Port Reception Waste Facilities Review – Belize

The Commonwealth Marine Litter Programme

Authors: Stewart Henry Williams, Adele Petterd, Amardeep Wander, Helen Cooney,
Issue Date: 21/09/2019

Cefas Document Control

Submitted to:	CEFAS
Date submitted:	21/09/2019
Project Manager:	Julia Baker
Report compiled by:	Asia Pacific Waste Consultants (APWC)
Quality control by:	
Approved by and date:	
Version:	Final

Version Control History			
Version	Author	Date	Comment
Draft Version 1	Stewart Williams, Adele Petterd, Amardeep Wander	10/08/2019	First Draft
Draft Version 2	Helen Cooney, Stewart Williams, Adele Petterd	02/09/2019	Second draft copy editing and addressed Cefas recommendations for improvement
Final	Adele Petterd, Stewart Williams	21/09/2019	Addressed final comments

Executive Summary

Over a 12-month period, from July 2018 to June 2019, almost 650 international port calls were made to Belize, including 41 flagged fishing vessels and 500-plus domestic fishing vessels operating in the Belize exclusive economic zone (EEZ), all with the potential to produce ship-generated waste (SGW) such as garbage, oily wastes and sewage. Although SGW is not actually landed in Belize for treatment and disposal (with certain exceptions), a considerable amount is being generated.

For garbage (Annex V – MARPOL), the 12-month estimate is that port-of-call vessels generated between 9,000 to 14,000 tonnes, flagged fishing vessels 270 tonnes and domestic fishing vessels 200 tonnes, which represents between 16 and 25 per cent of total land-based sources of waste generated per year in Belize (APWC estimates).

Currently, Belize is mostly unaware of the fate of these wastes. It relies on port-of-call vessels 'self-reporting' (via the ship's log) their waste generation and means of disposal upon arrival in other port nations. To address this, regional and bilateral port reception facility (PRF) arrangements need to be formalised.

Recent prosecutions of vessels falsifying such records in the United States, illegally dumping SGW (including plastics) in the Caribbean and circumventing coastguard inspections highlight that Belize cannot rely on merely trusting international shipping is doing the right thing and therefore verification systems are needed.

As highlighted in the 2018 REMPEITC report, Belize has MARPOL obligations to assist international shipping in disposing of certain SGW (Annex I and V) and this study shows there is potential capacity to do so (for Annex V), both in government and the private sector.

Meeting such obligations is also likely to be beneficial in assisting international vessels, growing services for domestic vessels, creating service-level jobs and reducing the risk of pollution events. Domestic vessel waste management does not exist and needs to be incorporated into overall Solid Waste Management Authority (SWaMA) plans. While there are concerns in conserving landfill space, incineration of garbage required for international shipping (classified as quarantine waste) achieves a 95 per cent reduction. Quarantine ash combined with domestic shipping waste should be small compared with residential and other commercial waste streams generated in Belize but will require careful consideration.

There is a requirement for Belize to take international shipping waste. More than 20 per cent of International Maritime Organization (IMO) registered vessels request SGW be disposed of in Belize annually, however almost all requests are refused. This may foster circumstances where dumping occurs illegally. This also results in neighboring ports being required to receive SGW generated by ships while they operated in Belizean waters.

Overall, the assessment found reception facilities for garbage, oily wastes and sewage to be less than satisfactory at international ports in Belize. In addition, noting the challenges faced by Belize and many other small developing states to provide adequate waste reception facilities for vessels, the report outlines several recommendations to improve these facilities at both ports and to assist in meeting obligations under international, national and local laws.

Acronyms

ACS	Association of Caribbean States
AMSA	Australian Maritime Safety Authority
APWC	Asia Pacific Waste Consultants
AWT	Alternative waste treatment
BAHA	Belize Agricultural Health Authority
BFD	Belize Fisheries Department
BSWaMA	Belize Solid Waste Management Authority
CARICOM	Caribbean Community
CARIFORUM	Caribbean Forum CDB Caribbean Development Bank
CCOA	Commonwealth Clean Oceans Alliance
Cefas	Centre for Environment Fisheries and Aquaculture Science
CELAC	Community of Latin American and Caribbean States
CLiP	Commonwealth Litter Programme
CLIA	Cruise Lines International Association
CPEC	Caribbean Program for Economic Competitiveness
DOE	Department of the Environment
EMF	Ellen Macarthur Foundation
EEZ	Exclusive Economic Zone
FFA/SPC	Pacific Islands Forum Fisheries Agency
ICCAT	International Commission for the Conservation of Atlantic Tunas
ICCL	International Council of Cruise Lines
IDB	Inter-American Development Bank
IMMARBE	International Merchant Marine Registry of Belize
IMO	International Maritime Organisation
IOM	International Organisation for Migration
JICA	Japanese International Cooperation Agency
JPRISM	Japanese Technical Cooperation Project for Promotion of Regional Initiative on Solid Waste Management
MARPOL 73/78	The International Convention for the Prevention of Pollution from Ships (Marine Pollution), 1973 as modified by the Protocol of 1978
MPEC	Marine Environment Protection Committee
NMSA	National Maritime Safety Authorities
NCL	Norwegian Cruise Lines
NSW	New South Wales, Australia
PACT	The Protected Areas Conservation Trust
PBL	Port of Belize Limited
PLF	Ports with limited facilities
PRF	Port waste reception facilities
RAC/REMPEITC-Caribe	RAC/REMPEITC-Caribe (Regional Activity Centre/Regional Marine Pollution Emergency, Information and Training Centre – Wider Caribbean Region)
RAPMaLi	Caribbean Regional Action Plan for Marine Litter
RFMO	Regional Fisheries Management Organizations

RMI	Retail Motor Industry Organisation
RRF	Regional Reception Facilities Plan
RWRC	Regional Ships' Waste Reception Centres
SIDS	Small Island Developing State
SICA	Central American Integration System
SGW	Ship-generated waste
TIDE	Toledo Institute for Development and Environment
UNEP	United Nations Environment Programme
USD	United States dollar
WA	Western Australia
WCPTC	Western Central Pacific Tuna Commission
WCR	Wider Caribbean Region
WRH	Waste reception handling

Table of Contents

Executive Summary ii

Acronyms iv

1 Background 9

2 Scope 11

3 Country Information 12

3.1 Ports in Belize 14

4 Legislative Context 18

4.1 Multilateral Environmental Agreements 18

4.2 Regional Memberships 22

4.3 National Regulations and Strategy 22

5 The Review Process 29

5.1 Preparation 29

6 Ship-generated waste in Belize 30

6.1 Type and frequency of vessels 31

6.2 International Port Calls 32

6.3 International Fishing Vessels (Belize and Foreign-Flagged) 33

6.4 Estimates of Garbage Generation in Belize Waters 35

6.5 Cruise Line Operations in Belize 36

6.6 Domestic Fishing Vessels 38

6.7 Belize-Flagged Vessels 40

6.8 Ship-Generated Waste Types 40

6.9 Shipping Wastes and Marine Litter 42

7 Gap Analysis – Port of Belize Harbour 42

7.1 Overview 42

7.2 Summary of Waste Reception Facilities: Port of Belize Harbour 44

7.3 Assessment for Waste Reception Facilities 44

7.4 Demand for Waste Reception Facilities 53

8 Gap Analysis – Port of Big Creek 54

8.1 Overview 54

8.2 Summary of Waste Reception Facilities: Port of Big Creek 55

8.3 Assessment of Waste Reception Facilities 56

8.4 Demand for Waste Reception Facilities 64

9 Recommendations 65

9.1 Summary of waste reception assessments 65

9.2 Key findings 66

9.3 Key challenges 66

9.4 Recommendations 66

Tables

Table 1: Belize participation in MEAs and conventions related to waste and shipping 18
Table 2: MARPOL regulations of relevance to waste reception facilities 19
Table 3: Belize MARPOL obligations 21
Table 4: Applicable marine waste legislation in Belize 25
Table 5: Pre-visit planning activities 29
Table 6: International ship-generated waste – Belize 35
Table 7: Cruise ship schedule 2017, 2018 & 2019: Port of Belize Harbour 36
Table 8: Cruise ship schedule 2017, 2018 & 2019: Harvest Cay 37
Table 9: Waste types generated by ships 40
Table 10: Summary of waste reception facilities at Port of Belize Harbour 44
Table 11: Assessment of waste reception facilities for oily waste: Port of Belize Harbour 45
Table 12: Assessment of waste reception facilities for NLS: Port of Belize Harbour 46
Table 13: Assessment of waste reception facilities for sewage: Port of Belize Harbour 47
Table 14: Assessment of waste reception facilities for garbage disposal: Port of Belize Harbour 49
Table 15: Assessment of waste management system: Port of Belize Harbour 51
Table 16: Summary of waste reception facilities: Port of Big Creek 56
Table 17: Assessment of waste reception facilities for oily waste: Port of Big Creek 56
Table 18: Assessment of waste reception facilities for NLS: Port of Big Creek 58
Table 19: Assessment of waste reception facilities for sewage: Port of Big Creek 59
Table 20: Assessment of waste reception facilities for garbage disposal: Port of Big Creek 60
Table 21: Assessment of waste management system: Port of Big Creek 62
Table 22: Summary assessments Port of Belize Harbour and Port of Big Creek 65

Figures

Figure 1: CLiP objectives 9
Figure 2: Port of Belize Harbour 15
Figure 3: Port of Belize Harbour incoming vessels in 2016 16
Figure 4: Port of Big Creek 16
Figure 5: Port of Belize Harbour incoming vessels in 2016 17
Figure 6: Harvest Caye port statistics 17
Figure 7: Belize stakeholder responsibilities 28
Figure 8: Number and percentage of port arrivals July 2018 to June 2019 b 31
Figure 9: Types of vessels visiting Belize ports 32
Figure 10: Belize High Seas Fisheries Unit issued licences 33
Figure 11: Belize EEZ boundaries 34
Figure 12: Port of Belize Harbour passenger ship arrivals 2017, 2018, 2019 37
Figure 13: Harvest Caye passenger ship arrivals 2017, 2018, 2019 37
Figure 14: Port of Belize Harbour port data log 2018-2019 43
Figure 15: Port of Big Creek Port Data Log July 2018 – June 2019 55

Images

Image 1: Fishing boats at Punta Gorda 11
Image 2: Six administrate districts of Belize 13
Image 3: Belize waterway network 14
Image 4: Cruise vessel at Harvest Caye 17
Image 5: Collected waste from vessels at Cucumber Yacht Marina 30
Image 6: Port of Belize Harbour Entrance Point 43
Image 7: Port of Big Creek entry point 55

1 Background

The Commonwealth Marine Litter Programme (CLiP) is an initiative delivered by the Centre for Environment Fisheries and Aquaculture Science (Cefas) and funded by the United Kingdom's Department for Environment, Food and Rural Affairs (DEFRA). The initiative supports developing countries across the Commonwealth to develop national litter action plans focusing on preventing plastics entering the ocean.

In 2019, CLiP contracted Asia Pacific Waste Consultants (APWC) to carry out a review on the adequacy of waste reception facilities at targeted international and domestic ports in Belize. This report outlines the findings from a review and gap analysis on the adequacy of waste reception facilities (for commercial, fishing, cruise liner and other vessels) using standard IMO methodology in the country's two largest ports: Port of Belize Harbour and the Port of Big Creek. It also considers impacts from international and domestic fishing vessels, yachts and pleasure craft.

CLiP's main objectives are as follows:

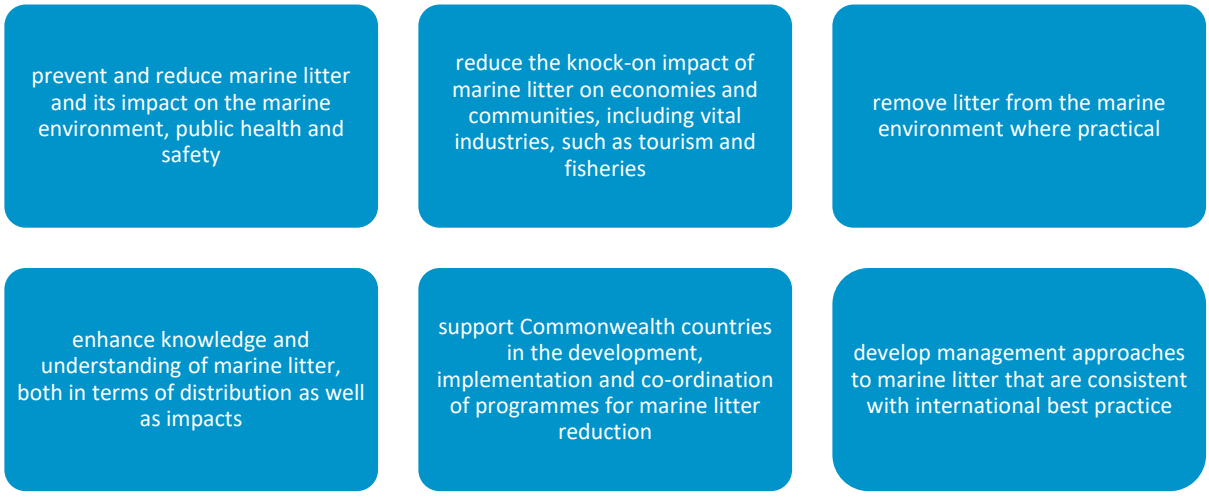


Figure 1: CLiP objectives

There is enormous global concern over the amount of waste, particularly plastic waste, being deposited in the world's oceans. Several types of waste are generated on ships. The type and quantity of wastes generated depend on various factors including the type and size of the ship, the duration of the journey and the speed of the ship, the type of fuel and the waste management practices on board. For centuries, most of the waste generated on ships ended up in the ocean. Estimates attribute shipping to roughly 20 per cent of ocean litter (UNEP 2016). Strong international and community action in maritime transport has been undertaken, including the IMO Convention MARPOL 73/78, which aims to reduce pollution from waste produced by ships. There is an obligation to provide port waste reception facilities (PRF), which must be adequate to meet the needs of ships using the port, without causing undue delay. It is therefore an obvious place in which to start tackling the problem.

There are established and newer regulatory instruments seeking to prohibit the discarding of waste from vessels at sea. MARPOL Annex V prohibits the discharge of all plastics, for example, and there are requirements for port discharge facilities, garbage management plans and record books applicable to vessels of different size classes. A recently approved Conservation and Management Measure of the Western Central Pacific Fisheries Commission will extend a prohibition on the discarding of plastic waste to fishing vessels registered in countries that are not a party to MARPOL Annex V with other regional fisheries commissions (including those in the Caribbean) expected to follow suit. This follows on from actions under IMO to prevent marine plastic litter entering the oceans through ship-based activities.

Globally, it is estimated that 6.4 million tonnes of marine litter enter the oceans each year, with about 8 million items entering the oceans every day

(UNEP 2005; McIlgorm, A., et al. 2008)

The United Nations Environment Programme (UNEP) has also recently been given a mandate to explore a legally binding instrument that would address plastic pollution of the oceans from all sources. In short, there are regulations that, if effectively enforced, require fishing vessels to retain certain types of waste and more directives are probably on the way. The challenge for countries such as Belize is to determine what must be done with this waste once received. This project seeks to establish the current state of the port reception facilities in Belize and provide long-term policy and implementation solutions for the possible impacts on international and domestic shipping, including the management of wastes from these facilities, with a specific focus on marine debris, garbage and plastic waste.

In order to comply with MARPOL requirements, the Regional Activity Centre/Regional Marine Pollution Emergency, Information and Training Centre – Wider Caribbean Region (RAC/REMPEITC-Caribe) sought to identify waste reception facilities in a number of key ports in the region. However, there are reported difficulties with such arrangements due to limited enforcement of MARPOL regulations, problems with waste agents and systems control and infrastructure, and the management of waste by municipal authorities all being problematic in many Caribbean Small Island Developing States (SIDS).

This project undertook a waste reception facility analysis of two international ports and related subsidiary ports in accordance with International Maritime Organization's (IMO) procedures. The report develops recommendations to update national port waste reception facilities plans, the infrastructure associated with these ports, as well as to develop arrangements regionally for domestic shipping that do not make call into port by operate within Belize waters.

APWC reviewed ship generated waste (international and domestic), port reception facilities and accompanying waste reception handling (WRH) plans in Belize. The analysis firstly identified international port complexes across Belize and secondly undertook a waste reception facility analysis of these ports in accordance with IMO procedures. The report has also considered ship waste generation and management from vessels that are not recorded via port of call (flagged and domestic fishing vessels).

APWC believes that the results of this study will also align broadly with various international programmes, and regional and national commitments, which are further discussed in section 4 of the report.

2 Scope

This report outlines the findings of a review and gap analysis on the adequacy of the provision of waste reception facilities for commercial, fishing, cruise liners and other vessels at the Port of Belize Harbour in Belize City and Port of Big Creek in Big Creek, Stann Creek District. In addition, other major cruise-ship terminals, such as Harvest Caye, pleasure craft and international yacht marinas, such as the Port of Old Belize, international ferry services, such as Punta Gorda, and small domestic fishery wharves are also investigated.

The analysis provides an overview of the waste reception services currently provided at the two international ports. It identifies gaps in these services with reference to the International Convention for the Prevention of Pollution from Ships (MARPOL) and outlines recommendations on how these gaps might be addressed.

The gap analysis conducted at the two sites took place in June 2019. The findings have been prepared in accordance with the IMO 'Guidelines for Ensuring the Adequacy of Port Waste Reception Facilities', as outlined in Resolution MEPC.83 (44).

Given that MARPOL does not apply to waste generated by land-based operations at the terminal or wharf, these analyses consider only waste generated by vessels resulting from their compliance with the Convention.

Image 1: Fishing boats at Punta Gorda

The report also estimates the quantities of waste that are theoretically generated within the Belize Economic Exclusion Zone (EEZ) onboard cruise liners, international cargo ships, international (including Belize-flagged) fishing vessels, international pleasure craft and yachts, and harbour craft that are recorded as making port calls. Analysis uses standard IMO methodology accepted internationally for port-of-call vessels as there is no Caribbean specific protocol. The approach for non-port-of-call vessels integrates the standard methodology with those approaches used previously for the Western and Central Pacific Fisheries Commission (WCPFC) and the Pacific Islands Forum Fisheries Agency (FFA) reports as APWC was unable to source Caribbean equivalent protocol. The report also

considers waste issues with domestic fishing vessels, although this is limited in the absence of an established methodology for these vessels and lack of waste audit data.

The type and total number of vessels registered under the Belize national flag is also illustrated to highlight the sum of vessels operating outside Belizean waters but currently subject to Belize law in relation to marine pollution. This is done to ensure consideration is made for these vessels' adherence to operating responsibly and preventing marine pollution in other national waters and on the high seas.

3 Country Information

Belize is located in Central America, nestled between Mexico in the north and Guatemala to the south and west. The country spans 2, 970 square kilometres, stretching 274 kilometres north to south and 109 kilometres east to west, with a total boundary of 516 kilometres. Approximately 450 small islands, locally known as 'cayes' are dotted along the 386-kilometre coastline, which spans the entire eastern border of Belize, located in the Caribbean Sea. Stretching down the eastern flank of the county is the world's second largest barrier reef – a popular tourist and diving destination. The border to the north and south is defined by two river systems, the Hondo River and the Sarstoon River. The topography of the coastline is lowland plains, most of which is covered in marshlands or mangrove swamps. The north of the country is again flat wetlands and coastal plains. Located in the south is the Maya mountains, ranging from 300 to 1,000 metres in altitude.

Belize's climate is considered subtropical, with temperatures usually ranging from between 22 to 31 degrees Celsius near the coastal fridge and 16 to 18 degrees in the mountainous region. The annual precipitation varies between the north and south of the country between 1,500 to 4,000 millimetres, respectively. Belize's location in the Caribbean makes it susceptible to hurricanes, which occur, on average, once every five years.

Belize is a Commonwealth country and Queen Elizabeth II is the nation's head of state. The government is a constitutional monarchy with a parliamentary system. Belize is divided into six administrative districts: Belize, Cayo, Corozal, Orange Walk, Stann Creek and Toledo, however Guatemala claims approximately half of the territory, including land and insular territories (approximately 11,000 square kilometres) in a long-standing, ongoing territorial dispute. Recent referendums in each country have led to both nations handing the decision to the International Court of Justice.

The latest census performed by the Statistical Institute of Belize in 2010 reported a population of 324,528 and a population density of 13.9 per square kilometre. According to the World Bank, in 2018 the population density increased to 16.8 per square kilometre, which gives Belize the lowest population density in Latin America. The population is predominantly rural, with the largest urban population located in the Belize District. The urban population is decreasing, however – between 2000 and 2010, the urban population in Belize District decreased by 5.5 per cent. Similarly, there was also a population decrease of 0.9 per cent in the lowest urban population centers in Belize in Toledo[1]. The World Bank reported in 2017 that the total estimated population was 375,769[2] an increase of 14.63 per cent.

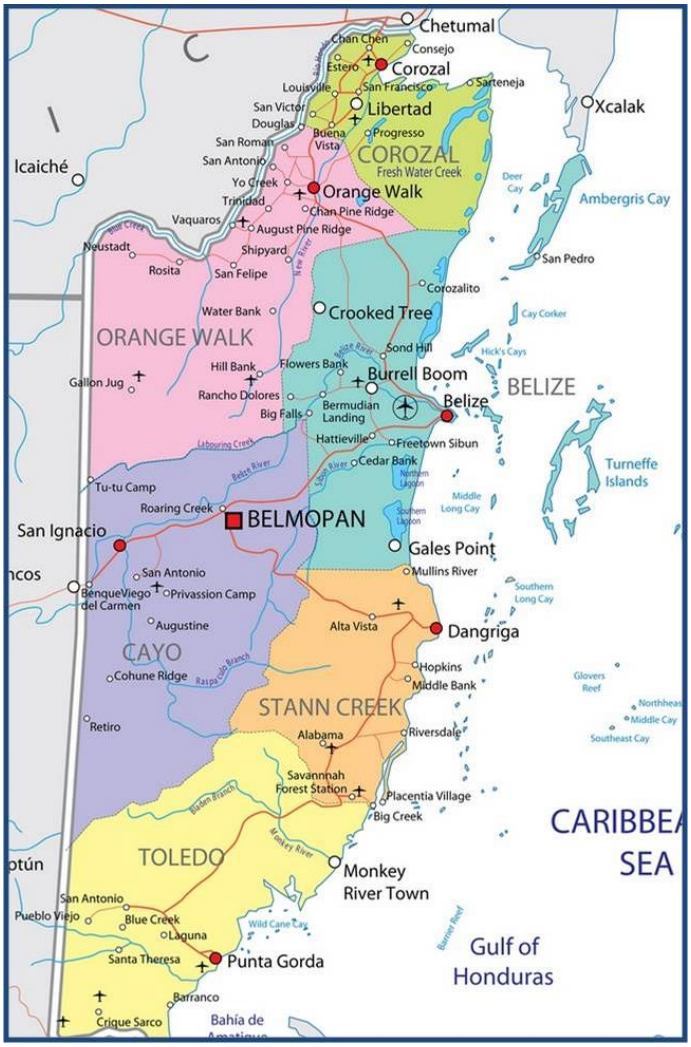


Image 2: Six administrate districts of Belize

The International Organisation for Migration (IOM) reports that Belize has received the largest incoming foreign population in relation to the total population size since 1983 but is also concurrently experience high emigration rates. In 2000, immigrants to Belize accounted for 14.8 per cent of the total population[3] ensuring a diverse and multicultural population. The official language of Belize is English, however Spanish is frequently spoken, as is Creole, Garifuna (Arawakan language), Mandarin, and German. Both Kekchi and Mopan Mayan are spoken throughout the country.

The economy of Belize is primarily based on agriculture, however tourism – especially via cruise ships – is flourishing and reportedly contributes more foreign exchange than trade. The World Bank reported the 2017 GDP was US$1.863 billion, representing less than 0.01 per cent of the world's economy. The main exported goods from Belize include raw sugar, bananas, fruit juice, whole frozen fish and crude oil worth US$374 million. Major export partners include United States, United Kingdom,

[1] Sib.org.bz. (2013). *Belize Population and Housing Census 2010 Country Report*. [online] Available at: http://sib.org.bz/wp-content/uploads/2017/05/Census_Report_2010.pdf
[2] Data.worldbank.org. (2019). Belize | Data. [online] Available at: https://data.worldbank.org/country/belize
[3] International Organization for Migration. (2016). Belize. [online] Available at: https://www.iom.int/countries/belize

Italy, Spain and Jamaica[4]. The main imported commodities are refined petroleum, planes, helicopters and/or spacecraft, rolled tobacco, recreational boats and trucks and cars worth US$1.07 billion. Import partners include US, Mexico, Cuba, Guatemala and China.

3.1 Ports in Belize

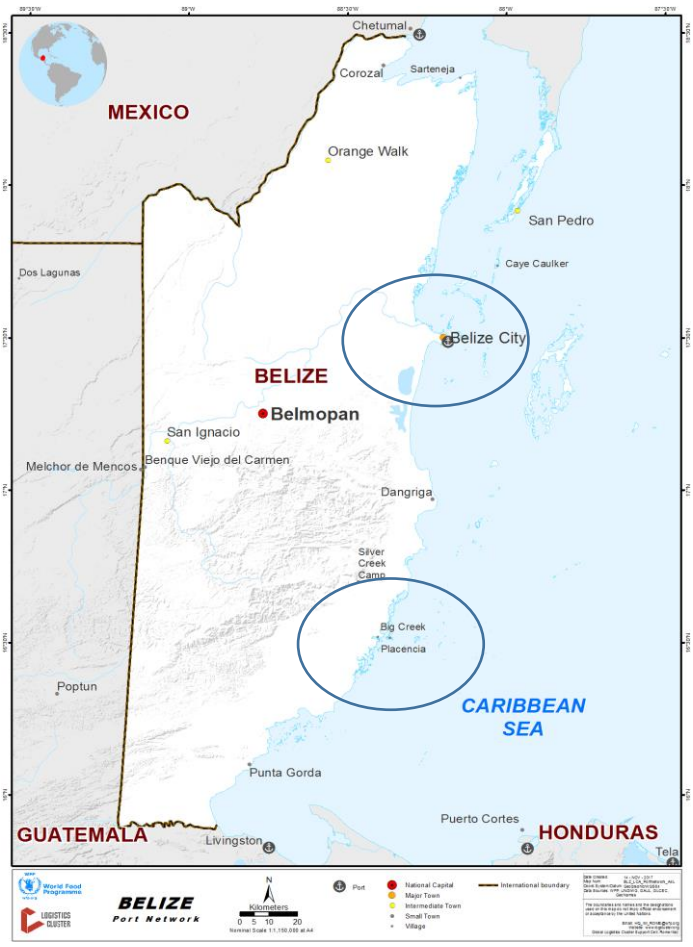


Image 3: Belize waterway network (source: Global Logistics Clusters, 2017)

There are two major international port complexes in Belize acting as cargo hubs for the country: the port of Belize Harbour in Belize City and port of Big Creek in Big Creek, Stann Creek District.

The port of Belize Harbour primarily act as container ports as well as the main ports for cruise ships visiting Belize. The port of Big Creek concentrates on agricultural products and exports such as bananas, citrus fruits as well as bulk cargo and some crude oil. In addition to Port of Belize Harbour, Harvest Caye is a private-purpose island resort owned by Norwegian Cruise Lines (NCL) and receives passengers from Norwegian Cruises. It is the only port in Belize where passengers can disembark rather than tender to land.

There are nine major shipping lines moving cargo to and from Belize to Central and North America, Europe and Japan. Any flagged ship can access ports in Belize.

There are three main international port areas for the purposes of providing customs and immigration clearances in Belize, which include:

Ports of Belize City
-Port of Belize Ltd
-Fort Street Tourism Village
-Petrol Terrminal
-Witconcrete Sugar Port

Port of Big Creek
(Banana Enterprise Limited)

Harvest Caye Cruise Port
(Norwegian Cruise Lines)

[4] Oec.world. (2019). OEC – Belize (BLZ) Exports, Imports, and Trade Partners. [online] Available at: https://oec.world/en/profile/country/blz/

In addition to the international ports, international pleasure craft and yachts moor at several marinas, including the following:

- **Cucumber Beach Marina** (Old Belize)
- **Fort George Jetty** (Belize City)
- **Placencia Hotel** Marina (Placencia)
- **Belize Yacht Club** Marina (Ambergris Caye)

3.1.1 Ports of Belize City

The port complex located in Belize City is comprised of the Port of Belize Limited (the main cargo port), the cruise terminal (Fort Street Tourism Village), the petrol terminal (Puma Energy Bahamas) and the 'molasses port' (Belize Sugar Industries). The greater port complex is the main entry into Belize for international vessels into the country.

Established in 1978 and later privatised in 2002, the Port of Belize Harbour is now privately owned, operated, managed and providing port-related services by Port of Belize Limited (PBL). Situated in the commercial district, the port complex handles various types of cargo, with priority being given to containerised vessels. It was reported in 2017 to handle between 95 and 98 per cent of the all imports for Belize and more than half of its exports[5] .

Figure 2: Port of Belize Harbour (Source: Schweikert and Ashcroft, 2017)

Although operating 24 hours a day, the Port of Belize Harbour faces access constraints and bottlenecks due to sharp turning angles. The width of the pier head not only prevents efficient use of both the shore and ship cranes, but operations can only be conducted one vessel at time. Once off-loaded, containers can be loaded onto a truck chassis/flatbed by container handles or crane to transport cargo.

[5] Business View Caribbean. (2017). The Port of Belize – The Country's Main Port. [online] Available at: https://businessviewcaribbean.com/port-belize-countrys-main-port/ [Accessed 9 July 2019].

The port offers storage, loading and unloading, and stripping and re-stuffing containers. Approximately 150 stevedores are employed. During 2016, the Port of Belize Harbour handled the following:

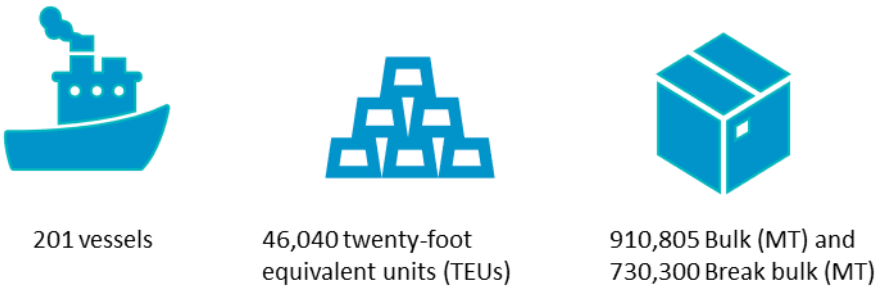


Figure 3: Port of Belize Harbour incoming vessels in 2016

3.1.2 Port of Big Creek

Established in 1990 to facilitate the export of bananas, the Port of Big Creek is a deepwater port located in the Toledo District, southern Belize. Owned and managed by Banana Enterprises Limited (BEL), the port itself is located 2.5 kilometres inland from the entrance of Big Creek and is considered a strategic alternative for transshipment through Guatemala. As Belize's first privately owned and second largest port, it was the first port where vessels could dock alongside the mainland and today receives mostly dry-cargo vessels. The port is predominantly used by the agricultural trade – more specifically, the banana, citrus and sugar industries. Shrimp and crude oil are also exported. Approximately 60 stevedores are employed.

Figure 4: Port of Big Creek (Source: Schweikert, 2017)

In 2016, the Port of Big Creek handled the following:

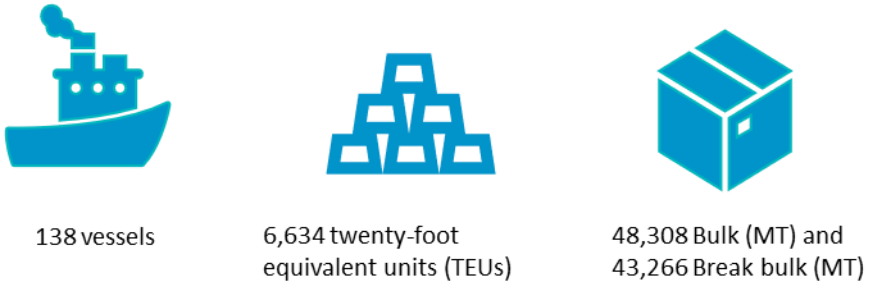


Figure 5: Port of Belize Harbour incoming vessels in 2016

3.1.3 Harvest Caye Cruise Port

Image 4: Cruise vessel at Harvest Caye (Source: Waight, 2019)

Harvest Caye Port was established as a purpose-built, resort-style port by Belize Island Holdings, a subsidiary of Norwegian Cruise Line Holdings Limited, to primarily receive passenger ships. The approximately 30-hectare (75-acre) island was purchased in August 2013 and the first cruise ship docked nine months after its scheduled launch on 17 November 2016. The island is located a few miles off southern Belize, and is situated in the Belize Barrier Reef, the second largest barrier reef system in the world behind the Great Barrier Reef in Australia. Harvest Caye is the only port where passengers can step off the cruise ship directly to port. In addition, the Port of Harvest Caye features the following:

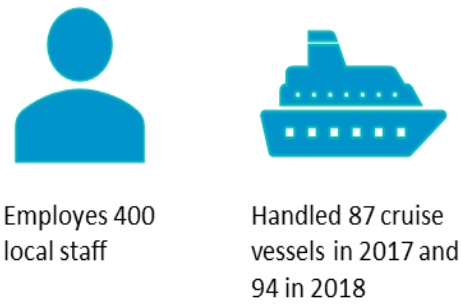


Figure 6: Harvest Caye port statistics

4 Legislative Context

4.1 Multilateral Environmental Agreements

Belize is party to numerous multilateral environmental agreements (MEAs) of relevance to the management and reduction of waste, pollution control and marine litter, as shown in Table 1.

Table 1: Belize participation in MEAs and conventions related to waste and shipping

Multilateral agreements and conventions	Status
Basel Convention on Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Entry into force 1997
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Entry into force 2005
Stockholm Convention on Persistent Organic Pollutants	Entry into force 2010
Montreal Protocol on Substances that Deplete the Ozone Layer	Entry into force 1998
MARPOL 73/78: International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (Annexes I, II, III, IV, V, and VI)	Entry into force 1995
Protocol of 1992 to Amend the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, 1971	Entry into force 1998
International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER) 2001	Entry into force 2011
Agreement establishing the Caribbean Regional Fisheries Mechanism	Entry into force 2002
Protocol concerning pollution from land-based sources and activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region	Entry into force 2010
Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region	Entry into force 1986
Protocol concerning Co-operation in Combating Oil Spills in the Wider Caribbean Region	Entry into force 1999
Protocol concerning specially protected areas and wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region	Entry into force 1999
Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas	Entry into force 2005
International Convention relating to the Limitation of the Liability of Owners of Sea-going Ships	Entry into force 1968

Multilateral agreements and conventions	Status
International Convention for the Prevention of Pollution from Ships, 1973 – Annex III: Hazardous substances carried in packaged form	Entry into force 1995
Convention on the International Maritime Organization	Entry into force 1958
Cartagena Convention (Oils Spills Protocol, Specially Protected Areas and Wildlife Protocol, Land-based Sources of Marine Pollution Protocol)	Entry into force 1999
Medellin Declaration on Marine Litter in Life Cycle Assessment and Management	Declaration of Support
Regional Platform for Marine Litter in collaboration with the Gulf and Caribbean Fisheries Institute (GCFI)	Declaration of Support
Caribbean Regional Action Plan for Marine Litter (RAPMaLi)	Declaration of Support

4.1.1 The International Convention for the Prevention of Pollution from Ships (MARPOL)

The key international convention addressing pollution of the marine environment by ships is the International Convention for the Prevention of Pollution from Ships, known as MARPOL.

The MARPOL Convention was adopted in November 1973 at the IMO with additional protocols and amendments incorporated over time. The Convention includes regulations aimed at preventing and minimising both accidental and routine pollution from ships and, at the time of writing, includes six technical annexes.

MARPOL outlines specific obligations about the provision of waste reception facilities. The onus for meeting these obligations is on government authorities rather than on ships or private companies. These obligations are designed to ensure ships can legally dispose of their waste, thus preventing illegal discharge to the marine environment and/or inappropriate land disposal. A snapshot of MARPOL regulations is included below in Table 2.

Table 2: MARPOL regulations of relevance to waste reception facilities

Annex I Regulations for the Prevention of Pollution by Oil (entered into force 2 October 1983)
This Annex covers prevention of pollution by oil from operational measures as well as from accidental discharges. Of relevance to this report is Regulation 38.1, which requires the government of each Party to provide facilities for the reception of oily residues and mixtures at oil-loading terminals, repair ports, and in other ports in which ships have oily residues to discharge. Such facilities must be adequate to meet the needs of the ships using them without causing undue delay. Regulations 38.2 and 38.3 expand on this basic requirement with reference to sludge tanks, oily bilge waters and certain other residues which are not permitted to be discharged en route.

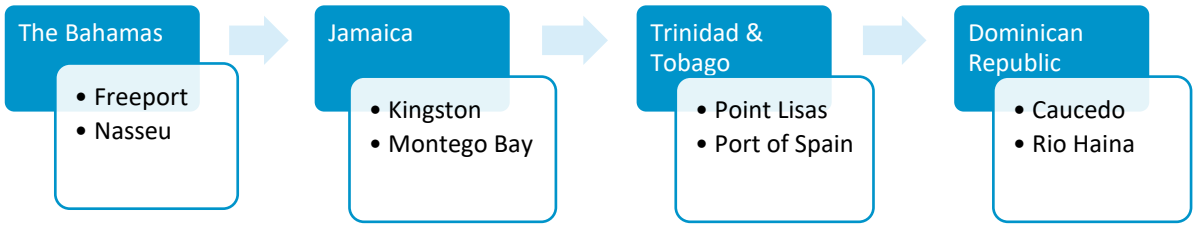
Annex II Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk (entered into force 2 October 1983)
Annex II details the discharge criteria and measures for the control of pollution by noxious liquid substances (NLS) carried in bulk. Regulation 18.1 requires the government of each Party to ensure that ports and terminals involved in bulk NLS cargo handling or NLS tanker repairs have adequate facilities for the reception of residues and mixtures containing noxious liquid substances.
Annex III Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form (entered into force 1 July 1992)
This Annex contains general requirements for the issuing of detailed standards on packing, marking, labelling, documentation, stowage, quantity limitations, exceptions and notifications on substances identified as marine pollutants in the International Maritime Dangerous Goods Code.
Annex IV Prevention of Pollution by Sewage from Ships (entered into force 27 September 2003)
Annex IV focuses on requirements to control pollution of the sea by sewage. It prohibits the discharge of sewage into the sea, except when the ship has an approved sewage treatment plant or when the ship is discharging comminuted and disinfected sewage using an approved system at an approved distance. Regulation 12.1 requires the government of each Party to ensure the adequate provision of facilities at ports and terminals for the reception of sewage, without causing delay to ships.
Annex V Prevention of Pollution by Garbage from Ships (entered into force 31 December 1988)
This Annex looks at different types of garbage and specifies the distances from land and the manner in which they may be disposed of. Notably, this Annex incorporates a complete ban on the disposal of all forms of plastics into the sea.
Annex VI Prevention of Air Pollution from Ships (entered into force 19 May 2005)
Annex VI sets limits on sulphur oxide and nitrogen oxide emissions from ship exhausts and prohibits deliberate emissions of ozone-depleting substances. Regulation 17.1 requires the government of each Party to ensure the provision of facilities adequate to meet the needs of ships using its repair ports for the reception of ozone-depleting substances and equipment containing such substances. It further requires that reception facilities are provided for exhaust gas cleaning residues in enclosed ports, harbours and estuaries.

4.1.2 Special provisions in MARPOL for Small Island Developing States (SIDS)

Sixteen Caribbean countries including Belize are classified as Small Island Developing States (SIDS). In recognition of the unique challenges that SIDS experience in providing adequate waste reception facilities for ships, the IMO specifies that providing such facilities at a regional level (as opposed to the national level) may be permitted. A feasibility study on the development of a regional reception facility plan for the SIDS of the wider Caribbean region was conducted by RAC/REMPEITC-Caribe in 2018. Assessments conducted to inform the development of the plan identified many ports in the Caribbean region could be considered as ports with limited facilities (PLFs) that may not meet 'adequacy' criteria as defined by the IMO.

As such, the study proposes that adequate reception facilities should be provided on a regional basis. It further identified the following locations as potential regional ships' waste reception centres (RWRC)

that could serve the needs of the ships visiting not only those ports, but also other ports connected by international shipping traffic:



The study also shows, however, that the value of such regional arrangements for Belize in relation to SIDS may be limited, as voyage patterns show that the strongest connectivity for Belize shipping is with the USA and Mexico (which are not included in the MARPOL special provisions) and to a lesser extent Honduras, Cayman Islands and Jamaica.

It is therefore also important that Belize consider bilateral arrangements with the USA and Mexico as well as the regional SIDS in formulating plans to meet national obligations under IMO for ship-generated waste.

4.1.3 Belize port reception facilities waste obligations

As a signatory to MARPOL, Belize has an obligation to provide adequate port reception facilities for the following types of waste:

Table 3: Belize MARPOL obligations

MARPOL Annex	Type of waste received	Criteria to provision of PRF
Annex I	Sludge tank residues	All ports and terminals which handle ships >400GT
	Oily bilge waters and other residues	All ports
Annex IV	Sewage	All ports and terminals
Annex V	Garbage	All ports and terminals
Annex VI	Exhaust gas cleaning residues	All ports, terminals and repair ports

4.1.4 Wider Caribbean Region (WCR) Special Area under MARPOL Annex V: Regulation for the Prevention of Pollution by Garbage

MARPOL defines a *Special Area* as 'a sea area where for recognised technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic, the adoption of special mandatory methods for the prevention of pollution of the sea by garbage is required'[6]. The Wider Caribbean Region (WCR) was designated as a special area due to heavy marine traffic and sensitive marine ecosystem in the region under Annex V waste (garbage generated on board a ship) in 1991, however it did not come into force until 1 May 2011. The resolution was delayed until most

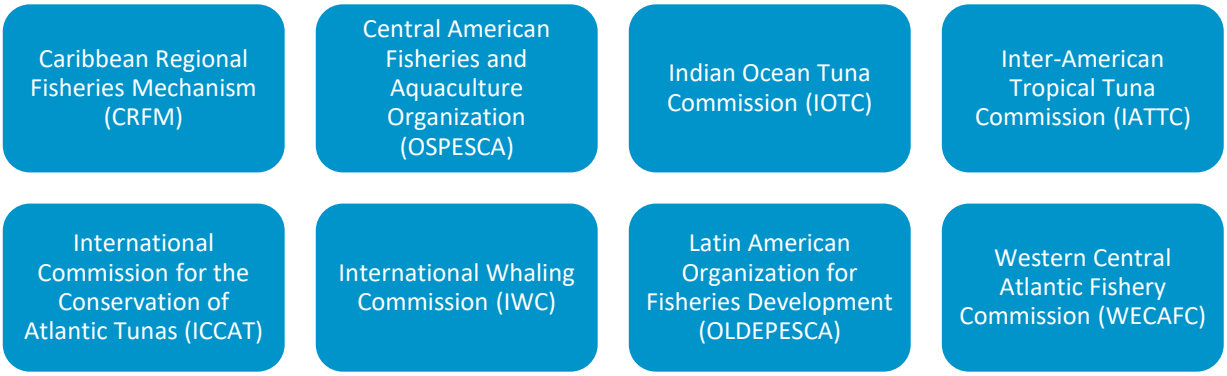
[6] Imo.org. (2019). *Garbage*. [online] Available at: http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Pages/Default.aspx

of the states boarding the WCR Special Area gave notice that relevant ports had adequate reception facilities available to receive waste – waste previously able to be dumped at sea. Vessels operating within the WCR are prohibited from discharging any garbage overboard into the sea (with the exception of food waste, which can be dumped overboard following stringent rules). RAC-REMPEITC (2018) found that Belize currently lacks proper procedures to accommodate receiving garbage, sewage and oil wastes from international and domestic ships.

4.2 Regional Memberships

Belize is a member of the Caribbean Community (CARICOM), the Community of Latin American and Caribbean States (CELAC), and the Central American Integration System (SICA). It is the only country to hold full membership in all three regional organisations.

It also is a member of the following regional fishing agreements:



4.3 National Regulations and Strategy

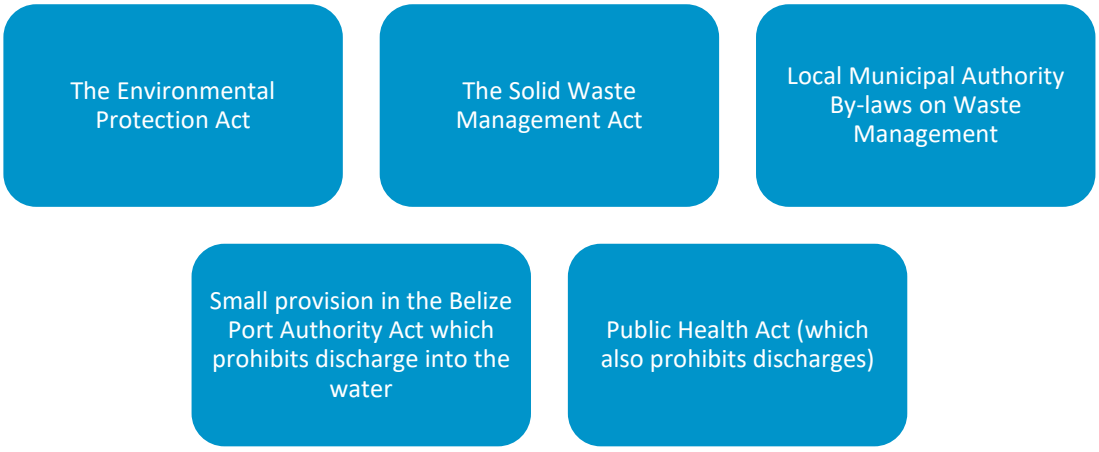
This section focuses on the frameworks and arrangements for waste management in Belize as well as the enabling stakeholders who contribute to the system integrity.

4.3.1 Pollution and Waste Frameworks

The principal framework for managing environmental pollution in Belize is covered by the following statutory instruments:

The Belize Solid Waste Management Authority (BSWaMA), administers the Solid Waste Management Strategy and Policy, with oversight by the Department of The Environment (DOE), through actively creating and improving a national network of transfer stations and related equipment that link to a centralised sanitary waste landfill for final disposal.

BSWaMA and Local Government in Belize achieves this through specific legislative powers and functions for waste management prescribed under the following legislation.



The responsibilities and powers of all parties that participate in waste collection, treatment disposal and recycling identified in the Belizean national frameworks, or who are otherwise participating, include the:

It is our understanding that the Department of Energy, Solid Waste Management Authority, Ministry of Health, Belize Agriculture and the Health Authority also collectively come together as an advisory panel to develop waste management strategies.

4.3.2 Development of a Port Waste Management Plan

In order for Belize to undertake the development of a Port Waste Management Plan, the following steps would be required:

- Responsibility would need to be assigned to a port planning team with regard to port reception facilities;
- Legislation would need to be developed to enforce compliance of ships to the MARPOL regulations;
- The necessary safety requirements for port reception facilities would need to be developed including ship to shore procedures for receiving such waste.

There is no system currently in place to assist in the development of a plan to control the different waste-handling operations such as issuing of licences, licence requirements for collection, transport and handling, applicable fees, public review and industry appeal provisions for shipping waste. Such systems are in place for fixed facilities such as landfills, transfer stations and recycling facilities and can be adapted for shipping operations if required. A Head Tax from cruise ships, which is then directed to the Protected Areas Conservation Trust (PACT), is a potential cost-recovery mechanism that could be used in a port waste management plan. Stakeholders indicated that in the past a small portion of these funds did return to the Port Authority and there are current discussions on what the future proportion of this may be.

The stakeholders also indicated that there is an environmental monitoring fee in place imposed by the Belize Department of Environment Services for any facility that requires environmental clearance, which is an ongoing, annual process.

Below is further information relating to the relevant regulations and acts specific to marine pollution and port reception facilities in Belize.

Table 4: Applicable marine waste legislation in Belize

Belize Port Authority Act Chapter 233
These regulations provide rules for the behaviour of ships in the ports of Belize. It outlines that all ships and all persons using port facilities shall take every precaution to avoid pollution of the air. Also, it is unlawful for any person to deposit, place or discharge into the territorial waters of Belize, any ballast, sanitary sewage, garbage, gaseous liquids or sanitary sewage, refuse or any other matter capable of producing floating matter, sediment or obstruction on the bottom of the ocean bed. In addition, the regulation outlines prevention of depositing of any substance, solid matter, article or thing that causes pollution of the port, or any port.
Harbours and Merchant Shipping Act
The *Harbours and Merchant Shipping Act* provides provisions for the general management of harbours, coastal and river passenger trade, foreign vessels, unseaworthy ships, shipwrecks and causalities. It outlines the powers of inspection and regulations for loading and unloading at piers, wharves, etc. The Act outlines that the Ports Commissioner or any person duly authorised may order the removal of litter and refuse found on the pier and issue fines not exceeding $25 in addition to removal costs. It also outlines that no person shall throw any rubbish on or from any part of the wharf.
Hazardous Waste Regulations 2009
An Act to make provision for maritime navigation if in the waters of Belize and for related matters. 'Ship' means and includes every description of vessel, boat or other craft used in navigation, including all vessels particularly referred to in Part III. The Minister may from time to time appoint harbours for the purpose of this Act and declare the limits and boundaries thereof. The Minister shall have the general superintendence, management and control of the harbour of Belize City and the Act. • Covers the definitions of 'hazardous waste' as well what is and is not included in the term. • Covers the required procedures and operations of a Hazardous Waste Management Facility as well as storage, transportation, treatment and disposal of hazardous waste procedures. • Details landfill disposal prohibitions and the classification of hazardous waste. • Stipulates the actions required if a breach of these regulations occurs, including investigations, offences and penalties incurred.

Environmental Protection Act

The Act established the Department of the Environment (DoE) in 1992, entrusting responsibility to monitor and implement the Act and its regulations as well and enforce the provisions of the Act and regulations. In addition, it grants the DOE broad regulatory and enforcement authority for the prevention and control of environmental pollution, conservation and management of natural resources, and environmental impact assessment. It entrusts the DoE with a broad range of functions relating to the protection of the environment, including:

- assessment of water pollution;
- co-ordination of activities relating to the discharge of wastes;
- licensing of activities that may cause water pollution;
- registration of sources of pollution;
- carrying out of research and investigations as to the causes;
- nature and extent of water pollution; and
- necessary prevention and control measures.

Amended in April 2009 to:

- provide for greater environmental control and management of the petroleum industry;
- makes improved provisions for the protection of the Belize Barrier Reef System;
- establishes an environmental management fund;
- provides for out-of-court settlement in appropriate cases; and
- provides for the issue of violation tickets for pollution offences.

It outlines the purpose and management of the environmental management fund including the income of the fund (one-tenth of 1% of gross revenue from all petroleum production in Belize).

The Act outlines the

- control and prevention of pollution from installation devices used in the exploration or exploitation of the natural resources of the sea-bed and subsoil of the maritime zone;
- the control and prevention of pollution from vessels, craft and other engines used in the maritime zone;
- the control and prevention of pollution of the maritime environment from land-based sources, including rivers, estuaries, pipelines, and outfall structures;
- the control and prevention of pollution of the marine environment arising from origin connection with seabed activities and from artificial islands, installations and structures in the maritime zone.

The DoE is responsible for the enforcement of several regulations made under the *Environmental Protection Act*. These include the Environmental Impact Assessment Regulations (S.I. 107 of 1995), the Environmental Protection (Effluent Limitations) Regulations (S.I. 94 of 1995) and the Pollution Regulations (S.I. 56 of 1996).

Solid Waste Management Act 2000

The *Solid Waste Management Act* is the most important legal instrument governing the solid waste sector. It establishes Belize's Solid Waste Management as an authority with power to provide for the collection and disposal of solid waste in declared areas and in accordance with regulations issued under the Act and provides for the vesting of solid waste management facilities in the Solid Waste Management Authority (BSWaMA).

The policy also establishes the structure and functions of the BSWaMA, a corporate body with independent legal status under the purview of the Ministry of Natural Resources and Immigration (MNRI). BSWaMA is

responsible for providing arrangements for the collection and disposal of solid waste within a service area. One of BSWaMA's main responsibilities is to assist local councils and their sanitation departments on a range of activities, including;

- design and enforcement of regulatory requirements for solid waste management systems;
- legal support and advice on drafting and renewal of contractual agreements with service providers;
- design and implementation of waste separation programmes at the source; and
- advice on marketing strategies for waste recycling.

Littering Offences Violation Tickets Regulations

These regulations state any person who commits a littering offence may be issued with a violation ticket by an authorised officer within 48 hours of the offence being seen. Regulation 6 states the value of the fine to be paid $100 for an individual and $500 for a body corporate of an unincorporated body. It provides provisions for time of payment and process for collecting unpaid fines. All fines and penalties are to be credited to the City Council or District Board where the offence was committed in within the town limits or the Consolidated Revenue Fund if the offence is committed outside town limits. Fines are to be used for keeping public roads and places clean and litter prevention.

Returnable Containers Act

Outlines acceptable procedures and containers that may be returned to the container's original source for a refund ranging from 5 to 15 cents, depending on the container's size and material. It covers the procedures around the acceptance of containers, the circumstances around the refusal of containers, refund value, regulation authority and offence circumstances. The Act is formulated to address littering, however, is rarely enforced.

Coastal Zone Management Act

Belize also participates in implementing the Strategic Action Plan for the Gulf of Honduras aimed at reducing pollution from maritime transport in the gulf. A draft Maritime Pollution Bill has also been prepared for Belize and is currently under review.

4.3.3 SGW Stakeholder responsibility

Figure 7: Belize stakeholder responsibilities

Central Government (Ministries)

- Formation of policies and enactment/enforcement of legislation

Central Government (subordinate Agencies)

- Implementation of policies/legislation enacted by central government including quarantine waste

Local Government

- Local governance in cities, towns and villages

Private Sector (Waste management Companies)

- Provision of SWM infrastructure, know-how & services

Private sector (Port Authorities)

- Ensuring compliance with local requirements
- Responsible for approving/denying requests for disposal of SGW
- Ensuring correct disposal of SGW
- Ensuring MARPOL obligations are met

Private Sector (Shipping Agents)

- Requesting disposal of SGW on behalf of ship operators

Private Sector (Shipping Operators)

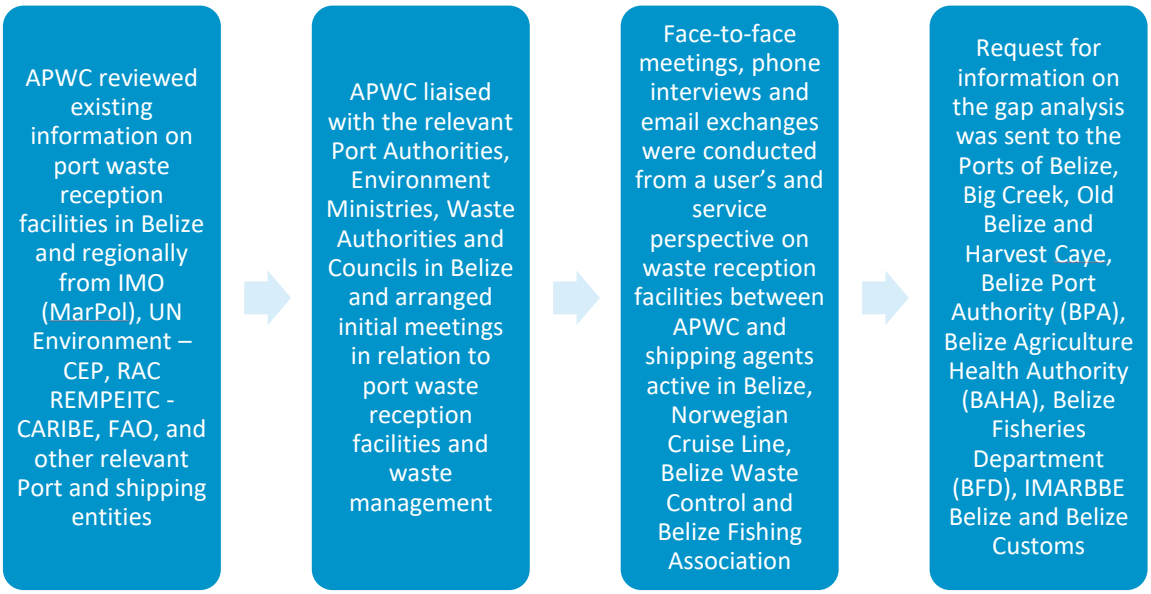
- Check port-specific requirements prior to arrival and provide 24 hour notice as per best practice guidelines
- Use standardised advance notification form
- Request waste delivery receive
- Report inadequacies of PRF

5 The Review Process

5.1 Preparation

In preparation for the review and analysis, several activities were carried out in advance of the in-country port visits, as shown in Table 5:

Table 5: Pre-visit planning activities



Following the review process, it was determined that the in-country visits and assessments should focus on Port of Belize Harbour and Port of Big Creek, while desktop review and virtual interviews would be conducted for Harvest Caye with Norwegian Cruise Lines (NCL).

The port audit team conducted in-country work in Belize over a 17-day period from the 1 to 17 June 2019. This included visits to the previously mentioned international ports plus visits to several marinas servicing international pleasure craft including Cucumber Beach Marina (Port of Old Belize) and Fort George Jetty (Belize City), while border ferry services were visited in Punta Gorda and domestic fishing jetties in Punta Gorda, Big Creek and Belize City.

Interviews were conducted with key stakeholders for ports and waste management, including the private sector and other relevant institutions such as Belize Port Authority, Belize Agricultural Health Authority (BAHA), Belize Fisheries Department (BFD), International Merchant Marine Registry of Belize (IMMARBE) and Belize Customs.

6 Ship-generated waste in Belize

Image 5: Collected waste from vessels at Cucumber Yacht Marina

To effectively review ship-generated waste in Belize, the type and frequency of vessels were investigated at the Port of Belize Harbour complex in Belize City, the Port of Big Creek, Harvest Caye cruise terminal and the Port of Old Belize (Cucumber Marina), including a review of the waste types expected to be generated by these vessel types.

Flagged fishing vessels licensed under the Belize High Seas Unit were also considered during this study. Their potential to pollute Belizean waters during activities in the EEZ, regardless of whether they make port of calls or not, is high.

This section also briefly considers shipping in relation to domestic shipping vessels, which are essentially unregulated, and vessels operating across the world under a Belize flag that could have an affect on other nations' waters or the high seas if good practice is not followed.

Section 6.4 of this report uses standardised IMO methodology to determine the quantities of garbage generated (Annex V), which includes ship-generated plastic waste matched to the number and types of ships presented in this section.

6.1 Type and frequency of vessels

Between July 2018 and June 2019, there was a total of 1,142 arrivals and 1,125 departures from Belize. Of these, more than half of the vessels (57%) arrived at the Port of Belize Harbour. The greatest contributors to the overall shipping activity were cruise ships (384), followed by tug vessels (300), cargo ships (212) and sailing vessels (116).

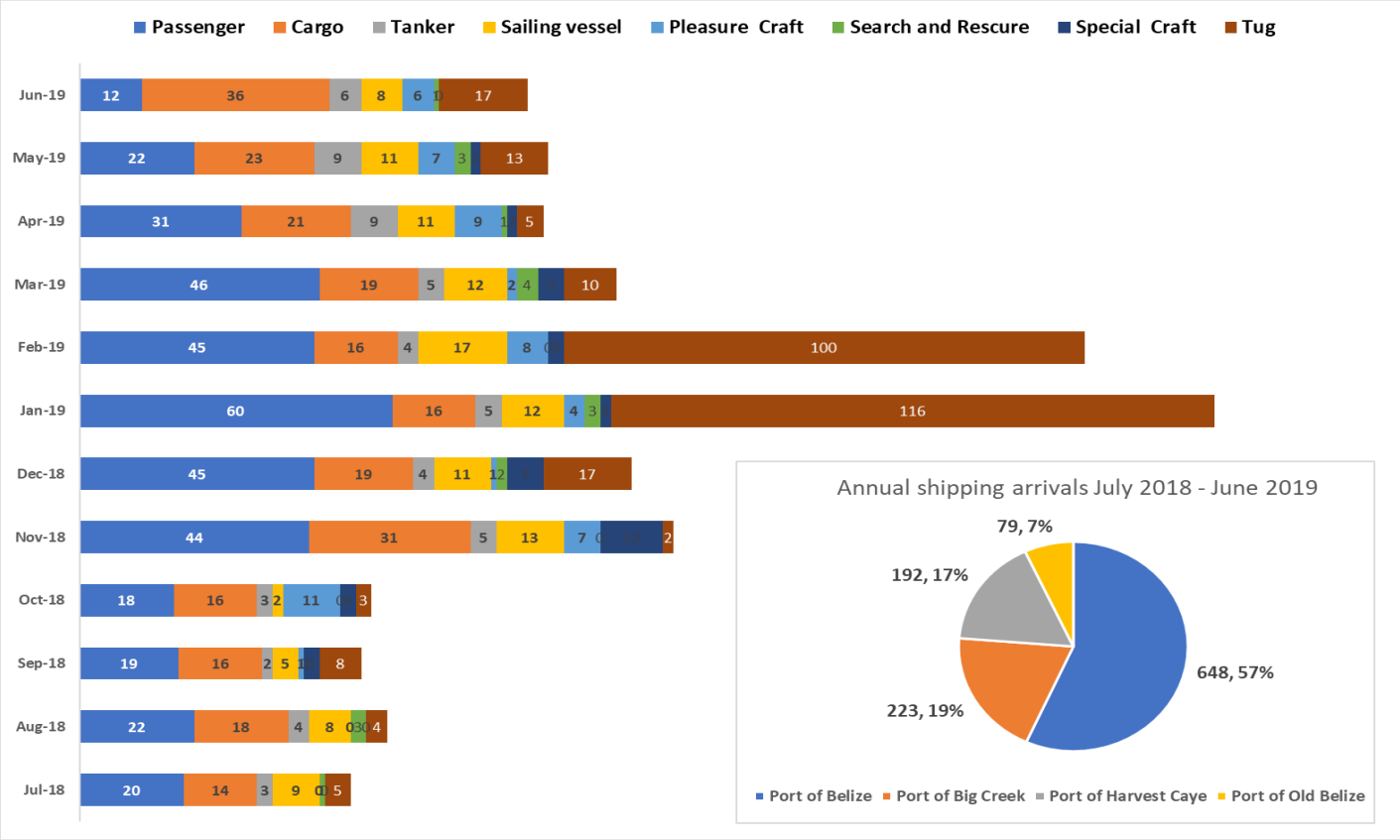


Figure 8: Number and percentage of port arrivals July 2018 to June 2019 broken down by type of ship and the port of arrival (source: marinetraffic.com)

*Figures do not include flagged (non-domestic) fishing vessels or naval vessels

6.2 International Port Calls

Based on the international port call data collected from marinetraffic.com, we note that each of the ports assessed in Belize has very different shipping traffic. As such, if there were to be a design of port reception facilities, these will be required to take into account the different type of shipping activity experienced by the different ports.

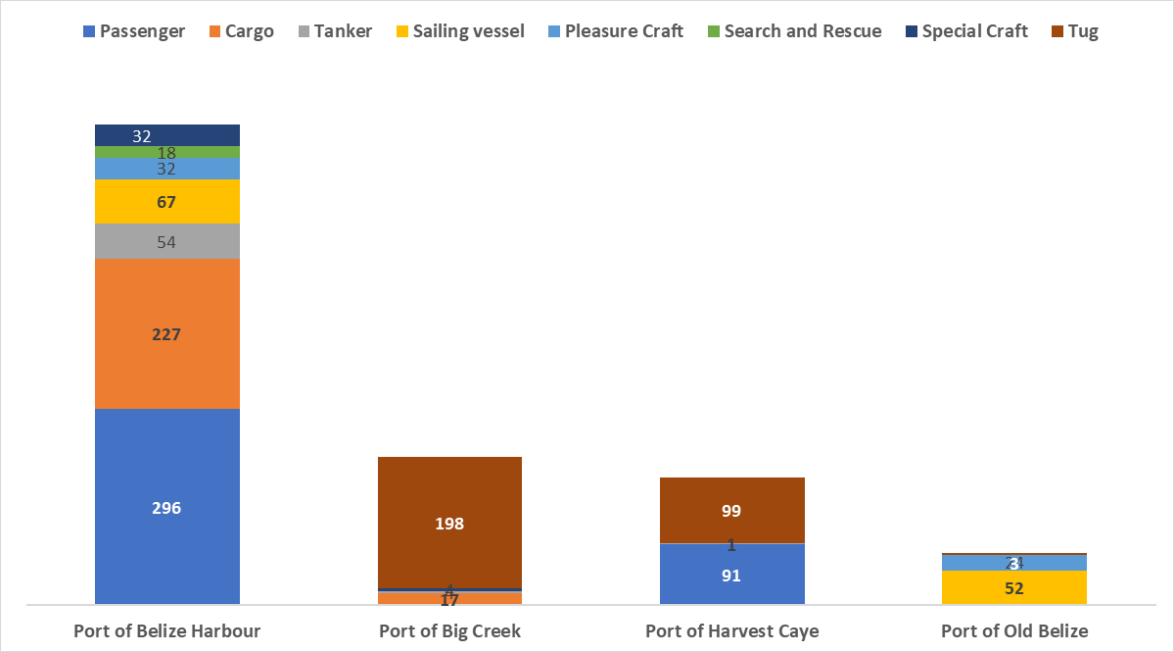


Figure 9: Types of vessels visiting Belize ports (Source: marinetraffic.com)

Above, Figure 9 highlights the shipping activity for various ports in Belize. The Port of Belize Harbour (which includes all associated ports in Belize City) receives a large percentage of the country's shipping activity and is particularly dominated by cruise liners, which accounted for the largest segment of traffic, comprising 40% of port-of-call vessels, while cargo vessels made up 30% of port calls.

By contrast, cruise liners were absent from the Port of Big Creek, where container vessels represented 17 or 68% of port calls. Tugboat movements were significantly higher, accounting for 89% of the total movements, or 198 port calls. Tugboat usage is compulsory for all vessels into Port of Big Creek except for vessels under 90 Meters and equipped with a functioning Bow Thruster. Most tug boats from Port of Big Creek are used effectively for cargo movements instead of being just tugs. Port of calls in total at the Port of Big Creek are very small (30%) in comparison to the Port of Belize Harbour.

The cruise terminal of Harvest Caye is, as expected, almost exclusively visited by cruise liners (98%). Tugboats movements account overall for 53% of port activity moving these very large cruise ships into the terminal. While the terminal ranks slightly lower in port-of-call movements than the Port of Big

Creek, it would be much higher by vessel tonnage, as half the cruise liners are in the 50 to 100 tonne range and the other half exceed this.

The Port of Old Belize is characterised by small private sailing vessels (66%) and pleasure craft (30%). Given the size of these vessels is small in comparison to the commercial fleet, they make up a minor portion of ship traffic to Belize but are unique in being able to discharge waste streams into the marine environment as they have minimal regulation requirements.

6.3 International Fishing Vessels (Belize and Foreign-Flagged)

The port-of-call data above (Figure 9) shows no visits from international fishing vessels (foreign or Belizean-flagged) occurred in 2018/2019. However, the Belize Ship Registry shows that 116 Belizean-flagged vessels are fishing vessels (trawler, fishing vessel, special purpose, reefer) (fleetmon.com 2019), while the Belize High Seas Fisheries Unit have identified that 41 licences have been issued (under the *High Seas Fishing Act 2003*) in 2019 for purse seiners, trawlers, longliner and other vessels. It is very common for flagged fishing vessels to operate in one countries EEZ but then travel to a port in a different country where actual transshipment or fish processing occurs as well as offloading of wastes, resupply and change of crew.

Such fishing vessels are governed under the Act and are also subject to the international and regional regulations applicable to the area of fishing, implemented by Regional Fisheries Management Organizations (RFMOs) such as International Commission for the Conservation of Atlantic Tunas (ICCAT), as well as by bilateral or multilateral agreements for the protection of certain areas or endangered marine species.

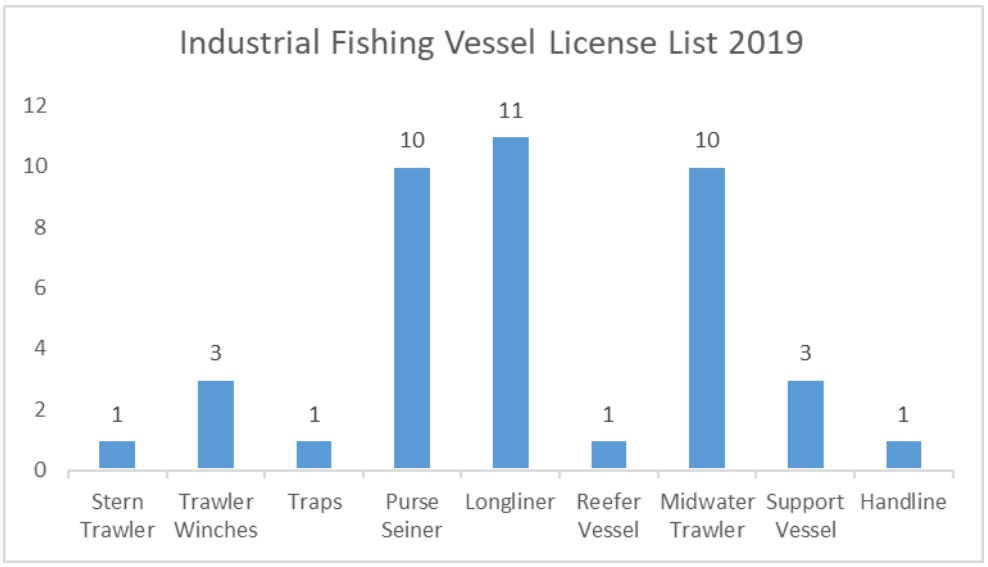


Figure 10: Belize High Seas Fisheries Unit issued licences

(Source: Fishing Licence List 13 May 2019: Gov of Belize. Belize high seas fisheries unit)

For the purposes of this report and in the absence of further data, the numbers and types of fishing vessels licensed under the High Seas Fisheries Unit are considered to be operating within the EEZ boundaries Belize shares with Guatemala, Honduras and Mexico as outlined red highlighted section in Figure 11 below.

International shipping conducting port calls (i.e. commercial vessels, cruise liners, naval vessels), as well as those operating in Belize's Economic Exclusion Zone (EEZ) without landing (i.e. international and Belize-flagged fishing vessels), all contribute to the potential volumes of ship-generated waste produced in Belize's territory.

It is common for flagged fishing vessels to operate in one countries EEZ and to land in another country based on where fish are transshipped or offloaded to a fish processing factory. Given Belize does not conduct either activity in its territories flagged vessels do not actually make many port calls.

The contribution from international shipping conducting port calls and flagged fishing vessels needs to be estimated to enable effective waste management to be undertaken, which has been conducted in the next section.

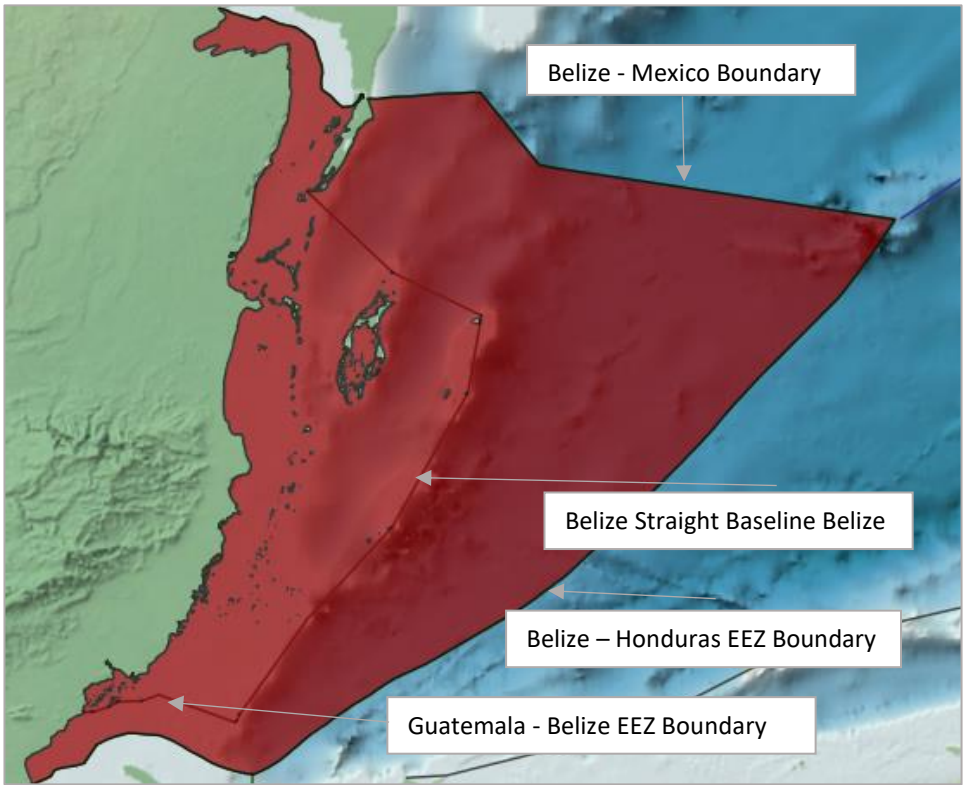


Figure 11: Belize EEZ boundaries (source marineregions.org)

6.4 Estimates of Garbage Generation from Port-of-Call and International Fishing Vessels in Belize Waters

This section considers the types and number of ships at the above-mentioned ports over a 12-month period and a calculation of the total amount of garbage (Annex V), including plastics.

Table 6 below includes a calculation for garbage generated for all port-of-call vessels in Belize. This is based on standard MARPOL methodology detailed in Annex X for different ship types, and estimates a kilogram/person/day rate, numbers of persons on board and average days at sea. This is combined with the number of port calls to generate a volume of waste per vessel per visit.

In addition, three categories of cruise liners are shown below, to relate to three different sizes of vessels and their corresponding passenger numbers. This is based on standard IMO methodology and relates to vessels below 50 tonnes, between 50 to 100 tonnes and above 100 tonnes.

For non-port-of-call flagged fishing vessels, the same IMO methodology has been combined with approaches used in the Pacific by FFA to calculate the number of days on water for purse-seiners and long-liners, with details being provided in Annex section F in place of actual effort data. The method has been used in the absence of comparable Caribbean data assuming internationally average crew numbers and fishing effort are similar for different kinds of flagged vessels.

Table 6: International ship-generated waste – Belize

Vessels	Average number of people on board	Average days at sea prior to port call	Annual visits	Garbage generated (kg/person/day)	Garbage generated per ship visit (kg)	Annual garbage generated (kg)
Tankers	25	3	36	2	150	5,400
Cruise Liners	5000	3	172	3	45000	7,740,000
Cruise Liners	2000	3	151	3	18000	2,718,000
Cruise Liners	1000	3	13	3	9000	117,000
Cargo	25	3	212	2	150	31,800
Pleasure Craft[1]	8	3	171	3	72	12,312
Trawlers[2]	30	28	151*	2	1680	253,680
Longliners[3]	8	14	74*	2	224	16,576
Harbour Craft	6	2	315	1	12	3,780
TOTAL						**10,898,548**

For Tankers, Cruise Liners and Cargo - Period 24/6/2018 to 23/6/2019 - Source Marine Traffic [1] All pleasure craft/yachts included [2] All flagged trawlers/purse seiners operating in Belize EEZ [3] All flagged long liners/other remaining non-trawler fishing vessels operating in Belize EEZ – Source Belize High Fisheries Unit 2019,

** This is based on average of sea days for purse seiners and long liners from the CEFAS CLIP PRF studies in the Solomon Islands (pending further information from Belize High Fisheries Unit*

Table 6 shows that cruise liners overwhelmingly have the greatest potential for garbage generation, with 97% of all potential garbage generated emanating from cruise ships. This represents 10,575

tonnes of garbage potentially being produced in Belizean waters per year. Flagged fishing vessels have the second largest potential, with only 270 tonnes of waste per year or 3%. The potential for garbage to be generated by tankers, cargo vessels, pleasure craft and harbour craft is insignificant in comparison with only 53 tonnes (<1%) per year.

Reporting the total estimate of ship waste generated highlights the total amount of waste that should be accounted for either by landing in Belize, at other ports, or reported as destroyed via ship waste disposal logs. However, with the Belize government not permitting SGW to be landed, the fate of this waste is uncertain. In order to determine the exact destination where this waste is being landed, a well-developed and robust system of auditing ship logs during port calls is required. As per the current system, there is a heavy reliance on the ships doing the 'right thing' once they leave Belizean waters.

6.5 Cruise Line Operations in Belize

Section 6.4 emphasized the importance of cruise liner shipping in the potential production of marine pollution and litter due to the size of the vessels and number of persons onboard in Belize waters.

The Caribbean Cruise ships make up less than 1% of the global merchant fleet but are responsible for 25% of all waste generated by merchant vessels (Butt, 2007). However, there is potential for Belize to produce a larger quantity of waste. This is due to Belize being a popular cruising destination located on the Western Caribbean loop, with a total of 364 scheduled visits in 2019 from 31 cruise ships (261 scheduled visits to Belize City Harbour and 103 visits to Harvest Caye).

In 2018, cruise liners entered Belizean waters on a total of 395 occasions, visiting Belize City Harbour 301 times and Harvest Caye 94 times. These figures are shown in Table 7 and Table 8 below and Figure 12 and Figure 13.

Table 7: Cruise ship schedule 2017, 2018 & 2019: Port of Belize Harbour

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2017	32	33	28	18	14	11	9	14	9	13	22	24	**227**
2018	35	35	32	20	22	19	22	23	15	21	26	30	**300**
2019	41	33	32	23	19	14	18	14	14	10	19	24	**261**

Source: (http://crew-center.com/belize-city-belize-cruise-ship-schedule-2019)

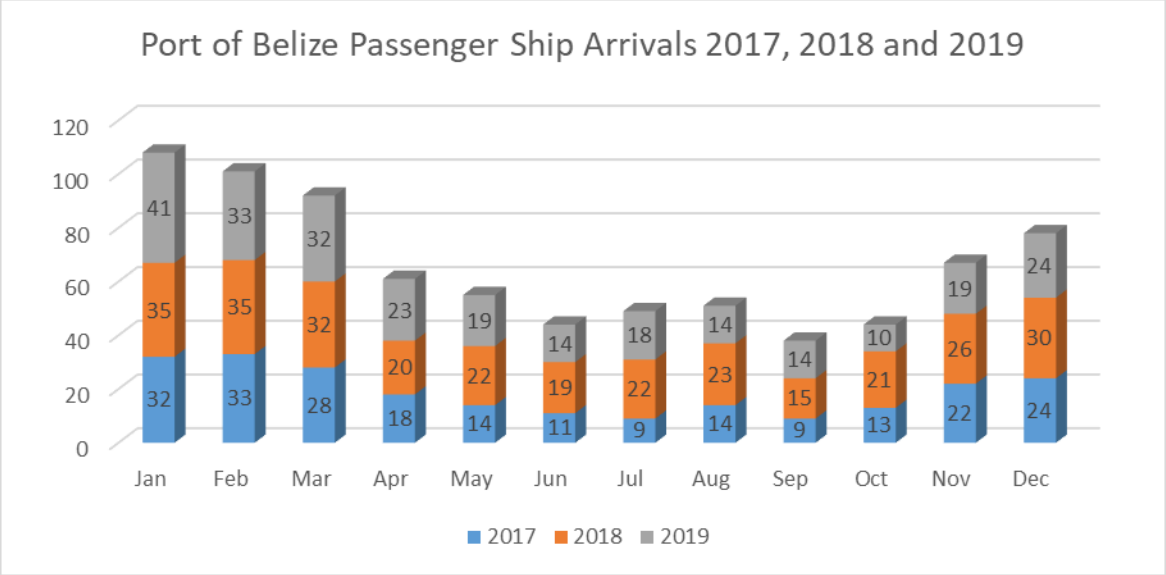


Figure 12: Port of Belize Harbour passenger ship arrivals 2017, 2018, 2019

The three-year trend of cruise liner visits shows a stable pattern of regular visits for the Port of Belize Harbour passenger terminal that peak during the winter periods of year for the northern hemisphere.

Table 8: Cruise ship schedule 2017, 2018 & 2019: Harvest Cay

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2017	12	14	17	12	2	2	2	2	2	2	9	11	**87**
2018	15	13	16	7	2	2	2	3	2	2	11	19	**94**
2019	18	14	13	9	3	2	5	4	2	3	13	17	**103**

Source: (http://crew-center.com/harvest-caye-belize-cruise-ship-schedule-2019)

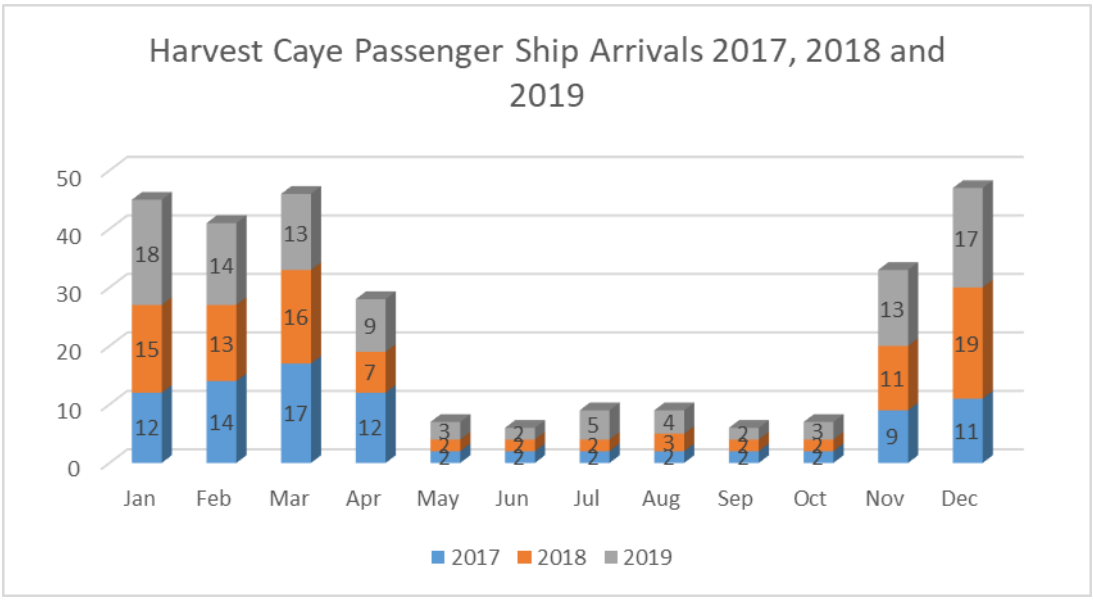


Figure 13: Harvest Caye passenger ship arrivals 2017, 2018, 2019

The three-year trend of cruise liner visits shows a stable pattern of regular visits for the Harvest Caye cruise terminal that peak during the winter periods of year for the northern hemisphere with a gradual increase each year. This illustrates that cruise line traffic is not only stable but an increasing feature of Belize and important to the economy. Therefore, factoring in an effective management system for the waste cruise liners produce in Belize waters is a prudent and necessary step to ensuring marine pollution and marine plastics are minimised.

The dangers in depending on international shipping to correctly manage SGW with no oversight or regulation from the Port State has been highlighted in the recent prosecutions of cruise liners for intentionally polluting in US and Caribbean waters. Both Princess and Carnival Cruise Lines were ordered to pay a $20 million criminal penalty on top of $40 million paid for previous offences. This included deliberately discharging plastic in Bahamian waters from the Carnival Elation and failing to accurately record the illegal discharges, and numerous accounts of failing to segregate plastic and non-food garbage from waste thrown overboard from numerous cruise ships. These incidents highlight that further vigilance and increased development of monitoring and audit systems are warranted.

6.6 Domestic Fishing Vessels

Domestic fishing vessels are essentially unregulated in Belizean waters in relation to marine waste and pollution (including plastics), as MARPOL requirements do not apply to domestic vessels in Belizean waters. No data was found for quantities of ship wastes (including garbage) produced, numbers of passengers on ships nor days vessels are on the water.

But with Fisheries having issued 2,716 fishing licences in 2017 and recorded a domestic fishing fleet in 2016 of 552 vessels (FAO, 2018), there is the potential for considerable nearshore pollution and the development of littering hotspots where concentrated fishing activities may occur. While there is no set methodology for determining the potential garbage generation rate from domestic vessels for illustration purposes, it is possible to consider a reasonable scenario until specific data is gathered.

The World Bank Report 'What a Waste 2' estimates the average quantity of waste produced per person per day in Belize is 0.76 kilograms. When this is multiplied by the number of fishing licences and an estimate of 100 fishing days a year (similar to longline and purse-seiner fishing efforts in Pacific waters[7]) the following quantity of waste is estimated:

0.76kg x 2716 x 100 = 206 tonne per year.

This theoretical estimate would result in domestic fishing vessels producing over 2 tonnes of waste per day and over 200 tonnes in a year, which is approaching the estimates for the high seas fishing fleet.

[7] Based on average effort of fishing vessels in the Pacific waters (Solomon Islands and Vanuatu).

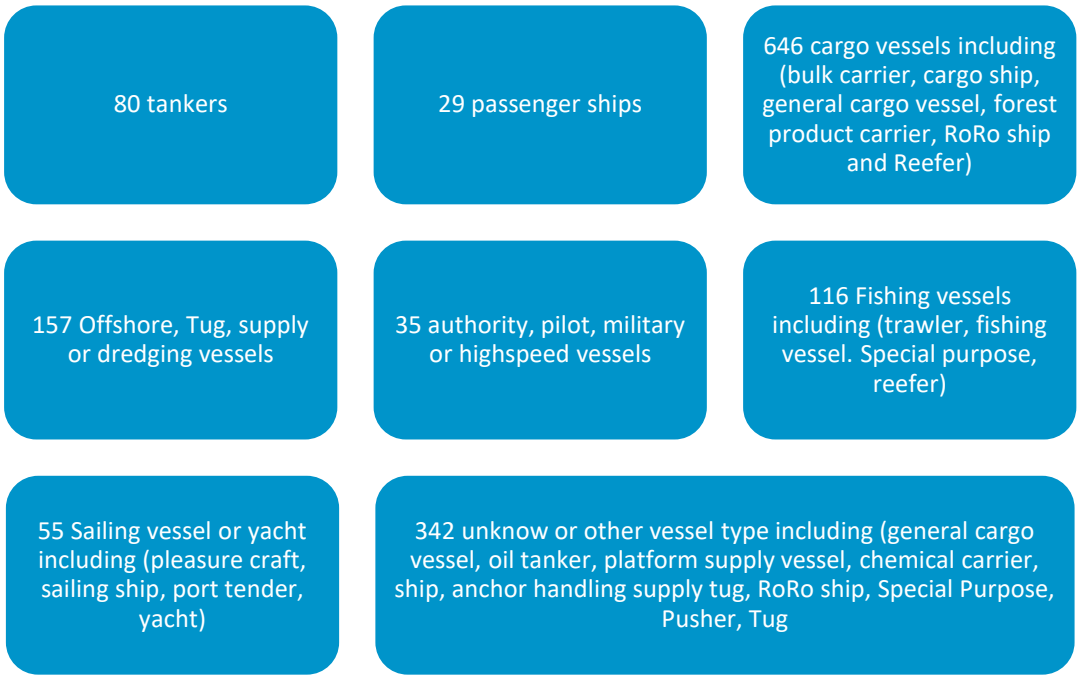
While the actual amount and type of waste produced by domestic fishing needs to be determined, as well as the number of 'sea days' to determine an actual figure, this is potentially a serious source of marine pollution, including plastics, and needs to be taken into account.

Unlike international shipping, domestic fishing waste needs to be managed by Belizean authorities and incorporated into the domestic waste management system with bins and collections points at jetties. In addition, education and outreach programmes should be incorporated and delivered to domestic fishers to increase compliance and a reduction in marine pollution.

6.7 Belize-Flagged Vessels

For the purposes of calculating marine pollution, garbage and plastics SGW, vessels registered under the Belize flag are often irrelevant as they are usually operating on the high seas or in the national waters of other nations (although fishing vessels are sometimes an exception to this). However, it should be considered that just as Belize would expect international vessels not to pollute its waters, it would want vessels that are operating under the Belize flag to do the same in other jurisdictions, especially given that marine pollution, and more specifically marine plastic pollution, is not only a local but a global issue.

Currently Belize has 1,473 registered, flagged vessels, which includes the following categories:



We present this data for the Government of Belize to consider if a comprehensive national plan to deal with wastes from shipping sources is being considered for development.

6.8 Ship-Generated Waste Types

Outlined in the table below are the types of waste ships generate. Ports would need to consider providing an appropriate waste reception facility to manage these types of waste.

Table 9: Waste types generated by ships

Oily wastes	
Description	Oily wastes generated through shipping include oily bilge water, oily residues (sludge), oily tank washings (slops), and some types of operational wastes such as used cooking oil, used lubricants and oily rags.

Drivers	The generation of oily wastes varies and depends on factors such as the size of the ship, engine room design, preventative maintenance, age of the components on the ship, type of engine, the age of the engine, type of fuel burnt, engine running hours per day and (in the case of slops) the number of oil tank cleanings and the type of fuel carried.
Vessels	While the type and volume of oily waste generated varies between vessels, all vessels produce some oily resides (sludge).
Noxious liquid substances (NLS)	
Description	The IMO defines NLS as those which, if discharged into the sea from tank cleaning or de-ballasting operations, are deemed to: present a major hazard to either marine resources or human health (Category X); present a hazard to either marine resources or human health or cause harm to amenities or other legitimate uses of the sea (Category Y); or present a minor hazard to either marine resources or human health (Category Z).
Drivers	Efficiency and methods used in cleaning and offloading cargo.
Vessels	Waste from NLS is only generated through the carriage of chemicals in bulk.
Sewage	
Description	Sewage is defined as drainage and other wastes from any form of toilets and urinals; drainage from medical premises, via wash basins, wash tubs and scuppers located in such premises; drainage from spaces containing living animals; or other waste waters when mixed with the drainages outlined above.
Drivers	Drivers for the generation of sewage include: the number of crew members, passengers or livestock; the type of toilets; the length of voyage; and the type of sewage treatment, comminuting or disinfection facilities on board.
Vessels	All vessels potentially have sewage on board.
Garbage	
Description	Garbage generated on ships includes plastics (contaminated and clean), fishing gear waste, and domestic waste such as paper, cardboard, fluorescent lamps, synthetic material, foils, metal cans, lids, glass, pantry packaging waste, etc.
Drivers	The main drivers are the number of crew and passengers and the types of products used by crew and passengers.
Vessels	All vessels generate garbage. • Cruise ships generate very large amounts of domestic garbage due to the number of persons on board. Cruise ships also generate high volumes of food wastes and food and beverage packaging as well as medical wastes and certain small hazardous items such as batteries, aerosol cans and photo-processing chemicals. • General cargo vessels produce smaller amounts of domestic garbage, but garbage such as dunnage and other cargo-related waste is more significant. • Tankers produce similar volumes of domestic garbage as for general cargo ships. • Fishing vessels generate fishing gear waste such as damaged nets, lines and other fishing gear in addition to domestic garbage.
Ozone-depleting substances (ODS)	
Description	Ozone-depleting substances are used onboard ships in air-conditioning appliances or cooling equipment on reefers. They can also be contained in mobile equipment (fridges, mobile air conditioners).
Drivers	Presence of appliances and technologies that emit ODS.

Vessels	Only vessels equipped with appliances and technologies that emit ODS.

In the context of Belize, it is important to note that there will be some wastes associated with the bulk carriage of noxious liquid substances (NLS) due to the nature of the vessels using the ports. However, all vessels – regardless of their size, purpose or cargo – produce some form of oily waste, sewage and garbage. The volumes of these waste types is highly dependent on the vessel type.

6.9 Shipping Wastes and Marine Litter

Of all ship generated waste types, data related to Annex V waste types (garbage and plastics) has universally proven to be the most unreliable. For example a 2017 study titled 'The Management of Ship-Generated Waste On-board Ships' conducted by independent research and consultancy organisation CE Delft (2017) for the European Maritime Safety Agency compared the estimated and reported quantities of ship waste with the actual waste quantities. The study found that estimated and real quantities were most accurate for MARPOL Annex I waste types (related to oil) and least accurate for MARPOL Annex V waste types (garbage and plastics), with a differential of between 20% and 600%. Such findings are further supported by Western and Central Pacific Fisheries Commission (WCPFC, 2015) garbage reporting, which estimated only 27% of the garbage which should be generated is reported as being landed.

The National Fishing Observers Programme in the Pacific (Generation 6 SPC/FFA Observer GEN-6 Forms 2003–2015) found fishing vessels committed more than 10,000 violations, primarily from purse-seiners but also long-liners (WCPDC, 2015). Plastic discharge constituted 71% of these violations, and 71% of the incidents were from fishing vessels flagged by nations distant from the actual fishing area.

While specific data for the Caribbean was not found, given that the same distant nation fishing fleets with similar craft and similar crews also operate in the Caribbean including Belize waters there are concerns that the same behaviors also exists.

7 Gap Analysis – Port of Belize Harbour

7.1 Overview

The Port of Belize Harbour complex located in Belize City is comprised of the Port of Belize Harbour (the main cargo port), the Cruise Terminal (Fort Street Tourism Village), the Petrol Terminal (Puma Energy Bahamas) and the 'Molasses Port' (Belize Sugar Industries). The greater port complex is the main entry into Belize for international vessels into the country.

Image 6: Port of Belize Harbour Entrance Point

Established in 1978 and later privatised in 2002, the Port of Belize Harbour City is now privately owned, operated, managed and provides port-related services by Port of Belize Limited (PBL). Situated in the commercial district, the Port complex handles various types of cargo, with priority being given to containerised vessels.

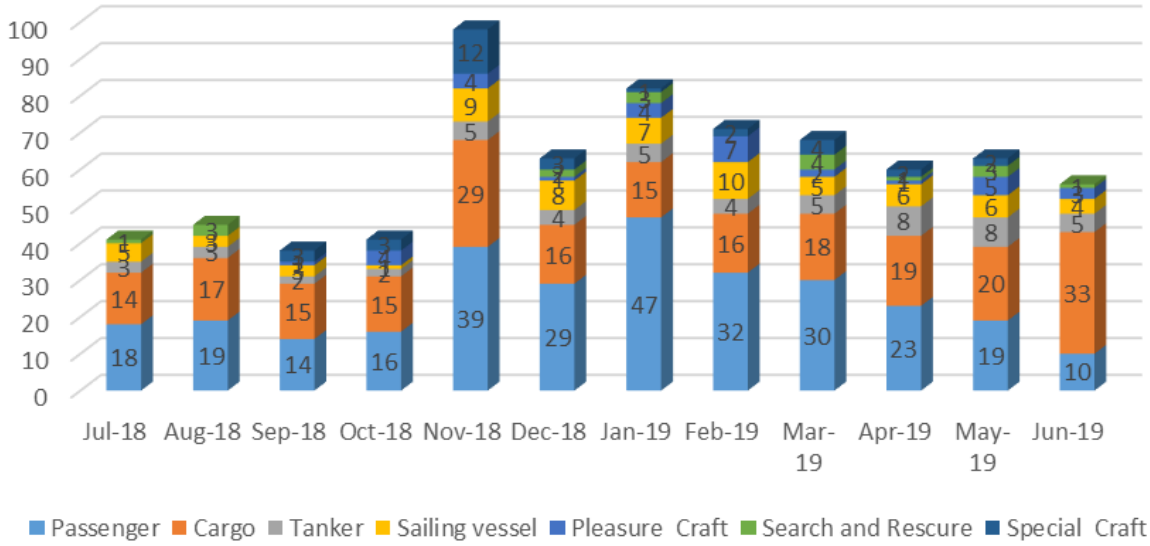


Figure 14: Port of Belize Harbour port data log 2018-2019

In 2018/2019, the Port of Belize Harbour and associated ports and terminals accommodated 648 vessels in total, with an average of 54 vessels per month. Figure 14 depicts the number of vessels received at the port for a twelve-month period from July 2018 to June 2019, by vessel type.

This is similar when compared to other SIDS of comparable size such as Vanuatu which has approximately 630 vessel visits in a 12-month period from 2018 to 2019 but less than the shipping visits made to the Solomon Islands which had 1607 in the 12 months from 2018 to 2019. However, unlike other SIDS Belize is also able to export and import goods via land transport which suggests it is receiving high port of call traffic.

7.2 Summary of Waste Reception Facilities: Port of Belize Harbour

The Port of Belize Harbour does not currently provide reception facilities for garbage and quarantine wastes and has no facilities to support the reception of sewage and used lubricating oil.

Table 10: Summary of waste reception facilities at Port of Belize Harbour

Type of waste	Can waste be received?	Type of reception facility	Any limitations in capacity?	Service provider
Oily	No	N/A	N/A	N/A
Oily tank washings	No	N/A	N/A	N/A
Dirty ballast water	No	N/A	N/A	N/A
Oily bilge water	No	N/A	N/A	N/A
Oil sludges	No	N/A	N/A	N/A
Used lubricating oil	No	N/A	N/A	N/A
Noxious liquid substances	No	N/A	N/A	N/A
Sewage	No	N/A	N/A	N/A
Garbage	Limited	Landfill	No	Private contractor
Quarantine wastes	Limited	Incineration	Yes	BAHA/private contractor

7.3 Assessment for Waste Reception Facilities

This section presents the detailed assessment of each waste type.

7.3.1 Oily wastes

The assessment of waste reception facilities for oily wastes at the Port of Belize Harbour and associated ports (Cruise Terminal, Petrol Terminal, Molasses Port) are detailed in Table 11.

In 2013, Integrated Skills found that waste treatment and processing systems/facilities for dealing with waste oils in Belize were not sufficient and not processed in accordance with best-practice methods. A further study in 2018 to ascertain the feasibility of PRF in Belize further estimated that during 2016, approximately 3,486m^3 per year of oily bilge waters passed through Belize (RAC/REMPEITC, 2018).

The assessment found that the reception of oily waste from international ships is not available at the Port of Belize Harbour and associated ports, nor at any other location in Belize.

Table 11: Assessment of waste reception facilities for oily waste: Port of Belize Harbour

		Yes	No
1	How are the oily wastes disposed of:		
	separation of oil and water, then recycling		X
	land disposal		X
	recycled		X
	incineration		X
	other		X
2	Are there restrictions on receipt or collection of oily wastes by service providers?:	X	
	minimum quantity	N/A	
	maximum quantity	N/A	
	discharge rate (m^3/hour)	N/A	
	vessel type	N/A	
	vehicle access to berth	N/A	
	other	N/A	
3	Are oily waste reception facilities available?:		X
	24 hours a day, 7 days per week	N/A	
	24 hours a day, 5 days per week	N/A	
	Business hours only, 7 days per week	N/A	
	Business hours only, 5 days per week	N/A	
4	Is prior notice for receipt of oily wastes required?:	X	
	0 hours	N/A	
	12 hours	N/A	
	24 hours	N/A	
	48 hours	N/A	
5a	Is the waste receipt service available?:		X
	at no cost	N/A	
	at a cost incorporated into standing port use charge	N/A	
	at a cost charged in addition to other services	N/A	
5b	Is the cost?:		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other (specify)	N/A	
6.	Is a waste collection service available?:		X
	at all berths		X
	at most berths		X
	at only one berth		X
	to vessels anchored within the port		X
	to vessels anchored outside the port		X
	other		X

Based on the assessment conducted, the provision of waste reception facilities for oily waste at the Port of Belize Harbour was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

Given that every ship visiting Belize could be expected to have some oily waste on board, reception facilities for oily wastes are inadequate to the needs of ships using the port. This includes not only the international ships in Belizean waters but also the considerable domestic shipping fleet.

The 2018 RAC REMPEITC report identifies that Under MARPOL Annex I, Belize has an obligation to provide adequate facilities for sludge tank residue at all ports and terminals which handle ships >400 GT (gross tonnage) (RAC REMPEITC, 2018). In addition, oily bilge waters and other residues should also be provided with PRFs.

Belize, in common with other Small Island Developing States (SIDS) can make use of Regional Port Waste Reception facility arrangements rather than providing reception facilities itself. However, given that it has entered no such arrangements in not having a formal regional agreement with other SIDs in place Belize may not be in compliance with certain parts of MARPOLs it has ratified.

Management approaches could be used to address oily wastes from both international and domestic shipping in Belizean waters through expanded EPR schemes or introduction of advanced recycling fees for oil products.

7.3.2 Noxious Liquid Substances (NLS)

The assessment of waste reception facilities for NLS at the Port of Belize Harbour is detailed in Table 12. The assessment found that there are several tankers visiting Belize and therefore current demand for reception of NLS cargo residues.

However, the assessment also found that the reception of NLS waste from international ships is not available at the Port of Belize Harbour and associated ports, nor at any other location in Belize.

Table 12: Assessment of waste reception facilities for NLS: Port of Belize Harbour

		Yes	No
1	Where is the NLS disposed of?:		
	directly from the ship to a mobile facility		X
	ships to a holding tanks prior to being pumped out		X
	other (specify)		X
2	Are there any restrictions on receipt or collection of NLS wastes by service providers?:	X	
	minimum quantity	N/A	
	maximum quantity	N/A	
	discharge rate (m^3/hour)	N/A	
	vessel type	N/A	
	vehicle access to berth	N/A	
3	Are NLS reception facilities available?:		X
	24 hours a day, 7 days per week		X
	24 hours a day, 5 days per week		X
	business hours only, 7 days per week		X
	business hours only, 5 days per week		X
	other (specify)		X
4	Is prior notice for receipt of NLS required?:	X	
	0 hours	N/A	
	12 hours	N/A	

		Yes	No
	24 hours	N/A	
	48 hours	N/A	
5a	Is the waste receipt service available?:		X
	at no cost	N/A	
	at a cost incorporated into standing port use charge	N/A	
	at a cost charged in addition to other services	N/A	
5b	Is the cost?:		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other (specify)	N/A	
6.	Is a waste collection service available?:		X
	at all berths		X
	at most berths		X
	at only one berth		X
	to vessels anchored within the port		X
	to vessels anchored outside the port		X
	other		X

Based on the above, the provision of waste reception facilities for NLS at the port of Port of Belize Harbour was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

Given that chemical tankers visiting Belize could be expected to have some NLS waste on board, reception facilities for NLS is inadequate to the needs of ships using the port.

It should be noted that Belize is, however, not obligated under ratified MARPOL statutes to provide ships with PRFs to offload NLS tank washings of prewash and cargo residues.

7.3.3 Sewage

The assessment of waste reception facilities for sewage at the Port of Belize Harbour is detailed in Table 13. The assessment found that sewage is not accepted from domestic vessels at the Port of Belize Harbour due to the quarantine risk associated with sewage discharge from international vessels.

In 2013, according to the Inter-American Development Bank (IDB), only 11% of the population of Belize City, Belmopan and San Pedro had access to sewage services, with the sewage systems servicing 37,500 consumers and treating approximately 5.7 million litres of sewage per day (IDB, 2013).

In Belize City, treatment is provided by a two-cell facultative lagoon system and the treated effluent is discharged into the Caribbean Sea via canals cut through a mangrove wetland.

Table 13: Assessment of waste reception facilities for sewage: Port of Belize Harbour

		Yes	No
1	Where is the sewage disposed of?		

		Yes	No
	Directly to a reticulated sewerage system		X
	Directly to a mobile facility		X
	Ships to holding tanks then pumped to a mobile facility		X
	Ships to on-site treatment facility to sewerage system		X
	other (specify)		X
2	Are there any restrictions on receipt or collection of sewage wastes by service providers?:	X	
	minimum quantity		X
	maximum quantity		X
	discharge rate (m^3/hour)		X
	vessel type		X
	vehicle access to berth		X
3	Are sewage reception facilities available?:		X
	24 hours a day, 7 days per week		X
	24 hours a day, 5 days per week		X
	business hours only, 7 days per week		X
	business hours only, 5 days per week		X
	other		X
4	Is prior notice for receipt of sewage required?:	X	
	0 hours	N/A	
	12 hours	N/A	
	24 hours	N/A	
	48 hours	N/A	
5a	Is the sewage receipt service available?:		X
	at no cost	N/A	
	at a cost incorporated into standing port use charge	N/A	
	at a cost charged in addition to other services	N/A	
5b	Is the cost?:		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other (specify)	N/A	
6	Is a waste collection service available?:		X
	at all berths	N/A	
	at most berths	N/A	
	at only one berth	N/A	
	to vessels anchored within the port	N/A	
	to vessels anchored outside the port	N/A	
	other	N/A	

Based on the above, the provision of waste reception facilities for sewage at the Port of Belize Harbour was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

As every ship visiting Belize could be expected to have some sewage on board, the lack of reception facilities for sewage from international arrivals leads to an assessment of 'less than satisfactory' for this section. Belize is a port of call for cruise ships and naval vessels, both of which have significant needs for sewage reception, particularly for longer stays in port.

Under MARPOL Annex IV, Belize has an obligation to provide adequate facilities for sewage treatment at all ports and terminals. Through not meeting these requirements or having a formal regional agreement with other SIDs in place Belize may not be in compliance with certain parts of MARPOLs it has ratified.

7.3.4 Garbage Disposal

The assessment of waste reception facilities for garbage disposal at the Port of Belize Harbour is detailed in Table 14. The assessment found that garbage is not accepted from international cruise vessels, cargo vessels and tankers. However, dry garbage is accepted from naval vessels, pleasure craft, yachts and long-stay vessels.

Table 14: Assessment of waste reception facilities for garbage disposal: Port of Belize Harbour

		Yes	No
Garbage disposal – on shore			X
1	Where is the garbage disposed?:		
	Local government dump/landfill	X	
	Private dump/landfill		X
	Transfer station		X
	Materials recycling facility		X
	Don't know		X
2	Where are quarantine wastes disposed?:		
	incinerator	X	
	sterilisation		X
	deep burial		X
	normal landfill	X	
Garbage disposal – ship to shore			
3	Are there any restrictions on receipt or collection of garbage wastes?:	X	
	minimum quantity	N/A	
	maximum quantity	N/A	
	vessel type	X	
	vehicle access to berths	X	
4	Are garbage waste reception facilities available?		X
	24 hours a day, 7 days per week	N/A	
	24 hours a day, 5 days per week	N/A	
	business hours only, 7 days per week	N/A	
	business hours only, 5 days per week	N/A	
	other (specify)	N/A	
5	Is prior notice for receipt of waste required?:	X	
	0 hours		X
	12 hours		X
	24 hours		X
	48 hours	X	

		Yes	No
6a	Is the waste receipt service available?:		X
	at no cost	N/A	
	at a cost incorporated into standing port use charge	N/A	
	at a cost charged in addition to other services	N/A	
6b	Is the cost?:		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other	N/A	
7	Is a waste collection service available?:		X
	at all berths		X
	at most berths		X
	at only one berth		X
	to vessels anchored within the port		X
	to vessels anchored outside the port		X
	other		X

Based on the above, the assessment of the provision of waste reception facilities for garbage disposal at the port of Belize Harbour was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

As every ship visiting Belize could be expected to have some garbage on board, the lack of reception facilities for garbage from international arrivals leads to an assessment of 'less than satisfactory' for this section. Belize is a port of call for cruise ships and naval vessels, both of which have a significant need for garbage reception, particularly for longer stays in port.

Under MARPOL Annex V, Belize has an obligation to provide adequate facilities for garbage treatment at all ports and terminals. Through not meeting these requirements or having a formal regional agreement with other SIDs in place Belize may not be in compliance with certain parts of MARPOLs it has ratified.

BAHA and the Belize Port Authority have both advised that some exceptions are permitted pertaining to wet garbage, which may be discharged in Belize if the vessel remains in port for extended periods (three-plus days) or in the case of the malfunction of onboard incinerators, which would compromise the safe storage as well as SGW from small visiting pleasure craft and naval vessels.

7.3.5 Waste Management System

The assessment of the waste management system at the Port of Belize Harbour is detailed in Table 15. The assessment found that a waste management plan has not been developed specifically for waste from ships nor has there been any attempt to integrate it into the national land-based management of solid wastes.

Table 15: Assessment of waste management system: Port of Belize Harbour

		Yes	No
1	Has a waste management plan (WMP) been developed and implemented for ship wastes?		X
2	Is the WMP part of an overall environmental management system (EMS) for the port?		X
3	Are marinas and fishing harbours covered by the port EMS or required to develop their own EMS?		X
4	Does the WMP provide a brief summary of the types of wastes received and the collection and disposal facilities/services?		X
5	Does the WMP address and provide management objectives for?:		X
6	Operations:		X
	Facility management		X
	Maintenance		X
	Signage		X
	Infrastructure		X
	Contractual arrangements		X
	Emergency response		X
	Seasonal variations		X
	Training and education		X
	Delegation of responsibilities and accountability		X
	Compliance with regulatory conditions, including auditing		X
7	Technical standards:		X
	Facility requirements		X
	Incorporation of new technologies		X
	Cleaning requirements		X
	Maintenance of equipment to technical standards		X
8	Environmental considerations:		X
	Prevention of pollution to surface waters		X
	Noise emissions		X
	Visual impacts		X
	Odour emissions		X
	Special considerations due to surrounding environment (e.g. proximity to wetland or mangrove areas)		X
	Coastal processes (e.g. extreme tides)		X
9	Plans for future expansion/upgrades:		X
	Oily wastes		X
	Noxious liquid substances (NLS)		X
	Sewage		X
	Garbage		X
	Recycling of wastes		X
	Quarantine wastes		X
10	Are contact details held for all waste service providers?		X
11	Are the service providers licensed/approved as required by legislation?		X
12	Are a copy of the licences on file?		X
13	Are a copy of the licences for the waste disposal facilities used by the service providers held on file?		X
14	Have receipts for waste disposal been sighted/copies held on file?		X
15	Are alternative waste service providers or disposal facilities available (e.g. spare drums, waste oil recyclers)?		X
16	Is there a procedure for choosing waste disposal service providers (e.g. list of preferred contractors)?		X

		Yes	No
17	Are the details of back-up facilities available on file?		X
18	Does the WMP include an emergency response plan?		X
19	Is the plan adequate in that it addresses at least the following issues?		X
	spillage of liquid		X
	spillage of solids		X
	leakage of gas		X
	fire or explosion		X
	emergency contacts		X
	other (specify)		X
20	Is information recorded on the quantities of each waste stream received, date of receipt, disposal contractor and method of disposal or treatment? (Data sighted/copies attached)		X
	Oily wastes		X
	Noxious liquid substances		X
	Sewage		X
	Garbage		X
	Recycling of wastes		X
	Quarantine wastes		X
21	Are there variations in the quantities of each waste stream received?:	unknown	
	in any one month (e.g. due to shipping variations)	unknown	
	in any one year (e.g. due to seasonal effects)	unknown	
	over a number of years (e.g. due to industry growth)	unknown	
	don't know	unknown	
22	Is this information analysed on an on-going basis to detect changes in usage (both short-term season variations and long-term growth or reductions) and assist in formulating future plans? (Graphs sighted)		X
23	Is on-going consideration given to changes in demand for waste reception facilities?		X
24	Do plans exist for future upgrades, extensions or reductions to the waste reception facilities?		X
25	Is there an on-going process for reviewing existing facilities and determining changes that may be required to meet adequacy, timing or waste generation demands?		X
26	Are there provisions for audits against the WMP, at least within two (2) years of implementation and thereafter every three (3) years?		X
27	Is there provision for periodic review of the WMP?		X
28	Are the relevant requirements of the MARPOL 73/78, UNCLOS and IMO generally adhered to by the users of the port?		X
29	Is there information on the state and local regulations regarding (please list legislation if known)?:	X	
	Waste management		X
	Pollution of water		X
	Pollution of air		X
	Noise emissions		X
	Discharges to sewer		X
	Storage of dangerous goods		X
30	Is there information on waste minimisation hierarchy i.e. avoid/reduce/reuse/recycle/reprocess?		X
31	Is an open and co-operative relationship maintained between the port authority and the relevant authorities and agents?	X	
32	Are there channels of communication and consultation with relevant organisations to ensure that particular changes in demand are considered in providing waste reception facilities? (Give examples of consultation methods)		X

		Yes	No
33	Do training programmes for port employees (both of the port authority and users) include a section on waste management and the facilities provided at the port?		X
34	Is there a section in the WMP or a separate document which is included in agreements with port users and specifies requirements for the usage of port waste reception facilities?		X
35	Is clear and visible signage for waste reception facilities present and includes?:		X
	advice at initial vessel contact point of waste reception facilities:		X
	direction to receptacle or disposal point location:		X
	labelling of all receptacles and disposal points:		X
	contact numbers:		X
	emergency procedures:		X
	translation into other languages as required:		X
36	Are there information sheets/leaflets available for each waste reception facility?		X
37	Is this information conveyed to ships?		X

Based on the above, the provision of the waste management systems at The Port of Belize Harbour was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully compliant

Currently, the issue of ship-generated waste from either international or domestic vessels has not been integrated into the plans, policies and processes for land-generated wastes. This may be due to the Belize policy of not accepting SGW from the majority of vessels. If this was to be developed, the Port Authority would be the appropriate agency to originate a port waste management plan in concert with other relevant stakeholders with the primary parties listed above.

7.4 Demand for Waste Reception Facilities

In 2018, a Port Facilities research report conducted by RAC REMPEITC was unable to ascertain the true demands for port reception facilities in Belize because 'accurate records for SGW received and disposed are widely not available by government maritime or port authorities' (RAC REMPEITC, 2018).

Regional stakeholders at a RAC REMPEITC workshop indicated that numerous requests to offload SGW are made by ship officials to their agents, who in turn inquire with the port officials. Such requests are never approved, however. In addition, between August 2015 and March 2016, the Belize Port Authority carried out a questionnaire exercise to ascertain the need for PRF of SGW and cargo residue by vessels which call at Belize's harbours and ports.

The data captured through this exercise outlined that:

- 36 IMP-registered vessels participated;
- Of the 36 respondents, 7 vessels requested for adequate disposal of waste or the need for Belize to have reception facilities for SGW and cargo residues for as follows –
    - 3 requests for disposal of Annex 1 (oily waste/residue/sludge) waste only;
    - 1 request for disposal of Annex 4 (sewage) waste; and

- 3 requests for Annex 1 and Annex V waste.

However, ship owners, agents and waste companies have consistently stated that if permitted, they would dispose of general waste (including plastic), sludge, oily water and rags and other shipping wastes as stated to the APWC CLiP team during the field survey. APWC found this situation continues to exist in 2019 though the demand for waste reception facilities for international shipping at The Port of Belize Harbour complex would be expected to be considerable, with more than 600 international vessels making port calls in 2018/2019 and all producing various SGW during their time in Belizean waters.

Interviews by APWC with shipping agents and private waste contractors indicated there is an interest to dispose of oily waste, sewage and garbage though this is not expected due to the current Belize position not to accept such ship-generated waste. This position was the result of Belize's concern of potentially becoming a dumping ground for international waste arriving from ships. The exception to this is the acceptance mostly of 'dry garbage', mostly from visiting naval vessels, long-stay vessels, pleasure craft and yachts.

Instead, the SGW generated by international shipping while in the Port of Belize Harbour must be retained on board the vessel until it can be disposed of in another port state such as Mexico, the USA and potentially at other international ports.

The lack of formal arrangements between Belize and other port states, either bilaterally or through the special provisions under IMO for SIDS to enter into regional arrangements, affects the ability effectiveness in accounting for waste and preventing leakage into the environment.

8 Gap Analysis – Port of Big Creek

8.1 Overview

The Port of Big Creek was established in 1990 to facilitate the export of bananas. It is a deepwater port located in the Toledo District, southern Belize. Owned and managed by Banana Enterprises Limited (BEL), the port itself is located 2.5 kilometres inland from the entrance of Big Creek and is considered

a strategic alternative for transshipment through Guatemala.

Image 7: Port of Big Creek entry point

As Belize's first privately owned and second largest port, it was the first port to allow vessels to dock alongside the mainland and today receives mostly dry-cargo vessels. The port is used heavily by the agricultural trade, more specifically the banana, citrus and sugar industries. Shrimp and crude oil are also exported from Big Creek. Approximately 60 stevedores are employed.

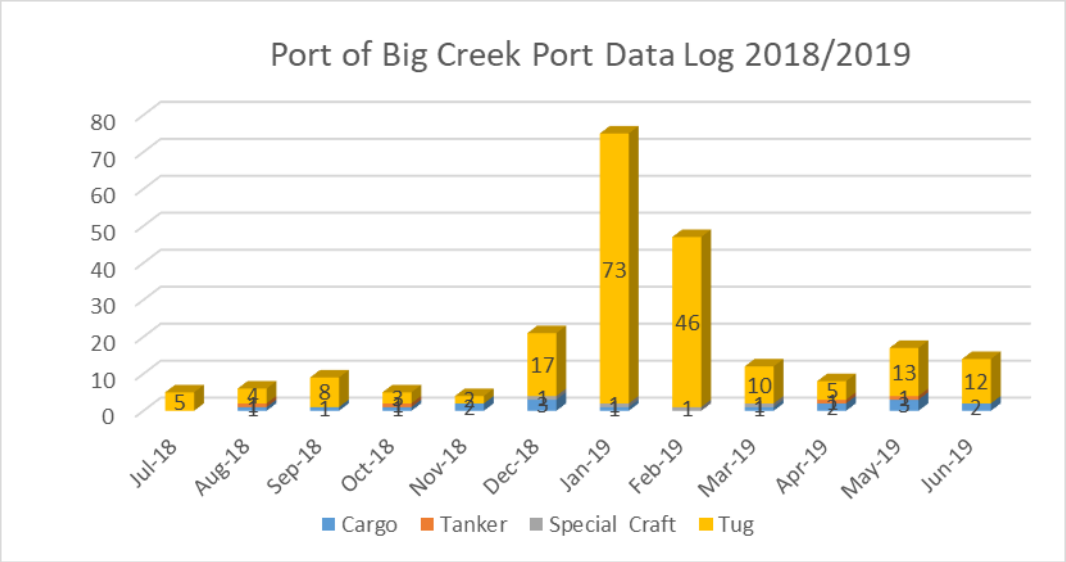


Figure 15: Port of Big Creek Port Data Log July 2018 – June 2019

8.2 Summary of Waste Reception Facilities: Port of Big Creek

The Port of Big Creek is generally without port reception facilities except for the very limited collection of dry garbage, as previously reported for the Port of Belize Harbour. The summary of waste reception facilities at the Port of Big Creek is outlined in Table 16.

Table 16: Summary of waste reception facilities: Port of Big Creek

Type of waste	Can waste be received?	Type of reception facility	Any limitations in capacity?	Service provider
Oily	No	N/A	N/A	N/A
Oily tank washings	No	N/A	N/A	N/A
Dirty ballast water	No	N/A	N/A	N/A
Oily bilge water	No	N/A	N/A	N/A
Oil sludges	No	N/A	N/A	N/A
Used lubricating oil	No	N/A	N/A	N/A
Noxious liquid substances	No	N/A	N/A	N/A
Sewage	No	N/A	N/A	N/A
Garbage	limited	Landfill	No	Private contractor
Quarantine wastes	limited	Incineration	Yes	BAHA/private contractor

8.3 Assessment of Waste Reception Facilities

This section presents the detailed assessment forms for each waste type.

8.3.1 Oily wastes

The assessment of waste reception facilities for oily wastes at the Port of Big Creek is detailed in Table 17.

In 2013, Integrated Skills found that waste treatment and processing systems/facilities for dealing with waste oils in Belize were not sufficient and not processed in accordance with best-practice methods. A further study in 2016 to ascertain the feasibility of PRF in Belize, further estimated that during 2016, approximately 3,489 m^3 per year of oily bilge waters passed through Belize.

The assessment found that the reception of oily waste from international ships is not available at the Port of Big Creek, nor at any other location in Belize.

Table 17: Assessment of waste reception facilities for oily waste: Port of Big Creek

		Yes	No
1	How are the oily wastes disposed of?:		
	separation of oil and water then recycling		X
	land disposal		X
	recycled		X
	incineration		X
	other		X
2	Are there restrictions on receipt or collection of oily wastes by service providers?:	X	

		Yes	No
	minimum quantity	X	
	maximum quantity	X	
	discharge rate (m^3/hour)	X	
	vessel type	X	
	vehicle access to berth	X	
	other	X	
3	Are oily waste reception facilities available?:		X
	24 hours a day, 7 days per week		X
	24 hours a day, 5 days per week		X
	Business hours only, 7 days per week		X
	Business hours only, 5 days per week		X
4	Is prior notice for receipt of oily wastes required?:	X	
	0 hours	N/A	
	12 hours	N/A	
	24 hours	N/A	
	48 hours	N/A	
5a	Is the waste receipt service available?:		X
	at no cost		X
	at a cost incorporated into standing port use charge		X
	at a cost charged in addition to other services		X
5b	Is the cost?		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other (specify)	N/A	
6.	Is a waste collection service available?:		X
	at all berths		X
	at most berths		X
	at only one berth		X
	to vessels anchored within the port		X
	to vessels anchored outside the port		X
	other		X

Based on the assessment conducted, the provision of waste reception facilities for oily waste at the Port of Big Creek was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

Given that every ship visiting Belize could be expected to have some oily waste on board, reception facilities for oily wastes are inadequate to the needs of ships using the port. This includes not only the international ships in Belizean waters but also the considerable domestic shipping fleet.

Under MARPOL Annex I, Belize has an obligation to provide adequate facilities for sludge tank residue at all ports and terminals which handle ships >400 GT (gross tonnage). In addition, oily bilge waters and other residues should also be provided with PRFs. Through not meeting these requirements or having a formal regional agreement with other SIDs in place Belize may not be in compliance with certain parts of MARPOLs it has ratified.

Management approaches could be used to address oily wastes from both international and domestic shipping in Belizean waters through expanded EPR schemes or introduction of advanced recycling fees for oil products.

8.3.2 Noxious Liquid Substances (NLS)

The assessment of waste reception facilities for NLS at the Port of Big Creek is detailed in Table 18. The assessment found that there are a number of tankers visiting Belize and therefore a current demand for the reception of NLS cargo residues.

However, the assessment found that the reception of NLS waste from international ships is not available at the Port of Big Creek, nor at any other location in Belize.

Table 18: Assessment of waste reception facilities for NLS: Port of Big Creek

		Yes	No
1	Where is the NLS disposed of?:		X
	directly from the ship to a mobile facility		X
	ships to a holding tanks prior to being pumped out		X
	other (specify)		X
2	Are there any restrictions on receipt or collection of NLS wastes by service providers?:	X	
	minimum quantity	X	
	maximum quantity	X	
	discharge rate (m^3/hour)	X	
	vessel type	X	
	vehicle access to berth	X	
3	Are NLS reception facilities available?:		X
	24 hours a day, 7 days per week		X
	24 hours a day, 5 days per week		X
	business hours only, 7 days per week		X
	business hours only, 5 days per week		X
	other (specify)		X
4	Is prior notice for receipt of NLS required?:	N/A	
	0 hours	N/A	
	12 hours	N/A	
	24 hours	N/A	
	48 hours	N/A	
5a	Is the waste receipt service available?:		X
	at no cost		X
	at a cost incorporated into standing port use charge		X
	at a cost charged in addition to other services		X
5b	Is the cost?:		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other (specify)	N/A	
6.	Is a waste collection service available?:		X
	at all berths		X
	at most berths		X
	at only one berth		X
	to vessels anchored within the port		X

		Yes	No
	to vessels anchored outside the port		X
	other		X

Based on the above, the provision of waste reception facilities for NLS at the Port of Big Creek was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

Given that chemical tankers visiting Belize could be expected to have some NLS waste on board, reception facilities for oily wastes are inadequate to the needs of ships using the port.

It should be noted that Belize is, however, not obligated under its ratified MARPOL statutes to provide ships with PRFs to offload NLS tank washings of prewash and cargo residues.

8.3.3 Sewage

The assessment of waste reception facilities for sewage at the Port of Big Creek is detailed in Table 19.

Table 19: Assessment of waste reception facilities for sewage: Port of Big Creek

		Yes	No
1	Where is the sewage disposed of?:		X
	Directly to a reticulated sewerage system		X
	Directly to a mobile facility		X
	Ships to holding tanks then pumped to a mobile facility		X
	Ships to on-site treatment facility to sewerage system		X
	other (specify)		X
2	Are there any restrictions on receipt or collection of sewage wastes by service providers?:	X	
	minimum quantity	X	
	maximum quantity	X	
	discharge rate (m^3/hour)	X	
	vessel type	X	
	vehicle access to berth	X	
3	Are sewage reception facilities available?:		X
	24 hours a day, 7 days per week		X
	24 hours a day, 5 days per week		X
	business hours only, 7 days per week		X
	business hours only, 5 days per week		X
	other		X
4	Is prior notice for receipt of sewage required?:	X	
	0 hours		X
	12 hours		X
	24 hours		X
	48 hours		X
5a	Is the sewage receipt service available?:		X
	at no cost		X
	at a cost incorporated into standing port use charge		X

		Yes	No
	at a cost charged in addition to other services		X
5b	Is the cost?:		
	reasonable in terms of service	N/A	
	a disincentive	N/A	
	other (specify)	N/A	
6.	Is a waste collection service available?:		X
	at all berths		X
	at most berths		X
	at only one berth		X
	to vessels anchored within the port		X
	to vessels anchored outside the port		X
	other		X

Based on the above, the provision of waste reception facilities for sewage at the Port of Big Creek was found to be:

1	**Less than satisfactory**	2	Satisfactory	3	Fully meets requirements

8.3.4 Garbage Disposal

The assessment of waste reception facilities for garbage disposal at the Port of Big Creek is detailed in Table 20. The assessment found that garbage is not accepted from international cruise vessels, cargo vessels and tankers. However, dry garbage is accepted from naval vessels, pleasure craft, yachts and long-stay vessels.

Table 20: Assessment of waste reception facilities for garbage disposal: Port of Big Creek

		Yes	No
Garbage disposal – on shore			X
1	Where is the garbage disposed of?:		
	Local government dump/landfill	X	
	Private dump/landfill		X
	Transfer station		X
	Materials recycling facility		X
	Don't know		X
2	Where are quarantine wastes disposed of?:		
	Incinerator	X	
	Sterilisation		X
	Deep burial		X
	Normal landfill	X	
Garbage disposal – ship to shore			
3	Are there any restrictions on receipt or collection of garbage wastes?:	Yes	
	Minimum quantity		X
	Maximum quantity		X
	Vessel type	X	
	Vehicle access to berths	X	
4	Are garbage waste reception facilities available?:		
	24 hours a day, 7 days per week		X

		Yes	No
	24 hours a day, 5 days per week		X
	business hours only, 7 days per week		X
	business hours only, 5 days per week		X
	other (specify)	X	
5	Is prior notice for receipt of waste required?:		
	0 hours		X
	12 hours		X
	24 hours		X
	48 hours	X	
6a	Is the waste receipt service available?:		
	At no cost		X
	At a cost incorporated into standing port use charge		X
	At a cost charged in addition to other services	X	
6b	Is the cost?:		
	Reasonable in terms of service	X	
	A disincentive		X
	Other	X	
7	Is a waste collection service available?:		
	At all berths		
	At most berths		
	At only one berth		
	To vessels anchored within the port		
	To vessels anchored outside the port		
	Other	X	

Based on the above, the provision of waste reception facilities for garbage disposal at the Port of Big Creek was found to be:

1	**Less Than Satisfactory**	2	Satisfactory	3	Fully meets requirements

As every ship visiting Belize could be expected to have some garbage on board, the lack of reception facilities for garbage from international arrivals leads to an assessment of 'less than satisfactory' for this section. Belize is a port of call for cruise ships and naval vessels, both of which have significant requirements for garbage reception, particularly for longer stays in port.

Under MARPOL Annex V, Belize has an obligation to provide adequate facilities for garbage treatment at all ports and terminals. Through not meeting these requirements or having a formal regional agreement with other SIDs in place Belize may not be in compliance with certain parts of MARPOLs it has ratified.

BAHA and the Belize Port Authority have both advised that some exceptions are permitted, with wet garbage authorised to be discharged in Belize if the vessel remained in port for extended periods (three-plus days) or in the case of the malfunction of onboard incinerators, which would compromise the safe storage as well as SGW from small visiting pleasure craft and naval vessels.

8.3.5 Waste Management System

The assessment of the waste management system at the Port of Big Creek is detailed below. The assessment found that a waste management plan has not been developed specifically for waste from ships nor has there been any attempt to integrate it into the national land-based management of solid wastes.

Table 21: Assessment of waste management system: Port of Big Creek

		Yes	No
1	Has a waste management plan (WMP) been developed and implemented for ship wastes?		X
2	Is the waste management plan part of an overall environmental management system (EMS) for the port?		X
3	Are marinas and fishing harbours covered by the port EMS or required to develop their own EMS?		X
4	Does the WMP provide a brief summary of the types of wastes received and the collection and disposal facilities/services?		X
5	Does the WMP address and provide management objectives for:		X
6	Operations:		X
	Facility management		X
	Maintenance		X
	Signage		X
	Infrastructure		X
	Contractual arrangements		X
	Emergency response		X
	Seasonal variations		X
	Training and education		X
	Delegation of responsibilities and accountability		X
	Compliance with regulatory conditions, including auditing		X
7	Technical standards:		X
	Facility requirements		X
	Incorporation of new technologies		X
	Cleaning requirements		X
	Maintenance of equipment to technical standards		X
8	Environmental considerations:		X
	Prevention of pollution to surface waters		X
	Noise emissions		X
	Visual impacts		X
	Odour emissions		X
	Special considerations due to surrounding environment (e.g. proximity to wetland or mangrove areas)		X
	Coastal processes (e.g. extreme tides)		X
9	Plans for future expansion/upgrades:		X
	Oily wastes		X
	Noxious liquid substances		X
	Sewage		X
	Garbage		X
	Recycling of wastes		X
	Quarantine wastes		X
10	Are contact details held for all waste service providers?		X
11	Are the service providers licensed/approved as required by legislation?		X
12	Are a copy of the licences on file?		X

		Yes	No
13	Are a copy of the licences for the waste disposal facilities used by the service providers held on file?		X
14	Have receipts for waste disposal been sighted/copies held on file?		X
15	Are alternative waste service providers or disposal facilities available (e.g. spare drums, waste oil recyclers)?		X
16	Is there a procedure for choosing waste disposal service providers (e.g. list of preferred contractors)?		X
17	Are the details of back-up facilities available on file?		X
18	Does the WMP include an emergency response plan?		X
19	Is the plan adequate in that it addresses at least the following issues?		X
	spillage of liquid		X
	spillage of solids		X
	leakage of gas		X
	fire or explosion		X
	emergency contacts		X
	other (specify)		X
20	Is information recorded on the quantities of each waste stream which are received, date of receipt, disposal contractor and method of disposal or treatment? (Data sighted/copies attached)		X
	Oily wastes		X
	Noxious liquid substances		X
	Sewage		X
	Garbage		X
	Recycling of wastes		X
	Quarantine wastes		X
21	Are there variations in the quantities of each waste stream received?		X
	in any one month (e.g. due to shipping variations)		X
	in any one year (e.g. due to seasonal effects)		X
	over a number of years (e.g. due to industry growth)		X
	don't know		X
22	Is this information analysed on an on-going basis to detect changes in usage (both short-term season variations and long-term growth or reductions) and assist in formulating future plans? (Graphs sighted)		X
23	Is on-going consideration given to changes in demand for waste reception facilities?		X
24	Do plans exist for future upgrades, extensions or reductions to the waste reception facilities?		X
25	Is there an on-going process for reviewing existing facilities and determining changes that may be required to meet adequacy, timing or waste generation demands?		X
26	Are there provisions for audits against the WMP, at least within two (2) years of implementation and thereafter every three (3) years?		X
27	Is there provision for periodic review of the WMP?		X
28	Are the relevant requirements of the MARPOL 73/78, UNCLOS and IMO generally adhered to by the users of the port?		X
29	Is there information on the state and local regulations regarding (please list legislation if known):		X
	Waste management		X
	Pollution of water		X
	Pollution of air		X
	Noise emissions		X
	Discharges to sewer		X

		Yes	No
	Storage of dangerous goods		X
30	Is there information on waste minimisation hierarchy i.e. avoid/reduce/reuse/recycle/reprocess?		X
31	Is an open and co-operative relationship maintained between the port authority and the relevant authorities and agents?		X
32	Are there channels of communication and consultation with relevant organisations to ensure that particular changes in demand are considered in providing waste reception facilities? (Give examples of consultation methods)		X
33	Do training programmes for port employees (both of the port authority and users) include a section on waste management and the facilities provided at the port?		X
34	Is there a section in the WMP or a separate document which is included in agreements with port users and specifies requirements for the usage of port waste reception facilities?		X
35	Is clear and visible signage for waste reception facilities present and includes:		X
	advice at initial vessel contact point of waste reception facilities:		X
	direction to receptacle or disposal point location:		X
	labelling of all receptacles and disposal points:		X
	contact numbers:		X
	emergency procedures:		X
	translation into other languages as required:		X
36	Are there information sheets/leaflets available for each waste reception facility?		X
37	Is this information conveyed to ships?		X

Based on the above, the waste management system at the Port of Big Creek was assessed as being:

1	**Less Than Satisfactory**	2	Satisfactory	3	Fully compliant

The issue of ship-generated waste from either international or domestic vessels has currently not been integrated into the plans, policies and processes for land-generated wastes.

This may be due to Belize's policy of not accepting SGW from the majority of vessels.

The Belize Port Authority would be the appropriate agency to develop a port waste management plan in conjunction other relevant stakeholders.

8.4 Demand for Waste Reception Facilities

In 2018, a Port Facilities research report conducted by RAC REMPEITC was unable to ascertain the true demands for port reception facilities in Belize because 'accurate records for SGW received and disposed are widely not available by government maritime or port authorities' (RAC REMPEITC, 2018) which has been reconfirmed by the APWC review.

Regional stakeholders at a RAC REMPEITC workshop indicated that numerous requests to offload SGW are made by ship officials to their agents, who in turn inquire with the port officials. Such requests are rarely approved.

As indicated in Section 7.4 Interviews by APWC with shipping agents and private waste contractors indicated the interest in disposing of oily waste, sewage and garbage though this is not expected due to the current Belize position not to accept such ship-generated waste.

Instead, the SGW generated by international shipping while in the Port of Big Harbour must be retained on board the vessel until it can be disposed of in another port states such as Mexico, the USA and potentially at other international ports.

The lack of formal arrangements between Belize and other port states, either bilaterally or through the special provisions under IMO for SIDS to enter into regional arrangements, affects the ability effectiveness in accounting for waste and preventing leakage into the environment.

9 Recommendations

9.1 Summary of waste reception assessments

The table below provides a summary of waste reception provisions at the Port of Belize Harbour and Port of Big Creek. Both ports received an assessment of 'unsatisfactory' overall.

Table 22: Summary of waste reception assessments for the Port of Belize Harbour and Port of Big Creek

Waste type	Port of Belize Harbour	Port of Big Creek
Annex I (Oily waste)	Not Available	Not Available
Annex II (NLS)	Not Available	Not Available
Annex IV (Sewage)	Not Available	Not Available
Garbage disposal	Limited[1]	Limited[1]
Noxious Liquid Substances (NLS)	Not Available	Not Available
Port Waste Management System	Not Available	Not Available
Overall	**Unsatisfactory**	**Unsatisfactory**

1– By unofficial government policy Annex V is not accepted, though with exceptions made for specific vessels such as naval vessels, long-stay vessels, etc.

9.2 Key findings

Cruise Liners generate the most shipping waste in Belize waters but disposal is 'elsewhere' (United States of America, Mexico).

Regulatory systems need strengthening to move from trusting that International shipping 'does the right thing' to verifying it.

Belize is not meeting MARPOL obligations for SGW generated in the Belize EEZ (Annex I and Annex V). This may contribute to waste dumping.

Belize depends on other port states to manage SGW generated in Belizean EEZ with no agreements in place.

Infrastructure for SGW (Annex V) exists in Belize (landfills/incinerators) and is capable to receive treated garbage and quarantine waste from ships but is not utilised.

There is need to build a larger incinerator network or enter formerly into regional port reception facility arrangements

Better auditing of waste from all shipping sources is needed to understand impacts and plan effective management.

Waste from domestic shipping waste (fishing, touristic)is not managed and can be integrated with land based waste management.

9.3 Key challenges

Willingness of shipping entities to share data and permit waste auditing.

Developing monitoring to show cause and effect or improvement from baseline to improved ship waste management.

Resources and expertise to undertake ship waste regulatory and audit actions.

Enabling government, donor, private sector engagement to improve Belize ship waste management.

Resources to develop national and regional frameworks for ship waste management.

Developing education and awareness on ship waste issues across the sector, both international and domestic.

9.4 Recommendations

Each recommendation is discussed in detail below.

9.4.1 Develop a National Port Reception Facility Waste Management Plan and related waste management frameworks

It is recommended that a National Port and Shipping Waste Management Plan is developed that secures resources, defines roles and responsibilities, assigns tasks, sets standards and time lines, includes a monitoring and evaluation framework and develops an interface for communication and co-ordination between stakeholders.

It should integrate all the requirements for port and shipping wastes to ensure that Belize meets its obligations under international, national and local laws. It can also help highlight where human resource and capability gaps exist so that responses can be made to address these, matched to processes and time lines.

It is also recommended that the plan is expanded to include both international and domestic shipping. It is strongly recommended the plan is integrated into the current and any future national solid waste management strategies and plans as a specific component.

9.4.2 Better regulatory oversight and reporting of international shipping to ensure waste is lawfully managed

It is recommended that a monitoring and audit plan with an increased focus on conducting ship waste audits on international vessels in Belizean waters be developed. It should target those types of vessels that are most likely to pollute or which will cause the most harm if they do so. This could be modelled on similar increased sea- and land-based audits recently mandated in the United States following illegal pollution by shipping in those waters. It should seek to make use of coast guard resources.

This should be linked to environmental audits and reporting of any dumping hotspots using reporting by international and domestic shipping to the ports or other authorities, and capitalising on relevant civilians, community groups and others to assist in reporting such events. Environmental monitoring capabilities, such as those recently augmented by the CLiP project, should also be used.

9.4.3 Improved national capability to manage shipping wastes by improved government/private sector engagement

It should be recognised that Belize has both an obligation (under MARPOL) and a capability (for solid waste) to dispose of certain types of SGW (some Annex I and Annex V). Belize is in a better position than most other Caribbean SIDS to accept some SGW due to the availability of land, the sources now available to develop waste infrastructure (IDB) and the interests and experience of the private sector to deal with quarantine type waste (i.e. HCW collection/incineration in Belize City).

By not providing such services, SGW generated in Belize waters by activities that could benefit the economy is transferred to other port states. In addition, the risk that vessels may pollute in Belize waters by holding onto SGW may also be increased due to storage capability, inconvenience and cost. There are existing mechanisms in place to indirectly charge shipping for SGW management, which then is used to develop shipping service industries that both assist international shipping, can be utilised by domestic shipping (sewage and oily wastes), create service industry jobs and assist in the reduction of pollution by minimising dumping events through provision of a suitable outlet for disposing of SGW.

To fully develop an SGW service-level industry, it is recommended that the Belize Government, in conjunction with relevant stakeholders, work closely with the private sector to meet Belize's MARPOL obligations for oily wastes, sewage and garbage.

As garbage generated on board domestic vessels is not classified as quarantine waste, it is recommended that provisions are made to incorporate this into the relevant local government solid waste management system. This would include provision of proper waste receptacles to ensure waste is captured and disposed of to the sanitary landfill facility at Mile 24 along with other residential and commercial waste.

9.4.4 Formalise regional port reception facility (other SIDS) or bilateral (Mexico/USA) arrangements for difficult waste

It needs to be recognised that Belize is unable to act as a PRF for all SGW such as NLS (Annex II), as it lacks the means to readily set up treatment facilities for hazardous wastes when compared with larger states.

Belize should therefore take advantage of the recent REMPEITC meetings and seek to formalise arrangements with those port states that are able to act as regional port reception facilities for difficult wastes, encouraging regional co-operation in data sharing, tracking and recording of SGW disposal. This approach assists in minimising waste dumping events and encourages regional co-operation and consolidation.

Given so many shipping movements that are not part of the regional port reception arrangements pass from Belize on to the USA and Mexico, it is also important to work with these port states in verifying where SGWs in general are being lawfully disposed of and seeking agreements that those states take categories of SGWs unable to be treated and disposed of in Belize.

9.4.5 Improve data collection for shipping waste in Belize waters through targeted sector waste audits

For this project, data was collected indirectly for international shipping through gathering commercial data based on the number of port calls made by international shipping vessels. Previously published estimates for numbers of passengers on board and waste generation per person were included. This is the general approach used by all port reception waste facility audits, as the resources and time required to measure ship-generated wastes directly would be considerable.

Given that established methodology is dated (1990s) and only covers international port-of-call vessels, it is recommended that Belize improve this scenario by ensuring data collected and methodologies used to extrapolate waste quantities and characteristics are revisited and amended. This would need to include conducting a quantification and characterisation (weight and volume) study on SGW for a range of port-of-call vessels to amend the current IMO approaches and that this is also conducted on

those vessels which operate in the EEZ but do not call to port (International fishing vessels). A similar process is also needed for domestic vessels.

This also needs to include methods of recording the total number of ships days (at port/moorings or moving) for both international and domestic vessels.

9.4.6 Engage private sector, civil society, communicates by education, awareness and resources on shipping waste issues

It is recommended that the private sector expand and integrate operations in treating healthcare waste (same treatment as quarantine waste) and better develop business models for oily and sewage wastes on a service model supported by government systems for shipping waste.

NGOs' capability to act as environmental advocates should be recognised and leveraged. There is a great opportunity for outreach groups to target port users, such as domestic fishermen, to conduct awareness and waste management training and integrate skill sets. In addition, it is also recommended for civil society to have the ability to report pollution activities.

10 Conclusions

The review found that despite clear obligations under MARPOL (Annex I and V), and capability to manage some SGWs (Annex V), almost no service is provided to international shipping in Belize. This is due in part to a policy of refusal (Annex V) and partly a lack of capability (remaining Annexes). Domestic shipping (mostly small fishing vessels) appeared to be unregulated for waste and pollution.

Garbage and quarantine waste is not permitted to be landed, based on the position of the Belize Government, although with some exceptions for visiting naval vessels, long-stay vessels and private pleasure crafts/ yachts. The wastes from these vessels appear to enter the domestic waste management system via private contractors.

There is currently little capacity in Belize to manage ship-generated oil wastes and sewage. However, reasonable capacity exists to manage garbage and quarantine wastes with the existing hazardous waste cell located within the Mile 24 Landfill in their modern sanitary waste landfill at Mile 24.

There are valid concerns however that landfilling garbage from international vessels could impact the operational life with APWC estimates showing it could produce the equivalent of 16% to 25% of all municipal wastes. Though if incineration was utilised this could be reduced to 0.8% to 1.25% equivalent of all municipal waste due to a 95% reduction in volume. There are also BAHA concerns on risks from inadequately treated waste from diseases such as swine fever.

The Belize Government does currently have some limited quarantine waste incineration capability (one operational/one out of operation) at the Port of Belize Harbour and the international air terminal,

while the private sector (Waste Control) additionally has some capacity and is operating a new high-temperature waste incinerator on the outskirts of Belize City. This is used to treat Belize City's healthcare waste, but Waste Control have expressed interest in increasing capacity to include quarantine waste.

Although most shipping is unable to berth at wharves, Belize has proven capacity and experience to move solid waste and recyclables by barge from islands such as Ambergris Caye and Harvest Caye. Reportedly, quarantine waste was previously moved by barge from ships for onshore disposal before the current policy not to accept SGW came into effect.

Although quarantine concerns do not seem to be applied to SGW from international pleasure craft and yachts (which is handled by private contractors and appears to enter the domestic waste stream untreated), this also may be related to the low volumes of SGW produced from such shipping.

SGW from domestic shipping (500-plus small fishing vessels) is not currently integrated within the wider waste management strategy of any of the responsible parties (ports, city councils and provincial authorities). However, there is potential for this to be included under the broader umbrella of waste improvement being led by BSWaMA, under project funding from donors such as IDB.

Given neither SGW from international nor from domestic vessels are directly measured, the focus of this report has been to identify which vessel types have the greatest potential to produce ship sources of marine pollution, including garbage including waste plastic.

The review identified three groups of focus to ensure effective management of ship-generated waste based on the number of vessels and the estimated time they spend within Belize's EEZ. These include:

International ships make 640 + port calls generating 9,458 tonnes of waste (99.5% from cruise liners) in the Belize EEZ per year.

International/national flagged fishing vessels (41) spend 5,369 ship days operating in the Belize EEZ generating 270 tonnes of waste per year.

Large domestic fishing fleet of over 500 vessels operating in Belize with no waste management in place. Potentially generates 200+ tonnes of waste per year.

Estimates in this review found that approximately 9,548 tonnes of garbage is generated through the 640 port calls made to the Ports of Belize Harbour, Big Creek and Harvest Caye, with 99.5% of this generated by cruise liners. The estimate for ship-generated garbage for locally based foreign and nationally flagged fishing vessels operating in Belize waters is approximately 270 tonnes, while garbage generated for the 500-plus domestic fishing vessels is estimated as 206 tonnes a year.

The fate of SGW while in Belize waters is not well understood. It is assumed that waste is landed at neighbouring ports in Mexico and the USA for international shipping (port-of-call and fishing vessels) and that domestic fishing vessel waste is probably disposed at sea.

While there has been attempts to promote regional port waste reception facility approaches for SIDS under REMPEITC's leadership, the relevance of this for Belize would appear to be low, as most vessels actually do not travel to SIDS ports after leaving Belize. For example, cruise ship routes for Belize are most strongly associated with ports in Mexico (94%) and the USA (82%) and much less with Jamaica (37%) (REMPEITC 2018).

For Belize to be confident that SGW is properly managed within its territorial waters, it is imperative that log book of port of call (especially cruise liners) and flagged fishing vessels are fully audited. Further, information from reported countries of waste disposal can be accessed to verify ship waste generated in Belize waters is indeed disposed of to land through regional port reception facility arrangements for SIDS or bilateral arrangements with Mexico and the United States.

11 References

Australian Maritime Safety Authority, 2014. Port Waste Reception Facilities Gap Analysis: Port of Moresby, Papua New Guinea. Available at: https://www.sprep.org/attachments/Publications/WMPC/AMSA-port-waste-reception-facilities-gap-analysis_PNG.pdf

Belize High Seas Fisheries Unit. (2019). BHSFU – Belize High Seas Fisheries Unit. [online] Available at: https://www.bhsfu.gov.bz/ [Accessed 15 June 2019].

Butt, N. (2017). The impact of cruise ship-generated waste on home ports and ports of call: A study of Southampton. School of Maritime and Coastal Studies, Southampton Solent University.

CE Delft, 2017. The Management of Ship-Generated Waste Onboard Ships. Prepared for: European Maritime Safety Agency. Publication code: 16.7185.130. Available at: http://www.emsa.europa.eu/work/download/4557/2925/23.html

Delfosse, S., McGarry, J., & Morin, T., 2010. Ship Generated Waste Disposal In the Wider Caribbean Region (Degree of Bachelor of Science). Worcester Polytechnic Institute.
Belize Agriculture Health Authority (2004). Quarantine Inspection Procedures at Ports of Entry. Belize.

Fao.org. (2019). FAO Fisheries & Aquaculture - Country Profile. [online] Available at: http://www.fao.org/fishery/facp/BLZ/en [Accessed 5 July. 2019].

FleetMon.com. (2019). Vessel Database Search - Discover more than 500000 ships. [online] Available at: https://www.fleetmon.com/vessels/ [Accessed 28 Jul. 2019].

Inter-American Development Bank (2013). Water and Sanitation in Belize.

Kaza, S., Yao, L., Bhada-Tata, P. and Van Woerden, F. (2018). What is Waste 2.0. A Global Snapshot of Solid Waste Management to 2050. [online] Available at: https://openknowledge.worldbank.org/handle/10986/30317 [Accessed 15 Jul. 2019].

Marinetraffic.com. (2019). MarineTraffic: Global Ship Tracking Intelligence | AIS Marine Traffic. [online] Available at: https://www.marinetraffic.com/ [Accessed 3 Jun. 2019].

Regional Activity Centre/ Regional Marine Pollution Emergency, Information and Training Centre - Wider Caribbean Region (2018). Feasibility Study on the Development of a Regional Reception

Facilities Plan for the Small Islands Development States of the Wider Caribbean Region: Annex D, Belize.

RAC-REMPEITC-Caribe (2018). Feasibility study on the Development of a Regional Reception Facility Plan for the Small Island Developing States of the Wider Caribbean Region.

Richardson, K., Talouli, A., Donoghue, M. and Haynes, D. (2015). Marine pollution originating from purse seine and longline fishing vessel operations in the Western and Central Pacific region, 2003-2015 WCPFC-TCC11-2015-OP06.

Schweikert, A. and Ashcroft, H. (2017). 2.1.1 Belize Port of Belize - Logistics Capacity Assessment - Digital Logistics Capacity Assessments. [online] Dlca.logcluster.org. Available at: https://dlca.logcluster.org/display/public/DLCA/2.1.1+Belize+Port+of+Belize [Accessed 9 Jul. 2019].

Schweikert, A. (2017). 2.1.1 Belize Port of Big Creek - Logistics Capacity Assessment - Digital Logistics Capacity Assessments. [online] Dlca.logcluster.org. Available at: https://dlca.logcluster.org/display/public/DLCA/2.1.1+Belize+Port+of+Big+Creek [Accessed 9 Jul. 2019].

The Government of Norway, The International Maritime Organization, United Nations Environment, and RAC-REMPEITC-Caribe. (2018). Feasibility Study on the Development of a Regional Reception Facilities Plan for the Small Island Developing States of the Wider Caribbean Region: ANNEX D Belize.

Marine plastic debris and microplastics - global lessons and research to inspire action and guide policy change. United Nations Environment Programme (UNEP) Nairobi. https://wedocs.unep.org/rest/bitstreams/11700/retrieve

Images

Global Logistics Clusters (2017). Belize Waterway Network. [image] Available at: https://dlca.logcluster.org/display/public/DLCA/2.5+Belize+Waterways+Assessment?preview=/12354194/12326160/BLZ_LCA_WaterwayNetwork_A4L_20171114.png.

Waight, L. (2019). Harvest Caye, Belize | 8 Things to Know About Harvest Caye, Belize. [online] Available at: https://www.belizehub.com/harvest-caye-belize/.

Marineregions.org. (n.d.). Marine Regions. [online] Available at: http://www.marineregions.org/eezdetails.php?mrgid=8457.

Appendix A: Stakeholder List

Name	Company	Title
Anthony Sankey	Belize Port Authority	Sr. Port Inspector
Ramsay Leacock	PUMA Energy	Terminal Superintendent
George Lamb	Belize Water Control Ltd.	General Manager
Caryl Maylian	Belize Water Control Ltd	Supervisor
Roberto Carrillo	Btalco Seaboard	Ops Manager
Merlene Martinez	Belize Port Authority	Ports Commissioner
Lisa Tillett	Public Health	Senior Public Health
Darlin Gartan	PSCO	Belize Port Authority
Jamani Balderamos	IMMARBE	Technical Officer
Edward Stane	IMMARBE	Compliance Officer
Gustavo Carriello	Port of Big Creek	Manager
Darion Butler	Caribbean Feeder Services	Operations Manager
Franzine Waight	Port of Belize Ltd	DCEO
Alfonso Juares	National Sanitation Driver	
Lumen M. Cayentano	Belize Solid Waste Management Authority	Sr. Technician
Kendrick Gordon DOE	DOE	Environmental Technician
Pamela Ewing	National Sanitation	Human Resources Manager
Michael Reimers	BIHL (Harvest Caye)	Operations
Sherlett Martinez	Belize Port Authority	Operations Manager
Floyd Williams	Belize City Council	Civil Engineer
Victor Mulligan	FSTV	
Major Jones	PBL Consultant	

Appendix B: Agent survey questions

Agent survey questions and contact details

Questions

1. What kinds of ships do you manage?
2. Approximately what number and/or proportion of your ships would request
    a. Garbage
    b. Oily waste
    c. Sewage
    d. Noxious liquid substances prewash
    e. Solid bulk cargo residues (dry or contained in hold wash water)
    f. Ozone-depleting substances
    g. Exhaust gas cleaning system residues
    h. Antifouling systems waste
    i. Ballast tank sediments
3. Do you have any views on why your ships might or might not choose to deliver waste to shore in port?
4. How/with whom do you make arrangements for waste reception?
5. Have you had any particular difficulties in making these arrangements?
6. Overall, are you satisfied with waste reception facilities in port?

Appendix C: MPEC Questionnaire for Adequacy of Port Waste Reception Facilities[8]

Contents

SECTION A ASSESSMENT DETAILS

SECTION B SUMMARY OF WASTE RECEPTION FACILITIES PROVIDED

SECTION C DEMAND FOR WASTE RECEPTION FACILITIES

SECTION D ASSESSMENT OF WASTE RECEPTION FACILITIES

Section D 1 Oily Wastes

Section D 2 Noxious liquid substances (NLS)

Section D 3 Sewage

Section D 4 Garbage Disposal – On Shore

Section D 5 Waste Management System

SECTION E ASSESSMENT OF ADEQUACY OF SERVICE

SECTION F QUESTIONS FOR SHIPPING AGENTS

[8] Derived from RESOLUTION MEPC.83(44), adopted on 13 March 2000: Guidelines for Ensuring the Adequacy of Port Waste Reception Facilities

Section A Assessment Details

Auditor	Organisation & Address	Contact Details Phone: Fax:	Date
Name of Port and Location			
Name and Contact Details of Port Representatives			
	Name: Position: Organisation: Address: Telephone/Fax: E-mail:		
	Name: Position: Organisation: Address: Telephone/Fax: E-mail:		
	Name: Position: Organisation: Address: Telephone/Fax: E-mail:		

Section B Summary of Waste Reception Facilities Provided

Type of waste	Can Waste be Received (Y or N)	Type of Reception Facility (Fixed, Road Tanker or Barge)	Any Limitations in Capacity (m^3)	Service Provider (Port, Private Contractor, State Authority or Other) Indicate the number of service providers
Oily[8]				
Oily tank washings				
Dirty ballast water				
Oily bilge water				
Oil Sludges				
Used lubricating oil				
Noxious Liquid Substances[9]				
Category A				
Category B				
Category C				
Category D				
Sewage				
Garbage[10]				
Category 1				
Category 2				
Category 3				
Category 4				
Category 5				
Quarantine Wastes				

Section C Demand for Waste Reception Facilities

					Number of Requests for Waste Collection			
Ship Type*	No of ship visits during the period of review	Average Range of dead weight (tonnes)	Average No. of Persons on Board	Oily Wastes	Noxious Liquid Substances	Sewage	Garbage	Quarantine Wastes
Oil Tankers								
Crude oil tankers								
Combination carriers*								
Chemical Tankers								
General Cargo								
Container Carriers								
Bulk Carriers								
Passenger ships								
Livestock Carriers								
Fishing Vessels								
Recreational Crafts								
Other								

*The ship types marked with an asterisk (*) are defined in the Annexes to MARPOL 73/78. The other types of ships have been indicatively inserted as their operations may influence the reception facilities required.

Section D 1 Oily Wastes

	Question	Yes	No
1	How are the oily wastes disposed of? (Please give details, on separate sheet, if available) separation of oil and water then recycling land disposal recycled incineration other (specify)		
2	Are there any restrictions on receipt or collection of oily wastes by service providers? (Please give details if available) Minimum quantity Maximum quantity Discharge rate (m^3 /hour) Vessel type Vehicle Access to Berth Other (specify)		
4	Are oily waste reception facilities available – 24 hours a day, 7 days per week 24 hours a day, 5 days per week Business hours only, 7 days per week Business hours only, 5 days per week		
5	Is prior notice for receipt of oily wastes required – 0 hours 12 hours 24 hours 48 hours		
6	.1 Is the waste receipt service available: At no cost at a cost incorporated into standing port use charge at a cost charged in addition to other services .2 Is the cost: reasonable in terms of service a disincentive other (specify)		
7	Is a waste collection service available: At all berths At most berths At only one berth to vessels anchored within the port To vessels anchored outside the port Other (specify)		
Comments:			

Based on the above, please provide an assessment of the provision of waste reception facilities:

1 - Less than satisfactory **2 - Satisfactory** **3 - Fully meets the requirements**

Section D 2 Noxious Liquid Substances (NLS)

Question		Yes	No
1	Where is the NLS disposed of? (Please give details if available) Directly from the ship to a mobile facility Ships to a holding tanks prior to being pumped out Other (specify)		
2	Are there any restrictions on receipt or collection of NLS wastes by service providers? (Please give details if available) Minimum quantity Maximum quantity Discharge rate (m^3 /hour) Vessel type Vehicle Access to Berth		
3	Are NLS reception facilities available - 24 hours a day, 7 days per week 24 hours a day, 5 days per week Business hours only, 7 days per week Business hours only, 5 days per week Other (specify)		
4	Is prior notice for receipt of NLS required - 0 hours 12 hours 24 hours 48 hours		
5	Is the waste receipt service available: at no cost at a cost incorporated into standing port use charge at a cost charged in addition to other services		
7	Is a waste collection service available: At all berths at most berths At only one berth To vessels anchored within the port To vessels anchored outside the port Other (specify)		
Comments:			

Based on the above, please provide an assessment of the provision of waste reception facilities:

1 - Less than satisfactory **2 - Satisfactory** **3 - Fully meets the requirements**

Section D 3 Sewage

Question		Yes	No
1	Where is the sewage disposed of? (Please give details if available) Directly to a reticulated sewerage system Directly to a mobile facility Ships to holding tanks then pumped to a mobile facility Ships to on-site treatment facility to sewerage system Other (specify)		
2	Are there any restrictions on receipt or collection of sewage wastes by service providers? (Please give details if available) Minimum quantity Maximum quantity Discharge rate (m^3 /hour) Vessel type Vehicle Access to Berth		
3	Are sewage reception facilities available - 24 hours a day, 7 days per week 24 hours a day, 5 days per week Business hours only, 7 days per week Business hours only, 5 days per week Other (specify)		
4	Is prior notice for receipt of sewage required - 0 hours 12 hours 24 hours 48 hours		
5	Is the waste receipt service available: At no cost At a cost incorporated into standing port use charge At a cost charged in addition to other services		
7	Is a waste collection service available to : At all berths at most berths At only one berth Vessels anchored within the port Vessels anchored outside the port		
Comments:			

Based on the above, please provide an assessment of the provision of waste reception facilities:

1 - Less than satisfactory **2 – Satisfactory** **3 - Fully meets the requirements**

Section D 4 Garbage Disposal – On Shore

Question	Yes	No
1 Where is the garbage disposed of? (Please give details if available) Local Government dump/landfill Private dump/landfill Transfer Station Materials Recycling Facility Don't know		
2 Where are quarantine wastes disposed of? (Please give details if available) incinerator sterilisation deep burial normal landfill		
Garbage Disposal – Ship to Shore		
3 Are there any restrictions on receipt or collection of garbage wastes? (Please give details if available) Minimum quantity Maximum quantity Vessel type Vehicle Access to Berths		
4 Are garbage waste reception facilities available - 24 hours a day, 7 days per week 24 hours a day, 5 days per week Business hours only, 7 days per week Business hours only, 5 days per week		
5 Is prior notice for receipt of waste required - 0 hours 12 hours 24 hours 48 hours		
6 Is the waste receipt service available: at no cost at a cost incorporated into standing port use charge at a cost charged in addition to other services		
7 Is a waste collection service available : at all berths at most berths at only one berth to vessels anchored within the port to vessels anchored outside the port		
Comments:		

Based on the above, please provide an assessment of the provision of waste reception facilities:

1 - Less than satisfactory **2 - Satisfactory** **3 - Fully meets the requirements**

Section D 5 Waste Management System

Question		Yes	No
1	Has a waste management plan (WMP) been developed and implemented for ship wastes?		
2	Is the waste management plan part of an overall environmental management system (EMS) for the port?		
3	Are marinas and fishing harbours covered by the port EMS or required to develop their own EMS?		
4	Does the WMP provide a brief summary of the types of wastes received and the collection and disposal facilities/services?		
5	Does the WMP address and provide management objectives for:		
6	*Operations:* Facility Management Maintenance Signs Infrastructure Contractual arrangements Emergency Response Seasonal Variations Training and Education Delegation of Responsibilities and Accountability Compliance with regulatory conditions, including auditing		
7	*Technical Standards*: Facility Requirements Incorporation of new technologies Cleaning requirements Maintenance of equipment to technical standards		
8	*Environmental Considerations:* Prevention of pollution to surface waters Noise Emissions Visual impacts Odour Emissions Special considerations due to surrounding environment (eg. proximity to wetland or mangrove areas) Coastal processes (e.g. extreme tides)		

9 *Plans for future expansion / upgrades:* Oily Wastes Noxious Liquid Substances Sewage Garbage Recycling of wastes Quarantine wastes		
10 Are contact details held for all waste service providers?		
11 Are the service providers licensed/approved as required by legislation?		
12 Are a copy of the licences on file?		
13 Are a copy of the licences for the waste disposal facilities used by the service providers held on file?		
14 Have receipts for waste disposal been sighted / copies held on file?		
15 Are alternative waste service providers or disposal facilities available (eg spare drums, waste oil recyclers)?		
16 Is there a procedure for choosing waste disposal service providers (eg list of preferred contractors)?		
17 Are the details of back-up facilities available on file?		
18 Does the WMP include an emergency response plan?		
19 Is the plan adequate in that it addresses at least the following issues? Spillage of liquid Spillage of solids Leakage of gas fire or explosion Emergency contacts Other (specify)		
20 Is information recorded on the quantities of each waste stream which are received, date of receipt, disposal contractor and method of disposal or treatment? (Data sighted/copies attached) Oily wastes Noxious Liquid Substances Sewage Garbage Recycling of wastes Quarantine wastes		
21 Are there variations in the quantities of each waste stream received? In any one month (e.g. due to shipping variations) In any one year (e.g. due to seasonal effects) Over a number of years (e.g. due to industry growth) Don't know		
22 Is this information analysed on an on-going basis to detect changes in usage (both short-term season variations and long-term growth or		

reductions) and assist in formulating future plans? (Graphs sighted)		
23 Is on-going consideration given to changes in demand for waste reception facilities?		
24 Do plans exist for future upgrades, extensions or reductions to the waste reception facilities?		
25 Is there an on-going process for reviewing existing facilities and determining changes that may be required to meet adequacy, timing or waste generation demands?		
26 Are there provisions for audits against the WMP (at least within 2 years of implementation and thereafter every 3 years?)		
27 Is there provision for periodic review of the WMP?		
28 Are the relevant requirements of the MARPOL 73/78, UNCLOS and IMO generally adhered to by the users of the port?		
29 Is there information on the state and local regulations regarding (please list legislation if known): Waste management Pollution of water Pollution of air Noise emissions Discharges to sewer Storage of dangerous goods Local Government requirements		
30 Is there information on waste minimisation hierarchy, i.e. avoid/reduce/ reuse/recycle/reprocess?		
31 Is an open and co-operative relationship maintained between the port authority and the relevant authorities and agents?		
32 Are there channels of communication and consultation with relevant organisations to ensure that particular changes in demand are considered in providing waste reception facilities? (Give examples of consultation methods)		
33 Do training programmes for port employees (both of the port authority and users) include a section on waste management and the facilities provided at the port?		
34 Is there a section in the WMP or a separate document which is included in agreements with port users and specifies requirements for the usage of port waste reception facilities?		
35 Is clear and visible signage for waste reception facilities present and includes: advice at initial vessel contact point of waste reception facilities: direction to receptacle or disposal point location: labelling of all receptacles and disposal points: contact numbers:		

emergency procedures: translation into other languages as required:		
36 Are there information sheets/ leaflets available for each waste reception facility?		
37 How is this information conveyed to ships?		

Comments:
Based on the above, please provide an assessment of the waste management systems:

1 - Less than satisfactory **2 - Satisfactory** **3 - Fully meets the requirements**

Assessment of Adequacy of Service

Organisation:	Representative Interviewed:	Contact Details Address: Phone: Fax:	Interview Date:

In the view of the representative interviewed, what overall rating would be given for the waste reception service?

1 - Less than satisfactory **2 - Satisfactory** **3 - Fully meets the requirements**

Please provide details of the good aspects of the waste reception services:

Please provide details of the deficiencies of the waste reception services:

Based on the above, please provide an assessment of the adequacy of waste reception service:

1 - Less than satisfactory **2 - Satisfactory** **3 - Fully meets the requirements**

Appendix D Estimates for Ship-Generated Waste

METHODOLOGY QUESTIONNAIRE ELEMENTS (RAC-REMPEITC, 2018 page 33–35, 36, 37–38)

Derived from *RESOLUTION MEPC.83(44), adopted on 13 March 2000: GUIDELINES FOR ENSURING THE ADEQUACY OF PORT WASTE RECEPTION FACILITIES*

Contents

Section I ***Calculations for MARPOL Annex I SGW Estimates***

Section II ***Calculations for MARPOL Annex V SGW Estimates***

Section III ***Calculations for International Fishing Vessels (non-port of call)***

For Annex I types of wastes and residues, the estimation method is based on averaged amounts of wastes.

- For the wastes that are associated with the cargo spaces of tankers, these averaged amounts of wastes are expressed as a percentage of the tankers deadweight tonnage (DWT).
- For the sludge tank residues and oily bilge waters, which are related to the operation of the engines and therefore relevant to all motor propelled vessels, other reference values are used.
- The applicable values and references are displayed in the table below. It is also indicated to which type of ports and facilities PRF for the reception of such wastes must be provided.

Type of waste	**Which ports**	**Averaged amount of wastes**
Wash water	Crude oil loading ports involved in regional trade (<1200 nm)/ Oil product loading ports > 1000 tonnes/day	4-8% of tankers DWT
Liquid oil residues		0.2-1% of tankers DWT
Oily solids		0.01-0.1% of tankers DWT
Sludge tank residues	All ports and terminals which handle ships > 400 GT	2-3% of daily fuel consumption
Oily bilge waters and other residues	All ports	1-10 m^3 per ship

Tanker-related wastes and residues

For the assessment of the expected waste quantities per country, the typical DWT of oil tankers attending that country is analysed. This concerns both crude oil and oil product tankers. The averages of the percentages as indicated above are used to estimate the amounts of waste: 6%, 0.6% and 0.06% respectively.

The values are calculated in cubic metres, assuming an average density of 1 t/m^3 for all types of wastes.

Sludges

The amount of sludge is expressed as a percentage of the daily fuel consumption per ship. Stopford provides the daily fuel consumption for container ships, bulk carriers and tankers of different sizes based on their ship register for the year 2006. The minimum values apply respectively to a 0-499 TEU feeder, 10,000-20,000 DWT handysize bulk carrier and a 1,000-5,000 DWT small tanker. The maximum values apply to a 600–12,000 TEU VLBC, and capesize bulk carriers and VLCC tankers of over 200,000 DWT.

For cruise ships, generally accepted data values are about 150 tons per day up to 250 tons per day, for large cruise ships sailing full speed. For the mentioned ship types the minimum, maximum and average values are displayed in the table below. Also, the reference ship sizes are included, associated with the listed fuel consumptions.

Fuel consumption for different types and sizes of ships

Ship type		Reference ship size	Fuel consumption (t/day)
Container ship	Min	Feeder 0-499 TEU	15.7
	Average	Handy+ 1000-3000 TEU	65.4
	Max	VLBC 6,000-12,000 TEU	211.3
Bulk carrier	Min	Handy 10-20 kDWT	22.5
	Average	Handymax 40-60 kDWT	33.4
	Max	Capesize >200 kDWT	60.3
Tanker	Min	Small <5000 DWT	7.9
	Average	Handy/ Panamax 30-80 kDWT	37.8
	Max	VLCC >200 kDWT	85.7
Cruise	Average		150
	Max		250

Based on the numbers listed above, the fuel consumption per ship is estimated based on interpolation for all ships over 400 GT. For cruise ships, an average value of 150 t/day is applied for all ships. All ships of other types than the ones listed above are assumed to have a similar DWT – fuel consumption relationship as container ships.

Using the range of percentages as described above, (2–3% of the daily fuel consumption), the amounts of sludges (in tons) to be provided to PRF can be derived. These are calculated per port based on an average value of 2.5% and a fuel density of 1 t/m^3. The volumes are calculated for all ships that visited the considered ports in 2016, also if their GT is under 400 GT.

Oily bilge waters

Oily bilge waters are associated with all types of motor-propelled vessels, where ships over 400 GT are allowed to discharge these at sea. However, as per the requirements in Annex I, all ports have to provide facilities for the reception of oily bilge waters.

The amount of oily bilge waters to be discharged from the ship is expressed as a volume range indicating the average amount of bilge water to be discharged per ship, which is 1 to 10 m^3 per ship, based on the typical sizes of bilge water holding tanks. However, research shows[9] that for ships engaged in near-coastal voyages, the tank sizes are smaller, between 1 and 3 m^3.

In order to estimate the amounts of oily bilge waters, the following volumes of waste water generation per day are used as a function of the vessel's GT:

Estimated daily volumes of oily bilge water generation (ref: REMPEC, 2004)

Gross tonnage (GT)	Estimated daily volume of oily bilge water (l/day)
<400	75
400–3,000	375
3,000–5,000	1125
5,000–7,000	1875
7,000–10,000	3000
>10,000	5000

Section II ***Calculations for MARPOL Annex V SGW Estimates***

All ports and terminals have to provide facilities for the reception of garbage, under MARPOL Annex V. Formulae to estimate the amounts of waste retained onboard vessels are provided in Annex A of the ISO Standard 21070:2011 'ships and marine technology – Marine environment protection – Management and handling of shipboard garbage'. The general format of the formulae is as follows:

Where:

V is the volume of the relevant type of waste in dm^3
d is the duration of the voyage in days (at least 30 days)
P is the number of persons onboard
The factors used in this study are taken from the study 'Assessment Of The Existing Situation And Needs Of Albania, Croatia And Slovenia Regarding Port Reception Facilities For Collecting Ship-Generated Garbage, Bilge Water And Oily Wastes - Activity 1: Collection And Treatment Of Solid And Liquid Wastes' (REMPEC, 2004).

These factors are based on the IMO 'Guidelines for the implementation of Annex V of MARPOL 73/78' and were adjusted based on surveys held with ship masters calling at the ports considered in the study. Factors are provided for different types of waste (domestic, maintenance and cargo related waste) and for different ship types (cargo ships, passenger ships and harbour craft).

[9] REMPEC (2004), Assessment Of The Existing Situation And Needs Of Albania, Croatia And Slovenia Regarding Port Reception Facilities For Collecting Ship- Generated Garbage, Bilge Water And Oily Wastes - Activity 1: Collection And Treatment Of Solid And Liquid Wastes

For cargo-associated waste, the study provides values expressed as fractions of the amount of cargo received. Since these numbers are not available on a ship-by-ship basis for most ports, factors from Palabryik (2003), expressing the amount of waste per day, have been used instead.

The used rates of waste generation per day for different types of waste (in kg) and ships are presented below:

Table 14 Annex V waste generation rates used

Tankers and all ships in the ship-type group 'dry cargo' are attributed to the group of cargo ships and passenger ships are all ships in the ship-type group 'passenger'. All other ships are assumed to fall into the group of 'harbour craft', as these ships are typically non-cargo carrying or passenger ships.

The duration of the voyage is calculated for each voyage in the LLI data, based on the dates of departure in the port of origin and of arrival in the destination port. By using the voyage duration for the estimation of waste generation on board, it is implicitly assumed that the ships discharge their waste in each port of call. As such, the estimated values might give an underestimation for other cases.

The numbers of persons on board are defined for passenger ships, cargo ships and harbour craft, based on data from literature and online information on passenger ships. The used values for cargo and passenger ships are presented in the tables below. For 'harbour craft', it is assumed that the average crew consists of eight persons.

Waste type	Cargo ships	Passenger ships	Harbour craft
Domestic	2 per person/day	3 per person/day	1 per person/day
Maintenance	11 per day	11 per day	11 per day
Cargo associated – general cargo	8.2 per day		
Cargo associated – dry bulk	49.3 per day		

The waste generation factors provide the amount of waste in kilograms. An average density of 250 kg/m^3 is applied in order to convert these values to cubic metres.

Section III ***Calculations for International Fishing Vessels***

This was calculated based on:
- Average numbers of crew (eight for long-liners/pole-liners and 30 for purse-seiners/trawlers – FFA Report Estimate);
- The previously reported generation of 2 kilograms of garbage per person per day;
- Average trip period of (14 days for long-liners/pole-liners and 28 days for purse-seiners/trawlers from a recent FFA report); and
-Average number of trips per year for long liners/purse-seiners – derived from the FFA Report Estimate.