The Sørkappøya Marine Litter Cleanup (SMLC) project integrated environmental mitigation with scientific research, producing two distinct outcomes:

1. MARINE LITTER REMOVAL

The project involved a thorough clean-up of 3 km of Sørkappøya's coast, representing approximately 15% of the island's circumference. A total of **4,538.50 kg** of legacy litter (i.e. litter resulting from long-term accumulation) was successfully removed from the study area, eliminating immediate threats posed by stranded litter to local wildlife, mitigating the long-term risk of secondary microplastic pollution caused by litter degradation and fragmentation, and preventing the reintroduction of litter items into the marine environment.

2. MARINE LITTER DATA

All collected litter was analysed to generate quantitative and qualitative data on marine litter pollution in the study area. Key research findings included:

- **Dominant material:** The analysis revealed a clear dominance of synthetic materials, which accounted for between 73.0% and 80.6% of the total litter mass per study section.
- **Dominant source:** Commercial fishing was identified as the primary source of litter pollution, contributing 65.8% to 68.5% of the overall litter load, which validates patterns observed elsewhere in the Svalbard archipelago.
- **Pollution hotspot verification:** The project confirmed Sørkappøya's status as a regional pollution hotspot, with litter densities reaching 1,973.85 kg/km.

Representative overview of marine litter loads along the coast of Sørkappøya.

Photo credit: Barbara Jóźwiak, forScience Foundation

In addition, the project provided insights into methodologies dominating current marine litter research, most notably the limitations of scaling up data from small, transect-based samples and the over-reliance on abundance-based metrics (item counts).

While the original plan involved preparing a publicly available report compiling the litter data collected during project fieldwork, the data will instead be shared as an open-access, peer-reviewed article to reach a wider audience and better contribute to the ongoing scientific and policy discussions on marine litter pollution in the Arctic. A manuscript entitled **"From clean-up to empirical data: Integrating research and mitigation to assess legacy marine litter on Sørkappøya, Svalbard"**, containing the full dataset along with other relevant project details, was submitted for publication in Scientific Reports on 26 July 2026.

## SUMMARY OF THE SUBMITTED MANUSCRIPT

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|---|---|
| Title: | From clean-up to empirical data: Integrating research and mitigation to assess legacy marine litter on Sørkappøya, Svalbard |
| Authors: | Barbara Jóźwiak & Adam Nawrot, forScience Foundation |
| Target journal: | Scientific Reports |
| Submission date: | 26 July 2026 |
| Current status: | Under review |

The manuscript provides a comprehensive assessment of legacy marine litter on Sørkappøya based on the data collected during the Sørkappøya Marine Litter Cleanup (SMLC) project, including details of the adopted approach to ensure full methodological transparency and thus facilitate cross-study comparisons and method replication. To address the inherent limitations of transect-based litter statistics in High Arctic environments, the study evaluated three 1-km study sections using a total removal approach. With two of the study sections on the western coast of the island and one on its eastern coast, it provided insights into spatial variability within litter loads in contrasting coastal contexts.

Overview of the SMLC study area. The left panel shows the location of the island and major ocean currents. The right panel shows the three study sections. The map of Sørkappøya was generated using NPI GIS data.

Photo credit: Anita Horowska, forScience Foundation

QUALITATIVE, QUANTITATIVE AND DISTRIBUTIONAL LITTER ANALYSIS

All marine litter collected within the study sections was analysed using a dedicated two-tiered litter categorisation protocol, with mass data recorded separately for each category and section. The manuscript presents and discusses these data across three complementary perspectives:

- **Quantity:** Assessment of the litter load per category per section using a linear density metric (kg $km^{-1}$), with additional surface-area calculations ($m^2$) enabling comparisons with existing marine litter statistics (reported in g $m^{-2}$).
- **Quality:** Evaluation of marine litter composition by:
    - Tier 1: **Material categories**, including synthetic materials (hard and soft plastics, fibres, foams, and rubbers), metals, glass and ceramics, and mixed and composite materials.
    - Tier 2: **Use-based categories**, including packaging, e-waste, nets and ropes, fishing floats, and other fishing-related items.
- **Distribution:** Analysis of spatial variations in litter accumulation and composition across the study sections, comparing overall mass and mass per category between the more exposed western coast and the eastern coast.

Once data collection (left) was completed, marine litter was securely packed (right) to avoid dispersal before pick-up, which was carried out by the Norwegian Coast Guard on 17 October 2025.

Photo credit: Barbara Jóźwiak, forScience Foundation

METHODOLOGICAL CRITIQUE

As a secondary focus, the manuscript contextualises the SMLC dataset within broader marine litter research in Svalbard. It offers a critical comparison between the total removal figures recorded on Sørkappøya and published data from other parts of the archipelago, demonstrating that an over-reliance on transect-based sampling produces theoretical loads that drastically exceed field-observed maxima.