OSPAR Beach Litter Monitoring in the Netherlands

Update 2019

Annual Report

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About

The North Sea Foundation is an independent non-governmental organization that provides knowledge necessary for an integrated sustainable protection, exploitation and spatial use of the North Sea and its coastal zones.

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Summary

Marine litter, in particular the accumulation of plastic litter in the marine environment, has been identified as a major global environmental problem. Due to ingestion and entanglement it is particularly harmful for many marine species. At least for 817 marine species it is recorded that they are negatively affected by marine litter. Qualitative and quantitative information about marine litter in our seas and oceans is required for policy development aiming to reduce marine litter and to assess effectiveness of existing programmes of measures.

This annual report provides an overview of the Dutch beach litter data analysis results for 2014-2019. In this period, 95 surveys were performed on four survey locations on the Dutch North Sea coast. The aim of the research is to provide insight in the litter types and its counts, materials, various sources, period averages and trends of beach litter that washes ashore on Dutch beaches.

The analysis of beach litter monitoring data was performed using the statistical data analysis tool LitteR. The number of specific litter types and total litter counts are reported using 6-year medians. LitteR further performs trend analysis using the Theil-Sen and Mann-Kendall tests.

The median total count (excluding small plastic pieces <2.5cm) in the period 2014-2019 is 193 counts/100 m beach .The total count trend of the 2014-2019 beach litter monitoring data shows indicatively (p-value 0.093 and trend slope of -11 counts/year) that the Dutch beaches are getting cleaner. The beaches Noordwijk, Terschelling and Veere show a decreasing trend, the beach of Bergen has no clear trend.

The recently adopted threshold value of 20 counts/100 m beach is not yet met.

At 57 surveys in the last four years marine litter weighs are recorded. The median total weight is 4.9 kilograms/100 m. The aggregated slope trend for the total weight shows a decreasing trend slope of -0.65.

Plastic accounts for more than 93 percent of the litter materials found. The data shows decreasing trends for plastic/polystyrene (-11.9 counts/year) and rubber (-0.61 counts/year). Increasing trends were found for sanitary (+0.209 counts/year) and wood litter types (+0.268 counts/year). For paper/ cardboard, wood, glass, metal, cloth/textile, ceramic/pottery and medical no trends were found.

The top-80% litter type analysis shows decreasing trends for 6 of the top 80% most found litter types. The largest decreasing trend (-6.79 counts/year) is from string and cord followed by balloons and ribbons (-0.836 counts/year) and industrial plastics (-0.505 counts/year). No trends were found for foam sponge, plastic crisp/sweet packets and lolly sticks, plastic cutlery/trays/straws and plastic cotton buds. Nets and pieces of net <50 cm shows a slight increasing trend (+0.91).

Specific functional use group analysis was conducted for single use plastics (SUP) and fishing related litter (FISH) types. Single use plastics account for 26 percent of the total count and fishing related items account for 46 percent of all litter types found. The data shows decreasing trends for SUP types (-3.1 counts/year) and FISH types (-6.47).

In 2019, during 67 percent of the surveys conducted paraffin was found. In the period 2014-2019 the trend indication show an increase in the presence of paraffin waxes for especially small pieces.

In 2019, during 13 (87 percent) of the 15 surveys conducted, plastic pellets were found. In the period 2014-2019 plastic pellets were encountered during 48 percent of the surveys. The trend of presence of pellets shows a significant increasing trend.

List of abbreviations

OSPAR	The international organization in which 15 Governments & the European Union cooperate to protect the marine environment of the North-East Atlantic.
MSFD	Marine Strategy Framework Directive
DG	Descriptor
RWS	Rijkswaterstaat – Department of Waterworks and Public Works
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RWS	Rijkswaterstaat – Department of Waterworks and Public Works
CEMP	Coordinated Environmental Monitoring Programme
CSV	Comma-separated values
JRC	Joint Research Centre
ICGML	OSPAR Intersessional Correspondence Group on Marine Litter
NSF	The North Sea Foundation
RAP	OSPAR Regional Action Plan for Marine Litter
SUP	Single Use Plastics
TV	Threshold value
MSC	Mediterranean Shipping Company
FISH	Fishing related litter types
WAXPOL	Other pollutants category
GES	Good Environmental Status
JRC	Joint Research Centre
ICGML	OSPAR Intersessional Correspondence Group on Marine Litter
NSF	The North Sea Foundation
RAP	OSPAR Regional Action Plan for Marine Litter
SUP	Single Use Plastics
TV	Threshold value
MSC	Mediterranean Shipping Company
FISH	Fishing related litter types
WAXPOL	Other pollutants category

1 Introduction

1.1 General introduction

Marine litter and in particular the accumulation of plastic litter in the marine environment, has been identified as a major global environmental problem (Sutherland et al., 2010; G7 Leader´s declaration 2015). Due to ingestion and entanglement is most likely that many marine species and very large amounts of individuals are harmed. At least for 817 marine species it is recorded that they are negatively affected by marine litter (Kühn & Van Franeker,2020). Millions of animals that live in the oceans are harmed, mutilated, and killed by marine litter each year (Butterworth et al., 2012).

It is estimated that more than 150 million metric tonnes of plastic have accumulated in the world's oceans and each year 12 million metric tonnes are added (Jambeck et al. 2016). Currently, plastic production continues to increase. For example, in 2017 the plastic production increased from 335 to 348 million tonnes of plastic materials (Statista, 2019).

Marine litter is defined as: *"any solid material which has been deliberately discarded or unintentionally lost on beaches, on shores or at sea. It covers materials transported into the marine environment from land by rivers, draining or sewage systems or winds. It includes any persistent, manufactured or processed solid material. Originating from sources both on land and at sea, marine litter comprises a wide range of materials, including plastic, metal, wood, rubber, glass and paper"* (OSPAR Commission, 2018).

Marine litter travels long distances with ocean currents and is found all over the globe in marine environments, even in very remote areas (Werner et al. 2016). Research shows that large quantities of floating plastics from Europe and US end up in the Arctic Ocean and in the pristine Artic ecosystem (Cózar et al. 2017).

Apart from the ecological impacts there are socio-economic impacts such as costs for cleaning activities and reduced attractiveness for recreational activities. It was calculated that the potential costs across the EU for coastal and beach cleaning was assessed at almost €630 million per year (OSPAR, 2016). Furthermore, lost, and discarded fishing nets can cause propeller issues and can consequently lead to shipping delays and lost fishing time (Newman et al. 2015).

Marine litter originates from sources both on land and at sea. Land based sources are landfills and littering of beaches and coastal areas (tourism); rivers and floodwaters; industrial emissions; discharge from storm water drains and untreated municipal sewerage (EC, 2019). Sea based sources are fishing and aquaculture; illegal or accidental dumping at sea from shipping (e.g. transport, tourism) and offshore mining and extraction (EC, 2019).

Quantifying each source remains challenging, studies are ongoing. Riverine litter input is estimated to be a major contributor to marine litter, but there is no comprehensive information about the amount of litter being transported through rivers to the sea (EC, 2016). Fishing and aquaculture is estimated to account for the loss of 9,888 – 32,770 tonnes per year that ends up in European seas (EC, 2018). Specific fishing gear used by the Dutch and Belgium fleet to protect nets from wearing down is dolly rope. It is estimated that 50-100 tons of dolly rope are lost annually (Bekaerd et al.;2015; Strietman et al., 2015). 60,000 up till 300,000 tonnes of ship-generated garbage (excluding oily- and sewage waste) is estimated to end up in European sea waters every year (EC, 2019).

1.2 European Marine Strategy Framework Directive (MSFD) and European SUP Directive

Within the European Marine Strategy Framework Directive (MSFD) marine litter is one of the descriptors (DG10) to assess the 'Good Environmental Status' of the marine environment. At EU level, the MSFD is the dedicated binding legal instrument for assessing, monitoring, setting targets and reaching good environmental status with regard to marine litter. The Directive obliges Member States to monitor marine litter.

The MSFD goal for DG10 for marine litter is defined as follows: Properties and quantities of marine litter do not cause harm to the coastal and marine environment by 2020.

The Dutch government has set a target for 2020 to reduce the amount of litter on the coast (beach litter) and the impact in marine organisms (plastic particles in stomachs of Northern Fulmars). The Dutch MSFD goals set for 2020 are:

- The amount of visible litter on the coast has decreased
- There is a downward trend in the amount of litter in marine organisms

The revised European Commission Decision 2017/848 requires EU Member States to establish threshold values (TVs) for criteria of Descriptor 10 on marine litter. TVs which are now mandatory through the new provisions, are intended to contribute to Member States determination of a set of characteristics for GES and enable their assessment of the extent to which GES is being achieved. The threshold value for marine litter has been set by the European Commission at 20 items per 100 meter of beach. This excludes items under 2.5 cm in length.

In 2018 the European SUP Directive was proposed by the European Commission and approved by the European Parliament in March 2019. The directive contains measures to address marine litter originating from the 10 single-use plastic products most often found on European beaches, as well as abandoned fishing gear and oxo-degradable plastics. Member States must bring the SUP Directive into force by 3 July 2021.

1.3 The OSPAR beach litter protocol and guideline

A guideline for monitoring marine litter on beaches has been developed as a tool to collect data on litter in the marine environment. OSPAR's Coordinated Environmental Monitoring Programme (CEMP) guideline for monitoring marine litter washed ashore and/or deposited on coastlines (beach litter) is based on the method developed during the OSPAR pilot project 2000-2006 and is complemented with information derived from UNEP's guideline. The OSPAR guideline has been designed to generate data on marine litter according to a standardized methodology. A uniform way of monitoring allows for regional interpretation of the litter situation in the OSPAR area and comparisons between regions. The guideline has been designed in such a way that all OSPAR countries can participate, bearing in mind adequate quality assurance of the data generated. There are several other litter monitoring projects in The Netherlands and the Dutch Caribbean are using the OSPAR methodology. These projects are: the Clean River project (Schone Rivieren, 2019), a pilot project in the Wadden Sea (Rijkswaterstaat Noord, 2019) and monitoring in Dutch Caribbean (WWF, 2018) .

1.4 Evaluation of OSPAR and national beach litter reduction measures

To OSPAR monitoring results are used to evaluate if the Regional Action Plan (RAP) for Marine Litter is effective. The OSPAR Contracting Parties agreed on this action plan for the period for the period 2014-2021. The RAP contains 23 national actions and 32 collective actions which aim to address both land-based and sea-based sources, as well as education and outreach and removal actions.

OSPAR's marine litter objective is "to substantially reduce marine litter in the OSPAR Maritime Area to levels where properties and quantities do not cause harm to the marine environment". The North-East Atlantic Environment Strategy (2010 – 2020) commits to "develop appropriate programmes and measures to reduce amounts of litter in the marine environment and to stop litter entering the marine environment, both from sea-based and land-based sources".

Furthermore, the OSPAR monitoring results are used to assess the effectivity of beach litter reduction measures. In reducing litter, the Netherlands focuses on prevention by means of an integrated source approach, communication and awareness campaigns, and closing product chains (through e.g. Green Deals, product requirements- and waste management policies). The Netherlands is also supporting the cleaning of beaches and the Fishing for Litter and DollyropeFree project. The policy approach of the Dutch implementation of the MSFD by initiating Green Deals aimed to reduce litter from fisheries, shipping and tourism in 2015, was evaluated.

The Green Deal approach in the Netherlands is a policy instrument to stimulate companies, regional and local government, stakeholder organizations, civil society organizations and interest groups to work together to accomplish green growth. It was concluded that these specific Green Deals contributed to awareness, actions, and measures to reduce marine litter. Examples of additional policy efforts are: the introduction of a ban on free plastic bags in shops introduced on January 1st, 2016;

initialisation of the "Zwerfafvalophaalregeling (ZOR)" in 2018. With this arrangement Rijkswaterstaat encourages to collect litter along the coast and river banks by third parties. The litter collected by volunteers is collected and processed free of charge and launch of the Dutch Plastic Pact (Plastic Pact NL) by the Ministry of Infrastructure and Water Management. The goal of the pact is to make single-use plastic products and packaging more sustainable and suitable for reuse. Ninety-seven parties have signed the pact, including producers and retailers.

1.5. Aims

The aims of this report are:

- to provide an annual update of the Dutch beach litter monitoring data of 2019;
- to provide an overview of the Dutch beach litter data analysis results for 2014-2019 using the LitteR software.

2 Methods

2.1 Selection of reference beaches

Within the OSPAR Beach Monitoring Guideline (OSPAR Commission, 2010) and CEMP guidelines (OSPAR Commission, 2016). The following criteria have been identified for selecting reference beaches. The beaches should be:(a) composed of sand or gravel and exposed to the open sea; (b) accessible to surveyors all year round; c) accessible for ease of marine litter removal; d) have a minimum length of 100 metres and if possible over 1 km in length; e) free of 'buildings' all year round; f) not subject to any other litter collection activities.

Figure 1 The Dutch reference beaches

Four reference beaches have been selected in the Netherlands (see figure 1). All the Dutch reference beaches are composed of sand, are accessible all year round, are easily accessible for marine litter removal, have a length of 100 metres, are free of buildings all year round and comply with the OSPAR criteria a, b, c, d, e. Additional information in regards to physical and geographical characteristics e.g. proximity of shipping lanes, river mouths, waste water outlets of each beach are available and updated when changes occur.

The compliance of criteria (f), 'no collection of any other litter activities', does not apply to all the beaches. The reference beach Bergen is cleaned on a weekly basis all year round. Volunteers and/ or local authorities incidentally clean the other beaches.

Therefore, contact with local beach authorities is important. Before a monitoring on a reference beach is executed, the local beach coordinator is contacted to check for any local activities that can influence the monitoring session, e.g. a local clean-up, an accident with cargo, a recent storm, etc. In 2014-2019 all local beach coordinator and/or municipalities have been contacted on a regular basis. As a guideline, no local beach cleaning should have occurred within the two weeks before a planned beach monitoring date. If this has occurred, it is attempted to postpone the monitoring to about two weeks after the cleaning date. However, in cases of extreme weather events, unexpected changes in employee schedules, or for any reason poor communication with local beach coordinators, the monitoring may occur within two weeks after a cleaning activity. In addition, not all cleaning activities are announced publicly or are known by the municipalities (see results and discussion).

2.2 Monitoring method

Each reference beach is a fixed section of beach covering the whole area between the water line to the back of the beach i.e. start of the dunes. Within the OSPAR area, the standard survey unit is 100 meters long from the water's edge to the back of the beach. Litter types are classified according to the 'Guideline for monitoring Marine Litter on the Beaches in the OSPAR Maritime Area, Edition 1.0' using OSPAR scoring lists (OSPAR Commission, 2010).

The monitoring session starts at the back of the beach on the landside. All visible litter (> 0.5 cm) on the beach surface is counted and registered on the OSPAR beach litter monitoring form. A small strip of about 2-3 meters is monitored; walking distance between the two surveyors is about 2-3 meters. Two surveyors walk parallel with the beach towards the end of the 100 meter monitoring area and draw a line in the sand during monitoring of the litter types. After reaching the 100-meter border of the monitoring area, the surveyors make a turn and proceed with the next strip. All litter is collected in

garbage bags. The drawn line is now the border of the monitoring strip. This method is repeated until the sea line is reached (see figure 2).

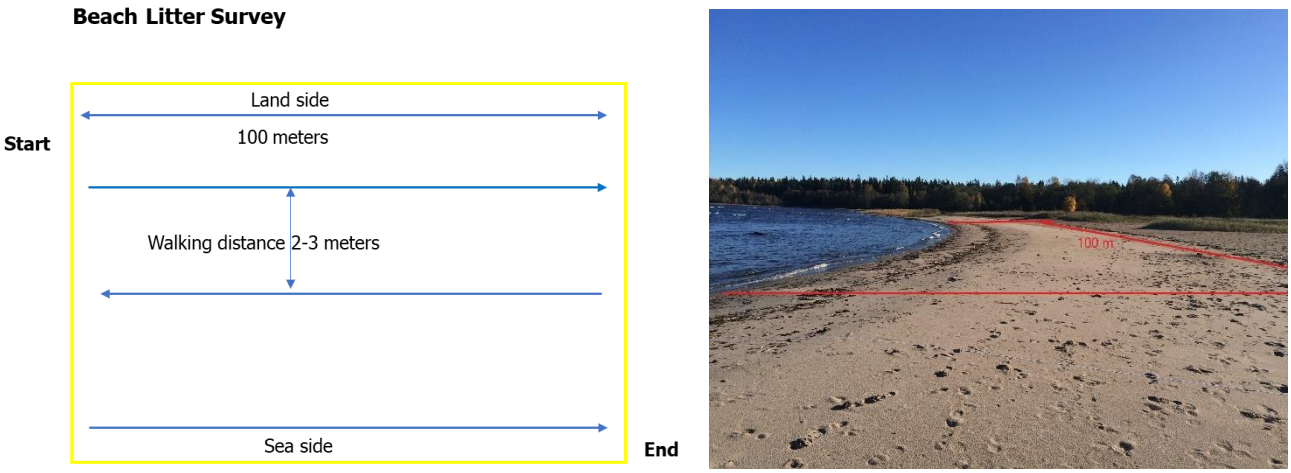

Figure 2 Walking pattern used for the beach litter monitoring.

The current 100 m-survey form contains 116 litter types (marked by item-codes). This includes identifiable litter types and associated pieces of these items, unknown items and unknown litter fragments. Unknown litter or litter types that are not on the survey form are noted in the appropriate "other item box". A short description of the "other" item will be included on the survey form. If possible, digital photos should be taken of unknown litter types for them to be identified later. Wax and other pollutants, as well as industrial plastic pellets are counted and reported separately.

Permanent reference points (marked by beach poles) are used to ensure that the same site will be monitored for all surveys. The Dutch Beach Litter reference beaches are: Bergen (beach pole 35.250); Noordwijk (beach pole 72.250); Oostkapelle/ Veere (beach pole 10.300) and Terschelling (beach pole 18.200).

2.3 Monitoring frequency and period

The reference beaches are surveyed four times a year. However, circumstances may lead to inaccessible situations for surveyors: such as stormy wind, and hazards such as rain, snow, or ice, and unexpected events such as container loss may result in a postponed or cancelled beach survey. The survey periods are as follows: Winter (January), Spring (April), Summer (July); and Autumn (October).

2.4 Data Management

The beach litter monitoring data are entered in the OSPAR database[1] within three working days after the monitoring took place, to have a good visual memory of the results and circumstances. The transcribed monitoring forms are scanned and digitally stored and added to the annual report. The monitoring data are (digitally) presented in an export of the OSPAR database. Until 2013, the data were entered by North Sea Foundation surveyors into an Excel file, and RWS transferred the data from the Excel file into the online database. From 2014 onwards, the North Sea Foundation enters the data from the (fresh) paper monitoring forms into the OSPAR Beach Litter Database online database. The Marine Conservation Society (MCS) now hosts this database. In 2020 the database will be transferred and hosted by the OSPAR commission. RWS CIV also stores the beach litter data in the RWS DONAR database.

2.4.1 Data clean-up

The OSPAR beach litter data files are cleaned by removing the mesoplastic fragments (<2.5 cm, type 117), wax types (types 108-110) and other pollutants (type 111) from the datafile. This removal is

[1] http://www.mcsuk.org/ospar/home

automatically performed via the litteR type file, because these types are excluded (not selected) in the Total Count group and the other groups.

2.6 LitteR software

In 2020 Rijkswaterstaat has developed a new tool to perform statistical analysis of litter data (e.g. beach, river, seafloor litter). This LitteR package version 8.1 provides functions to facilitate several kinds of litter analysis, e.g., trend analysis[2]. The following descriptive statistics are performed: 1) mean count, i.e., the arithmetic mean of the counts for each litter type, 2) median count, i.e., the median of the counts for each litter type 3) relative count: the contribution of each litter type to the total count of litter types (%) 4) coefficient of variation(CV): the ratio of the standard deviation to the mean of the counts for each litter type (%) 5) ratio of MAD and median (RMAD, %) 6) number of surveys (n) 7) Theil-Sen slope (slope): a robust non-parametric estimator of slope (litter counts / year) 8) p-value: the p-value associated with the one-tailed Mann-Kendall test to test the null hypothesis of no monotonically increasing trend in case the Theil-Sen slope is greater than zero and no monotonically decreasing trend in case the Theil-Sen slope is smaller than zero.

The outputs of the analysis are included in LitteR reports including tables and bar plots, the descriptive statistics for the litter types and groups are stored in a CSV-file. All litteR input and output files for a single run are stored in a single snapshot folder.

2.7 Calculation of total litter count

The occurrence of considerable fluctuations in the total abundance of beach litter surveys was avoided by using 6-year arithmetic averages and median values to describe total abundance. The litter type small plastic pieces <2.5cm [117] is excluded from the total count calculation and is analysed separately. The averages are calculated from individual beach survey abundance, and not from annual averages.

2.8 Threshold value compliance check

The threshold value is calculated based on 39 surveys (from 6-7-2017 until 17-10-2019), litter type small plastic pieces <2.5cm [117] is excluded. The median value is calculated of these 39 surveys to calculate the median assessment value. This value is compared to the threshold value of 20 litter types per 100 m coastline (Van Loon et al. 2020).

2.9 Material analysis

Trend analysis is performed of the total abundances of litter types (period 2014-2019) which have been assigned to any of the following categories: Plastic/polystyrene, Rubber, Sanitary, Paper/cardboard, Wood, Glass, Cloth/textile, Metal, Ceramic/pottery, and Medical.

2.10 Single Use Plastics

Trend analysis is performed using the combined total counts of the following single use litter types (period 2014-2019):

Plastic: Yokes [1]; Plastic: Bags [2]; Plastic: Small_bags [3]; Plastic: Bag_ends [112]; Plastic: Drinks [4]; Plastic: Cleaner [5]; Plastic: Food [6]; Plastic: Toiletries [7]; Plastic: Other_bottles [12]; Plastic: Caps [15]; Plastic: Crisp [19]; Plastic: Cups [21]; Plastic: Cutlery [22]; Plastic: Fertiliser [23]; Plastic: Meshbags [24]; Rubber: Balloons [49]; Paper: Cig_stubs [64]; San: Condoms [97]; San: Buds [98]; San: Towels [99]; San: Tampons [100]; San: Toilet [101]; San: Other [102]; Med: Containers [103]; Faeces: In_bags [121]

2.11 Fishing related litter types

Trend analysis is performed using the combined total counts of the following fishing related litter types (period 2014-2019):

Plastic: Lobsterpots [26];Plastic: Fish_tags [114]; Plastic: Octopus_pots [27]; Plastic: Oyster_nets [28]; Plastic: Oyster_trays [29]; Plastic: Mussel_sheeting [30]; Plastic: Rope [31]; Plastic: String [32]; Plastic: Fishing_net_small [115]; Plastic: Fishing_net_large [116]; Plastic: Tangled [33]; Plastic: Fishboxes [34];

[2] https://cran.r-project.org/web/packages/litteR/index.html

Plastic: Fishing_line [35]; Plastic: Light_sticks [36]; Plastic: Floats [37]; Wood: Lobsterpots [71]; Wood: Fish_boxes [119]; Pottery: Octopus_pots [95]

2.12 Top-80% analyses

Trend analyses are performed on the top-80% litter types. The top-80% is defined as the list of most abundant litter types that during a six-year period constitute an average of at least 80% of the total abundance.

2.11 Unknown litter types

Photographs of unknown litter types are stored in a photo database at the North Sea Foundation, sent to ICGML Basecamp for judgment of other marine litter experts and are displayed in the annual report.

2.12 Survey dates and special circumstances

Survey dates and relevant special circumstances, such as extreme weather conditions, nearby sand supplementation or any other activities that may influence the monitoring, are listed on the field forms and published in the annual report.

2.13 Indication of waxes and other pollutants

During each monitoring, the presence of paraffin is registered under OSPAR code 108 size 0-1 cm, 109 size 1-10 cm and 110 size >10 cm. The frequency of how many pieces or lumps of paraffine are found is estimated per meter of strandline. Waxes are monitored along the flood line with the assumption based on experience that all waxes are gather there. The total number per size category within three squares of 1 by 1 meter along the flood line is registered. If the waxes are found along the entire flood line then for three squares of 1 meter by meter all lump waxes are counted for each size category and divided by three and recorded on the OSPAR form. For this report, the presence percentage for the period 2014-2018 for each size category is calculated. For the trend analysis, the Excel Data analysis toolbox was used to calculate the p values.

2.14 Indication of pellets

Each monitoring the presence of pellets is registered with a yes/ no on the OSPAR form. To get a better insight in the number of pellets washing ashore, an indication of the number of pellets found during each monitoring is recorded in the notes section. The following count sizes categories are used: 1-50, 50-100 and 50-<500 pellets. The presence percentage of pellets for the period 2014-2018 is included in the report. For the trend analysis, the Excel Data analysis toolbox was used to calculate the p value.

2.15 Monitoring of total weight

Since 2016, supplementary research has been conducted by weighing the marine litter gathered after each survey. From 2017 on, during all surveys marine litter weighted and recorded. The aim is to get a better insight in the weight of marine litter washing ashore. The recorded weights are analysed with LitteR to conduct a total weight trend analysis.

3. Results & Discussion

This chapter includes the beach litter monitoring results of the period 2014- 2019. In the following sections, the total count for each beach and for all beaches aggregated are shown. The top-80% analysis of total litter count and material analysis will be elaborated on in more detail. Due to the use of LitteR, the data presentation differs with previous annuals report.

Exports from the OSPAR database containing all litter data from have been added in Appendix I. The scanned field forms included in Appendix II. The LitteR analysis files are included in Appendix III.

3.1 Special circumstances and weather conditions

The prevailing wind direction in the Netherlands is southwest. According to the KNMI there were no heavy storms with windspeed 10 Beaufort (24.5 m/s) or above in 2019 (KNMI, 2020). In addition, there were no specific extreme weather conditions which have influenced the results of the surveys conducted in 2019. However, during the winter survey conducted in January 2019 in Noordwijk, a large amount of litter was found which was mixed with natural materials, mostly wood.

Due to intense cleaning activities after the container losses of the vessel MSC Zoë early January 2019, the monitoring on Terschelling in quarter 1 of 2019 was not conducted.

3.2 Descriptive statistics

Exports from the OSPAR database containing all litter data from 2014- 2019 have been added in the digital Appendix II. During this period, 95 surveys were performed. In the following sections, the total count for each beach and for all beaches aggregated are shown. The top-80% analysis of total item count, source analysis, and material analysis will be elaborated on in more detail.

3.2.1 Total count

The average total item abundance per 100 meter beach, the trend and the significance of the trend are displayed in table 2, 6-year arithmetic averages and median values are presented. The median total count (excluding small plastic pieces <2.5cm) in the period 2014-2019 is 193 counts/100 m beach. The average number (mean) of total litter count for all beaches aggregated amounts to 254 litter types per 100 m beach. Decreasing trends were found for Veere, Noordwijk and Terschelling. No trend was found for Bergen. In 2019, the lowest count of litter types per survey was in Veere (40 counts/100 m) and the highest count was in Noordwijk (568 counts/100 m).

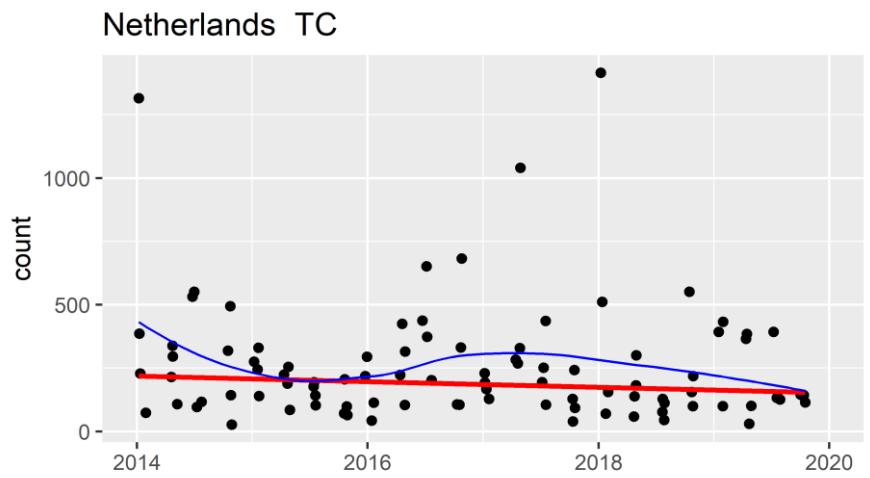

Figure 3 Trend plot total count aggregated results for all Dutch beaches with trend slope -11 and p value 0.09 (exclusively small plastic [117])

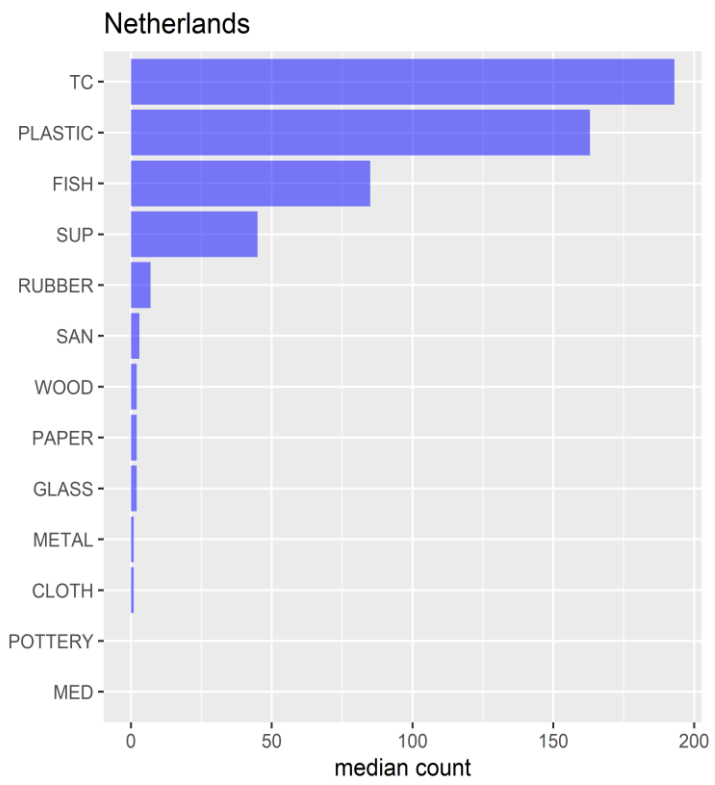

Figure 4 Material composition of aggregated results for all Dutch beaches (exclusively small plastic <2.5cm [117])

In each plot, the black dots are the observations, the thin grey line segments connect the dots and guide the eye, the blue line is the loess-smoother (it is only given for 25 or more points) and the red line is the Theil-Sen slope.

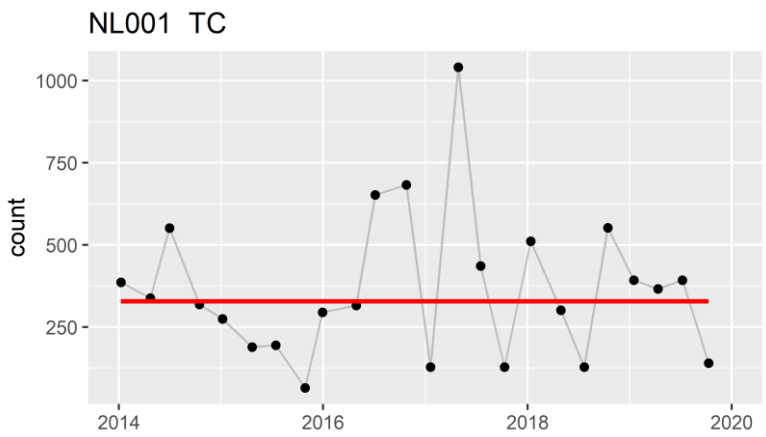

Figure 5 Trend plot aggregated total count results for NL001 Bergen (exclusively category small plastic [117]) for period 2014-2019 with trend slope 0 and p value 0.52.

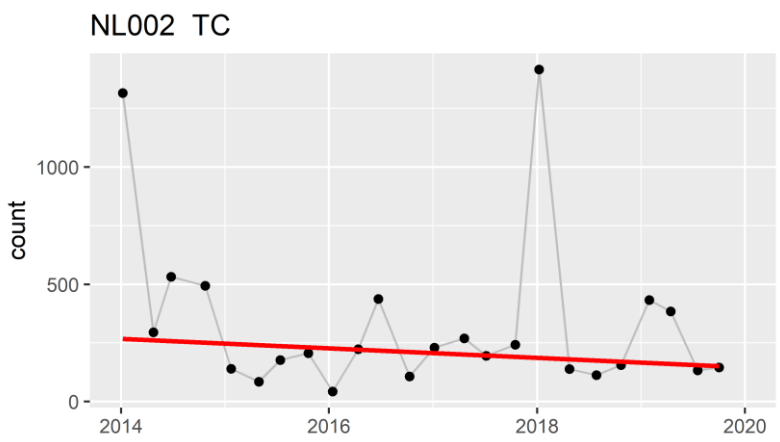

Figure 6 Trend plot aggregated total count results for NL002 Noordwijk (exclusively category small plastic [117]) for period 2014-2019 with trend slope -20.3 and p value 0.18.

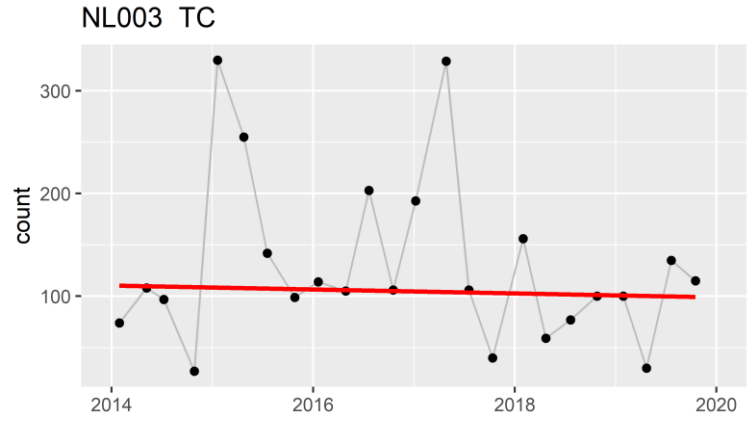

Figure 7 Trend plot aggregated total count results for NL003 Veere (exclusively category small plastic [117]) for period 2014-2019 with trend slope -1.91 and p value 0.33.

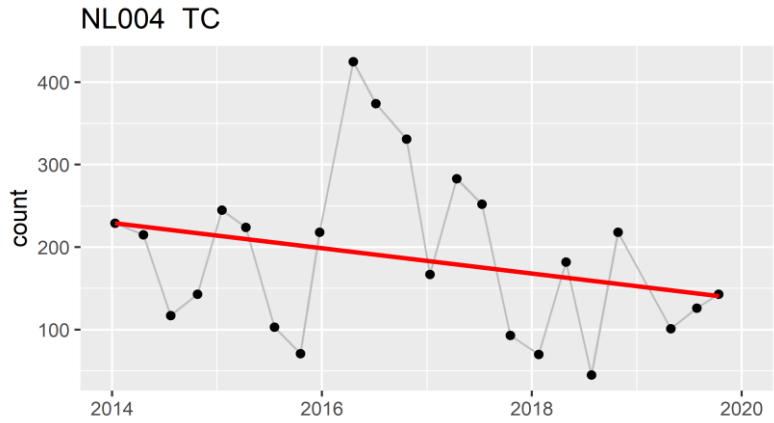

Figure 8 Trend plot aggregated total count results for NL004 Terschelling (exclusively category small plastic [117]) for period 2014-2019 with trend slope -15.3 and p value 0.01.

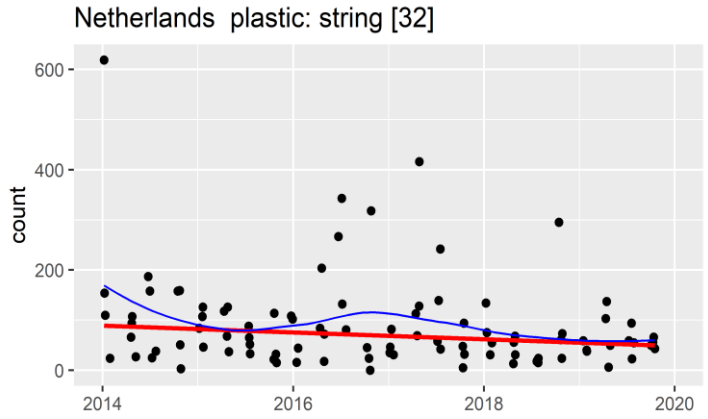

Figure 9 Trend plot plastic string and cord[32] aggregated results for the period 2014- 2019 with trend slope -6.79 and p value 0.02

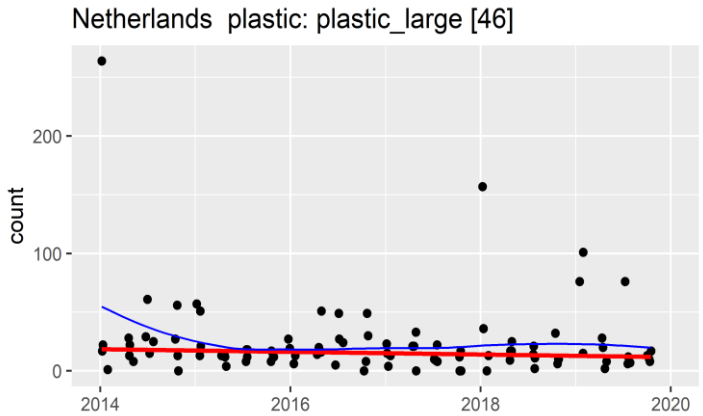

Figure 10 Trend plot Plastic/polystyrene pieces 2,5 cm > < 50 cm [46] aggregated results for the period 2014- 2019 with trend slope -1.14 and p value 0.05

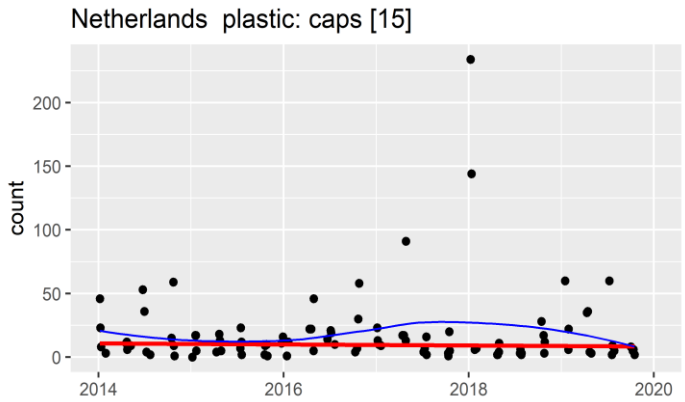

Figure 11 Trend plot Plastic caps [15] aggregated results for the period 2014- 2019 with trend slope -0.4 and p value 0.21

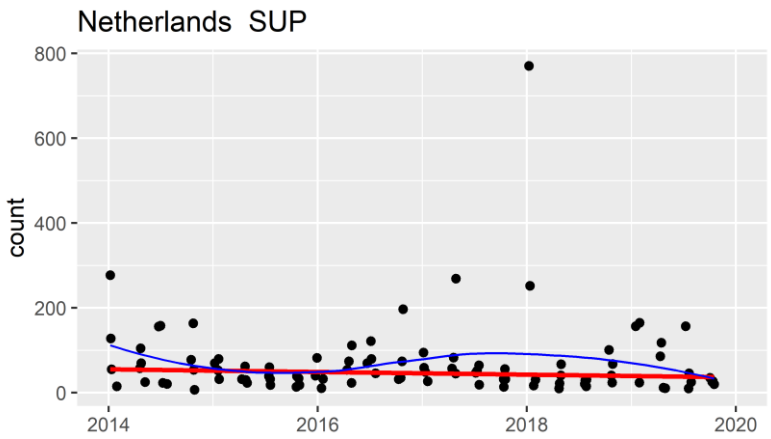

Figure 12 Trend plot for SUP items aggregated results for period 2014-2019 with trend slope -3.1 and p value 0.05

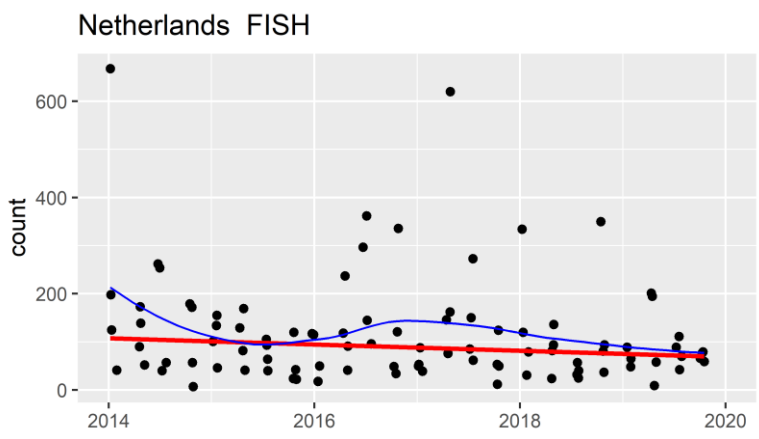

Figure 13 Trend plot for fish related items aggregated result for period 2014-2019 with trend slope -6.5 and p value 0.04

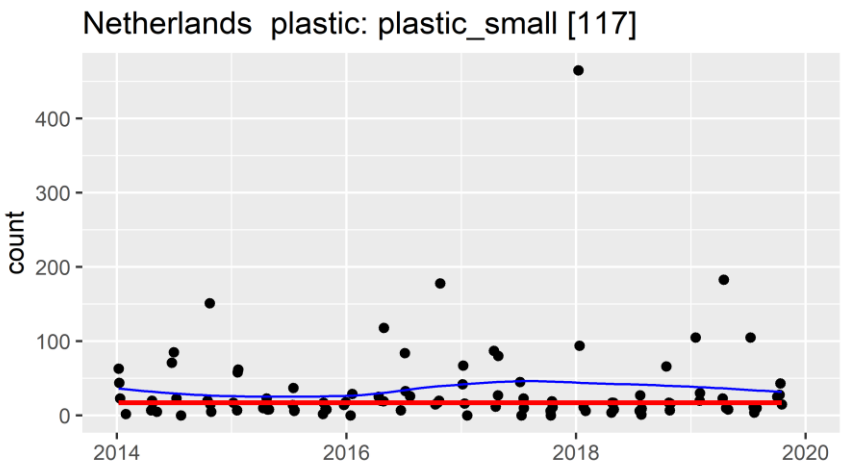

Figure 14 Trend plot small plastic pieces <2.5 cm [117] aggregated results for the period 2014- 2019 with trend slope 0 and p value 0.60

Figure 16 Litter found during survey in Bergen, 2019

Figure 17 Lead surveyor Marijke Boonstra on beach of Terschelling.

Figure 18 Small pieces of plastic and pellets

Figure 19 Dolly rope which is recorded under string and cord is found on the beach of Bergen, 2019

Figure 20 Paraffine found during survey in Noordwijk, 2019

Figure 21 Fishing related litter found on the beach of Bergen, 2019.

	
Figure 22 Polluted beach after container disaster near Terschelling (Source ANP, 2019	Figure 23 Polluted beach after container disaster near Terschelling (Source ANP, 2019

Table 2 Total count, trend and significance of the trend per beach and for all four beached aggregated for the period 2014-2019 (exclusively category small plastic [117]). Significant trends are printed in bold.

Spatial code	Location	period		mean	median	n	slope	p value
NL001	Bergen	8-1-2014	10-10-2019	366	328	24	0	0.52
NL002	Noordwijk	7-1-2014	2-10-2019	330	214	24	-20.3	0.18
NL003	Veere	29-1-2014	17-10-2019	129	106	24	-1.91	0.33
NL004	Terschelling	11-1-2014	12-10-2019	190	182	23	-15.3	0.10
Ber|Noo|Ter|Vee	Netherlands	7-1-2014	17-10-2019	254	193	95	-11	0.09

In comparison with the total count inclusively small plastics <2.5 cm [117] of the period 2013-2018, the total count continues to decrease. The median total count for the 2013-2018 was 289 counts/100 m . For the period 2014-2019 it is now 222 counts/100 m beach. The aggregated slope trend for all litter types including small plastics <2.5 cm [117] is again decreasing from -32 in 2013-2018 to -10.8 in 2014-2019 (p value 0.14. However, the trend seems to be stagnating.

3.2.2 Top-80% types

Top-80% analysis has resulted in a top-11 for all four beaches for the period 2014-2019. Since this research aims to provide insight in the Dutch situation, results are displayed as aggregated results for all four beaches. The aggregated results for the four Dutch beaches are given in table 3

Plastic string ranks as the number one most found item, this litter type accounts for more than 34% of the total number of litter types found. In the top 80% most found litter types Plastic nets and pieces of net<50cm [115] shows an increasing trend. Plastic string and cord (mostly dolly rope) [32], Plastic/polystyrene pieces 2.5 cm >< 50 cm [46], Plastic caps [15], Tangled nets/cord/rope) and string (mostly dolly rope [33], Plastic industrial sheeting [40] and Rubber Balloons, including plastic valves, ribbons, strings etc. [49] have decreasing trends. For Plastic foam sponge [45], Plastic crisp/sweet packets and lolly sticks [19] and Plastic Cutlery/trays/straws [22] and Sanitary plastic Cotton bud sticks [28] no visible trends were found.

The trend plots for the top 3 most found litter types are included in figure 9, 10 and 11.

Table 3 Top 80% of most found litter types along the Dutch coast, including mean and median counts/100m, percentage of total count, trend [total count/year], and trend significance for the period 2014-2019. Significant trends are printed bold.

Aggregated results for Terschelling / Bergen / Noordwijk / Veere (period 7-1-2014/ 17-10-2019)							
Rank	**Litter category [OSPAR-100-ID]**	**mean**	**median**	**%TC**	**n**	**slope**	**p value**
1	Plastic: string [32]	88.7	59	34.3	95	-6.79	**0.02**
2	Plastic: plastic_large [46]	23.5	15	9.02	95	-1.14	**0.05**
3	Plastic: caps [15]	18.3	9	5.96	95	-0.4	0.21
4	Plastic: foam sponge [45]	11.7	6	5.22	95	0	0.27
5	Plastic: crisp [19]	12.7	8	4.83	95	0	0.41
6	Plastic: fishing net small [115]	13.1	4	4.62	95	0.909	**0.01**
7	Plastic: tangled [33]	7.84	6	3.95	95	-0.251	0.12
8	Plastic: industrial [40]	8.23	6	3.46	95	-0.505	**0.05**
9	Rubber: balloons [49]	8.11	6	3.09	95	-0.836	**0.01**
10	Plastic: cutlery [22]	5.56	2	1.76	95	0	0.48
11	Sanitary: buds [98]	5.76	2	1.61	95	0	0.81

3.3.3 Small plastics

The category small plastic pieces >25cm [117] has been analyzed separately. These small plastic pieces account for 10.3% of the litter recorded in the period 2014-2019. The median is 17 counts/ 100 m and the average (mean) accounts for 35 counts/100 m. No trend is found and has a p value of 0.60.

3.3.4 Material analysis

The litter types are categorized in following categories: plastic/polystyrene [406], rubber [407], sanitary [414], wood [410], paper/cardboard [409], glass [412], metal [411], cloth/textile [408], ceramic/pottery [413] and medical [415].

In addition, all types are categorized under single use plastic (SUP) en fishing related litter (FISH).

In the period 2014-2019, plastic is the most found type of material followed by rubber, sanitary, paper/ cardboard and wood (see figure 4). The other materials are glass, metal, cloth/textile, ceramic/pottery and medical. Since the category rubber, sanitary and medical litter types included plastic litter types such as cotton bud sticks and balloons including plastic strings and sanitary containers, the percentage of plastic materials is higher. These categories together account for 6.1%. By applying this method, 93% is of the type of litter found is plastic.

The data shows decreasing trends for plastic/polystyrene (-11.9) and rubber (-0.61). Minor increasing trends were found for sanitary (0.209) and wood litter types (0.268). For paper/ cardboard, wood, glass, metal, cloth/textile, ceramic/pottery and medical no trends were found. Trend analysis of all litter materials are provided in table 4.

Table 4 Aggregated material trend analysis of litter types for each material category including trend in abundance/year and significance of trend for the period 2014-2019. Significant trends are printed bold.

Aggregated results for Terschelling / Bergen / Noordwijk / Veere (period 7-1-2014/ 17-10-2019)					
Material category	**mean**	**median**	**% of total count**	**Trend [abundance/ year]**	**Significance of trend (p-value)**
plastic/polystyrene [406]	222	163	86.9	-11.9	0.06
rubber [407]	9.72	7	3.8	-0.605	0.05
sanitary [414]	7.15	3	2.2	0.209	0.08
wood [410]	3.29	2	1.8	0.268	**0.02**
paper/cardboard [409]	3.96	2	1.8	0	0.92
glass [412]	2.83	2	1.4	0	0.65
metal [411]	2.22	1	0.9	0	**0.05**
cloth/textile [408]	1.69	1	0.7	0	0.11
ceramic/pottery [413]	0.821	0	0.3	0	0.55
medical [415]	0.421	0	0.1	0	0.94

3.3.5. Trends for Single Use Plastics and Fishing related litter

Specific material analysis is conducted for single use plastics and fishing related litter types (see paragraph 2.10 and 2.11). Single use plastics account for 25.5% of the total count and fishing related items account for 45.5% of all litter types found. The data shows decreasing trends for single use plastics (-3.1 counts/year) and for fishing related type (-6.47). Trend analysis of SUP and FISH types are provided in table 5.

Table 5. Aggregated material trend analysis of SUP and FISH litter types for each material category for the period 2014-2019. Significant trends are printed bold.

Aggregated results for Terschelling / Bergen / Noordwijk / Veere (period 7-1-2014/ 17-10-2019)					
Material category	**mean**	**median**	**% of total count**	**Trend [counts/year]**	**Trend significance (p-value)**
Single Use Plastics (SUP)	69.2	45	25.5	-3.08	0.054
Fishing related litter (FISH)	116	85	45.5	-6.47	**0.042**

3.4. Threshold value

The threshold value (TV) is calculated based on 39 surveys (from 6-7-2017 until 17-10-2019), litter type small plastic pieces 0.5-2.5 cm [117] is excluded. The median 39 surveys conducted in the period 6-7-2017 until 17-10-2019 is 140 items per 100 meter of coastline. The threshold value of 20 counts per 100 m coastline is not yet met.

3.5 Presence of wax and other pollutants

Since the beginning of the beach litter monitoring (2002), the presence of pollutants, such as paraffin, has been separately recorded on the OSPAR Marine Litter Monitoring Survey Form. This included four litter types. Paraffin/waxes are recorded per size category which are 0-1cm [108], 1-10 cm [109] and >10cm [110] and the frequency of paraffin per 100m (estimated number per meter of strandline) is recorded. For other pollutants [110] only frequency is recorded.

In 2019, during 67% of the surveys conducted waxes such as paraffin were found. Medium wax pieces (size 1-10 cm) were most found, in 60% of surveys medium sizes waxes were found. Table 7 includes the number of waxes and pollutants found in the period 2014-2019 with median and averages (mean) per size category. Figure 24 shows the percentages and trend indications for the period 2014-2019. The trend indications show that the overall presence of is increasing. The presence of medium and large wax pieces show no clear trend. The trend indication of the presence of small pieces shows a clear increase. There seem to be variances in the number and sizes of pollutants found. More research is needed to gain insight in these variations.

Tabel 6 Overview of number of times waxes and other pollutants per size category found in period 2014-2019

Years	Number of times found Wax_small [108]	Number of times found Wax_medium [109]	Number of times found Wax_large [110]
2014	0	9	1
2015	0	5	1
2016	3	7	1
2017	6	8	1
2018	6	4	0
2019	7	9	2
Mean total number of times waxes found period 2014-2019	4	7	1
Median total number of times waxes found period 2014-2019	5	8	1

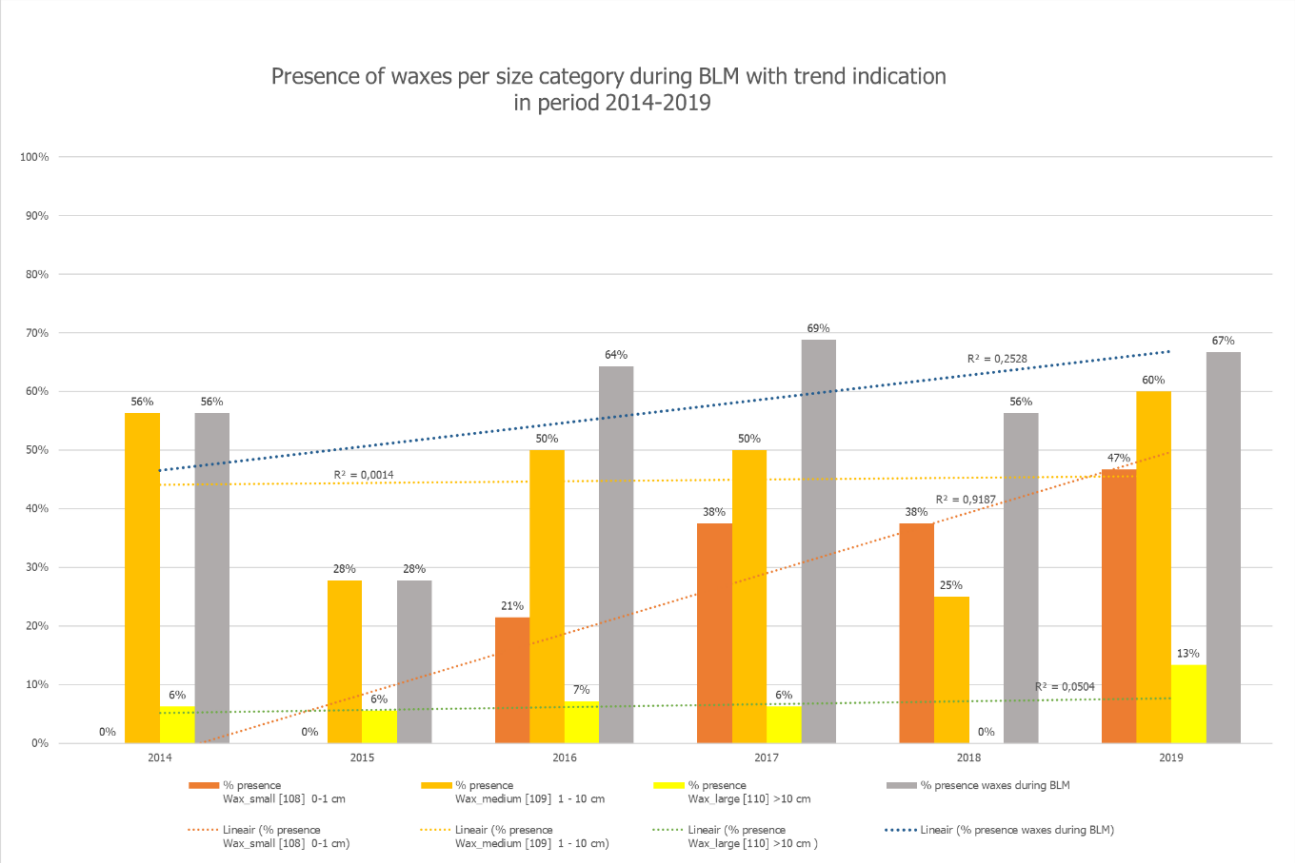

Figure 24 Presence of waxes per size with trend indication in period 2014-2019

3.6 Pellets

In 2019, during 13 (87%) of the 15 surveys conducted, plastic pellets were found. In 2018, during 6 (38%) of the 16 surveys conducted, plastic pellets were found. In some cases, it was only a few (1-50), in other cases more than (50 - <500) pellets. Table 6 shows the periods where plastic pellets are found. Plastic pellets are mostly found in Q3 and Q4 in 2019. In Bergen and Noordwijk, pellets were found during all surveys, the abundance of pellets was highest on the beach of Bergen. Furthermore, an analysis was conducted on the presence of pellets for the period 2014-2019. The results are included in table 7. In the period 2014-2019, during 48% of surveys pellets were found. Most times pellets were found in 2017 and 2019. Bergen is the location where most pellets in the period 2014-2019, in 75% of surveys conducted pellets were found. Based on the trend analysis of the total number of times pellets found in the period 2014-2019, the average (mean) of the times pellets are found is 8 and the median is 7 times per year. The trend is significant increasing trend (p value 0.00). In figure 25, the trend indication is shown.

There seem to be yearly variances in the number of times pellets are present. More research is needed to gain insight in these variations.

Table 7 Presence of pellets in 2014-2019

Location	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**% of surveys where pellets were found per location in period 2014-2019**
Bergen	3	1	3	3	4	4	75%
Noordwijk	1	1	2	3	1	4	50%
Terschelling	1	0	1	2	1	3	35%
Veere	1	1	2	2	0	2	33%
Total number of times pellets found per year	6	3	8	10	6	13	46
% of surveys where pellets were found per year	38%	17%	57%	63%	38%	87%	48%

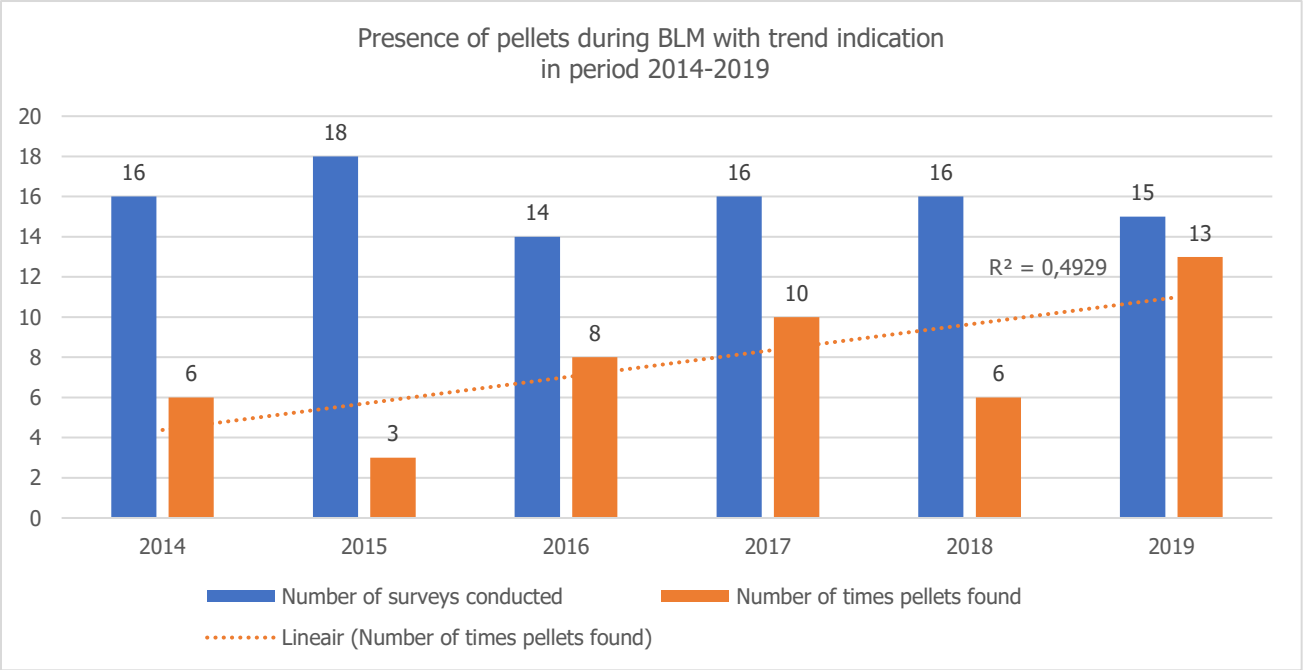

Figure 25 Presence of pellets found during BLM with trend indication in period 2014-2019 (p value 0.00)

3.7 Monitoring of total weight

In 2019, beach litter was weighed at all 15 surveys. All litter types were collected in a plastic bag after the sand was manually removed by shaking off the sand as much as possible. The bag was weighed with a digital balance. In 2016, the weight of marine litter has been recorded. At 57 surveys in the last four years marine litter weighs are recorded (see Appendix IV for the overview).

The median total weight is 4.9 kilograms/100 m. On average the total weight accounts for 5.9 kilogram/100m. The aggregated slope trend for the total weight shows a decreasing trend slope of -0.65 with a p value of 0.09 (see figure 26).

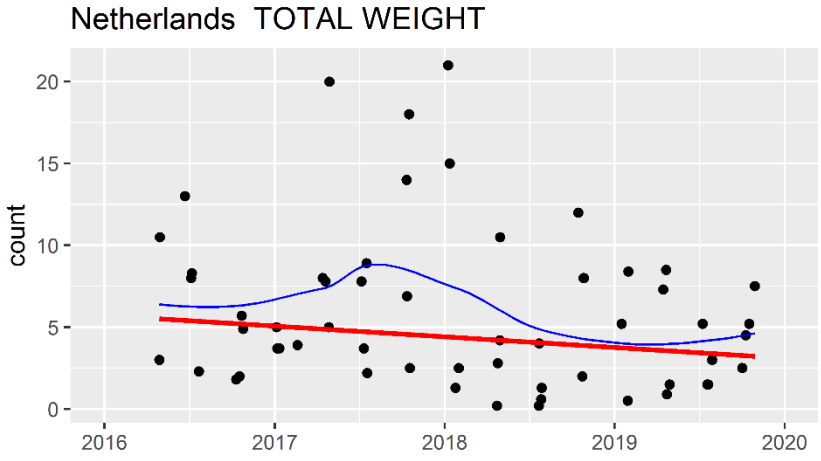

Figure 26 Aggregated trend plot for beach litter weighed at 57 surveys in period 2016-2019 (trend slope -0.65 and p value 0.09)

Based on the data collected in the past four years, there seems to be a correlation between the number of litter types found and the average weight of marine litter recorded. Both show a decreasing trend. It could be explained by the fact that large litter types which in most cases are more heavy, are less frequently found. More data and in-depth analysis is needed to establish this correlation.

3.8 General discussion

The beach litter monitoring aims to gain insight into the quantities and types of litter that wash up on the Dutch North Sea beaches. This provides insight into the presence of (floating) litter and the degree of pollution in the North sea.

The analysis of the period 2014-2019 shows a decreasing trend, which is good news. This is probably the result of increased public and political awareness, successful public campaigns and projects by various NGO's, implementation of international, European, national laws and policies. The increased awareness has also led to a growing number of (beach) cleaning initiatives and individual cleaning efforts during beach visits.

At the same time, the Dutch coast has become more popular. For coastal municipalities, a clean beach is high on the agenda, with tourism and the rise in (international) tourists as important drivers. The number of international tourists grew with 7% compared to 2018, to 20,1 million visitors. Almost 15% of these visitors visited the Dutch coast during their stay (NBTC Holland Marketing, 2020). As for Dutch tourists, a visit to the beach was on the top 3 activities in 2018 (NBTC Holland Marketing, 2019).

Coastal municipalities participate in "Clean Beach Elections" that are organised since 2003. All municipalities with reference locations are currently participating in this competition. These are the touristic parts of the beaches in those municipalities. Some municipalities have placed garbage bins on the beaches to encourage beach tourists to dispose their litter. These garbage bins are also often used to dispose marine litter found on the beach.

In addition, the yearly Boskalis Beach Cleanup Tour, a coastal clean-up where the entire Dutch coast is cleaned up in the month August, was organised by the NSF for the seventh time in 2019. During this event, 10,991 kilogram of litter was collected.

In various coastal municipalities beachcomber bins[3] and containers are placed along the coast to encourage beachgoers to clean beaches. Other activities such as river clean-ups have also been conducted at a larger scale than before. In the period 2013-2018 a total of 175.000 kilo of litter was removed of riverbanks (Schone Rivieren, 2019). Since 2017, the Plastic Soup Foundation organises World Cleanup Day in the Netherlands. Worldwide more than 20 million people participated. These are examples of large clean-up activities. There are much more examples of smaller initiatives, schools and individuals that clean beaches, rivers, canals, streets, parks etc. on regular basis.

Another example is the Fishing For Litter scheme where fishermen collect debris that gets stuck in their nets during normal fishing activities. This debris is stored in big bags and delivered in the ports for processing. In 2019, 567 tons of debris was collected which also included lost container goods of the MSC Zoe (KIMO, 2020). It is likely that operational fishing waste is also collected in these bags. Currently, 134 fishing boats are participating.

Lastly, Rijkswaterstaat initiated a national arrangement "Zwerfafvalophaalregeling (ZOR)" in 2018. With this arrangement Rijkswaterstaat encourages to collect litter along the coast and riverbanks by third parties. The litter collected is collected and processed free of charge. Currently, no information is available how many third parties have made use of the arrangement and how much litter is collected.

It is difficult to assess how these developments and increased awareness and cleaning activities affect the OSPAR Beach Litter Monitoring. No exact information is available on litter amounts and types collected by municipalities and coastal cleaning initiatives on an annual basis. The question rises, are we getting better at cleaning of is the North Sea getting cleaner? Probably both factors contribute to the currently decreasing trend.

The fulmar litter monitoring also shows a decreasing trend of litter found in fulmar stomachs. Combined with the results of the beach litter monitoring, there are indications that the abundance of litter in the North Sea is decreasing. More data sources will need to be combined to answer the

[3] "Jutbakken" are beachcomber bins that placed on the beach. Beachcombers can dispose litter found on beaches in these bins. These bins are emptied by the municipality. There is variety of type of bins placed on beaches.

question with high certainty. In the meantime, political, public and governmental efforts should continue to stop the input of litter in our seas.

4 Conclusions and recommendations

4.1 Conclusions

This report provides an annual update of Dutch beach litter monitoring data and an overview of the Dutch beach litter statistical data analysis results for 2014-2019. This year the statistical analysis was conducted using the LitteR software. This meant that some changes were made on the analysis and presentation of the data, compared to previous years.

The 2014-2019 beach litter monitoring data suggest that the Dutch beaches are getting cleaner, though the 6 year trend is not statistically significant (p value 0.01). On average 254 litter types (excluding small plastic pieces [117]) are found per 100 meter beach in the period 2014-2019. The median total count is 193 items per 100 m beach for the period 2014-2019. The average count including small plastic pieces [117] is 289 litter types per 100 meter beach (p value 0.14). The aggregated trends for the total counts excluding small plastic pieces show a decreasing trend of -11 items per 100 meter beach per year. In 2019, the highest count was in Noordwijk, with 568 litter items during one survey, the lowest number of litter items was 40, during a survey in Veere.

The beaches Noordwijk, Terschelling and Veere show a decreasing trend in total counts per year. Noordwijk has the highest decreasing trend in average item abundance per year, namely -20.3. For Bergen no trend was found. In comparison with the period 2013-2018 the decreasing trends seem slower; which could indicate it is getting more difficult to reduce the number of litter items further.

On average the total weight accounts for 5.9 kilogram/100m. The median total weight is 4.9 kilograms/100 m. The aggregated slope trend for the total weight shows a decreasing trend slope of -0.65 with a p value of 0.09.

The threshold value of 20 counts/100m is not yet met.

Plastic is the most found material. It accounts for more than 93% of all the litter items found. The data shows decreasing trends for plastic/polystyrene (-11.9 counts/year) and rubber (-0.61). Minor increasing trends were found for sanitary (0.209) and wood litter types (0.27 counts/year). For paper/ cardboard, wood, glass, metal, cloth/textile, ceramic/pottery and medical no trends were detected.

The top 80% litter items are: string [32] 34%; Plastic: plastic_large [46] (9%); Plastic: caps [15] (6%); Plastic: foam sponge [45] (5%); Plastic: crisp [19] (5%); Plastic: fishing net small [115] (4%); Plastic: tangled [33] (4%); Plastic: industrial [40] (4%), Rubber: balloons [49] (3%); Plastic: cutlery [22] (2%); Sanitary: buds [98] (2%).

The top-80% litter type analysis shows decreasing trends for 6 of the top 80% most found litter types. The largest decreasing trend (-6.8 counts/year) is from string and cord followed by balloons and ribbons (-0.8 counts/year) and industrial plastics (-0.5 counts/year). No trends were found for foam sponge, plastic crisp/sweet packets and lolly sticks, plastic cutlery/trays/straws and plastic cotton buds. Nets and pieces of net <50 cm shows a slight increasing trend (+0.9).

Specific functional use analysis was conducted for the single use plastics (SUP) and fishing related litter (FISH) groups. Single use plastics account for 26 percent of the total count and fishing related items account for 46 percent of all litter types found. The data shows decreasing trends for SUP types (-3.1 counts/year) and FISH types (-6.47).

In 2019, during 67 percent of the surveys conducted paraffin was found. In the period 2014-2019 the trend indication show an increase in the presence of paraffin waxes for especially small pieces.

In 2019, during 13 (87 percent) of the 15 surveys conducted, plastic pellets were found. In the period 2014-2019 plastic pellets were encountered during 48 percent of the surveys. The trend of presence of pellets shows a significant increasing trend with a p value of 0.00.

The results for the 2014-2019 beach litter monitoring data shows a decreasing trend and indicate that the Dutch North Sea beaches are getting cleaner. Fishing related litter which accounts for the largest amount of litter found show a decreasing significant trend.

However, overall downward trends are at a lower rate in comparison with the previous period (2013-2018). It is therefore important that current policies and measures in place are evaluated and further improved in such a way that it can maintain a continued reduction of marine litter entering the North Sea. These efforts are needed to reach the threshold value of 20 litter types per 100 m.

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Appendixes

Appendix IV Survey dates and weights

#	Survey beach	Year	Weight per monitoring in kg
1	NL03	28-4-2016	3.0
2	NL01	29-4-2016	10.5
3	NL02	22-6-2016	13.0
4	NL01	5-7-2016	8.0
5	NL04	7-7-2016	8.3
6	NL03	22-7-2016	2.3
7	NL02	10-10-2016	1.8
8	NL03	17-10-2016	2.0
9	NL04	22-10-2016	5.7
10	NL01	25-10-2016	4.9
11	NL02	5-1-2017	5.0
12	NL03	6-1-2017	3.7
13	NL04	11-1-2017	3.7
14	NL01	19-2-2017	3.9
15	NL04	14-4-2017	8.0
16	NL02	20-4-2017	7.8
17	NL01	28-4-2017	20
18	NL03	27-4-2017	5.0
19	NL02	6-7-2017	7.8
20	NL04	11-7-2017	3.7
21	NL01	17-7-2017	8.9
22	NL03	18-7-2017	2.2
23	NL01	11-10-2017	14
24	NL03	12-10-2017	6.9
25	NL02	16-10-2017	18
26	NL04	18-10-2017	2.5

27	NL001	12-1-2018	15.0
28	NL001	30-4-2018	10.5
29	NL001	23-7-2018	4.0
30	NL001	15-10-2018	12.0
31	NL002	8-1-2018	21.0
32	NL002	25-4-2018	2.8
33	NL002	28-7-2018	1.3
34	NL002	23-10-2018	2.0
35	NL003	31-1-2018	2.5
36	NL003	23-4-2018	0.2
37	NL003	22-7-2018	0.2
38	NL003	26-10-2018	8.0
39	NL004	24-1-2018	1.3
40	NL004	29-4-2018	4.2
41	NL004	27-7-2018	0.6
42	NL004	27-10-2018	8.0
43	NL001	16-1-2019	5.2
44	NL001	12-4-2019	8.5
45	NL001	9-7-2019	5.2
46	NL001	10-10-2019	4.5
47	NL002	30-1-2019	8.4
48	NL002	15-4-2019	7.3
49	NL002	19-7-2019	1.5
50	NL002	2-10-2019	2.5
51	NL003	29-1-2019	0.5
52	NL003	23-4-2019	0.9
53	NL003	21-7-2019	1.5
54	NL003	17-10-2019	5.2

55	NL004	29-4-2019	1.5
56	NL004	29-7-2019	3.0
57	NL004	29-10-2019	7.5