BEACH MARINE LITTER IN THE PACIFIC ISLANDS

2024 Activity Report

A COLLABORATION BETWEEN

THE COMMITTING TO SUSTAINABLE WASTE ACTIONS IN THE PACIFIC (SWAP)

THE PACIFIC OCEAN LITTER PROJECT (POLP)

IMPLEMENTING SUSTAINABLE LOW AND NON-CHEMICAL DEVELOPMENT IN SIDS (ISLANDS)

Cover Photo: Pillet, J (2024). *SWAP Marine Litter Activities Image Library* (Photograph). SPREP.

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DISCLOSURE STATEMENT

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LIST OF ACRONYMS

AFD	Agence française de développement
AMD	Anthropogenic Marine Debris
DEPC	Department of Environmental Protection and Conservation
DoC	Department of Conservation
ECD	Environment & Conservation Division
EEZs	Exclusive Economic Zones
GEF	Global Environment Facility
GPS	Global Positioning System
ICCD	International Coastal Cleanup Day
INC	Intergovernmental Negotiating Committee
IOC	Intergovernmental Oceanographic Commission
ISLANDS	Implementing Sustainable Low and Non-chemical development in SIDS
KIOST	Korea Institute of Ocean Science & Technology Project
LOSC	Law of the Sea Convention
MECDM	Ministry of Environment Climate Change Disaster Management & Meteorology, Solomon Islands
MEIDECC	Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications, Tonga
ML	Marine Litter
MNRE	Ministry of Natural Resources and Environment, Samoa
NOWPAP	Northwest Pacific Action Plan 1994
PICTs	Pacific Islands Countries and Territories
POLP	Pacific Ocean Litter Project
POLYP	Pacific Ocean Litter Youth Project
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SPREP	Secretariat of the Pacific Regional Environment Programme
StatsNZ	Statistics New Zealand

SWAP	Committing to Sustainable Waste Actions in the Pacific
UN	United Nations
UNEP	United Nations Environment Programme
USP	The University of the South Pacific
WGS 84	World Geodetic System 1984

1. INTRODUCTION

1.1. PROJECT BACKGROUND

The ocean has long served as a vital source of food, transportation, and commerce, particularly in the Pacific, where it holds strong cultural value and heritage (Bergmann et al., 2015; Friedlander et al., 2016). The Pacific's blue economy, driven by ocean-based fishing and tourism, contributes approximately USD 3.3 billion (AUD 4.4 billion) to the national economies of Pacific Island Countries and Territories (PICs) (Seidel et al., 2010). However, waste management is a major issue for most Pacific Islands due to limited regional scientific knowledge of marine litter distribution, composition, and abundance (SPREP, 2018). Developments in intergovernmental programs, such as the Secretariat of the Pacific Regional Environment Programme (SPREP) and its 'Committing to Sustainable Waste Actions in the Pacific' (SWAP) project and the 'Pacific Ocean Litter Project' (POLP) among other programmes, aim to deepen this pool of knowledge by addressing these limitations.

Marine litter is commonly found at the sea surface or washed up on coastal shorelines (Bergmann et al., 2015). Most studies have focused on coastal beach areas due to ease of accessibility and aesthetic concerns (Bergmann et al., 2015). The 2009 UNEP/IOC standardised operational guidelines and methodology were adopted for the marine litter surveys conducted across the Pacific from 2019 to 2024 to balance data collection accessibility, accuracy, and efficiency (Cheshire et al., 2019).

With a deeper understanding of marine litter type, density, and regional trends, communities, institutions, businesses and governments can make informed decisions to advance sustainable waste management. These marine litter findings and SPREP activities play a crucial role in supporting Pacific leaders' negotiations towards the global plastics treaty being developed for implementation in late 2024 (SPREP, 2024b; UNEP, n.d.).

1.2. OBJECTIVES OF THE REPORT

This report presents the findings of 73 beach marine litter surveys and waste audits conducted in Fiji, Samoa, the Solomon Islands, Tonga, Vanuatu and Wallis and Futuna from 2019 to 2024.

The results presented in this report provide critical data and insights that inform discussions towards the development of the Global Plastics Treaty, as requested by UN Environment

Programme (UNEP) Resolution 5/14 (UNEP, n.d.). This resolution called for a comprehensive approach to address the full life cycle of plastic, including production, design, and disposal. The data from these surveys contribute to the Intergovernmental Negotiating Committee (INC) sessions, which began in 2022 and aim to finalise the treaty by the end of 2024 (UNEP, n.d.). The findings from this Marine Litter Study support the INC's efforts by offering an overview of the marine litter problem in the Pacific including detailed data collected in the countries and territories involved in the SWAP, POLP and GEF ISLANDS projects, thereby aiding in the creation of effective and sustainable waste management policies.

1.3. SUMMARY OF KEY FINDINGS

- A total of 73 surveys and audits of were conducted across the Pacific:
    - Fiji: 6 surveys since 2023
    - Samoa: 22 surveys since 2019
    - Solomon Islands: 17 surveys since 2022
    - Tonga: 13 surveys since 2021
    - Vanuatu: 10 surveys since 2023
    - Wallis & Futuna: 5 surveys since 2021
- Of the 73 surveys conducted, 43 locations areas were surveyed. Only 15 of the 43 sites had replicated its marine litter surveys and waste audits.
- The primary source of marine litter waste is hard to determine from onshore beach marine litter surveys and waste audits due to the transboundary nature of litter and the slow breakdown of plastics in the environment.
- There were 76,869 items collected throughout the 73 surveys, weighing in at 4,492kg. For each waste category, total number of items collected were:
    - 44,653 plastic items
    - 2,790 foamed plastic items
    - 2,828 fabric & textiles items
    - 8,861 glass & ceramic items
    - 11,191 metal items
    - 2,892 paper & cardboard items
    - 954 rubber items
    - 966 wood items
    - 1,734 other items
- On average, each site/survey would have:

- 767 ± 609 plastic items
- 40 ±14 foamed plastic items
- 42 ± 21 fabric & textiles items
- 120 ± 44 glass & ceramic items
- 143 ± 159 metal items
- 46 ± 36 paper & cardboard items
- 16 ± 9 rubber items
- 18 ± 24 wood items
- 25 ± 22 other items

- The average litter density (the number of waste items over 5 mm in size) for the Pacific is 3,448 waste items per 1,000 m^2, with a standard deviation of ± 9,727. The highest litter density recorded was 74,667 items per 1,000 m^2, whilst the lowest litter density was 58 items per 1,000 m^2. The regional litter density averages were:
  - Fiji's average litter mean density was 2,947 ± 3,662 items per 1,000 m^2
  - Samoa's average litter mean density was 581 ± 897 items per 1,000 m^2
  - Solomon Island's litter mean density was 10,680 ± 18,423 items per 1,000 m^2
  - Tonga's litter mean density was 537 ± 443 items per 1,000 m^2
  - Vanuatu's litter mean density was 3,144 ± 2,309 items per 1,000 m^2
  - Wallis and Futuna's litter mean density was 255 ± 120 items per 1,000 m^2
- The surveys were not conducted regularly enough (UNEP/IOC recommends every 3 months) to establish reliable marine litter accumulation trends.
- Plastics items were highly abundant across all surveys, key plastic lines were:
  - Bottle caps & lid - average of 485 ± 305 per PICTs total results
  - Bottles (≤ 2 L) – average of 1,159 ± 1,113 per PICTs total results
  - Fibreglass fragments – average of 773 ± 1,718 per PICTs total results
  - Food containers – average of 322 ± 147 per PICTs total results
  - Food wrappers – average of 2,119 ± 2,476 items per PICTs total results
  - Other plastic – average of 275 ± 406 per PICTs total results
  - Plastic bags - average of 402 ± 292 per PICTs total results
  - Rope – average of 152 ± 252 per PICTs total results
  - Unidentifiable hard plastic fragment – average of 564 ± 572 per PICTs total results
  - Unidentifiable soft plastic fragments – average of 355 ± 323 per PICTs total results

2. ABOUT THE PARTNERS

2.1. SECRETARIAT OF THE PACIFIC REGIONAL ENVIRONMENT PROGRAMME

The Secretariat of the Pacific Regional Environment Programme (SPREP) is a regional organisation founded by the Governments and Administrations of the Pacific. SPREP is dedicated to the protection and sustainable management of the Pacific's environment and natural resources. Established in 1993, SPREP underscores the profound commitment of Pacific Island Governments and Administrations to environmental stewardship and sustainable development on a global stage.

SPREP comprises 26 members spread across thousands of kilometres of ocean, united by shared cultural, historical, and environmental elements. The membership includes 14 Pacific Island countries, 7 territories, and 5 metropolitan states with vested interests in the region. The combined Exclusive Economic Zones (EEZs) of the Pacific island countries and territories cover 30 million square kilometres, although the land area constitutes only two per cent of this vast expanse.

2.2. COMMITTING TO SUSTAINABLE WASTE ACTIONS IN THE PACIFIC (SWAP) PROJECT

SPREP has the lead responsibility for regional coordination and delivery of waste management and pollution control initiatives. Utilising the strategic management framework, Cleaner Pacific 2025, SPREP guides regional cooperation and collaboration. The regional SPREP programme overseeing marine litter data collection and activities for Pacific Island Countries and Territories (PICTs) is the 'Committing to Sustainable Waste Actions in the Pacific' (SWAP) project.

The SWAP project, funded primarily by the French agency Agence Française de Développement (AFD), is a €3 million initiative running from 2020 to 2024. It aims to enhance sanitation, environmental, social, and economic conditions in PICTs through improved sustainable waste management and financing mechanisms.

SWAP focuses on four thematic waste areas including **used oil, disaster waste, and marine debris management**. Its activities include, among other things, community waste awareness

campaigns, 'Community of Practice' capacity training and workshops, and in-country marine litter waste monitoring pilot projects.

The six Pacific islands that benefited from and were actively involved in phase I of the SWAP project included:

- Fiji
- Samoa
- Solomon Islands
- Tonga
- Vanuatu
- Wallis and Futuna

2.3. PACIFIC OCEAN LITTER PROJECT (POLP)

The Pacific Ocean Litter Project (POLP) aims to reduce the volume of single-use plastics that become marine litter in Pacific coastal environments. This 7-year initiative (2019-2027) is funded with AUD 16 million from the Australian Government and is implemented by SPREP in collaboration with the governments and peoples of the Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu.

These countries benefit from the project through direct support for domestic single-use plastic reduction activities and regional POLP initiatives. Additionally, they gain from shared learning, outcomes, and best practice examples delivered through POLP actions in counterpart Pacific nations.

2.4. THE IMPLEMENTING SUSTAINABLE LOW AND NON-CHEMICAL DEVELOPMENT IN SMALL ISLAND DEVELOPING STATES (GEF ISLANDS)

The Implementing Sustainable Low and Non-Chemical Development in Small Island Developing States (GEF ISLANDS) Programme is supporting 33 island nations in the Atlantic, Caribbean, Indian and Pacific regions to improve chemicals and waste management.

GEF ISLANDS will safely dispose of over 200,000 tonnes of hazardous products and 17,000 tonnes of toxic chemicals, including POPs. It will also lead to the avoidance of nearly 90 tonnes of mercury. Through co-finance activities it will avoid over 300,000 tonnes of marine litter - mostly plastics.

Small Island Developing States (SIDS) are dependent on imports for everyday items like batteries, computers, cars, and plastic-based items. Many of these products contain substances which become hazardous if not disposed of safely.

Island nations are especially vulnerable to pollution risks as they suffer from both a lack of space and limited physical and legal infrastructure to safely and sustainably manage hazardous chemicals and waste. When these products reach the end of their serviceable lives they are often dumped or burnt or accumulate in landfills, releasing toxins into the soil, water and air. This leads to harmful impacts to human health and the wider environment.

The GEF ISLANDS Programme has four main objectives:

- Prevent future build-up of chemicals entering SIDS – by strengthening legislation and import regulations on products containing hazardous materials.
- Safely manage and dispose of existing hazardous chemicals, products and materials – by raising awareness of the pathways of contamination and building capacity among key stakeholders to sustainably manage hazardous chemicals and waste.
- Manage products entering SIDS throughout their lifecycle – from import oversight to final safe disposal, and build local, national and international public-private partnerships to facilitate this lifecycle approach.
- Facilitate SIDS-SIDS learning and sharing of knowledge – by ensuring innovations and successes (or setbacks) in one SIDS can be picked up and inform activities in another. ISLANDS is supporting the Green Forum and six Communities of Practice to achieve this.

2.5. SUSTAINABLE COASTLINES, NEW ZEALAND

Since 2018, Sustainable Coastlines, a New Zealand/Aotearoa charity, has been running a long-term citizen science program in New Zealand to gather open-access scientific data on marine litter and transform these insights into actionable solutions. The Litter Intelligence Programme, New Zealand's first national litter database, was developed in close partnership with Statistics New Zealand (StatsNZ), the Department of Conservation (DoC) and the Ministry for the Environment's Waste Minimisation Fund. This collaboration aims to enhance

our understanding and management of the litter problem, as we cannot address what we do not measure.

Sustainable Coastlines collaborated in this activity by providing technical support but above all through the design, development and delivery of training to communities on how to conduct a statistically reliable waste survey and audit.

Photo 2.5.1. *Training Session, USP, Fiji, 4 May 2023 – Credits: Julie Pillet, SWAP*

2.6. IN-COUNTRY PARTNERS

2.6.1. University of the South Pacific, Pacific Ocean Litter Youth Project, Fiji

The Pacific Ocean Litter Youth Project (POLYP) is a youth collective based at the University of the South Pacific (USP) lower Laucala Campus who are dedicated to collecting and categorising marine litter in Fiji. By leveraging science and art, the project aims to catalyse behavioral change among consumers and producers and inform policy. The objectives of POLYP are to shift societal paradigms around marine litter pollution by engaging youth in coastal clean-up campaigns, conducting coastal litter assessments, and advocating through storytelling and art. Additionally, the project involves

researching coastal litter characteristics, performing brand audits, and lobbying decision-makers to take decisive action against marine litter pollution.

2.6.2. Ministry of Natural Resources and Environment (MNRE) and the Division of Waste Management and Pollution Control (WMPC), Samoa

The Ministry of Natural Resources and Environment (MNRE), Samoa leads the management of Samoa's environment and natural resources. MNRE addresses a diverse range of issues through its 10 core divisions including the Waste Management and Pollution Control Division (WMPCD) and 4 divisions comprising of Corporate Service, IT, Legal and Internal Audit.

Their vision is to enhance the quality of life for all Samoans, grounded in the sustainable development and management of the country's natural resources and environment. MNRE collaborates closely with communities and stakeholders to pursue sustainable development. Their key roles include serving as environmental regulators, administrators, advisors, and advocates.

2.6.3. Ministry of Environment Climate Change Disaster Management & Meteorology (MECDM); Environment & Conservation Division (ECD), Solomon Islands

The Environment & Conservation Division (ECD) is one of four departments within the Ministry of Environment, Climate Change, Disaster Management & Meteorology (MECDM), Solomon Islands. ECD is responsible for the conservation and management of the environment. Its key areas of work include promoting and protecting biodiversity, managing protected areas and wildlife species, conducting bioresearch, and providing environmental training, awareness, and outreach. The division also focuses on development control, waste management, pollution control, and community-based resource management.

Under its program on development, waste management, and pollution control, ECD aims to promote, implement, enforce, and enhance appropriate environmental safeguards and tools to support sustainable development and effective waste management and pollution control.

2.6.4. Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Department of Environment, Tonga

The Department of Environment within the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), Tonga was established in 2001 with a mission to promote the conservation of biological diversity, sustainable use, and management of natural resources while maintaining ecosystem services. The Department aligns its efforts with Pillars 2 and 5 of the *Tonga Strategic Development Framework II*, focusing on the following outcomes:

- *2.1* - Improved collaboration with and support to social and community groups
- *5.1* - More equitable, sustainable, and appropriate management of natural resources to ensure a steady long-term flow of benefits
- *5.2* - Cleaner environments and reduced pollution from household and business activities
- *5.3* - Enhanced national and community resilience to potential disruptions and damage to wellbeing, growth, and development from natural disasters, including extreme weather events, with a particular focus on the likely increase in such events due to climate change

2.6.5. Ministry of Climate Change Adaptation, Meteorology & Geohazard, Environment, Energy and Disaster Management, Department of Environmental Protection and Conservation (DEPC), Vanuatu

The Department of Environmental Protection and Conservation (DEPC) began as the Vanuatu Environment Unit in 1986. Today, it is formally recognised as a department under the Ministry of Climate Change Adaptation, Meteorology & Geo-Hazards, Environment, Energy, and Disaster Management. In 2002, the Government of the Republic of Vanuatu enacted the Environmental Management and Conservation Act No. 12 of 2002, now known as the Environmental Protection and Conservation Act [CAP 283] (the EPC Act). This legislation formally established DEPC and defines its role in developing, coordinating, and implementing the Government's environmental policies and programs.

The DEPC's responsibilities include assessing the environmental impact of proposed developments, working with communities to establish 'Community Conservation Areas',

collaborating with researchers to understand Vanuatu's unique environment, protecting internationally endangered species, controlling ozone-depleting substances, and partnering with municipal and provincial governments to manage waste and pollution. Additionally, DEPC administers environmental laws and collaborates with various partners to address local, regional, and global environmental priorities.

2.7. UNIVERSITY OF NEWCASTLE, AUSTRALIA

The University of Newcastle collaborates with Pacific partners to address environmental, social, and economic challenges, fostering equitable prosperity, social cohesion, and healthy communities. Guided by the University's Pacific Research Roadmap, the university is committed to supporting its nearest neighbours through its 'Looking Ahead' Strategic Plan 2020-2025, which emphasises an Asia Pacific focus.

In partnership with the SPREP, the University has established the Pacific Node in Apia, Samoa. This initiative provides a flexible research framework for collaborative engagement between academia, industry, government, and communities, targeting national priority areas such as climate resilience, ecosystem and biodiversity protection, waste management and pollution control, and environmental governance.

Active projects demonstrate the breadth of research excellence, innovation, and training being applied in the region. In 2024, the partnership between SPREP and the University of Newcastle was further strengthened by offering an internship for an Australian university student to participate in data analysis and compiling a comprehensive report from across the region. The internship aimed to broaden the scope of the marine litter study by incorporating an overview of results from current studies on marine litter and plastic pollution, existing or current regional or international policies and regulations on marine litter and plastic pollution, and a discussion of the tools or actions that could be implemented at the national or regional level to address marine litter and plastic pollution.

3. MARINE LITTER BACKGROUND

3.1. THE UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The SWAP project claims it has direct links in addressing the United Nations (UN) Sustainable Development Goals (SDGs); relative goals include Goal 11 Sustainable Cities and Communities, Goal 12 Responsible Consumption and Production, Goal 13 Climate Action and Goal 14 Life Below Water (SPREP, 2024a).

Figure 3.1.1. *Sustainable Development Goals (UN, 2015a)*

3.2. INTERNATIONAL FRAMEWORKS AND MECHANISMS

Due to the dynamic nature of marine litter deposition, transportation and accumulation, marine litter is a transboundary challenge that requires regional and global instruments to reduce and manage waste pollution (UNEP, 2021a; Jeftic et al., 2009). A summary of relevant instruments include:

- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) 1972
- United Nations Environment Programme (UNEP) Regional Seas Programme 1974
- Regional Seas Conventions - The Convention for the Protection of the Mediterranean Sea Against Pollution 1976
- Apia Convention 1976

- Law of the Sea Convention (LOSC) 1982
- Agreement on the protection of the marine environment and the coastal area of the Southeast Pacific (Lima Convention) 1986
- Noumea Convention 1986
- Convention for the Protection of the Marine Environment of the North-East Atlantic 1992 (OSPAR Convention)
- Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention) 1992
- Convention on Biological Diversity 1993
- Northwest Pacific Action Plan (NOWPAP) 1994
- Waigani Convention 1995
- Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific (NEP) 2002
- Anthropogenic Marine Debris (AMD) protocols

SPREP is the Secretariat of the Noumea Convention, Waigani Convention and Apia Convention (SPREP, 2024d).

3.3. MARINE LITTER CHALLENGE

3.3.1. Sources of Marine Litter

Lincoln et al. (2022) defined marine litter as any persistent, manufactured or processed solid material that has been deliberately or unintentionally discarded, disposed of, or abandoned in the marine and surrounding coastal environment. Waichin et al. (2016) observed that land-based sources, such as littering, plastic bag usage and solid waste disposal contributed to 80% of the marine litter and plastic debris in the marine environment. This litter run-off is increased in densely populated or industrialised areas (Waichin et al., 2016). Extreme weather events, such as cyclones or flooding can increase the transfer of land-based debris to the sea. Waichin et al. (2016) determined that ocean-based sources account for 20% of marine plastic debris and were mainly caused by commercial fishing and shipping. Plastic debris that originates from both sea and terrestrial sources can be transported through longshore ocean currents into the subtropical gyres where it forms oceanic accumulation zones of transboundary marine litter, such as the Great Pacific Garbage Patch in the North Pacific Ocean (Lebreton et al., 2012).

3.3.2. Type of Plastics

Microplastics are one of the greatest potential threats to the marine environment (Laskar et al., 2019). Plastics are synthetic polymer compounds that are mostly derived from petrochemical sources and are difficult to break down or decompose due to their high molecular mass and durable plasticity (Laskar et al., 2019). Primary (particulate emissions from industrial production) or secondary (deteriorated or fragments of larger plastic particulate material) are classed as microplastics when they are less than 5 millimetres (mm) in size and are not visible to the naked eye (Laskar et al., 2019). Nanoplastics are particulates that are 10-100 nanometres (nm) in size and can occur from plastics weathering on fragmentation (Laskar et al., 2019). Macro plastics are large plastic items larger than 5 mm.

3.3.3. Plastic Waste Litter Trends

The 2021 United Nations Environment Programme (UNEP) 'From Pollution to Solution: A Global Assessment of Marine Litter and Plastic Pollution' report revealed that marine litter and plastic pollution are accumulating in the ocean at an unprecedented rate with an estimated 75 million to 199 million tons of plastics already circulating in the ocean (UNEP, 2021a, p. 14). The UNEP Global Waste Management Outlook for 2024 found that municipal solid waste generation is predicted to grow globally from 2.1 billion tonnes in 2023 to 3.8 billion tonnes by 2050 (Lenkiewicz et al., 2014). The 2021 UNEP report predicted that on average 9-14 million tons of plastic waste is entering the aquatic ecosystems every year (UNEP, 2021a). Figure 3.3.3.1 highlights the historical and future trends of global plastic production, accumulation, and management paths (UNEP, 2021a). The direct annual global cost of waste management is estimated to be USD 252

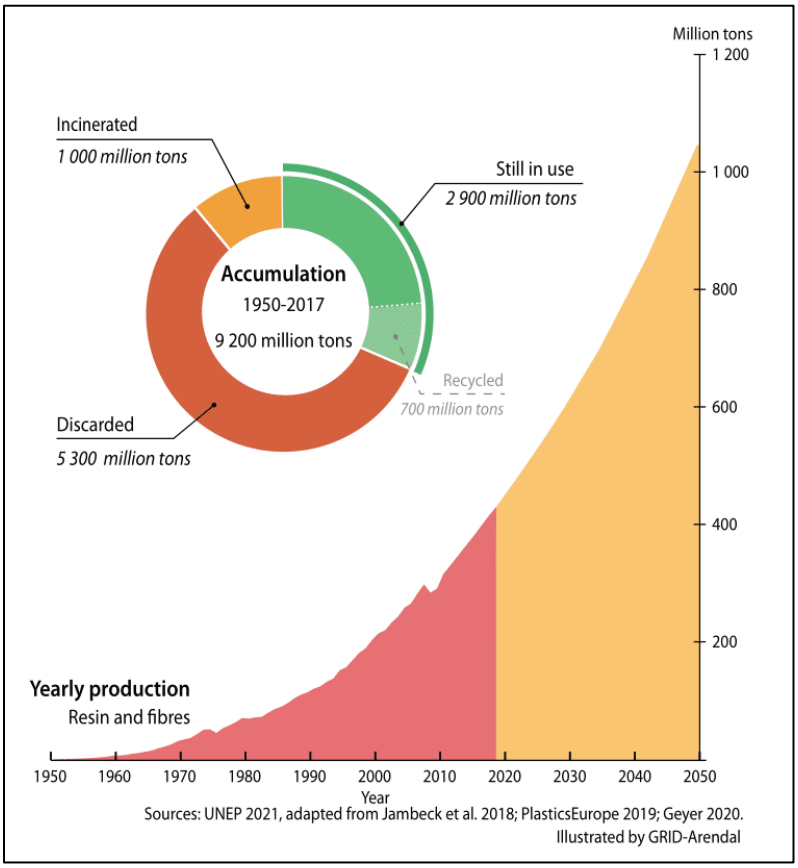

Figure 3.3.3.1. *Global plastic production, accumulation, and future trends (UNEP, 2021a)*

billion, but with the additional hidden costs from poor waste disposal practices, pollution, poor health and climate change pressures, this cost could rise to USD ~361 billion (Lenkiewicz et al., 2014). UNEP declares that without urgent waste management to reduce waste, particularly synthetic polymers (plastic) production, accumulation, and reduction of historical pollution by 2050, the annual global cost could double to USD 640.3 billion (Lenkiewicz et al., 2014).

3.3.4. Waste and the Triple Planetary Crisis

The impact of municipal waste growth and management has a strong influence on the triple planetary crisis of climate change, biodiversity loss and pollution. These impacts are summarised in Figure 3.3.4.1.

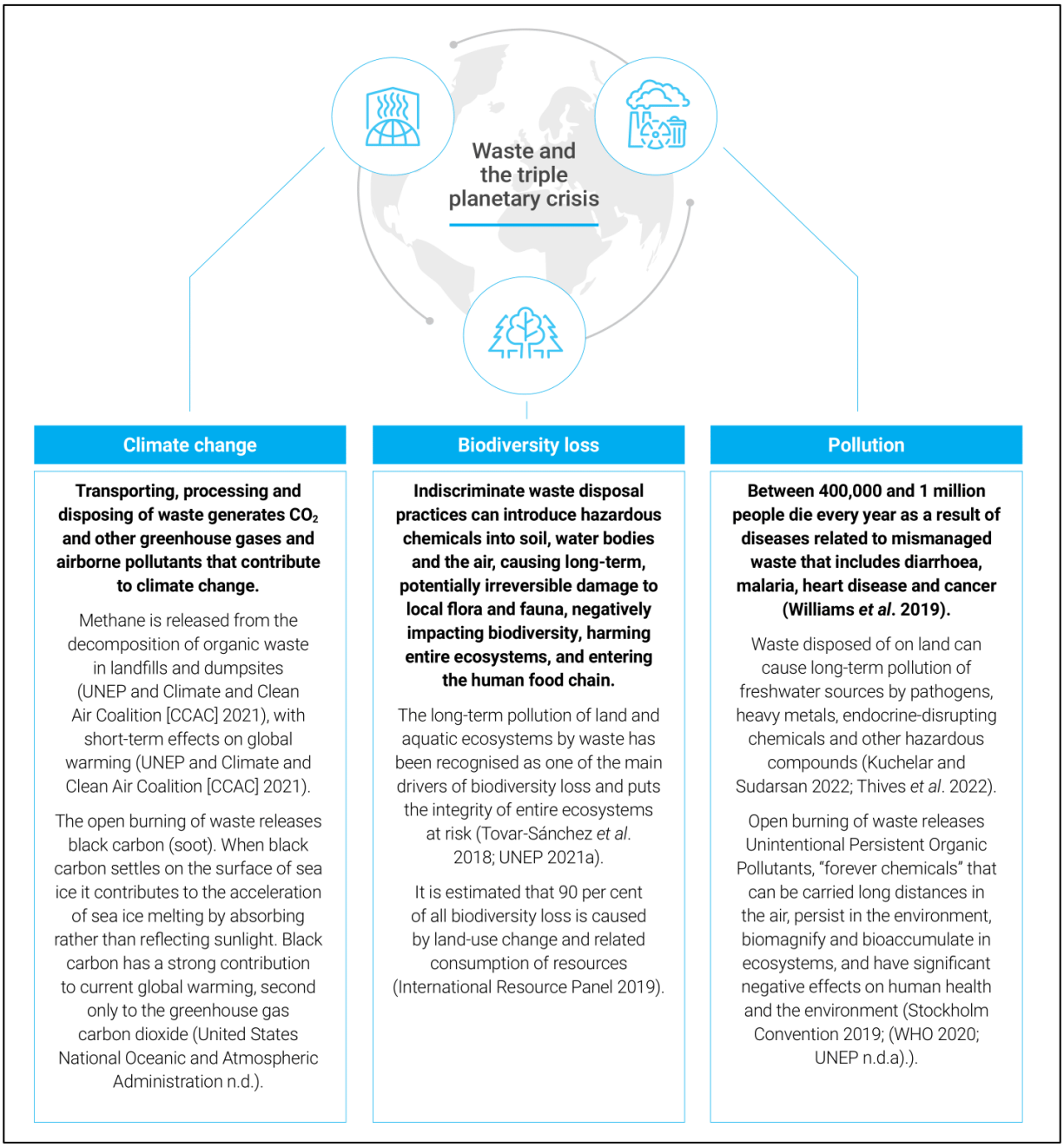

Figure 3.3.4.1. *Waste and the Triple Planetary Crisis (Lenkiewicz et al., 2014)*

4. LITTER SURVEYS AND AUDITS METHODOLOGY AND DATA

4.1. UNEP/IOC MARINE LITTER SURVEY & AUDIT GUIDELINES

In 2009, the United Nations Environment Programme (UNEP), in collaboration with the Intergovernmental Oceanographic Commission (IOC), established standardised operational guidelines for marine litter surveying and monitoring to facilitate global comparative studies of highly resolved data (Cheshire et al., 2019). This research adopted a localised adaptation of the UNEP/IOC marine litter beach surveying and waste audit guidelines and methodologies proposed by Sustainable Coastlines. By utilising this standardised procedure, the resulting data accurately represent the density and types of marine litter found on Pacific beaches (Cheshire et al., 2019). The collected data highlight prominent waste streams and areas of high litter density, aiding in deepening local and governmental knowledge of marine debris. This research examines the degree and composition of marine litter along the Pacific coastline to enhance informed waste management decisions at both national and international levels. Replicating the marine litter beach survey and waste audit enables short- and long-term comparative studies within the beach location, across other survey sites, and with other Pacific Island countries and territories.

4.2. BEACH MARINE LITTER SURVEY

4.2.1. Survey Planning & Site Selection

Pre-survey planning and scoping must be undertaken to identify and select suitable beaches to allow the establishment of appropriate sampling units. Site selection evaluates the beach's appropriateness by considering the site's accessibility, representativeness, and relevance to the study objectives. Survey sites should have clear access and exposure to the sea and are not to be blocked or screened by anthropogenic structures, such as breakwaters and jetties (Cheshire et al., 2019). Sampling sites for this research were selected by each Pacific country/territory and had to be sites that were not subject to other litter collection activities, such as tourist clean-ups near popular locations (e.g. resorts). Survey activities were to be conducted on coastal areas that had minimal impact on endangered or protected species. Once a suitable site is identified the sampling design and units within those beaches can be determined. This sampling design and units specify the area/s within the beach that are most representative and ensure the domains of the sampling transect can be accessed over the lifetime of the study.

The survey schedule defines how many times the survey and waste audit were to be replicated, this is site-specific and regionally directive. The UNEP/IOC recommends for long-term data comparisons for surveys to be replicated every 3 months (Cheshire et al., 2019). Due to the hazardous nature of waste and potential risk, beach litter surveys and waste audits require detailed planning and risk assessment. Surveys should be planned to occur during low tide and clear low-wind climatic conditions (Cheshire et al., 2019).

4.2.2. Survey Transect

The survey transect is constructed at the most apparent high tide mark along the beach face. The minimum length of a transect should be 100 m with a low to moderate beach slope (15-45^{o}) (Cheshire et al., 2019). The transect is measured and staked with 10 m on either side of the high tide mark. The modal transect was 100 m x 20 m. Three reference photos in the direction out to sea, back to the beach and along the survey area were taken at the transect start point. Refer to Appendix A.

Photo 4.2.2.1. *Setting up of the survey area, Pauni Beach, Ifira Island, Vanuatu, 30 May 2023 – Credits: Julie Pillet, SWAP*

The Global Positioning System (GPS) latitude and longitude coordinates of the transect dimensions were measured using a handheld Garmin Trex and recorded in the World Geodetic System 1984 (WGS 84) datum. If less than 10 items were recovered the survey length should be extended (Cheshire et al., 2019).

Photo 4.2.2.2. *Setting up of the survey area and recording of the latitude and longitude coordinates of the transect dimensions, USP Foreshore Beach, Fiji, 2 May 2023 – Credits: Julie Pillet, SWAP*

4.2.3. Survey Background Data

Before each survey was conducted, the survey type, site name, province, monitoring group names of participants, lead citizen scientist, substratum type, date and times were recorded. An anecdotal visual assessment grade (A - D) of the beach rubbish level pre-survey was determined visually by the lead citizen scientist. The visual assessment grades specify 'A' as being completely clean with no rubbish visible within the survey area, 'B' as predominantly litter-free with some minor instances, 'C' as widespread litter with some accumulations, and 'D' as being heavily impacted by rubbish; refer to Appendix B.

4.2.4. Survey Waste Collection

All visible litter that was not dangerous, oversized, immovable, or organic and over 5 mm in size was collected within the identified survey area. No waste was to be collected outside of this transect area. A systematic collection pattern was implemented with all participants lining along one side of the survey area and scouting from one side to the other at least two times.

Photo 4.2.4.1. *Waste collection, Aka'aka, Wallis, 18 September 2021 – Credits: A Vaka Heke*

4.3. BEACH WASTE AUDIT

All the litter collected was segregated into plastic, foamed plastic, fabric & textiles, glass & ceramic, metal, paper & cardboard, rubber, wood, or other waste categories. All litter under 5 mm was removed from the audit using a sieve. The waste items were further segregated and refined into 113 waste lines; refer to Appendix C for the waste classifications. The litter density of items per unit and weight in grams per unit were calculated for each waste line. All waste materials should be weighed when dry and clean, however, a confidence rating of either high confidence (items were predominately dry, clean and accurate) or low confidence (items were predominately wet, dirty and potentially erroneous) was recorded for each weight recorded.

Photo 4.3.1. *Waste audit, Valuutai, Samoa, 27 June 2023 – Credits: Sustainable Coastlines*

Photo 4.3.2. *Waste segregation, Vanuatu, 31 May 2023 – Credits: Sustainable Coastlines*

4.4. MARINE LITTER DATA MANAGEMENT

Beach survey and waste audit data were recorded through the Litter Intelligence application accessed through a phone/tablet or manual paper form. The data was supplied and uploaded to Sustainable Coastlines for verification. A survey status of either official or ad-hoc was determined for each dataset to indicate if the monitoring group had official waste monitoring training or remote virtual training. Each dataset was provided with a numeric sequential

identification number and published for viewing or downloading on the open-source Litter Intelligence platform.

Photo 4.4.1. *Data Collection, Mendana Beach, Solomon Islands, 31 August 2023 – Credits: Sustainable Coastlines*

Photo 4.4.2. *Data Recording, Tonga, 25 August 2023 – Credits: Sustainable Coastlines*

4.4.1. Marine Litter Data Analysis

Between 31 August 2019 and 11 October 2024, 73 beach marine litter surveys and waste audits were conducted across the Pacific Island region. Participating PICTs included Fiji, Samoa, Solomon Islands, Tonga, Vanuatu, Wallis & Futuna. Of the 73 surveys conducted, 43 locations areas were surveyed. Only 15 of the 43 sites replicated its marine litter survey and auditing.

The 73 datasets were provided in a spreadsheet format downloaded from the online Litter Intelligence portal. Each dataset was reviewed and compiled into a grouped dataset to represent the overall waste findings for each PICT. The representative country waste findings were then compiled into a master dataset to represent the overall waste findings for the Pacific Island region. To enable a multifaceted standardised comparison, considering different survey transect sizes, litter density of items per 1,000 m^2 was used. Due to the significant prevalence of plastic waste, this report focuses exclusively on analysing plastics. It delves into the substantial plastic waste items for each Pacific Island country and territory, providing a detailed examination of this category.

The litter density for each PICT was compared to their own average, the Pacific's mean litter density from 73 surveys and Sustainable Coastline's Litter Intelligence average captured from their 2,287 surveys from 2018-2024 (containing the result from the PICTs and New Zealand surveys).

5. ABOUT THE SPREP MARINE LITTER ACTIVITIES

5.1. INTERNATIONAL COASTAL CLEAN-UP DAYS

International Coastal Cleanup Day (ICCD) is an annual event held on the third Saturday of September. Organised by Ocean Conservancy, a nonprofit environmental advocacy group based in Washington, D.C., this event focuses on addressing some of the most significant threats facing our oceans today. Ocean Conservancy brings together people, science, and policy to champion innovative solutions and advocate for a sustainable ocean.

International Coastal Cleanup Day unites volunteers to remove marine debris from beaches, rivers, and waterways, with support from over 100 countries worldwide. Since the first cleanup in 1986, over 17 million volunteers have gathered more than 348 million pounds of waste in 150 countries.

5.1.1. ICCD 2021

In 2021, 587 volunteers joined from four participating Pacific Island countries and French territories registered through SWAP, namely Samoa (3 activities), Tonga (1 activity), Vanuatu (1 activity) and Wallis and Futuna (5 activities). These activities collected and removed nearly 5,660 kilograms (kg) of waste from the natural environment.

Photo 5.1.1.1. *ICCD2021, Aka'aka, Wallis, 18 September 2021 – Credits: A Vaka Heke*

5.1.2. ICCD 2022

In 2022, 2,147 volunteers joined from six participating Pacific Island countries and French territories registered through SWAP, POLP and the Korea Institute of Ocean Science & Technology Project (KIOST), namely Cook Islands (1 activity), Fiji (4 activities), Samoa (4 activities), Solomon Islands (11 activities), Vanuatu (1 activity) and Wallis and Futuna (3 activities). The activities collected and removed approximately 7,750 kg of waste from the natural environment.

Photo 5.1.2.1. *ICCD2022, Maleala Coastal Area, Samoa, 12 October 2022 – Credits: MNRE*

5.1.3. ICCD 2023

In 2023, 885 volunteers joined from six participating countries and French territories registered through SWAP, POLP and GEF ISLANDS, namely Solomon Islands (8 activities), Fiji (1 activity), Samoa (7 activities), Tuvalu (5 activities), Tonga (3 activities), and Wallis and Futuna (1 activity). The activities collected and removed approximately (based on the data shared on Litter Intelligence) 18,895 items weighing 592.9 kg from the natural environment.

5.2. SWAP MARINE LITTER PILOT PROJECTS

As part of the SWAP project activities, SWAP collaborated with local partners to implement a Marine Litter Pilot Project at specific sites.

5.2.1. Fiji Coastal Litter Project

The 'Fiji Coastal Litter Project' was a youth project targeted at coastal clean-up campaigns to educate the community on how to care for the environment and raise awareness of future environmental and pollution concerns. The project intended 14 coastal clean-ups to be repeated every three months over six months at specific coastal sites located around Suva Harbour (SWAP, 2024).

Photo 5.2.1.1. *Fiji Coastal Litter Project, Makuluva Island, Fiji, 27 February 2024 – Credits: POLYP*

5.2.2. Samoa Marine Litter Pilot Project

The 'Samoa Marine Litter Pilot Project' was a marine debris management awareness and clean-up campaign targeted at three coastal communities within Upolu and Savaii. The pilot project aimed to host clean-up days occurring every three months and to gather data over six months to gauge marine litter trends relevant to that site and in general, Samoa (SWAP, 2024).

Photo 5.2.2.1. *Samoa Marine Litter Project, Pu'apu'a, Samoa, 12 April 2024 – Credits: MNRE*

5.2.3. Honiara Marine Litter Pilot Project in the Solomon Islands

The 'Honiara Marine Litter Pilot Project' in the Solomon Islands targeted waste management and litter issues within the Mataniko River in Honiara City (SWAP, 2024). The pilot project aimed to deliver coastal waste clean-ups and litter audits every three months to gain insights into reliable trends in marine litter and littering (SWAP, 2024). The project also aimed to reduce pollution to prepare Honiara City to host the 2023 Pacific Games (SWAP, 2024).

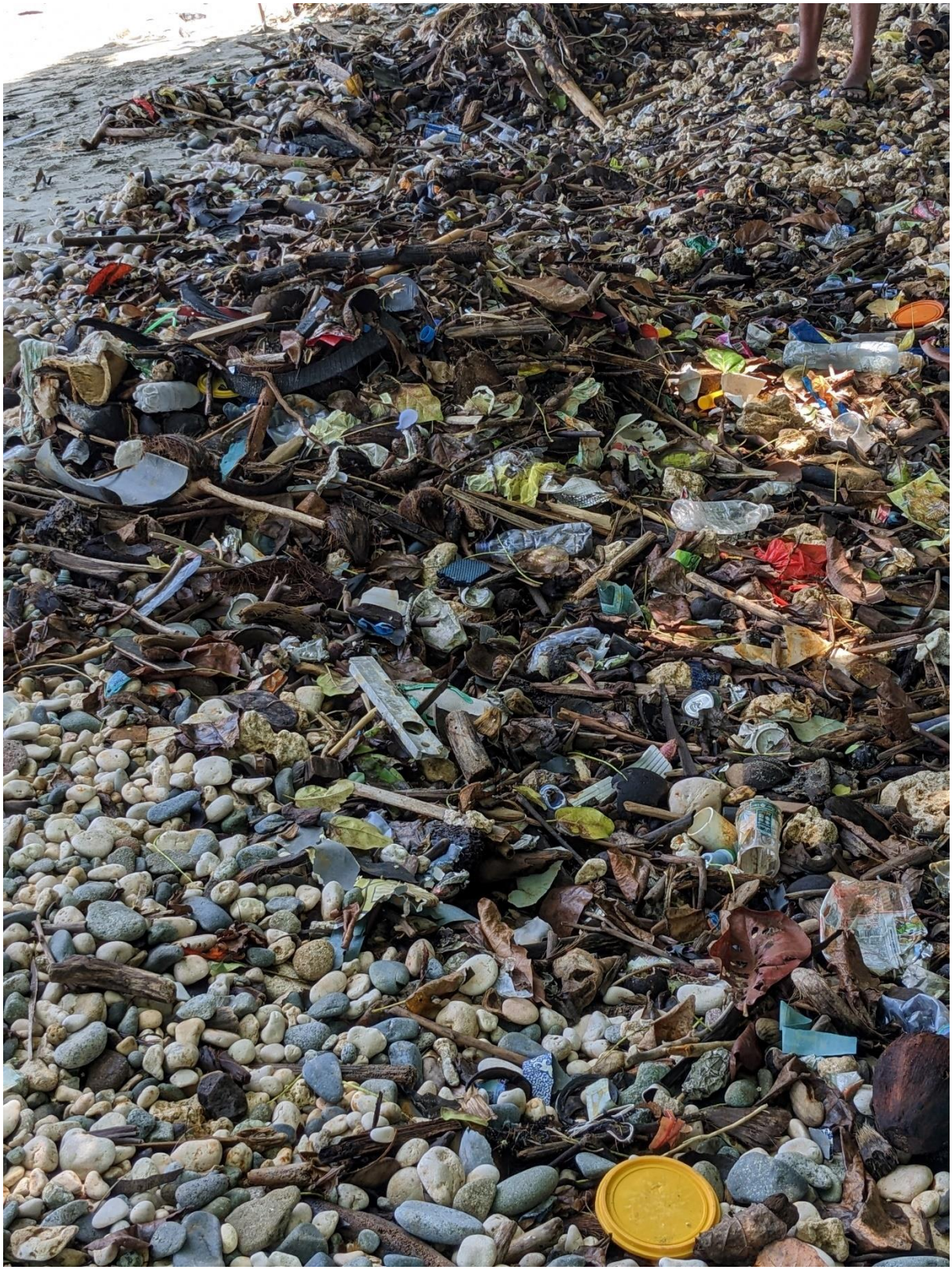

Photo 5.2.3.1. *Honiara Marine Litter Pilot Project in the Solomon Islands, Baudoko Beach, Solomon Islands, 14 March 2023 – Credits: Julie Pillet, SWAP*

5.2.4. Nuku'alofa Waterfront Clean-Up Campaign in Tonga Pilot Project

The 'Nuku'alofa Waterfront Clean-Up Campaign in Tonga' aimed at coastal clean-ups along the Nuku'alofa waterfront to improve marine species restoration, habitat rehabilitation, prevention of disease outbreaks and air quality (SWAP, 2024). The project engaged communities, women's group, secondary and primary schools and volunteer groups in litter awareness and expanding marine litter knowledge and data.

Photo 5.2.4.1. *Nuku'alofa Waterfront Clean-Up Campaign in Tonga Pilot Project, Popua Beach, Tonga, 22 August 2023 – Credits: Julie Pillet, SWAP*

5.2.5. Tackling Marine Litter in Selected Sites in Shefa Province in Vanuatu Pilot Project

The 'Tackling Marine Litter in Selected Sites in Shefa Province in Vanuatu' aimed at coastal-ups and building marine litter knowledge and trends within the Shefa Province (SWAP, 2024). The project aimed to address the core waste issues and provide good practices and solutions to waste management (collection, treatment, and proper disposal) in Vanuatu (SWAP, 2024). The project aimed to assist the Vanuatu government in progressing reforms in single-use plastic bans.

Photo 5.2.5.1. *Tackling Marine Litter in Selected Sites in Shefa Province in Vanuatu Pilot Project, Ifira Point Beach, Vanuatu, 31 May 2023 – Credits: Julie Pillet, SWAP*

6. ABOUT THE MARINE LITTER SURVEYS AND WASTE AUDITS

6.1. SURVEY LOCATIONS

6.1.1. All Surveyed Locations

Figure 6.1.1.1 illustrates the 73-beach marine litter survey locations within the Pacific region and their respective country/territory. Refer to Appendix D for the metadata that supports the marine litter data analysis extracted from the Litter Intelligence online portal.

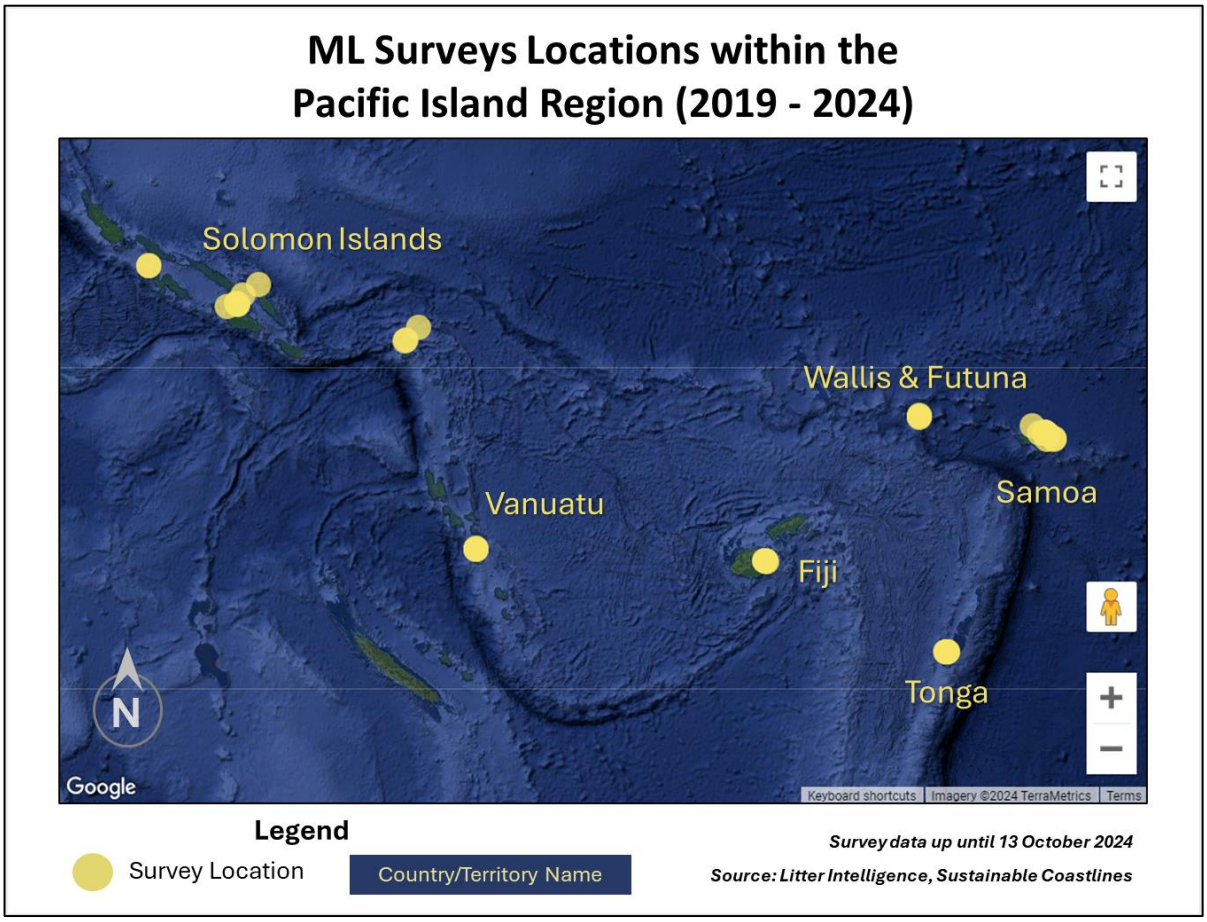

Figure 6.1.1.1. *Beach ML Survey Locations within the Pacific Island Region, 2019-2024 (Litter Intelligence, 2024a).*

6.1.2. Fiji Survey Locations

Figure 6.1.2.1 illustrates the five beach survey locations surrounding Suva Harbour located within the province of Rewa on the island of Viti Levu, Fiji. The locations included Makuluva Island, Bowling Club Helipad Beach, FRCS Foreshore, Suva Point Beach and the University of South Pacific Foreshore within Suva. The data analysed for Fiji covers the period from February 5, 2023, until April 27, 2024. Refer to Appendix D for survey metadata.

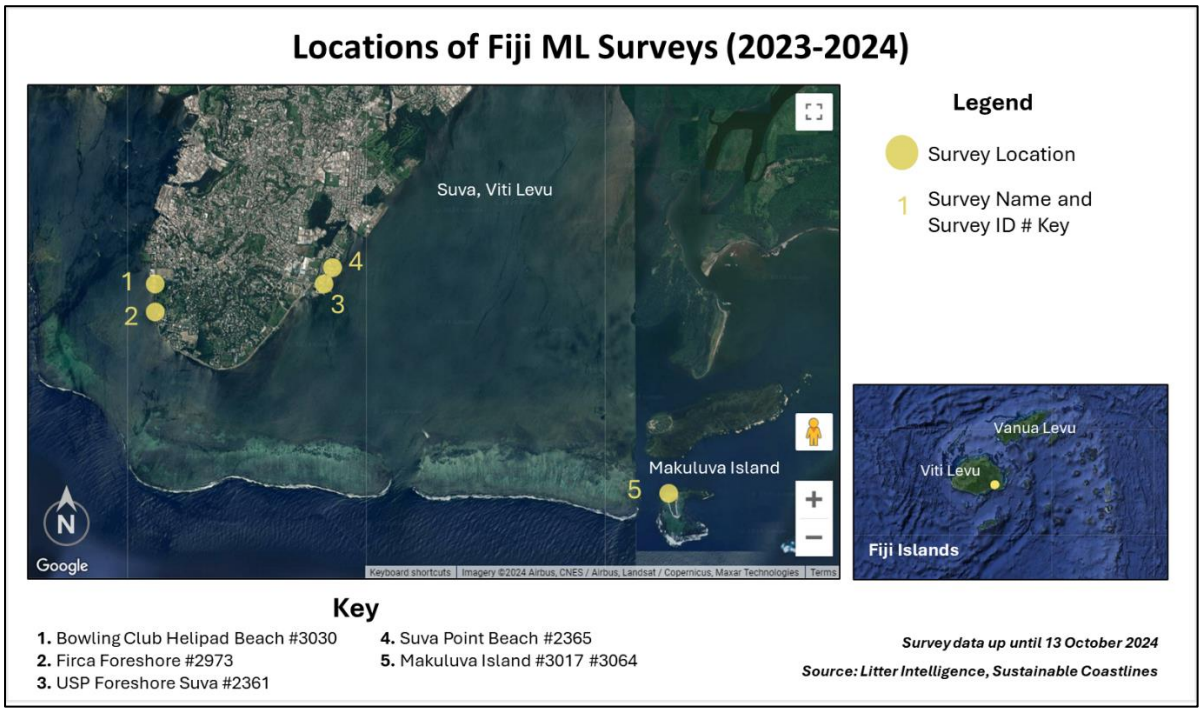

Figure 6.1.2.1. *Map of Beach ML Survey Locations within Fiji, 2023 - 2024 (Litter Intelligence, 2024a)*

6.1.3. Samoa Survey Locations

Figure 6.1.3.1 illustrates the 14 beach survey locations located on Upolu and Savai'i islands within Samoa. The provinces (not pictured) include Fa'asaleleaga on Savai'i Island and A'ana, Atua, Tuamasaga, and Vaisigano on Upolu Island. The locations include Pu'apu'a on Savai'i, Vailuutai, Apia Harbour Sand Bank, Mulinuu Seawall (Adjacent to MET Office), Mulinuu Seawall (Apia Yacht Club), Maleafatu Park Seawall (Apia Bay), Vaisigano (Sheraton Waterfront Apia), Apia Waterfront, Vaiala sandbank (Apia), Moataa, Solosolo Seawall, Malaela Coastal Area, Lalomanu Beach Fales and Vaovai Falealili on Upolu. The data analysed for Samoa covers the period from August 31, 2019, until April 12, 2024. Refer to Appendix D for survey metadata.

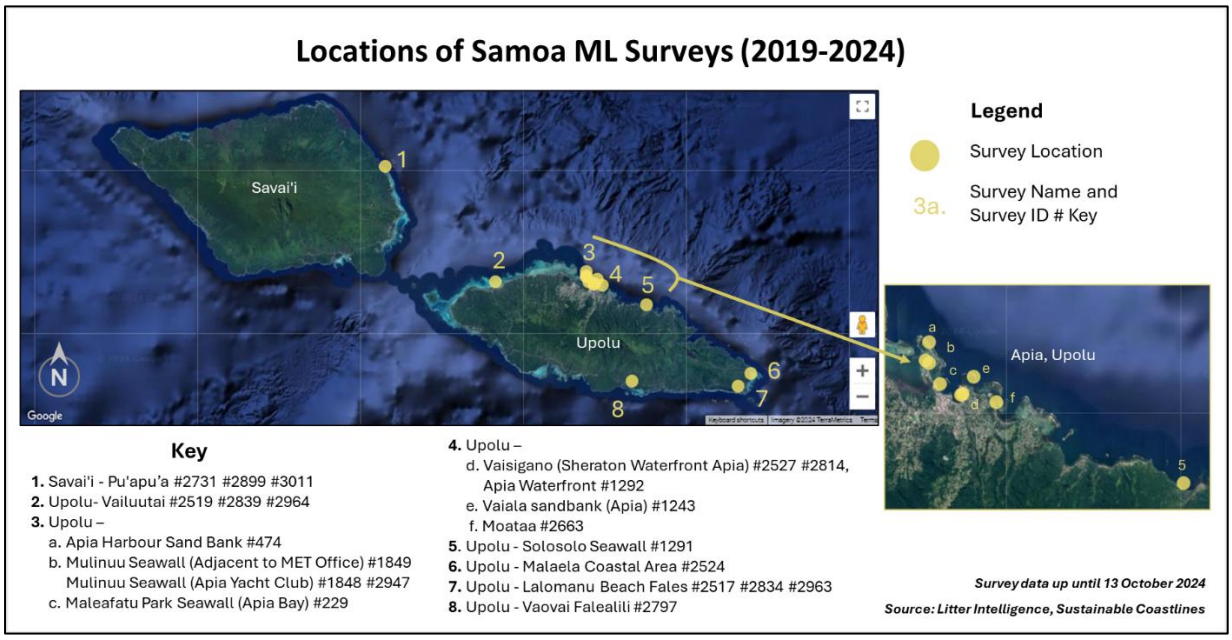

Figure 6.1.3.1. *Map of Beach Marine Litter Survey Locations within Samoa, 2019 - 2024 (Litter Intelligence, 2024a)*

6.1.4. Solomon Islands Survey Locations

Figure 6.1.4.1 illustrates the 12 beach survey locations located on Gizo Island, Guadalcanal, Malaita, Tulagi Island, the Reef Islands and Santa Cruz Islands within the Solomon Islands. The provinces (not pictured) include Central, Temotu and Western. The locations included Tisi Beach Gizo, Malakerava 3 Hotel Residential Area, Tiaro Primary/ Community High School Beach, Baudoko Beach Honiara, Karaina Coastal Front, Mendana Beach, Mataniko Coastal Area Marine Beach Front Tulagi, Lilisiana Beach, Luova Beach Santa Cruz Island (Temotu Province), Matu Beach and Tanga Coastline. The data analysed for the Solomon Islands covers the period from September 17, 2022, until March 27, 2024. Refer to Appendix D for survey metadata.

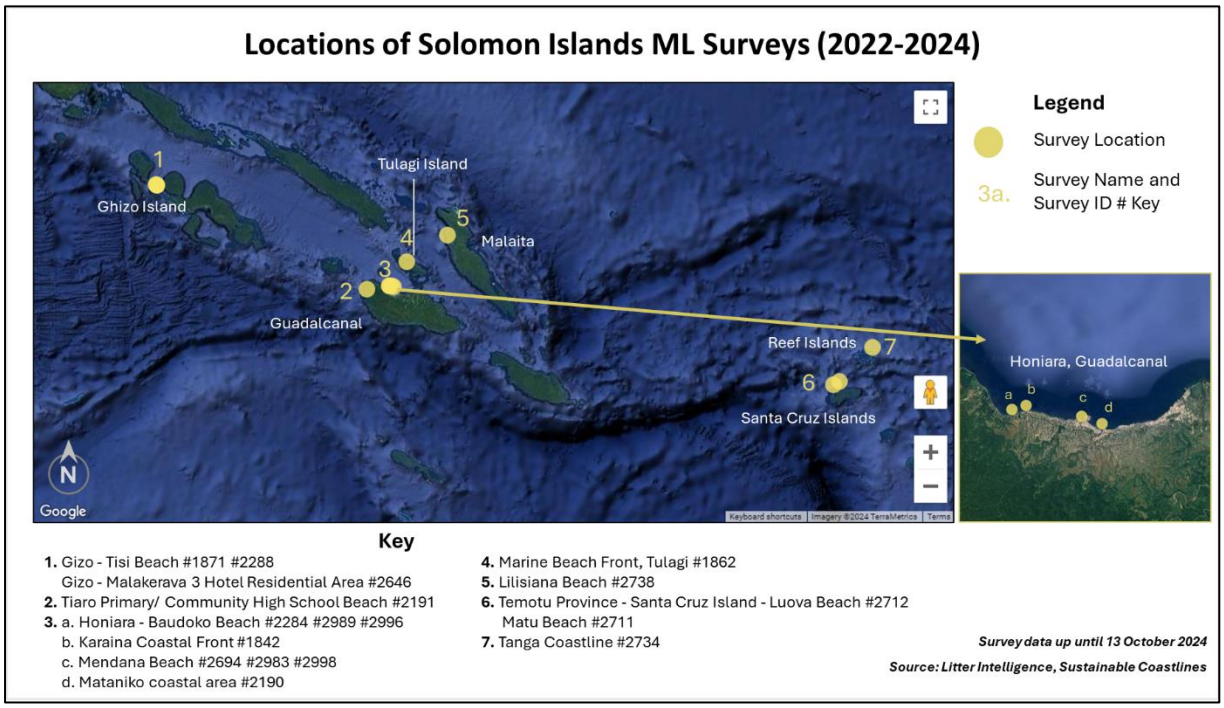

Figure 6.1.4.1. *Map of Beach ML Survey Locations within the Solomon Islands, 2022 - 2024 (Litter Intelligence, 2024a).*

6.1.5. Tonga Survey Locations

Figure 6.1.5.1 illustrates the five beach survey locations located on Tongatapu Island within Tonga. The locations include Sopu Western Side, and Sopu East, Kolomotua Coastal Area, Popua Beach West, and Popua Beach East in Nuku'alofa city (capital). The data analysed for Tonga covers the period from September 18, 2021, until October 11, 2024. Refer to Appendix D for survey metadata.

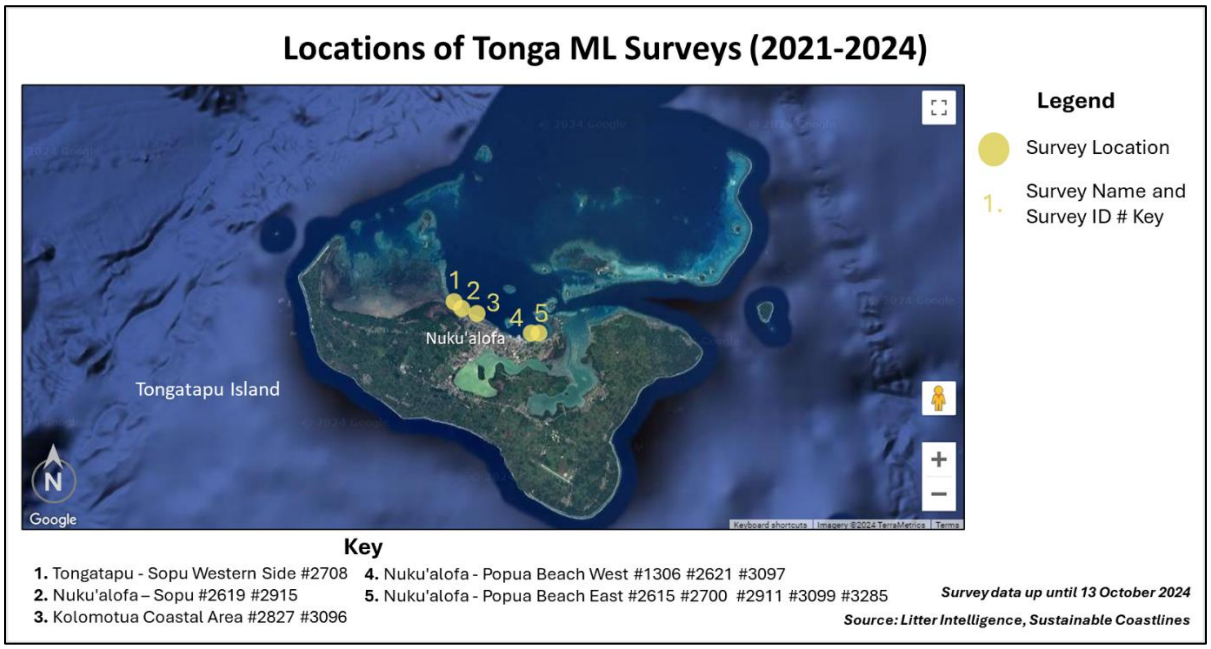

Figure 6.1.5.1. *Map of Beach ML Survey Locations within Tonga, 2021 - 2024 (Litter Intelligence, 2024a).*

6.1.6. Vanuatu Survey Locations

Figure 6.1.6.1 illustrates the four beach survey locations within the province of Shefa in Vanuatu. The locations include Pauni Beach Ifira Island, Ifira Point Port Vila, Mr. Chris's house Ifira Point Port Vila and Etmat Bay, Erakor. The data analysed for the Vanuatu covers the period from May 30, 2023, until July 26, 2024. Refer to Appendix D for survey metadata.

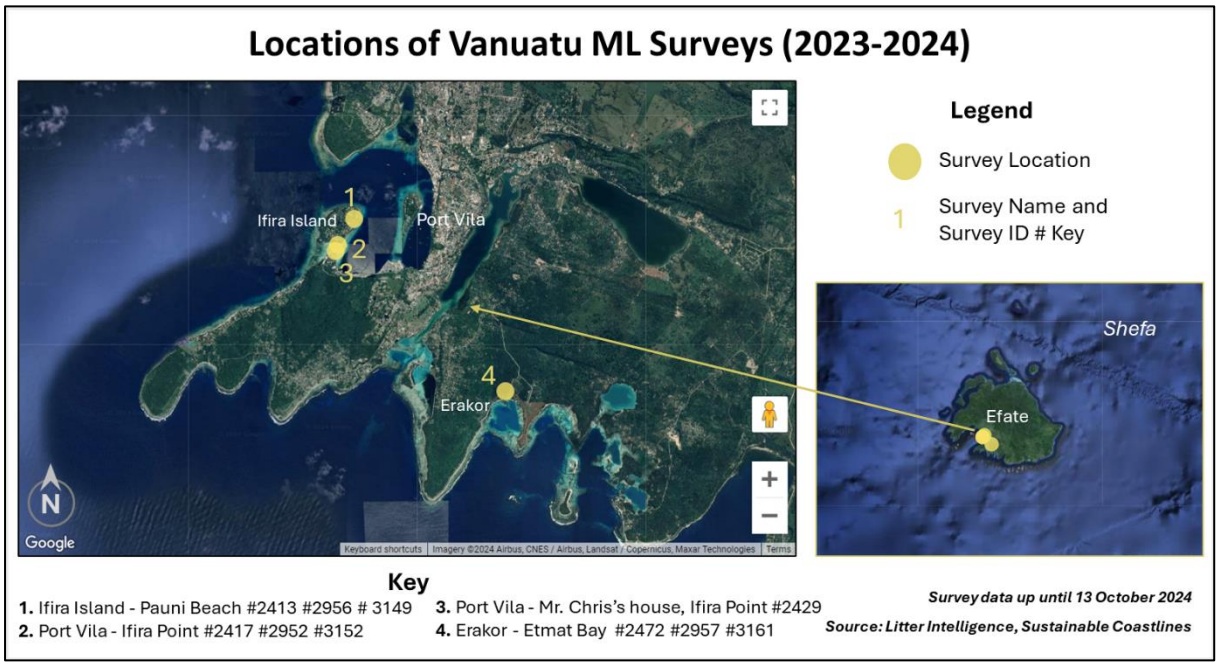

Figure 6.1.6.1. *Map of Beach ML Survey Locations within Vanuatu, 2023- 2024 (Litter Intelligence, 2024a)*

6.1.7. Wallis & Futuna Survey Locations

Figure 6.1.7.1 illustrates the three beach survey locations within Wallis within the French territory of Wallis & Futuna. The locations include a beach between the Fale Fono district in Hihifo, Aka'aka in Hahake and Lavegah by the sea in Mu'a. The data analysed for the Wallis covers the period from September 18, 2021, until September 16, 2023. Refer to Appendix D for survey metadata.

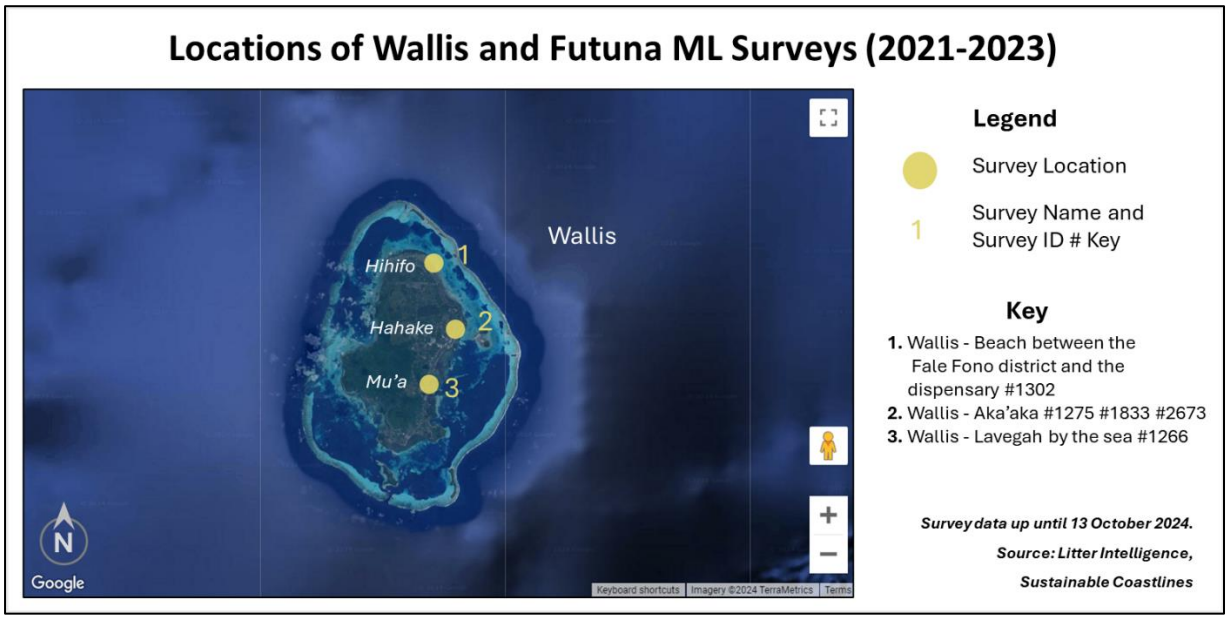

Figure 6.1.7.1. *Map of Beach ML Survey Locations within Wallis and Futuna, 2021- 2023 (Litter Intelligence, 2024a).*

7. MARINE LITER RESULTS - OVERALL

7.1. PACIFIC ISLANDS DISTRIBUTION AND FREQUENCY OF BEACH ML SURVEYS

Figure 7.1.1 illustrates the distribution of marine litter (ML) beach survey and waste audit provided by each PICT. Figure 7.1.1 is complemented by Table 7.1.2, their collective findings suggest that out of the 73 ML surveys analysed, Samoa contributed 30.1% of the Pacific Island region marine litter findings by participating in 22 surveys since 2019. The Solomon Islands contributed 23.3% with 17 surveys since 2022, Tonga 17.8% with 13 surveys since 2021, Vanuatu 13.7% with 10 surveys since 2023, Fiji 8.2% with 6 surveys since 2023, and Wallis & Futuna 6.8% with 5 surveys since 2021.

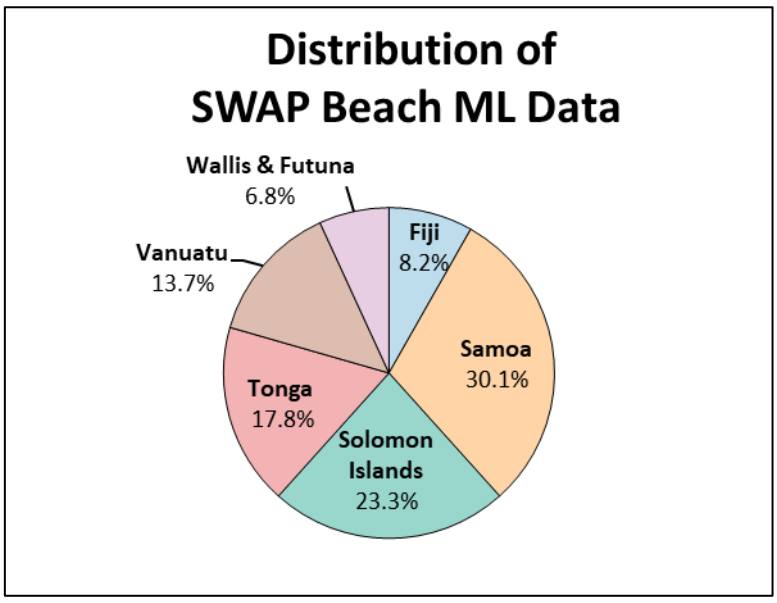

Figure 7.1.1. *Distribution of Beach ML Data 2019-2024*

Table 7.1.2. *Distribution and Type of Beach ML Surveys 2019-2024*

Country / Territory	NO. Surveys[1]	Surveyed Areas	Start Year	Last Survey
Fiji	6	5	2023	27/4/2024
Samoa	22	14	2019	12/04/2024
Solomon Islands	17	12	2022	27/03/2024
Tonga	13	5	2021	11/10/2024
Vanuatu	10	4	2023	26/07/2024
Wallis & Futuna	5	3	2021	16/09/2023
Total Surveyed	73	43		

[1] Survey data up until 11 October 2024.

Figure 7.1.3 illustrates the frequency of ML beach surveys and waste audits provided by each PICT. Figure 7.1.3 suggests that Samoa was the only country to conduct beach ML data in 2019 and 2020, whilst Tonga and Wallis & Futuna initiated their survey programs in 2021. Figure 7.1.3 indicates the Solomon Islands initiated their survey programs in 2022, whilst Fiji and Vanuatu initiated in 2023. Figure 7.1.3 suggests that 45% of the ML surveys analysed in this report were conducted in 2023, whilst 30% were captured in 2024 and 12% in 2022. The remaining 12% were ML data from surveys conducted between 2019-2021. Refer to Appendix D for the individual survey dates, locations and participation.

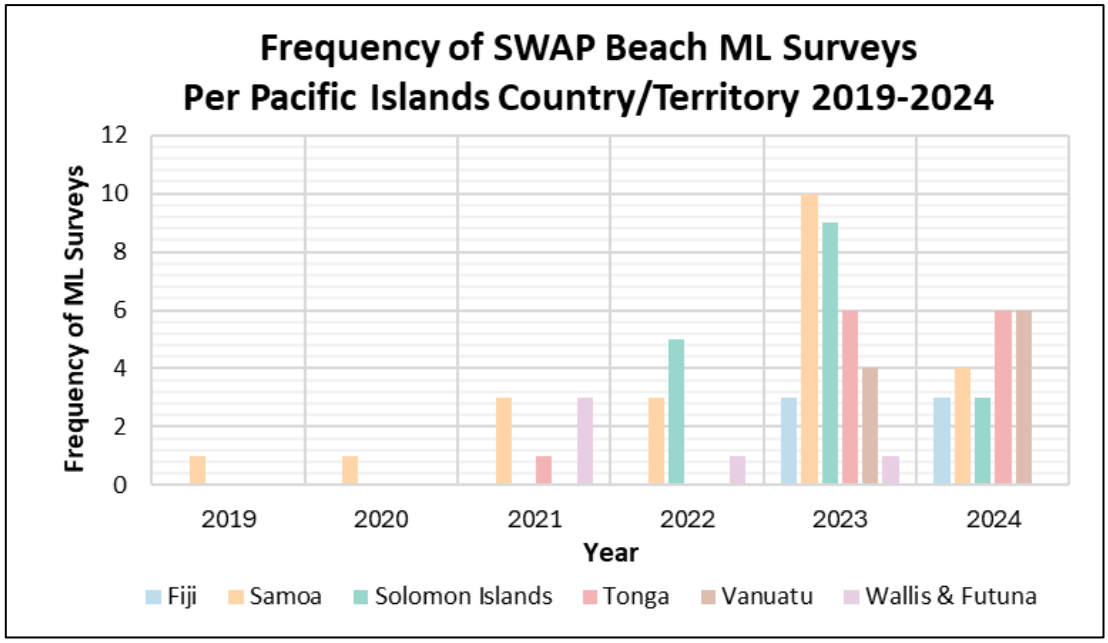

Figure 7.1.3. *Frequency of Beach ML Surveys Per PICT 2019-2024*

7.2. PACIFIC ISLANDS DISTRIBUTION OF ANECDOTAL VISUAL ASSESSMENTS

Figure 7.2.1 illustrates the distribution of anecdotal visual assessments conducted by lead citizen scientists per waste audit. Figure 7.2.1 suggests that 56% (41 surveys) of beaches across the Pacific Islands which were surveyed area are perceived as grade B 'predominately litter-free', whilst 32% (23) of beach areas surveyed were grade C perceived as having 'litter widespread across the beach' and survey area. Figure 7.2.1 suggests that only 8% (6) of the beach areas surveyed were heavily impacted by rubbish (grade D), whilst only 4% (3) beach areas were grade A 'clean with limited-none rubbish visible' within the survey area.

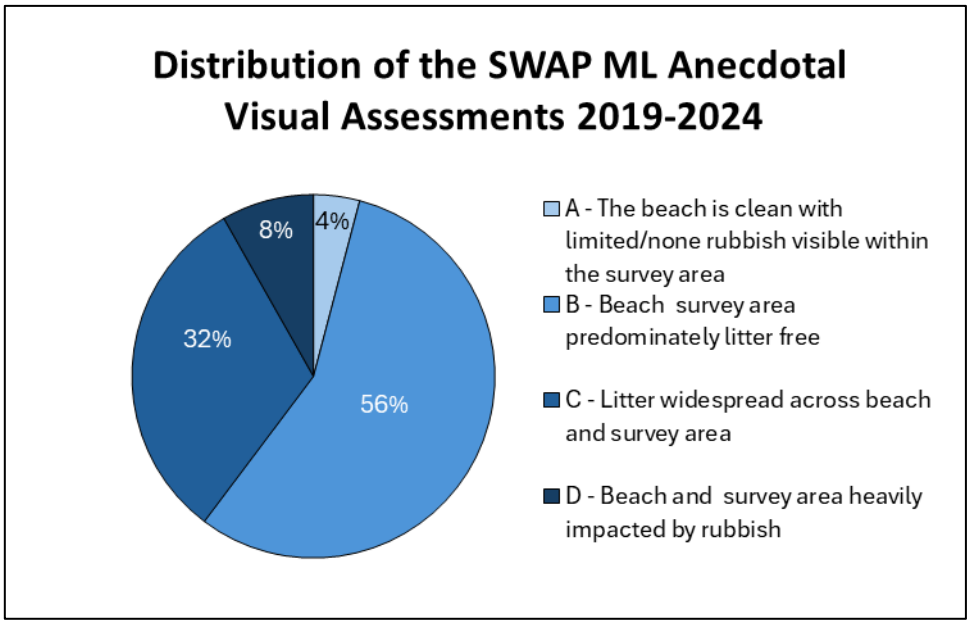

Figure 7.2.1. *Distribution of the Beach ML Anecdotal Visual Assessments Pre-Audit 2019-2024.*

Note this is an anecdotal visual assessment pre-waste audit and not precisely representative of the litter level present.

7.3. PACIFIC ISLANDS DISTRIBUTION OF PLASTIC FREQUENCY

Figure 7.3.1 illustrates the spread distribution of the total plastic percentiles audited across the ML beach surveys and waste audits across the Pacific Island region. Figure 7.3.1 suggests that of the 73 Pacific beach surveys and audits conducted 23% of the surveys (17 surveys) had 61-70% of plastic items evident in their audits. Figure 7.3.1 indicates that 15% (11) of surveys had 71-80% audited plastic items, 10% (7) of surveys had 81-90%, and 7% (5) of surveys had 91-100% of plastic items evident in their audits.

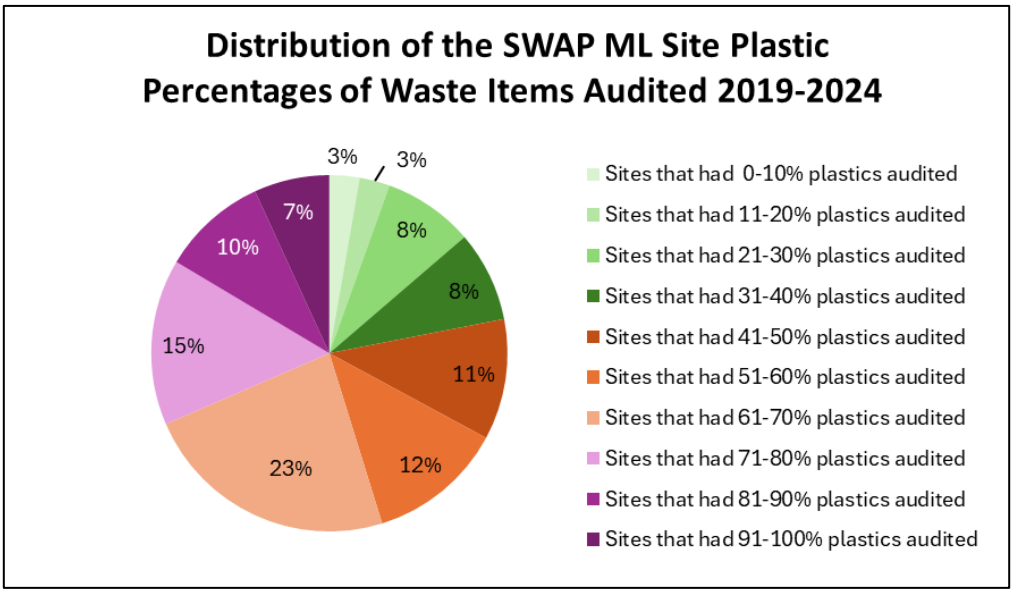

Figure 7.3.1. *Distribution of ML Site Plastic Waste Percentages 2019-2024.*

7.4. PACIFIC ISLANDS BEACH ML DENSITY

Table 7.4.1 describes the mean litter density of the number of waste items per 1,000 m^2 for each PICT. Table 7.4.1 suggests that on average, there are 3,448 waste items (over 5 mm) per 1,000 m^2 found on Pacific Island beaches with a standard deviation (SD) of ± 9,727. Table 7.4.1 describes the highest (maximum) litter density recorded within the Solomon Islands with 74,667 items per 1,000 m^2, whilst the lowest (minimum) litter density occurred in Samoa with 58 items per 1,000 m^2.

Table 7.4.1. *Marine Litter Density Across Pacific Islands (2019-2024).*

Country / Territory	MEAN (ITEMS PER 1,000 M²)	MAXIMUM (ITEMS PER 1,000 M²)	MINIMUM (ITEMS PER 1,000 M²)	MEAN STANDARD DEVIATION ±
Fiji	2,947	10,071	78	4,011
Samoa	581	4,395	58	897
Solomon Islands	10,680	74,667	186	18,423
Tonga	537	1,427	70	443
Vanuatu	3,144	7,271	725	2,309
Wallis & Futuna	255	355	70	120
Overall	**3,448**	**74,667**	**58**	**9,727**

7.4.1. Beach Marine Litter Density - Fiji

Table 7.4.1 indicates that across their six surveys, the islands of Fiji have an average beach marine litter density of 2,947 items per 1,000 m^{-2}, with a variability of ±4,011 items. The highest recorded density was 10,071 items per 1,000 m^2 at Viti Levu - Bowling Club Helipad Beach on 25/11/2023, whilst the lowest was 78 items per 1,000 m^2 at Makuluva Island captured on 24/02/2024.

7.4.2. Beach Marine Litter Density - Samoa

Table 7.4.1 indicates that across their 22 surveys, Samoa has an average beach marine litter density of 581 items per 1,000 m^2, with a variability of ± 897 items. The highest recorded density was 4,395 items per 1,000 m^2 at Upolu - Maleafatu Park Seawall (Apia Bay) on 31/08/2019, whilst the lowest was 58 items per 1,000 m^2 recorded at Upolu - Lalomanu Beach Fales on 15/3/2024.

7.4.3. Beach Marine Litter Density - Solomon Islands

Table 7.4.1 indicates that across their 17 surveys, Solomon Islands has an average beach marine litter density of 10,680 items per 1,000 m^2, with a variability of ± 18,423 items. The highest recorded density was 74,667 items per 1,000 m^2 at Honiara - Baudoko Beach on 14/03/2023, whilst the lowest was 186 items per 1,000 m^2 recorded at Tiaro Primary/ Community High School Beach on 17/10/2022.

7.4.4. Beach Marine Litter Density - Tonga

Table 7.4.1 indicates that across their 13 surveys, Tonga has an average beach marine litter density of 537 items per 1,000 m^2, with a variability of ± 443 items. The highest recorded density was 1,427 items per 1,000 m^2 at Nuku'alofa - Popua Beach West on 25/8/2023, whilst the lowest was 70 items per 1,000 m^2 recorded at Tongatapu - Kolomotua Coastal Area on 06/06/2024.

7.4.5. Beach Marine Litter Density - Vanuatu

Table 7.4.1 indicates that across their ten surveys, Vanuatu has an average beach marine litter density of 3,144 items per 1,000 m^2, with a variability of ± 2,309 items. The highest recorded density was 7,271 items per 1,000 m^2 at Port Vila - Ifira Point on 31/5/2023, whilst the lowest was 725 items per 1,000 m^2 recorded at Erakor - Etmat Bay on 26/07/2024.

7.4.6. Beach Marine Litter Density - Wallis and Futuna

Table 7.4.1 indicates that across their five surveys, Wallis and Futuna have an average beach marine litter density of 255 items per 1,000 m², with a variability of ± 120 items. The highest recorded density was 355 items per 1,000 m² at Wallis - Aka'aka on 18/9/2021, whilst the lowest was 70 items per 1,000 m² recorded at Wallis - Beach between the Fale Fono district and the dispensary on 18/09/2021.

7.5. PACIFIC ISLANDS BEACH ML WASTE AUDIT – OVERALL TOTAL NO. OF ITEMS, WEIGHT & MEAN

Unlike litter density which considers the size of the surveyed area, Table 7.5.1 illustrates the total number of ML waste items collected and weighed per waste category across Pacific Island beaches from 2019 to 2024. Figure 7.5.2 illustrates the distribution of this total ML waste collection per number of items, whilst Figure 7.5.3 illustrates the total distribution per waste weight. Figure 7.5.4 provides further insights into each waste category, illustrating the overall mean ML per no. of items per waste category and its variability.

Table 7.5.1. *Overall Pacific Beach ML Waste Finding from 2019 – October 2024*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	44,653	767	609	1,082
Foamed Plastic	2,790	40	14	49
Fabric & Textiles	2,828	42	21	1,259
Glass & Ceramic	8,861	120	44	324
Metal	11,191	143	159	636
Paper & Cardboard	2,892	46	36	66
Rubber	954	16	9	214
Wood	966	18	24	138
Other	1,734	25	22	725
TOTAL	76,869			4,492
Standard Deviation (±)	14,009			450

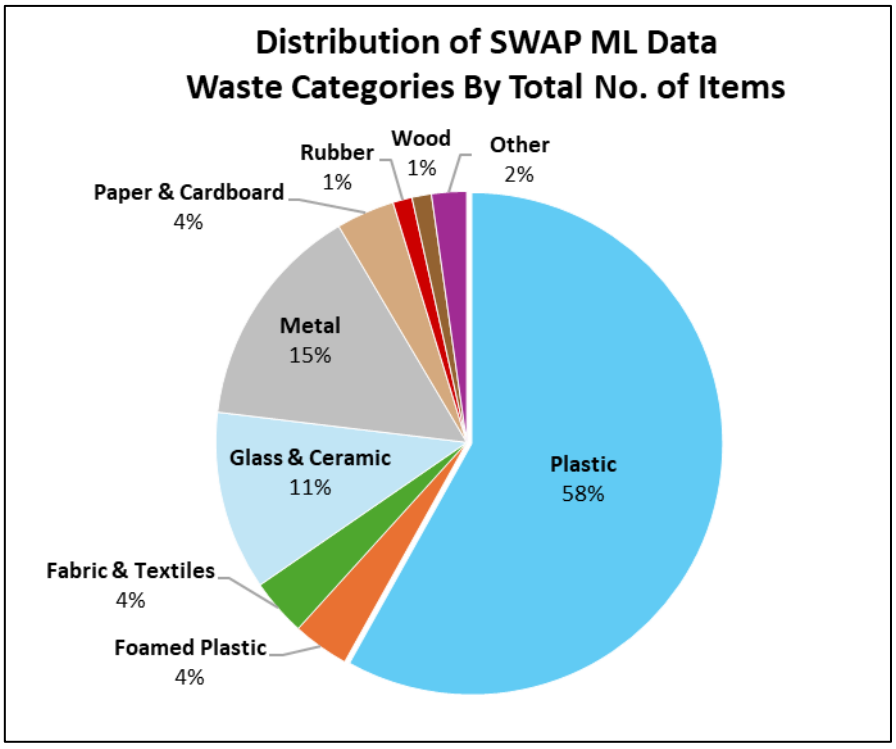

Figure 7.5.2. *Distribution of Overall Beach ML Per Waste Category by Total No. of Items, 2019-2024.*

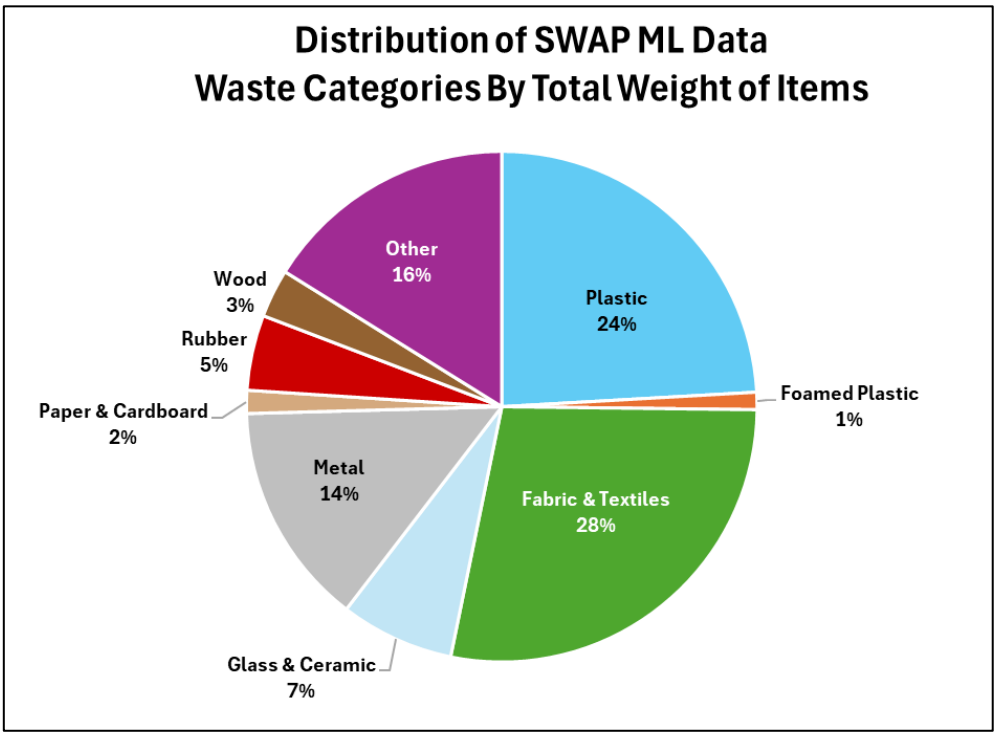

Figure 7.5.3. *Distribution of Overall Beach ML Per Waste Category by Weight, 2019-2024.*

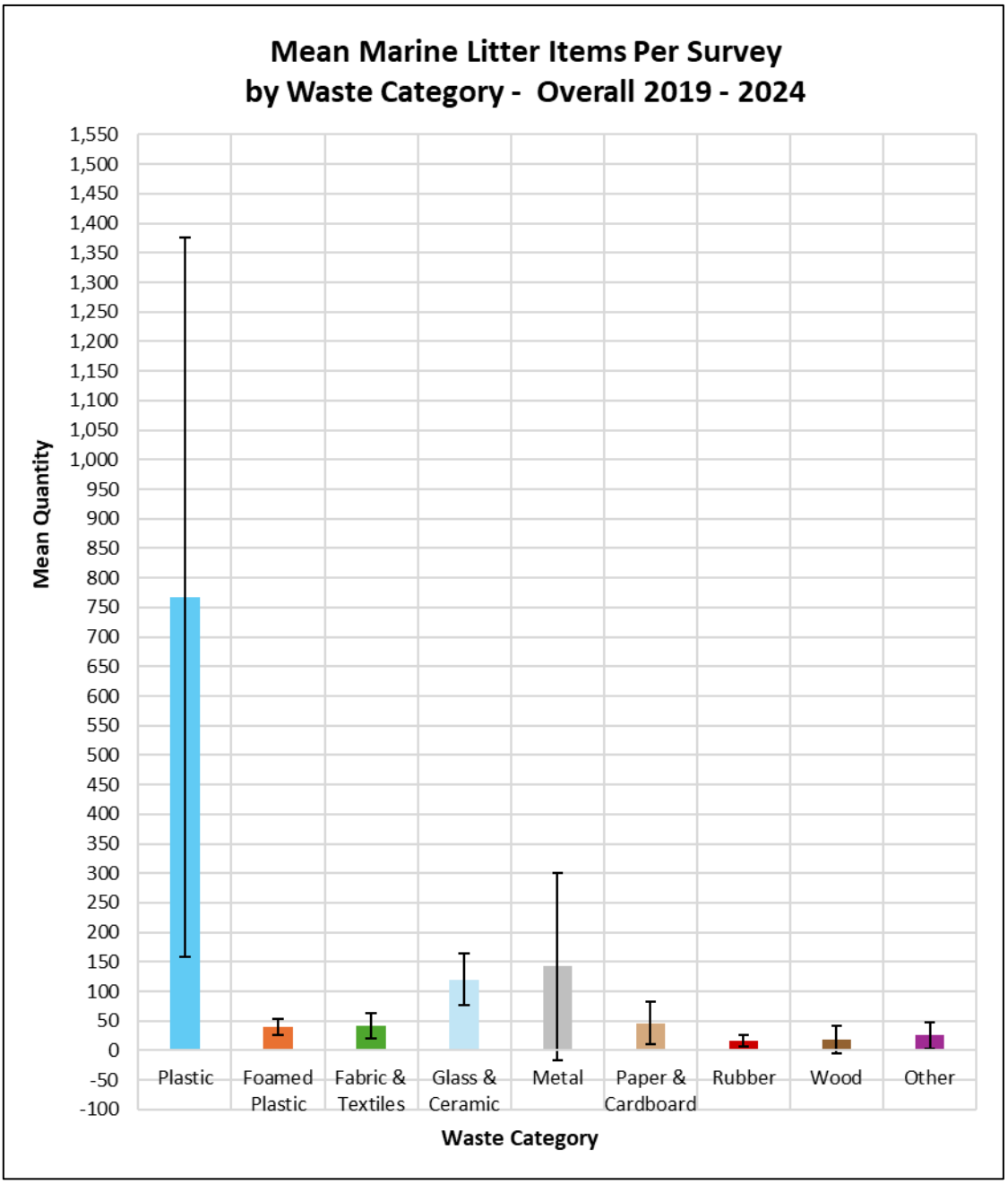

Figure 7.5.4. *Overall Mean ML Items Per Beach Survey By Waste Category - 2019-2024.*

7.5.1. Overall Total No. of Items, Weight & Mean - Plastics

Table 7.5.1 and Figure 7.5.2 suggest that 58% (44,653) of the total items (76,869) were of plastic material. Figure 7.5.3 indicates that plastics made up 24% (1,082 kg) of the total waste weighed. Figure 7.5.4. suggests an average of 767 plastic items ± 609 were found on beaches across the Pacific from 2019 to 2024. Refer to the individual country/territory data to identify the key plastic product waste items.

7.5.2. Overall Total No. of Items, Weight & Mean - Foamed Plastic

Table 7.5.1 and Figure 7.5.2 suggest that 4% (2,790) of the total items (76,869) were of foamed plastic material. Figure 7.5.3 indicates that foamed plastic made up 1% (49 kg) of the total waste weighed. Figure 7.5.4. suggests an average of 40 foamed plastic items ± 14 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of foamed plastic line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.3. Overall Total No. of Items, Weight & Mean - Fabric and Textiles

Table 7.5.1 and Figure 7.5.2 suggest that 4% (2,828) of the total items (76,869) were of fabric and textile material. Figure 7.5.3 indicates that fabric and textiles made up 28% (1,259 kg) of the total waste weighed. However, it has to be noted that the true weight of each fabric and textile material item is not truly reflective as most items were not completely dry, which can have a significant impact on the result when weighed. Figure 7.5.4. suggests an average of 42 fabric and textile items ± 21 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of fabric and textiles line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.4. Overall Total No. of Items, Weight & Mean - Glass and Ceramic

Table 7.1.5.1 and Figure 7.1.5.2 suggest that 12% (8,861) of the total items (76,869) were of glass and ceramic material. Figure 7.1.5.3 indicates that glass and ceramics made up 7% (324 kg) of the total waste weighed. Figure 7.1.5.4. suggests an average of 120 glass and ceramic items ± 21 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter

Intelligence data webpage for a deeper breakdown of glass and ceramic line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.5. Overall Total No. of Items, Weight & Mean - Metal

Table 7.1.5.1 and Figure 7.1.5.2 suggest that 15% (11,191) of the total items (76,869) were of metal material. Figure 7.1.5.3 indicates that metals made up 14% (636 kg) of the total waste weighed. Figure 7.1.5.4. suggests an average of 143 metal items ± 159 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of metal line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.6. Overall Total No. of Items, Weight & Mean - Paper and Cardboard

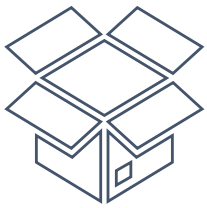

Table 7.1.5.1 and Figure 7.1.5.2 suggest that 4% (2,892) of the total items (76,869) were of paper and cardboard material. Figure 7.1.5.3 indicates that paper and cardboard made up 2% (66 kg) of the total waste weighed. Figure 7.1.5.4. suggests an average of 46 paper and cardboard items ± 36 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of paper and cardboard line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.7. Overall Total No. of Items, Weight & Mean - Rubber

Table 7.5.1 and Figure 7.5.2 suggest that 1% (954) of the total items (76,869) were of rubber material. Figure 7.5.3 indicates that rubber made up 5% (214 kg) of the total waste weighed. Figure 7.5.4. suggests an average of 16 rubber items ± 9 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of rubber line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.8. Overall Total No. of Items, Weight & Mean - Wood

Table 7.5.1 and Figure 7.5.2 suggest that 1% (966) of the total items (76,869) were of wood material. Figure 7.5.3 indicates that wood made up 3% (138 kg) of the total waste weighed. Figure 7.5.4. suggests an average of 18 wood items ± 24 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of

wood line items for each country/territory for this report focuses mainly on the plastic waste category.

7.5.9. Overall Total No. of Items, Weight & Mean - Other

Table 7.5.1 and Figure 7.5.2 suggest that 2% (1,734) of the total items (76,869) were of 'other material'. Other material items include paraffin or wax, sanitary items, personal care items, appliances and electronics, batteries (household and non-household), boat parts, cotton buds and any kind of waste that cannot be categorised under the other materials listed above. Figure 7.5.3 indicates that items under the category 'other' made up 16% (725 kg) of the total waste weighed. Figure 7.5.4. suggests an average of 25 other items ± 22 were found on beaches across the Pacific from 2019 to 2024. Refer to the Litter Intelligence data webpage for a deeper breakdown of other line items for each country/territory for this report focuses mainly on the plastic waste category.

8. MARINE LITER RESULTS - FIJI

8.1. FIJI BEACH ML DENSITY

Figure 8.1.1 illustrates the litter density (items per 1,000 m²) conducted on the islands of Fiji. Figure 8.1.1 compares these survey results (columns) with the averages for Fiji, the Pacific Island Countries and Territories (PICTs) average results from 73 surveys, and Sustainable Coastlines' Litter Intelligence beach average litter density from 2,287 surveys (2024). As presented in Table 7.4.1, Fiji's average litter mean density was 2,947 ± 3,662 items per 1,000 m², whereas the PICTs average was 3,448 ± 9,727 items per 1,000 m².

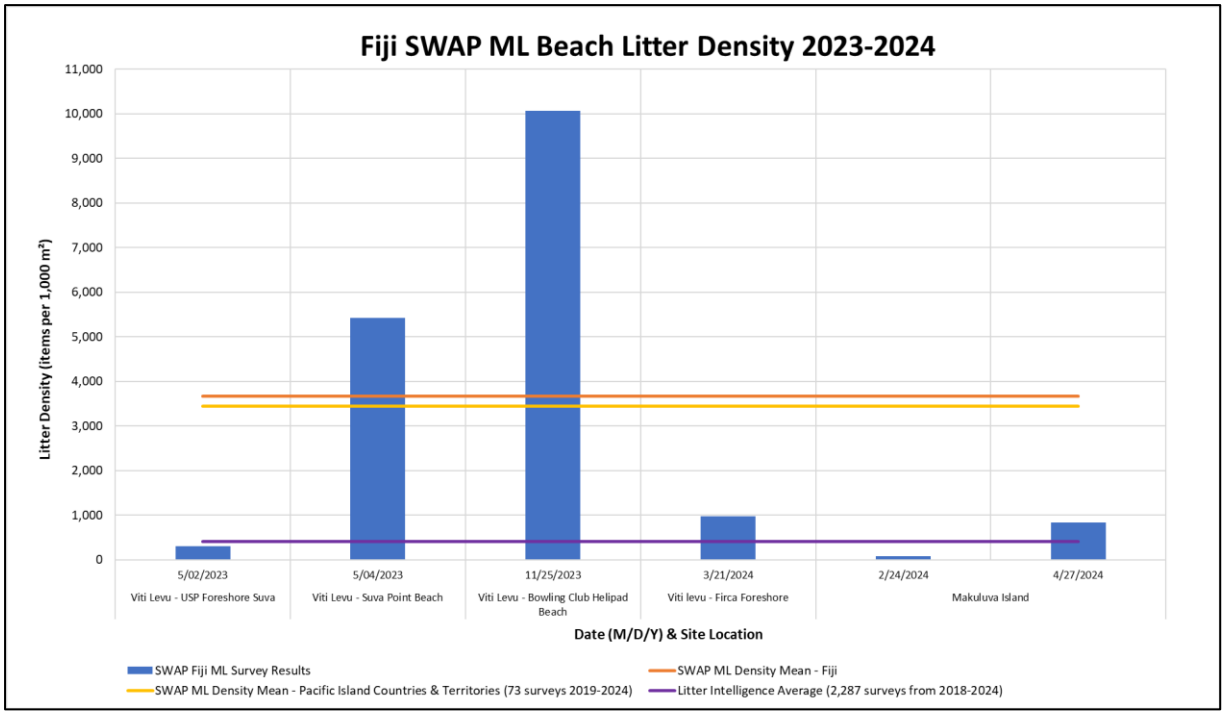

Figure 8.1.1. *Marine Litter Density Results – Fiji*

8.2. FIJI BEACH ML RESULTS PER CATEGORY

Table 8.2.1 illustrates the total number of beach ML waste items collected and weighed per waste category across Fiji from 2023 to 2024. Table 8.2.1 indicates that the total number of macro waste items collected for auditing in Fiji between 2023 and 2024 was 13,045 and Figure 8.2.2 illustrates this distribution per waste category. Table 8.2.1 and Figure 8.2.2 suggests that out of the 13,045 items collected, 10,266 (79%) were plastic, 309 (2%) were foamed plastic, 404 (3%) fabrics and textiles, 848 (7%) were glass and ceramic, 375 (3%) were metal,

694 (5%) paper and cardboard. Figure 8.2.2 indicates rubber, wood and other materials were <2% collectively.

Table 8.2.1. *Fiji Beach ML Surveyed and Audited from 2023 – 2024*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	10,266	1,711	2,928	87
Foamed Plastic	309	52	63	9
Fabric & Textiles	404	67	74	402
Glass & Ceramic	848	141	204	38
Metal	375	63	63	17
Paper & Cardboard	694	116	252	9
Rubber	50	8	5	32
Wood	30	5	4	34
Other	69	12	8	2
TOTAL	**13,045**			**518**

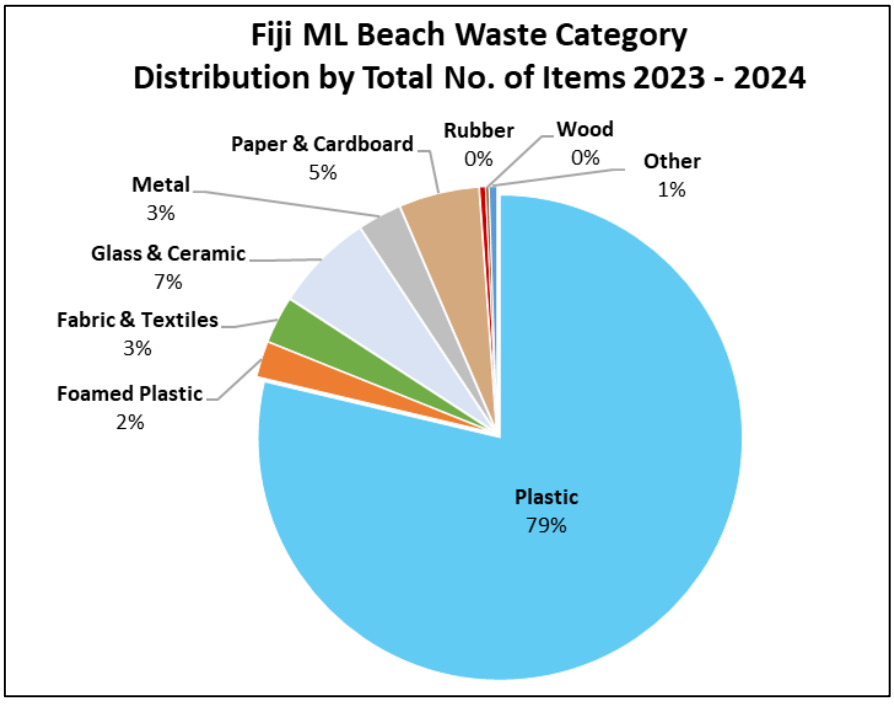

Figure 8.2.2. *Fiji Beach ML Distribution Per Waste Category by Total No. of Items, 2023-2024*

Figure 8.2.3 compares the total number of categorised waste items collected in 2023 and 2024. In Fiji, three surveys were conducted each year. Figure 8.2.3 indicates a high occurrence of plastic items, with 8,793 items collected in 2023 and 1,473 in 2024, showing a decrease of

7,320 items. Notably, Viti Levu - Bowling Club Helipad Beach recorded 8,238 plastic items in 2023, significantly contributing to the high total.

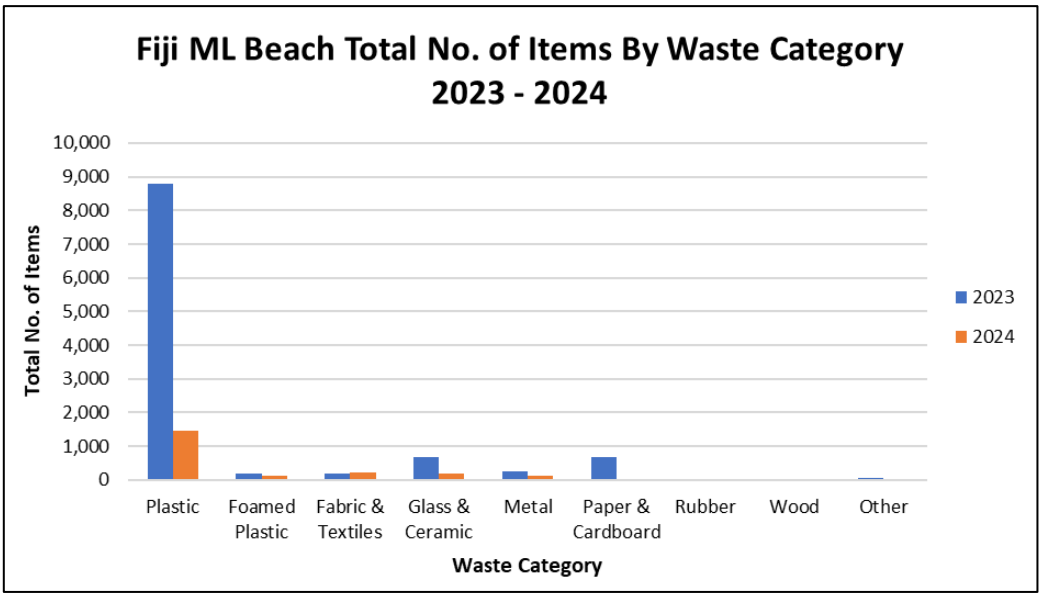

Figure 8.2.3. *Fiji Beach ML Distribution Per Waste Category by Total No. of Items, 2023-2024*

Figure 8.2.4 presents the average number of items collected per waste category in Fiji. The error bars represent the standard deviation, indicating the variability in the data. The mean number of plastic waste items collected per beach survey is 1,711 ± 2,928. For other categories, the averages are foamed plastic 52 ± 63, fabric and textiles 67 ± 74, glass and ceramic 141 ± 204, metal 63 ± 63, paper and cardboard 116 ± 252, rubber 8 ± 5, wood 5 ± 4, and other 12 ± 8 items.

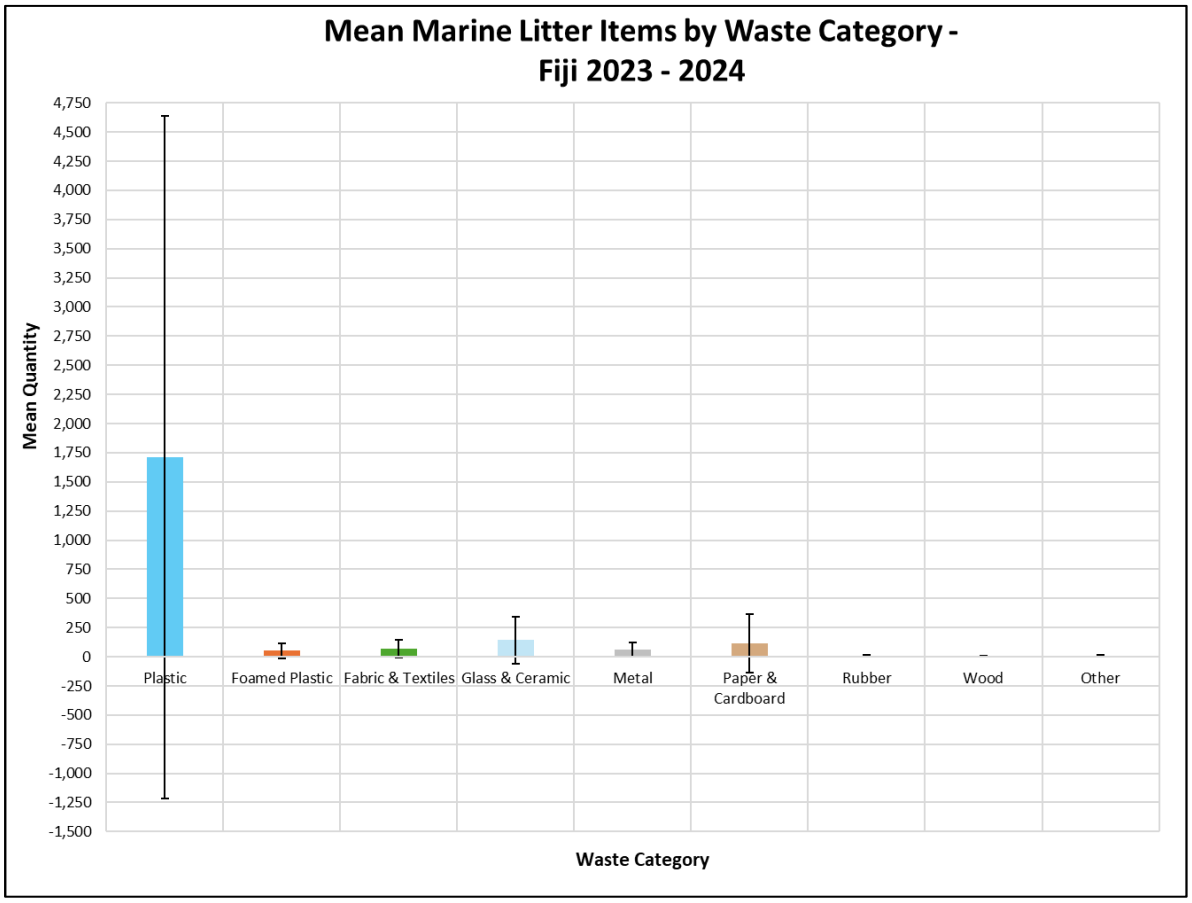

Figure 8.2.4. *Fiji Beach ML Mean No. of Items Per Waste Category 2023-2024*

8.3. FIJI BEACH ML TOTAL WEIGHT OF ITEMS

Figure 8.3.1 illustrates the distribution of categorized items by total weight. According to Table 8.2.1, the total weight of all items collected and audited from Fiji's six surveys was 518 kg. Figure 8.3.1 shows that 64% of the total weight (402 kg) was fabric and textile materials. Plastic accounted for 87 kg (14%), foamed plastic 9 kg (1%), glass and ceramic 38 kg (6%), metal 17 kg (3%), paper and cardboard 9 kg (2%), rubber 32 kg (5%), wood 34 kg (5%), and other materials 2 kg (<1%). Notably, the weight of fabric and textiles may be affected by whether the items were fully dry or saturated with water.

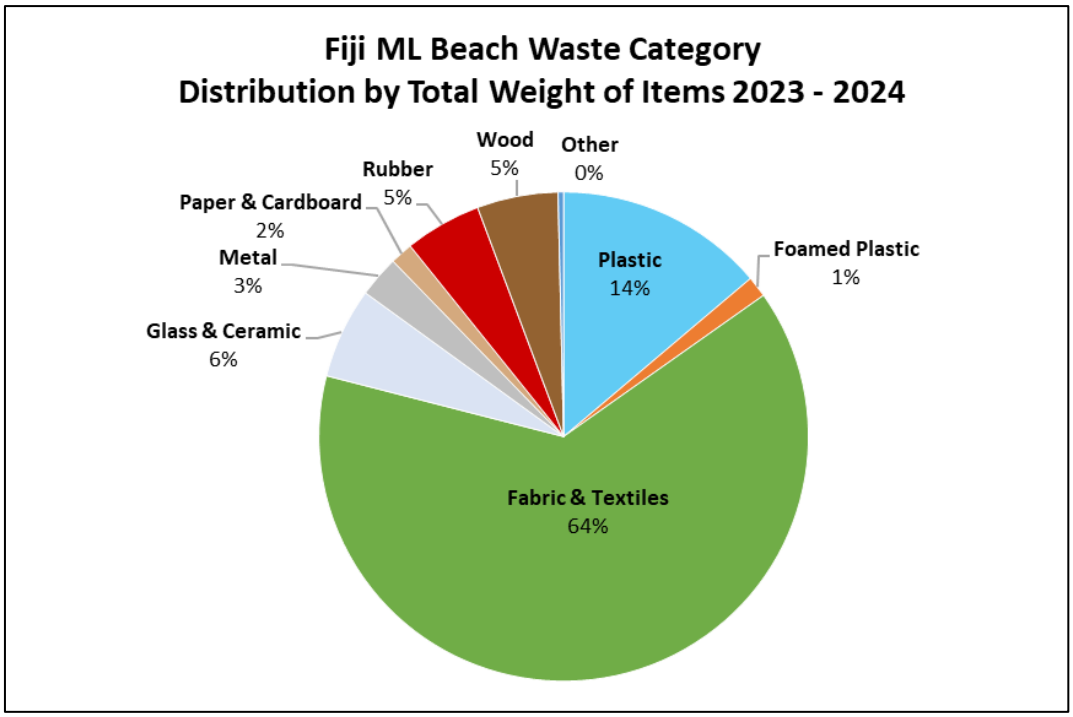

Figure 8.3.1. *Fiji Beach ML Distribution Per Waste Category by Total No. of Items, 2023 - 2024*

Figure 8.3.2 compares the total weight of categorised waste items collected in 2023 and 2024. In Fiji, three surveys were conducted each year. Figure 8.3.2 indicates a high occurrence of fabric and textiles, with 19 kg weighed in 2023 and 383 kg in 2024, showing an increase of 364 kg. Plastic items weighed in as 43 kg in 2023, and 45 kg in 2024, an increase of 2 kg.

Figure 8.3.2. *Fiji Beach ML Distribution Per Waste Category by Total Weight of Items, 2023-2024*

Figure 8.3.3 shows the average weight of collected items per waste category in Fiji. The error bars represent the standard deviation, indicating data variability. The mean weight of plastic waste per beach survey is 15 kg ± 9 kg, and for fabric and textiles, it is 67 kg ± 141 kg. The averages for other waste categories are foamed plastic 1 kg ± 2 kg, glass and ceramic 6 kg ± 7 kg, metal 3 kg ± 2 kg, paper and cardboard 2 kg ± 3 kg, rubber 5 kg ± 10 kg, wood 6 kg ± 8 kg, and other materials <1 kg. Notably, Figure 8.3.3 highlights discrepancies in the weights of fabric and textiles and underscores the differences between counting the number of waste items and their weight.

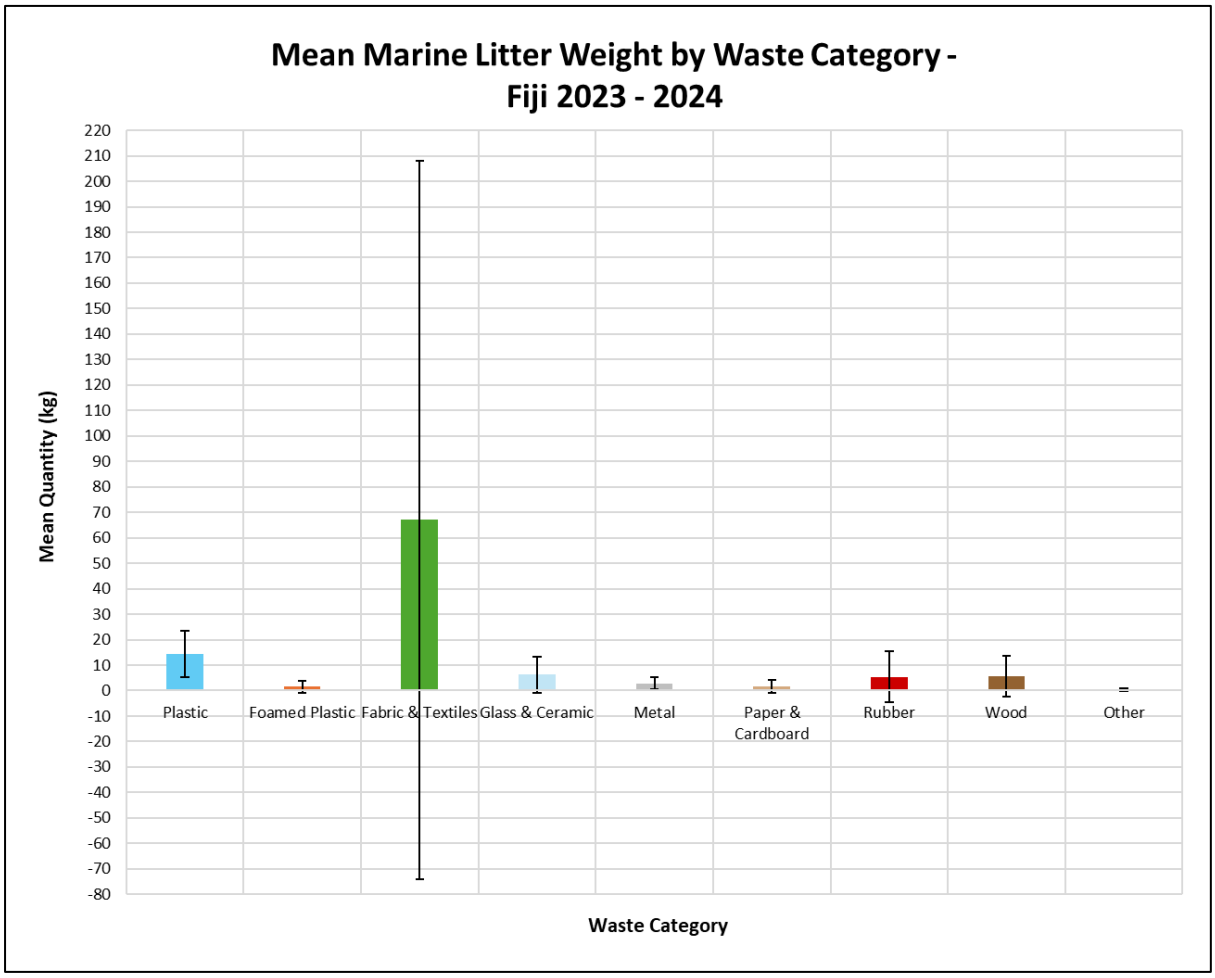

Figure 8.3.3. *Fiji Beach ML Mean Weight Per Waste Category 2023-2024.*

8.4. FIJI BEACH ML PLASTICS WASTE NO. OF ITEMS

The following figures delve deeper into the plastic category to identify key occurrences of plastic marine litter for each Pacific Island country. As plastic is a lightweight material, the

following results focus on the number of plastic items, with the need to consider the size of the plastic items.

Figure 8.4.1 illustrates the distribution of key plastic items recorded under the 'plastic' waste category, highlighting areas with high occurrences. Figure 8.4.1 indicates that out of the total 10,266 plastic items collected between 2023 and 2024, 7,400 (72%) were food wrappers. Bottles of 2 litres or less accounted for 518 items (5%), food containers for 463 items (5%), unidentifiable hard plastic fragments for 322 items (3%), and plastic bags for 301 items (3%).

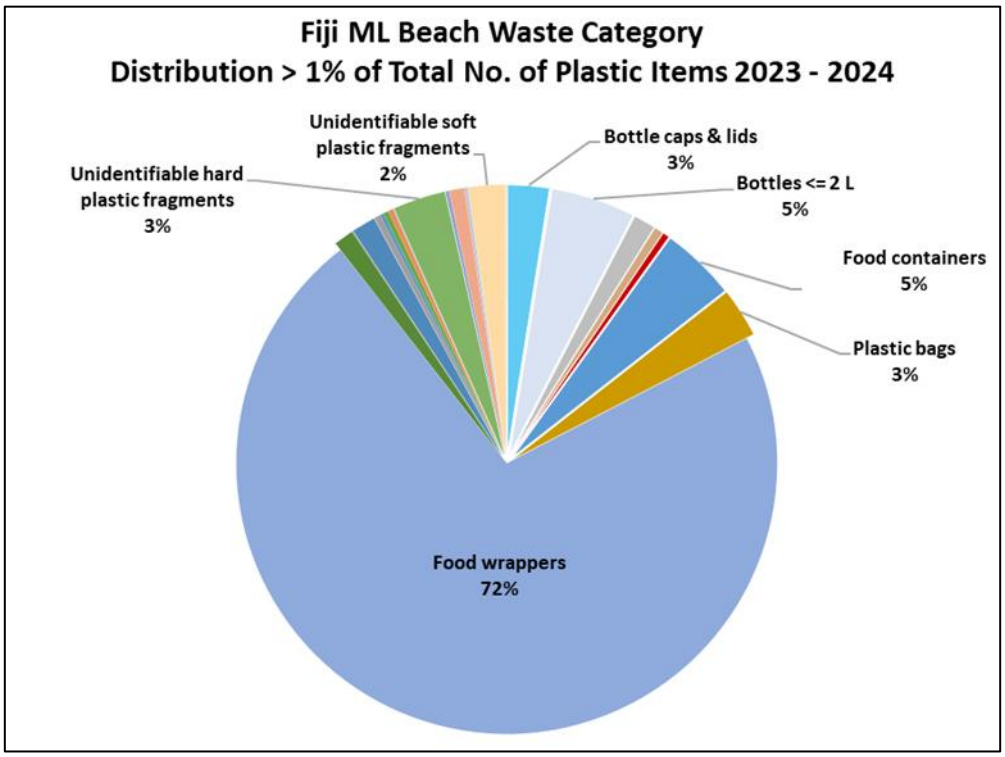

Figure 8.4.1. *Distribution of Total Plastic Beach ML Items Collected on Fiji Beaches 2023-2024.*

Figure 8.4.2 provides a detailed analysis of the results from Figure 8.4.1, breaking down the occurrences of each key plastic item for 2023 and 2024. Figure 8.4.2 shows that food wrappers had the highest occurrence, with 7,208 items collected in 2023 and 192 in 2024. Appendix E lists the mean number of all plastic items found on Fiji's beaches, indicating that the average number of food wrappers is 3,700 ± 3,508 items per year.

Figure 8.4.2 shows that bottle caps and lids accounted for 141 items in 2023 and 116 items in 2024, with a mean of 129 ± 12.5 (Appendix E); Bottles of 2 litres or less were recorded as 164 items in 2023 and 354 items in 2024, with a mean of 259 ± 95 items per year; Food containers accounted for 254 items in 2023 and 209 items in 2024, with a mean of 232 ± 23 items per

year. Notably, in Figure 8.4.2 there were 299 plastic bags recorded in 2023 and only 2 in 2024, with a mean of 151 ± 149 items per year. Refer to Appendix E for further details.

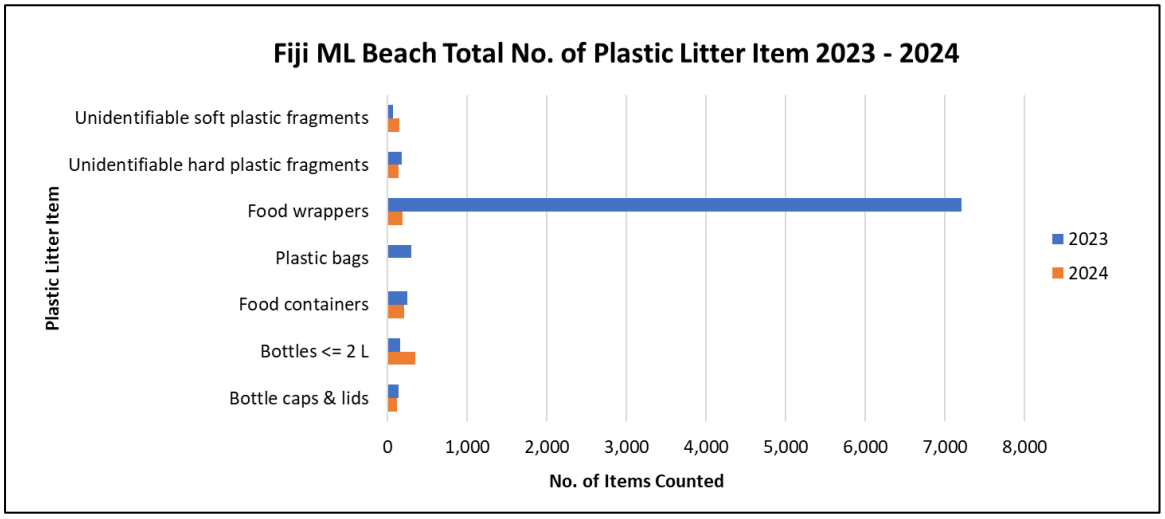

Figure 8.4.2. *Comparison of Top Plastic Beach ML Items Collected on Fiji Beaches (2023 – 2024)*

9. MARINE LITTER RESULTS – SAMOA

9.1. SAMOA BEACH ML DENSITY

Figure 9.1.1 illustrates the litter density (items per 1,000 m²) conducted in Samoa from 2019 - 2024. Figure 9.1.1 compares these survey results (columns) with the averages for Samoa, the Pacific Island Countries and Territories (PICTs) average results from 73 surveys, and Sustainable Coastlines' Litter Intelligence beach average litter density from 2,287 surveys (2024). As presented in Table 7.4.1, Samoa's average litter mean density was 581 ± 897 items per 1,000 m² whereas the PICTs average was 3,448 ± 9,727 items per 1,000 m².

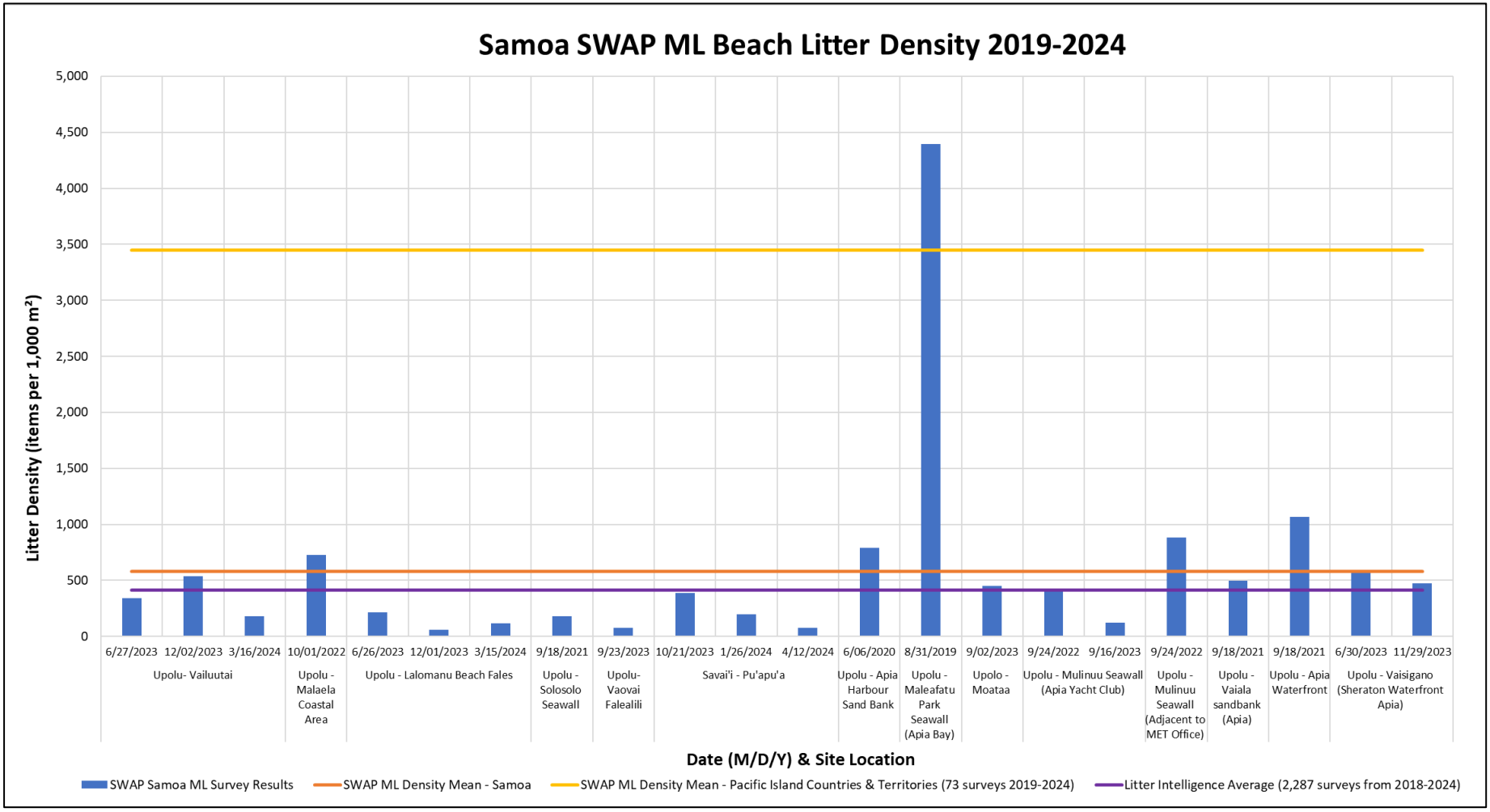

Figure 9.1.1. *Marine Litter Density Results – Samoa*

9.2. SAMOA BEACH ML RESULTS PER CATEGORY

Table 9.2.1 shows the total number of beach ML waste items collected and weighed per category across Samoa from 2019 to 2024. A total of 16,365 macro waste items were collected for auditing. Figure 9.2.2 breaks down this distribution, 8,027 (49%) were plastic, 1,004 (6%) foamed plastic, 763 (5%) were fabrics and textiles, 3,354 (21%) were glass and ceramic, 1,645 (10%) metal, and 1,151 (7%) paper and cardboard. Rubber, wood, and other materials collectively comprised less than 3%.

Table 9.2.1. *Samoa Beach ML Surveyed and Audited from 2019 – 2024*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	8,027	382	337	400
Foamed Plastic	1,004	48	118	13
Fabric & Textiles	763	36	46	611
Glass & Ceramic	3,354	160	522	136
Metal	1,645	78	97	107
Paper & Cardboard	1,151	55	150	33
Rubber	220	10	10	88
Wood	23	1	3	5
Other	178	8	9	123
TOTAL	16,365			1,516

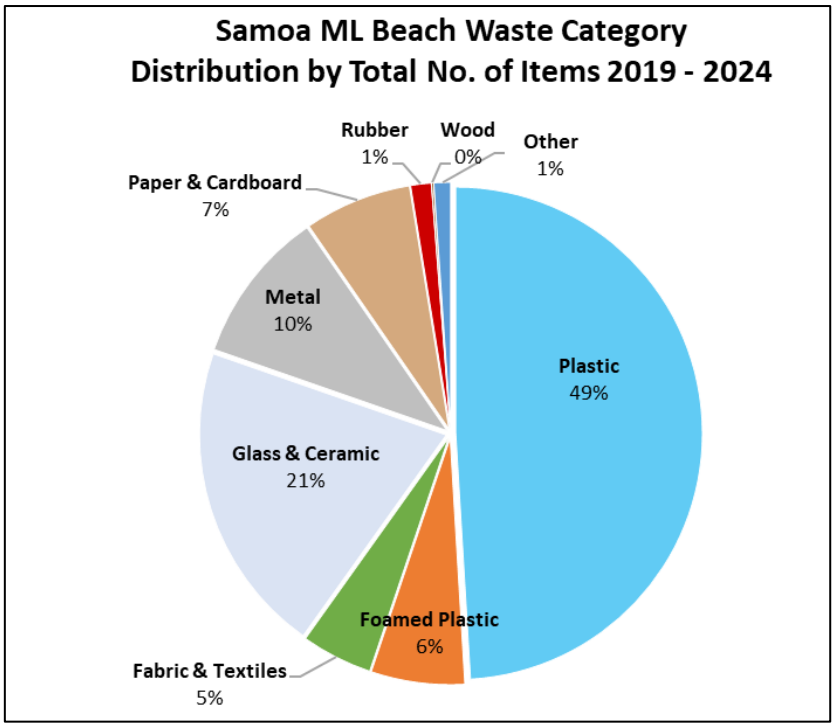

Figure 9.2.2. *Samoa Beach ML Distribution Per Waste Category by Total No. of Items, 2019-2024.*

Figure 9.2.3 compares the total number of categorised waste items collected from 2019 to 2024. In Samoa, one survey was conducted in 2019, one in 2020, three in 2021, three in 2022, ten in 2023 and four in 2024. Figure 9.2.3 indicates a high occurrence of plastic items, with 597 items collected in 2019, 361 (2020), 1,285 (2021), 2,489 (2022), 2,664 (2023), and 631 in 2024. Between 2019 and 2024 there is an increase of 34, although this fluctuates throughout the years, with a max increase of 1,204 plastic items from 2021 to 2022 and a minimum decrease of -2,033 items from 2023 to 2024, this does not consider the number of surveys conducted between each year. Notably, Upolu - Mulinuu Seawall (Adjacent to MET Office) recorded 1,222 plastic items in 2022, significantly contributing to the high total. In 2019, Upolu - Maleafatu Park Seawall (Apia Bay) recorded 2,414 glass or ceramic fragments.

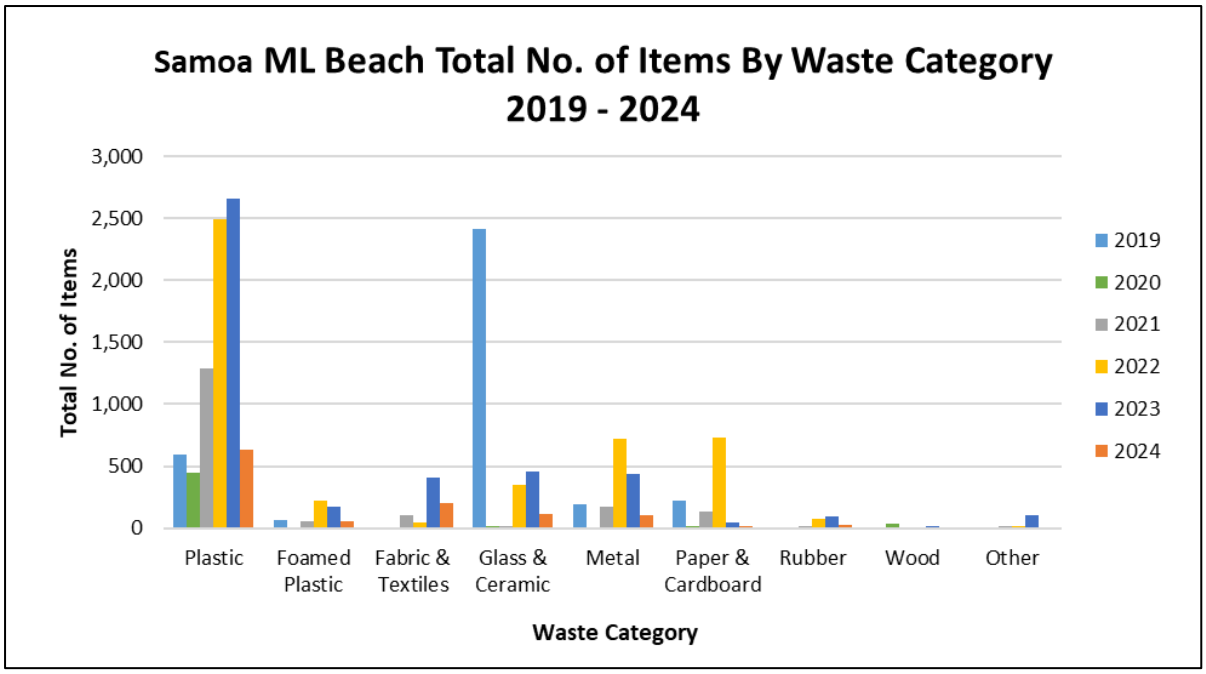

Figure 9.2.3. *Samoa Beach ML Distribution Per Waste Category by Total No. of Items, 2019 - 2024.*

Figure 9.2.4 presents the average number of items collected per waste category in Samoa. The error bars represent the standard deviation, indicating the variability in the data. The mean number of plastic waste items collected per beach survey is 382 ± 337. For other categories, the averages are foamed plastic 48 ± 118, fabric and textiles 36 ± 46, glass and ceramic 160 ± 522, metal 78 ± 97, paper and cardboard 55 ± 150, rubber 10 ± 10, wood 1 ± 3, and other 8 ± 9 items.

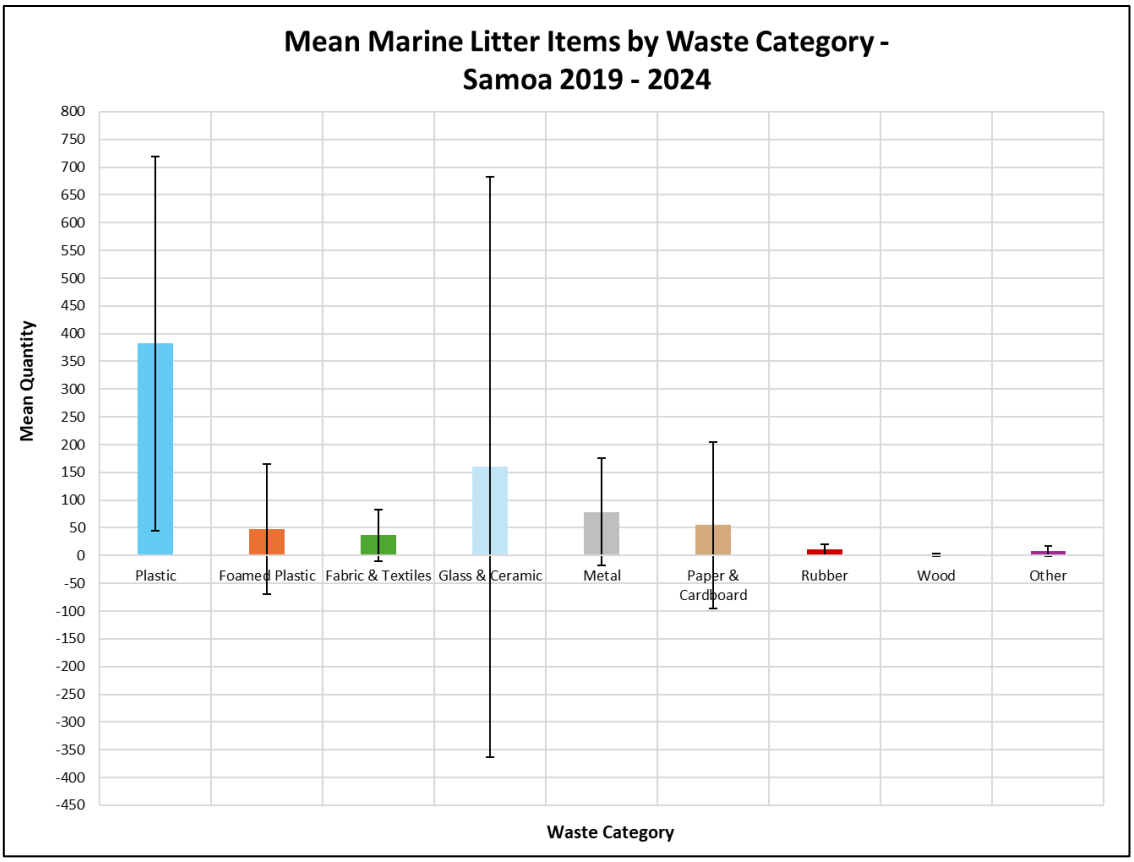

Figure 9.2.4. *Samoa Beach ML Mean No. of Items Per Waste Category 2019 - 2024.*

9.3. SAMOA BEACH ML TOTAL WEIGHT OF ITEMS

Figure 9.3.1 illustrates the distribution of categorized items by total weight. According to Table 9.2.1, the total weight of all items collected and audited from Samoa's 22 surveys was 1,516 kg. Figure 9.3.1 shows that 40% of the total weight (611 kg) was fabric and textile materials. Plastic accounted for 400 kg (27%), foamed plastic 13 kg (1%), glass and ceramic 136 kg (9%), metal 107 kg (7%), paper and cardboard 33 kg (2%), rubber 88 kg (6%), wood 5 kg (<1%) and other materials 123 kg (8%). Notably, the weight of fabric and textiles may be affected by whether the items were fully dry or saturated with water. The majority of the weight regarding 'other' were appliances and electronics, batteries (household) and boat parts.

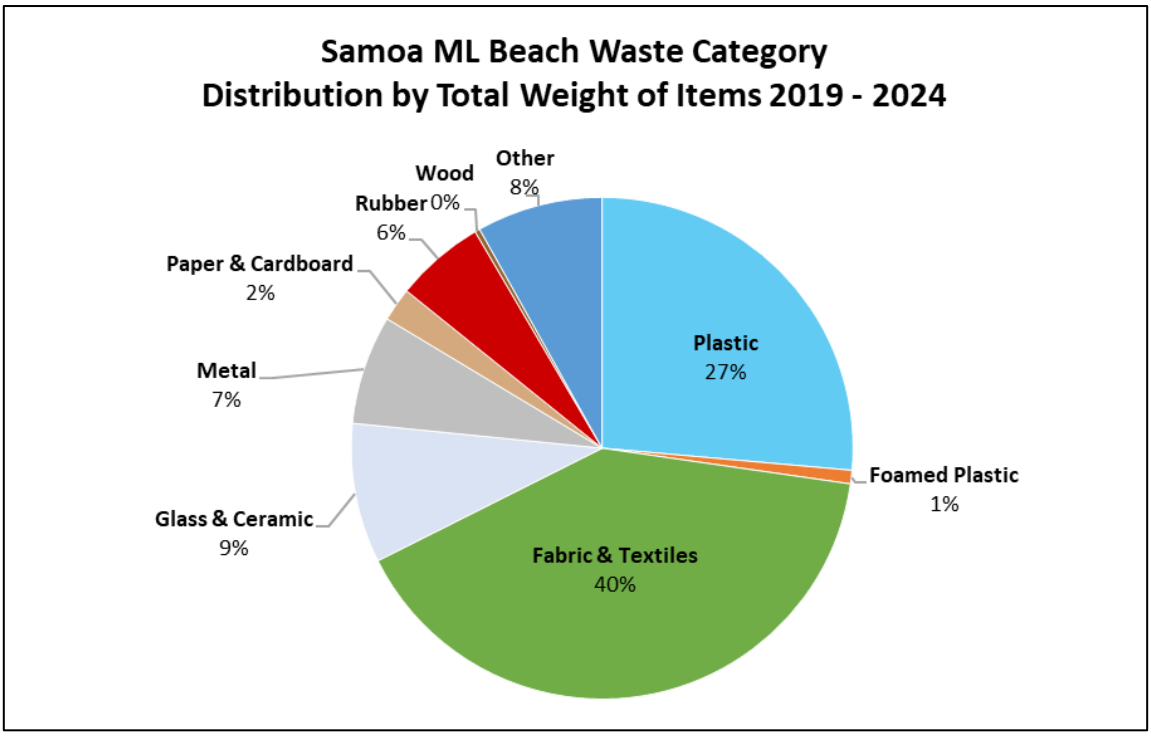

Figure 9.3.1. *Samoa Beach ML Distribution Per Waste Category by Total No. of Items, 2019-2024.*

Figure 9.3.2 compares the total weight of categorised waste items from Samoa's 22 surveys conducted between 2019 and 2024. Figure 9.3.2 shows a high occurrence of fabric and textiles, with 458.14 kg collected in 2023 and 121.302 kg in 2024. Figure 9.3.2 indicates plastic items weighed 233.22 kg in 2023 and 66.68 kg in 2024. The number of surveys conducted each year should be considered when interpreting these results.

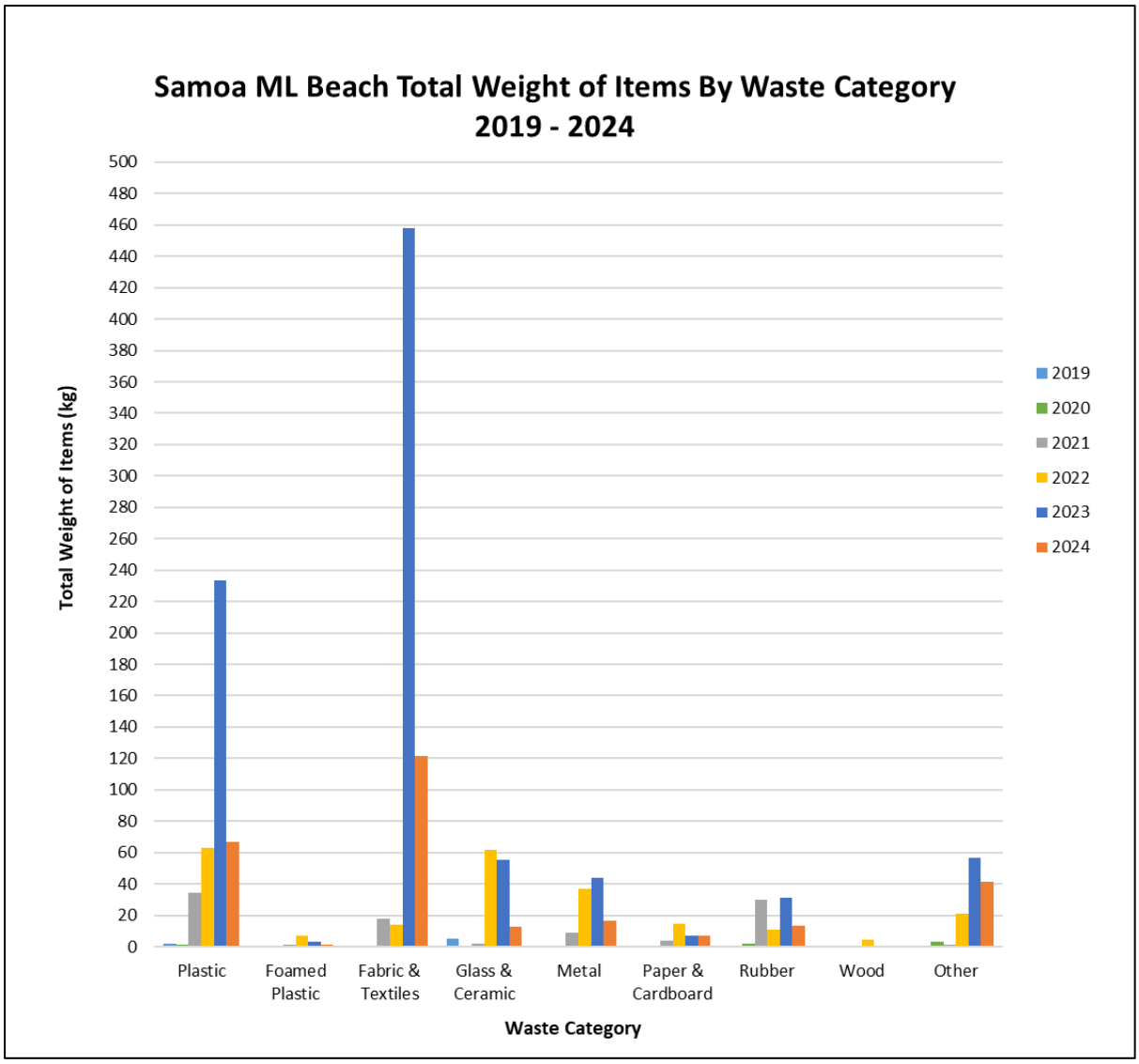

Figure 9.3.2. *Samoa Beach ML Distribution Per Waste Category by Total Weight of Items, 2019 - 2024.*

Figure 9.3.3 shows the average weight of collected items per waste category in Samoa. The error bars represent the standard deviation, indicating data variability. The mean weight of plastic waste per beach survey is 19 kg ± 31 kg, and for fabric and textiles, it is 29 kg ± 89 kg. The averages for other waste categories are foamed plastic 1 kg ± 1 kg, glass and ceramic 6 kg ± 10 kg, metal 5 kg ± 5 kg, paper and cardboard 2 kg ± 3 kg, rubber 4 kg ± 7 kg, wood 0.2 kg ± 1 kg, and other materials 6 kg ± 15 kg. Notably, Figure 9.3.3 highlights discrepancies in the weights of fabric and textiles and underscores the differences between counting the number of waste items and their weight.

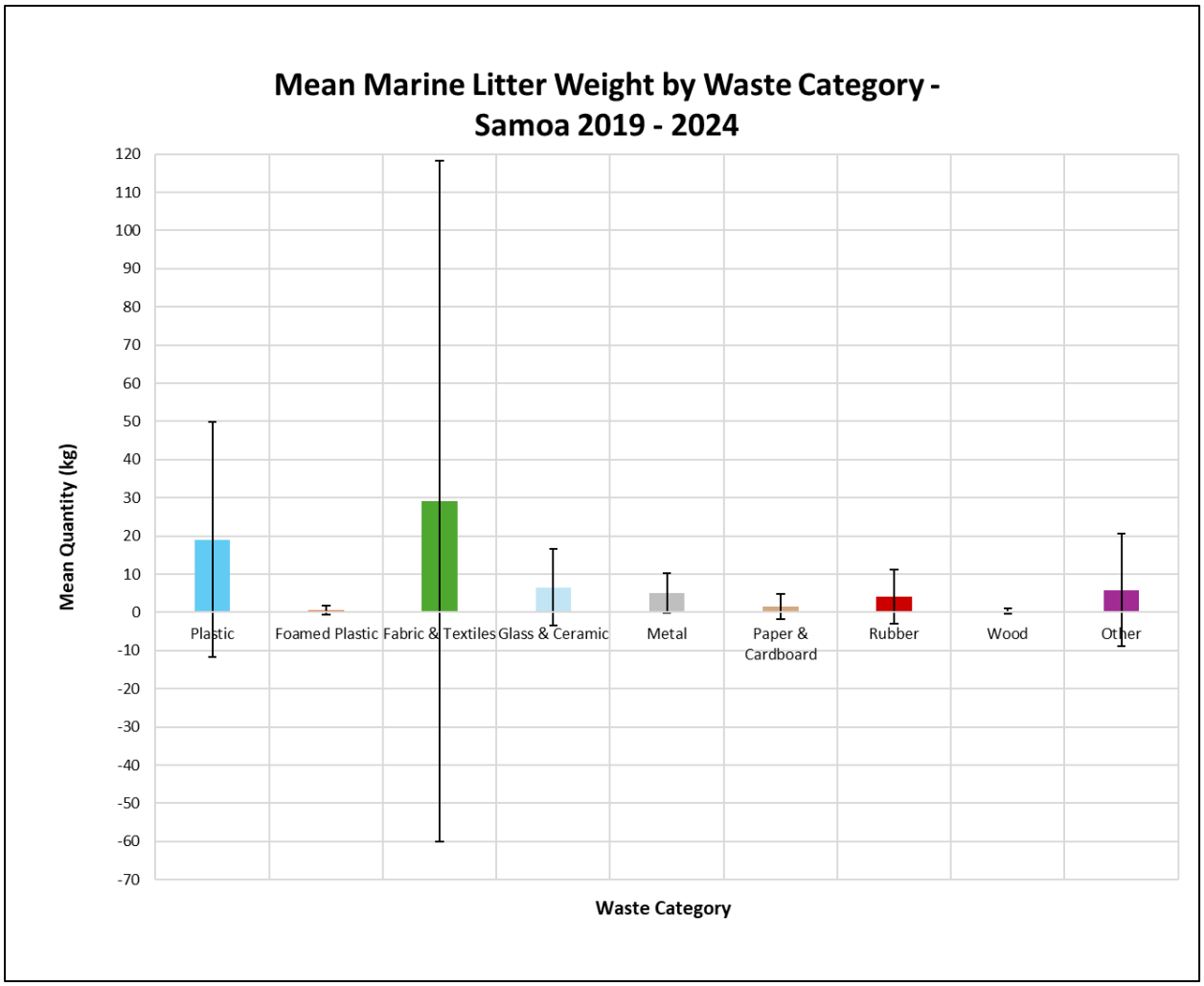

Figure 9.3.3. *Samoa Beach ML Mean Weight Per Waste Category 2019-2024.*

9.4. SAMOA BEACH ML PLASTICS WASTE NO. OF ITEMS

Figure 9.4.1 illustrates the distribution of key plastic items recorded under the 'plastic' waste category, highlighting areas with high occurrences. Figure 9.4.1 indicates that out of the total 8,027 plastic items collected between 2019 and 2024, 2,637 (33%) were plastic bottles less than or equal to 2 L. Food wrappers accounted for 1,269 items (16%), food containers for 433 items (5%), cigarettes, butts & filters for 600 (7%), 860 (11%) bottle caps & lids and 466 (6%) were plastic bags. Notably, 352 (4%) plastic items were unidentifiable soft plastic fragments, 392 (5%) were unidentifiable hard plastic fragments and 328 (4%) 'other' plastic.

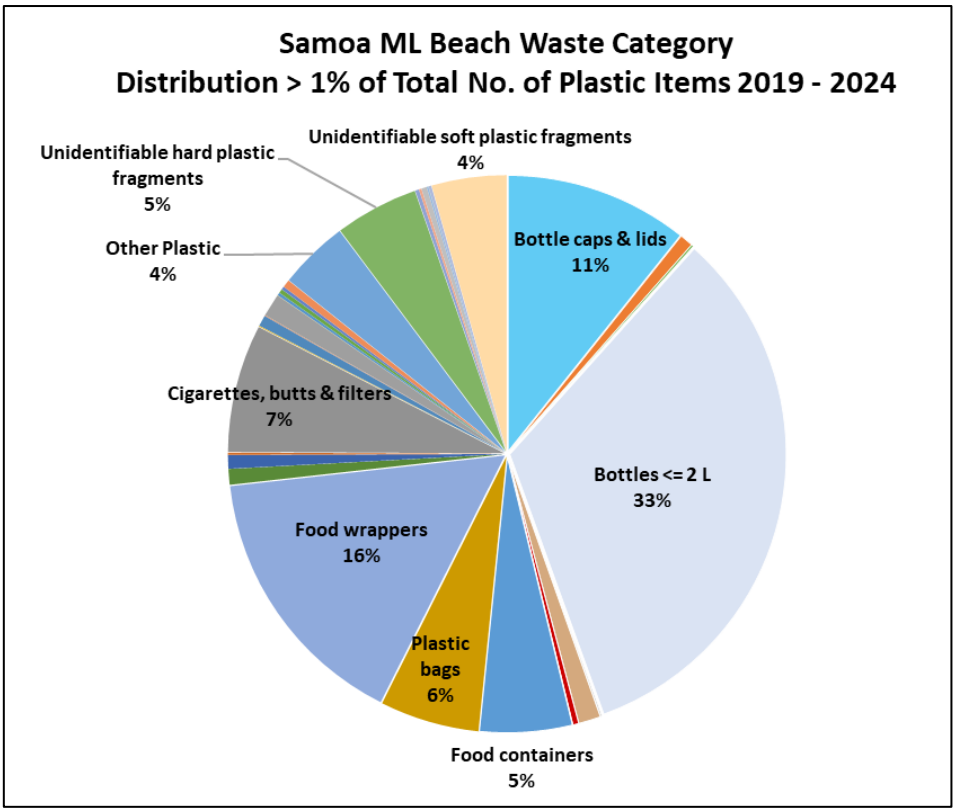

Figure 9.4.1. *Distribution of Total Plastic Beach ML Items Collected on Samoa Beaches 2019-2024.*

Figure 9.4.2 provides a detailed analysis of the results from Figure 9.4.1, breaking down the occurrences of each key plastic item between 2019 and 2024. Figure 9.4.2 shows that bottles less than or equal to 2 L had the highest occurrence, with 14 items collected in 2019, 40 (2020), 841 (2021), 1,172 (2022), 410 (2023) and 160 in 2024. Appendix F lists the mean number of all plastic items found on Samoa's beaches and indicates that the average number of bottles less than or equal to 2 L is 440 ± 432 items per year.

Figure 9.4.2 shows that food wrappers accounted for 143 items in 2019, 24 (2020), 56 (2021), 456 (2022), 320 (2023) and 270 in 2024. Food wrapper items on beaches in Samoa had a mean frequency of 212 ± 152 items per year. Figure 9.4.2 indicates the frequency of food containers was 5 (2019), 9 (2020), 0 (2021), 241 (2022), 128 (2023) and 50 in 2024, estimating a mean of 72 ± 87 items per year. Figure 9.4.2 indicates for bottle caps & lids, 53 in 2019, 50 (2020), 129 (2021), 448 (2022), 153 (2023) and 27 in 2024, a mean of 143 ± 143 items per year. Refer to Appendix F for further details.

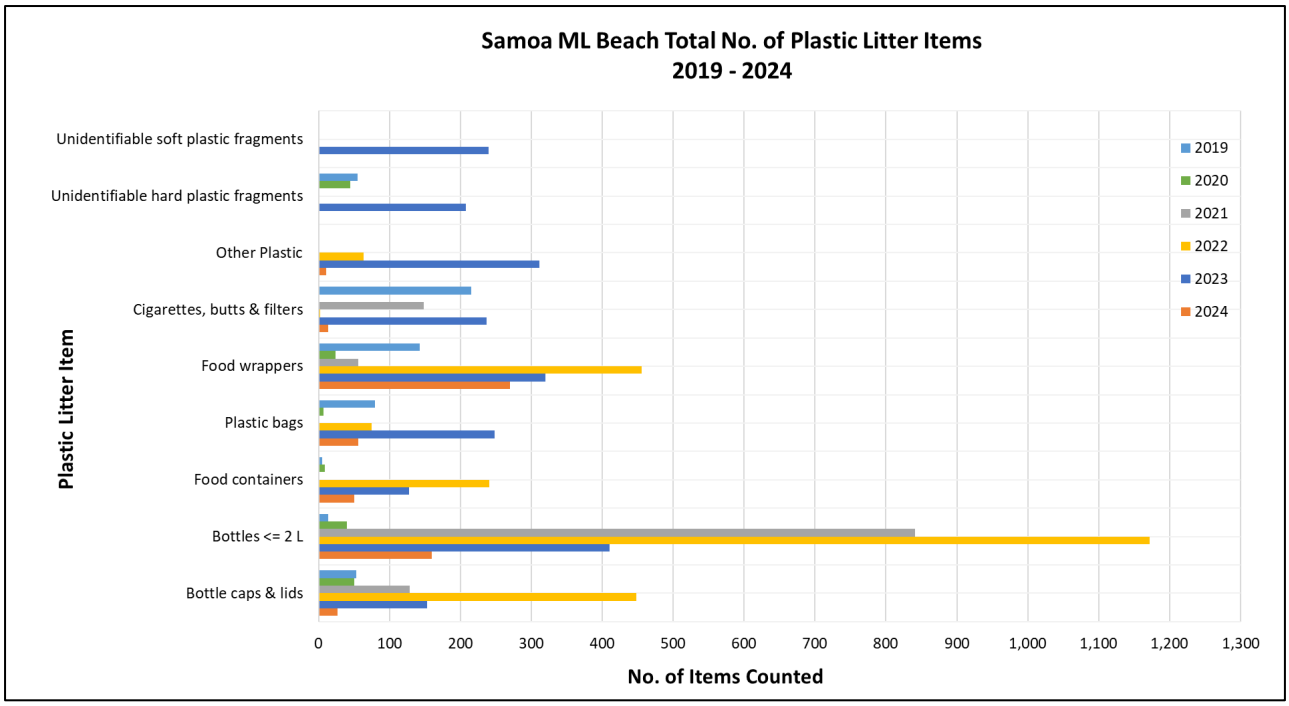

Figure 9.4.2. *Comparison of Top Plastic Beach ML Items Collected on Samoa Beaches (2019 – 2024)*

10. MARINE LITTER RESULTS – SOLOMON ISLANDS

10.1. SOLOMON ISLANDS BEACH ML DENSITY

Figure 10.1.1 illustrates the litter density (items per 1,000 m²) conducted in the Solomon Islands from 2022 - 2024. Figure 10.1.1 compares these survey results (columns) with the averages for the Solomon Islands, the Pacific Island Countries and Territories (PICTs) average results from 73 surveys, and Sustainable Coastlines' Litter Intelligence beach average litter density from 2,287 surveys (2024). As presented in Table 7.4.1, Solomon Island's litter mean density was 10,680 ± 18,423 items per 1,000 m² whereas the PICTs average was 3,448 ± 9,727 items per 1,000 m².

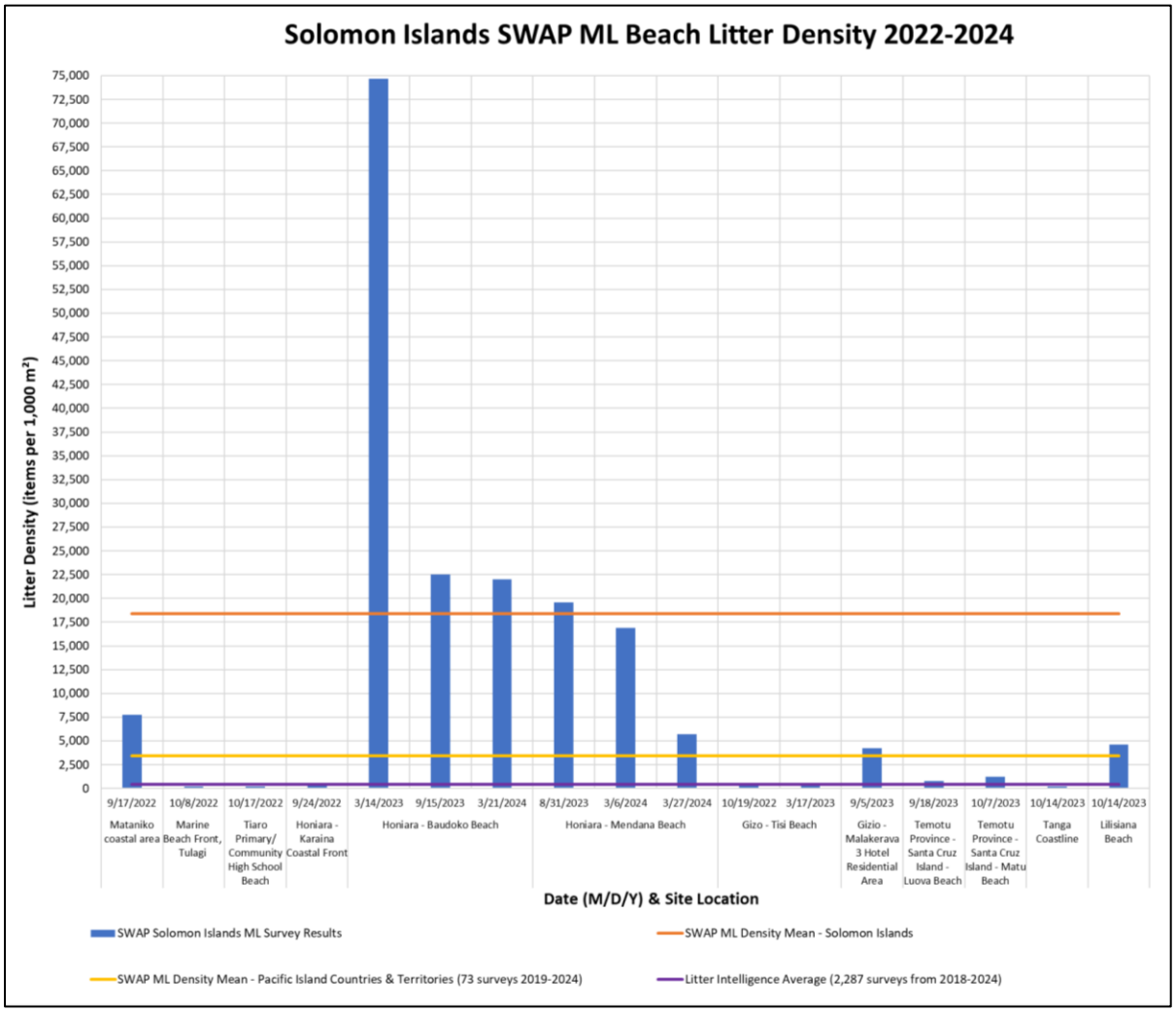

Figure 10.1.1. *Marine Litter Density Results – Solomon Islands*

10.2. SOLOMON ISLANDS BEACH ML RESULTS PER CATEGORY

Table 10.2.1 shows the total number of beach ML waste items collected and weighed per category across the Solomon Islands from 2022 to 2024. A total of 23,769 macro waste items were collected for auditing. Figure 10.2.2 breaks down this distribution, 10,005 (42%) were plastic, 777 (3%) were foamed plastic, 1,071 (5%) were fabrics and textiles, 2,680 (11%) were glass and ceramic, 7,353 (31%) metal, and 441 (2%) paper and cardboard. Rubber and wood comprised less than 2%, while other materials comprised 1,004 (4%).

Table 10.2.1. *Solomon Islands Beach ML Surveyed and Audited from 2022 – 2024*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	10,005	625	684	316
Foamed Plastic	777	49	75	11
Fabric & Textiles	1,071	67	72	170
Glass & Ceramic	2,680	168	287	63
Metal	7,353	460	483	277
Paper & Cardboard	441	28	64	10
Rubber	221	14	26	23
Wood	217	14	49	53
Other	1,004	63	78	560
TOTAL	23,769			1,484

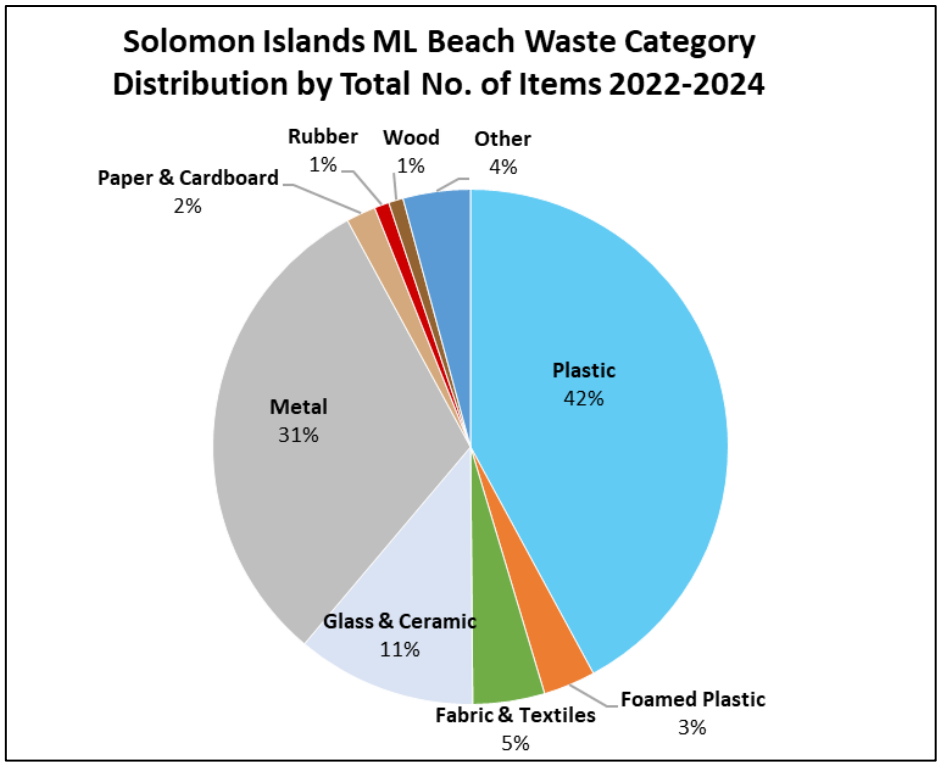

Figure 10.2.2. *Solomon Islands Beach ML Distribution Per Waste Category by Total No. of Items, 2022-2024.*

Figure 10.2.3 compares the total number of categorised waste items collected from 2022 to 2024. In the Solomon Islands, five surveys were conducted in 2022, nine in 2023 and three in 2024. Figure 10.2.3 indicates a high occurrence of plastic items, with 2,368 items collected in 2022, 5,833 (2023), and 1,804 in 2024. The year for the highest number of plastic items audited is 2023, with an increase of 3,465 in 2022, but a decrease of 4,029 in 2024. Note, this does not consider the number of surveys conducted each year. Notably, there were 5,892 metal items audited in 2023, 958 in 2022 and 503 in 2024. The highest number of plastics recorded in one survey was in 2022, with 2,639 plastic items audited at Honiara-Baudoko Beach on the 14th of March 2023. There were 1,882 glass and ceramic items audited in 2023, 1,091 items were surveyed from Gizio - Malakerava 3 Hotel Residential Area on 5th September 2023, with 1002 glass or ceramic fragments accounted for.

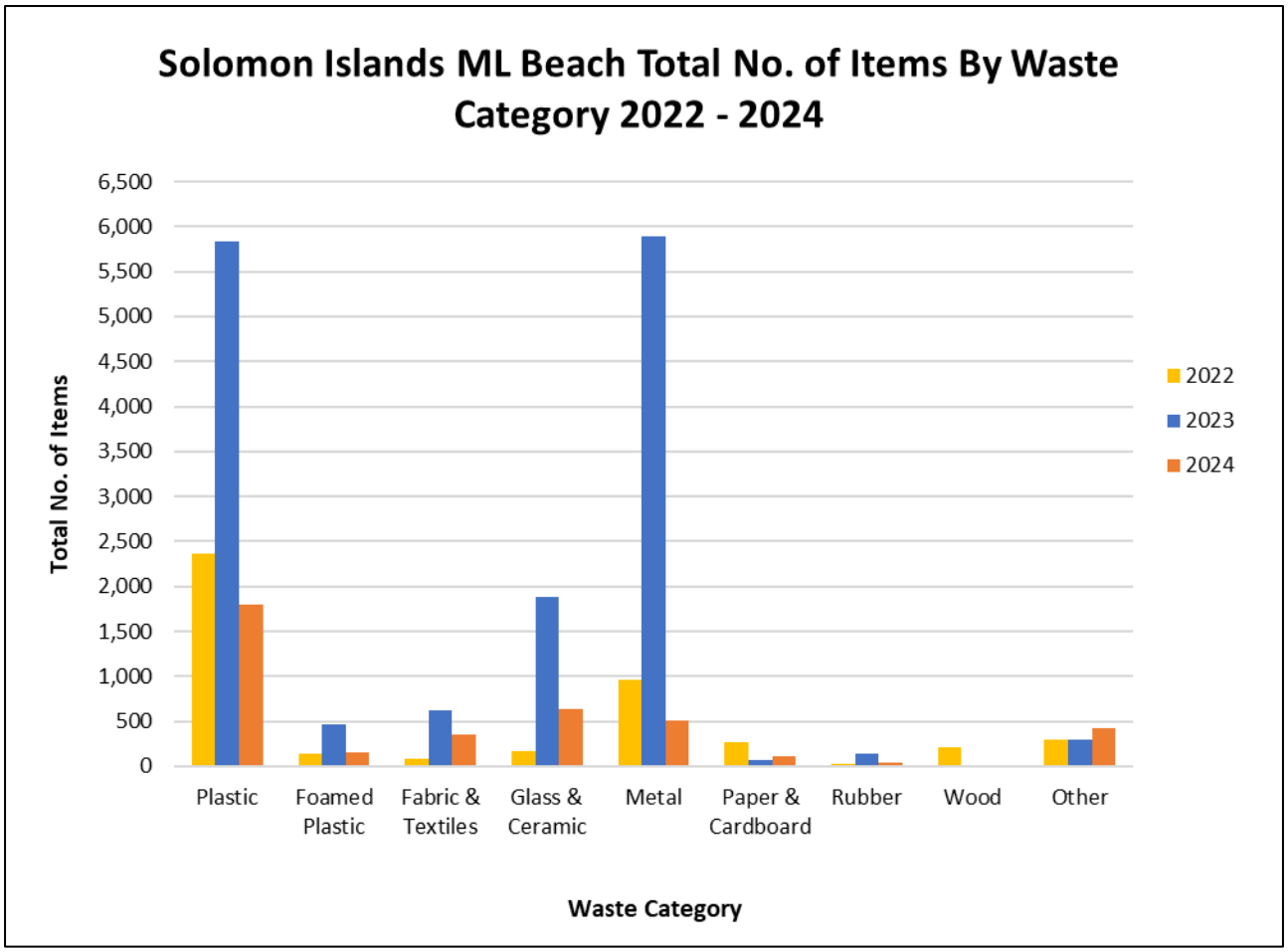

Figure 10.2.3. *Solomon Islands Beach ML Distribution Per Waste Category by Total No. of Items, 2022 - 2024.*

Figure 10.2.4 presents the average number of items collected per waste category in the Solomon Islands. The error bars represent the standard deviation, indicating the variability in the data. The mean number of plastic waste items collected per beach survey is 625 ± 684. For other categories, the averages are foamed plastic 49 ± 75, fabric and textiles 67 ± 72, glass and ceramic 168 ± 287, metal 460 ± 483, paper and cardboard 28 ± 64, rubber 14 ± 26, wood 14 ± 49, and other 63 ± 78 items.

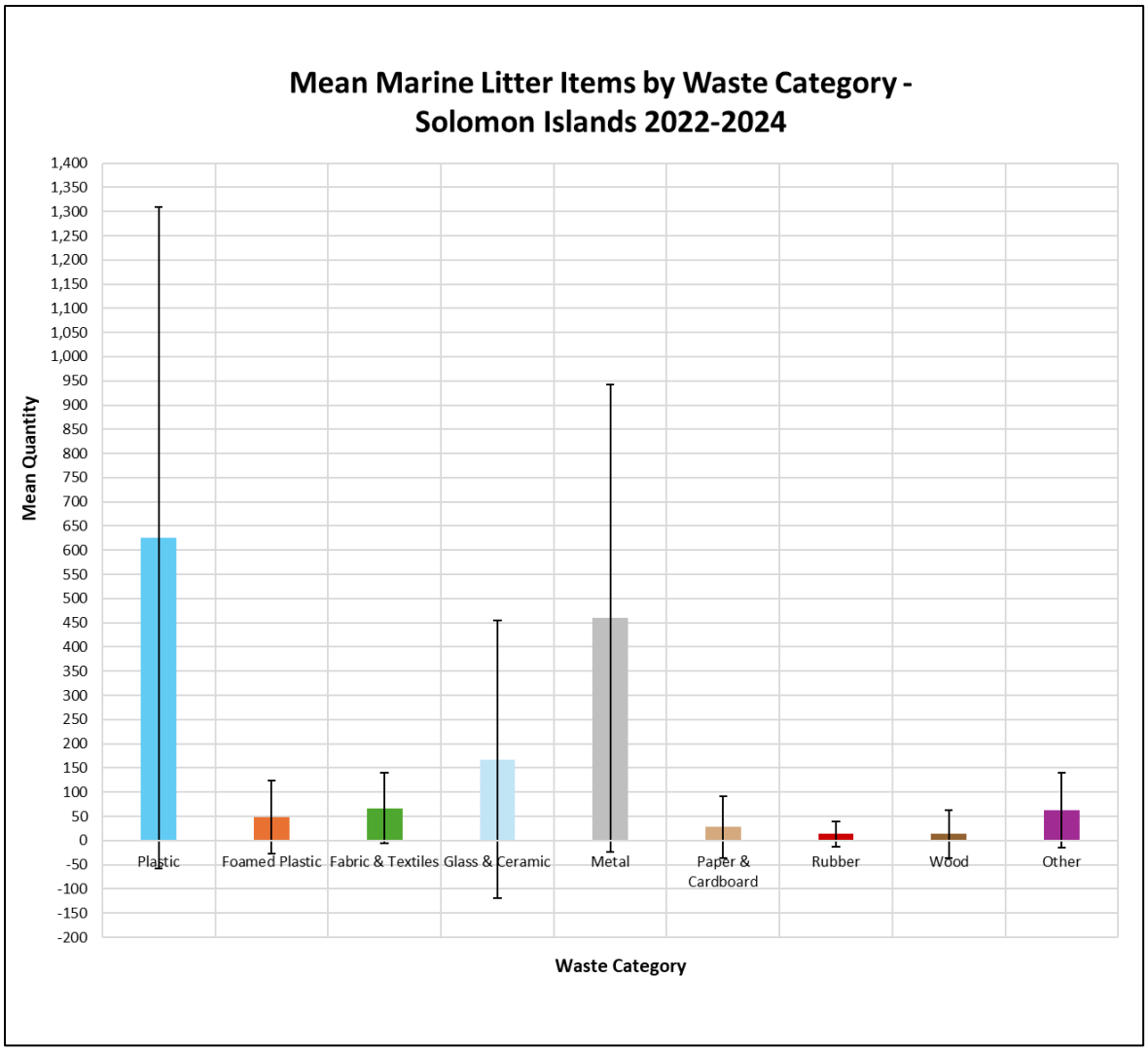

Figure 10.2.4. *Solomon Islands Beach ML Mean No. of Items Per Waste Category 2022 - 2024.*

10.3. SOLOMON ISLANDS BEACH ML TOTAL WEIGHT OF ITEMS

Figure 10.3.1 illustrates the distribution of categorised items by total weight in kg. According to Table 10.2.1, the total weight of all items collected and audited within Solomon Island's 17 surveys was 1,484 kg. Figure 10.3.1 shows that 38% of the total weight (560 kg) was other, specifically one 500 kg battery (non-household) collected from Honiara - Karaina Coastal Front on 24th September 2022 and batteries (Household) collected throughout a range of surveys 2022-2024. As illustrated in Figure 10.3.1, plastic accounted for 316 kg (21%), fabric and textile materials 170 kg (11%), foamed plastic 11 kg (1%), glass and ceramic 63 kg (4%), metal 277 kg (19%), paper and cardboard 10 kg (1%), rubber 23 kg (1%), and wood 53 kg (4%). Within the metal category, aluminium drink cans and other cans (<= 4 L) were primary

contributors to heavy weights and counts. Notably, the weight of fabric and textiles may be affected by whether the items were fully dry or saturated with water.

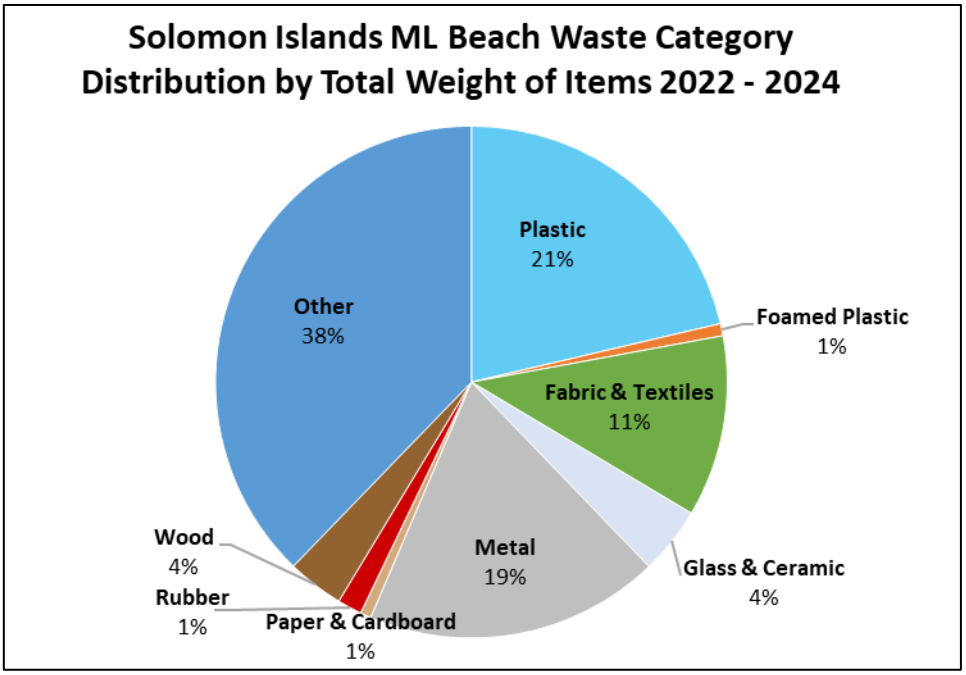

Figure 10.3.1. *The Solomon Islands Beach ML Distribution Per Waste Category by Total No. of Items, 2022 - 2024.*

Figure 10.3.2 compares the total weight of categorised waste items from Solomon Island's 17 surveys conducted between 2022 and 2024. Figure 10.3.2 shows a high occurrence of "other" materials in 2022, which was the non-household battery. Figure 10.3.2 shows plastic items weighed 100.69 kg in 2022, 132.14 kg in 2023 and 83.58 kg in 2024. The number of surveys conducted each year should be considered when interpreting these results.

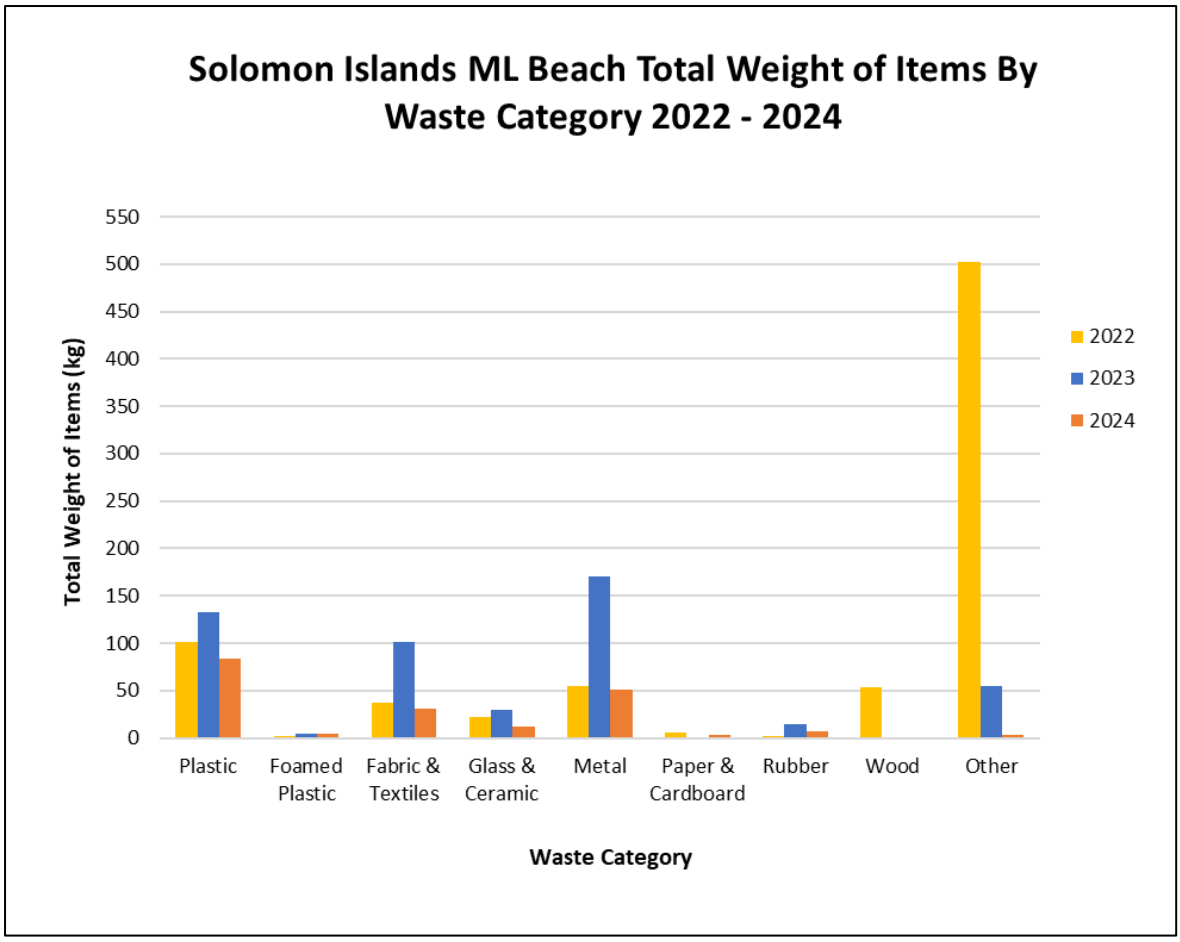

Figure 10.3.2. *Comparison of Top Plastic Beach ML Items Collected on the Solomon Islands Beaches (2022 – 2024)*

Figure 10.3.3 shows the average weight of collected items per waste category in the Solomon Islands. The error bars represent the standard deviation, indicating data variability. The mean weight of plastic waste per beach survey is 20 kg ± 26.60 kg and for fabric and textiles 1 kg ± 1.24 kg. The averages for other waste categories are foamed plastic 1 kg ± 1 kg, glass and ceramic 4 kg ± 4.70 kg, metal 17 kg ± 18.33 kg, paper and cardboard 1 kg ± 1.26 kg, rubber 1 kg ± 3.01 kg, wood 3 kg ± 10.14 kg, and other materials 35 kg ± 124.27 kg. Notably, Figure 10.3.3 highlights discrepancies in the weights of 'other' items (batteries) and underscores the differences between counting the number of waste items and their weight.

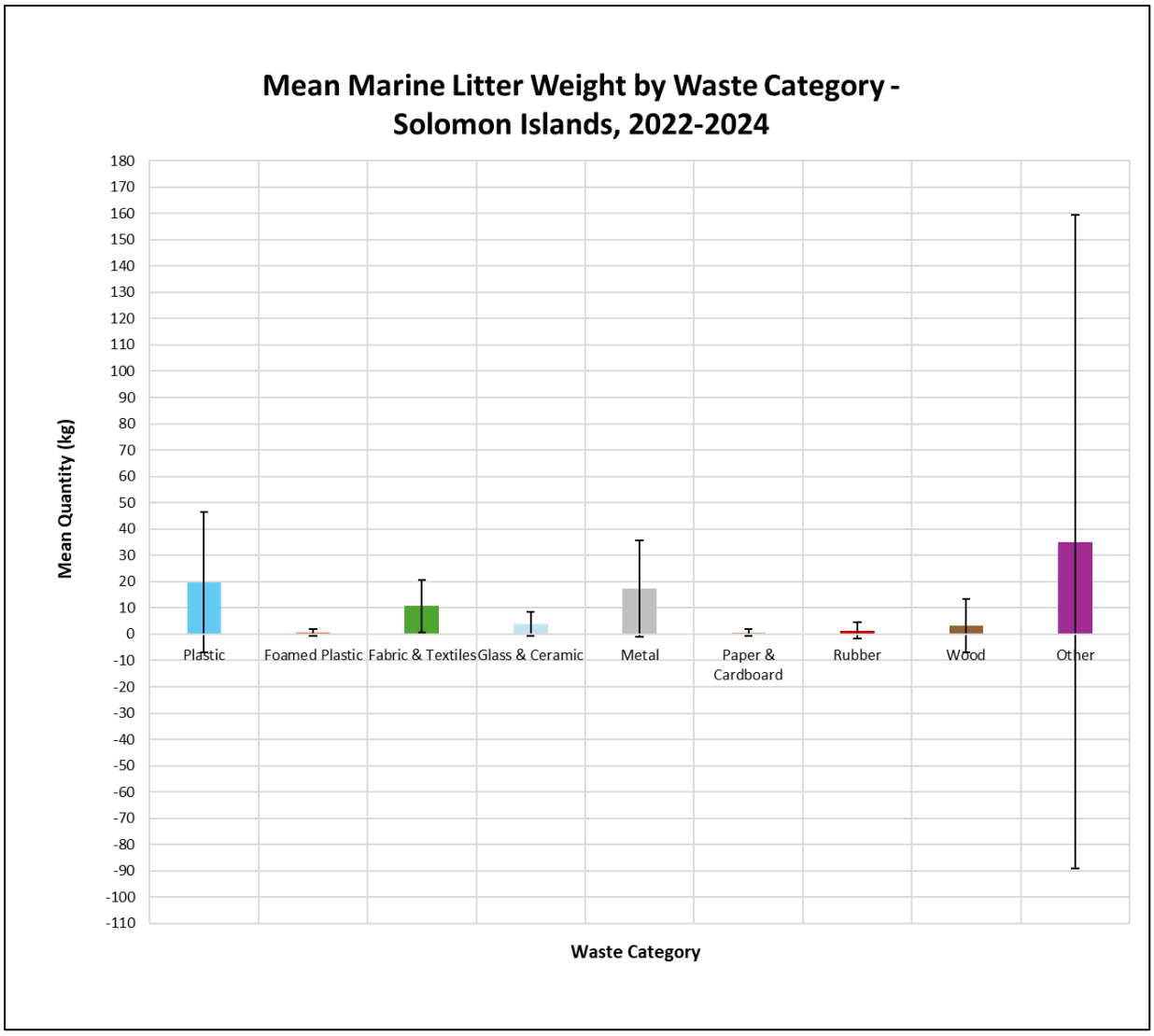

Figure 10.3.3. *Solomon Islands Beach ML Mean Weight Per Waste Category 2022 - 2024.*

10.4. SOLOMON ISLAND BEACH ML PLASTICS WASTE NO. OF ITEMS

Figure 10.4.1 illustrates the distribution of key plastic items recorded under the 'plastic' waste category, highlighting areas with high occurrences. Figure 10.4.1 indicates that out of the total 10,005 plastic items collected between 2022 and 2024, 2,815 (28%) were plastic bottles less than or equal to 2 L. Food wrappers accounted for 2,392 items (24%), food containers for 315 items (3%). Figure 10.4.1 indicates that 904 (9%) were plastic bags, 475 (5%) were bottles, drums, jerrycans & buckets over 2 L, 695 (7%) were bottle caps & lids, 478 (5%) were unidentifiable hard plastic fragments, and 1,151 (12%) were 'other' plastics unlisted.

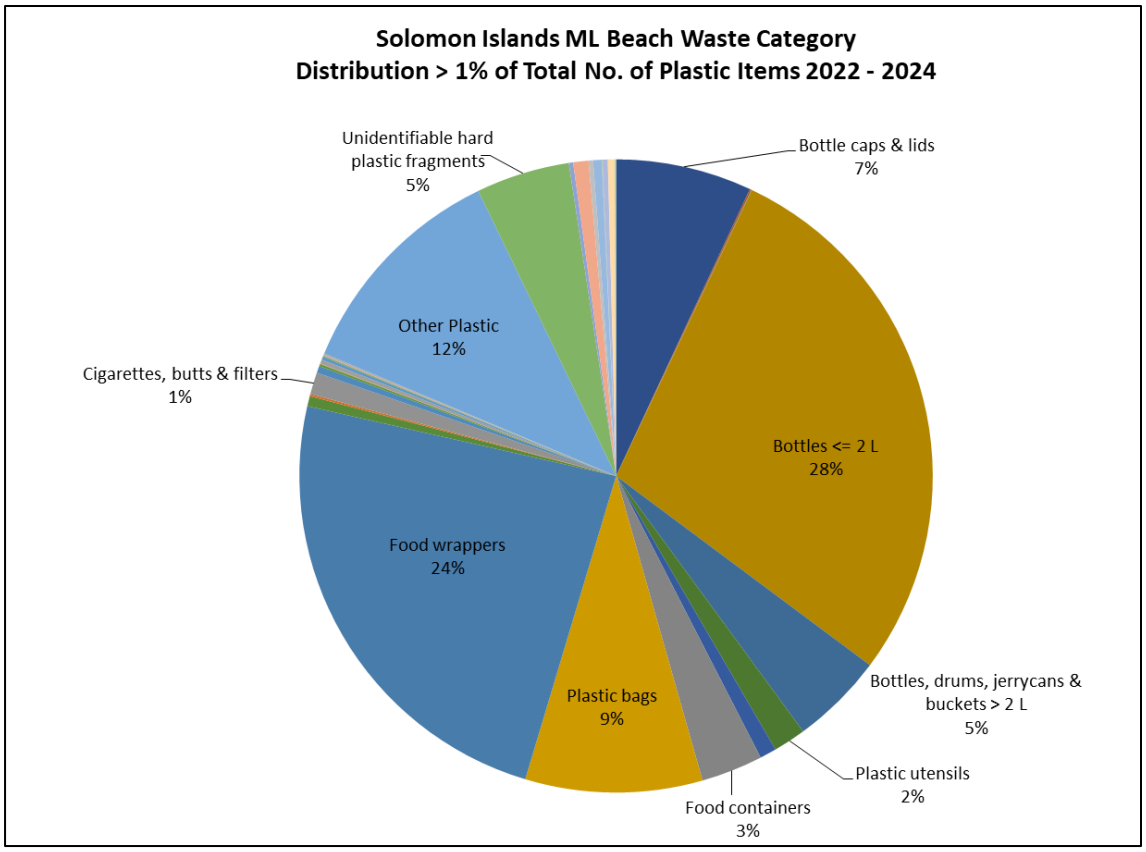

Figure 10.4.1. *Distribution of Total Plastic Beach ML Items Collected on the Solomon Island Beaches 2022 - 2024.*

Figure 10.4.2 provides a detailed analysis of the results from Figure 10.4.1, breaking down the occurrences of each key plastic item between 2022 and 2024. Figure 10.4.2 shows that bottles less than or equal to 2 L had the highest occurrence in 2022 with 1,484 collected whilst 1,259 in 2023 and 72 in 2024. Figure 10.4.2 shows that food wrappers accounted for 68 in 2022, 1,311 in 2023 and 1,013 in 2024. Appendix G lists the mean number of all plastic items found on the Solomon Islands beaches and indicates that the average number of bottles less than or equal to 2 L is 938 ± 619 items per year and food wrappers are 797 ± 530 items per year.

Figure 10.4.2 indicates that 1,119 'other' plastics were accounted for in 2023, this was not a large amount found in one survey, this collection occurred across multiple and in different locations. Figure 10.4.2 indicates that 360 plastic bags were accounted for in 2022, 489 in 2023, and 55 in 2024, plastic bags mean frequency is 301 ± 182 items per year. Refer to Appendix G for further details.

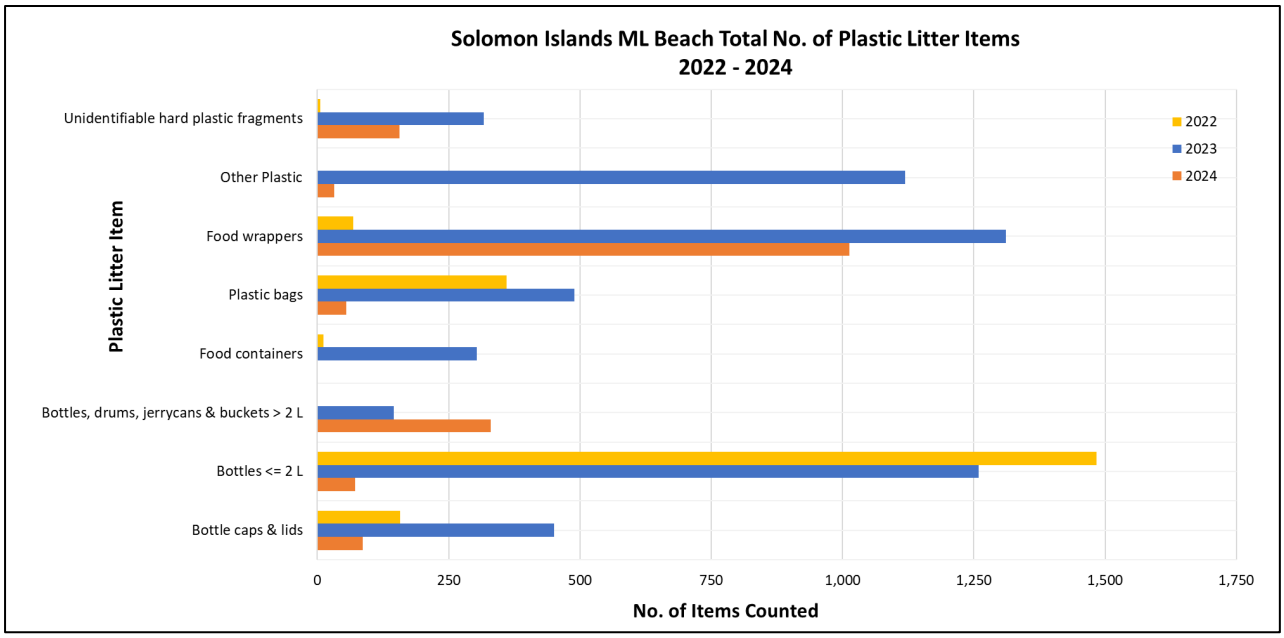

Figure 10.4.2. *Comparison of Top Plastic Beach ML Items Collected on Solomon Islands Beaches (2022 – 2024)*

11. MARINE LITTER RESULTS – TONGA

11.1. TONGA BEACH ML DENSITY

Figure 11.1.1 illustrates the litter density (items per 1,000 m²) conducted in Tonga from 2021 - 2024. Figure 11.1.1 compares these survey results (columns) with the averages for Tonga, the Pacific Island Countries and Territories (PICTs) average results from 73 surveys, and Sustainable Coastlines' Litter Intelligence beach average litter density from 2,287 surveys (2024). As presented in Table 7.4.1, Tonga's litter mean density was 537 ± 443 items per 1,000 m² whereas the PICTs average was 3,448 ± 9,727 items per 1,000 m².

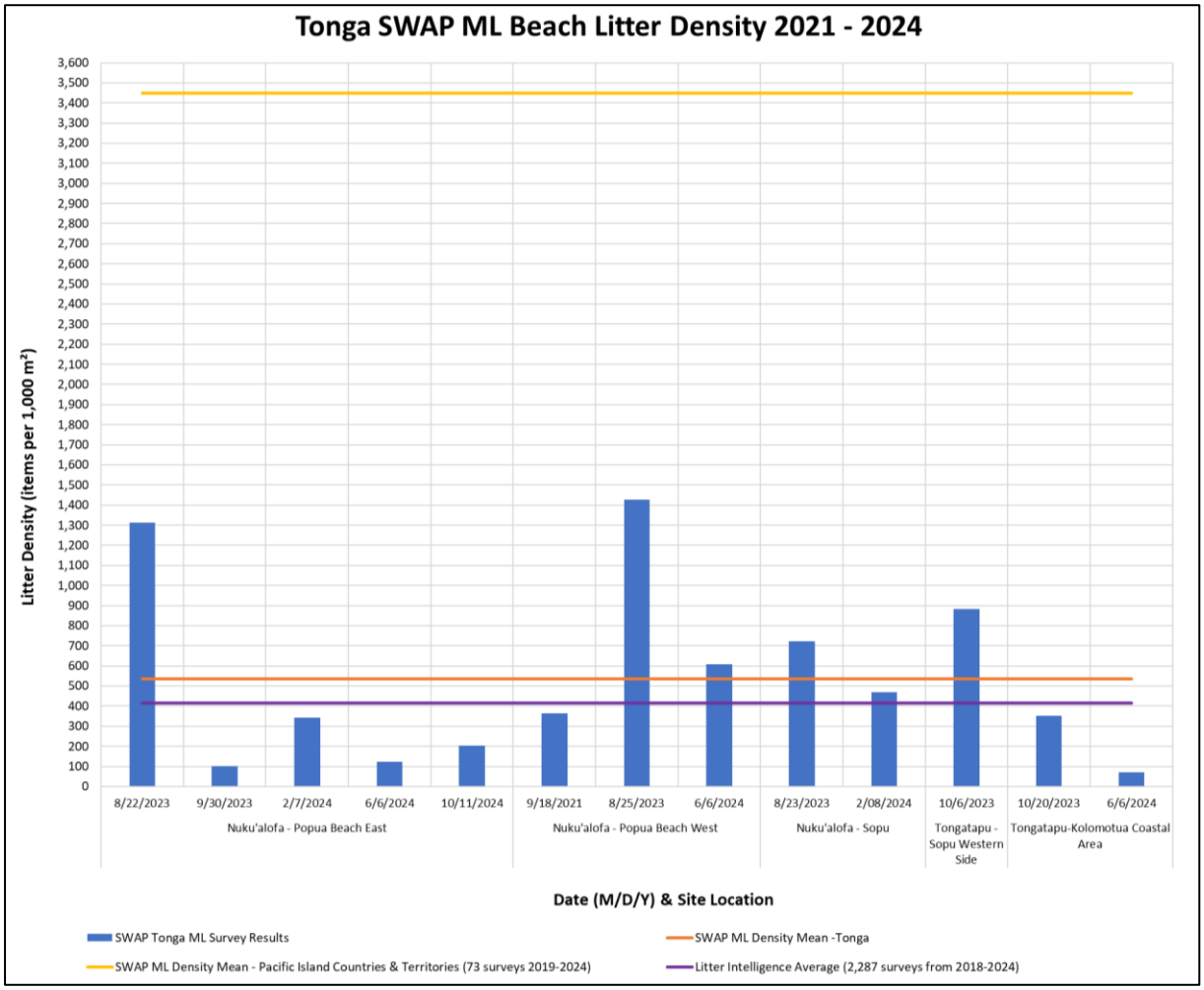

Figure 11.1.1. *Marine Litter Density Results – Tonga*

11.2. TONGA BEACH ML RESULTS PER CATEGORY

Table 11.2.1 shows the total number of beach ML waste items collected and weighed per category across Tonga from 2021 to 2024. A total of 6,250 macro waste items were collected for auditing. Figure 11.2.2 breaks down this distribution, 3,258 (52%) were plastic, 163 (3%) were foamed plastic, 217 (3%) were fabrics and textiles, 1,043 (17%) were glass and ceramic, 881 (14%) metal, and 232 (4%) paper and cardboard. Figure 11.2.2 indicates 196 (3%) rubber, 28 (<1%) wood and 1,232 (4%) other materials.

Table 11.2.1. *Tonga Beach ML Surveyed and Audited from 2021 – 2024*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	3,258	272	268	69
Foamed Plastic	163	14	13	1
Fabric & Textiles	217	18	18	47
Glass & Ceramic	1,043	87	132	14
Metal	881	73	71	14
Paper & Cardboard	232	19	12	4
Rubber	196	16	21	43
Wood	28	2	3	16
Other	232	19	22	2
TOTAL	6,250			209

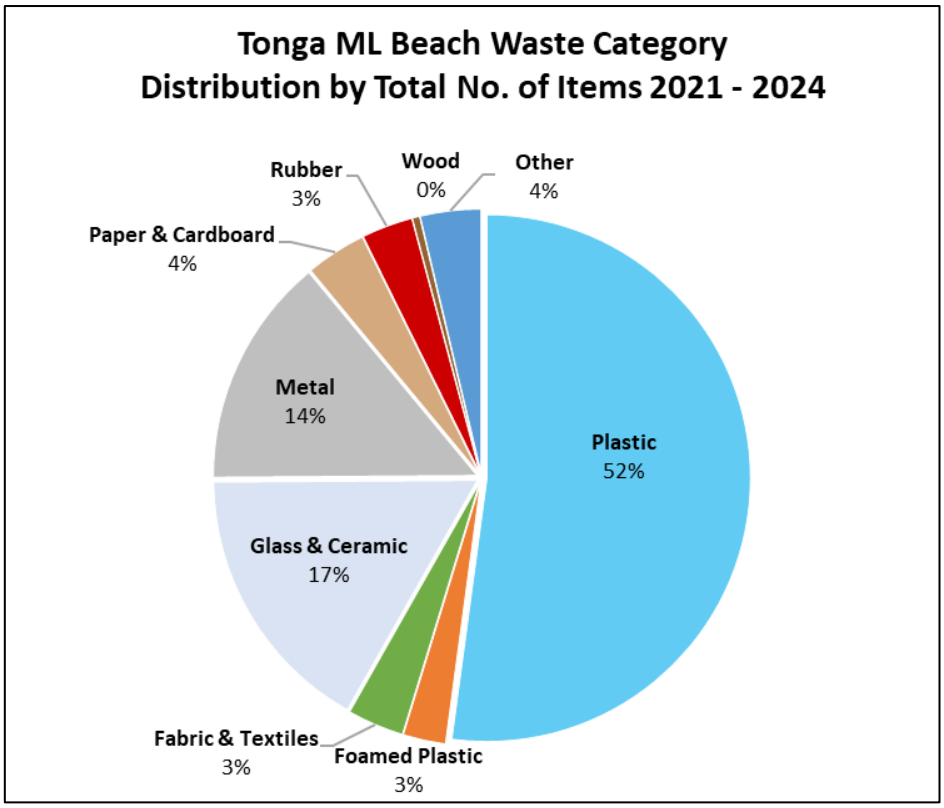

Figure 11.2.2. *Tonga Beach ML Distribution Per Waste Category by Total No. of Items, 2021-2024.*

Figure 11.2.3 compares the total number of categorised waste items collected in 2021, 2023 and 2024. In Tonga, one survey was conducted in 2021, six in 2023 and six in 2024. Figure 11.2.3 indicates a high occurrence of plastic items, with 526 items collected in 2021, 1,968 (2023), and 764 in 2024. The year for the highest number of plastic items audited is 2023, with an increase of 1,442 from 2021 to 2023, but a decrease of 1,204 in 2024. Note, this does not consider the number of surveys conducted each year.

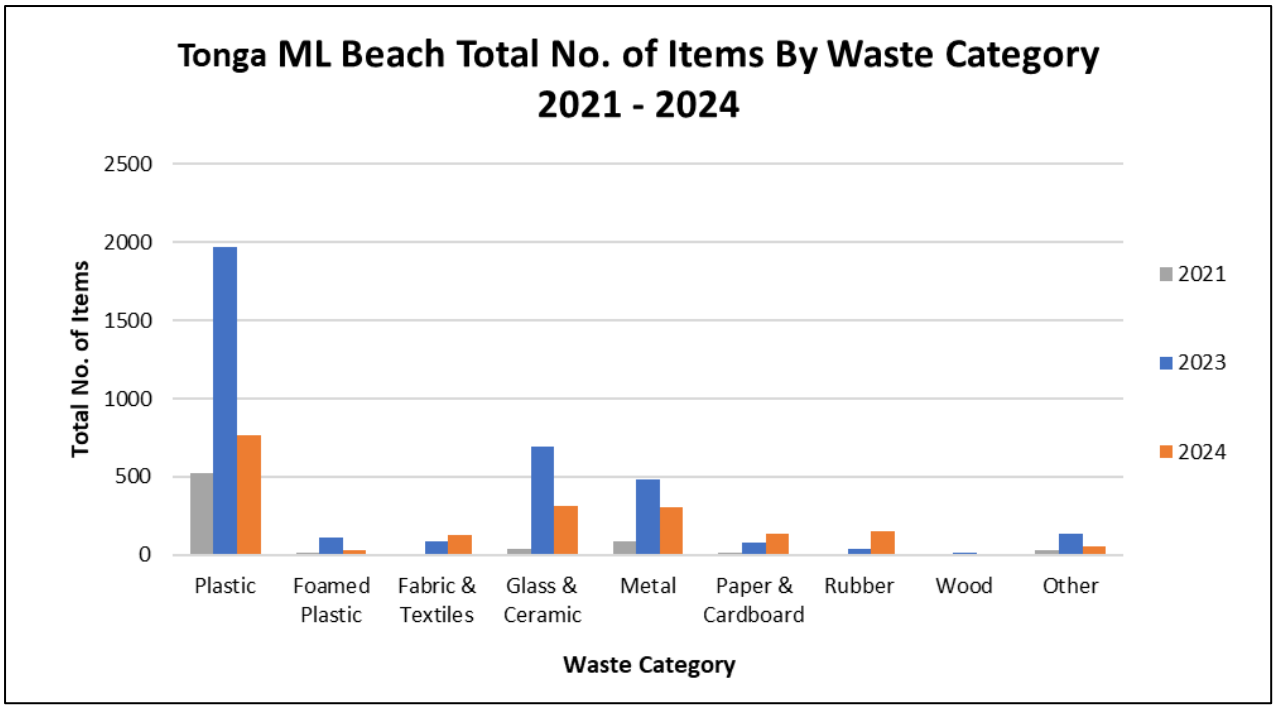

Figure 11.2.3. *Tonga Beach ML Distribution Per Waste Category by Total No. of Items, 2021 - 2024.*

Figure 11.2.4 presents the average number of items collected per waste category in Tonga. The error bars represent the standard deviation, indicating the variability in the data. The mean number of plastic waste items collected per beach survey is 272 ± 268. For the other categories, the averages are foamed plastic 14 ± 13, fabric and textiles 18 ± 18, glass and ceramic 87 ± 132, metal 73 ± 71, paper and cardboard 19 ± 12, rubber 16 ± 21, wood 2 ± 3, and other 19 ± 22 items.

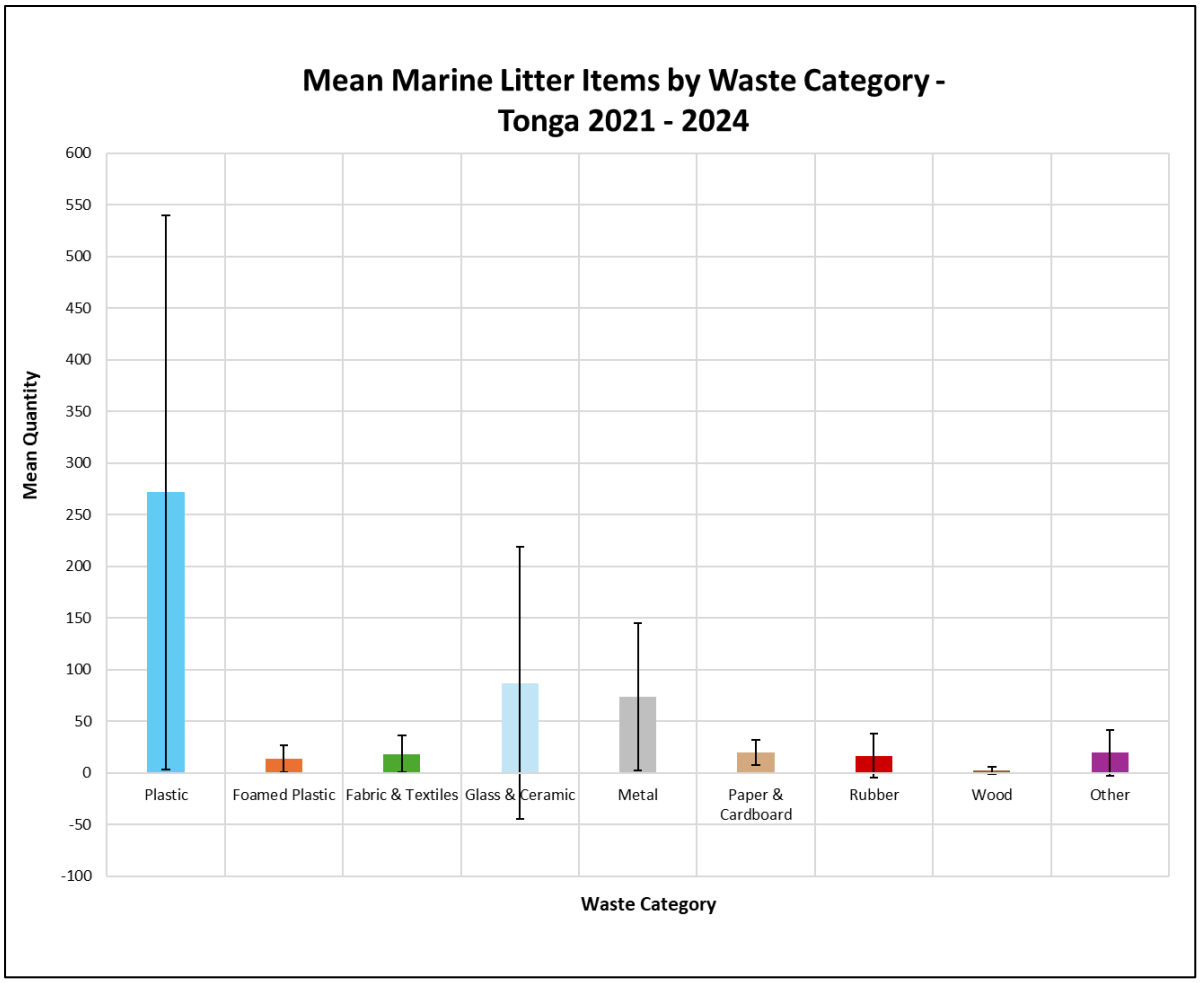

Figure 11.2.4. *Tonga Beach ML Mean No. of Items Per Waste Category 2021 - 2024.*

11.3. TONGA BEACH ML TOTAL WEIGHT OF ITEMS

Figure 11.3.1 illustrates the distribution of categorised items by total weight in kg. According to Table 11.2.1, the total weight of all items collected and audited within Tonga's 13 surveys was 209 kg. Figure 11.3.1 shows that 33% of the total weight (69 kg) was plastic, fabric and textile materials 47 kg (22%), foamed plastic 1 kg (<1%), glass and ceramic 14 kg (7%), metal 14 kg (7%), paper and cardboard 4 kg (2%), wood 16 kg (7%) and other 2 kg (1%). Figure 11.3.1 indicates that rubber weighed 43kg (21%) of the total weight, 38 kg of this is reported as from tyres, and the remaining weight is rubber footwear and other rubber. Notably, the weight of fabric and textiles may be affected by whether the items were fully dry or saturated with water.

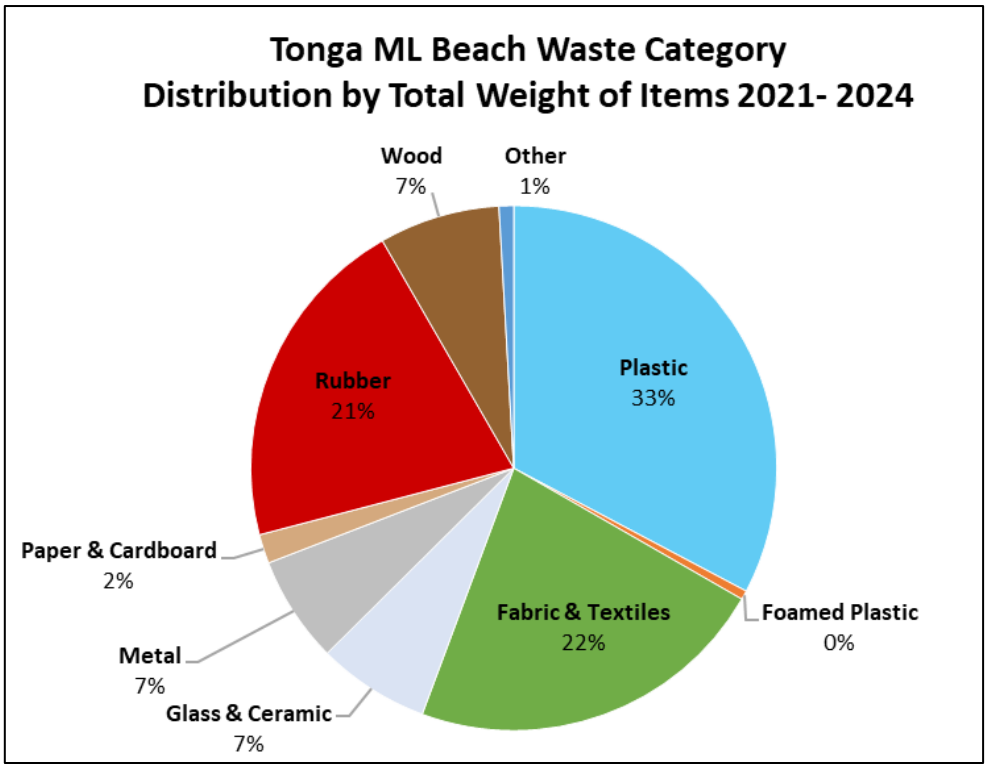

Figure 11.3.1. *Tonga Beach ML Distribution Per Waste Category by Total No. of Items, 2021 - 2024.*

Figure 11.3.2 compares the total weight of categorised waste items from Tonga's 13 surveys conducted in 2021, 2023 and 2024. Figure 11.3.2 shows a high occurrence of plastic items weighing in at 3.1 kg in 2021, 58 kg in 2023 and 7.45 kg in 2024. For fabric & textiles, Figure 11.3.2 indicates 0 kg in 2021, 42.6 kg in 2023, and 4.16 in 2024. The number of surveys conducted each year and the wet and dry weight of the product should be considered when interpreting these results.

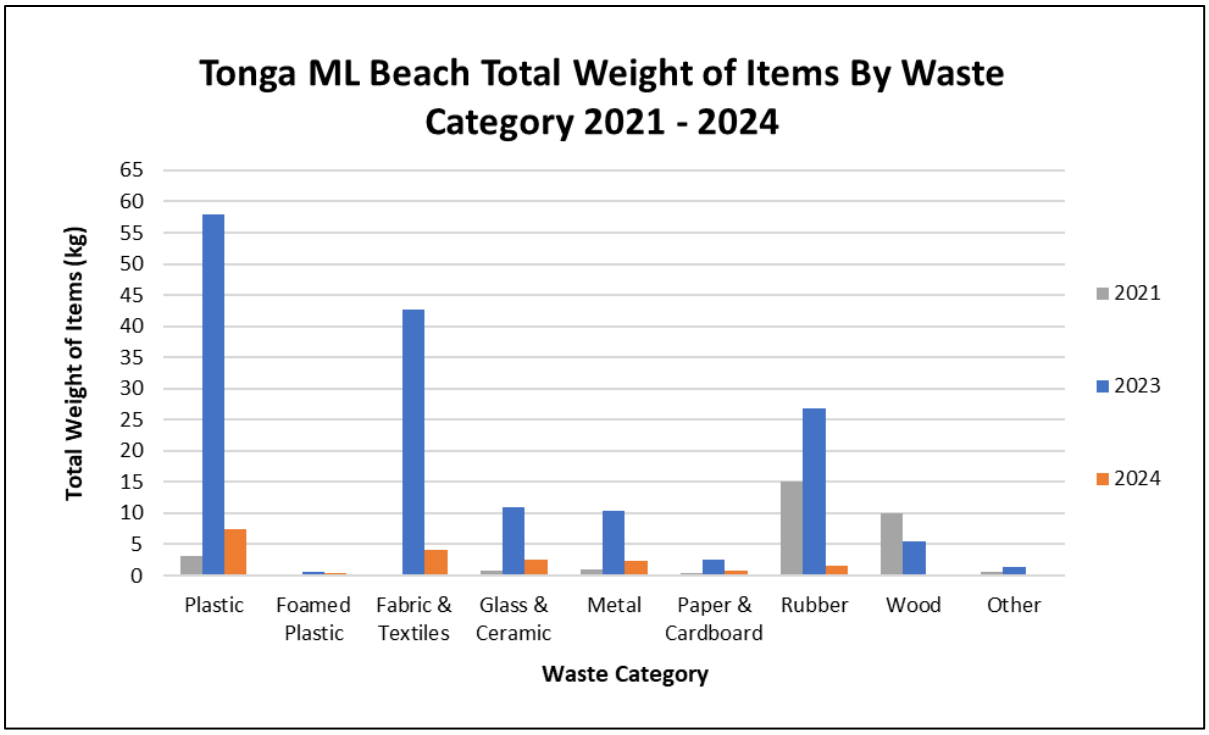

Figure 11.3.2. *Comparison of Top Plastic Beach ML Items Collected on Tonga Beaches (2021 – 2024)*

Figure 11.3.3 shows the average weight of collected items per waste category in Tonga. The error bars represent the standard deviation, indicating data variability. The mean weight of plastic waste per beach survey is 6 kg ± 8.40 kg and for fabric and textiles 4 kg ± 8.81 kg. The averages for other waste categories are foamed plastic 0.10 kg ± 0.08 kg, glass and ceramic 1.2 kg ± 1.48 kg, metal 1.1 kg ± 1.08 kg, paper and cardboard 0.3 kg ± 0.37 kg, rubber 4 kg ± 6.23 kg, wood 1.3 kg ± 3.02 kg, and other materials 0.16 kg ± 0.25 kg.

Notably, Figure 11.3.3 highlights discrepancies in the weights of fabric and textiles items, items include clothing, towels and linen, footwear & shoes, and unidentifiable cloth fragments; this result underscores the differences between counting the number of waste items and their weight.

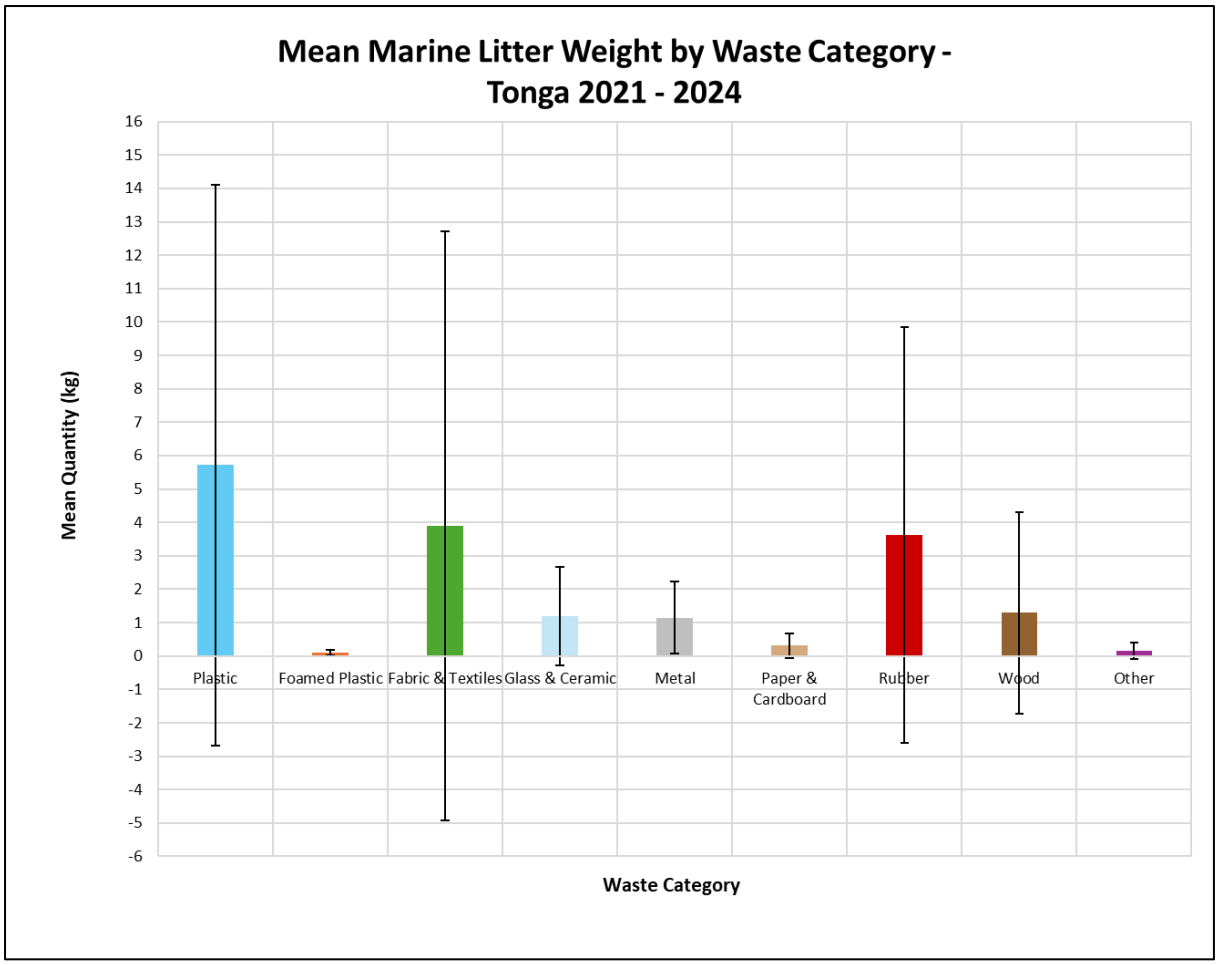

Figure 11.3.3. *Tonga Beach ML Mean Weight Per Waste Category 2021 - 2024.*

11.4. TONGA BEACH ML PLASTICS WASTE NO. OF ITEMS

Figure 11.4.1 illustrates the distribution of key plastic items recorded under the 'plastic' waste category, highlighting areas with high occurrences. Figure 11.4.1 indicates that out of the total 3,258 plastic items collected in 2021, 2023 and 2024, 588 (18%) were plastic bags, 429 (13%) were food wrappers, 471 (14%) were plastic bottles less than or equal to 2 L. Figure 11.4.1 indicates that there were 402 (12%) food containers, 156 (5%) bottle caps & lids, 103 (3%) were straws, 96 (3%) plastic utensils, and 67 (2%) were rope. Figure 11.4.1 indicates 367 (11%) were unidentifiable soft plastic fragments and 228 (7%) were unidentifiable hard plastic fragments.

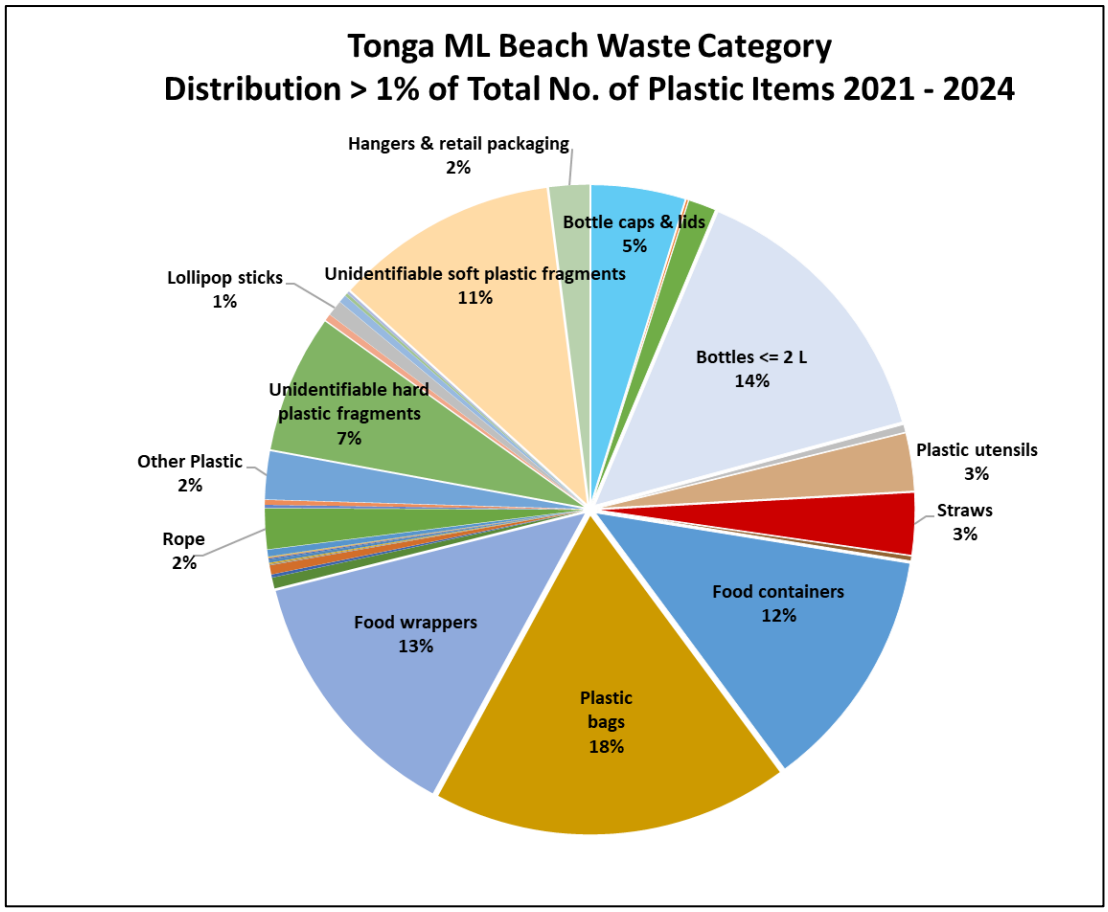

Figure 11.4.1. *Distribution of Total Plastic Beach ML Items Collected on Tonga Beaches 2021-2024.*

Figure 11.4.2 provides a detailed analysis of the results from Figure 11.4.1, breaking down the occurrences of each key plastic item for 2021, 2023 and 2024. Figure 11.4.2 shows that plastic bags, plastic bottles less than or equal to 2 L and food wrappers had the highest occurrences over the years. Plastic bags were 155 items in 2021, 311 in 2023, and 122 in 2024, indicating an average number of plastic bags of 196 ± 82 per year. Plastic bottles less than or equal to 2 L were 33 items in 2021, 340 in 2023, and 98 in 2024, indicating an average number of bottles <= 2, 157 ± 132 per year. There were 62 food wrapper items in 2021, 276 in 2023, and 91 in 2024, indicating an average number of food wrappers is 143 ± 95 per year. Refer to Appendix H for the list of the mean number of all plastic items found on Tonga's beaches,

Figure 11.4.2 shows food containers accounted for 72 items in 2021, 211 in 2023 and 119 items in 2024, with a mean of 134 ± 58 items per year. Notably, in Figure 11.4.2 there were no unidentifiable soft plastic fragments or unidentifiable hard plastic fragments in 2021, but there were 55 'other' plastic recorded. Figure 11.4.2 indicates there were 188 unidentifiable hard plastic fragments in 2023, and 40 in 2024, a mean of 114 ± 81 items per year, whereas

there were 299 unidentifiable soft plastic fragments in 2023 and 68 in 2024, indicating a mean of 184 ± 128 items per year. Refer to Appendix H for further details.

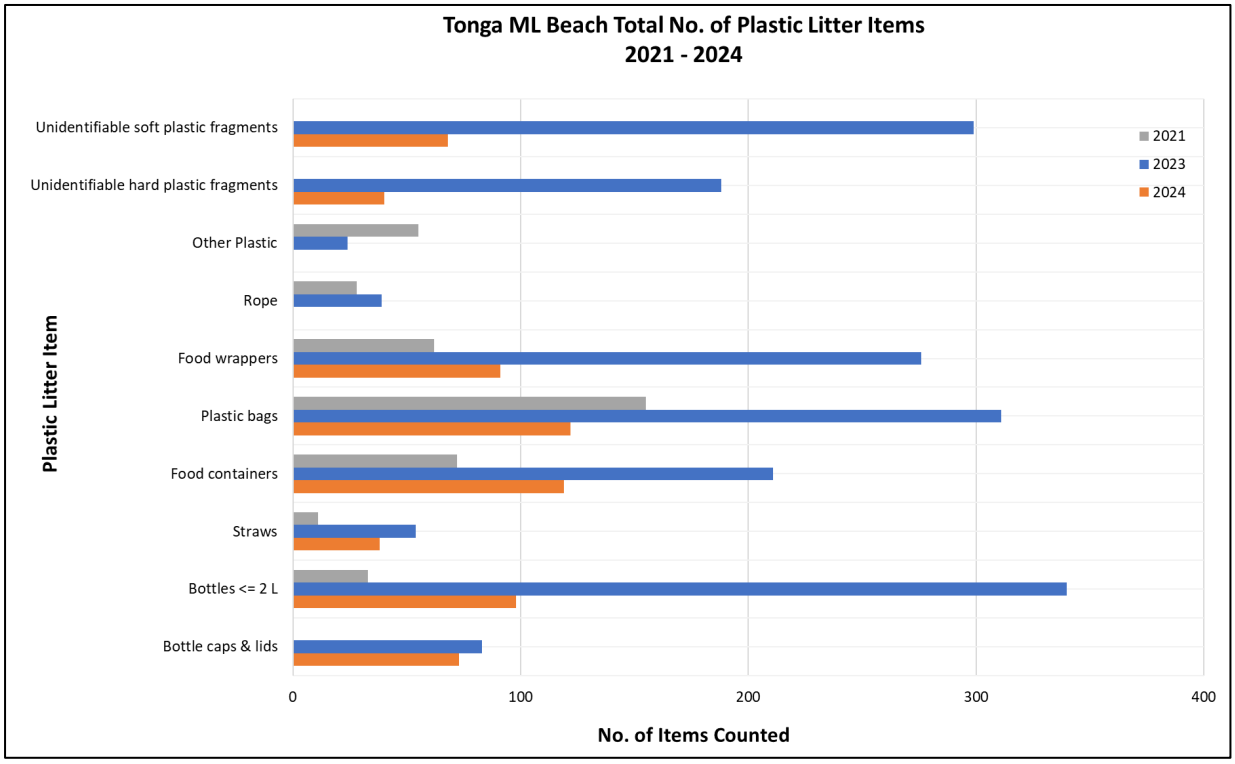

Figure 11.4.2. *Comparison of Top Plastic Beach ML Items Collected on Tonga Beaches (2021 – 2024)*

12. MARINE LITTER RESULTS – VANUATU

12.1. VANUATU BEACH ML DENSITY

Figure 12.1.1 illustrates the litter density (items per 1,000 m²) conducted in Vanuatu from 2023 - 2024. Figure 12.1.1 compares these survey results (columns) with the averages for Vanuatu, the Pacific Island Countries and Territories (PICTs) average results from 73 surveys, and Sustainable Coastlines' Litter Intelligence beach average litter density from 2,287 surveys (2024). As presented in Table 7.4.1, Vanuatu's litter mean density was 3,144 ± 2,309 items per 1,000 m² whereas the PICTs average was 3,448 ± 9,727 items per 1,000 m².

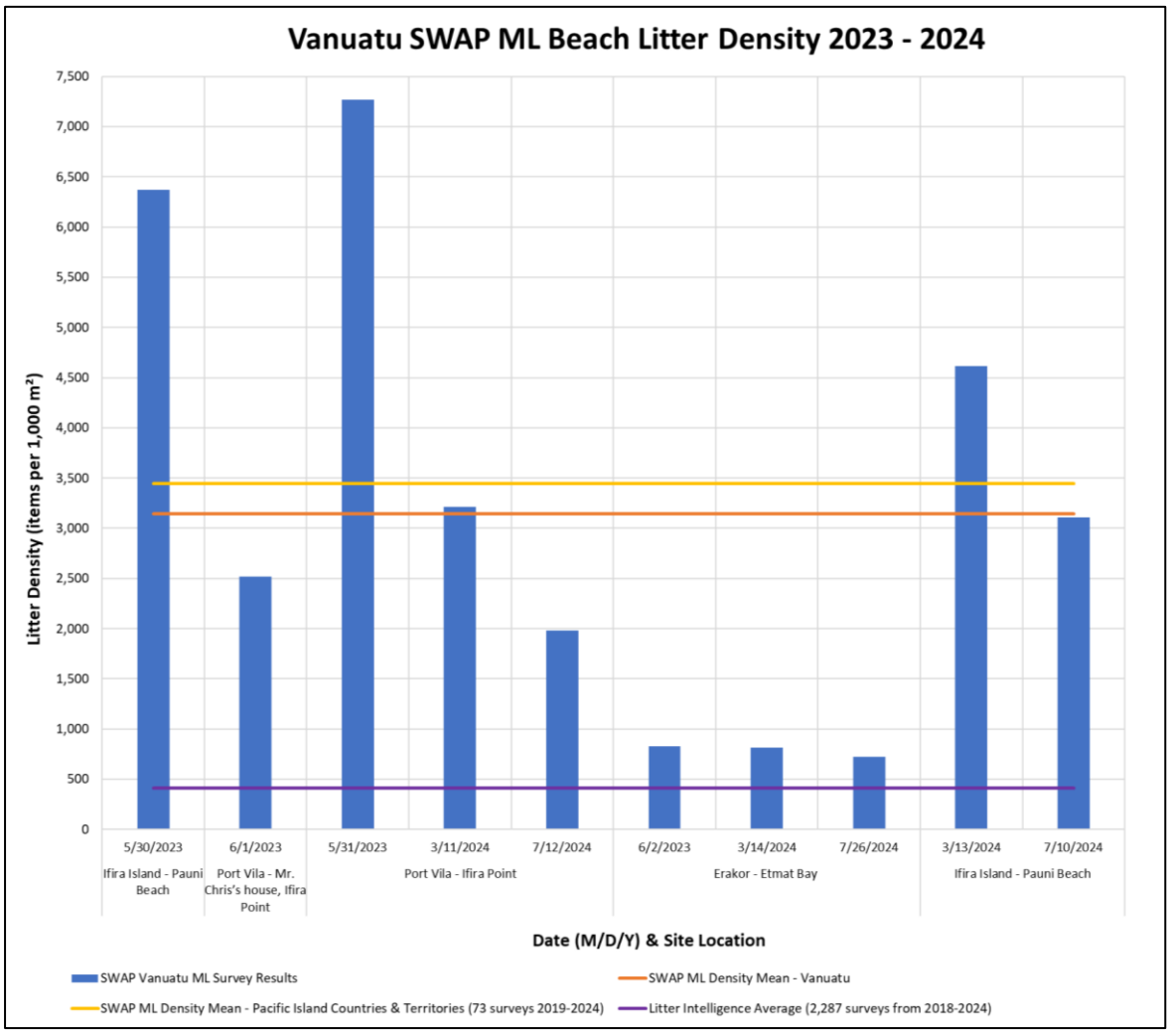

Figure 12.1.1. *Marine Litter Density Results – Vanuatu*

12.2. VANUATU BEACH ML RESULTS PER CATEGORY

Table 12.2.1 shows the total number of beach ML waste items collected and weighed per category across Vanuatu from 2023 to 2024. A total of 14,473 macro waste items were collected for auditing. Figure 12.2.2 breaks down this distribution, 11,967 (83%) were plastic, 407 (3%) were foamed plastic, 194 (1%) were fabrics and textiles, 503 (3%) were glass and ceramic, 378 (3%) metal, and 231 (1%) paper and cardboard. Figure 12.2.2 indicates 129 (1%) rubber, 572 (4%) wood and 92 (1%) other materials.

Table 12.2.1. *Vanuatu Beach ML Surveyed and Audited from 2023 – 2024*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	11,967	1,330	1,560	67
Foamed Plastic	407	45	57	8
Fabric & Textiles	194	22	38	4
Glass & Ceramic	503	56	47	10
Metal	378	42	53	13
Paper & Cardboard	231	26	26	3
Rubber	129	14	14	3
Wood	572	64	142	27
Other	92	10	14	0
TOTAL	14,473			134

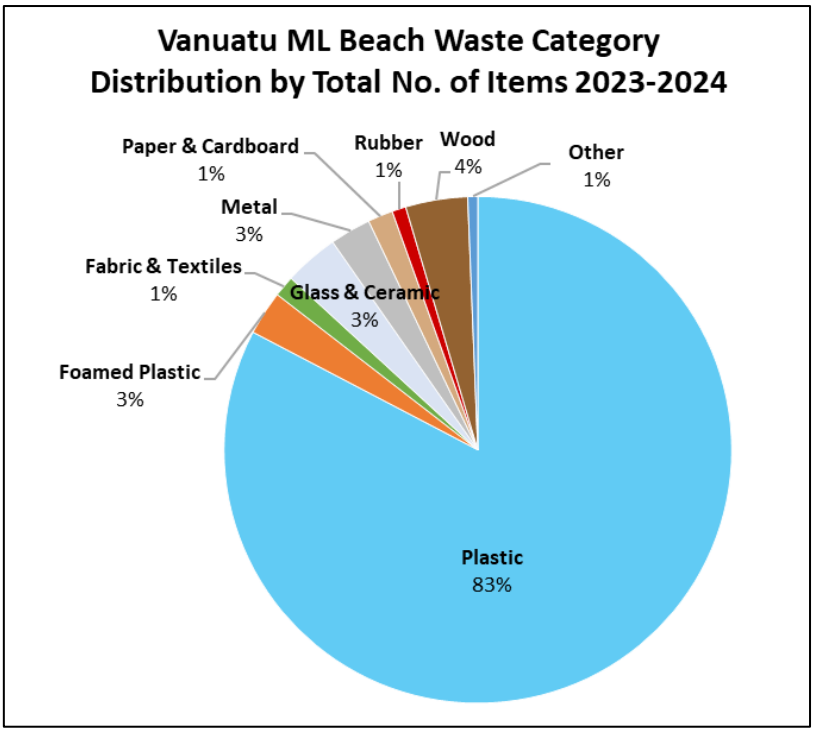

Figure 12.2.2. *Vanuatu Beach ML Distribution Per Waste Category by Total No. of Items, 2023 - 2024.*

Figure 12.2.3 compares the total number of categorised waste items collected between 2023 and 2024. In Vanuatu, four surveys were conducted in 2023 and six in 2024. Figure 12.2.3 indicates a high occurrence of plastic items, with 6,944 plastic items collected in 2023 and 5,023 in 2024, this is a decrease of 1,921. Note, this does not consider the number of surveys conducted each year.

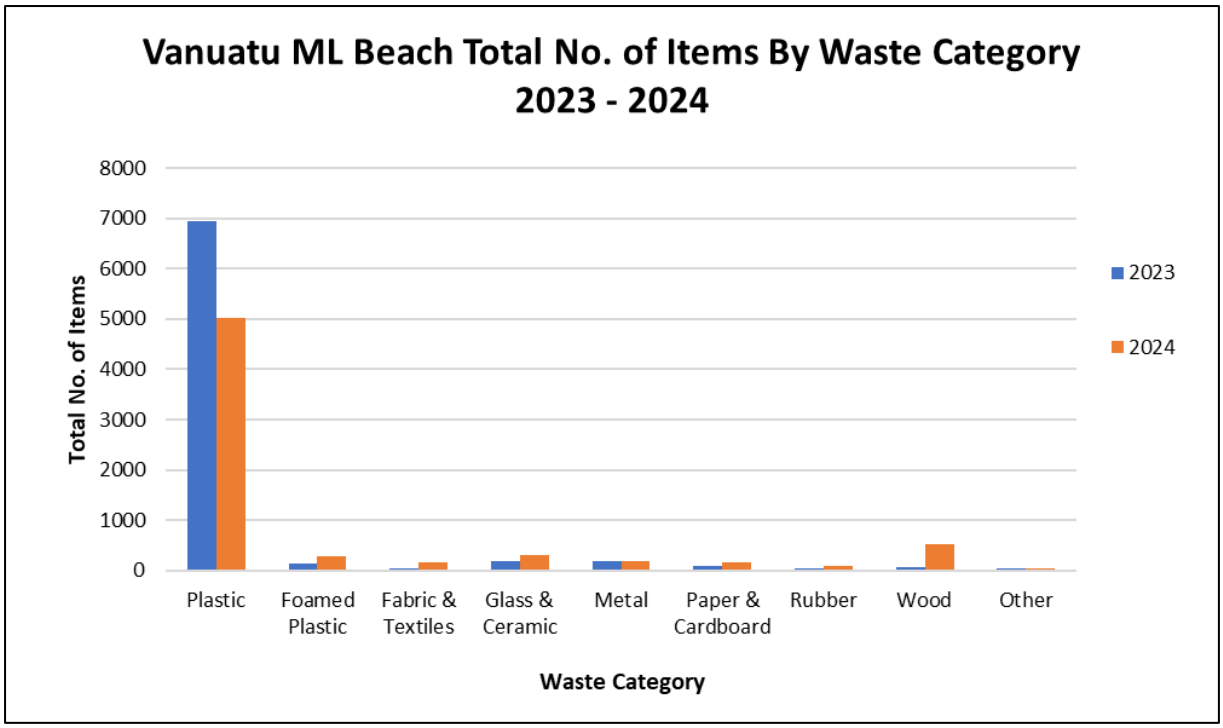

Figure 12.2.3. *Vanuatu Beach ML Distribution Per Waste Category by Total No. of Items, 2023 - 2024.*

Figure 12.2.4 presents the average number of items collected per waste category in Vanuatu. The error bars represent the standard deviation, indicating the variability in the data. The mean number of plastic waste items collected per beach survey is 1,330 ± 1,560. For the other categories, the averages are foamed plastic 45 ± 57, fabric and textiles 22 ± 38, glass and ceramic 56 ± 47, metal 42 ± 53, paper and cardboard 26 ± 26, rubber 14 ± 14, wood 64 ± 142, and 10 ± 14 'other' items.

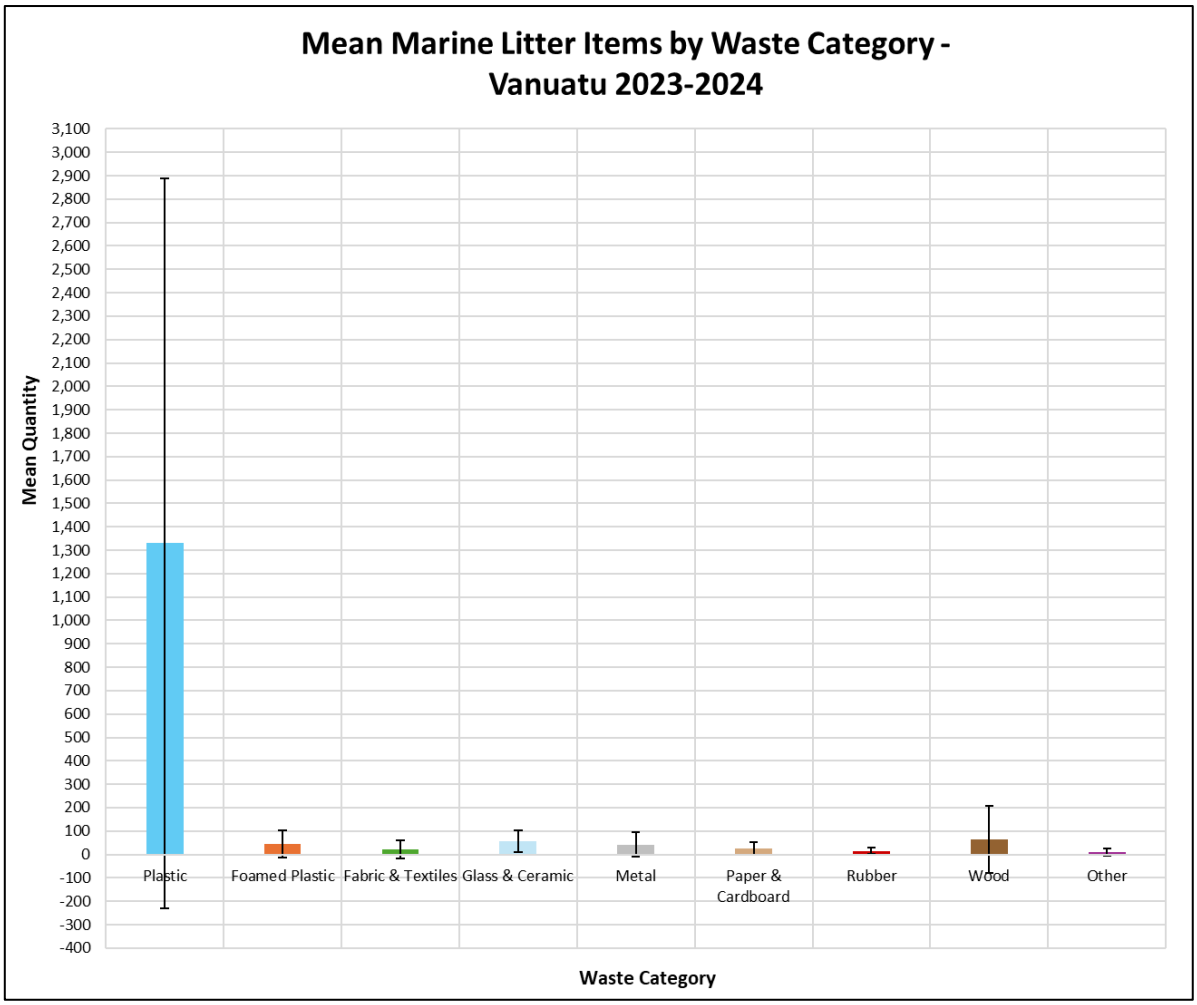

Figure 12.2.4. *Vanuatu Beach ML Mean No. of Items Per Waste Category 2023 - 2024.*

12.3. VANUATU BEACH ML TOTAL WEIGHT OF ITEMS

Figure 12.3.1 illustrates the distribution of categorised items by total weight in kg. According to Table 12.2.1, the total weight of all items collected and audited within Vanuatu's 10 surveys was 134 kg. Figure 12.3.1 shows that 50% of the total weight (67 kg) was plastic, fabric and textile materials 4 kg (3%), foamed plastic 8 kg (6%), glass and ceramic 10 kg (7%), metal 13 kg (10%), paper and cardboard 3 kg (2%), rubber 3 kg (2%), and other 0 kg. Figure 12.3.1 indicated that wood weighed 27 kg (20%) of the total weight, 26.4 kg of this is reported as from processed timber & pallet crates, and the remaining weight is wooden utensils and other wood not lister. Notably, the weight of fabric and textiles may be affected by whether the items were fully dry or saturated with water.

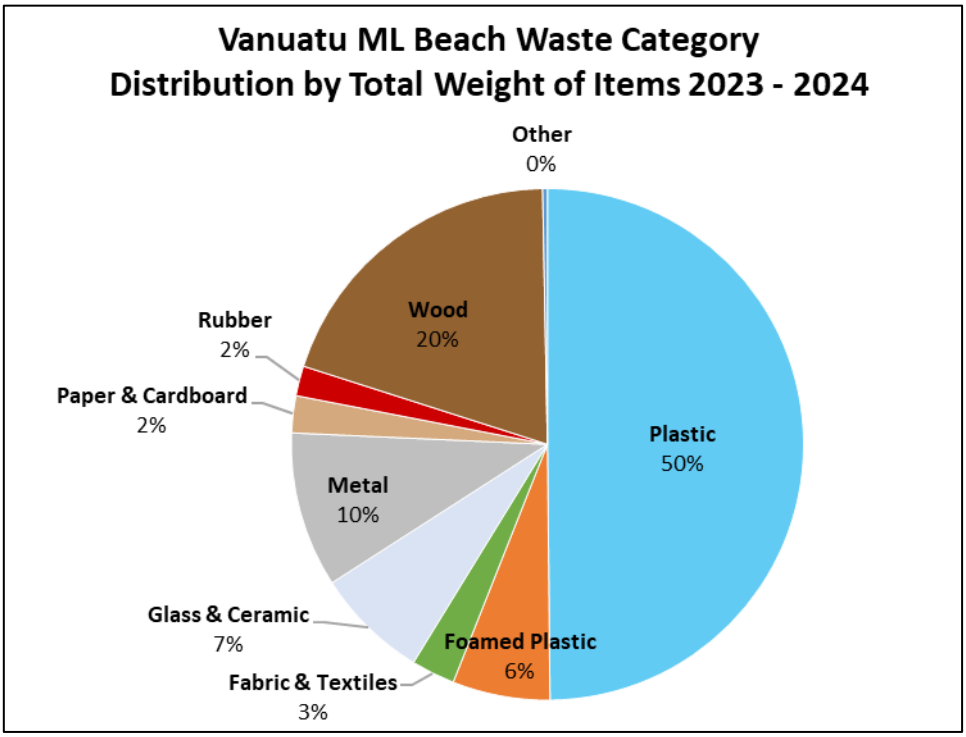

Figure 12.3.1. *Vanuatu Beach ML Distribution Per Waste Category by Total No. of Items, 2023 - 2024.*

Figure 12.3.2 compares the total weight of categorised waste items from Vanuatu's 10 surveys conducted in 2023 and 2024. Figure 12.3.2 shows a high occurrence of plastic items weighing in at 42.31 kg in 2023 and 24.68 kg in 2024. For fabric & textiles, Figure 12.3.2 indicates 0.94 kg in 2023 and 2.77 kg in 2024. The number of surveys conducted each year and the wet and dry weight of the product should be considered when interpreting these results.

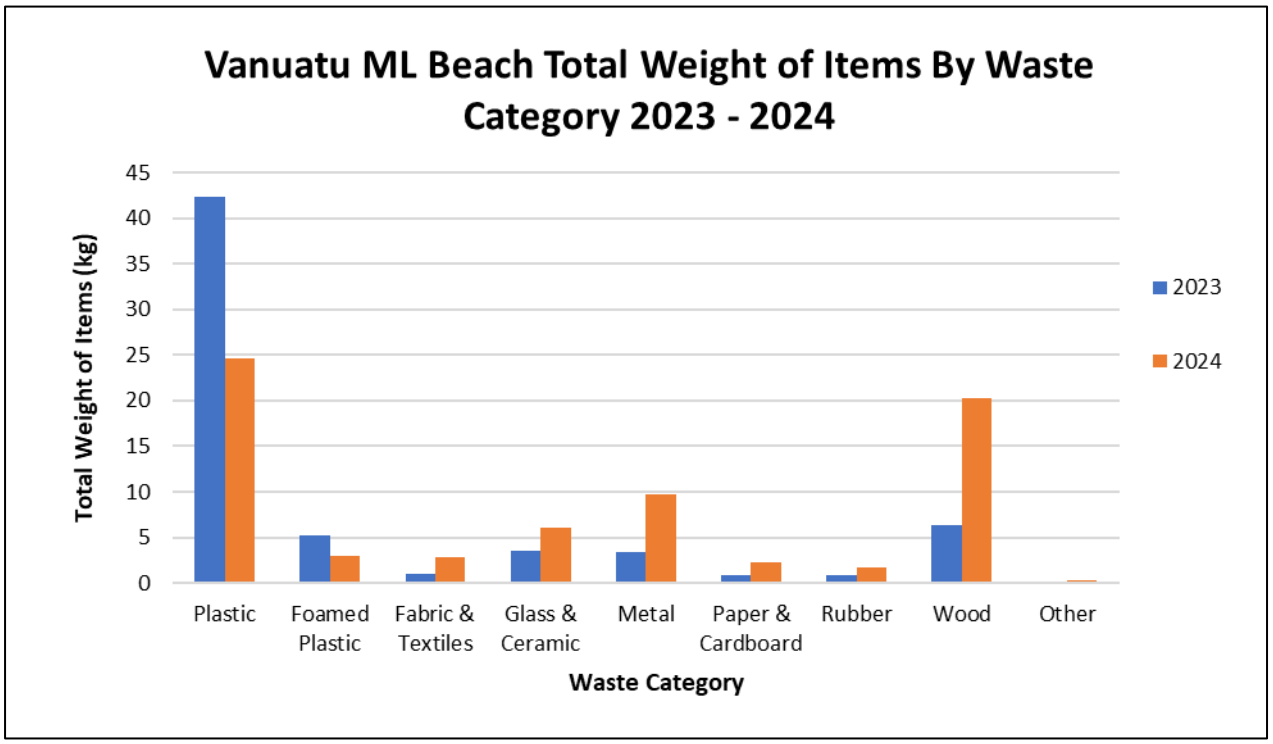

Figure 12.3.2. *Comparison of Top Plastic Beach ML Items Collected on Tonga Beaches (2023 – 2024)*

Figure 12.3.3 shows the average weight of collected items per waste category in Vanuatu. The error bars represent the standard deviation, indicating data variability. The mean weight of plastic waste per beach survey is 7 kg ± 9.44 kg and for fabric and textiles 0.4 kg ± 0.31 kg. The averages for other waste categories are foamed plastic 0.9 kg ± 1.84 kg, glass and ceramic 1.1 kg ± 1.19 kg, metal 1.5 kg ± 1.40 kg, paper and cardboard 0.3 kg ± 0.47 kg, rubber 0.3 kg ± 0.28 kg, wood 3 kg ± 5 kg, and other materials is 0 kg.

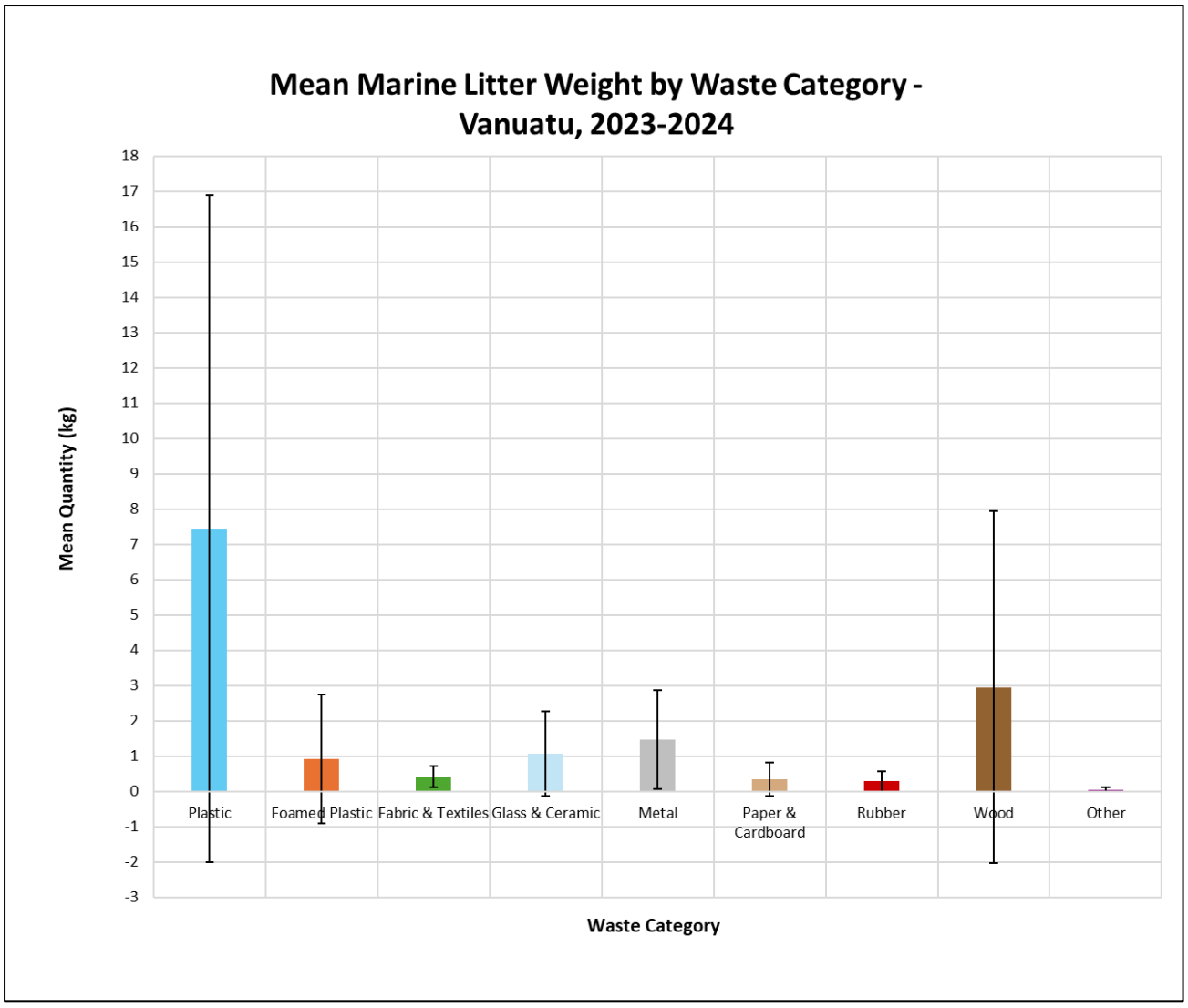

Figure 12.3.3. *Vanuatu Beach ML Mean Weight Per Waste Category 2023 - 2024.*

12.4. VANUATU BEACH ML PLASTICS WASTE NO. OF ITEMS

Figure 12.4.1 illustrates the distribution of key plastic items recorded under the 'plastic' waste category, highlighting areas with high occurrences. Figure 12.4.1 indicates that out of the total 11,967 plastic items collected in 2023 and 2024, 4,614 (39%) were fibreglass fragments. Notably, 3,475 fibreglass fragments were collected from the Port Vila - Ifira Point survey on the 31st of May, 2023. Figure 12.4.1 indicates that 1,819 (15%) were unidentifiable hard plastic fragments, 1,026 (9%) were unidentifiable soft plastic fragments, 1,204 (10%) were food wrappers, and 797 (7%) bottle caps & lids. Figure 12.4.1 highlights that 712 (6%) were rope, 290 (2%) were plastic bottles less than or equal to 2 L and 296 (2%) were food containers.

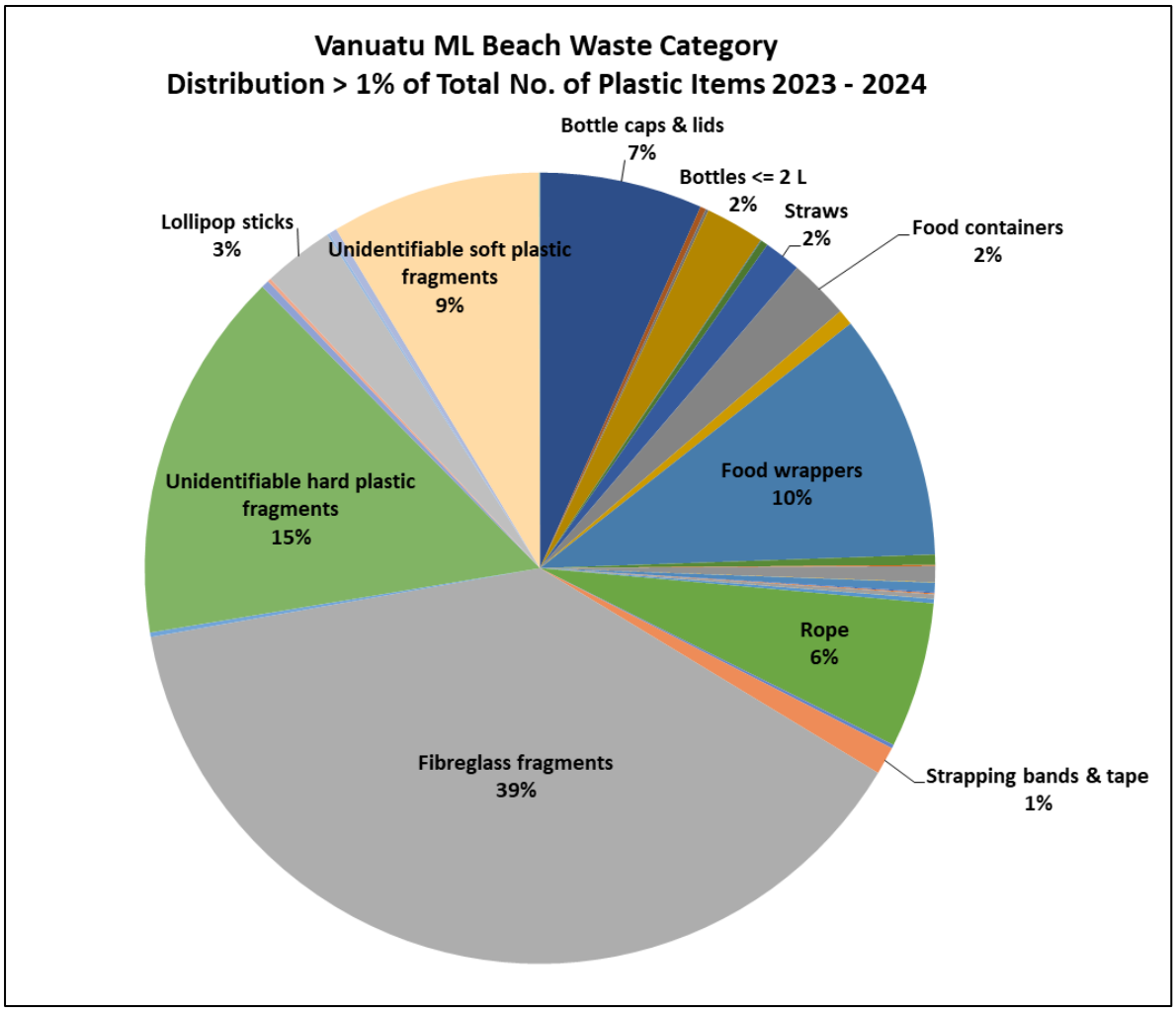

Figure 12.4.1. *Distribution of Total Plastic Beach ML Items Collected on Vanuatu Beaches 2023 - 2024.*

Figure 12.4.2 provides a detailed analysis of the results from Figure 12.4.1, breaking down the occurrences of each key plastic item between 2023 and 2024. Figure 12.4.2 shows that plastic fibreglass fragments had the highest occurrences, with 4,051 items in 2023 and 563 in 2024, this indicates a mean frequency of 2,307 ± 1,744 items per year. Figure 12.4.2 indicates that there were 762 unidentifiable hard plastic fragments in 2023, and 1,057 in 2024, a mean of 910 ± 148 items per year. Refer to Appendix I for the list of the mean number of all plastic items found on Vanuatu's beaches.

Figure 13.4.2 shows unidentifiable soft plastic fragments accounted for 548 in 2023 and 478 in 2024, suggesting a mean of 513 ± 35 items per year. For food wrappers, Figure 13.4.2 shows there were 350 in 2023 and 854 in 2024, with a mean of 602 ± 252 items per year, and for Bottle caps & lids, 218 in 2023 and 579 in 2024, a mean of 399 ± 181 items per year. Figure 13.4.2 indicates for Bottles <= 2 L, 104 were collected in 2023 and 186 in 2024, suggesting a mean of 145 ± 41 items per year. Refer to Appendix I for further details.

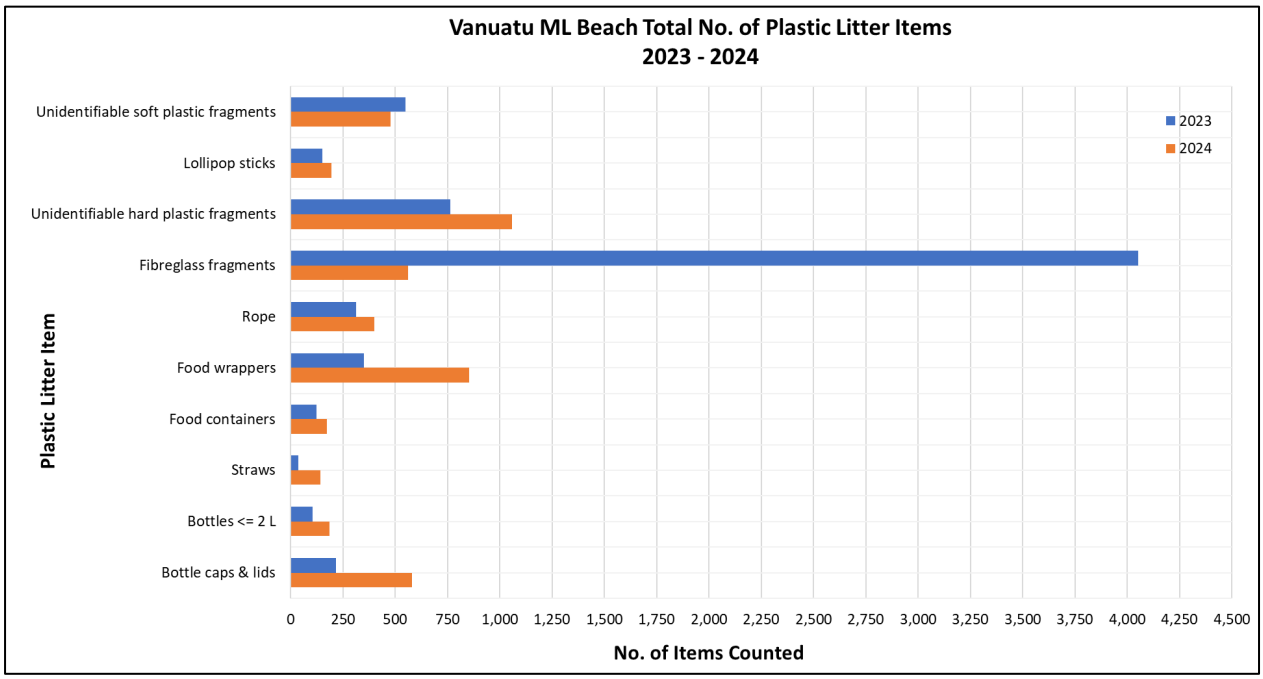

Figure 12.4.2. *Comparison of Top Plastic Beach ML Items Collected on Vanuatu Beaches (2023 – 2024)*

13. MARINE LITTER RESULTS – WALLIS AND FUTUNA

13.1. WALLIS AND FUTUNA BEACH ML DENSITY

Figure 13.1.1 illustrates the litter density (items per 1,000 m²) conducted in Wallis and Futuna between 2021 - 2023. Figure 13.1.1 compares these survey results (columns) with the averages for Wallis and Futuna, the Pacific Island Countries and Territories (PICTs) average results from 73 surveys, and Sustainable Coastlines' Litter Intelligence beach average litter density from 2,287 surveys (2024). As presented in Table 7.4.1, Wallis and Futuna's litter mean density was 255 ± 120 items per 1,000 m² whereas the PICTs average was 3,448 ± 9,727 items per 1,000 m².

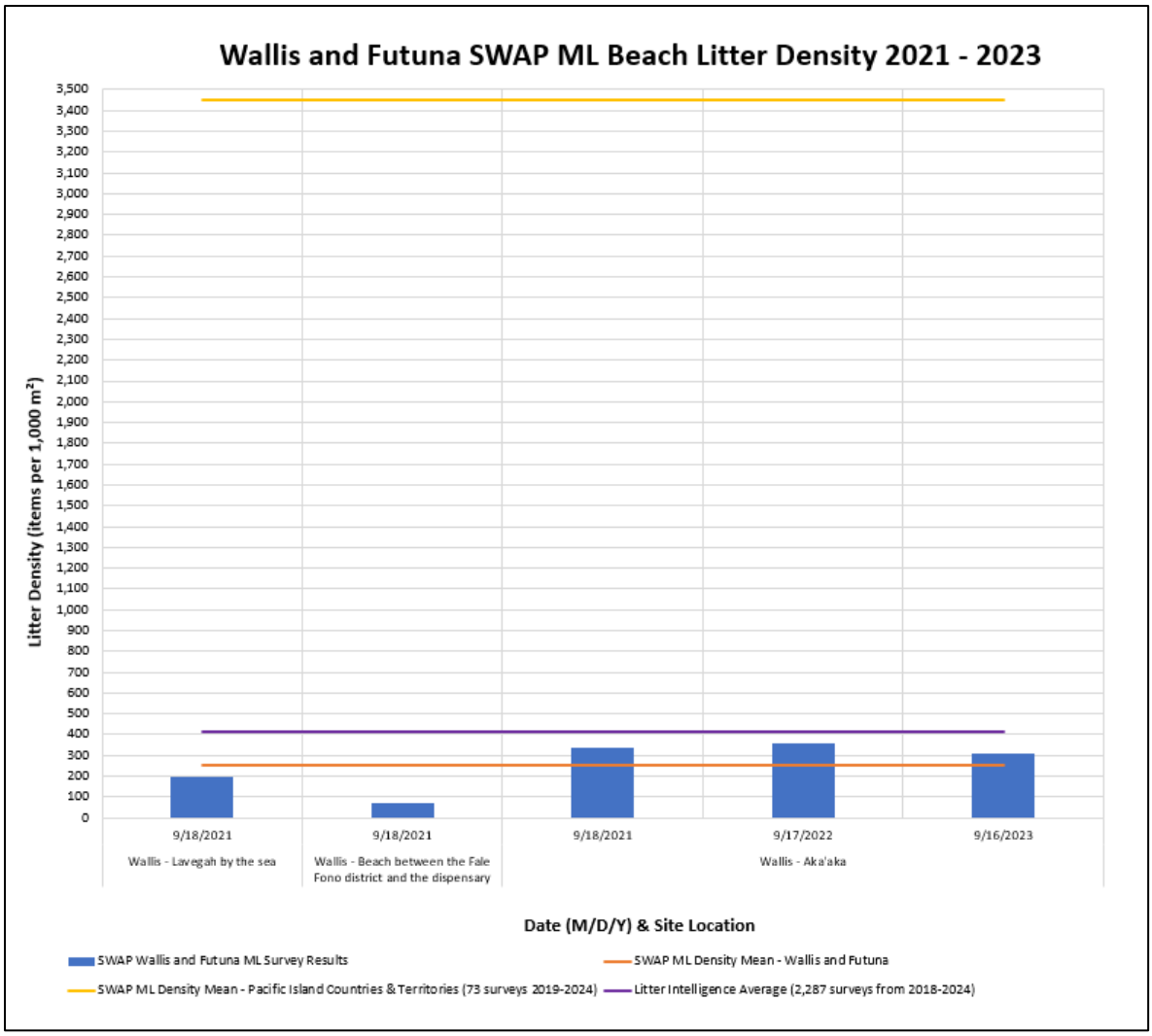

Figure 13.1.1. *Marine Litter Density Results – Wallis and Futuna*

13.2. WALLIS AND FUTUNA BEACH ML RESULTS PER CATEGORY

Table 13.2.1 shows the total number of beach ML waste items collected and weighed per category across Wallis and Futuna from 2021 to 2023. A total of 2,967 macro waste items were collected for auditing. Figure 13.2.2 breaks down this distribution, 1,130 (38%) were plastic, 130 (4%) were foamed plastic, 179 (6%) were fabrics and textiles, 433 (15%) were glass and ceramic, 559 (19%) metal, and 143 (5%) paper and cardboard. Figure 13.2.2 indicates 138 (5%) rubber, 96 (3%) wood and 159 (5%) other materials.

Table 13.2.1. *Wallis and Futuna Beach ML Surveyed and Audited from 2021 – 2023*

Type of product	Total No. of Items Audited	Mean No. of Items Audited	Mean No. of Items Standard Deviation (±)	Total Weight of items (kg)
Plastic	1,130	283	143	143
Foamed Plastic	130	33	7	7
Fabric & Textiles	179	45	25	25
Glass & Ceramic	433	108	62	62
Metal	559	140	208	208
Paper & Cardboard	143	36	6	6
Rubber	138	35	26	26
Wood	96	24	4	4
Other	159	40	37	37
TOTAL	2,967			518

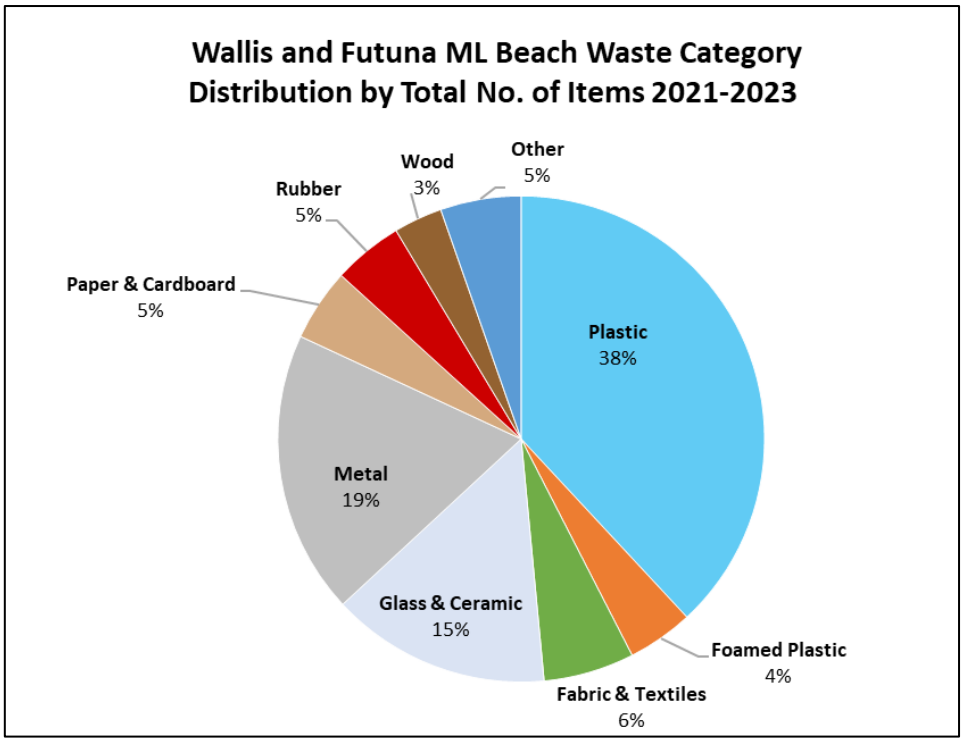

Figure 13.2.2. *Wallis and Futuna Beach ML Distribution Per Waste Category by Total No. of Items, 2021 - 2023.*

Figure 13.2.3 compares the total number of categorised waste items collected between 2021 and 2023. In Wallis and Futuna, three surveys were conducted in 2021, one in 2022 and one in 2023. Figure 13.2.3 indicates a high occurrence of plastic items, with 448 plastic items collected in 2021, 313 in 2022 and 369 in 2023. Figure 13.2.3 suggests that between 2021 and 2023 there was a decrease in 79 plastic items counted. Note, this does not consider the number of surveys conducted each year. Figure 13.2.3 also highlights the metal category, with 275 collected in 2021, 218 in 2022 and 66 in 2023. Notably, of this a total of 245 metal items were aluminium drink cans, 195 were construction material and 72 were unidentifiable metal fragments.

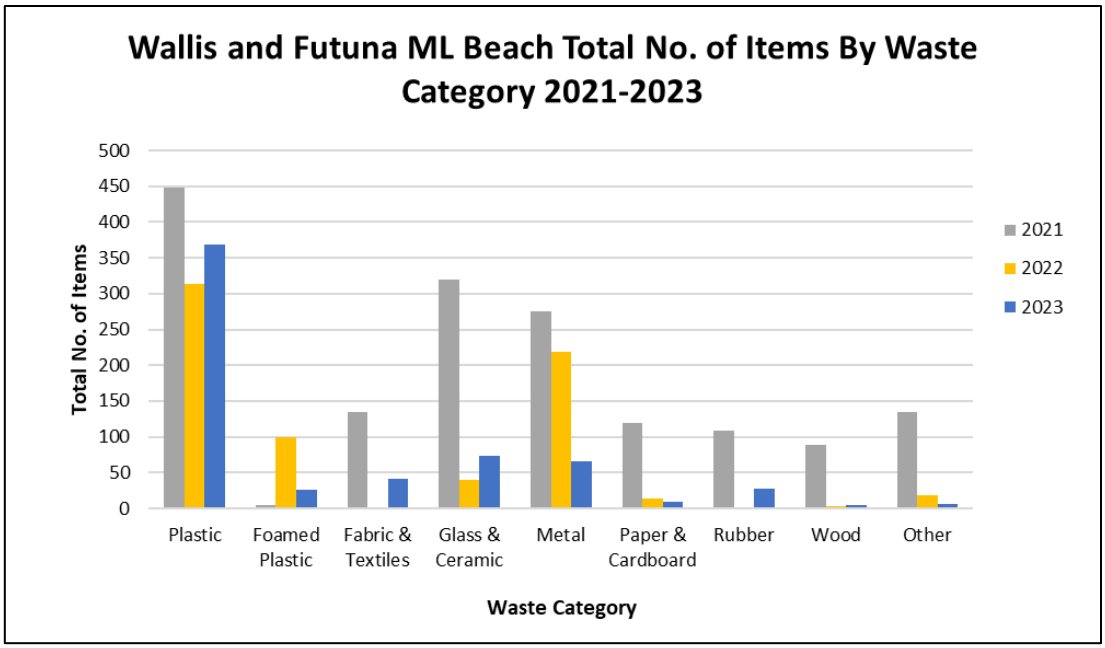

Figure 13.2.3. *Wallis and Futuna Beach ML Distribution Per Waste Category by Total No. of Items, 2021 - 2023.*

Figure 13.2.4 presents the average number of items collected per waste category in Wallis and Futuna. The error bars represent the standard deviation, indicating the variability in the data. Figure 13.2.4 suggests the mean number of plastic waste items collected per beach survey is 283 ± 73. For the other categories, figure 13.2.4 indicates the averages are foamed plastic 33 ± 46, fabric and textiles 45 ± 63, glass and ceramic 108 ± 63, metal 140 ± 66, paper and cardboard 36 ± 56, rubber 35 ± 51, wood 24 ± 43, and 40 ± 33 'other' items.

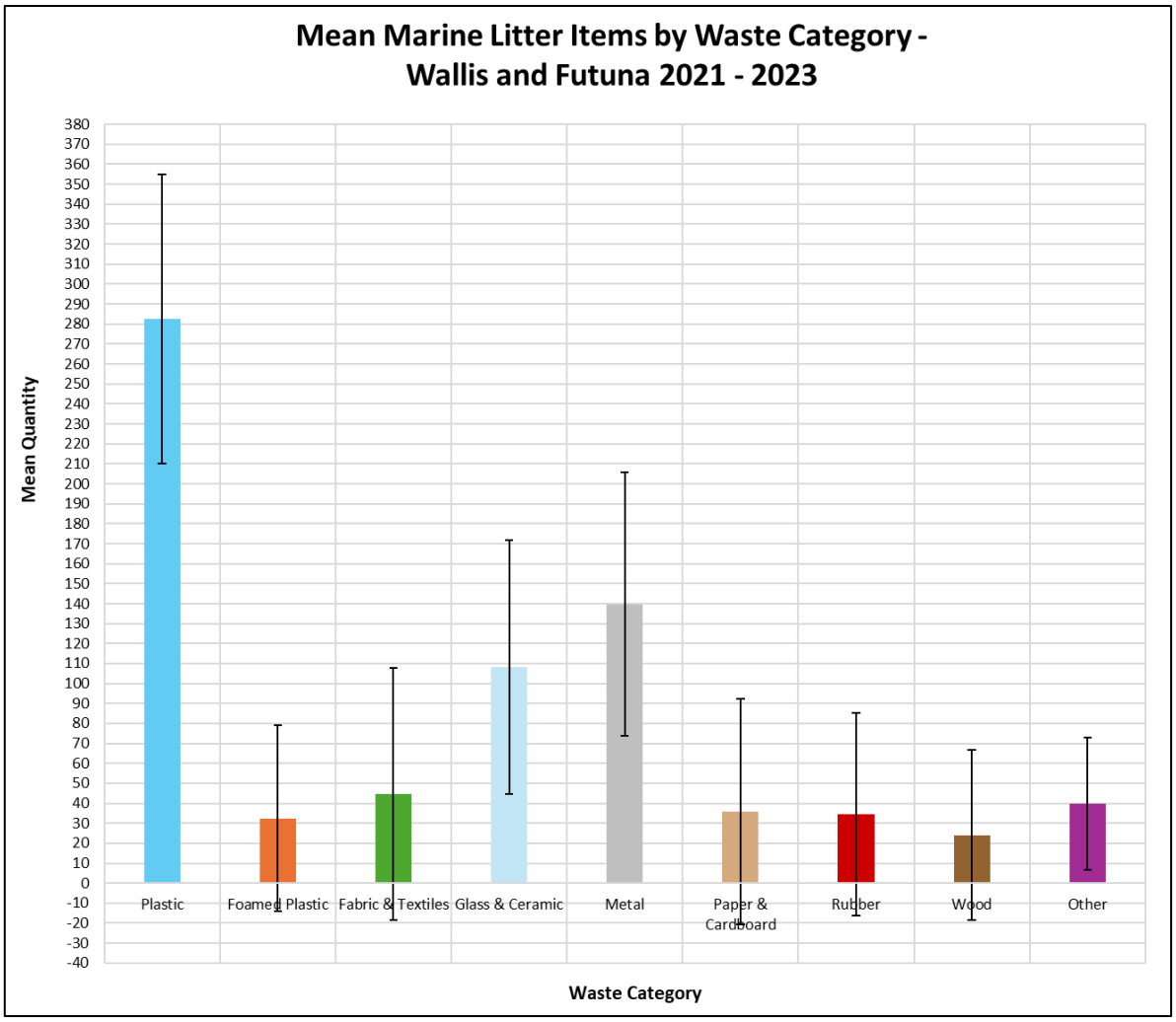

Figure 13.2.4. *Wallis and Futuna Beach ML Mean No. of Items Per Waste Category 2021 - 2023.*

13.3. WALLIS AND FUTUNA BEACH ML TOTAL WEIGHT OF ITEMS

Figure 13.3.1 illustrates the distribution of categorised items by total weight in kg. According to Table 13.2.1, the total weight of all items collected and audited within Wallis and Futuna's five surveys was 518 kg. Figure 13.3.1 shows that 40% of the total weight (208 kg) was metal, 28% (143 kg) was plastic, and 12% (62 kg) were glass and ceramic. Figure 13.3.1 indicates that fabric and textile materials were 25 kg (5%), foamed plastic was 7 kg (1%), paper and cardboard 6 kg (1%), rubber 26 kg (5%), wood 4 kg (1%) and other 37 kg (7%). Of the metal, 151 kg was metal vehicle parts. Notably, the weight of fabric and textiles may be affected by whether the items were fully dry or saturated with water.

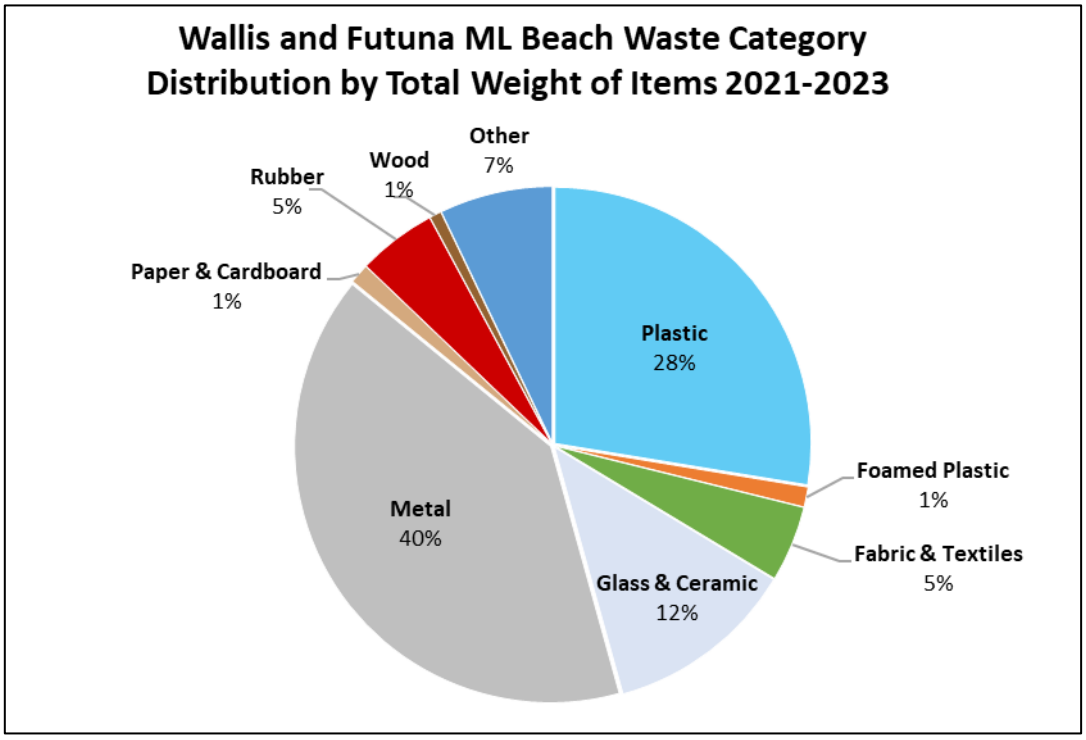

Figure 13.3.1. *Wallis and Futuna Beach ML Distribution Per Waste Category by Total No. of Items, 2021 - 2023.*

Figure 13.3.2 compares the total weight of categorised waste items from Wallis and Futuna's five surveys conducted between 2021 and 2023. Figure 13.3.2 shows a high occurrence of plastic items weighing in at 86.95 kg in 2021, 27.33 kg in 2022 and 28.60 kg in 2023. For metal, figure 13.3.2 indicates 28.98 kg in 2021, 170.94 kg in 2022 and 8.35 kg in 2023. The number of surveys conducted each year and the wet and dry weight of the product should be considered when interpreting these results. The other 2022, 32.59 kg result occurrence is due to a non-listed 'other' item that weighed 22 kg and 8 kg boat parts, surveyed at Wallis - Aka'aka on 17th September 2022.

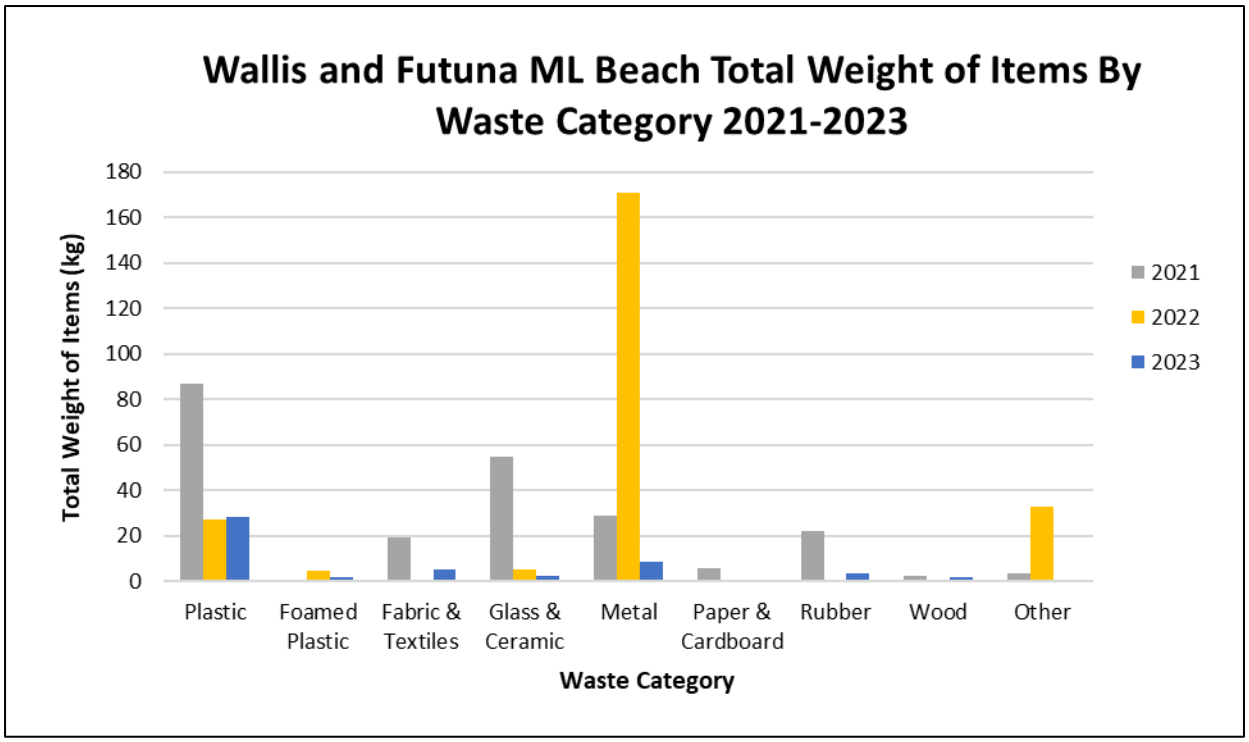

Figure 13.3.2. *Comparison of Top Plastic Beach ML Items Collected on Wallis and Futuna Beaches (2021 – 2023)*

Figure 13.3.3 shows the average weight of collected items per waste category in Wallis and Futuna. The error bars represent the standard deviation, indicating data variability. Figure 13.3.3 indicates the mean weight of plastic waste per beach survey is 36 kg ± 21.91 kg, 52 kg ± 79.39 kg for metal, and 16 kg ± 17.08 kg for glass and ceramic. Figure 13.3.3 suggests the averages for other waste categories are foamed plastic is 2 kg ± 2.19 kg, 6 kg ± 9.17 kg for fabric and textiles, paper and cardboard 2 kg ± 2.83 kg, rubber 6 kg ± 10.67 kg, wood 1 kg ± 0.63 kg, and other materials is 9 kg ± 15.61 kg.

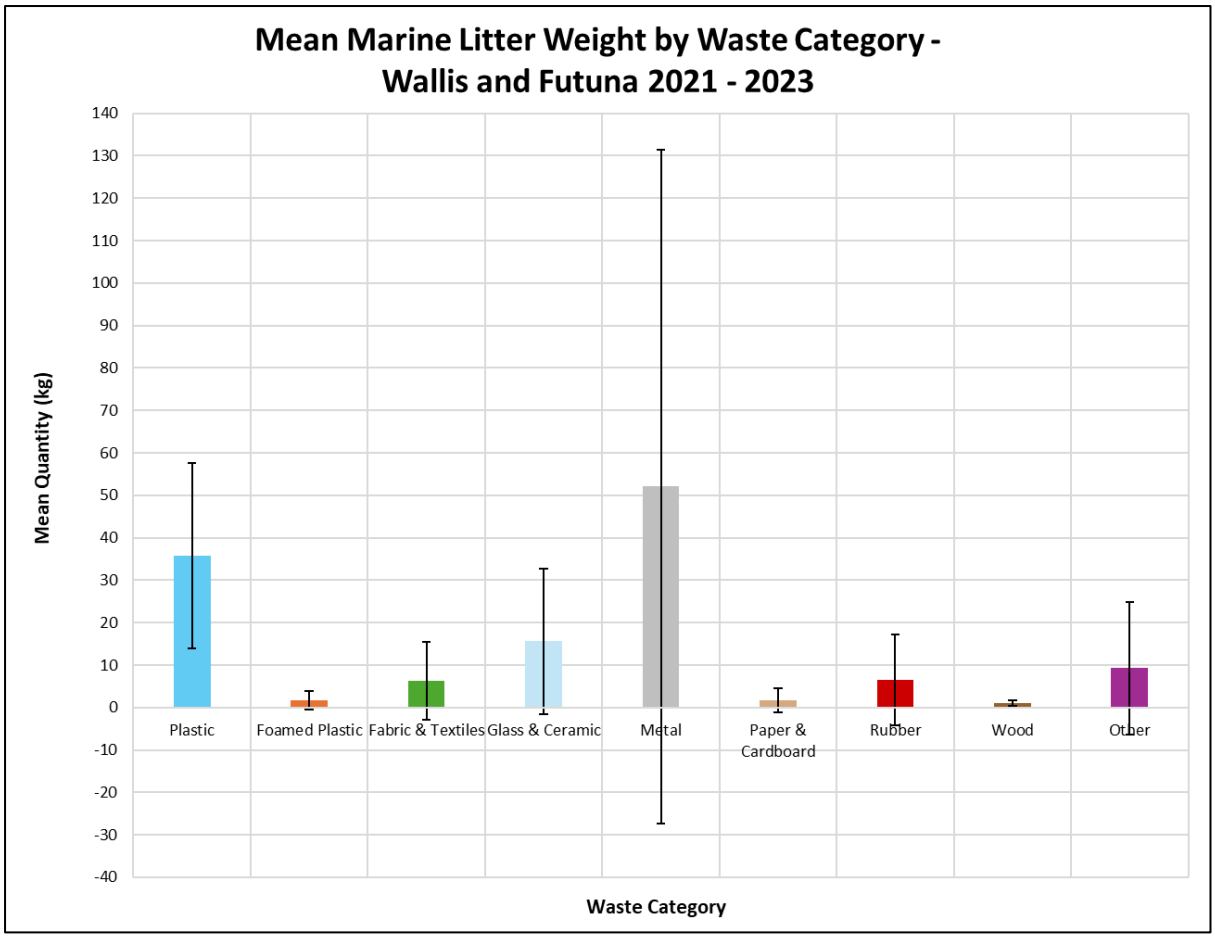

Figure 13.3.3. *Wallis and Futuna Beach ML Mean Weight Per Waste Category 2021 – 2023*

13.4. WALLIS AND FUTUNA BEACH ML PLASTICS WASTE NO. OF ITEMS

Figure 13.4.1 illustrates the distribution of key plastic items recorded under the 'plastic' waste category, highlighting areas with high occurrences. Figure 13.4.1 indicates that out of the total 1,130 plastic items collected between 2021 and 2023, 225 (20%) were plastic bottles less than or equal to 2 L, 143 (13%) were bottle caps & lids, 142 (13%) were unidentifiable hard plastic fragments and 123 (11%) were unidentifiable soft plastic fragments. Figure 13.4.1 indicates that 78 (7%) were plastic bags, 75 (7%) were rope, and 64 (6%) were other plastic non-listed.

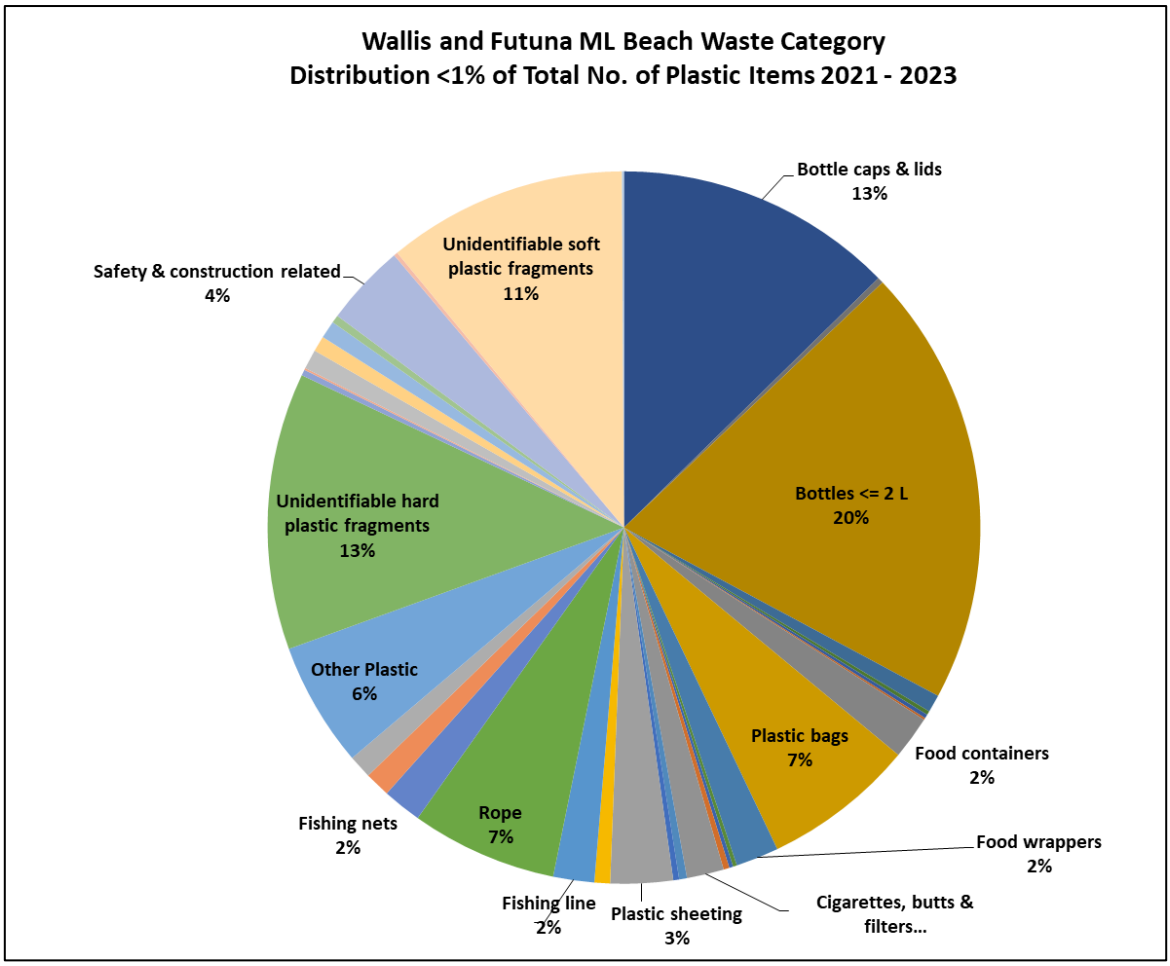

Figure 13.4.1. *Distribution of Total Plastic Beach ML Items Collected on Wallis and Futuna Beaches 2021 - 2023*

Figure 13.4.2 provides a detailed analysis of the results from Figure 13.4.1, breaking down the occurrences of each key plastic item between 2021 and 2023. Figure 13.4.2 shows that for plastic bottles less than or equal to 2 L the frequency was 53 in 2021, 113 in 2022, and 59 in 2023, indicating a mean frequency of 75 ± 27 items per year. Figure 13.4.2 indicates that there were 16 bottle caps & lids in 2021, 69 in 2022, and 58 in 2023, a mean of 48 ± 23 items per year. Refer to Appendix J for the list of the mean number of all plastic items found on Wallis and Futuna's beaches.

Figure 13.4.2 shows that for unidentifiable hard plastic fragments, there were 91 in 2021, 3 in 2022 and 48 in 2023, a mean of 47 ± 36 items per year; whereas there were 100 unidentifiable soft plastic fragments accounted for in 2021, 0 in 2022, and 23 in 2023, suggesting a mean of 62 ± 43 items per year. Figure 13.4.2 indicates that for plastic bags there were 37 were collected in 2021, 29 in 2022, and 12 in 2023, suggesting a mean of 26 ± 10 items per year. Refer to Appendix H for further details.

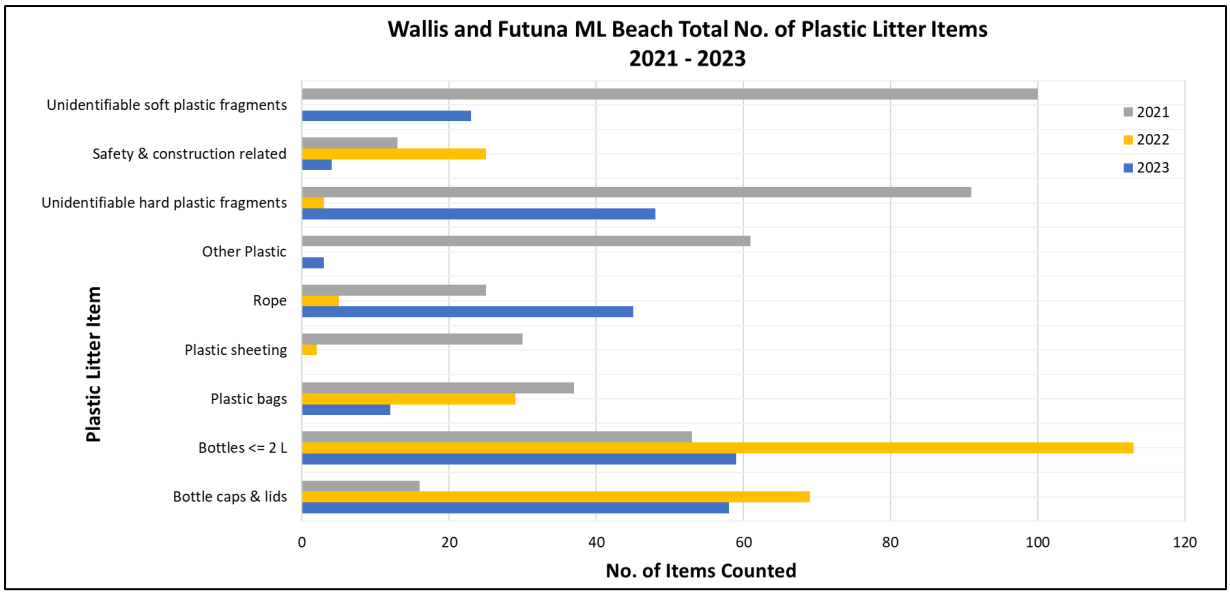

Figure 13.4.2. *Comparison of Top Plastic Beach ML Items Collected on Wallis and Futuna Beaches (2021 – 2023)*

14. DISCUSSION ON FINDINGS, LIMITATIONS & OPPORTUNITIES

The following is a summary of key discussion points regarding the results, limitations, and opportunities to enhance the accuracy and effectiveness of marine litter monitoring and management.

14.1. FREQUENCY AND DISTRIBUTION OF BEACH MARINE LITTER MONITORING

The 2009 UNEP/IOC standardised operational guidelines and methodology were adopted for the marine litter surveys undertaken as part of this study, as this method balances data collection accessibility, accuracy, and efficiency (Cheshire et al., 2019). UNEP/IOC recommends that beach surveys be replicated every three months for a period of five or more years to ensure the data is relevant and representative of true marine litter accumulation rates (Cheshire et al., 2009).

Table 7.1.2 indicates that **Samoa** had the highest frequency of waste monitoring activities, with 22 surveys conducted over four years. However, this finding is disproportionate, as on average, only 1.5 surveys were conducted per site, with the majority occurring in 2023 (Figure 7.1.1). Only three of the 14 surveyed Samoan beach sites (Vailuutai, Lalomanu Beach Fales, and Pu'apu'a) conducted three surveys since 2023, with an average gap of 3–5 months between surveys.

Table 7.1.2 indicates that the **Solomon Islands** had the second-highest frequency of surveys in this analysis, with 17 surveys. According to Litter Intelligence, 18 surveys were initially uploaded for the Solomon Islands. However, upon review, survey ID #2995 from September 15, 2023, was removed due to duplication and advice from the SWAP coordinator. As shown in Figure 10.1.1, of the 17 analysed surveys, the Solomon Islands had two sites that conducted at least three surveys: Honiara - Baudoko Beach in March 2023, September 2023, and March 2024, and Honiara - Mendana Beach in August 2023, and on March 6 and 27, 2024. This results in an average of one survey every six months.

Table 7.1.2 indicates that **Tonga** has the third-highest frequency of surveys in this analysis, with a total of 10 surveys. Figure 7.1.1 shows one survey in 2021, conducted as part of International Coastal Cleanup Day on September 18, 2021, and six surveys each in 2023 and 2024. Five of these surveys were conducted at Nuku'alofa - Popua Beach East, making it the site with the highest replication in this analysis (Figure 7.1.1). Figure 11.1.1 highlights the fluctuation in litter density at the Nuku'alofa - Popua Beach East site. The highest litter density

recorded was 1,314 items per 1,000 m² on August 22, 2023, while the lowest was 101 items per 1,000 m² on September 30, 2023. This variation may be due to the short interval between surveys. The proposed 2023-2024 average beach marine litter density for Nuku'alofa - Popua Beach East is 417 items ± 456.5 per 1,000 m². Nuku'alofa - Popua Beach West was another replicated survey site in Tonga's SWAP Marine Litter Pilot Project, with three surveys conducted.

Further analysis for each site or locality can be conducted upon request. However, the reliability of the data will depend on several factors:

- the accuracy of the surveys conducted
- the characteristics of the site
- the number of reliable datasets available to minimise errors and enhance reliability.

It is also important to consider the international, regional, and local impacts on marine litter waste, as marine litter has a range of sources that are difficult to determine and investigate.

14.2. PUBLIC PARTICIPATION

The 73 litter surveys conducted under this study involved approximately **1,811 citizen scientists** from diverse backgrounds, localities, and levels of exposure to scientific research. Alongside collecting marine litter data, the SWAP capacity training designed and delivered by Sustainable Coastlines enhanced community knowledge and awareness about waste management (SPREP, 2023). Various Pacific communities actively participated in clean-up campaigns and Sustainable Coastlines training, fostering a better understanding of their waste habits, inputs, and regional strategies to reduce marine litter and pollution (SPREP, 2023). Additionally, the SWAP activities provided opportunities for gender and youth empowerment (SPREP, 2024e).

Photo 14.2.1. *Honiara Marine Litter Pilot Project in the Solomon Islands, Baudoko Beach, Solomon Islands, 14 March 2023 – Credits: Julie Pillet, SWAP*

However, despite these positives, there is a level of error associated with the volunteer citizen scientist approach (Cheshire et al., 2009). Figure 7.2.1 illustrates how anecdotal visual assessments of beach waste can be misleading, as 56% of the surveys suggested the beach was predominantly litter-free. In contrast, Table 7.4.1 indicates that Pacific beaches had an average litter density of 3,448 ± 9,727 items per 1,000 m². This large standard deviation highlights the significant variability in litter densities, suggesting that litter accumulation trends vary greatly between Pacific sites, the timing of surveys, and the survey area/location.

The impact of the marine litter awareness training and capacity building in the community by Sustainable Coastlines under the SWAP cannot be determined from these activity results. Particularly in Pacific communities that only participated in one activity and/or received ad-hoc training. The long-term impacts of improved waste habits cannot be confidently linked to a decrease in litter on beaches as the results may not truly reflect the local community.

Incorporating rigorous training and standardised protocols can help mitigate human error in citizen science marine litter monitoring, while also empowering communities by raising

awareness, fostering environmental stewardship, and providing valuable data for local and global conservation efforts.

14.3. CONFIDENCE RATING IN BEACH MARINE LITTER MEASUREMENTS

The mean weight results for all PICTs show significant variability, indicating low confidence in focusing solely on weights for marine litter analysis. As recommended by UNEP/IOC guidelines, all waste materials should be weighed when dry and clean.

However, this would mean incorporating into the audit protocol measures that are unsuited (cleaning and/or drying of collected debris) and could lead to a risk of deterioration of the collected materials. Therefore, based on Sustainable Coastlines experience, it is recommended not to clean or dry the collected debris but to apply a confidence rate to the data (high confidence when the material is free of sand/dirt and dry vs. low confidence when the weight of the debris is increased because it is soiled or wet).

Due to the low confidence rating of items that were not completely dry during weighing, the average item weight and weight distribution are considered but not emphasised in recommendations. Weights are useful for highlighting large objects, such as boats, tyres, and electronic appliances. However, average weights were excluded from the plastic analysis to reduce potential errors and inconclusiveness, as plastic fragments vary greatly in size and easily break down into smaller pieces.

14.4. PLASTIC TRENDS, IMPACT AND CONSIDERATIONS

The proportion of plastic in marine litter is alarming, given the significant impact plastics can have on human and ecosystem health. Plastics can travel long distances and persist for extended periods before breaking down into microplastics. These microplastics have been linked to bioaccumulation in the food chain, leading to the toxification of marine life and the leaching of harmful chemicals into the environment (Schneider et al., 2018).

Photo 14.4.1. *Hard plastic fragments, Etmat Bay, Vanuatu, 14 March 2024 – Credits: Julie Pillet, SWAP*

Schneider et al. (2018) found that 60% of the litter collected from coastlines was composed of plastic material. This study supports that observation, as shown in Table 7.5.1 and Figure 7.5.1, where plastic was the most dominant waste type found on Pacific beaches, accounting for 58% (44,653 items) of the total waste counted from 2019-2024. Table 7.5.1 indicates that, on average, there are 767 ± 609 plastic items within each surveyed beach area across the Pacific. This survey does not account for all plastic items outside the survey site, in the tidal zone, or the dune/beach backshore zone.

Each PICT had different dominant plastic items. The key plastic items and their total numbers collected across the Pacific are summarised below:

- **Bottle caps & lids:** 2,908 items collected across the Pacific, with a mean of 485 ± 305 per country/territory.
- **Bottles (≤ 2 L):** 6,956 items collected across the Pacific, with a mean of 1,159 ± 1,113 per country/territory.
- **Fibreglass fragments:** 4,635 items collected across the Pacific, with a mean of 773 ± 1,718 per country/territory.

- **Food containers:** 1,931 items collected across the Pacific, with a mean of 322 ± 147 per country/territory.
- **Food wrappers:** 12,716 items collected across the Pacific, with a mean of 2,119 ± 2,476 per country/territory.
- **Other plastic:** 1,647 items collected across the Pacific, with a mean of 275 ± 406 per country/territory.
- **Plastic bags:** 2,414 items collected across the Pacific, with a mean of 402 ± 292 per country/territory.
- **Rope:** 909 items collected across the Pacific, with a mean of 152 ± 252 per country/territory.
- **Unidentifiable hard plastic fragments:** 3,381 items collected across the Pacific, with a mean of 564 ± 572 per country/territory.
- **Unidentifiable soft plastic fragments:** 2,128 items collected across the Pacific, with a mean of 355 ± 323 per country/territory.

Refer to each country/territory results and Appendix K for further details.

Bergmann et al. (2019) emphasise that determining the source origins of food wrappers and plastic bottles under 2 L can be challenging, yet these waste streams are prevalent in local communities. Some studies have found that beach marine litter densities can increase by up to 40% in summer due to the influx of tourists, linking plastic waste to specific local activities (Bergmann et al., 2019). These findings underscore the potential for targeted waste collection and enhanced management schemes, such as single-use plastics bans and recycling incentives (Williams et al., 2019).

14.5. COMPARISON OF BEACH MARINE LITTER DENSITIES

Marine litter studies conducted in Mo'orea and Tahiti by Verlis & Wilson (2020) found average litter density was 830 items per 1000 m^2. This finding relates to the research findings presented in Table 7.4.1 where on average litter density for Samoa was 581 items per 1000 m^2, Tonga 537 items per 1000 m^2 and Wallis & Futuna 255 items per 1000 m^2. These findings may suggest that litter densities of above 1,000 are considerately dense for the region (Verlis & Wilson, 2020). Table 7.4.1 suggests that Fiji had a mean litter of 2,947 items per 1000 m^2 and Vanuatu had a mean litter of 3,144 items per 1000 m^2. Table 7.4.1 suggested that the Solomon Islands recorded the highest average litter density out of the sites examined, with an average of 10,680 items per 1000 m^2, and in its extreme occurrence 74,667 items per 1,000 m^2. The Solomon Islands had the largest range of 74,481 items and the highest variation of

on average +/- 18,423 items (Table 7.4.1). This assumption suggests that litter densities can be highly variable regionally. These findings emphasise the significance of these activities as they aid in deepening the Pacific marine litter understanding and encourage the sharing of trends and best practices.

14.6. COMPARISON OF BEACH MARINE LITTER SURVEY RESULTS (PER NO. OF ITEMS)

Due to varying population densities, hydrographic, and geological conditions, it is very difficult to compare litter densities and trends across different coastal areas (Galgani et al., 2015). Galgani et al. (2015) discovered through multiple global studies that dominant marine patterns indicate a prevalence of plastics, with denser litter loads closer to urban areas and high tourism traffic.

In comparing the overall mean litter categories (Figure 7.5.4) and each PICT's mean litter categories and variability (Fiji - Figure 8.2.4; Samoa - Figure 9.2.4; Solomon Islands - Figure 10.2.4; Tonga - Figure 11.2.4; Vanuatu - Figure 12.2.4; and Wallis and Futuna - Figure 13.2.4), there is a clear variation in plastic accumulation and other dominant waste streams across PICTs. For example, Figure 8.2.2 suggests that 79% of the total items surveyed in Fiji were plastic, with an average of 1,711 ± 2,928 plastic items surveyed on beaches in Fiji. In contrast, Figure 11.2.2 indicates that only 52% of the total items surveyed in Tonga were plastic, with an average of 272 ± 268 plastic items surveyed on beaches in Tonga. Additionally, Figure 8.2.2 shows that metals account for 3% of the total items audited in Fiji, with an average of 63 ± 63 metal items surveyed on beaches around Fiji, compared to 14% and 73 ± 71 metal items surveyed on beaches in Tonga (Figure 11.2.2).

While it might be tempting to assume that Fiji has a higher occurrence of plastic items lesser of metal items as compared to Tonga, such assumptions can be misleading. This difference highlights the importance of replicated surveys, the need for local contextualisation, and the understanding that site-specific trends may not be reflective of the entire region (Cheshire et al., 2009). It is crucial not to compare different sites directly and make assumptions without considering the unique environmental and socio-economic factors influencing each location.

14.7. SURVEY CONDITIONS AND MAPPING

The large scale of the research means the findings do not account for changes in litter deposition due to seasonal and weather conditions or the impact of long-shore currents (Lincoln et al., 2022). Lincoln et al. (2022) observed that litter densities were significantly

higher on beaches following climatic events, such as heavy rain and associated runoff. Additionally, the results do not fully consider the life cycle of marine litter, which can accumulate on beaches from various waste streams (Prevenios et al., 2018). These streams include offshore global currents, neighbouring or upstream waste runoff, and historical marine litter that may have been floating nearby or previously uncollected (Cheshire et al., 2009; Prevenios et al., 2018). Prevenios et al. (2018) emphasise the importance of understanding site-specific litter and wave dynamics for effective waste monitoring, source trend analysis, and future modelling.

A limitation of this study is the absence of scale in the maps and the spatial information being stored in Google Maps. This restricts spatial analysis and comparison with other global models on different platforms, as well as a deeper investigation of site dimensions and locality.

Overall, the study's findings do not account for changes in litter deposition due to seasonal and weather conditions or the impact of long-shore currents (Lincoln et al., 2022). Lincoln et al. (2022) found that litter densities were significantly higher on beaches following climatic events, such as heavy rain and associated runoff.

14.8. BEACH MARINE LITTER SURVEY SITE SPECIFICS

This study did not investigate waste accumulation per site or the potential differences between beach surface types (e.g., sandy vs. rocky shores). This could be of further interest, as Moore et al. (2001) discovered that glass and hard plastics accumulate more easily on rocky shores than on sandy beaches. Additionally, advances in spatial mapping could enhance the study. A 2018 study of coastal marine debris on eight Hawaiian Islands successfully implemented spatial mapping to systematically quantify, categorise, and map marine macro-debris on Hawaiian shores (Moy et al., 2020). Moy et al. (2020) found that high-resolution spectral imagery combined with spatial analysis is an effective method for remotely quantifying and categorising marine macro-debris on large scales and remote shorelines. While the activities carried out as part of this study have helped to increase community and institutional understanding and awareness of the marine litter issue, their impact and data accuracy could be further improved using spatial mapping techniques.

15. RECOMMENDATIONS

15.1. RECOMMENDATION – INCREASING DATA COLLECTION AND SURVEY SITES

To enhance the data depth for each Pacific Island Country or Territory (PICT) and enable comprehensive analysis of regional trends across different spatiotemporal scales, it is recommended to replicate beach waste surveys and audits (Cheshire et al., 2009). Increased replication will not only improve the reliability of marine litter data but also boost community participation in beach clean-up events. The UNEP/IOC suggests that beach surveys be conducted every three months for a period of five or more years to ensure the data is relevant and accurately represents true marine litter accumulation rates (Cheshire et al., 2009). By following these guidelines, we can achieve more accurate and comprehensive data, which is crucial for understanding and addressing the issue of marine litter. Additionally, regular surveys can foster greater community engagement and awareness, leading to more effective and sustained efforts in reducing beach marine litter accumulation. This, in turn, helps mitigate the negative impacts on the environment, community, and industries such as fisheries and tourism.

15.2. RECOMMENDATION – INCREASING THE RELIABILITY OF WET/DRY MATERIAL WEIGHTS

To improve the confidence rating and data reliability of waste audits, it is essential to ensure that all waste materials are dry and clean before being weighed. Dry and clean materials provide more accurate weight measurements, reducing the potential for errors caused by moisture or contaminants. This practice aligns with the guidelines set by UNEP/IOC, which emphasise the importance of precise and consistent data collection methods. By adhering to these standards, we can achieve more reliable and meaningful results, ultimately enhancing the effectiveness of our marine litter analysis and recommendations.

15.3. RECOMMENDATION – PLASTIC WASTE REDUCTION & RECYCLING

There are a range of strategies to reduce plastic in both marine and terrestrial environments. Based on scientific literature, here are some recommended strategies for plastic waste reduction:

- **Implementing Single-Use Plastics Bans:** Numerous studies and reports emphasise the effectiveness of banning single-use plastics in significantly reducing plastic waste. However, the success of these policies varies depending on regional contexts. Factors

such as consumer preferences, availability and access to alternatives, environmental impact of alternatives, economic competitiveness, employment effects, recycling infrastructure, costs, and the capacity of authorities to enforce these policies all play crucial roles in their effectiveness (Farrelly et al., 2021).

- **Enhancing Waste Management Systems (Local & Regional Scale):** Strengthening waste management systems is essential for mitigating the environmental impacts of plastic waste. This involves expanding opportunities for improved waste collection, segregation, and recycling infrastructure across local and regional scales in the Pacific (Kibria et al., 2023). Effective waste management not only reduces pollution but also supports the transition to a circular economy by ensuring that plastic materials are reused and recycled efficiently. The Pacific region faces significant challenges in managing plastic waste, including limited funding, inadequate access to recycling markets, insufficient recycling infrastructure, and high costs associated with the exportation and importation of recyclable materials. These issues are highlighted by SPREP in its report and underscore the need for improved waste management systems and international cooperation to address these challenges effectively. Investing in advanced technologies, such as waste-to-energy solutions and sorting facilities, can further enhance the efficiency and effectiveness of waste management practices.
- **Promoting Recycling Incentives:** Encouraging recycling through incentives for both businesses and Pacific communities can significantly boost recycling rates. This can be achieved by implementing deposit-return schemes for plastic bottles and other recyclable items (Farrelly et al., 2021). However, to make this effective, further efforts are needed to secure funding, improve access to recycling facilities, and overcome regional and local limitations.
- **Increasing Public Awareness and Education:** Public education campaigns about the impacts of plastic pollution and the importance of reducing plastic use can drive community engagement and behavioural change (UNEP, 2021b). These awareness programs can be tailored to highlight specific local activities contributing to plastic waste. Initiatives like the Sustainable Waste Actions in the Pacific (SWAP) project aim to improve knowledge and raise awareness about sustainable waste management practices. By promoting proper waste management and supporting activities such as coastal clean-ups and recycling programs, these projects enhance community awareness of the issue, encourage waste reduction, and contribute to the global effort to reduce plastic pollution and enhance environmental sustainability.

Photo 15.3.1. *Artwork based on marine litter for awareness-raising purposes, USP, Fiji, 4 May 2023 – Credits: Julie Pillet, SWAP*

- **Strengthening Policy Frameworks:** Addressing gaps in national and regional policy frameworks is essential. This study can be expanded by examining deficiencies in legislation, enforcement, and international cooperation to enhance the effectiveness of plastic pollution management.
- **International Cooperation and Conventions:** Advocating for and participating in international conventions focused on plastic pollution can help PICTs address the transboundary nature of marine plastic debris (Farrelly et al., 2021). Collaborative efforts can lead to more robust global strategies and support for local initiatives (Farrelly et al., 2021).

By considering these recommendations and adopting the suggested strategies, Pacific Island countries and territories, as well as nations worldwide, can make significant strides in reducing plastic waste and protecting their marine environments. **Marine litter is a global issue that requires a collective effort to reduce, improve, and repair the environment.** We are all connected to waste. By working together, we can enhance the sustainability and health of our communities and interconnected ecosystems.

15.4. RECOMMENDATION – ENHANCING STUDY SCOPE AND DELIVERY

To improve the study and its impact, it is essential to report post-collection waste management and treatment pathways (Schneider et al., 2018). Including feedback from the surveys, tips for improvements, and sharing strategies can help enhance knowledge and the delivery of marine litter monitoring and management. This approach will also foster a better transboundary understanding of marine litter issues.

15.5. RECOMMENDATION – GLOBAL DATABASE OF MARINE LITTER

Sharing data and trends can create opportunities for developing regional and international frameworks aimed at reducing marine litter and pollution (SPREP, April 2023). The Sustainable Coastlines Litter Intelligence initiative facilitates the easy upload and access to review similar data, making it a valuable tool for researchers and policymakers. Increased adoption of this initiative can enhance data collection and comparison with a global database, enabling the analysis of global trends. This comprehensive data analysis can inform and improve policy and decision-making related to funding, environmental controls, and frameworks on both regional and global scales. By leveraging such initiatives, we can foster a more coordinated and effective approach to tackling marine litter and pollution.

15.6. RECOMMENDATION – ENHANCING THE ML CLIMATE INFLUENCE ON THE ANALYSIS

To enhance the study's reliability and quality, it is recommended to record weather conditions, tidal regimes, and beach morphodynamic signatures (e.g., modal beach state) at each site during each beach survey (Cheshire et al., 2009). This detailed data collection will contribute to scientific site-specific modelling, investigation, and understanding of how marine litter accumulates, transports, and deposits at specific locations.

15.7. RECOMMENDATION – ENHANCING THE ML SPATIAL MAPPING AND SCIENTIFIC DATA

Collecting spatial data for each survey can significantly enhance the consistency and reliability of marine data analysis. This approach allows for the accurate development of regional accumulation trends by providing detailed insights into the spatial distribution of marine litter. Furthermore, incorporating spatial data enables the expansion of surveys to include remote and uninhabited sites, which are often underrepresented in marine litter studies (Moy et al., 2020). By mapping litter accumulation patterns and understanding the factors

influencing these patterns, researchers can better model, investigate, and comprehend how marine litter accumulates, transports, and deposits at specific locations. This comprehensive understanding is crucial for developing targeted and effective marine litter management strategies.

16. CONCLUSION

In conclusion, this report, along with the marine litter study and community feedback, underscores the importance of these efforts and their impact on livelihoods. The SWAP project and its partners have successfully built waste awareness and strengthened Pacific communities' capacity to conduct standardised marine litter beach surveys. The results from 73 surveys across Fiji, Samoa, Solomon Islands, Tonga, Vanuatu, and Wallis and Futuna deepen regional and international understanding of beach marine litter. These findings provide a distinct Pacific perspective, informing local and international negotiations towards sustainable waste management. The study highlights opportunities for further research and improved marine litter management, ultimately benefiting global communities by enhancing our understanding and ability to manage and model marine litter.

« The sad complicity between humans and the earth.

A negligent society = a sick planet

The earth is not a gift from humans. But we must treat it like our precious gem and a priceless gift to our children.

We must stop suffocating our EARTH, our fertile SEA, our ENVIRONMENT. »

***Photo 16.1.** ICCD2021, Falaleu Coastal Area, Wallis, 18 September 2021 – Credits: Sarah David*

17. REFERENCES

Bergmann, M., Gutow, L., Klages, M. (2015). *Global Distribution, Composition and Abundance of Marine Litter*, Marine Anthropogenic Litter, Springer Open. https://doi.org/10.1007/978-3-319-16510-3

Cheshire, A., Adler, E. Barbière, J., Cohen, Y., Evans, S., Jarayabhand, S., Jeftic, L., Jung, R., Kinsey, S., Kusui, E., Lavine, I., Manyara, P., Oosterbaan, L., Pereira, M., Sheavly, S., Tkalin, A., Varadarajan, S., Wenneker, B., Westphalen G. (2009). *UNEP/IOC Guidelines on Survey and Monitoring of Marine Litter*, United Nations Environment Programme, Intergovernmental Oceanographic Commission, Regional Seas Reports and Studies No. 186, IOC Technical Series No. 83. PDF.

Committing to Sustainable Waste Actions in the Pacific (SWAP). (2024*). Marine Litter Pilot Projects*, Secretariat of the Pacific Regional Environment Programme (SPREP). https://swap.sprep.org/en/marine-litter-pilot-projects

Farrelly, T., Borrelle, S., Fuller, S. (2021). *The Strengths and Weaknesses of Pacific Islands Plastic Pollution Policy Frameworks*, Sustainability 13, no. 3: 1252. https://doi.org/10.3390/su13031252

Friedlander, A., Wagner, D., Gaymer, C., Wilhelm, T., Lewis, N., Brooke, S., Kikiloi, K., Varmer, O. (2016*). Co-operation between large-scale MPAs: successful experiences from the Pacific Ocean*, Aquatic Conservation: Marine and Freshwater Ecosystems, 26:126–141. https://doi.org/10.1002/aqc.2645

Galgani, F., Hanke, G., Maes, T. (2015). *Global Distribution, Composition and Abundance of Marine Litter*, Marine Anthropogenic Litter. Springer Open, 2, p 29-56. https://doi.org/10.1007/978-3-319-16510-3_2

Gonçalves, C., Lavers, J., Bond, A. (2019). *Global Review of Beach Debris Monitoring and Future Recommendations*, Environmental Science and Technology. 12158−12167, p7. 10.1021/acs.est.9b01424.

Jeftic, L., Sheavly, S., Adler, E. (2009 April). *Marine Litter: A Global Challenge*, United Nations Environment Programme (UNEP). PDF. https://www.unep.org/resources/report/marine-litter-global-challenge

Kibria, G., Masuk, N, Safayet, R, Quoc Nguyen, H., Mourshed, M. (2023). *Plastic Waste: Challenges and Opportunities to Mitigate Pollution and Effective Management*, International Journal of Environmental Research, vol 17. 20. https://doi.org/10.1007/s41742-023-00507-z

Laskar, N., Kumar, U. (2019). *Plastics and microplastics: A threat to the environment*, Environmental Technology & Innovation, **14**. https://doi.org/10.1016/j.eti.2019.100352

Lebreton, L., Greer, S., Borrero, J. (2012). *Numerical modelling of floating debris in the world's oceans*, Marine Pollution Bulletin, **64** (3), 653-661. https://doi.org/10.1016/j.marpolbul.2011.10.027

Lenkiewicz, Z., Bernardes, F., Halpaap, A., Louzada, L., Ramola, A., Filho, S., Henrique, H., Souza, S., Smith, J., Ternald, D. Wilson. (2024 February). *Global Waste Management Outlook 2024*, United Nations Environment Programme (UNEP), International Solid Waste Association (ISWA). PDF. https://wedocs.unep.org/20.500.11822/44939

Lincoln, S., Andrews, B., Birchenough, S., Chowdhury, P., Engelhard, G., Harrod, O., Pinnegar, J., Townhill, B. (2022). *Marine litter and climate change: Inextricably connected threats to the*

world's oceans, Science of The Total Environment, 837. ttps://doi.org/10.1016/j.scitotenv.2022.155709

Litter Intelligence. (2024*a*). *Marine Litter Beach Insights*, TerraMetrics, Google Earth Imagery Pacific Island Countries/Territories. Acquired on 30th April 2024. https://insights.litterintelligence.org/

Litter Intelligence. (n.d.*a*). *Visual Assessment Photo Reference Guide*, version 1.3, 1. PDF. https://litterintelligence.org/media/rvrn4pmf/6-sc_litter-intelligence-visual-assessments-v1-3.pdf

Litter Intelligence. (n.d.*b*). *Beach Surface Photo Reference Guide*, version 1, 1-2. PDF. https://litterintelligence.org/media/tooll23z/sc_litter-intelligence_beach-surface-guide.pdf

Litter Intelligence. (n.d.*c*). *Litter Categories For Reference During Audit Reference Guide*, version 3.6,1-4. PDF. https://litterintelligence.org/media/vwdn0pmg/litter-categories_v3-6.pdf

Moore, S., Gregorio, D., Carreon, M., Weisberg, S., Leecaster. (2001). *Composition and distribution of beach debris in Orange County*, Marine Pollution Bulletin, **42**(3), 241–245.

Moy, K., Neilson, B., Chung, A., Meadows, A., Castrence, M., Ambagis, S., Davidson, K. (2018). *Mapping coastal marine debris using aerial imagery and spatial analysis*, Marine Pollution Bulletin, 132, p 52-59. https://doi.org/10.1016/j.marpolbul.2017.11.045

Prevenios, M., Zeri, C., Tsangaris, C., Liubartseva, S., Fakiris E., Papatheodorou, G. (2018). *Beach litter dynamics on Mediterranean coasts: Distinguishing sources and pathways*, Marine Pollution Bulletin, Elsevier, 129 (2), 448-457. https://doi.org/10.1016/j.marpolbul.2017.10.013

Schneider, F., Parsons, S., Clift, S., Stolte, A., McManus, M. (2018). *Collected marine litter — A growing waste challenge*, Marine Pollution Bulletin, 128, p 162-174. https://doi.org/10.1016/j.marpolbul.2018.01.011

Secretariat of the Pacific Regional Environment Programme (SPREP). (2016). *Cleaner Pacific 2025*, Pacific Regional Waste and Pollution Management Strategy 2016-2025. PDF. https://sustainabledevelopment.un.org/content/documents/commitments/1326_7636_commitment_cleaner-pacific-strategy-2025.pdf

Secretariat of the Pacific Regional Environment Programme (SPREP). (2018). *Pacific Marine Action Plan: Marine Litter 2018–2025*. PDF.

Secretariat of the Pacific Regional Environment Programme (SPREP). (2023). *SWAP Marine Litter Training*, Samoa Activity Report Sustainable Coastline, 49-50. PDF. https://library.sprep.org/content/swap-marine-litter-training-samoa-activity-report-sustainable-coastlines-june-2023

Secretariat of the Pacific Regional Environment Programme (SPREP). (2024*a*). *Committing to Sustainable Waste Actions in the Pacific (SWAP) Project*. https://www.sprep.org/SWAP/sustainable-waste-actions-in-the-pacific-swap

Secretariat of the Pacific Regional Environment Programme (SPREP). (2024*b*) Pacific delegates advocate for a key regional aspiration to be included in the plastic treaty text, Latest News. Online Article. https://www.sprep.org/news/pacific-delegates-advocate-for-a-key-regional-aspiration-to-be-included-in-the-plastic-treaty-text

Secretariat of the Pacific Regional Environment Programme (SPREP). (2024c). *The Pacific Ocean Litter Project (POLP).* https://www.sprep.org/polp

Secretariat of the Pacific Regional Environment Programme (SPREP). (2024*d*). *Convention Secretariat*. https://www.sprep.org/convention-secretariat

Secretariat of the Pacific Regional Environment Programme (SPREP). (2024*e*). SWAP Gender Strategy. https://www.sprep.org/swap-gender-strategy

Secretariat of the Pacific Regional Environment Programme (SPREP). (2023 April). *SWAP places sustainable waste management action on top of agenda at 2023 Steering Committee meeting*, Latest News. Online Article. https://www.sprep.org/news/swap-places-sustainable-waste-management-action-on-top-of-agenda-at-2023-steering-committee-meeting

Seidel, H., Lal, P. (2010). *Economic value of the Pacific Ocean to the Pacific Island Countries and Territories*, IUCN Oceania, 8. PDF. https://www.iucn.org/sites/default/files/import/downloads/economic_value_of_the_pacific_ocean_to_the_pacific_island_countries_and_territories_p.pdf

United Nations Environment Programme (UNEP) (2021a). *From Pollution to Solution: A global assessment of marine litter and plastic pollution*, Nairobi. PDF. https://www.unep.org/resources/pollution-solution-global-assessment-marine-litter-and-plastic-pollution

United Nations Environment Programme (UNEP). (n.d.). Intergovernmental Negotiating Committee on Plastic Pollution. Retrieved from https://www.unep.org/inc-plastic-pollution

United Nations Environment Programme UNEP (2021b). Plastics, Marine Litter, and Climate in the Pacific Region. https://wedocs.unep.org/20.500.11822/37408.

Verlis, K., Wilson, S. (2020). *Paradise Trashed: Sources and solutions to marine litter in a small island developing state*, Waste Management, 103, p 128-136. https://doi.org/10.1016/j.wasman.2019.12.020

Waichin, L., Hin Fung, T., Lincoln, F. (2016). *Plastic waste in the marine environment: A review of sources, occurrence and effects*, Science of The Total Environment, **566–567**, 333-349 https://doi.org/10.1016/j.scitotenv.2016.05.084

Williams, M., Gower, R., Green, J., Whitebread, E., Lenkiewicz, Z. and Schröder, P. (2019). No Time to Waste: Tackling the Plastic Pollution Crisis Before It's Too Late. Teddington, United Kingdom: Tearfund. https://learn.tearfund.org/en/resources/policy-reports/no-time-to-waste

18. APPENDICES

- APPENDIX A: LITTER INTELLIGENCE BEACH ML SURVEY EXAMPLES
- APPENDIX B: LITTER INTELLIGENCE VISUAL ASSESSMENT & BEACH SURFACE GUIDES
- APPENDIX C: LITTER INTELLIGENCE LITTER CATEGORIES BRIEFING
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APPENDIX A: LITTER INTELLIGENCE BEACH ML SURVEY EXAMPLES

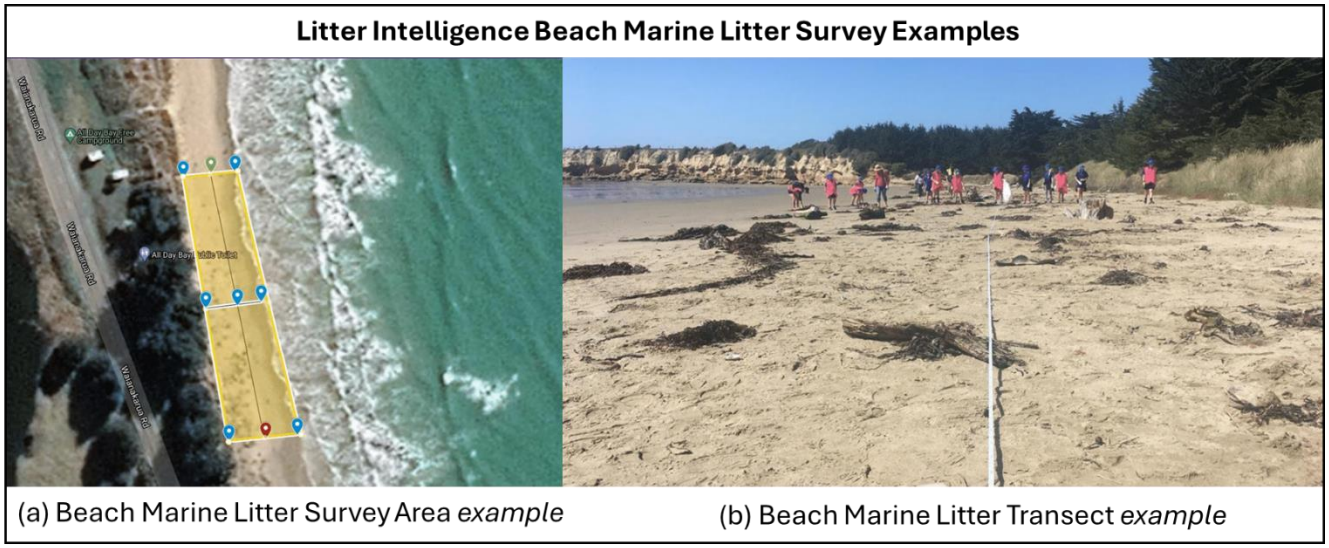

Figure A1: *Litter Intelligence Beach Marine Litter Survey Examples (SPREP, 2023)*

APPENDIX B: LITTER INTELLIGENCE VISUAL ASSESSMENT & BEACH SURFACE GUIDES

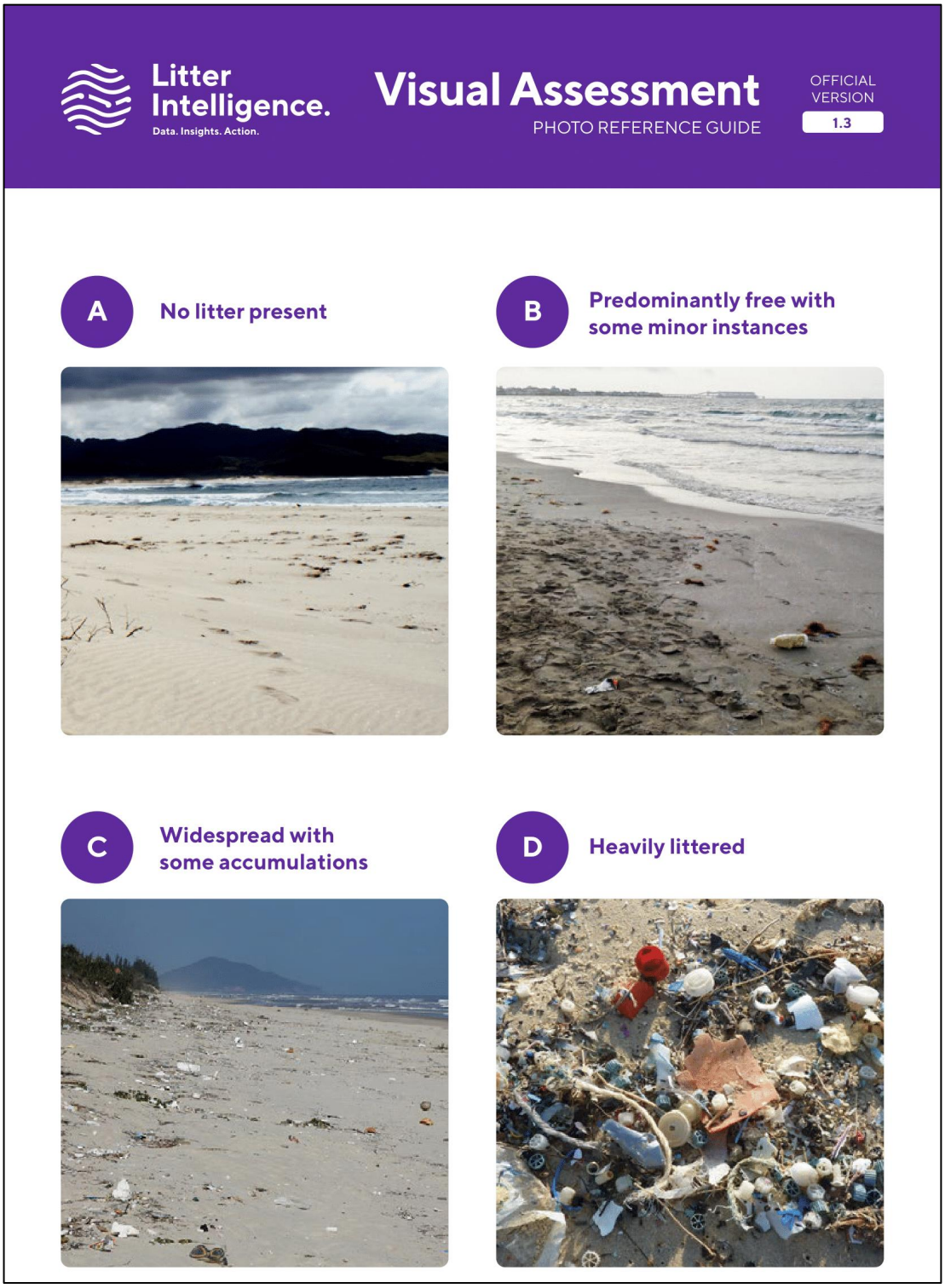

Figure B1. *Litter Intelligence Visual Assessment Beach Litter Grade Reference Guide (Litter Intelligence, n.d.a)*

Litter Intelligence.
Data. Insights. Action.

Beach surface

PHOTO REFERENCE GUIDE

OFFICIAL VERSION 1.0

Mud

Very fine, soft and often sticky surface when dust and earth mixes with water. Includes silt and clay and tidal areas around mangroves.

Sand

Made of finely divided rock, shell and minerals. From very fine sand (0.0625mm) up to 2mm in diameter, e.g., a grain of rice.

Gravel / pebble

Coarse and smooth rounded rock fragment sized between 2mm and 64mm. Fits in a small hand.

Cobbles

Smooth, rounded rocks larger between 64mm and 256mm. Cobble and rock rubble are in the same size range, but differ in shape and finish. Just larger than a standard soccer ball.

Rock rubble

Coarse rock fragments between 64mm and 256mm. Cobble and rock rubble are in the same size range, but differ in shape and finish. Just larger than a standard soccer ball.

Boulder

Large detached rock: anything larger than 256mm in diameter. School-ruler sized boulders up to house-sized.

PTO

Figure B2. *Litter Intelligence Beach Surface Reference Guide (Litter Intelligence, n.d.b).*

Litter Intelligence.
Data. Insights. Action.

Beach surface

PHOTO REFERENCE GUIDE

OFFICIAL VERSION 1.0

Bedrock

Solid (consolidated) rock ground or shelf.

Shell

Whole shell and shell fragments over 2mm in diameter. (Smaller than 2mm would be classified as sand).

Artificial

Includes (but is not limited to) marina, boat ramp, wharf, marine farm, drilling platform, artificial reef.

Mixed substrate

If there is more than one substrate represented on your beach. If there is a large majority of one surface type, e.g., a few shells on a sandy beach, choose the dominant type as your surface.

Unknown

If you are unsure of the type of substrate of your beach.

Figure B2. *(continued)*

APPENDIX C: LITTER INTELLIGENCE LITTER CATEGORIES BRIEFING

Litter Intelligence.
Data. Insights. Action.

Litter Categories

FOR REFERENCE DURING AUDIT

OFFICIAL VERSION 3.6

How to use this document

After your litter survey, take your rubbish to a safe and sheltered location to audit. Categorise your litter according to the categories below, copying the appropriate fields over to your **Audit Data** sheet and recording the count and weight as you go.

Health & Safety

Important instructions for some litter categories. Look for the icons below in the **H&S** column and follow instructions during your audit.

Take extra caution. Only adults to touch.

Biohazard: Only count, do not weigh. Only trained leaders to touch.

Code	Plastic	H&S	Notes & Examples
PL24.14	Bacterial habitat wheels		Caldines, kaldnes, bio balls, sewage
PL13	Baskets, crates & trays		Fish bins, pallets, bread
PL01	Bottle caps & lids		Toothpaste caps, nozzles, tops, corks
PL01.01	Bottle neck rings		Milk bottle rings
PL01.02	Bottle seals & tabs		
PL02	Bottles <= 2 L		
PL03	Bottles, drums, jerrycans & buckets > 2 L		Bucket handle
PL24.06	Cable ties & zip ties		Container door security seal
PL10	Cigarette lighters		Vapes, vaping devices
PL11	Cigarettes, butts & filters		Butts, filters
PL24.03	Clothes pegs		Plastic
PL12.1	Cosmetics and medical packaging		Inhalers, cosmetics, pill packets, condom wrappers, chapstick, shampoo bottles, conditioners, sunblock, sunscreen, cream, lotion, toothpaste tubes. Excludes syringes
PL05	Drink package rings		Six-pack rings, ring carriers
PL22	Fibreglass fragments		
PL17	Fishing gear		Plastic lures, traps & pots, glow sticks, knife handles, snifters, burley pots, berley pots, light sticks, cyalume sticks, flasher rig packaging
PL18	Fishing line		Monofilament line & braids
PL20	Fishing net		
PL06	Food containers		Fast food, cups, lunch boxes, bread bag tags, coffee cups, coffee lids, plastic fish, soy sauce packets, condiment packets, food bag handles
PL07.01	Food wrappers		Candy, muesli bars, lolly wrappers, fruit stickers, tea bags, gladwrap, cling wrap
PL24.07	Gardening & farming related		Plant bags & pots, hose, plastic pipes, plant labels, weed matting, vine ties, tubes, bolus,drench capsules, capsules, bristles, oesophagus clips, brooms, brush, dust pans, line trimmer, weed eater, line, fencing, waratah caps
PL09	Gloves		
PL24.11	Hangers & retail packaging		Retail packets, coat hangers, barcodes, tags, RFID, hooks, labels, silica pouches, gel sachets, hanger, receipt reel
PL24.04	Lollipop sticks		Lolly sticks
PL15	Mesh bags		Vegetables, oyster nets, mussel bags, nets, netting, fruits, elasticated mesh
PL24.10	Parking tickets & receipts		Wristbands, plastic

1

Figure C1. *Litter Intelligence Litter Categories Reference Guide (Litter Intelligence, n.d.c).*

Litter Intelligence.

Litter Categories OFFICIAL VERSION 3.6

PL24.02	Pens & Stationery		Plastic pencils, glue sticks, binders, folders, laminating sheets, clips, vivids
PL07	Plastic bags		Includes opaque bags, clear bags, ziplock bags, post bags, courier bags
PL14	Plastic buoys		Includes floats, mussel buoys, fishing buoys, buoys
PL16	Plastic sheeting		Tarpaulins, pallet wrap, weed matting, silage wrap, sacks, baleage wrap, haylage wrap, bubble wrap, shrink wrap
PL04	Plastic utensils		Knives, forks, spoons, stirrers, cutlery, plastic chopsticks
PL24.09	Plastic vehicle parts		Bike parts, bicycle parts, car, vehicle parts. Excludes tyres
PL23	Resin pellets		Visual assessment only
PL19	Rope		Synthetic twine & string
PL24.08	Safety & construction related		Road cones, safety mesh, barrier arms, plumbing, pipes, conduit, caution tape, sea wall matting, geotextile fabric, curtain hooks, tile spacers, sealant tubes, caulking, PVC, broom bristles, tubes, dustpan, builder's bog, vinyl, lino flooring
PL24.05	Shotgun wadding & shells		
PL21	Strapping bands & tape		Packaging tape, insulation tape, electrical tape, sellotape, packing tape, tape
PL04.01	Straws		
PL12	Syringes	⊗	**Biohazard:** Only trained leaders to touch. Don't weigh. Plastic
PL08	Toys, sport, & recreation (Plastic)		Plastic firework pieces, snorkels, sunglasses, goggles, golf balls, figurine, fake flowers, beads, garland, fake leaves, wreath, lei, Lego, tinsel, decorations, dive masks, party poppers, plastic plants, camping, ribbon
PL24.01	Unidentifiable hard plastic fragments		Unidentifiable plastic, fragments, melted plastic, burnt plastic
PL07.02	Unidentifiable soft plastic fragments		Plastic packet wrap, soft plastic, unidentifiable plastic, fragment,
PL24	Other plastic (specify)		Plastic, paint chips, casters, wheels, cap brim, dish brush, scrubbing brush, cigarette packet wrap, plastic funnel, corflute, signage, property sign, roll your own cigarette packaging, bank card, eftpos
Code	**Foamed Plastic**	**H&S**	**Notes & Examples**
FP05.02	Ear plugs		
FP03	Foam buoys		Includes floats
FP05.03	Foam glazier spacers		Blue foam squares, green foam squares
FP01	Foam sponge		Sponge
FP02	Polystyrene cups or food packs		Includes coffee cups, styrofoam
FP04	Polystyrene insulation or packaging		Includes bean bag foam balls, foam socks, sleeves, foam netting, wine sleeves
FP05.04	Toys, Sport, & Recreation (Foamed Plastic)		Nerf gun bullets, pool noodles, camping mats, yoga mats, balls, surf boards, toys, boogie boards, body boards, flasher rig packaging
FP05.01	Unidentifiable foamed plastic fragments		Unidentifiable foam, fragments
FP05	Other foamed plastic (specify)		Packaging, tubing, handle grip, insulation, flasher rig packaging, expanding foam, mattress
Code	**Fabric & Textiles**	**H&S**	**Notes & Examples**
CL02	Backpacks & bags		Fabric
CL03	Canvas, sailcloth & sacking (hessian)		Sacks, fabric

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Figure C1. *(continued)*

Litter Intelligence.

Litter Categories OFFICIAL VERSION 3.6

CL05	Carpet & furnishing		Fabric
CL01	Clothing, towels and linen		Bracelets, fashion accessories, clothing tags, socks, duvets, pillows, underwear, pants, jerseys, polyester, polypropylene, buttons, clips, buckles, cotton reel, clothing, hats, gloves, towels, fabric
CL01.01	Footwear & shoes		Excludes shoe soles, jandals, flip flops
CL04	Rope, line or string (natural)		Wool
CL06	Other cloth		Leather, dog collars, velcro, vinyl, soft toys, fabric
CL06.01	Unidentifiable cloth fragments (specify)		Polyester stuffing, sea fluff, tennis ball fuzz, rags, dacron, unidentifiable cloth fragments, fabric
Code	**Glass & Ceramic**	**H&S**	**Notes & Examples**
GC02	Bottles & jars		
GC01	Construction material		Including bricks, cement, pipes, concrete, asphalt, tile
GC05	Fluorescent light tubes		
GC06	Glass buoys		
GC07	Glass or ceramic fragments	!	**Can be sharp! Adults only.** Terracotta, pottery, glass & ceramic
GC04	Light globes/bulbs		
GC03	Tableware		Plates & cups
GC08	Other glass & ceramic (specify)		
Code	**Metal**	**H&S**	**Notes & Examples**
ME03	Aluminium drink cans		
ME02	Bottle caps, lids & pull tabs		
ME09	Construction material		Fencing & electrical wiring, nails, screws, staples, wire mesh, waratahs, rivets, bearings, tools, barbed wire, bolts, nuts, metal, wires, wiring, spanner
ME07	Fishing related	!	**Can be sharp!** Sinkers, lures, hooks, traps, pots, swivels, shark/long line clips, split rings, pliers, knife, clips
ME06	Foil wrappers		Tin foil, aluminium foil. Excludes foil lined plastic wrappers
ME05	Gas bottles, drums & buckets (> 4 L)		
ME10.02	Metal vehicle parts		Spark plugs
ME04	Other cans & containers (<= 4L)		Tin cans, aerosols, inhaler canisters, tubes, ointment tubes, nitrous, canister, inhaler, nangs
ME10.01	Sharps, needles, lancets, metal catheters	✕	**Biohazard:** Only trained leaders to touch. Don't weigh. Metal
ME01	Tableware		Plates, cups, cutlery, utensils, knives, forks, spoons
ME08	Unidentifiable metal fragments		Unidentifiable metal, fragment
ME10	Other metal (specify)		Coins, sparklers, bullets, toys, bullet shells, shopping trolley/cart, figurine, stationary items, key rings, keys, rings, jewellery, buttons, watches, thumbtack, drawing pins, push pins, twist ties, hanger
Code	**Paper & Cardboard**	**H&S**	**Notes & Examples**
PC02	Cardboard boxes		
PC03	Cups, food trays & wrappers		Paper bags, cigarette packs, drink containers, cardboard takeaway containers, napkins, serviettes, rolling papers, zigzags, tea bags, paper straw, lollypop stick (paper), lollipop stick (paper), wrapper
PC04	Fireworks		Fireworks
PC01	Paper, newspapers & paper receipts		Magazines, newspaper, paper receipts

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Figure C1. *(continued)*

Litter Intelligence.

Litter Categories OFFICIAL VERSION 3.6

PC03.01	Tetrapaks		Cartons, flavoured milk, juice
PC05.01	Unidentifiable paper & cardboard fragments		Unidentifiable paper, fragments
PC05	Other paper & cardboard (specify)		Sandpaper, toilet rolls
Code	**Rubber**	**H&S**	**Notes & Examples**
RB08.02	Chewing gum		Chewing gum
RB08.03	Construction & Automotive		Plumbing, seals, washers, rubber & silicone sealants, o-rings, tubing
RB03	Gloves		Includes latex and rubber dipped gloves
RB05	Inner-tubes and rubber sheet		Tubing
RB06	Rubber bands		Sheep docking rings
RB02	Rubber footwear		Shoe soles, jandals, flip flops, gumboots
RB01	Toys, Sports & Recreation (Rubber)		Swim caps, neoprene, wetsuits, goggles, dive masks, fins, flippers, snorkels, balloons, tennis balls, footballs, dog toys, straps
RB04	Tyres		Tyres
RB08.01	Unidentifiable rubber fragments		Unidentifiable rubber, fragments
RB08	Other rubber (specify)		Tip, walking stick foot, chair leg foot, glide, crutch, plug
Code	**Wood**	**H&S**	**Notes & Examples**
WD01	Corks		Wine corks
WD02	Fishing traps and pots		Cork floats
WD05	Matches and wooden fireworks parts		
WD04	Processed timber & pallet crates		Includes fence & gate posts, unidentifiable wood, fragments, particle board, construction, fence post, tanalised wood, MDF, custom wood, cork tiles
WD03	Wooden utensils		Icecream sticks, chip forks, chopsticks, toothpicks, knives, spoons, stirrers, cutlery, chopsticks
WD06	Other wood (specify)		Pencil, toys, furniture
Code	**Other**	**H&S**	**Notes & Examples**
OT03	Appliances & electronics		Other, plugs, electric cords, electronics
OT04	Batteries (household)		AA, AAA, C, D, other household batteries
OT05.01	Batteries (non-household)		Vehicle and other non-household batteries
OT05.02	Boat parts		Other
OT02.01	Cotton buds		Cotton buds, earbuds, Q-tips
OT02.03	Faeces	⊗	**Biohazard:** don't weigh. Only count bags of poo Other
OT01	Paraffin or wax		Other, candle, crayon
OT02.05	Personal care items		Hair ties, hair brushes, combs, toothbrushes, nail files, emery board, hair clips, hair pins, bobby pins, baby dummy, pacifier, headband, fake fingernails
OT02	Sanitary items	⊗	**Biohazard:** don't weigh. Nappies, tampons and applicators, bandages, plasters, sports tape, face masks, tissues, toilet paper, tp, napkins, liners, pads, catheter bags, condoms, wipe, wipes, band aid, bandaid, band-aid, wet wipes
OT05	Other (specify)		Chalk

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Figure C1. *(continued)*

Note: In 2024, an additional plastic waste line, vapes was added to the list (not pictured).

APPENDIX D: LITTER INTELLIGENCE ML METADATA

Table D1: *Litter Intelligence Metadata for the Pacific Islands ML Surveys August 2019 – October 2024*

ID	COUNTRY	REGION	LOCATION	DATE (M/D/Y)	STATUS	SURVEY AREA	SURFACE TYPE
2361	Fiji	Rewa	Viti Levu - USP Foreshore Suva	5/02/2023	Official	100m x 9m	Mixed Substrate
2365			Viti Levu - Suva Point Beach	5/04/2023	Official	10m x 10m	Mixed Substrate
3030			Viti Levu - Bowling Club Helipad Beach	11/25/2023	Official	100m x 10m	Mixed Substrate
2973			Viti Levu - Firca Foreshore	3/21/2024	Official	100m x 12m	Sand
3017			Makuluva Island	2/24/2024	Official	100m x 20m	Sand
3064				4/27/2024	Official	100m x 10m	Mixed Substrate
2519	Samoa	A'ana	Upolu- Vailuutai	6/27/2023	Official	50m x 8m	Sand
2839				12/2/2023	Official	50m x 10m	Sand
2964				3/16/2024	Official	100m x 20m	Sand
2524		Atua	Upolu - Malaela Coastal Area	10/1/2022	Official	200m x 5m	Artificial
2517			Upolu - Lalomanu Beach Fales	6/26/2023	Official	100m x 20m	Sand
2834				12/1/2023	Official	100m x 20m	Sand
2963				3/15/2024	Official	100m x 20m	Sand
1291			Upolu - Solosolo Seawall	9/18/2021	Ad hoc	50m x 20m	Artificial
2797			Upolu- Vaovai Falealili	9/23/2023	Official	100m x 20m	Sand
2731		Fa'asaleleaga	Savai'i - Pu'apu'a	10/21/2023	Official	100m x 20m	Sand
2899				1/26/2024	Official	100m x 20m	Sand
3011				4/12/2024	Official	100m x 20m	Sand
474		Tuamasaga	Upolu - Apia Harbour Sand Bank	6/06/2020	Ad hoc	227m x 5m	Rock Rubble
229			Upolu - Maleafatu Park Seawall (Apia Bay)	8/31/2019	Official	100m x 8m	Rock Rubble
2663			Upolo - Moataa	9/2/2023	Official	100m x 11m	Sand
1848			Upolu - Mulinuu Seawall (Apia Yacht Club)	9/24/2022	Ad hoc	300m x 10m	Boulder
2947				9/16/2023	Official	300m x 10m	Artificial
1849			Upolu - Mulinuu Seawall (Adjacent to MET Office)	9/24/2022	Ad hoc	300m x 10m	Boulder
1243			Upolu - Vaiala sandbank (Apia)	9/18/2021	Ad hoc	60m x 20m	Cobbles
1292		Vaisigano	Upolu - Apia Waterfront	9/18/2021	Ad hoc	59m x 16m	Sand
2527			Upolu - Vaisigano (Sheraton Waterfront Apia)	6/30/2023	Official	148m x 15m	Sand
2814				11/29/2023	Official	50m x 15m	Sand

Continued: Table D1: Litter Intelligence Metadata for the Pacific Islands Marine Litter Surveys August 2019 – October 2024

ID	COUNTRY	REGION	LOCATION	DATE (M/D/Y)	STATUS	SURVEY AREA	SURFACE TYPE
1862	Solomon Islands	Central	Marine Beach Front, Tulagi	10/8/2022	Ad hoc	80m x 20m	Sand
2284		Guadalcanal	Honiara - Baudoko Beach	3/14/2023	Official	10m x 6m	Mixed Substrate
2996				9/15/2023	Official	10m x 6m	Sand
2989				3/21/2024	Official	10m x 6m	Sand
1842			Honiara - Karaina Coastal Front	9/24/2022	Ad hoc	100m x 20m	Mixed Substrate
2694			Honiara - Mendana Beach	8/31/2023	Official	10m x 6m	Sand
2983				3/6/2024	Official	20m x 6m	Sand
2998				3/27/2024	Official	20m x 6m	Sand
2190			Mataniko Coastal Area	9/17/2022	Ad hoc	20m x 20m	Sand
2191			Tiaro Primary/ Community High School Beach	10/17/2022	Ad hoc	100m x 20m	Gravel/Pebble
2738		Malaita	Lilisiana Beach	10/14/2023	Ad hoc	100m x 2m	Sand
2734		Temotu	Tanga Coastline	10/14/2023	Ad hoc	100m x 10m	Bedrock
2711			Temotu Province - Santa Cruz Island - Matu Beach	10/7/2023	Ad hoc	200m x 11m	Gravel/Pebble
2712			Temotu Province - Santa Cruz Island - Luova Beach	9/18/2023	Ad hoc	200m x 10m	Sand
2646		Western	Gizio - Malakerava 3 Hotel Residential Area	9/5/2023	Official	10m x 6m	Mixed Substrate
1871			Gizo - Tisi Beach	10/19/2022	Ad hoc	100m x 10m	Sand
2288				3/17/2023	Official	100m x 6m	Mixed Substrate
2615	Tonga	Tongatapu	Nuku'alofa - Popua Beach East	8/22/2023	Official	100m x 8m	Mixed Substrate
2700				9/30/2023	Ad hoc	100m x 20m	Gravel/Pebble
2911				2/7/2024	Official	100m x 20m	Rock Rubble
3099				6/6/2024	Official	100m x 20m	Rock Rubble
3285				10/11/2024	Official	100m x 20m	Rock Rubble
1306			Nuku'alofa - Popua Beach West	9/18/2021	Ad hoc	100m x 20m	Sand
2621				8/25/2023	Official	50m x 6m	Gravel/Pebble
3097				6/6/2024	Official	50m x 6m	Boulder
2619			Nuku'alofa - Sopu	8/23/2023	Official	50m x 10m	Mixed Substrate
2915			Nuku'alofa - Sopu	2/08/2024	Official	50m x 10m	Cobbles
2708			Tongatapu - Sopu Western Side	10/6/2023	Official	100m x 10m	Gravel/Pebble
2827			Tongatapu-Kolomotua Coastal Area	10/20/2023	Official	100m x 20m	Gravel/Pebble

3096				6/6/2024	Official	100m x 20m	Rock Rubble

Continued: Table D1: Litter Intelligence Metadata for the Pacific Islands Marine Litter Surveys August 2019 – October 2024

ID	COUNTRY	REGION	LOCATION	DATE (M/D/Y)	STATUS	SURVEY AREA	SURFACE TYPE
2472	Vanuatu	Shefa	Erakor - Etmat Bay	6/2/2023	Official	100m x 12m	Sand
2957				3/14/2024	Official	100m x 12m	Sand
3161				7/26/2024	Official	100m x 12m	Sand
2413			Ifira Island - Pauni Beach	5/30/2023	Official	25m x 10m	Mixed Substrate
2956				3/13/2024	Official	25m x 10m	Sand
3149				7/10/2024	Official	25m x 10m	Sand
2417			Port Vila - Ifira Point	5/31/2023	Official	62m x 10m	Mixed Substrate
2952				3/11/2024	Official	62m x 10m	Sand
3152				7/12/2024	Official	62m x 8m	Sand
2429			Port Vila - Mr Chris's house, Ifira Point	6/1/2023	Official	25m x 10m	Sand
1275	Wallis & Futuna	Hahake	Wallis - Aka'aka	9/18/2021	Ad hoc	100m x 20m	Sand
1833				9/17/2022	Ad hoc	100m x 20m	Mixed Substrate
2673				9/16/2023	Ad hoc	100m x 20m	Mixed Substrate
1302		Hihifo	Wallis - Beach between the Fale Fono district and the dispensary	9/18/2021	Ad hoc	200m x 40m	Sand
1266		Mua	Wallis - Lavegah by the sea	9/18/2021	Ad hoc	100m x 20m	Mixed Substrate

APPENDIX E: BEACH ML MEAN PLASTIC LINE ITEMS - FIJI

Table E1. Fiji Mean Beach ML Plastic Line Items 2023-2024

Litter Item	Litter Item Code	2023 No. Count	2024 No. Count	Mean No. of Items Per Survey	Mean SD ±
Bottle caps & lids	PL01	141	116	129	12.5
Bottle neck rings	PL01.01	1	0	1	0.5
Bottle seals & tabs	PL01.02	3	0	2	1.5
Bottles <= 2 L	PL02	164	354	259	95
Bottles, drums, jerrycans & buckets > 2 L	PL03	28	110	69	41
Plastic utensils	PL04	35	23	29	6
Straws	PL04.01	44	0	22	22
Drink package rings	PL05	0	0	0	0
Food containers	PL06	254	209	232	22.5
Plastic bags	PL07	299	2	151	148.5
Food wrappers	PL07.01	7,208	192	3,700	3,508
Toys, sport, & recreation (Plastic)	PL08	104	18	61	43
Gloves	PL09	1	1	1	0
Cigarette lighters	PL10	0	1	1	0.5
Cigarettes, butts & filters	PL11	0	0	0	0
Syringes	PL12	0	1	1	0.5
Cosmetics and medical packaging	PL12.1	76	71	74	2.5
Baskets, crates & trays	PL13	0	0	0	0
Plastic buoys	PL14	0	0	0	0
Mesh bags	PL15	0	1	1	0.5
Plastic sheeting	PL16	38	0	19	19
Fishing gear	PL17	0	0	0	0
Fishing line	PL18	21	0	11	10.5
Rope	PL19	24	7	16	8.5
Fishing nets	PL20	0	0	0	0
Strapping bands & tape	PL21	9	22	16	6.5
Fibreglass fragments	PL22	0	0	0	0
Resin pellets	PL23	0	0	0	0
Other Plastic	PL24	3	0	2	1.5
Unidentifiable hard plastic fragments	PL24.01	178	144	161	17
Pens & Stationery	PL24.02	10	12	11	1
Clothes pegs	PL24.03	66	24	45	21
Lollipop sticks	PL24.04	3	7	5	2
Shotgun wadding & shells	PL24.05	0	1	1	0.5
Cable ties & zip ties	PL24.06	1	0	1	0.5
Gardening & farming related	PL24.07	1	0	1	0.5
Safety & construction related	PL24.08	5	3	4	1
Plastic vehicle parts	PL24.09	0	0	0	0
Parking tickets & receipts	PL24.10	0	0	0	0
Unidentifiable soft plastic fragments	PL07.02	73	154	114	40.5
Bacterial habitat wheels	PL24.12	0	0	0	0
Hangers & retail packaging	PL24.11	3	0	2	1.5
Vapes	PL10.01	0	0	0	0
Mean Plastic Count - Fiji		**8,793**	**1,473**	**1,711**	**2,928**

APPENDIX F: BEACH ML MEAN PLASTIC LINE ITEMS - SAMOA

Table F1. Samoa Mean Beach ML Plastic Line Items 2019-2024

Litter Item	2019	2020	2021	2022	2023	2024	Mean No. of Items Per Survey	Mean SD ±
Bottle caps & lids	53	50	129	448	153	27	143	143
Bottle neck rings	4	23	0	0	36	0	11	14
Bottle seals & tabs	0	0	0	0	10	0	3	4
Bottles <= 2 L	14	40	841	1,172	410	160	440	432
Bottles, drums, jerrycans & buckets > 2 L	0	0	0	0	8	0	2	3
Plastic utensils	10	5	28	7	54	0	17	19
Straws	2	6	0	0	13	7	5	5
Drink package rings	0	0	0	0	0	0	0	0
Food containers	5	9	0	241	128	50	72	87
Plastic bags	80	7	0	75	248	56	78	82
Food wrappers	143	24	56	456	320	270	212	152
Toys, sport, & recreation (Plastic)	0	1	1	0	72	0	15	27
Gloves	0	0	62	0	2	0	16	23
Cigarette lighters	2	4	0	0	5	0	2	2
Cigarettes, butts & filters	215	0	148	0	237	0	120	104
Syringes	0	1	0	1	2	0	1	1
Cosmetics and medical packaging	0	0	0	0	26	25	13	12
Baskets, crates & trays	0	0	0	0	0	0	0	0
Plastic buoys	0	0	0	0	1	0	0	0
Mesh bags	0	0	0	0	3	0	1	1
Plastic sheeting	0	0	0	23	84	0	27	31
Fishing gear	0	0	0	0	1	0	0	0
Fishing line	1	10	2	0	1	0	2	3
Rope	1	6	0	0	2	10	3	4
Fishing nets	0	0	0	0	15	0	4	6
Strapping bands & tape	5	9	0	0	21	1	6	7
Fibreglass fragments	0	0	0	0	0	0	0	0
Resin pellets			0	0	0	0	0	0
Other Plastic	1	0	0	2	311	14	66	115
Unidentifiable hard plastic fragments	55	45	9	64	208	11	65	67
Pens & Stationery	6	2	0	0	10	0	3	4
Clothes pegs	0	2	4	0	6	0	2	2
Lollipop sticks	0	4	5	0	16	0	5	6
Shotgun wadding & shells	0	0	0	0	0	0	0	0
Cable ties & zip ties	0	1	0	0	7	0	2	3
Gardening & farming related	0	0	0	0	1	0	0	0
Safety & construction related	0	0	0	0	13	0	3	5
Plastic vehicle parts	0	0	0	0	0	0	0	0
Parking tickets & receipts	0	0	0	0	0	0	0	0
Unidentifiable soft plastic fragments	0	112	0	0	240	0	70	91
Bacterial habitat wheels	0	0	0	0	0	0	0	0
Hangers & retail packaging	0	0	0	0	0	0	0	0
Vapes	0	0	0	0	0	0	0	0
Mean Plastic Count - Samoa	**597**	**361**	**1,285**	**2,489**	**2,664**	**631**	**382**	**337**

APPENDIX G: BEACH ML MEAN PLASTIC LINE ITEMS – SOLOMON ISLANDS

Table G1. Solomon Islands Mean Beach ML Plastic Line Items 2022-2024

Litter Item	Litter Item Code	2022	2023	2024	Mean No. of Items Per Survey	Mean SD ±
Bottle caps & lids	PL01	158	451	86	232	158
Bottle neck rings	PL01.01	1	7	0	3	3
Bottle seals & tabs	PL01.02	0	3	0	1	1
Bottles <= 2 L	PL02	1,484	1,259	72	938	619
Bottles, drums, jerrycans & buckets > 2 L	PL03	0	145	330	158	135
Plastic utensils	PL04	23	117	26	55	44
Straws	PL04.01	41	37	7	28	15
Drink package rings	PL05	0	0	0	0	0
Food containers	PL06	11	304	0	105	141
Plastic bags	PL07	360	489	55	301	182
Food wrappers	PL07.01	68	1,311	1,013	797	530
Toys, sport, & recreation (Plastic)	PL08	0	52	0	17	25
Gloves	PL09	0	0	0	0	0
Cigarette lighters	PL10	0	7	4	4	3
Cigarettes, butts & filters	PL11	108	4	0	37	50
Syringes	PL12	0	0	0	0	0
Cosmetics and medical packaging	PL12.1	20	7	8	12	6
Baskets, crates & trays	PL13	0	12	0	4	6
Plastic buoys	PL14	0	0	0	0	0
Mesh bags	PL15	0	2	0	1	1
Plastic sheeting	PL16	16	6	0	7	7
Fishing gear	PL17	0	0	0	0	0
Fishing line	PL18	11	3	0	5	5
Rope	PL19	3	2	0	2	1
Fishing nets	PL20	0	1	1	1	0
Strapping bands & tape	PL21	0	3	0	1	1
Fibreglass fragments	PL22	0	0	9	3	4
Resin pellets	PL23	0	0	0	0	0
Other Plastic	PL24	0	1,119	32	384	520
Unidentifiable hard plastic fragments	PL24.01	5	317	156	159	127
Pens & Stationery	PL24.02	2	20	0	7	9
Clothes pegs	PL24.03	51	22	5	26	19
Lollipop sticks	PL24.04	3	20	0	8	9
Shotgun wadding & shells	PL24.05	0	0	0	0	0
Cable ties & zip ties	PL24.06	0	44	0	15	21
Gardening & farming related	PL24.07	0	3	0	1	1
Safety & construction related	PL24.08	0	27	0	9	13
Plastic vehicle parts	PL24.09	0	1	0	0	0
Parking tickets & receipts	PL24.10	0	0	0	0	0
Unidentifiable soft plastic fragments	PL07.02	0	33	0	11	16
Bacterial habitat wheels	PL24.12	0	0	0	0	0
Hangers & retail packaging	PL24.11	3	5	0	3	2
Vapes	PL10.01	0	0	0	0	0
Mean Plastic Count – Solomon Islands		**2,368**	**5,833**	**1,804**	**625**	**684**

APPENDIX H: BEACH ML MEAN PLASTIC LINE ITEMS – TONGA

Table H1. Tonga Mean Beach ML Plastic Line Items 2021-2024

Litter Item	Litter Item Code	2021	2023	2024	Mean No. of Items Per Survey	Mean SD ±
Bottle caps & lids	PL01	0	83	73	78	37
Bottle neck rings	PL01.01	0	4	0	2	2
Bottle seals & tabs	PL01.02	40	1	5	15	18
Bottles <= 2 L	PL02	33	340	98	157	132
Bottles, drums, jerrycans & buckets > 2 L	PL03	0	1	12	7	5
Plastic utensils	PL04	20	53	23	32	15
Straws	PL04.01	11	54	38	34	18
Drink package rings	PL05	0	0	8	4	4
Food containers	PL06	72	211	119	134	58
Plastic bags	PL07	155	311	122	196	82
Food wrappers	PL07.01	62	276	91	143	95
Toys, sport, & recreation (Plastic)	PL08	0	2	16	9	7
Gloves	PL09	0	0	5	3	2
Cigarette lighters	PL10	11	4	0	5	5
Cigarettes, butts & filters	PL11	0	2	0	1	1
Syringes	PL12	0	2	0	1	1
Cosmetics and medical packaging	PL12.1	5	0	0	2	2
Baskets, crates & trays	PL13	0	0	0	0	0
Plastic buoys	PL14	0	0	2	1	1
Mesh bags	PL15	0	0	1	1	0
Plastic sheeting	PL16	0	1	0	1	0
Fishing gear	PL17	0	1	0	1	0
Fishing line	PL18	1	4	6	4	2
Rope	PL19	28	39	0	22	16
Fishing nets	PL20	0	5	0	3	2
Strapping bands & tape	PL21	0	8	0	4	4
Fibreglass fragments	PL22	0	0	0	0	0
Resin pellets	PL23		0	0	0	0
Other Plastic	PL24	55	24	0	26	23
Unidentifiable hard plastic fragments	PL24.01	0	188	40	114	81
Pens & Stationery	PL24.02	0	0	0	0	0
Clothes pegs	PL24.03	0	10	1	6	4
Lollipop sticks	PL24.04	0	3	23	13	10
Shotgun wadding & shells	PL24.05	0	0	0	0	0
Cable ties & zip ties	PL24.06	0	2	11	7	5
Gardening & farming related	PL24.07	2	1	2	2	0
Safety & construction related	PL24.08	0	4	0	2	2
Plastic vehicle parts	PL24.09	0	0	0	0	0
Parking tickets & receipts	PL24.10	0	0	0	0	0
Unidentifiable soft plastic fragments	PL07.02	0	299	68	184	128
Bacterial habitat wheels	PL24.12	0	0	0	0	0
Hangers & retail packaging	PL24.11	31	35	0	22	16
Vapes	PL10.01	0	0	0	0	0
Mean Plastic Count – Tonga		**526**	**1,968**	**764**	**272**	**268**

APPENDIX I: BEACH ML MEAN PLASTIC LINE ITEMS – VANUATU

Table I1. Vanuatu Mean Beach ML Plastic Line Items 2023-2024

Litter Item	Litter Item Code	2023	2024	Mean No. of Items Per Survey	Mean SD ±
Bottle caps & lids	PL01	218	579	399	181
Bottle neck rings	PL01.01	23	5	14	9
Bottle seals & tabs	PL01.02	14	0	7	7
Bottles <= 2 L	PL02	104	186	145	41
Bottles, drums, jerrycans & buckets > 2 L	PL03	2	2	2	0
Plastic utensils	PL04	8	27	18	10
Straws	PL04.01	38	143	91	53
Drink package rings	PL05	0	0	0	0
Food containers	PL06	123	173	148	25
Plastic bags	PL07	3	74	39	36
Food wrappers	PL07.01	350	854	602	252
Toys, sport, & recreation (Plastic)	PL08	23	27	25	2
Gloves	PL09	0	0	0	0
Cigarette lighters	PL10	0	6	3	3
Cigarettes, butts & filters	PL11	55	23	39	16
Syringes	PL12	2	0	1	1
Cosmetics and medical packaging	PL12.1	30	15	23	8
Baskets, crates & trays	PL13	0	0	0	0
Plastic buoys	PL14	6	0	3	3
Mesh bags	PL15	0	5	3	3
Plastic sheeting	PL16	15	6	11	5
Fishing gear	PL17	1	0	1	1
Fishing line	PL18	2	20	11	9
Rope	PL19	313	399	356	43
Fishing nets	PL20	8	10	9	1
Strapping bands & tape	PL21	26	110	68	42
Fibreglass fragments	PL22	4,051	563	2,307	1,744
Resin pellets	PL23	0	0	0	0
Other Plastic	PL24	15	7	11	4
Unidentifiable hard plastic fragments	PL24.01	762	1,057	910	148
Pens & Stationery	PL24.02	19	19	19	0
Clothes pegs	PL24.03	4	13	9	5
Lollipop sticks	PL24.04	152	194	173	21
Shotgun wadding & shells	PL24.05	0	0	0	0
Cable ties & zip ties	PL24.06	4	8	6	2
Gardening & farming related	PL24.07	0	0	0	0
Safety & construction related	PL24.08	19	20	20	1
Plastic vehicle parts	PL24.09	0	0	0	0
Parking tickets & receipts	PL24.10	0	0	0	0
Unidentifiable soft plastic fragments	PL07.02	548	478	513	35
Bacterial habitat wheels	PL24.12	0	0	0	0
Hangers & retail packaging	PL24.11	6	0	3	3
Vapes	PL10.01	0	0	0	0
Mean Plastic Count – Vanuatu		**6,944**	**5,023**	**1,330**	**1,560**

APPENDIX J: BEACH ML MEAN PLASTIC LINE ITEMS – WALLIS & FUTUNA

Table J1. Wallis & Futuna Mean Beach ML Plastic Line Items 2021-2023

Litter Item	Litter Item Code	2021	2022	2023	Mean No. of Items Per Survey	Mean SD ±
Bottle caps & lids	PL01	16	69	58	48	23
Bottle neck rings	PL01.01	0	0	0	0	0
Bottle seals & tabs	PL01.02	0	0	3	2	1
Bottles <= 2 L	PL02	53	113	59	75	27
Bottles, drums, jerrycans & buckets > 2 L	PL03	2	3	4	3	1
Plastic utensils	PL04	0	0	2	1	1
Straws	PL04.01	0	0	2	1	1
Drink package rings	PL05	0	0	1	1	0
Food containers	PL06	1	13	8	7	5
Plastic bags	PL07	37	29	12	26	10
Food wrappers	PL07.01	1	7	14	7	5
Toys, sport, & recreation (Plastic)	PL08	1	1	0	1	0
Gloves	PL09	0	0	2	1	1
Cigarette lighters	PL10	0	3	0	2	1
Cigarettes, butts & filters	PL11	0	14	5	6	6
Syringes	PL12	0	0	0	0	0
Cosmetics and medical packaging	PL12.1	0	0	4	2	2
Baskets, crates & trays	PL13	0	0	0	0	0
Plastic buoys	PL14	1	0	2	2	1
Mesh bags	PL15	0	0	0	0	0
Plastic sheeting	PL16	30	2	0	16	14
Fishing gear	PL17	0	6	2	3	2
Fishing line	PL18	1	3	17	7	7
Rope	PL19	25	5	45	25	16
Fishing nets	PL20	6	6	8	7	1
Strapping bands & tape	PL21	5	0	8	7	3
Fibreglass fragments	PL22	2	0	10	6	4
Resin pellets	PL23	0			0	0
Other Plastic	PL24	61	0	3	32	28
Unidentifiable hard plastic fragments	PL24.01	91	3	48	47	36
Pens & Stationery	PL24.02	0	1	2	1	1
Clothes pegs	PL24.03	0	0	1	1	0
Lollipop sticks	PL24.04	0	10	0	5	5
Shotgun wadding & shells	PL24.05	0	0	8	4	4
Cable ties & zip ties	PL24.06	1	0	8	5	4
Gardening & farming related	PL24.07	0	0	4	2	2
Safety & construction related	PL24.08	13	25	4	14	9
Plastic vehicle parts	PL24.09	1	0	1	1	0
Parking tickets & receipts	PL24.10	0	0	0	0	0
Unidentifiable soft plastic fragments	PL07.02	100	0	23	62	43
Bacterial habitat wheels	PL24.12	0	0	1	1	0
Hangers & retail packaging	PL24.11	0	0	0	0	0
Vapes	PL10.01	0			0	0
Mean Plastic Count – Wallis and Futuna		448	313	369	283	73

APPENDIX K: FREQUENCY OF PLASTIC LITTER ITEMS PER COUNTRY/TERRIROTY 2019-2024

Table K1. Frequency of plastic litter items per PICs 2019-2024

PLASTIC LITTER ITEM	LITTER CODE	FIJI	SAMOA	SOLOMON ISLANDS	TONGA	VANUATU	WALLIS & FUTUNA	TOTAL NO. OF ITEMS	MEAN NO. OF ITEMS	SD ±
Bottle caps & lids	PL01	257	860	695	156	797	143	2,908	485	305
Bottle neck rings	PL01.01	1	63	8	4	28	0	104	17	22
Bottle seals & tabs	PL01.02	3	10	3	46	14	3	79	13	15
Bottles <= 2 L	PL02	518	2,637	2,815	471	290	225	6,956	1,159	1,113
Bottles, drums, jerrycans & buckets > 2 L	PL03	138	8	475	13	4	9	647	108	171
Plastic utensils	PL04	58	104	166	96	35	2	461	77	53
Straws	PL04.01	44	28	85	103	181	2	443	74	59
Drink package rings	PL05	0	0	0	8	0	1	9	2	3
Food containers	PL06	463	433	315	402	296	22	1,931	322	147
Plastic bags	PL07	301	466	904	588	77	78	2,414	402	292
Food wrappers	PL07.01	7,400	1,269	2,392	429	1,204	22	12,716	2,119	2,476
Toys, sport, & recreation (Plastic)	PL08	122	74	52	18	50	2	318	53	39
Gloves	PL09	2	64	0	5	0	2	73	12	23
Cigarette lighters	PL10	1	11	11	15	6	3	47	8	5
Cigarettes, butts & filters	PL11	0	600	112	2	78	19	811	135	212
Syringes	PL12	1	4	0	2	2	0	9	2	1
Cosmetics and medical packaging	PL12.1	147	51	35	5	45	4	287	48	48
Baskets, crates & trays	PL13	0	0	12	0	0	0	12	2	4
Plastic buoys	PL14	0	1	0	2	6	3	12	2	2
Mesh bags	PL15	1	3	2	1	5	0	12	2	2
Plastic sheeting	PL16	38	107	22	1	21	32	221	37	33
Fishing gear	PL17	0	1	0	1	1	8	11	2	3
Fishing line	PL18	21	14	14	11	22	21	103	17	4
Rope	PL19	31	19	5	67	712	75	909	152	252
Fishing nets	PL20	0	15	2	5	18	20	60	10	8
Strapping bands & tape	PL21	31	36	3	8	136	13	227	38	45
Fibreglass fragments	PL22	0	0	9	0	4,614	12	4,635	773	1,718
Resin pellets	PL23	0	0	0	0	0	0	-	-	-

Other Plastic	PL24	3	328	1,151	79	22	64	1,647	275	406

CONTINUED: *APPENDIX K: FREQUENCY OF PLASTIC LITTER ITEMS PER COUNTRY/TERRIROTY 2019-2024*

PLASTIC LITTER ITEM	LITTER CODE	FIJI	SAMOA	SOLOMON ISLANDS	TONGA	VANUATU	WALLIS & FUTUNA	TOTAL NO. OF ITEMS	MEAN NO. OF ITEMS	SD ±
Unidentifiable hard plastic fragments	PL24.01	322	392	478	228	1,819	142	3,381	564	572
Pens & Stationery	PL24.02	22	18	22	0	38	3	103	17	13
Clothes pegs	PL24.03	90	12	78	11	17	1	209	35	35
Lollipop sticks	PL24.04	10	25	23	26	346	10	440	73	122
Shotgun wadding & shells	PL24.05	1	0	0	0	0	8	9	2	3
Cable ties & zip ties	PL24.06	1	8	44	13	12	9	87	15	14
Gardening & farming related	PL24.07	1	1	3	5	0	4	14	2	2
Safety & construction related	PL24.08	8	13	27	4	39	42	133	22	15
Plastic vehicle parts	PL24.09	0	0	1	0	0	2	3	1	1
Parking tickets & receipts	PL24.10	0	0	0	0	0	0	-	-	-
Unidentifiable soft plastic fragments	PL07.02	227	352	33	367	1,026	123	2,128	355	323
Bacterial habitat wheels	PL24.12	0	0	0	0	0	1	1	0	0
Hangers & retail packaging	PL24.11	3	0	8	66	6	0	83	14	24
Vapes	PL10.01	0	0	0	0	0	0	-	-	-