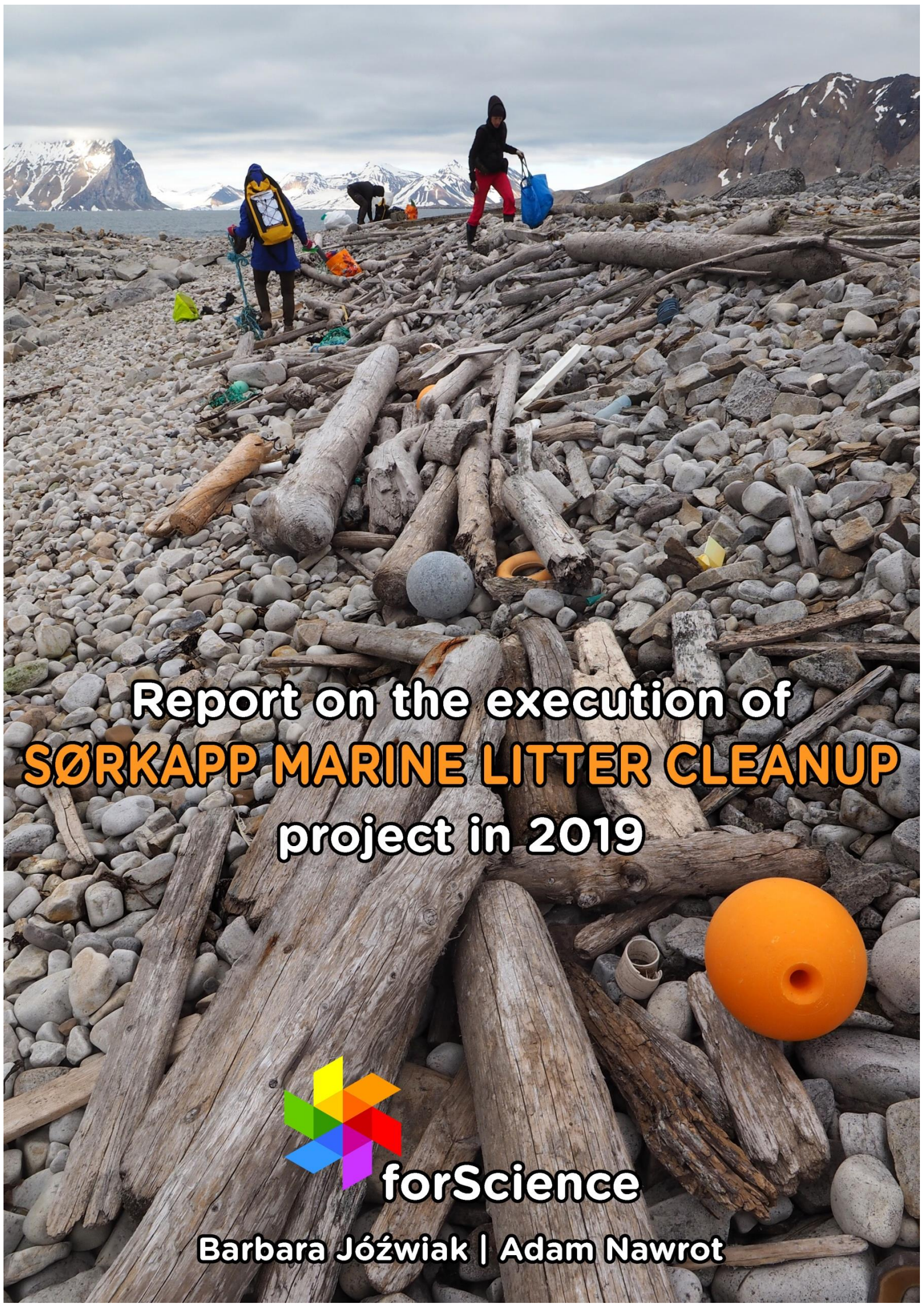

Report on the execution of SØRKAPP MARINE LITTER CLEANUP project in 2019

forScience

Barbara Jóźwiak | Adam Nawrot

Contents

1. About the forScience Foundation

The forScience Foundation is a little non-governmental organisation, whose statutory aims include diverse scientific, ecological and educational activity. For lack of external funding, our work was initially limited to co-organising events and helping to realise other people's ideas.

Sørkapp Marine Litter Cleanup project is our first fully independent endeavour. The funding necessary for its execution was granted in 2018 by Svalbard Environmental Protection Fund.

More information about the Foundation can be found on www.forScience.pl.

2. Project objectives

Sørkapp Marine Litter Cleanup is an initiative combining ecology and science. As a result, its objectives fall into two separate categories.

First of all, we aim to achieve an instant, positive impact by eliminating the immediate risk posed by beach litter to local wildlife. In order to maximise our contribution to local clean-up activities, we focus on a section of the coast which has not yet been subject to beach clean-ups[1]. The section covers the north-western coast of Sørkappland, located within Sør-Spitsbergen National Park.

[1] *According to the information provided by the Governor's Office, no official clean-up activities had been performed in the area prior to the commencement of Sørkapp Marine Litter Cleanup project. We have found out, however, that an unofficial beach clean-up was carried out along this section of the coast in August 1985. The information was shared by Adam Krawczyk from the Jagiellonian University in Kraków, Poland, who was at the time in Palffyodden with a group of scientists. In his journal Krawczyk described a meeting with four young Norwegians who conducted the clean-up. They started in Gåshamna, but it is hard to say where they stopped or how thorough they were. For the sake of the project, however, we assume that the litter found by the team within the project's target area had been accumulating along the shoreline for at least 34 years.*

To increase the scientific value of the fieldwork conducted in 2019, apart from the litter itself we also collected information on its types, amount, distribution and – as far as possible – origin.

One of the aims of the project is to eliminate the risk that beach litter poses to local wildlife.

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To increase the scientific value of our work, we collected not only litter but also litter-related data.

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In 2020, the Foundation's team will once again remove all beach litter from the exact same stretch of the coast and collect the above-mentioned litter data. The information will make it possible to estimate the rate of litter accumulation in this part of Svalbard and, at the same time, allow a better understanding of the differences in litter concentration along particular sections of the coast.

Bearing in mind how little is known about the rate in which marine litter accumulates along the west coast of Sørkappland (which constitutes the first potential accumulation zone for marine debris carried northwards by the West Spitsbergen Current and westwards by the East Spitsbergen Current), the results are bound to prove useful for environmental management and scientific research.

3. Project target area

Sørkappland is the southernmost tip of Spitsbergen, which is the largest island in the Svalbard Archipelago. The area stretches from Sørneset (in the south) to the southern coast of Hornsund Fiord (in the north), lying entirely within Sør-Spitsbergen National Park.

The section of the coast selected for the project starts at Andvika Bay and finishes 23 km further, near Breineset. In the east, the section is limited by the steep slopes of Wurmbrandegga ridge, while in the south it reaches the coastal plain of Brainesflya, terminating between the branches of the Slaklielva river (Fig. 3.1)[2].

One side of the project's target area is bordered by Hornsund Fiord, while the other faces the Greenland Sea. The beaches overlooking the open sea are under the influence of the warm West Spitsbergen Current and the cold East Spitsbergen Current, which flow along the western coast of the island, as well as wind waves generated by westerly winds and ocean swell generated at a

[2] *Initially, the southern limit of the target area was Breineset. After a careful analysis of the shoreline, however, we concluded that the point is located too far. This is the reason for the discrepancy between the target area as presented in the original map (available, among others, on the Foundation's website) and the map included in the present report.*

considerable distance from the shore during storms. The part of the coast located inside Hornsund Fiord is largely protected from phenomena occurring at sea. It is, however, affected by winds blowing from the northerly and north-westerly direction as well as easterly and north-easterly winds (prevalent in this part of the Svalbard Archipelago), which have no impact on the western coast. These differences, resulting from the location of the target area, will make it possible to better understand the impact of waves and swell, winds and ocean currents on the accumulation and distribution of beach litter in the area.

Moreover, the highly diversified shoreline will allow us to draw conclusions regarding litter concentration along particular sections of the coast.

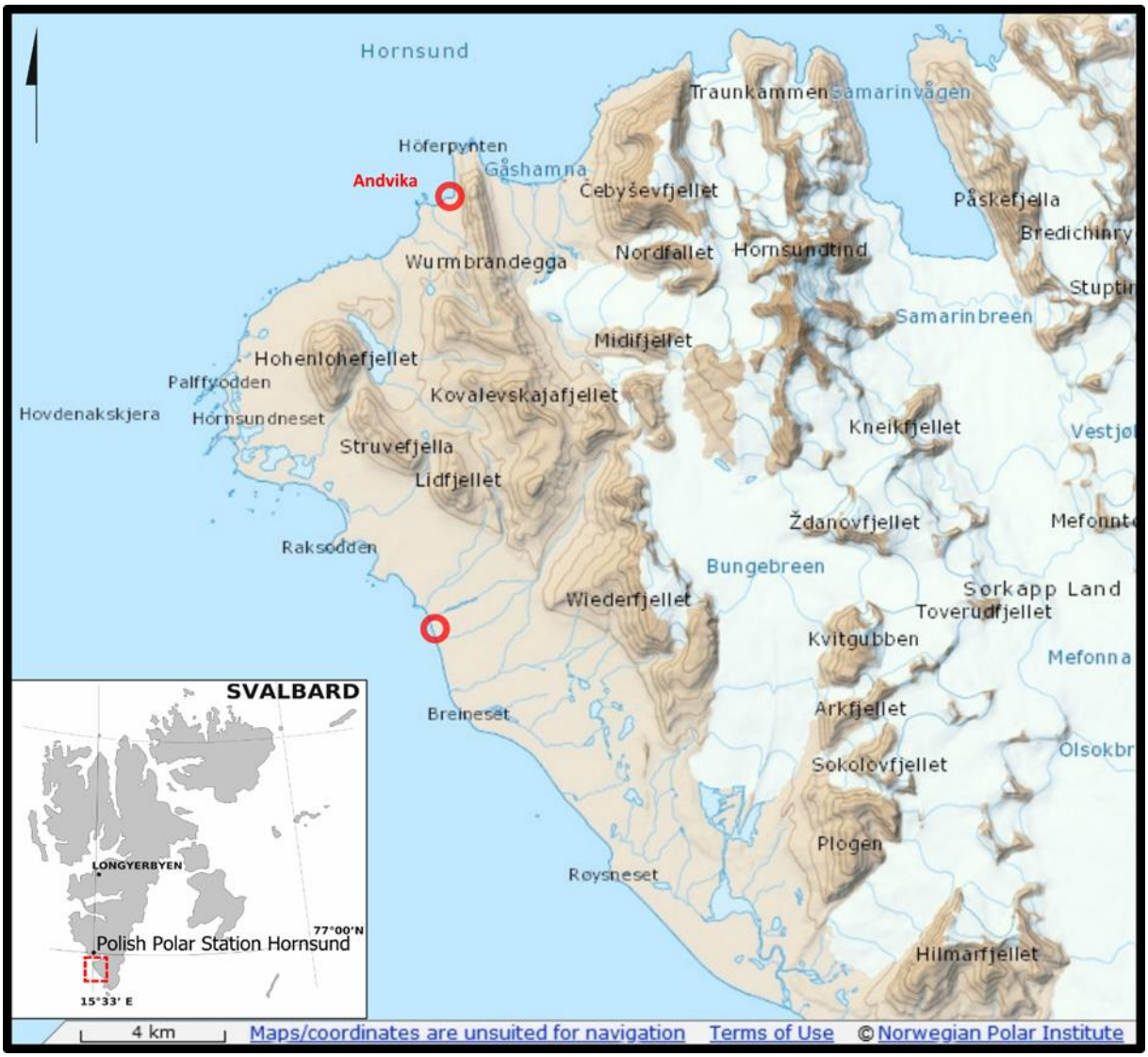

Fig. 3.1. Target area of *Sørkapp Marine Litter Cleanup* project
Map created by Adam Nawrot, forScience Foundation, on the basis of http://toposvalbard.npolar.no/

The beaches within the project's target area are mainly covered with coarse-grained gravel, stones and rocks of various sizes, while the shape of the shore is outlined by rocky outcrops. In the intertidal zone, the shoreline is highly varied, with numerous cliffs and crags, which make the task of litter collection significantly more difficult.

Sandy beaches are less common and the majority of them can be found in the section of the coast which faces westwards towards the open sea. They are flatter, with a thick layer of stones and gravel in the intertidal zone.

A typical beach of north-western Sørkappland.

© Barbara Jóźwiak, forScience Foundation

Sandy beaches are much less common.

© Barbara Jóźwiak, forScience Foundation

Found along the entire length of the coast are numerous skerries, or underwater rocky reefs, which have a considerable impact on the direction and energy of the waves reaching the shore. Bearing in mind that the majority of beach litter is transferred to the base in Palffyodden with the help of a rubber boat, skerries present a serious challenge during transport.

4. Methodology and scope of project fieldwork

There are several projects currently carried out in Svalbard, whose aim is to remove marine litter washed ashore by the waves, estimate the scale of litter pollution or determine litter sources and human behaviour due to which litter items end up on local beaches. The methodology, however, differs significantly from one initiative to another.

Let us take, for example, Svalbard Intertidal Project (SIP) conducted by the Institute of Oceanology, Polish Academy of Sciences (IO PAS). The project team make an estimate of the number and weight of litter items found along a 100-kilometre fragment of the coast. The task takes approximately a week to complete. The only type of litter taken into account when making the estimate is litter made of synthetic materials, which is subdivided into several distinct categories. The aim of the project is not to clean the coast, but to gather litter-related data. As a result, removed from the beaches are only those litter items which are to undergo a thorough laboratory analysis (for the presence of alien species) [1].

Beach monitoring conducted in keeping with the guidelines provided by Oslo/Paris Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) is another example of an initiative whose main objective is gathering data rather than cleaning up the litter accumulated along the coast. According to the OSPAR protocol, all litter items found within a given sampling area are divided into several dozen categories (including a range of non-plastic litter types) and scrupulously counted. The weight of collected litter is not considered relevant. Bearing in mind the amount of time and effort involved in using the method, OSPAR monitoring is only carried out on

selected 100-metre sections of the coast. The litter data is supplemented with detailed information on the location of the sampling area and the existing conditions. The aim of these surveys, which usually take several hours to complete, is sample monitoring of beach litter along the coast, detecting trends and testing the efficiency of the existing legislation [2].

A different example is the Clean-up Svalbard programme carried out by the members of the Association of Arctic Expedition Cruise Operators (AECO), under the supervision of the Governor of Svalbard. In this case, collecting data is not a priority. As the name suggests, the prime objective of the programme is to clean up Svalbard, with beach clean-ups carried out during standard tourist expedition cruises and during biannual dedicated cruises, which bring together local volunteers. Due to the nature of the programme, particular clean-ups take no more than a few hours. There seem to be no specific rules regarding the length of targeted beaches and the thoroughness with which they are cleaned. Beach litter collected by tourists and volunteers is not counted or weighed. The forms used to report completed clean-ups [3] contain just a rough estimate of the overall litter amount. The information regarding the location of a given clean-up does not include much detail either [4].

The aims of *Sørkapp Marine Litter Cleanup* project are both scientific (gathering information) and ecological (cleaning up the coast). As a result, our methodology is a combination of the above-mentioned strategies. The team not only removes beach litter that has accumulated within the project's target area over the years, but also collects information, which makes it possible to determine spatial variability in litter concentration and which will, at a later stage, help to work out the rate of litter accumulation in this part of Svalbard. At the same time, the procedure we have adopted for litter sorting and weighing is straightforward enough for the project to cover a relatively large fragment of the coast.

Before the beginning of fieldwork, the project's target area (described in Chapter 3) had been divided into working sections (#1–#23), each of which measured 1 km in length. For practical reasons, the sections were mapped out on the basis of shapefiles showing a simplified coastline [5]. As a result, their shape is not an exact reflection of the actual shore (Fig. 4.1). Due to the fact that discrepancies between the actual and the represented course of the shoreline are inevitable even with considerably more accurate maps of the area [6], we decided to use general maps, which are a lot easier to use during fieldwork (Fig. 4.2).

The #10B working section, visible in Figure 4.1, is an addition. It covers a group of near-shore rocks, known as Pomorsteinane, which does not fit the definition of the coast adopted in the project. Taking advantage of very low water, which enabled easy access to the rocks, we removed all litter accumulated in the area. It was not, however, included in our statistics.

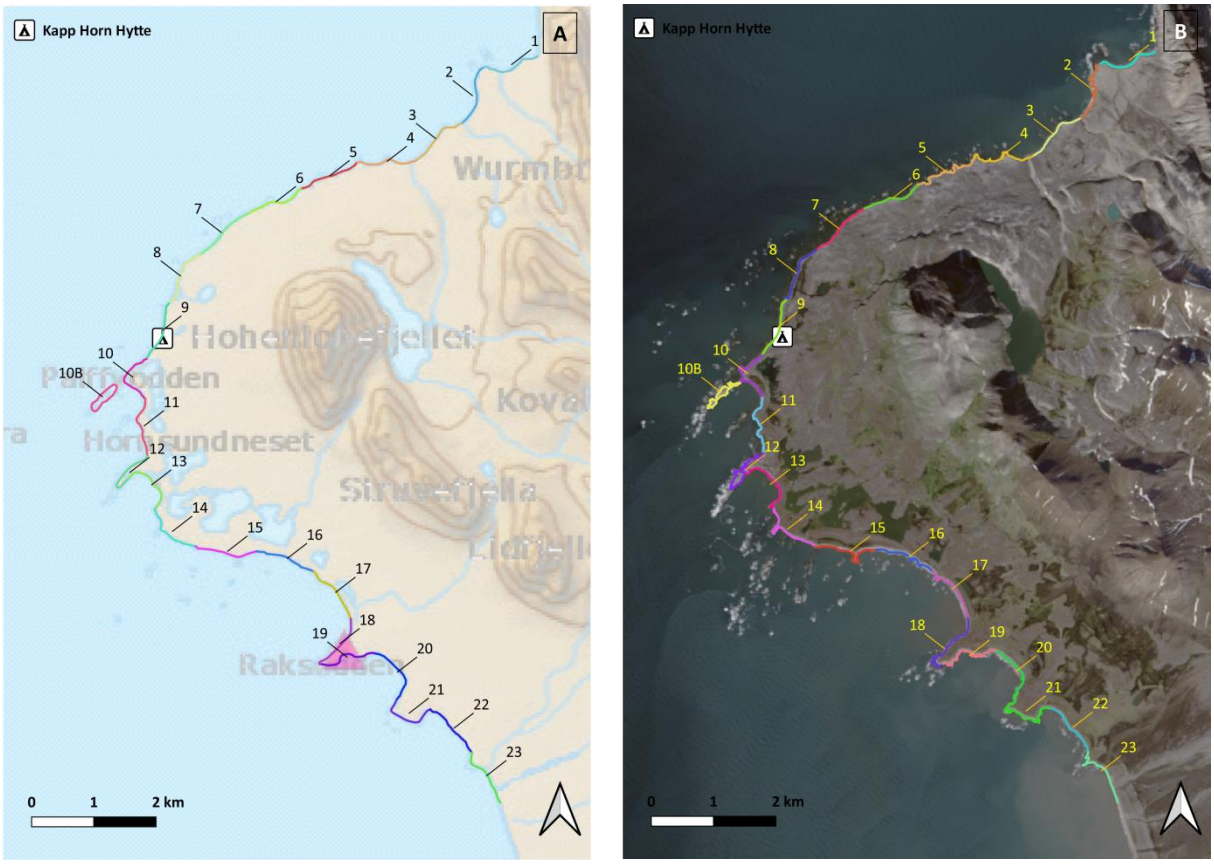

Fig. 4.1. The target area of the project divided into working sections:
A: on the basis of a shapefile retrieved from https://svalbardkartet.npolar.no;
B: on the basis of Kartdata Svalbard 1:100 000 (S100 Kartdata) / Map Data, NPI (2014)).

Maps created by Adam Nawrot, forScience Foundation (source: Norwegian Polar Institute / USGS Landsat)

Fig. 4.2. Discrepancies between map representations of the shoreline and its actual course: working sections A (in red) and B (in yellow) against the background of a satellite photograph

Map created by Adam Nawrot, forScience Foundation (source: Norwegian Polar Institute / USGS Landsat)

The table below (Tab. 4.1) contains information on the length of working sections according to a general map (A) and a more accurate map of the area (B). The differences between A and B values indicate a high diversification in the course of the shoreline within the project's target area. All calculations have been made with the use of geographic information software QGIS 3.10.

Tab. 4.1. Differences in the length of working sections #1 to #23
A: according to a general map [5]; **B:** according to a more accurate map of the coastline [6].

Calculated by Adam Nawrot, forScience Foundation

Working section	Length [m]			Working section	Length [m]		
	A	B	difference		A	B	difference
#1	1000	1014	14	#13	1000	1261	261
#2	1000	1391	391	#14	1000	1406	406
#3	1000	1043	43	#15	1000	1419	419
#4	1000	1428	428	#16	1000	1246	246
#5	1000	1645	645	#17	1000	1224	224
#6	1000	1035	35	#18	1000	1808	808
#7	1000	1068	68	#19	1000	1585	585
#8	1000	1062	62	#20	1000	1035	35
#9	1000	1028	28	#21	1000	1881	881
#10	1000	1369	369	#22	1000	970	-30
#11	1000	1177	177	#23	1000	1346	346
#12	1000	2069	1069	#10B	1735	2026	291

Beach litter was collected by a group of 4–6 people, working in pairs. While doing the work, each pair was equipped with a survey form, a camera and a GPS device (which were used to record the appearance, label content and location of selected litter items) as well as personal litter bags and a supply of big bags (used to set up temporary litter depots). Additionally, bearing in mind the risk of encountering a polar bear, each pair carried a firearm, a flare gun and a sufficient supply of appropriate ammunition. In order to enable communication between particular pairs and – if need be – with the outside world, we also carried VHF radiotelephones, a satellite phone and an inReach device.

A team member ready to head out from the base.

© Joanna Nawrot, forScience Foundation

Fishing nest trapped under rock debris were cut out.

© Barbara Jóźwiak, forScience Foundation

The team collected all litter items visible to the naked eye, the only exception being fragments of fishing nets trapped under rock debris, whose removal was impossible or potentially dangerous (due to falling rocks), and items too heavy to be removed without the use of specialist equipment. The latter included an old Russian buoy weighing 77 kg and a large metal cylinder (probably a damaged sonar buoy) with the estimated weight of approximately 1000 kg[3] [7]. Both items were reported to the Norwegian Coast Guard, who promised to remove them at the earliest opportunity. The trapped fishing nets were not reported but, as far as possible, cut out from under the rocks. The strip of land the fieldwork was carried out on was about 100 metres wide, counting from the edge of the water. Still, most litter was found no more than several meters inland.

The buoy's serial number, weight and year of manufacture imprinted on its side.

© Joanna Nawrot, forScience Foundation

According to the information available in Norwegian press, the item weighs at least 1000 kg.

© Barbara Jóźwiak, forScience Foundation

Due to weather conditions, fieldwork was carried out at different times of day. As a result, water level was not always the same (as it depends on the tidal stage). Bearing in mind, however, that waves and swell prevent marine litter from accumulating in the intertidal zone, the approach does not introduce an error.

[3] *Unable to weigh the cylinder ourselves, we have taken the information regarding its weight from an article describing a similar object, published by a Norwegian magazine Nordlys. According to the article, a cylinder of the sort weighs between 1100 and 1200 kg. To avoid artificially inflating our statistics, we have rounded the number down to exactly one ton (1000 kg).*

Every few hundred metres, a temporary litter depot was set up, with all litter items collected within a given section placed in big bags and secured against the wind. The spots for litter depots were selected so that they could be safely accessed from the sea. The bags were clearly labelled and their exact location was recorded with the use of a GPS device. Within a few days, all litter was transferred to the base with the help of a rubber boat.

A typical example of a temporary litter depot left on the beach for later pick up.

© Joanna Nawrot, forScience Foundation

Depot contents were transferred to the base with the help of a rubber boat.

© Barbara Jóźwiak, forScience Foundation

Litter from each 1-kilometre section was divided into the following categories:

- Plastic
- Plastic buoys
- Nets and ropes
- Rubber
- Other (e.g. polystyrene, synthetic foams, textiles, multi-material waste)
- Metal
- Metal buoys
- Glass
- Hazardous waste (e.g. lubricants, aerosols, electronic waste, batteries).

Next, litter belonging to particular categories was carefully weighed. Used for the purpose was a *Bascula* digital hanging scale (maximum weight: 300 kg; accuracy: 50 g) and two *Pesola* MacroLine spring scales (maximum weight: 2.5 kg and 5.0 kg; division: 20 and 50 g respectively; accuracy: 0.3%).

Once the litter had been weighed and the weight written down (separately for each kilometre), the litter was put back into big bags, this time according to its category rather than the section of the beach where it had been collected. All big bags were carefully labelled and secured to prevent potential damage by wind or animals.

5. The impact of weather conditions on project fieldwork

The participants of the first round of fieldwork arrived in Longyearbyen on June 18 and set out for Hornsund on the following day. The work related to repacking the supplies and transporting them and the team members to Palffyodden started on June 20. Thanks to favourable weather conditions, all tasks involved in the process were promptly completed. Unfortunately, a couple of days later the weather seriously deteriorated, making fieldwork difficult and, on some days, completely impossible.

Project fieldwork was carried out between June 21 and July 12. It is this period that the meteorological data presented below refer to. The data come from Meteorological Bulletins published by the Polish Polar Station Hornsund [8–9]. The only exception is the information regarding the maximum daily gust wind speed, prepared on the basis of minute data from the automatic meteorological station operating in the vicinity of the Polish Polar Station.

Due to the fact that the Station lies approximately 9 km from the northern edge of Sørkappland, the weather data collected there cannot be seen as fully representative of the area in which *Sørkapp Marine Litter Cleanup* project was executed. Bearing in mind that, unlike the north-western part of Sørkappland, the Polish Polar Station is sheltered from the north-east, we expect that the least accurate records are those regarding wind speed, as the wind blew predominantly from the easterly and north-easterly directions.

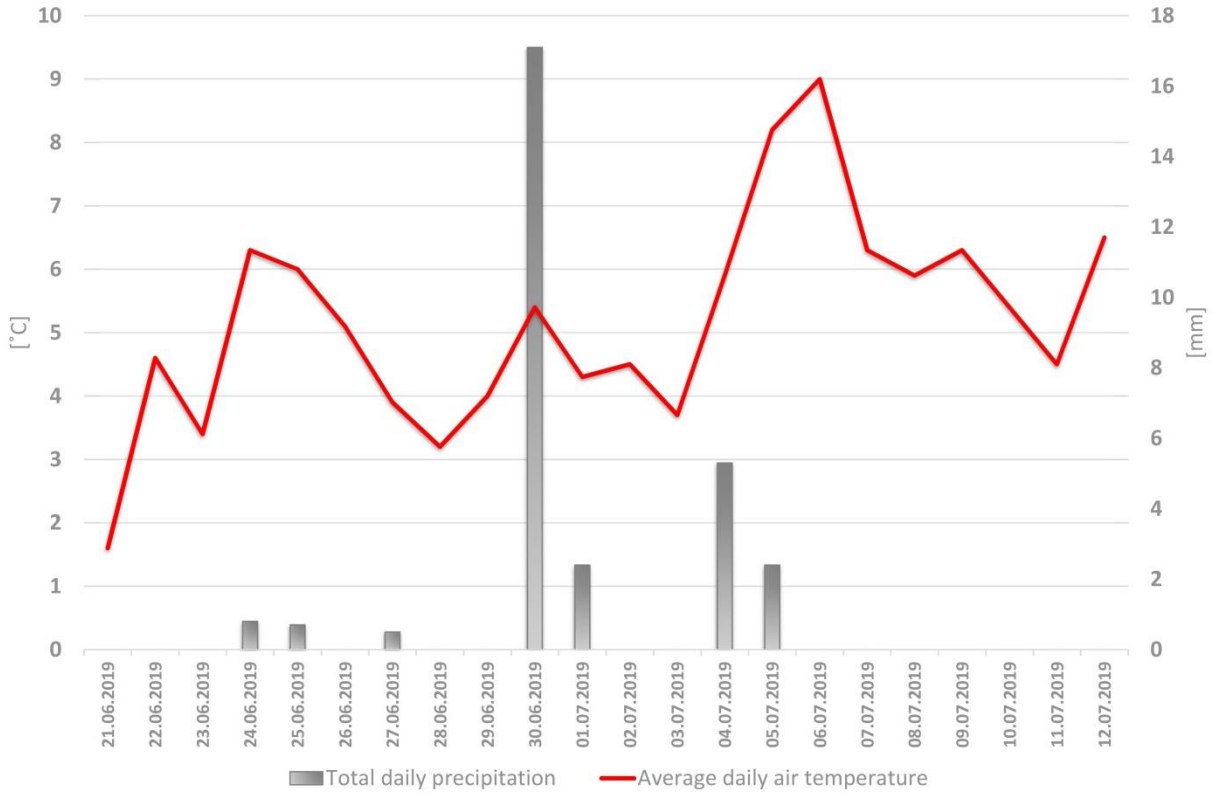

Fig. 5.1. Total daily precipitation and average daily air temperature over the course of project fieldwork.

Adam Nawrot, forScience Foundation, on the basis of PPS Hornsund Meteorological Bulletins [8–9]

From June 21 to July 12, the average daily air temperature was 5.2°C. The maximum temperature of 12.1°C was recorded on July 6. On the same day, the average daily air temperature also reached its peak at 9°C (Fig. 5.1). The minimum air temperature recorded at the Polish Polar Station Hornsund during the course of project fieldwork was 0.2°C (June 21).

Throughout the period the team spent in Sørkappland (June 21 to July 12), rain fell relatively infrequently. The total amount of precipitation amounted to 29.2 mm (which is to say, 29.2 litres per m^2). Maximum precipitation occurred on June 30, when the total daily amount of rain reached

17.1 mm (17.1 litres per m^2). This took place during a period of fierce winds, which lasted from the end of June through the first week of July.

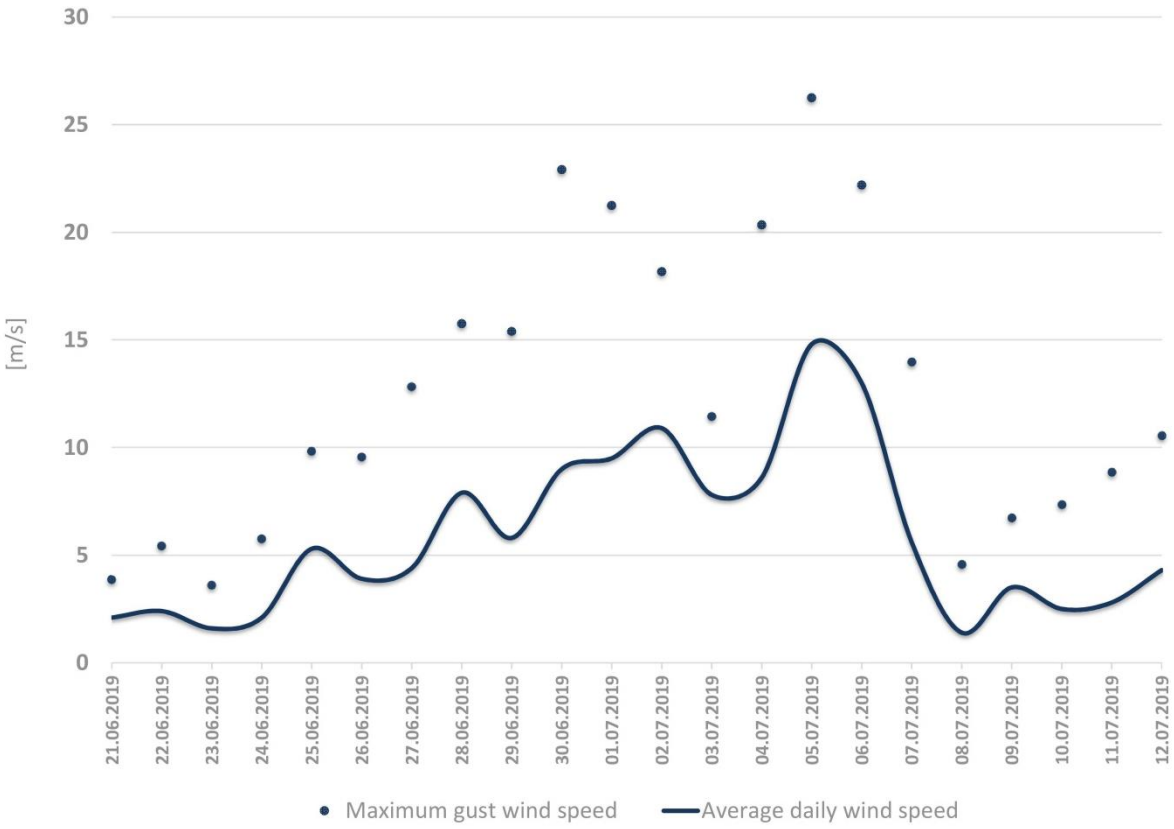

Fig. 5.2. Average daily wind speed and maximum gust wind speed over the course of project fieldwork.

Adam Nawrot, forScience Foundation, on the basis of PPS Hornsund Meteorological Bulletins [8–9] and minute data from the automatic meteorological station operating in the vicinity of PPS Hornsund

The wind started to grow stronger on June 25. At the beginning, its average speed did not exceed 6 m/s and the maximum gust wind speed was under 10 m/s. Soon, however, the conditions became significantly more severe. The situation failed to improve until July 7 (Fig. 5.2). Maximum average daily wind speed of 14.8 m/s (53.3 km/h) was recorded on July 5. On this day, the maximum gust wind speed reached 26.3 m/s (94.7 km/h). It is worth keeping in mind, though, that the data comes from the Polish Polar Station Hornsund, located on the opposite side of the fiord. We do expect that, due to the area's topography, wind speed in the immediate vicinity of Palffyodden was in fact much higher.

Eight days of fierce winds disrupted the execution of project fieldwork planned for the summer season of 2019. The wind made it difficult and, on some days, impossible to collect, weigh and catalogue beach litter or to use a rubber boat to pick up the contents of temporary litter depots left on the coast. Due to weather conditions, the actual fieldwork lasted 13 out of the planned 21 days. As a result, the team managed to clean 15 working sections instead of the expected 23.

6. Findings

From June 21 until July 12, a team of six conducted fieldwork aimed at collecting and describing beach litter accumulated along the north-western coast of Sørkappland. Within 15 working sections (#4–#18) we found 3631 kg of litter, of which we cleared away 2554 kg. The remaining 1077 kg comprised two litter items which were impossible to remove without the use of specialist equipment. As mentioned in Chapter 4, both items were reported to the Norwegian Coast Guard, who promised to remove them at the earliest opportunity.

Tab. 6.1. Beach litter found within 15 working sections in the north-western part of Sørkappland. The amounts have been rounded to 1 kg and they do not include the litter found in section #10B.

Category	Weight [kg]		Altogether [kg]	
	Collected	Left	Collected	Left
Plastic	961	-	2554	1077
Rubber	75	-		
Other	213	-		
Nets and ropes	857	-		
Metal	347	1077		
Glass	48	-		
Hazardous waste	54	-		
		Total:	**3631**	

The amounts presented in Table 6.1 do not include the litter collected in section #10B (see: Chapter 4), which totalled 114 kg.

Table 6.2 shows the minimum, maximum and average concentration of beach litter [kg/km] within 15 working sections (#4–#18). The values given in the table represent the total amount of litter, regardless of category. They have been calculated so that they correspond with the overall length of the working sections, taking into account discrepancies between the course of the shoreline as represented in different types of maps (working sections A and B). More information on the topic has been provided in Chapter 4.

Tab. 6.2. Beach litter concentration within 15 working sections in the north-western part of Sørkappland. The amounts have been rounded to 1 kg and they do not include the litter found in section #10B.

	Overall length of all sections [km]	Litter amount [kg/km]		
		Minimum	Maximum	Average
Sections A	15.00	81	1327	242
Sections B	20.25	58	1065	185

Figure 6.1 illustrates the proportion of different categories of litter within each of the 15 cleaned working sections (#4–#18). The size of pie charts indicates the total amount of litter [kg] found in the corresponding sections. There were clear differences in litter concentration between particular sections of the project's target area. The sections with the greatest litter accumulation were #5 and #16, where the total weight of all litter categories equalled 461 and 1327 kg respectively.

Section #16 stretches over the northern part of Vestvika Bay, whose sand and gravel shore faces westwards, towards the open sea, rising gently above water level. Even though the number of skerries (underwater rocky reefs) within the bay is limited, it does contain a large group of rocks jutting out of the water. Section #5 (second in terms of litter concentration) differs from section #16 with regard to both location and geomorphological features. It covers a stretch of the coast situated south of Sigfredbogen Bay, inside Hornsund Fiord. The section is lined with numerous skerries and rocks, which often form steep cliffs rising several meters above sea level.

The least littered section of the coast was #14, with 81 kg of beach litter. Although the section borders the open sea, it is sheltered by numerous skerries and rocks (known as Vestvikskjera) found in the coastal zone.

The most common litter category was plastic. The highest concentration of plastic litter was found in sections #5 and #16, which is where the overall amount of litter was also at its maximum. The amount of plastic collected in sections #5 and #16 was 119 and 127 kg respectively.

Apart from section #9, every working section contained a large number of plastic and metal buoys. Other types of metal items were found in each of the sections. The largest item was a metal cylinder weighing approximately 1000 kg, discovered in section #16. More information on the cylinder can be found in Chapter 4.

The least common categories of beach litter were glass (48 kg total weight), hazardous waste (54 kg) and rubber (75 kg). Section #7 was free of litter belonging to these categories. It was, at the same time, a section with the smallest concentration of plastic waste (23 kg).

Fieldwork conducted in 2019 made it possible to collect much more detailed data regarding the amount and distribution of marine litter washed ashore within the project's target area. Bearing in mind, however, that *Sørkapp Marine Litter Cleanup* project has not yet been completed, the information shared in the present report does not go beyond the basics and is provided for illustrative purposes only. The full data set, along with a detailed analysis, will be published in the final report produced after the completion of the project.

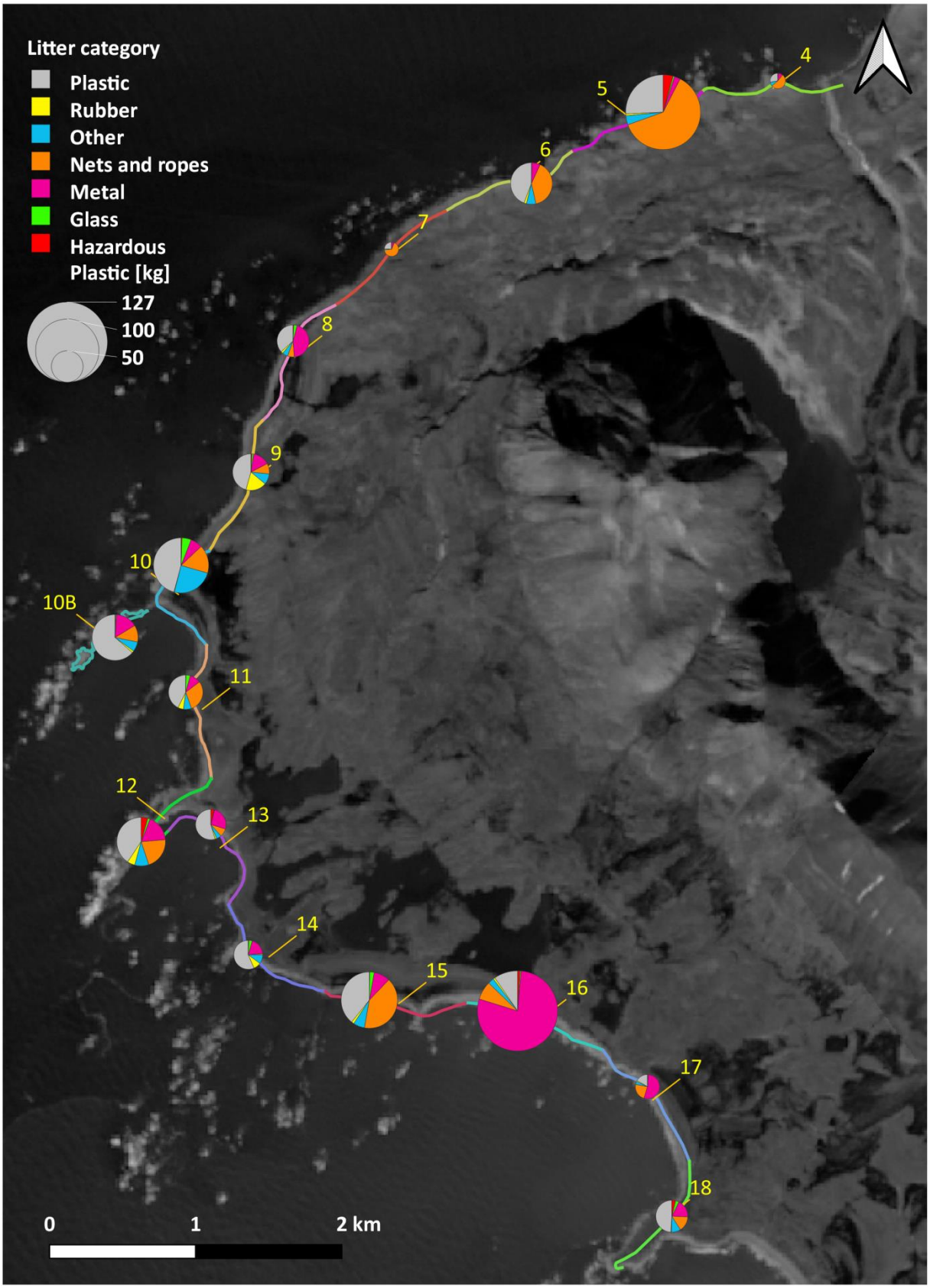

Fig. 6.1. A diagram illustrating the proportion of different litter categories within each of the cleaned working sections along the north-western coast of Sørkappland. The size of pie charts indicates the total amount of litter [kg] found in the corresponding sections.

Adam Nawrot, forScience Foundation (source: Norwegian Polar Institute / USGS Landsat)

7. Logistics of litter disposal

After being carefully weighed, the litter was sorted again, this time in accordance with waste sorting guidelines applicable in Longyearbyen, which specify that all waste must be divided into plastic and other burnable material, ropes and nets, metal, glass, and hazardous waste. The guidelines had been confirmed with the Longyearbyen waste management facility prior to the team's arrival in Sørkappland.

Due to its largely neutral character, some metal items (or, to be more specific, 300 kg of aluminium fishing buoys) remained in Palffyodden, from where they will be removed in 2020, at the end of the second round of fieldwork.

On 11–12 July, all bags were transported to the Polish Polar Station Hornsund on board a shallow draft workboat rented for the purpose from the Station. Completing the task required several boat rides back and forth across the fiord, as the Station and Palffyodden lie on its opposite sides (at a distance of about 15 km from each other). This stage of the project would have been considerably more challenging had it not been for the help received from the members of the 42nd Polish Polar Expedition of the Institute of Geophysics PAS.

The litter was sorted and bagged as required by the Longyearbyen waste management facility.

© Joanna Nawrot, forScience Foundation

The bags were transported on board a shallow draft workboat rented from the PPS Hornsund.

© Joanna Nawrot, forScience Foundation

The bags were deposited on the premises of the Polish Polar Station Hornsund, where they awaited transportation to Longyearbyen. On August 25, all bags were loaded onto the research vessel *Horyzont II*, and on August 26 – unloaded at the port of Longyearbyen, from where they were collected by the local waste management facility.

The litter delivered to Longyearbyen consisted of:

- Plastic: 10 bags containing c. 1040 kg
- Other burnable waste: 2 bags containing c. 300 kg
- Ropes and nets: 6 bags containing c. 870 kg
- Metal: 1 bag containing c. 45 kg
- Glass: 1 bag containing c. 60 kg
- Hazardous waste: 1 bag containing c. 55 kg

In order to load the litter onto the research vessel *Horyzont II*, specialist equipment had to be used.

© Joanna Perchaluk

After being unloaded in Longyearbyen, the litter was taken over by the local waste management facility.

© Włodzimierz Sielski

According to the rules applicable in Svalbard, marine litter collected during voluntary beach clean-ups is disposed of at the expense of Svalbard Environmental Protection Fund.

8. Additional promotional and informational activity

In the year 2019, the forScience Foundation put plenty of extra work into promoting the project and raising public awareness regarding the issue of marine litter in the Arctic. Our activity included, among others:

- a lecture entitled "Katastrofa nie tylko klimatyczna. Arktyka jako wyznacznik kondycji naszej planety", delivered during a conference „Klimat dla ludzi – ludzie dla klimatu", which took place on 13–15 December at Dolnośląski Ośrodek Doskonalenia Nauczycieli in Wrocław, Poland: dodn.dolnyslask.pl/ogolnopolska-konferencja-klimat-dla-ludzi-ludzie-dla-klimatu/
- educational presentations for children and teenagers entitled "Lessons from the Arctic", held on October 11 at the Janusz Korczak Primary School in Okup, Poland
- a series of articles discussing the project, Svalbard and the issue of marine litter, published on the Foundation's website in Polish and in English: www.forScience.pl
- a series of posts about the first round of fieldwork in Sørkappland as well as on Svalbard's nature and history, published on the Foundation's Facebook page in Polish and in English: www.facebook.com/FundacjaforScience/
- a series of interviews broadcast by Radio Kampus
- a series of interviews broadcast by several Polish television channels, including:
  - TVN24: tvnmeteo.tvn24.pl/informacje-pogoda/swiat,27/polacy-sprzatali-arktyke-ze-smieci,296782,1,0.html
  - Halo Polonia: halopolonia.tvp.pl/43877084/09082019-2205
  - PolandIn (in English): www.youtube.com/watch?v=HF5XGTYLv3w&t=8s
  - Polsat Rodzina: www.ipla.tv/wideo/rozrywka/MAMMA-MIA/5015880

- a series of magazine articles discussing various aspects of the project and the issue of marine litter, including:
  - Arktyczne plaże toną w śmieciach, *Biologia w Szkole*, 34, pp. 44–46 (digital version available on: www.czasopismobiologia.pl/artykul/arktyczne-plaze-tona-w-smieciach)
  - Miesiąc sprzątania Arktyki, Wroclaw University of Science and Technology: pwr.edu.pl/uczelnia/aktualnosci/miesiac-sprzatania-arktyki-jedrzej-gorski-wrocil-z-misji-na-svalbardzie-11302.html
  - Zebrali tony śmieci w Arktyce, Wyborcza.pl: wyborcza.pl/7,75400,25073907,zebrali-tony-smieci-w-arktyce-znalezli-butelke-po-ludwiku-i.html
  - Sørkapp Marine Litter Cleanup, czyli porządki na Svalbardzie, *Zew Północy,* 35, pp. 29–31
  - Plastikowa Arktyka, *Biologia w Szkole,* 36, pp. 12–17
    (digital version available on: www.czasopismobiologia.pl/artykul/plastikowa-arktyka)

Apart from the material prepared by the Foundation, with its assistance or under its supervision, a few additional articles were published online in 2019. These included:

- Polacy sprzątają Arktykę. Świat powinien brać z nich przykład, *Turystyka.wp.pl:* turystyka.wp.pl/polacy-sprzataja-arktyke-swiat-powinien-brac-z-nich-przyklad-6412754767021697a
- Polen sammeln Müll in der Arktis, *PolenJournal.de:* polenjournal.de/wissenschaft-technologie/2852-polen-sammeln-muell-in-der-arktis

A meeting with Ambassador Olav Myklebust
at the Royal Norwegian Embassy in Warsaw, Poland.

© Royal Norwegian Embassy in Warsaw

A presentation for school children
at the Janusz Korczak Primary School in Okup.

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