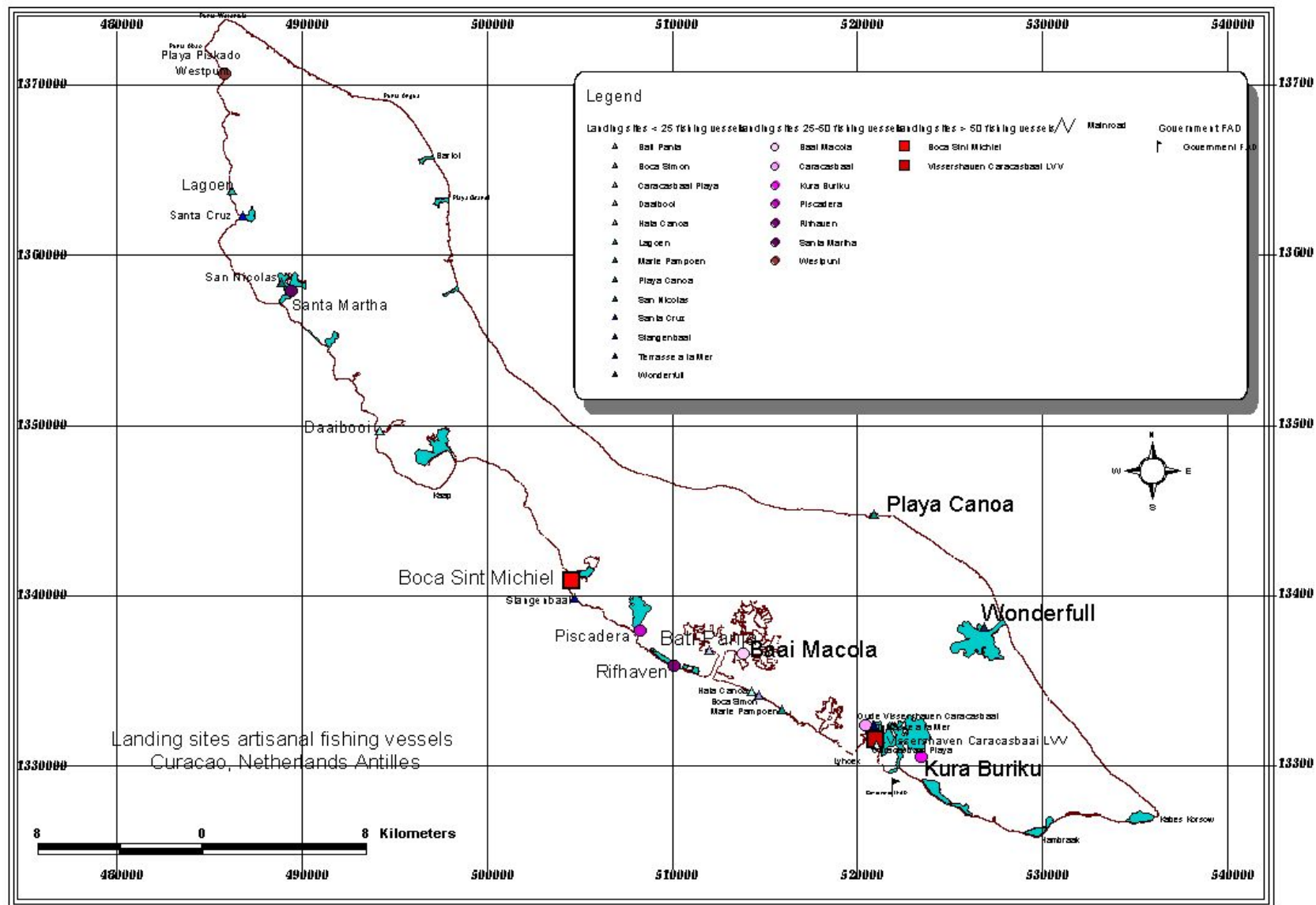
<sup>5</sup> Please note that this source is different than the source used in table 3.7. As we do not have the original documents to which *Verslag Monitoring 2002-2003* refers quoting the 435 vessels in 2001 in table 3.7 we cannot check this data issue. See also section 2.2 about this problem.

---

In 2016 we could not estimate the length of 39 vessels. In 2001 this was not an issue as Dilrosun were able to compare their observations with the data set of the harbour registry.

What is called 'St Michiel' in 2016 can probably be compared to 'Boca' and 'Boca Slangenbaai' from 2001 – as it is the same bay. The number of vessels halved there (from 44 in 2001 to 24 in 2016). And also Westpunt and Playa Piskadó can be taken together; the number of vessels there (in the West) has declined sharply (from 23 in 2001 to 4 in 2016). RIF and Daaibooi weren't landing beaches anymore in 2016. The number of vessels in the 2 harbours of Curacao, Piscadera and Caracasbaai, remained more or less the same (Piscadera #2 48 in 2001 – 50 in 2016; Caracasbaai Vissershaven 72 in 2001 and 68 in 2016).

The number of vessels smaller than 5m have declined from 131 in 2001 to 98 in 2016 (a decline of 26%) yet whether or not this is a real decline or not is difficult to assess as this year's frame survey was held at the end of the hurricane season (see section 2.3). The number of vessels in the category 5-7 meters has remained relatively the same size (3 more in 2016). The number of vessels in the category of 7-9 meters has almost halved (from 57 to 28 in 2016) and the of the largest category there has been a decline of 21% (from 79 to 63 in 2016).



**Figure 3.5:** Map of the landing sites of artisanal fishing vessels Curacao in 2001 (Source: Faisal Dilrosun).

### 3.3 Interviews with the fishermen

In total 32 interviews were held with fishermen in the harbours and landing beaches of Curacao. The interviews were held to get a bit of extra information on about the vessels as well as on the fishery (gear used, species caught, nr of crew). See section 2.2 for the methodology used and section 2.3 for the possible limitations.

Most of the interviews (28) were held with captains, fishermen owning their own fishing vessel. Three fishermen were labelled as 'a friend of the captain', 'a builder of fishing vessels' and 'a nephew of the captain'. The harbours where the fishers came from / where the interviews were held, were: Caracasbaai (7), Mambo beach (1), Piscadera #1 (4), Piscadera #2 (11), Playa Kanoa (1), St. Michiel (5) and Playa Piskadó (3).

#### 3.3.1 About the vessels

The fishermen had vessels of different length categories; 11 vessels were larger than 9m (29.52 feet), 4 were between 7-9m (22.96-29.52 feet), 10 were between 7-5m (22.96-16.4) and 6 were smaller than 5m (16.4 feet). The average length was 7m (24 feet), and the vessels differed in age – between less than 1 year old (the vessel was built in 2016) and 58 years old, with an average of 24.5 years old (of 6 vessels there was no age).

Three vessels were not in use, all of them being in repair, one of them with the aim to be sold.

19 of the vessels had a cabin and inboard motor (of which 12 also a sail), 1 vessel had a guard. Of the 13 vessels without inboard motor, 10 had an outboard motor, of one vessel it was unclear and 2 vessels had oars instead of a motor.

The outboard motors have an average HP of 18.6 HP, ranging between 8 and 48 (see table 3.10). Yamaha is the most popular motor brand, one vessel has a Johnson outboard motor. Of the inboard motors the average is 161 HP, ranging between 15 and 400 HP (table 3.9). Of the inboard motors, Perkins is the most popular brand (9) followed by Detroit (4) and Cummins (2).

Vessel	Length	Cabin	Sail	Oar	Inb	HP	Motor brand
10	36	yes	no	no	yes	250	Cummins
11	33	yes	yes	no	yes	100	Perkins
12	19	yes	X	X	yes	85	Perkins
13	30	yes	yes	no	yes	130	Perkins
15	21	yes	no	no	yes	51	Perkins
16	36	yes	yes	no	yes	350	Cummins
17	27	yes	yes	no	yes	85	Perkins
18	35	yes	yes	no	yes	140	Detroit
20	25	yes	no	yes	yes	15	Mercury
21	32	yes	yes	no	yes	160	Perkins
22	35	yes	yes	no	yes	400	Detroit
23	30	yes	yes	no	yes	210	Caterpillar
24	33	yes	yes	no	yes	300	Perkins
25	21	yes	yes	no	yes	30	Lombardini
26	22.2	yes	no	no	yes	85	Yamaha
27	28	yes	no	no	yes	200	Perkins
28	36	yes	yes	no	yes	40	Detroit
30	59	yes	no	no	yes	301	Detroit
31	28	yes	yes	no	yes	135	Perkins

**Table 3.9:** The 19 vessels with an inboard motor, showing the HP and the motor brand, as well as the length of the vessel, the presence of a cabin, sail and oars.

Vessel	Length	Cabin	Sail	Oar	Out	HP	Motor brand
1	13	no	no	yes	yes	15	Yamaha
2	14	no	no	yes	yes	15	Yamaha
3	14	no	no	no	yes	8	Yamaha
4	15	no	no	yes	yes	15	Yamaha
5	16.5	no	no	yes	yes	15	Yamaha
6	17	no	no	yes	yes	25	Johnson
7	17	no	no	yes	yes	15	Yamaha
9	18	no	no	no	yes	15	Yamaha
14	23	no	no	no	yes	48	Yamaha
32	10	no	no	yes	yes	15	Yamaha

**Table 3.10:** The 10 vessels with an outboard motor, showing the HP and the motor brand, as well as the length of the vessel, the presence of a cabin, sail and oars.

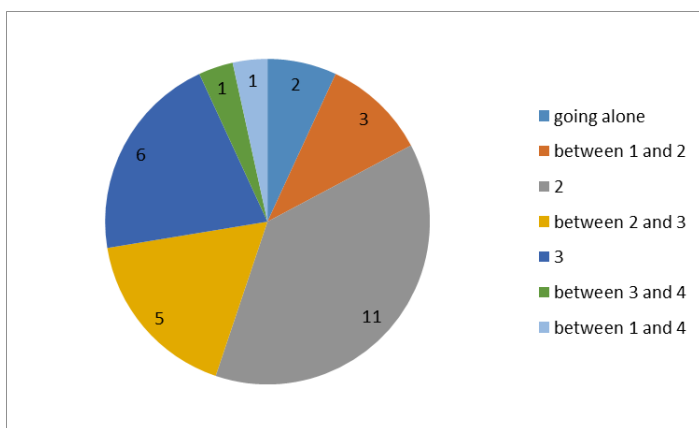
Thirteen vessels have either a GPS or fishfinder or winch or electric reel on board (see table 3.11). Twelve vessels have a GPS, 8 have a fishfinder on board, 4 a winch and 4 an electric reel. All being vessels with an inboard motor. In table 3.11 the vessels are listed with either a GPS or fishfinder or winch or electric reel, showing the vessel length and the HP and motor brand of the inboard motor. Three vessels (nr 16, 17 and 26) have all extra's on board.

Vessel	Length	Inb	HP	Motor brand	GPS	Fishfin	Winch	Electric r
10	36	yes	250	Cummins	yes	no	no	no
12	19	yes	85	Perkins	yes	X	X	X
16	36	yes	350	Cummins	yes	yes	yes	yes
17	27	yes	85	Perkins	yes	yes	yes	yes
18	35	yes	140	Detroit	yes	no	no	no
22	35	yes	400	Detroit	no	yes	no	no
23	30	yes	210	Caterpillar	yes	yes	no	no
24	33	yes	300	Perkins	yes	yes	no	no
26	22.2	yes	85	Yamaha	yes	yes	yes	yes
27	28	yes	200	Perkins	yes	yes	yes	no
28	36	yes	40	Detroit	yes	no	no	no
30	59	yes	301	Detroit	yes	no	no	no
31	28	yes	135	Perkins	yes	yes	no	yes

**Table 3.11:** The 13 vessels with either a GPS or Fishfinder or winch or electric reel, showing also the vessel length and the HP and motor brand of the inboard motor.

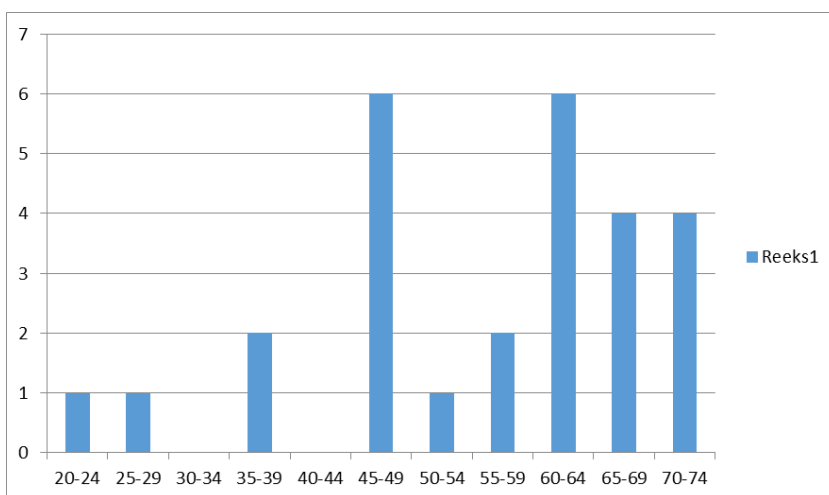
### 3.3.2 Social demographics

The fishermen indicate to go fishing with between 1 and 4 fishers, on average with 2 people. Ten fishers gave variable answers like between 2 and 3 or between 1 and 4. See figure 3.6 for the spread of answers.



**Figure 3.6:** Answers of fishermen (3 did not respond, so N=29) on the question with how many crew do you go to sea?

The average age of a fisher was 55 years old (range 23-74). Most of the interviewed fishers were 50 years or older (60%) see figure 3.7).



**Figure 3.7:** The nr. of fishers per age cohort of 5 years between 20 and 75 years (N=27).

Most of them (19) indicate to have always been fishing or more than 50 years; 5 less than 10 years, three between 20 and 25 years (N=27).

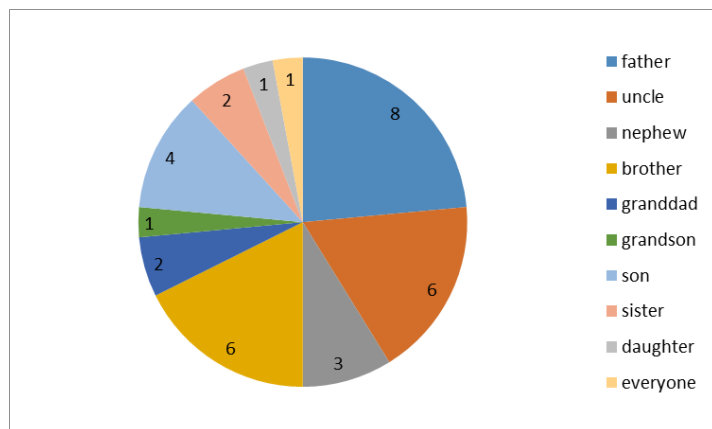
The fishermen go between 1 and 7 times per week. Some indicate to only go in the weekend (2), some indicate to go between 1-2, 2-3 or 3-4 times a week. On average they go 2.8 times a week. Nineteen fishermen claim that fishing is the primary source of income; amongst them are some whom go only once a week or only in weekends. It is most likely that these men also have another source of income, such as pension.

From previous research it also became clear that it is difficult to establish what a full-time fisher is and what a part-time fisher. Earlier estimations were: 200 (50 full-time and 150 part-time) fishers in 2011; 390 (140 full-time and 250 part-time) in 1994 (Van Buurt 2001); 652 (267 full-time and 385 part-time) in 1959 (Zaneveld 1961) and 1000 fishers in 1905 (Boeke 1905). Current estimations of the number of full time fishers on the island is about 15 (personal communication with Mr. Dilrosun and Mr. Constantia), whereby fulltime is defined as fully dependant on fishing as main income source.

The Waitt Institute did a large fisheries survey on the island in the beginning of 2016, their data showed that 71% of the fishers were part-time fishers (N=78) with 33 fishers full-time (personal communication). Their definition was that full-time fishers would go 5 times a week and part-time fishers would go twice a week, often in the weekend. The FAO defined full-time fishers as fishers

fishing 15 hours a week (Van Buurt 2001). When discussing this with staff of the Ministry of Health, Environment and Nature in December 2016, they explained that many fishers either have a pension alongside their fishing income or even a government payment. They assessed that approximately 15 fishers on the island would be really fulltime fishers, following the idea that they would have no other income than fishing. It is clear that this is a difficult subject to come to useful conclusions. It really is a matter of definition, and which definition is useful also depends what the goal of defining is. Is it about establishing the dependency on fishing as a source of income, is it establishing the effort of the fleet or is it about establishing the level of professionalism of the fishers – that all depends. It does mean however that as there are so many definitions, that it is difficult to compare data across studies – especially if the data is not accompanied by the definitions and methodology.

Five fishermen take tourists on board, one 'a lot' and three 'sometimes'. Twenty of the fishermen we spoke to, indicate to have more fishers in the family, many of them mentioning more than one relative (see figure 3.8).



**Figure 3.8:** The family-members mentioned by the fishermen to also be working in fishing, and the number of times the 'category' is mentioned (N=20).

---

## 4 Conclusions and recommendations

This report presents the results of the frame survey of Curacao's fishing fleet, which took place between September and December 2016. A frame survey was conducted at all homeports and landing sites listed by the Ministry of Health, Environment and Nature, whereby all vessels were counted and described up to a relevant number of characteristics, such as length, use of motors, sails etc. In total 294 fishing vessels were recorded. 238 of these vessels were assessed as 'in use'. 85% of the vessels (in use) were motorised – either with inboard motors (110) or with outboard motors (96). The 32 remaining vessels were propelled with oars. Most vessels were located in the two main harbours of the island: Caracasbaai and Piscadera. Most vessels (164 of 294) were smaller than 7m .

Fisheries in Curacao are predominantly artisanal with reef fishing (mostly handline) for demersal species and trolling (handline dragged through the water) for pelagic species, being the two main types. In this frame survey we have described how size of the vessels as well as the presence of an inboard motor and a cabin are seen as indications of the type of fishing. With larger vessels (>7m) with cabin and inboard motor indicating that fishers probably engage in trolling; and vice versa that smaller vessels (<7m) and the absence of an inboard motor and cabin are seen as indication that fishers will probably engage more in reef handline fishing. These categories are not 100% mutually exclusive, but can serve as an indication. Also it should be noted that there are other types of fishing that take place. A boat activity survey could give more information about this (see recommendations).

**The fleet of large boats (>7m)** consists of 91 vessels. Sixteen vessels were not in use at the time of the survey, of which 10 were in repair. The length varied between 24 and 45 feet (7-14m), with an average of 32.5 feet (10m). 61 vessels also had a sail, used as a safeguard against malfunction of the inboard motor.

**The fleet of small boats (<7m)** consists of 164 vessels. Twenty-seven vessels were not in use at the time of the survey, of which eight were in repair. Of the 137 vessels in use, eleven were categorised as maybe in use. The length varies between 7 and 22 feet (2-7m), with an average length of 15 feet (4.5m). 31 of these vessels had a cabin *and* an inboard motor of which 21 also have a sail. Twenty-eight of the 31 vessels are in use, of those not in use (1 from Caracasbaai and 2 from Piscadera #2), 2 were in repair. Five vessels had a cabin but not an inboard motor. Of the vessels without cabin (128), 23 had a small guard from the waves (and sun sometimes, depending on the construction) at the front of the vessel most of them propelled with outboard motor.

It is expected that the 91 large vessels and the 31 smaller vessels with cabin and inboard motor will be *mostly* active in trolling. It is expected that the 133 smaller vessels without inboard motor will be *mostly* active in handline fishing on the reef.

When comparing the data of 2016 with data from previous research, several developments seen suggested:

1. The number of landing beaches have declined, either because the bays / lagoons have become land (St Annabaai, RIF) or because beaches have become closed or private beaches (Daaiboobaai, Cas Abao, St Jan, Djermini, Wacao); or the landing beaches, bays are not used by fishing vessels anymore (St Pedro, St Catharina and St Jorisbaai, Bati Paña). Some landing beaches and harbours are also 'new' such as Kurá Buriko and Bai Macola (also there in 1994).
2. When comparing our data (2016) with the data of 2001 (provided by Dilrosun), the number of vessels decreased from 322 to 294. The number of vessels smaller than 5m have declined from 131 in 2001 to 98 in 2016 (a decline of 26%), yet whether or not this is a real decline or not is difficult to assess as this year's frame survey was held at the end of the hurricane season (see section 2.3). The number of vessels in the category 5-7 meters has remained relatively the same size (3 more in 2016). The number of vessels in the category of 7-9



---

meters has almost halved (from 57 to 28 in 2016) and the of the largest category there has been a decline of 21% (from 79 to 63 in 2016).

3. When comparing our data (2016) with the LVV data of 1979, 1981, 1983, 1987, 1990, 1993, 1994, 1992 and 2001, of vessels larger than 5m it suggests that the fleet is back to the level of the 1980s. With still a significant higher number of large vessels compared to the 1980s (40% more), but much less than in the 1990s (26% less). The next size level (cat 2; 7-9m) is much smaller than before; it was around 50 in the 1980ies and around 70 in the 1990ies now around 30 in 2016.
4. Where in 1959 fishing vessels were quite spread over the island, in later years a concentration has taken place in Caracasbaai and Piscaderabaai.

In addition 32 interviews were held with fishermen to get some more information about the vessels, the fishers and their fishery. The average age of the fishermen was 55 years old, with the fishermen being between 23 and 74 years old (N=27), most of them older than 50 years. Following that most of the fishers (19) indicate to have 'always' been fishing or more than 50 years. Twenty of the fishermen indicate to have more fishers in the family, many of them mentioning more than one relative (such as a father, brother, son or uncle but also a sister or daughter).

The variety in times fishing per week varies from once a week to every day, yet on average the fishers we spoke to (which was a relative small number) go 2.8 times a week. For 19 fishers fishing is their primary source of income, yet amongst them are some whom go only once a week or only in weekends. It is most likely that these men also have another source of income, such as a pension (considering their relative high age). From previous research it also became clear that it is difficult to establish what a full-time fisher is and what a part-time fisher and also that definitions and methods differ widely. Staff of the Ministry of Health, Environment and Nature explained that many fishers either have a pension alongside their fishing income or even a government payment. They assessed that approximately 15 fishers on the island would be really fulltime fishers, having no other income than fishing. Five fishers (5) we spoke to take tourists on board every now and then. The fishers on average go to sea with 2 people (including themselves).

From the fishers we also get additional information on the vessels. The average age of the vessels is 24.5 years old. The vessels are motorised with inboard motors, on average with 161 HP (range between 15-400, Perkins the most popular brand) and outboard motors on average with 18.6 HP (range between 8-48 – Yamaha most popular brand). Thirteen fishers (all having inboard motorised vessels) indicate to have either a GPS, fishfinder, electric reel or winch on board (or a combination thereof).

The main possible limitations of the research were the timing of the research. As it took place right after the hurricane season it is possible that many smaller vessels would still be stored on land (not in the harbour or at the landing beaches). In addition we have only been able to interview 32 fishers which is a relative low number.

---

## 4.1 Recommendations

It would be useful if this frame survey would be followed by the next steps:

1. a boat activity survey and
2. landings survey in order to determine fishing effort, catch and catch composition.

Together these surveys will contribute to better management of the fishery of Curacao, as the government will be able to manage based on accurate data. Although the fishing sector might be financially less important than other sectors (notably tourism) for the economy of Curacao, it is important for many people as a direct or indirect source of (additional) income, of food and it contributes to knowledge of the ecosystem being maintained on the island. In addition fishing significantly impacts the marine ecosystem of the island, most of it being valuable coral reefs. These reefs are of eminent importance worldwide (all reefs taken together) and crucial for the welfare of the island, with tourism (cruise and diving) being an important sector. Proper management of the fishery, based on accurate data is therefore important. In addition, by doing so the government of Curacao can fulfil their obligations towards ICCAT and can contribute to the FAO statistics.

It is recommended to keep the frame survey data up to date, by doing a yearly update. In addition it is recommended to do the next steps as soon as possible, making sure that the data of the three surveys can be validly combined.

---

## 5 Quality Assurance

Wageningen Marine Research utilises an ISO 9001:2008 certified quality management system (certificate number: 187378-2015-AQ-NLD-RvA). This certificate is valid until 15 September 2018. The organisation has been certified since 27 February 2001. The certification was issued by DNV Certification B.V.

Furthermore, the chemical laboratory at IJmuiden has NEN-EN-ISO/IEC 17025:2005 accreditation for test laboratories with number L097. This accreditation is valid until 1<sup>th</sup> of April 2017 and was first issued on 27 March 1997. Accreditation was granted by the Council for Accreditation. The chemical laboratory at IJmuiden has thus demonstrated its ability to provide valid results according a technically competent manner and to work according to the ISO 17025 standard. The scope (L097) of de accredited analytical methods can be found at the website of the Council for Accreditation ([www.rva.nl](http://www.rva.nl)).

On the basis of this accreditation, the quality characteristic Q is awarded to the results of those components which are incorporated in the scope, provided they comply with all quality requirements. The quality characteristic Q is stated in the tables with the results. If, the quality characteristic Q is not mentioned, the reason why is explained.

The quality of the test methods is ensured in various ways. The accuracy of the analysis is regularly assessed by participation in inter-laboratory performance studies including those organized by QUASIMEME. If no inter-laboratory study is available, a second-level control is performed. In addition, a first-level control is performed for each series of measurements.

In addition to the line controls the following general quality controls are carried out:

- Blank research.
- Recovery.
- Internal standard
- Injection standard.
- Sensitivity.

The above controls are described in Wageningen Marine Research working instruction ISW 2.10.2.105. If desired, information regarding the performance characteristics of the analytical methods is available at the chemical laboratory at IJmuiden.

If the quality cannot be guaranteed, appropriate measures are taken.

---

# Acknowledgements

The author would like to thank Lonneke Bitter for the fine work she has done, doing all the fieldwork and helping out with the methods chapter of this report. I am sure you have enjoyed your internship on the beautiful island of Curacao! Mr. Constantia and Mr. Dilrosun are also thanked for their help in the fieldwork (Dankie Pipi!) and in providing information and reports and discussing the preliminary outcomes in December on such short notice. Thanks!

---

# References

Anon. 2003. Verslag Monitoring Visserij Curaçao 2002-2003

Boeke, J. 1907, Rapport betreffende een voorlopig onderzoek naar de toestand van de visserij en de industrie van zeeproducten in de Kolonie Curaçao. I. 's Gravenhage.

Buurt, van. 2001. Visserijbeleidsplan Eilandgebied Curaçao. Dienst LVV.

Debrot, A. and L. Nagelkerken. 2000. User perceptions on coastal resource state and management options in Curacao. *Rev. Biol. Trop.* 48 Supl. I: 95-106.

Graaf, de, M. E. Houtepen, E. Tichelaar, D. Miller, T. Brunel, L. Nagelkerke. 2016. Status and trends reef fish and coastal fisheries Bonaire (Caribbean Netherlands): report card 2014-2015. Wageningen University & Research rapport CO87/16 CONFIDENTIAL.

Latijnhouwers, K. 2015, Using a century old baseline to quantify changes in the fisheries and fish populations of Curacao. Master thesis University of Amsterdam.

Lindop, A., E. Bultel, K. Zylich, D. Zeller 2015. Reconstructing the former Netherlands Antilles marine catches from 1950 to 2010. Fisheries Centre. The University of British Columbia. Working Paper Series. Working Paper #2015-69.

Van't Hof, T., A. Debrot, I. Nagelkerken. 1995. Curacao Marine Management Zone: A Plan for Sustainable Use of Curacao's Reef Resources. Unpublished report, Curacao Tourism Development Bureau/Carmabi/STINAPA.

Vermeij, M. 2012, The current state of Curacao's Coral Reefs. Carmabi Foundation / University of Amsterdam.

Zaneveld, J. 1962, The fishery resources and the fishery industries of the Netherlands Antilles. In: *Proceedings of the Gulf and Caribbean Fisheries Institute*, 14, pp. 137-171.

---

# Justification

Report C022/17  
Project Number: 4318100025

The scientific quality of this report has been peer reviewed by a colleague scientist and a member of the Management Team of Wageningen Marine Research

Approved: Dolfi Debot  
Researcher

Signature:



Date: 6-2-2016

Approved: Drs. J. Asjes  
MT member Integration

Signature:



Date: 7-4-2017

---

Wageningen Marine Research  
T +31 (0)317 48 09 00  
E: [marine-research@wur.nl](mailto:marine-research@wur.nl)  
[www.wur.eu/marine-research](http://www.wur.eu/marine-research)

Visitors' address

- Ankerpark 27 1781 AG Den Helder
- Korringaweg 5, 4401 NT Yerseke
- Haringkade 1, 1976 CP IJmuiden

---

Wageningen Marine Research is the Netherlands research institute established to provide the scientific support that is essential for developing policies and innovation in respect of the marine environment, fishery activities, aquaculture and the maritime sector.

**Wageningen University & Research:**

is specialised in the domain of healthy food and living environment.

**The Wageningen Marine Research vision**

'To explore the potential of marine nature to improve the quality of life'

**The Wageningen Marine Research mission**

- To conduct research with the aim of acquiring knowledge and offering advice on the sustainable management and use of marine and coastal areas.
- Wageningen Marine Research is an independent, leading scientific research institute

Wageningen Marine Research is part of the international knowledge organisation Wageningen UR (University & Research centre). Within Wageningen UR, nine specialised research institutes of the Stichting Wageningen Research Foundation have joined forces with Wageningen University to help answer the most important questions in the domain of healthy food and living environment.

---

