



Marine Debris Presence on Beaches in Katmai National Park and Aniakchak National Monument and Preserve

2012–2021

Natural Resource Report NPS/KATM/NRR—2023/2527





ON THIS PAGE

Large accumulation of debris on Swikshak beach, Katmai National Park and Preserve, September 2019.
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ON THE COVER

Brown bear cub chewing on a plastic bottle in Hallo Bay, Katmai National Park and Preserve, June 2019.
NPS / B. CARROTHERS

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Executive Summary

Following the 2011 tsunami and disaster in Japan, the National Oceanic and Atmospheric Administration launched the Marine Debris Monitoring and Assessment Program. In 2012, National Park Service staff began monitoring marine debris presence on beaches within Katmai National Park and Aniakchak National Monument and Preserve. Monitoring consists of conducting a standardized standing stock survey where four 5-meter transects are searched for marine debris at each beach. From 2012–2021, 64 marine debris surveys were conducted with 83% of debris made of plastic materials and the rest comprised of processed lumber, metal, and cloth materials. Marine debris is an ongoing issue for KATM, negatively impacting its wildlife and the visitor experience.

Acknowledgements

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Introduction

Katmai National Park and Preserve (KATM) contains over 800 kilometers of remote coastline and Aniakchak National Monument and Preserve represents nearly another 100 kilometers of coastline. The coastline is made up of coastal marshes, sedge meadows, rocky beaches, and the Aleutian Range draining its glaciers into the ocean. In this remote part of Alaska, across the Shelikof Strait from Kodiak island, marine debris washing ashore is a growing concern. Cleanup efforts have been made with the help of NOAA grants to remove debris from various KATM beaches. In 2015, in collaboration with sponsors, over 10,000 kg of debris was removed from 28 beaches along the coast (Polasek et al. 2017). Among debris collected, 68% was hard plastic fragments and 75% of the beaches cleaned had debris densities between 100 and 300 kg/km (Polasek et al. 2017). In 2021, 7,000 kg of debris was removed from 3 coastal beaches within KATM (A. Schroeder, personal communication, 2021).

Within the North Pacific, the Great Pacific Garbage Patch, located between California and Hawai'i has been estimated to contain over 79 thousand tonnes of plastic, covering an area of over 1.6 million km², and is only increasing (Lebreton et al. 2018). In addition to the gradual increase of marine debris through time due to the global human population, events like the 2011 Tōhoku earthquake and tsunami rapidly increased the amount of debris entering the world's oceans. The Tōhoku tragedy was responsible for upwards of an estimated 5.5 million tonnes of debris entering the global ocean system in a day (Ministry of the Environment 2012). The annual global ocean debris input ranges from 5.5 million tonnes and 19 million tonnes (Lebreton et al. 2018).

The large influx of marine debris in natural systems has negatively impacted many species. Within Alaska and British Columbia, 386 Steller sea lions (*Eumetopias jubatus*) were either entangled in marine debris or ingested fishing gear between the years of 2000 and 2007 (Williams et al. 2011). Researchers in Washington found plastics in the ventriculi of 41.5% of 171 stranded Cassin's auklets (*Ptychoramphus aleuticus*) during a 2014 mass die-off (Floren & Shugart 2017). Research is ongoing around the world about the effects that plastics have on our wildlife and on our natural systems globally. It is important to know where plastics are accumulating due to the negative impacts they have on our wildlife.

Starting in 2012, KATM has contributed to the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program (MDP), specifically the Marine Debris Monitoring and Assessment Project (MDMAP). The MDMAP is a citizen science program tasked with assessing the accumulation of density of marine debris by completing either a standing stock or accumulation survey. Due to the logistics of having to remove debris associated with the accumulation survey method, KATM has been conducting standing stock surveys to monitor the density of debris present on the coast. The standing stock survey method reflects the relatively long-term balance between debris inputs and removal to help understand the overall impact of debris (NOAA 2012). Katmai staff currently survey five beaches, including three within KATM park boundaries and two in Aniakchak National Monument and Preserve (ANIA). This report summarizes survey efforts for

fives beaches surveys in KATM and ANIA by Katmai staff for the 2021 season, and compares 2021 trends to previous years.

Methods

NOAA's standing stock survey protocols were followed for all surveys completed within KATM and ANIA (NOAA 2012). Standing stock surveys were generally scheduled to take place twice a year (June and September), however, due to weather constraints and travel limitations, sometimes one or no surveys were conducted each year. Survey locations are accessed by wheeled-plan landings on the beach and are limited by the tides. Surveys were completed in teams of 2 observers with all debris larger than a bottle cap (~2.5 cm) recorded using standardized MDMAP data sheets (<https://marinedebris.noaa.gov/mdmap-protocol-documents-and-field-datasheets>). Transects are 5 m in width (Figure 1) and the length is measured by range finder from the waterline to the back barrier of the beach.



Figure 1. A typical standing stock survey transect laid out with marking flags from NOAA standing stock surveys conducted in Katmai National Park and Aniakchak National Monument and Preserve. [NPS Photo].

Results and Discussion

Analysis of the marine debris data has shown that plastic was the dominant material found during the surveys (82.5%) at all locations combined across years since we started conducting the surveys (Figures 2 and 3). The abundance of plastic marine debris found on the beaches is likely due to the buoyancy and durability of plastic that allows it to float and be pushed by currents along the surface of the ocean without breaking down (Eriksen et al. 2014). Hard plastic fragments were the most common plastic debris type at each survey location, with the exception of Hallo Bay, where the most common plastic debris type was foam fragments (Figure 4). Plastics made of high density polyethylene, low density polyethylene, and polypropylene are less dense than water (Fazey and Ryan 2016) and therefore can float freely in the ocean. These are the plastics that are found on the beaches within the park and are used to make products such as plastic containers, plastic straws, and plastic bags, and commonly wash up on shorelines.

Many of the marine debris items found during surveys were inscribed with languages from Asia. The North Pacific Current moves from the east coast of Asia to the Alaska Current which washes up onto the southern coast of Alaska, bringing marine debris from Asia to Alaska (Fazey and Ryan 2016; Figure 5). As seen in Figure 4, a considerable portion of marine debris found during our surveys is related to the fishing industry (net/rope and buoys/floats).

The negative effects of marine debris are ongoing and impact natural resources and park visitors alike. Cleanup efforts of marine debris on beaches will aid in mitigating these negative effects. Monitoring debris accumulation at KATM and ANIA contributes to NOAA's understanding of how the southern coast of Alaska is impacted by marine debris.

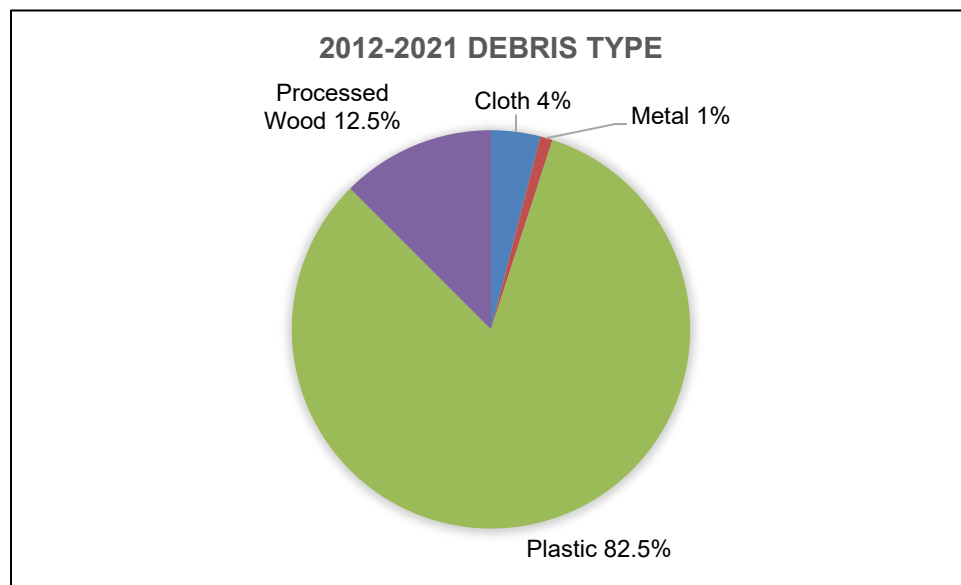


Figure 2. The percentages of material type in which marine debris found was made of. This includes combined numbers for all surveyed beaches at KATM and ANIA for the duration in which the park has conducted marine debris surveys.

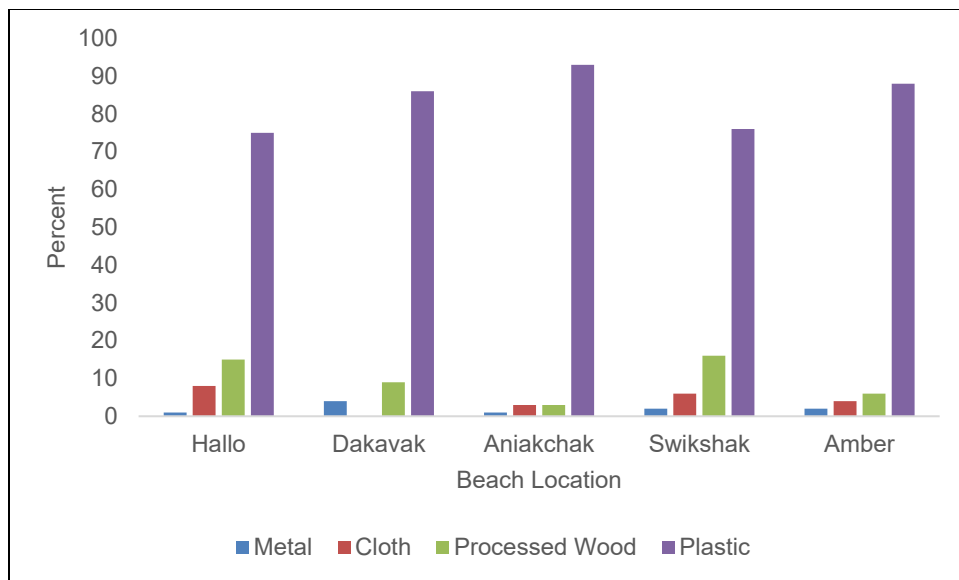


Figure 3. The percent of marine debris material type by location. This represents the combination of material type found from all surveys conducted at each location from 2012–2021.

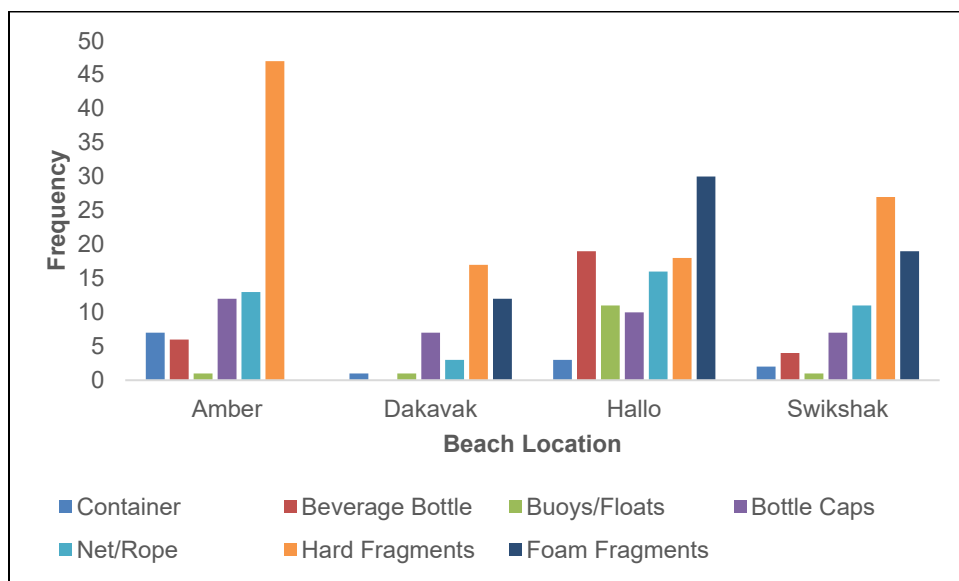


Figure 4. The frequency in which the most common plastic debris type was found at each marine debris survey location from 2012–2021. Aniakchak was excluded from this figure due to low plastic found relative to other locations.

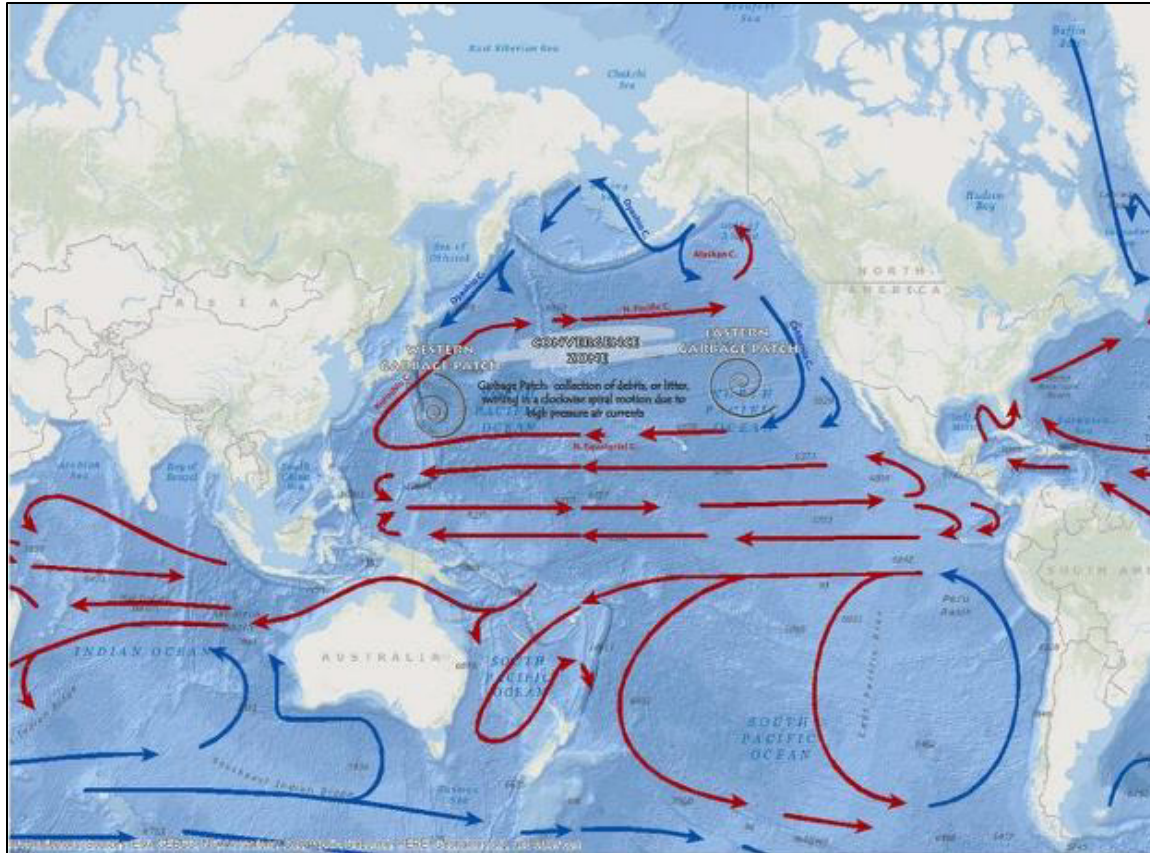


Figure 5. The ocean currents connect the world's water ways. <https://oceanblueproject.org/ocean-currents-map/>.

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Appendix A

NOAA Marine Debris Standing Stock Survey locations in Aniakchak National Monument and Preserve and Katmai National Park and Preserve (2013–2019).

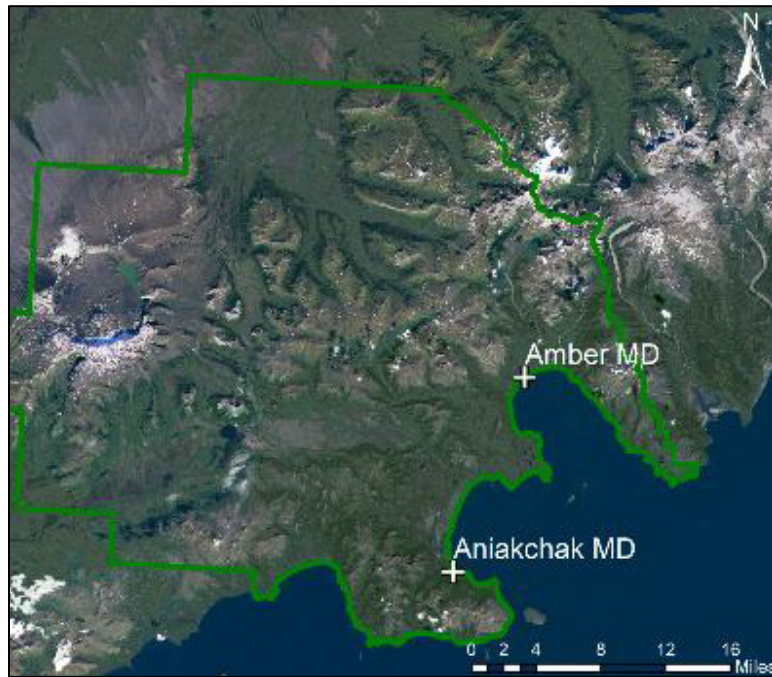


Figure A-1. Aniakchak National Monument and Preserve.



Figure A-2. Katmai National Park and Preserve.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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