MANUAL

TRAINING OF TRAINERS ON MONITORING AND ASSESSMENT OF MARINE LITTER AND MICROPLASTICS

9-13 September 2019, Bali, Indonesia

UN environment

COBSEA
COORDINATING BODY ON THE SEAS OF EAST ASIA

RC3S

Open Universiteit
www.ou.nl

UNIVERSITAS UDAYANA

GPML
Global Partnership on Marine Litter

GPA
Global Programme of Action for the Protection of the Marine Environment from Land-based Activities

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1.1 Logistical Note Bali

Logistical Note
Training of Trainers on Monitoring and Assessment of Marine Plastic Litter and Microplastics
9-13 September 2019, Bali, Indonesia

I. INTRODUCTION

Marine litter has become a rising issue of concern across the world, with thousands of pieces of trash estimated to be afloat on every square mile of ocean. The revised Coordinating Body on the Seas of East Asia (COBSEA) Regional Action Plan on Marine Litter (RAP MALI) was adopted at the 24th Intergovernmental Meeting of COBSEA held in June 2019. The RAP MALI, *inter alia*, recognizes that the absence of adequate science-based monitoring and assessment programmes is a significant barrier to addressing marine litter, and notes that monitoring and assessment are indispensable in identifying marine litter status and trends and its most critical impacts, and to support development, tracking and evaluation of policy and management interventions.

The 'Training of Trainers on Monitoring and Assessment of Marine Plastic Litter and Microplastics' that will be held on 9-13 September 2019 in Bali, Indonesia, is organized by the Coordinating Body on the Seas of East Asia (COBSEA) and the Global Partnership on Marine Litter (GPML) and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), and co-hosted by the Regional Capacity Center on Clean Seas (RC3S) and the Ministry of Environment and Forestry of Indonesia.

This training aims to support the establishment of harmonized national monitoring programmes to address the need for quality data and effective monitoring of land- and sea-based sources, quantities, fate and impact of marine litter, and strengthen the capacity of countries to use an evidence-based approach towards achievement of relevant goals and targets, including Sustainable Development Goal 14 Target 1 The training was designed by the Open University of the Netherlands based on the *"Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean"* developed by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP).

The training Hands on training exemply sever methodologies in the field

II. VISITORS TO BALI

1. General Information

Bali is a province of Indonesia and the westernmost of the Lesser Sunda Islands. Located east of Java and west of Lombok. The province includes the island of Bali and a few smaller neighbouring islands, notably Nusa Penida, Nusa Lembongan, and Nusa Ceningan. The provincial capital, Denpasar, is the most populous city in the Lesser Sunda Islands and the second largest, after Makassar, in Eastern Indonesia. Bali is the only Hindu-majority province in Indonesia, with 83.5% of the population adhering to Balinese Hinduism.[2]

Bali is Indonesia's main tourist destination, which has seen a significant rise in tourists since the 1980s.[6] Tourism-related business makes up 80% of its economy.[7] It is renowned for its highly developed

arts, including traditional and modern dance, sculpture, painting, leather, metalworking, and music. The Indonesian International Film Festival is held every year in Bali. In March 2017, TripAdvisor named Bali as the world's top destination in its Traveller's Choice award.[8]

Bali is part of the Coral Triangle, the area with the highest biodiversity of marine species.[9] In this area alone, over 500 reef-building coral species can be found. Recently, Bali was the host of the 2018 Annual Meetings of the International Monetary Fund and the World Bank Group. Bali is the home of the Subak irrigation system, a UNESCO World Heritage Site.[11] It is also home to a unified confederation of kingdoms composed of 10 traditional royal Balinese houses, each house ruling a specific geographic area. The confederation is the successor of the Bali Kingdom. The royal houses are not recognised by the government of Indonesia; however, they originated before Dutch colonisation.

2. International Airport in Bali

Bali is serviced by the Ngurah Rai International Airport. Grand Inna Bali Beach Resort, is approximately 17.7 kilometres (about 35 minutes) from the Ngurah Rai International Airport in Bali. **Ngurah Rai Airport Taxi** provides licensed, metered taxis from the Ngurah Rai International Airport at a cost of approximately **USD 11.00 – 15.00 (150,000 – 200,000 Rupiahs)** one way. This may vary e.g. based on the number of persons in the taxi.

3. Time Zone

Central Indonesia Time, UTC+08:00.

4. Accommodation and Venue

The training will be held at the Grand Inna Bali Beach from 9-13 September 2019.

The training will be in classroom sessions begin 9:00 am Monday 9 September 2019. Please kindly bring along your laptop.

GRAND INNA BALI BEACH RESORT
Jl. Hangtuah, Sanur P.O. Box 3275 Denpasar 80227 Bali Indonesia
T. +62 361 288 511 F. +62 361 287 917

Participants are encouraged to stay at the Inna Grand Bali Beach Resort. A block booking has been made by COBSEA, with a special room rate including breakfast as indicated below.

ROOM CATEGORY	Group Rate (IDR) Single occp
Deluxe Room	**Rp 950.000,-net/room/night**
Regency suite room	Rp 2.500.000,-net/room/night
Executive suite room	Rp. 3.500.000,-net/room/night
Extra Bed adults	Rp 400.000,-net/bed/night

Ms. Krittika Kleesuwan (Kris) Kleesuwan.unescap@un.org will do the hotel reservations for you. In order to ensure your accommodation is properly reserved, please provide us with your complete travel itinerary (arrival/departure date and time) by **30 August 2019.**

Check-in/check-out times: Check-in time is 14:00 hours on the day of arrival. Check-out time is 12:00 hours on the day of departure.
Please visit the hotel website www.grandinnabalibeach.com for additional hotel information.

5. Visa Arrangements
All participants are responsible for their own visa arrangements. Among COBSEA countries, only participants from People's Republic of China and Republic of Korea require a visa. Visas can be obtained in advance or at the airport for "visa on arrival" at a cost of USD 35. For more detailed information visit: http://www.imigrasi.go.id/index.php/en/public-services/visit-visa#voa-countries

6. Flight Arrangements and Daily Subsistence Allowance (DSA)
UN Environment will support up to 3 persons per participating country, upon request. The most direct and least costly economy air ticket will be issued by UN Environment and will be sent electronically to you in due time. Participants will receive the Daily Subsistence Allowance (DSA) during the meeting to cover meals and hotel accommodation. Terminal expenses will be given to cover incidental travel cost. In order to facilitate the payment of the daily subsistence allowance, eligible participants are requested **to submit the original boarding passes of all in-coming flights** to the secretariat staff at registration. Participants are expected to stay for the duration of the meeting. Each person will be responsible for his/her incidental charges posted to the room account during the stay. This includes any telephone charges, salon or spa charges, gift shop purchases, mini-bar, room services, etc. and any alcoholic beverages or meals that are charged to the room from other locations within the hotel that are outside of the official meeting events. You are advised to arrange (at your own expense or that of your organization) insurance against sickness, accident, permanent or temporary disability, death and third-party risk for the period of the meeting including the journey to and from Bali, Indonesia. UN Environment will not assume responsibility for any other expenditures, including the following:

a) All expenses in the home country incidental to travel abroad, including expenditure for visa, medical examination, inoculations and other such miscellaneous items and internal travel to and from the airport of arrival and departure in the home country;
b) Salary and related allowances for the participants during the period of the meeting;
c) Cost incurred by the participants in respect of travel insurance, accident insurance, medical bills or hospitalization fees in connection with attending the meeting;
d) Compensation in the event of death or disability of participants in connecting with attending the meeting;
e) Any loss or damage to personal property of participants while attending the meeting or losses or damages claimed by third parties as a result of any negligence on the part of the participants.

7. Training
A lot of field work
The first day of the training will be held in a classroom. Subsequent days will include field sampling. Please note that due to the high temperature of up to 30 degrees during the day, fieldwork days will start at 7am to avoid sampling at peak temperatures. Afternoons will be spent in laboratory or classroom. Please also be prepared to collect and dissect corpus including gut for biota sampling. All participants are requested to have read Chapter 10 on Recommendations in *Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean* developed by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP). Additional course materials will be given out at the beginning of the training.

8. Appropriate Gear

Due to high temperatures, intense sunlight and extensive time spend in the field, we encourage all participants to bring a reusable water bottle, closed walking shoes, long but light clothing as well as a hat and sun lotion. While September usually seems only modest rainfall, participants may wish to bring rain gear. As some of the field work may take place on a boat, please take precautionary measures if you are prone to seasickness.

9. Electricity

The electric voltage in Indonesia is 230 volts. In Bali you can expect the 2-pin socket (Type C). The pins are round, not flat or rectangular

10. Official Languages

The training will be conducted in English.

11. Money and Credit Cards and Banking

The unit of currency in Indonesia is the rupiah (Rp). Banknotes come in denominations of Rp 1,000, 2,000, 5,000, 10,000, 20,000, and 50,000, and Rp 100,000. The coins in circulation are in denominations of 100, 200, 500 and 1000 rupiah. Credit cards, cash cards or debit cards are widely accepted in Indonesia. Provided you have your PIN, you can use these to get cash or cash advances from banks and ATMs carrying the Visa or PLUS symbols. For cash advances, MasterCard and Visa are the most popular. US dollars are the most widely accepted foreign currency as well as traveller's cheques. One United States dollar is equivalent to approximately 14,005.60 (as of 24 June 2019) Indonesian Rupiah. Travelers may obtain current exchange rates from currency converter tools online. (Please note that rates are subject to variation.) Cash advances from ATMs are in local currency primarily. ATMs may be subject to a daily withdrawal limit and in some cases a withdrawal fee.

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1.2 Preparation Note for participants

Training of Trainers on Monitoring and Assessment of Marine Litter and Microplastics

9-13 September, Bali, Indonesia

Preparation note for participants

I. Goals and objectives of the training

The 'Training of Trainers on Monitoring and Assessment of Marine Plastic Litter and Microplastics' to be held on 9-13 September 2019 in Bali, Indonesia, is organized by the Coordinating Body on the Seas of East Asia (COBSEA), the Global Partnership on Marine Litter (GPML) and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), and co-hosted by the Ministry of Environment and Forestry of Indonesia and the Regional Capacity Center on Clean Seas (RC3S). The training will be implemented in partnership with Universitas Udayana.

The training is based on the *Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean* developed by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP). Additional course materials will be provided at the beginning of the training.

The main goal of the training is to enable course participants to establish/design a programme to monitor and assess the distribution and abundance of plastic litter.

The overall learning objectives are:

1. Participants are able to establish/design a programme to monitor and assess the distribution and abundance of plastic litter.
2. Participant are able to differentiate between the different types of monitoring.
3. Participants can apply several methods to monitor and assess the distribution and abundance of plastic litter.
4. Participants are able to perform site selection appropriate for their own geographic context.
5. Participants are able to report on the distribution and abundance of plastic litter.
6. Participants are able to use data to inform and guide policy.

II. Preparation before the course

1. Read the guidelines:

   Participants are kindly requested to read the GESAMP *Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean* before attending the course, to build the necessary foundation for course activities. Additional course materials will be provided at the beginning of the training. If you are unable to finish reading the entire Guidelines beforehand, kindly make sure that you read at least Chapter 10 of the document:

GESAMP (2019). Guidelines or the monitoring and assessment of plastic litter and microplastics in the ocean (Kershaw P.J., Turra A. and Galgani F. editors), (IMO/FAO/IOC-UNESCO/UNIDO/WMO/IAEA/ UN/UNEP/UNDP/ISA Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). Rep. Stud. GESAMP No. 99, 130p.

http://www.gesamp.org/publications/guidelines-for-the-monitoring-and-assessment-of-plastic-litter-in-the-ocean

2. Share your expectations:

Kindly describe in 3 bullet points – based on Chapter 10 of the Guidelines – your expectations for the 5-day training. These expectations will be shared as part of the country presentations (see 3. below).

3. Prepare a 10-minute presentation:

Country delegations are kindly requested to prepare a 10-minute PowerPoint presentation on the national follow-up activity you are planning to carry out. Time has been allocated for one presentation per country on Day 1 of the training. Kindly coordinate this presentation with your fellow country delegates (see the list of participants for contact details).

The presentations should:

- identify the policy issue(s) in your country;
- summarize the state of data (gaps) in your country;
- present current methods used (see Chapter 10);
- share your 3 expectations for the training (see 2. above).

4. Review additional background information (optional):

Partner websites and resources on marine litter:

- Universitas Udayana
- COBSEA
- UN Environment Programme
- Clean seas
- The Global Partnership on Marine Litter

Videos:

- 5 Gyres North Atlantic Gyre Expedition
- Fulmar stomach dissection
- Marine debris tracker

1.3 Trainers and Participants

Training of Trainers on Monitoring and Assessment of Marine Litter and Microplastics

9-13 September 2019 in Bali, Indonesia

The 'Training of Trainers on Monitoring and Assessment of Marine Plastic Litter and Microplastics' that will be held on 9-13 September 2019 in Bali, Indonesia, is organized by the Coordinating Body on the Seas of East Asia (COBSEA), the Global Partnership on Marine Litter (GPML) and the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), and co-hosted by the Regional Capacity Center on Clean Seas (RC3S) and the Ministry of Environment and Forestry of Indonesia.

This training aims to support the establishment of monitoring programmes to address the need for quality data and effective monitoring of land and sea based sources, quantities, fate and impact of marine litter and strengthen the capacity of member countries to use an evidence-based approach to decision making in support of global initiatives, including Sustainable Development Goal 14.1.

The training is based on the *Guidelines for the Monitoring and Assessment of Plastic Litter in the Ocean* developed by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP).

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4	Gede Hendrawan	Lecturer	Udayana University (Denpasar University)	gede.hendrawan@unud.ac.id
5	Prof. Daoji Li	Oceanography, Estuarine and Coastal Ecosystems	East China Normal University	daojili@sklec.ecnu.edu.cn
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1.4 Schedule

Training of Trainers on Monitoring and Assessment of Marine Litter and Microplastics

9-13 September 2019 in Bali, Indonesia

Preliminary Agenda

Monday	
9:00 - 9:30	Coffee
9:30 - 9:45	Welcome remarks - UN Environment Programme (Heidi Savelli) - Ministry of Environment and Forestry (MOEF) & Regional Capacity Centre for Clean Seas (RC3S) (Dida Migfar Ridha, Director of Coastal and Marine Pollution and Degradation Control of MOEF, and *ex officio* Executive Director of RC3S) - Short introduction on the training schedule (Ansje Löhr) -
9:45 - 10:45	Introduction of Marine Litter pollution (Prof. Daoji Li) - *(Guidelines chapters 1 and 2)* - Background of the marine litter issue - Definitions and terminologies General outlook on the region and regional needs (Jerker Tamelander)
10:45 - 11:15	Break
11:15 - 12:15	Three participants: presentations on the planned national follow up activity (15 min per country) (Ansje Löhr) (Cambodia, South Korea, China)
12:15 - 13:15	Lunch

13:15 - 14:15	Three participants: presentations on the planned national follow up activity (15 min per country) (Ansje Löhr) (Singapore, Thailand, Malaysia)
14:15 – 14:45	Two participants: presentations on the planned national follow up activity (15min per country) (Ansje Löhr) (Indonesia, Vietnam)
14:45 – 15:15	Break
15:15 - 16:15	Presentation on designing monitoring and assessment programmes (Denise Hardesty) – *Guidelines: Chapter 3* Get acquainted with the role of monitoring and assessment - Definition of main concepts and terminologies - Indicators and targets (significant risks and associated indicators) - Method differentiation
16:15 – 16:45	Introduction of monitoring of the shoreline (Denise Hardesty, Trang Nguyen, Gede Hendrawan) – *Guidelines: Chapter 4* - Description and relevance of the method - Sampling strategy
16:45 - 17:15	Introduction of monitoring biota (Prof. Daoji Li) – *Guidelines:* Chapter 7 - Description and relevance of the method - Sampling strategy (indicator species)

Tuesday	
7:00 - 11:00	MONITORING OF THE SHORELINE (Denise Hardesty, Trang Nguyen, Gede Hendrawan, tbd) Groups 1-4
11:00 – 11:30	Recap and questions
11:30 - 12:30	Lunch
12:30 - 15:00	PROCESS SHORELINE SAMPLES (Denise Hardesty, Trang Nguyen, Gede Hendrawan, tbd) DEMONSTRATE MONITORING BIOTA in the lab (Gede Hendrawan and team)
15:00 - 15:45	Presentation on designing monitoring and assessment programmes (Denise Hardesty) - Reporting research findings
15:45 – 16:00	Introduction of sea surface monitoring method (Denise Hardesty, Trang Nguyen) *Guidelines Chapter 5* - Description and relevance of the method - Sampling strategy
16:00 - 16:15	Introduction of seafloor monitoring method (Prof. Daoji Li, Gede Hendrawan) – Guidelines Chapter 6 - Description and relevance of the method - Sampling strategy

Wednesday	
7:00 - 11:00	SEA SURFACE MONITORING (Denise Hardesty, Trang Nguyen) - Sampling/ processing/ analysis (Groups 1-2)
7:00 - 11:00	MONITORING OF THE SEAFLOOR (Prof. Daoji Li, Gede Hendrawan) - Description and relevance of the method - Sampling strategy (Groups 3-4)
11:00 – 11:30	Recap and questions
11:30 - 12:30	Lunch
12:30 - 13:30	Presentation on designing monitoring and assessment programmes - data analysis (Denise Hardesty/ Prof Daoji Li) - *(Guideline chapter 3)* - Data requirements - Data analysis - Uncertainties
13:30 - 16:00	Discussion of participant's questions (All trainers)

Thursday	
7:00 - 11:00	SEA SURFACE MONITORING (Denise Hardesty, Trang Nguyen) - Sampling/ processing/ analysis (Group 3-4)
7:00 - 11:00	MONITORING OF THE SEAFLOOR (Prof. Daoji Li, Gede Hendrawan) - Description and relevance of the method - Sampling strategy (groups 1-2)
11:00 - 11:30	Recap and questions
11:30 - 12:30	Lunch
12:30 - 13:30	Case studies (Trang Nguyen, Gede Hendrawan) - Case study Vietnam - Case study Bali
13:30 - 14:30	Work on proposals and discuss with the trainers
14:30 – 15:00	Break
15:00 - 16:00	Work on proposals and discuss with the trainers

Friday	
8:00- 9:00	UN Environment Programme (Heidi Savelli) - Global outlook and way forward
9:00 - 10:30	In-depth presentations on specific topics (All trainers) - Baseline, site selection, sub-sampling, sample size, reporting research findings etc.
10:30 - 11:30	Short presentations on follow-up activities (5 min per country) (Ansje Löhr)
11:30 – 12:30	Lunch
12:30 – 14:00	Wrap up, final discussions, feedback and concluding remarks

2.1 Handbook of Survey Methodology Plastics Leakage (developed for CSIRO Global Plastic Pollution Project)

CSIRO OCEANS & ATMOSPHERE

www.csiro.au

Handbook of Survey Methodology

Plastics Leakage

(developed for CSIRO Global Plastic Pollution Project)

Qamar Schuyler, Kathy Willis, TJ Lawson, Vanessa Mann, Chris Wilcox and Britta Denise Hardesty

12 March 2018

Version 1.3

CSIRO Oceans & Atmosphere

Citation

Schuyler QA, Willis K, Lawson TJ, Mann V, Wilcox C, and Hardesty BD (2018) Handbook of Survey Methodology – Plastics Leakage. CSIRO, Australia. ePublish EP178700

Keywords

marine debris; marine plastics; marine pollution; environmental pollution; debris surveys; survey methodology; beach clean-up.

Copyright

Important disclaimer

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1 Overview and relevance

Marine debris has been identified as a significant risk to biodiversity, economies, human health, fisheries management, tourism and invasive species transport.

Most marine debris, with estimates up to 80% or more, comes from land-based sources. Surveying litter along coastal areas is an important and low-cost way to build a dataset that can enable long-term assessment and monitoring of marine debris. However, because most waste that is lost into the marine environment comes from land-based sources, we are better poised to understand where, why and when waste is leaked into the environment when we have information from across the landscape (rather than only in coastal areas). Hence, this global project focuses not only at the coast, but in upland and riverine areas. To understand the breadth of losses to the marine environment, we will also quantify floating plastics in the nearshore environment.

Objective

We are using field sampling to measure, and mathematical modelling to estimate, the distribution and movement of plastic waste near urban centres, along waterways, on the coastline and in the ocean.

Outputs

We are designing robust sampling plans tailored for each country involved. These plans can be adapted for other participating countries. These data will comprise a comprehensive dataset of plastics on land, along rivers, at the coastal interface, and in the ocean for major coastal cities around the world. We will use these data with statistical models to produce maps that highlight the plumes of plastic emerging from urban centres and nearby areas. We will then estimate the amount of plastic from the plumes that is lost to the open ocean or redeposited back to land.

Outcomes

This project will provide a clear linkage between land-based waste management and losses of waste into the marine environment.

We are engaging and training local partner institutions.

We are building capacity to help people from participating countries be able to improve their analytical skills in terms of measuring, analysing, and mapping plastic pollution.

Learnings from the project can serve as a basis for advocacy to drive social pressure for investment in infrastructure and regulation for waste handling.

Our results will also be used to engage with industry regarding best-practices.

We are also identifying opportunities for waste management and valuing plastic to reduce poverty and create alternative livelihoods.

Methods

This Handbook provides detail on the various survey methodologies used by CSIRO's team that focus on plastic pollution on land and at sea – in upland, riverine, coastal and marine environments. We invite you to follow our methodologies in order to develop consistent, robust datasets across various geographies that can be used in understanding waste or debris flows from land to the ocean.

Survey methods

This handbook covers methodology for conducting surveys in four different areas:

- Inland Areas: 3-6 transects that are 25m^2 in area (either 2m x 12.5m or 1m x 25m), conducted in the primary land use types at the survey area.
- Riverine Areas: 3-6 transects that run from the water's edge to 2m beyond the influence of the river, and are 2m wide.
- Coastal Areas: 3-6 transects that run from the water's edge at the coastline to the vegetation near the coast, and are 2m wide.
- At-sea in the nearshore – through Surface Trawl Surveys: Three 15-minute tows conducted from a vessel or boat in nearshore areas.

The three types of terrestrial surveys; Inland, River, and Coastal transects, are all very similar in nature. While there are slight differences between the data collected at each site, the basic methodology is the same. We have provided a single description of each of these three survey approaches that incorporates key information unique to each type of survey area (see p. 12). For each of these three survey areas, we carry out transects to estimate the amounts and types of litter or waste we find in these environments.

The fourth compartment we survey is the surface of the ocean in nearshore environments. At-sea trawl surveys are very different to the terrestrial surveys. They require a boat or vessel, and a specialised floating trawl net. Methods for carrying out surface trawl surveys are provided separately on page 22.

Conducting clean-ups to be included in data collection for this global project

We encourage participants to combine the data collection with a clean-up. If your group would like to conduct a clean-up and record/report your findings, please refer to the methods in Appendix B on page 30.

2 Important tips and instructions

Please read this section carefully before you begin collecting data. You will find advice on the following topics:

1. Site selection and choosing survey locations within the site;
2. Collecting size class data;
3. How to sub-sample if your survey area has too much debris to accurately count it all;
4. Notes to remember prior to collecting your data.

2.1 Site selection

CSIRO staff will work closely with you and your team to identify exact survey sites. Please do not undertake this activity without our input. YOU (and your team) identify the city and/or river of interest and we will work with you to select the actual survey sites for all 4 survey types.

If you would like to add a new area or change any of your sites, please let us know well in advance of field sampling, as the sites that have been chosen for your project have been carefully selected based on random stratified sampling. This ensures that the data cover a wide range of site types, and that all possible site types are accounted for (for instance varying population densities, proximity to roads and waterways, and land use types). If you are intending on conducting surveys outside of the sites that have been selected by CSIRO, please ensure that they are selected at random, and not on the basis of already existing debris accumulation points. If you find that your sites selected by CSIRO either have such high amounts of debris that they are too difficult to sample easily, or conversely have almost no debris, we can assist with adaptive sampling to address these issues.

What if I can't access the site?

If you can't reach the GPS point for any reason (e.g. it is inaccessible by road, the vegetation is too dense, or it is in a dangerous area), sample as close as you reasonably can to the GPS coordinates. Keep in mind to select as randomly as possible (e.g. throw a rock, stick, or stake over your shoulder and sample at that location) – don't look for the area with the most amount of trash to carry out your transect – this would bias the data and is not what we want.

How many transects should I conduct?

Whether you are conducting river surveys, inland surveys, or coastal surveys, you will start with a **minimum of three transects** at your site. If you finish all three transects and have not yet found a single item of debris on **any** of the transects, add another one. Keep adding transects either until you have found at least one item, or you have completed six transects, whichever comes first.

How will I count it all?

Remember that the goal of this project is to gain an accurate representation of the debris loads in the environment. While some (most likely tiny pieces of) debris, waste or litter may be missed, the goal is to cord and report the best data possible, though we acknowledge that sometimes people may miss small bits of debris. We all treat this topic specifically under the 'subsampling' section (2.3).

Choosing transect locations at a site

Where should you conduct these transects? The answer varies depending on the type of transect you are conducting.

Coastal Transects

First, have a look at the environment around you. If it is all very similar, all of your transects can be placed anywhere within the area, taking into account minimum distances from access points (50m) and between transects (50m) (see Points to Note, p.10). If there are several different habitats or land use types at your site, divide your three transects proportionally between site types.

For example, a coastal site may contain some sandy beach areas and some rocky slab zones (Figure 2.1). Since more of the beach is sandy, run two transects in the sandy area, and one in the rocky part.

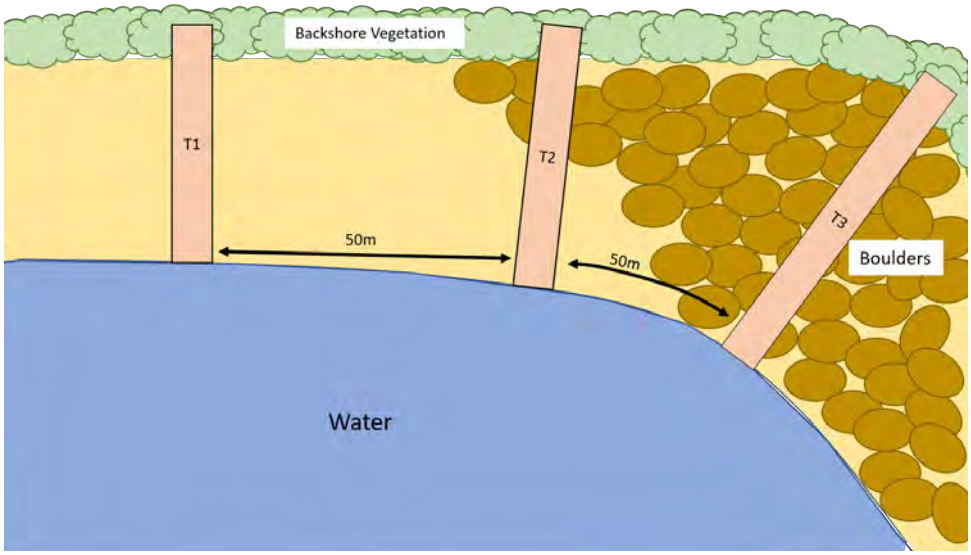


Figure 2.1 Example of how to lay out three transects in a coastal area.

River transects

The first river transect should be conducted at least 50m from the access point. Each subsequent transect should be at least 50m apart.

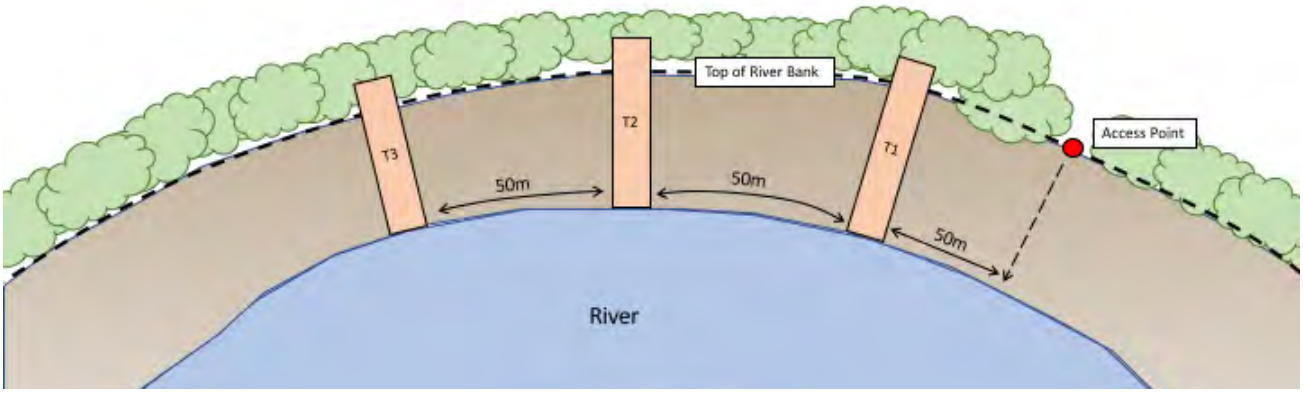


Figure 2.2 Example of how to lay out three transects in a river survey

Inland transects

The **Inland Transect Data** sheets specify a variety of land use types, including car parks, roadways, schools, etc. Immediately below you can see what this looks like on the data sheet:

Type of survey:	Walkway Car park Roadway School Public transport Drain Natural Veg. Wetland Park Disused Ag/ pasture Ag/ cultivated Other (specify):	*Circle the best option to describe the type of land use of the survey area*

In the example below, you would complete one transect in the park (2m x 12.5m), one along the walkway (2m x 12.5m), and one along the edge of the road (1m x 25m).

If you have to add transects beyond the first three because you have found no debris, please add them first in any land-use types that you have not yet surveyed, and then add any remaining transects proportional to habitat types within the area. In the example below, you would add a fourth transect of 2m x 12.5m around the bus shelter ("Public Transport" land-use), a fifth in the park, and a sixth along the walkway.

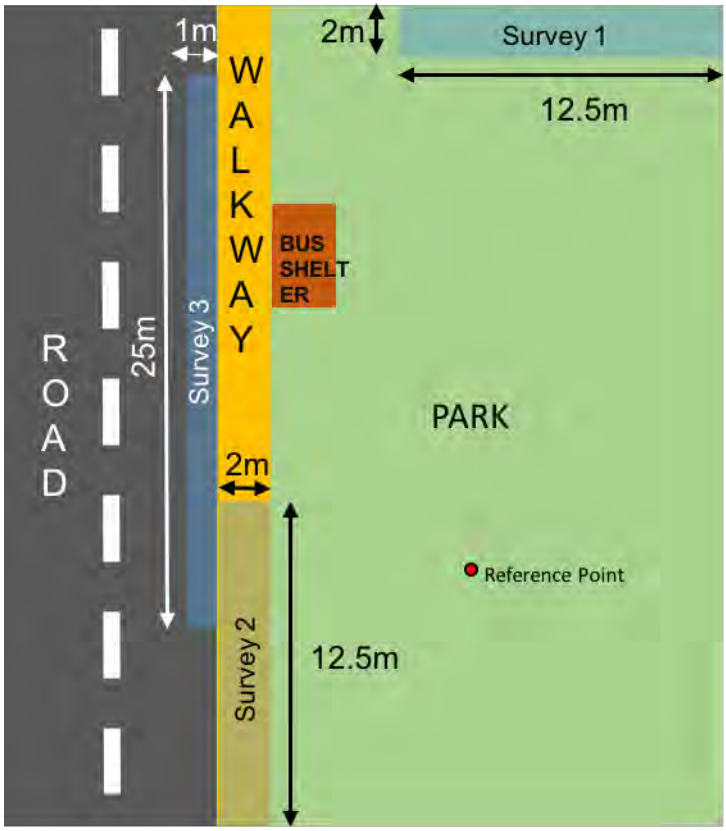


Figure 2.3 Example of an inland survey across different land use types

If in doubt of how to distribute transects,

Figure 2.4 provides a useful flow chart to help when determining where to locate transects within a site.

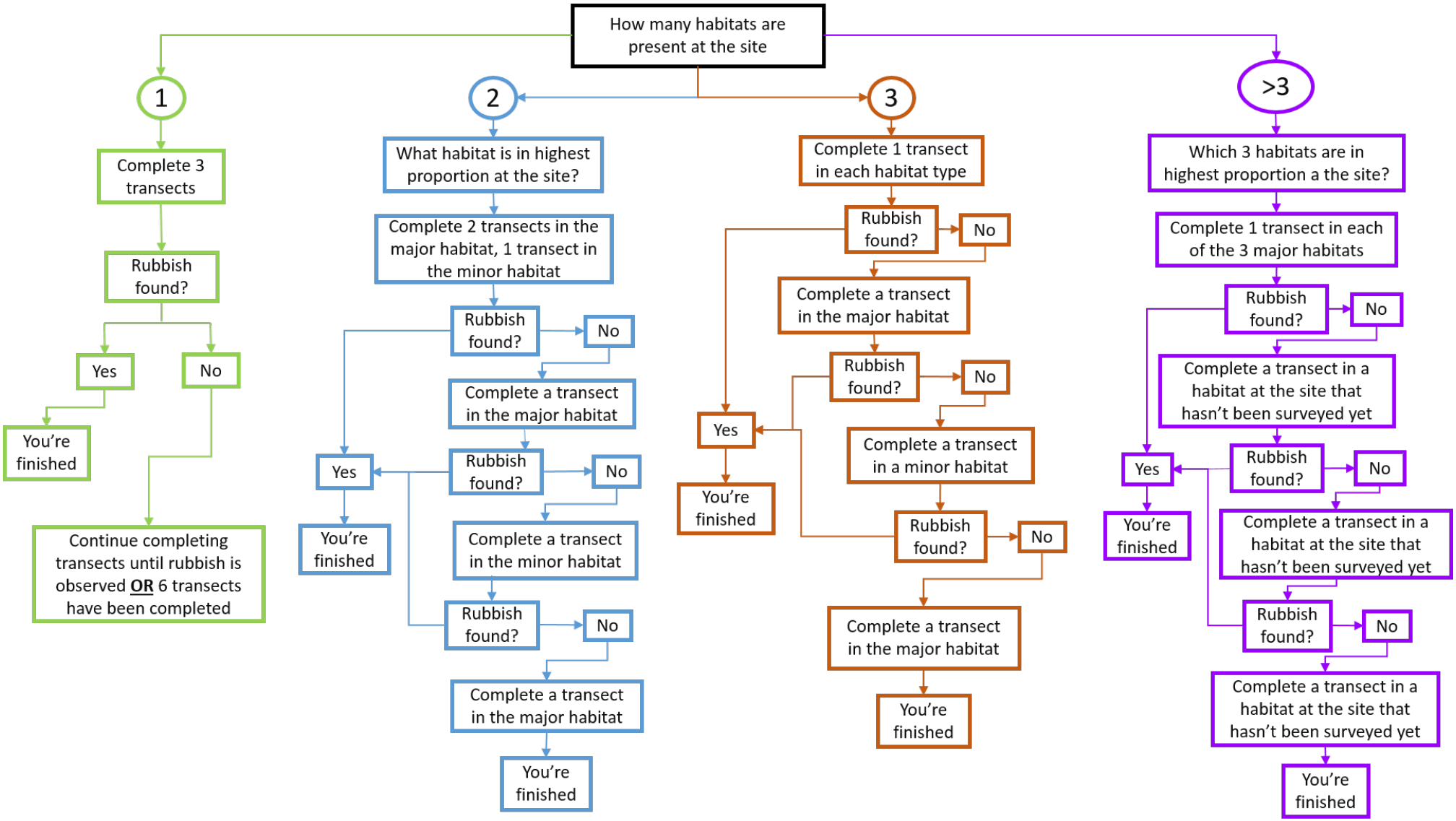


Figure 2.4. Decision tree to aid in figuring out where to place transects at your site location.

2.2 Size Class

To understand the way debris moves around different environments we collect information on the size of some of the debris we encounter. Because it would be too time consuming (and it is not necessary), we only record the size class of a maximum of 10 items on each transect, rather than recording the size of every single item we find. We record a size class for up to ten of the items found in each transect. The following technique will ensure that the data are collected as we require. In short, we want to record the size of a few items across the entire transect length. This is not relevant for surface trawl sampling.

Size class methods for transects

1. Divide the total length of the transect by 10. This will give you equal intervals to collect size class data. E.g. If the total length of your transect is 26m, interval lengths will be 2.6m each. Record the total length on the **Items** List datasheet in the box labelled "Interval start (m)" to help you to remember distance intervals.

** **Note: for coastal and river transects,** record transect lengths in whole meters (e.g. 26m, not 26.4m). **

Size class (and sub-sampling intervals)

Interval start (m) 26m		Dist. on tran	ID	Size class
1	0 – 2.6	0.5	G3W	2
2	2.6 – 5.2	2.8	RIW	5
3	5.2 – 7.8	None		
4	7.8 – 10.4	10.3	D5W	1
5	10.4 – 13.0	10.5	D5F	1
6	13.0 – 15.6			
7	15.6 – 18.2			
8	18.2 – 20.8			
9	20.8 – 23.4			
10	23.4 - end			

2. Starting from the distance of zero, record the beginning and end of each interval on the size class table on the **Items List** datasheet. See first column above.
3. For the first piece of debris you find in each interval, record the distance along the transect (to the nearest 1/10 of a meter). See column 2 above.
4. Record the ID of the item (e.g. G1), whether it is whole (W) or fragmented (F) (see column 3 above).
5. Finally, record the size class of that item as per below (column 4).

   NOTE: Record the size class **ONLY** for the **FIRST** item you see in each interval. If there is no debris in an interval, write 0 or N/A in the datasheet for that interval and keep going.
6. Size classes are determined by the longest dimension of the object that will fit within the size class box (see Appendix A, p.28). Size classes start as doubling – e.g. 1cmx1cm; 2cm x 2cm, 4cm x 4cm, 16cm x 16cm.

2.3 Sub-sampling

When you arrive at your site, look closely at the amount of debris in the area. If it is too dense to complete an accurate count, you will have to sub-sample the area. If you think it will take you more than 30 minutes to record all information for the entire transect – SUBSAMPLE – it will make your life simpler!

Figure 2.5 An example of when subsampling would be required

Sub-sampling methods for transect surveys

1. Use the intervals from the Size Class interval that you have written on the **Items List** datasheet. Begin at the start of the transect, 0m. Following the example above, with a total transect length of 26m, each interval will be 2.6m long.

Size class (and sub-sampling intervals)

Interval start (m) 26m	
1	0 – 2.6
2	2.6 – 5.2
3	5.2 – 7.8
4	7.8 – 10.4
5	10.4 – 13.0
6	13.0 – 15.6
7	15.6 – 18.2
8	18.2 – 20.8
9	20.8 – 23.4
10	23.4 - end

2. Choose an appropriate sub-sampling length. The width of the subsample will be the entire width of your transect (e.g. either 1m or 2m). **Choose a sub-sample length** which will divide evenly into the length of the interval. For example, divide the interval length by 2, 5, or 10, depending on the amount of debris present. We will call this value "**X**". Use your best guess, without spending too much time to make that decision! In this example, the transect length is 26m and the interval length is 2.6m. In areas of very concentrated debris, you may select **X** as 10, and have a subsample area of 26cm x 200cm. In areas with slightly less debris, **X** can be 5, and you will survey a larger area, 52cm x 200cm. By selecting a value that divides evenly into the length of the interval, it will make the math easier later on.

3. Record the subsample measurement on the top of the **Transect Data** sheet. Circle Y on the **Transect Data** sheet and the **Items List** datasheet to indicate that you have subsampled the data.

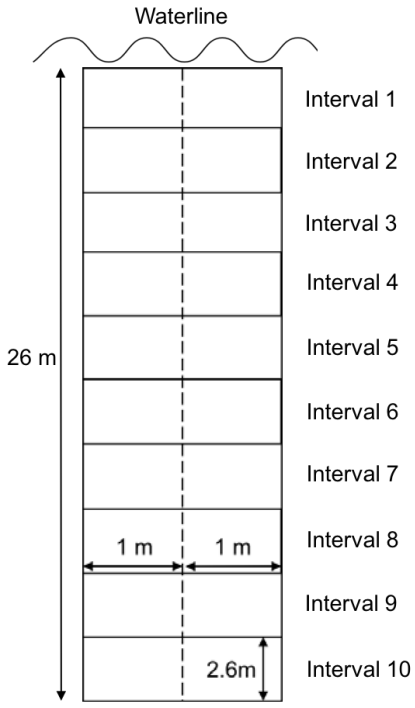
Coastal Transect Data

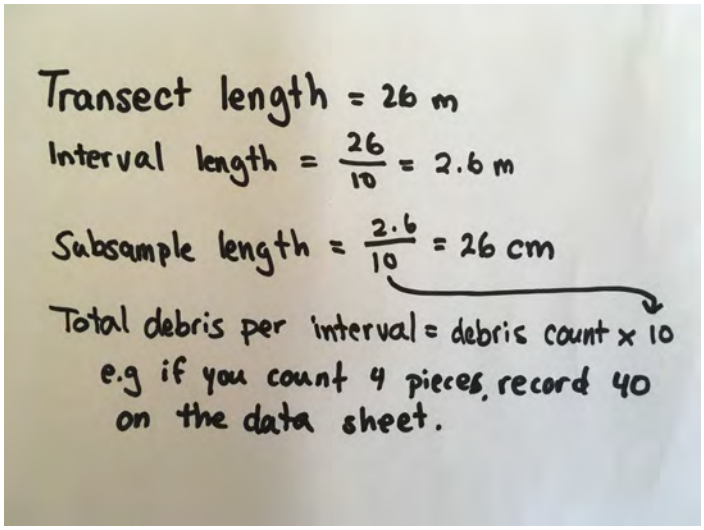
Site Name: Dodges Ferry	Date 26/09/2017	Transect Number: 3 of 3
Transect length (m): 26m	Transect width (m): 2m	Total No. of surveyors: 3
Subsampled? (Y) N	Subsample measurement: 26cm x 200cm	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

4. At the start of each interval, mark out on the ground the areas you have chosen for subsampling. Within each subsample area, count and the number of each different item of debris found as you would on a standard transect.

   NOTE: Before you record the counts of each item on the data sheet, you will need to multiply the number of items times "X" to yield a total count of what the grand total would have been if you had counted every item along the transect (rather than the total items in the subsample).

   Therefore, you will multiply the number of items of debris by the proportion of the subsample area. For example, if you divided your interval length by 10 to determine your subsample length, you will multiply the number of items by 10. If you divided by 2, you will multiply by 2. In the example above, with an interval length of 2.6m and a subsample length of 26cm, all counts will be multiplied by 10 BEFORE you record them on the **Items List** datasheet.





5. Circle the numbers for each individual subsample (so that it is clear that the numbers are distinct from one another), and repeat for every subsequent subsample. If you run out of room on one datasheet, use another, but make sure to fill in how many pages you have used for that transect on the top of the **Items List** datasheet.

Site ID Code: AH110 **ITEMS LIST** **Page** 1 **of** 2

Date: 16/1/19 ☐ **No debris found** **Transect No.** 2 **of** 3 **Subsampled?** (Y) N

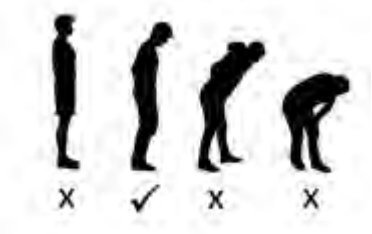
	ITEMS	ID	Fragment	Whole		ITEMS Cont.	ID	Fragment	Whole
Plastic	Pipe/PVC	H1	20		Foam	Food container	D1		
	Beverage bottle <1 L	H2	10 40 60	20 10 50		Cup/plates/bowls	D2		20 30
	Other bottle	H3				Polystyrene	D4		30
	Bottle cap/lid	H4		90 80 40		Unknown/other	D5		
	Food container	H5				Cigarette/butt	P1		

2.4 Before starting transects at any of the sites

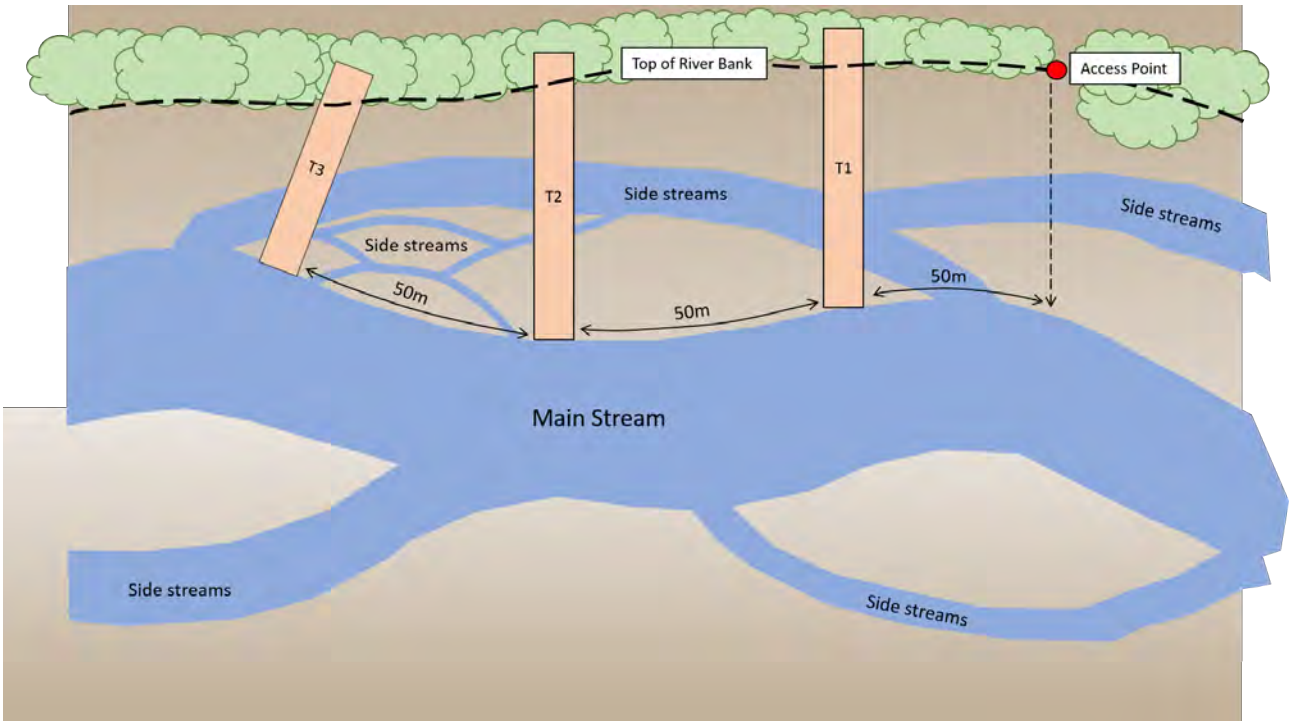
Points to note:

- Before you begin your first transect, have a close look at the area, and determine whether you will need to sub-sample. Sub-sampling methods are used when there is too much debris within the survey area to complete an accurate count (see Sub-Sampling, p. 8). If you are sub-sampling, make sure that you tally the same sized sub-sampling area in each interval. Use additional **Items List** datasheets as necessary.
- Ensure that you complete one **Site Information** sheet per site and at least one **Transect Data/Items List** datasheet for each transect at the site.
- Survey a minimum of three and a maximum of six transects per site.
- Split your transects between the major habitat or land use types (eg: sand, rock slab, boulders, mangroves, park, roadway, vacant lot etc.).
- For coastal and river sites, transects should be located at least 50m from site access point (ideally all should be located on the same side of access point, unless they are in different habitat types). Transects should be 50m away from each other.
- All **Coastal** transects begin at the water's edge and end two metres into the continual terrestrial vegetation (see p. 17).
- All **River** transects begin at the water's edge and end two metres past the influence of the river (see p. 17).
- To ensure standardised data collection, searching should be done from a standing position. When looking for debris, DO NOT bend over. Walk upright and look down with your eyes. Pick up anything you are unsure of for closer inspection, as lots of shells look like plastic and vice versa.

  Note: if you see something you are unsure about, bend down to pick it up, and then decide if it is or is not an item to be reported. But when you are bending down, please do not look for other items to include – wait until you stand upright again!



- All pieces of observable debris within the transect area should be counted. For trawl sample surveys, collect all pieces of debris that are identifiable as non-natural.
- Note that if you find lots of items of one particular category, you can record them in whole numbers instead of ticks, if that saves room or time! E.g. 24 + 2 + 3 instead of ~~IIII~~. Please circle the individual numbers or put plus signs between them, so that it is clear that they are distinct numbers.
- If you find lots of one particular item that is not listed specifically on the data sheet, please add it to the "other" category.
- If you encounter a "braided river" on your **River** transects, run the transect from the edge of the main river to 2m beyond the influence of the outermost side stream. As with other river transects, If you can't tell where the influence of the river ends, go to 2 m beyond the top of the river bank.



3 Standard Transect Methods

3.1 Equipment list

The following is a list of equipment you will need for terrestrial debris surveys. If you are conducting a Surface Trawl Survey, please refer to the equipment list on page 22.

1. GPS (or GPS app on phone)
2. Compass (on phone)
3. Camera (on phone)
4. Wind speed app on phone
5. 1 x 50m Tape measure (can use 25m tape measure for **Inland** transects if desired)
6. 2 markers that you can use to mark points on the ground (such as stakes, sticks, or rocks)
7. One metre long piece of string or rope for each surveyor that can be used to measure width of transect.
8. Pencil to record data
9. Data sheets - one **Site Information** sheet and at least 6 **Transect Data**/**Items List** datasheets for each site visited.

   ** Note it is always a good idea to bring extra **Items List** datasheets in case of subsampling. **
10. Clipboard and rubber bands to keep datasheets in order
11. Gloves (optional), noting you will probably pick up many pieces of litter/rubbish to inspect them.
12. Printout of “Cheat Sheets” and size classes for easy referral.

Setting up your GPS

If you do not have a hand-held GPS, there are a number of useful GPS apps that can be used for your Android or iPhone. Commander Compass Lite is useful in many parts of Asia, and the GPS Status Toolbox has also worked well for people. Please let us know your favourite easy-to-use app so we can share with our networks.

1. Go to the setup page
2. Go to the interface or units page
3. Make sure it is on decimal degrees (dd.dddd) eg 34.96898, 128.567777
4. Datum is WGS84

3.2 Standard Transect Methodology

1. Walk to the GPS location (**inland**) or to where you access the site (**River** and **Coastal**). This may be where you parked the car and can first see the beach/shore/river, it may be the boardwalk where you enter the site. It is often useful to take the first photo here, especially if there is a sign that names the site/beach.

Figure 3.1 Example access points for a river survey (left) and coastal survey (right)

2. Take a GPS reading and record the latitude and longitude under the "Access point location" box and the GPS accuracy on the **Site Information** sheet.
3. Before you move on, fill out the rest of the details on the **Site Information** sheet in the sections SURVEYOR DETAILS and SITE DETAILS.

INLAND SITE INFORMATION

SURVEYOR DETAILS		
Organisation:	CSIRO	*Organisation responsible for survey*
Surveyor name:	John Smith	*Name of data recorder*
Contact number:	+61 234 567 890	*Contact number for data recorder*
Contact email:	John.Smith@csiro.au	*Contact email for data recorder*
Site location:	Latitude: ..... -42.5678° S..... Longitude: .....142.5678° E	*Latitude and longitude of site location (dd.dddd). Ensure GPS is in WGS 84.*
GPS Accuracy	+/- 3m	*Accuracy (metres) of GPS at time of reading*

SITE DETAILS		
Location/Municipality:	Hobart	*Town location of site*
Country:	Australia	*Country in which site was sampled*
Survey date:	16/1/2019	*Date survey undertaken (dd/mm/yyyy)*
Site ID code:	AHIIO	*Site ID code (provided by CSIRO)*
Site name:	Mawson Place	*Unique name of site*

Photo number/s and name of photographer	P1005, John Smith	*The name of photographer and numbers of photos taken at the site*
Dominant land use:	(Industrial) Residential Commercial/Municipal Natural/Parkland Agricultural Roadway	*Circle best option to describe the dominant land use at the site*
Number of humans:	Time of day (00:00): ..... 09:30..... No. of people: ..... 4.....	*Number of people counted in a 100 x 100m area*
Current weather:	(Clear) Rain/Storm Overcast Drizzle	*Circle best option to describe the weather.*
Wind speed:	0 (1) 2 3 4 5	*0: calm* *1: light breeze (<10km/h , <6 knots)* *2: mod. breeze (10-25km/h, 6-20 kn)* *3: strong breeze (25-49km/h, 21- 26 kn)* *4: high wind (50-65 km/h , 27-35 kn)* *5: gale (65-85 km/h, 35-45 kn)*
Wind direction: *(compass)*	(N) NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Date of last clean up:	Street sweeper yesterday (15/1/19)	If known
Access to site:	Paved Unpaved Trail Other (specify):	
Trash cans or rubbish bins present?	(Yes) No	
Cleanliness **at first glance**:	(No debris visible) Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None (Construction) Household Other(specify):	
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish (Apparent spilled trash or rubbish) (Storm or flood) High winds Public event Mowing	
Comments: Did a clean-up as well at this site.		

4. Look around the area, and decide where you will place your transects.
    a. **Inland** sites: determine how many different land use types you see within 100 metres. If there are several different land use types, divide your three transects between them. If you have more than three land use types, choose the three that are largest in area in your site.
    b. **River** and **Coastal** sites: Determine how many different habitat types you see at your site. If there are several different habitat types, divide your three transects between them.
5. Walk to your first transect location.
    a. **Inland** sites: It doesn't matter which land use type you start in. Pick one and walk to it. Take a GPS reading when you first enter the land use type, and this will be the "Transect start" on the **Inland Transect Data** sheet. If your site reference point is in the middle of a single large land use type, use a random method to select the location of your first transect (for example pick up a stone and throw it over your shoulder or choose a random number and walk that number of steps). Put in one of your transect markers here. This is the 'Transect Start' for Transect 1 on the **Inland Survey Data** sheet.

b. **River** and **Coastal** sites: Choose a direction and walk 50m away from the access point. it doesn't matter if you go to the left or right of the access point for transects, but ideally choose one side. In small areas you may have to run transects on both sides of the access point. Once you are 50m from the access point, use a random method to select the location of the first transect (for example pick up a stone and throw it over your shoulder or choose a random number and walk that number of steps along the river). Put in one of your transect markers here at the river's edge. If you cannot access the river at 50m due to vegetation or for safety reasons, please walk **further** (i.e. walk 70 or 100m if necessary) to start your first survey. This is the 'Transect Start' for transect 1 on your **Transect Data** sheet.

6. Fill in as much of the Transect Data sheet as you can BEFORE you begin to collect data on your first transect. Be sure to record the name of the data recorder at the bottom of the page.

Inland Transect Data

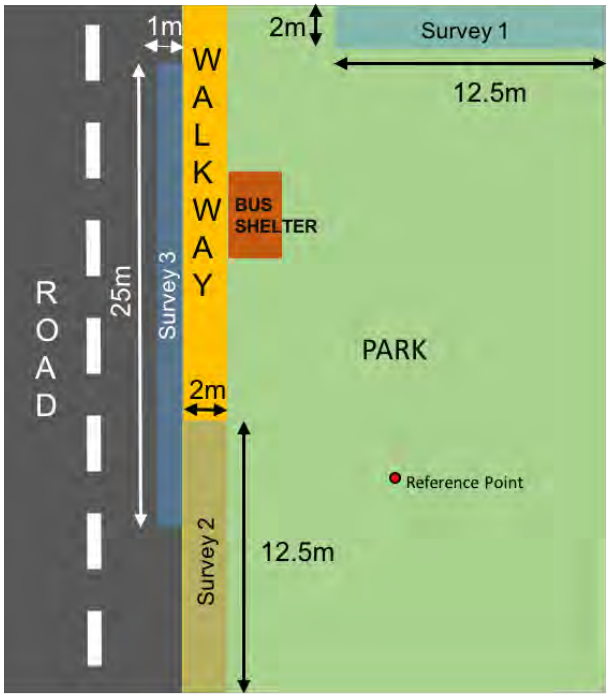
Site ID Code: AHIIO	Date: 16/01/2019	Transect Number: 2 of 3
Transect length (m): 25 m	Transect width (m): 1 m	Total No. of surveyors: 3
Subsampled? Y (N)	Subsample measurement: N/A	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect Start:	Latitude: ..... -42.5678° S..... Longitude: .....142.5678° E ..... Start Time (00:00): .....09:30..... Photo numbers: .....P1278.....	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Ensure GPS is in WGS 84* *Record Start Time of transect* *Photographer name and number of photo, taken from transect start point*
Transect End:	Latitude: ..... Longitude: ..... End Time (00:00): ..... Photo #/photog. name:	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of transect* *Photographer name and number of photo, taken from transect end point*
Type of transect:	Walkway Car park **(Roadway)** School Public transport Drain Natural Veg. Wetland Park Disused Ag/ pasture Ag/ cultivated Other (specify):	*Circle the best option to describe the type of land use of the transect area*
Slope/gradient:	A B C D E **(F)**	*Difference in elevation from start to end of transect.* *A = Flat (no difference) B = 5-50cm (ankle to knee height)* *C = 50-100cm (knee to hip) D = 100-150cm (hip to chest)* *E = 150-180cm (chest to head) F = > 180cm (above head height)*
Vegetation height:	No vegetation **(0 – 5cm)** 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation in the transect area*
Substrate colour (if visible):	White / cream Yellow Orange Brown **(Black)** Grey Red	*Predominant colour of substrate (not vegetation)*
Percent (%) Bare ground	100	*How much of the transect area is bare ground (i.e. un-vegetated) (in 10% intervals)*
Percent (%) of area surveyed:	100	*If unable to survey the whole area what was sampled (in 10% intervals)*
Cleanliness **at first glance**:	No debris visible **(Scattered debris visible)** Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	**(None)** Construction Household Other(specify):	
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish **(Storm or flood)** High winds Public event Mowing	
Comments:		

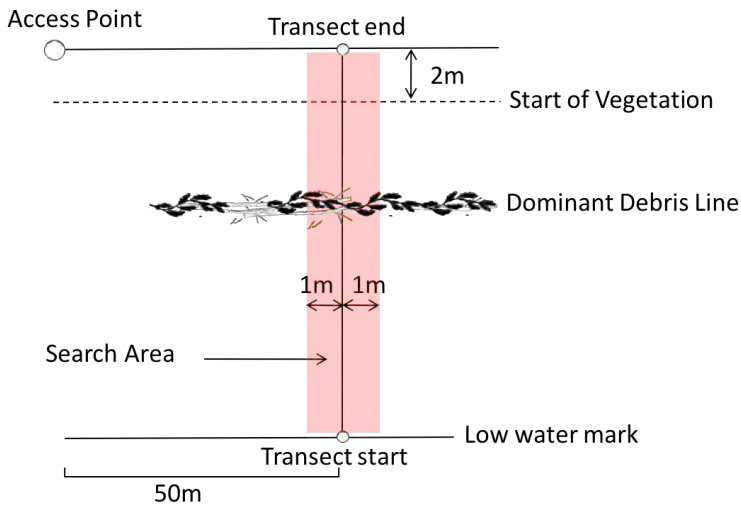
Name of data recorder: John Jackson

Name of person who entered data:

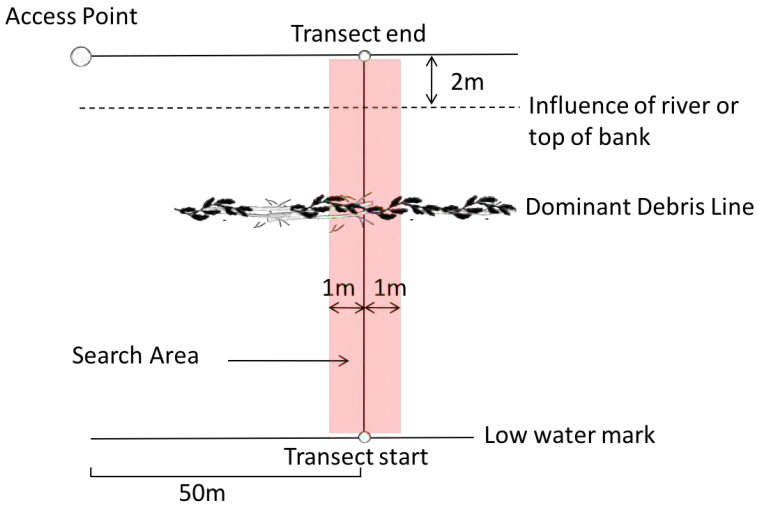
How to lay out transects for Inland, River, and Coastal Sites



Inland transects: Transects should be either 1m x 25m, or 2m x 12.5m. Transects should be situated in different land use types found within 100m of the reference GPS point. In this example, there are four habitats: Walkway, road edge, park, and public transport. You should conduct transects at three of these habitat types. If you do not find debris in any of them, run a fourth transect in the fourth habitat type.



River transects: Transects run from the waterline of the river, to 2 metres beyond the influence of the river. This can be determined by a change in vegetation, an erosion line, a forested area, or a high water mark debris line. If the influence of the river cannot be determined, the transect should run to 2 m beyond the top of the river bank. Be sure to mark the distance of the dominant debris line and the Influence of the river or the top of the river bank. Ensure that transect length is in whole meters (e.g. 26m, not 26.4m).



Coastal Transects: Transect should run from the water's edge to 2m beyond the start of continuous vegetation. Be sure to mark the distance of the dominant debris line on the **Coastal Transect Data** sheet. Ensure that transect length is in whole meters (e.g. 26m, not 26.4m).

7. Laying the transects (see page 17):
    a. **Inland** Transects: Decide whether you will use a 1 x 25 m transect or 2 x 12.5m transect. This will depend on the land-use type. For example, a road edge will be long and narrow, while it may be more convenient to run a wider transect in a park. Be sure to record the length and width of the transect on the **Inland Survey Data** sheet.
    b. **River sites:** Start the tape at the river's edge and lay the tape down from the marker to 2m beyond the edge of the influence of the river. This could be where you see a change in vegetation, an erosion line, a forested area, or a high water mark debris line. Think about how high the river would go in a minor flood, and go 2m beyond that. If it is too difficult to tell where the river's influence is, continue the transect to 2m beyond the top of the bank. Ensure that transect length is in whole meters (e.g. 26m, not 26.4m).
    c. **Coastal sites**: Start the tape at the water's edge and lay the tape down from the marker to 2m beyond the line of continuous vegetation. Ensure that transect length is in whole meters (e.g. 26m, not 26.4m).
8. Place your second marker at the end of the transect. When laying out the tape try not to walk along the transect line, because debris along the transect could be buried or uncovered as a result of walking along the line, Instead, walk the tape out in an arc and straighten the tape once at the end of the transect. Note the total length of the transect and record it on the **Transect Data** sheet.

9. As you are laying out the survey tape, take careful note of the amount of debris in the survey area. If it is too much to count accurately, choose a sub-sampling unit and follow the sub-sampling methodology (page 8).

10. Once you know the entire length of the transect, fill out the intervals for the size class on the **Items List** datasheet.
    a. Divide the total length of the transect by 10. This will give you equal intervals to collect size class data. E.g. If the total length of your transect is 26m, interval lengths will be 2.6m each.
    b. Starting from zero, record the beginning and end of each interval on the size class table on the **Items List** datasheet.

Size class (and sub-sampling intervals)

	Interval start (m) 26m
1	0 – 2.6
2	2.6 - 5.2
3	5.2 - 7.8
4	7.8 - 10.4
5	10.4 - 13.0
6	13.0 - 15.6
7	15.6 - 18.2
8	18.2 - 20.8
9	20.8 - 23.4
10	23.4 - end

11. Starting at your transect start point (at the water's edge for **River** or **Coastal** sites), record the start time. Take a photo of the transect looking up along it, and ensure you write down the number of the photo(s) and the name of the person who took the photos. Try to include the whole transect area in the photo. Record the photo number(s) on the datasheet.
12. In a two-person team, each person walks along either side of the tape looking for any items of debris within 1 metre (for 1m x 25m **Inland** transects, have one surveyor walk down one side of the tape). When looking for debris, DO NOT bend over. Walk upright and look down with your eyes. Pick up anything you are unsure of for closer inspection as lots of shells/rocks look like plastic and vice versa. Walk towards the end of the transect and record all debris items you observe from a standing position.

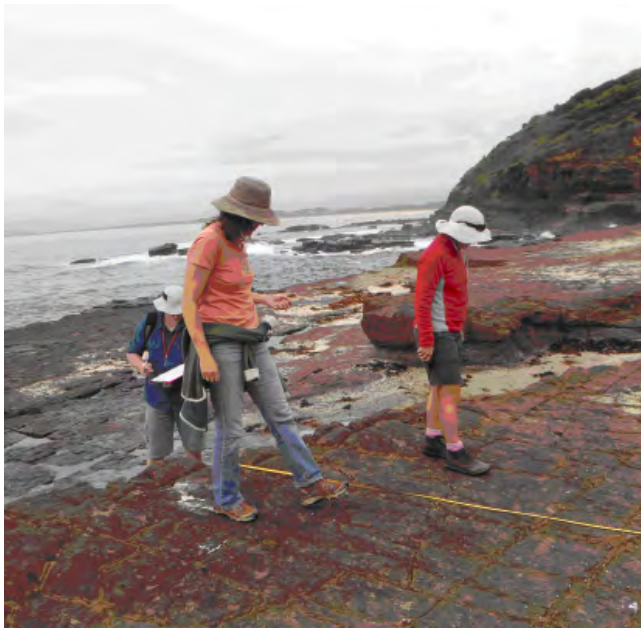


Figure 3.2 Surveyors walking either side of river transect line (left) and coastal transect line (right) searching for litter up to 1m from transect.

13. If you find debris, record it in the appropriate column of the **Items List** datasheet, either "Whole" for items that are identifiable as whole, or "Fragment" for items that are not whole. If you do not find debris, check the box labelled "No debris found"

Site ID Code: AHIIO **ITEMS LIST** **Page** 1 **of** 1

Date: 16/1/19 ☐ **No debris found** **Transect No.** 3 **of** 3 **Subsampled?** Y (N)

	ITEMS	ID	Fragment	Whole		ITEMS Cont.	ID	Fragment	Whole
ard Plastic	Pipe/PVC	H1	𝍸		Foam	Food container	D1		1
	Beverage bottle <1 L	H2	III + 16 + 2	𝍸		Cup/plates/bowls	D2		
	Other bottle	H3	𝍸 IIII			Polystyrene	D4	III	
	Bottle cap/lid	H4				Unknown/other	D5	2	
	Food container	H5		III		Cigarette/butt	P1		
	Utensil/plate/bowl	H6	5			Paper/cardboard	P2		

14. Remember to collect a size class for the first item found in each interval. The size class is based on the longest dimension of the item that fits within the size class box (See Appendix A. Marine Debris Size Chart). For the first piece of debris you find in each interval, record the distance along the transect, the ID of the item and whether it is a fragment or whole (e.g. G1W, D5F), and the size class of the item.

Size class (and sub-sampling intervals)

Interval start (m) 26m		Dist. on tran	ID	Size class
1	0 – 2.6	0.5	G3W	2
2	2.6 – 5.2	2.8	RIW	5
3	5.2 – 7.8	None		
4	7.8 – 10.4	10.3	D5W	1
5	10.4 – 13.0	10.5	D5F	1
6	13.0 – 15.6			
7	15.6 – 18.2			
8	18.2 – 20.8			
9	20.8 – 23.4			
10	23.4 - end			

NOTE: Record the size class **ONLY** for the **FIRST** item you see in each interval. If there is no debris in an interval, skip it and keep going.

15. **River and Coastal transects:** When you reach the dominant or high tide debris line record the distance along the transect. Often the dominant debris line may be several meters wide along the site. Choose what you think is the 'central' point to record in the datasheet. Note that in some cases there may be no debris line (mark N/A on the sheet), or there may be more than one debris line (choose the most dominant one). For **River transects**, also record the distance from the water's edge to the highest point that water comes up the bank. You may see an erosion line here. Also record the distance to the top of the bank, if it is within your transect.
16. Continue your survey, recording everything you find until you have reached the end of your transect (**River Transects -** 2m past the influence of the river. **Coastal Transects** – 2m into the surrounding vegetation).
17. When you have finished tallying the debris in the transect, take another GPS reading at the end marker. This is the 'Transect End.' Also record the time for ending the transect and take a photo(s) looking back towards the first transect marker. Please remember to record photo number(s) and the name of the photographer on the datasheet.

Inland Transect Data

Site ID Code: AHIIO	Date: 16/01/2019	Transect Number: 2 of 3
Transect length (m): 25 m	Transect width (m): 1 m	Total No. of surveyors: 3
Subsampled? Y (N)	Subsample measurement: N/A	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect Start:	Latitude: ..... -42.5678° S..... Longitude: .....142.5678° E ..... Start Time (00:00): .....09:30..... Photo numbers: .....P1278.....	*Latitude and longitude recorded in decimal degrees (dd.dddd) Ensure GPS is in WGS 84* *Record Start Time of transect* *Photographer name and number of photo, taken from transect start point*
Transect End:	Latitude: ..... -42.5878° S..... Longitude: .....142.7678° E ..... Start Time (00:00): .....09:30..... Photo numbers: .....P1279, P1280, Jack.....	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of transect* *Photographer name and number of photo, taken from transect end point*

Figure 3.3 Left: Example of a survey transect on a riverbank, showing the tape extending 2m beyond the influence of the river. Right: Example of a survey transect at a coastal site, showing the tape extending 2m beyond the vegetation.

18. Now you have completed one transect. Move to another land-use or habitat type and repeat steps 5-17 to conduct another survey. If there is only one land-use or habitat type at a site, walk 50m away from your first transect, and choose the next location by a random method.
19. Remember to complete a minimum of three transects per site. If you do not find any debris on the three transects, complete additional transects until you have either found a piece of debris or have completed 6 transects. Try to place transects in different land-use types, or locate them proportional to the area of the different land-use types. For tips on where to place your transects, see page 3.
20. Upon returning from the field, please enter the data into the Global Plastics Database.

4 Surface Trawl Methodology

4.1 Equipment list

Equipment for on the boat

1. Net
2. 3 x cod ends
3. Buckets (or something to put debris from tows in). You will need one bucket per tow, and there are three tows for each station, so bring at least 3 buckets per station that you plan to sample.
4. Datasheets – at least 3 per station
5. GPS (can be on mobile phone)
6. Camera (can be on mobile phone)
7. Smart phone with app to measure:
    a. Windspeed/direction
    b. Groundspeed
    c. Compass

Equipment for in the lab/sorting on shore

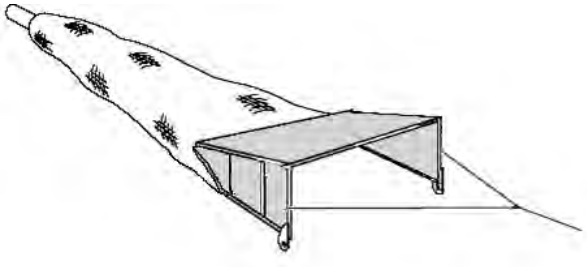
8. 4 x clear plastic tubs
9. Tweezers
10. Battery torch or flashlight

4.2 Methodology for deployment and use of surface trawl net sampling for marine debris

Note that these instructions cover three stages of trawl sampling:

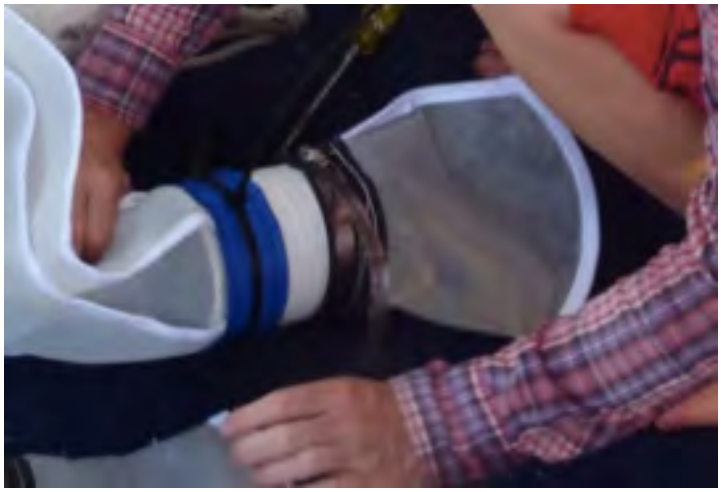
- Before leaving land
- What to do on the boat
- How to sort samples back on land

Before leaving land:
Remove the net from the bag and assemble. Make sure to check the net for holes and repair if necessary. The standard net used by CSIRO has a mouth size of 60 cm by 22 cm, and a mesh size of 330 microns. If you are using a net other than the type provided by CSIRO, please ensure that the mesh size is 330 microns, and that you record the mouth dimensions on the **Surface Trawl Site Information** datasheet.

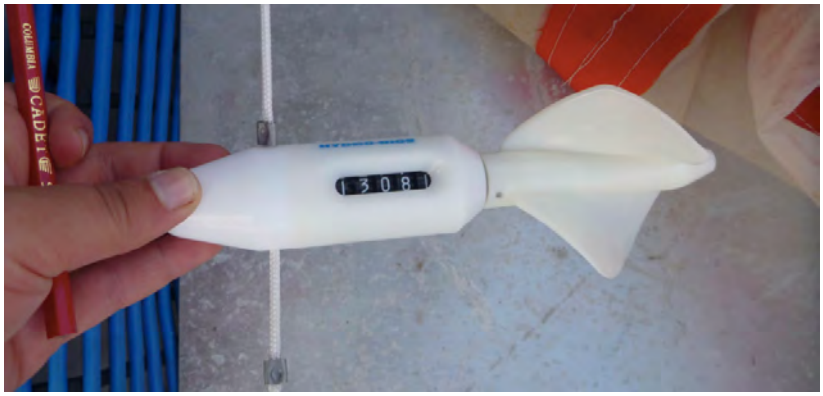


On the vessel:

1. Attach a cod end, making sure that it is clean of all debris.



2. Attach the flow meter. Check that the flow meter is turning freely.



3. Attach the tow rope to the net.

4. Attach the other end of the tow rope to a point on the vessel so that when you put the net in the water it will be towed alongside the vessel, not behind the boat. If towing from a large boat you might need to put weights on the rope to keep the net from skipping across the top of the water.
5. Before you deploy the net, fill in as much of the **Surface Trawl Site Information** datasheet as possible.

SURFACE TRAWL SITE INFORMATION

STATION DETAILS			
Country	Australia		
Location	Derwent River	*(e.g. river name, nearest city, etc)*	
Station Number	3		
Surveyor name and organisation	Jack Doe, CSIRO		
Date *(local; dd/mm/yyyy)*	16/10/2017		
Net type	CSIRO net		
Net mesh size	330 micron		
Net mouth dimensions	60cm x 22cm		
Salinity *(if known, ppt)*	35	**Sea surface temperature** *(°C)*	14.2

TOW DETAILS			
Tow Number	**1**	**2**	**3**
Wind speed *(true, kn)*	15		
Wind direction (degrees)	325		

6. Make sure the boat is going at a speed of 2-3 knots (3.7 – 5.5km/h), and double check all net rigging and cod end before you begin.
7. Deploy the net over the side of the vessel and record start latitude and longitude and start time, in decimal degrees (dd.dddd). Make sure to write in the 5 digit number from the flow meter as well.

Wind direction (degrees)	325		
Start latitude (decimal deg)	-42.9519		
Start longitude (decimal deg)	-147.9239		
Start time *(local / UTC)*	13:20 local		
Start flow meter count	13080		

8. Tow the net for approximately 15 minutes, while vessel is moving at a speed of 2-3 knots, then pull the net out of the water. The goal is to travel approximately one nautical mile (just under 2 kms).

** You may just want to idle the boat once the first transect has been completed and as you prepare for the second and third transect.

9. Record end latitude and longitude, end time, duration of tow, boat speed, direction, and depth, and flow meter end count on the data sheet.

Start flow meter count	13080		
End latitude *(-S)*	-42.9155		
End longitude *(E)*	147.4683		
End time *(local / UTC)*	13:35 local		
End flow meter count	13097		
Average vessel speed *(ground, kn)*	3		
Average vessel direction (degrees)	45		
Average depth *(local, m)*	14 m		
Notes	Lots of debris lines. Net picked up lots of algae.		

10. Take the cod end off and wash contents into a bucket using sea water. Make sure to wash cod end thoroughly to get all debris out. Label bucket with station and tow number, and attach a new, clean cod end.
11. Repeat steps 5 to 10 for tow 2 and tow 3.
12. Once you have finished the station, wash the net and cod ends thoroughly making sure that there is NO debris in the cod end or net as this will contaminate the next sample.
13. Once you have finished all stations, wash all gear thoroughly and leave to dry before packing back up in bag.

Trawl sample sorting – WHEN YOU'RE BACK ON LAND

Sorting of the trawl samples occurs back on land, not in the boat. Note that you will be doing three separate sorts for each tow sample that you have done, so a total of 9 for each station.

1. Tip the contents of station 1 tow 1 into a clear plastic tub. Wash the cod end out into the bucket, making sure that the rinse water also goes into the bucket.
2. Remove any natural/organic material such as seaweed etc. from the bucket, making sure there are no pieces of debris stuck to the organic material.
3. Draw a grid on the bottom of a clear plastic petri dish.
4. Using metal tweezers, remove all pieces of debris you see (using ambient light) and put them in the gridded petri dish.
5. Tally the debris on the **Surface Trawl Collections** datasheet.
6. Continue until you can't find any more pieces

***** Take a 15min break *****

7. Do a second sort on the same sample by repeating steps 4 to 6.

   ***** Take a 15 min break *****

8. Do a third sort on the same sample by repeating steps 4 to 6, but this time use torch light (if available) to search for debris.
9. If you find anything that you are unsure of, have a look under a dissecting microscope (if available). If in doubt, include in the sample.
10. Once you have completed your 3 sorts for the tow or petri dish is full, take a photo, then empty contents into a piece of foil and label with station and tow number. Continue sorting debris into a petri dish if not completed.
11. Wrap all debris from station/tow in foil and label foil with:

   a. Cruise
   b. Station number
   c. Tow number
   d. Name of collector
   e. Date

12. Repeat for all tow samples

Surface Trawl Collection Data

Country	Australia
Location *(e.g. river name, nearest city, etc)*	Derwent River
Station Number	3

Collection Data	Separate the three sorts for each sample in the boxes provided								
Tow Number	**1**			**2**			**3**		
Sorted By (name)	Jack Doe								
Sort number	1	2	3	1	2	3	1	2	3
Hard plastic	3	1	0						
Soft plastic	6	2	1						
Plastic line / fibres	1	0	0						
Foam / Styrofoam	3	0	0						
TOTAL PLASTIC	13	4	1						
Photo details									
Notes									

Appendix A. Marine Debris Size Chart

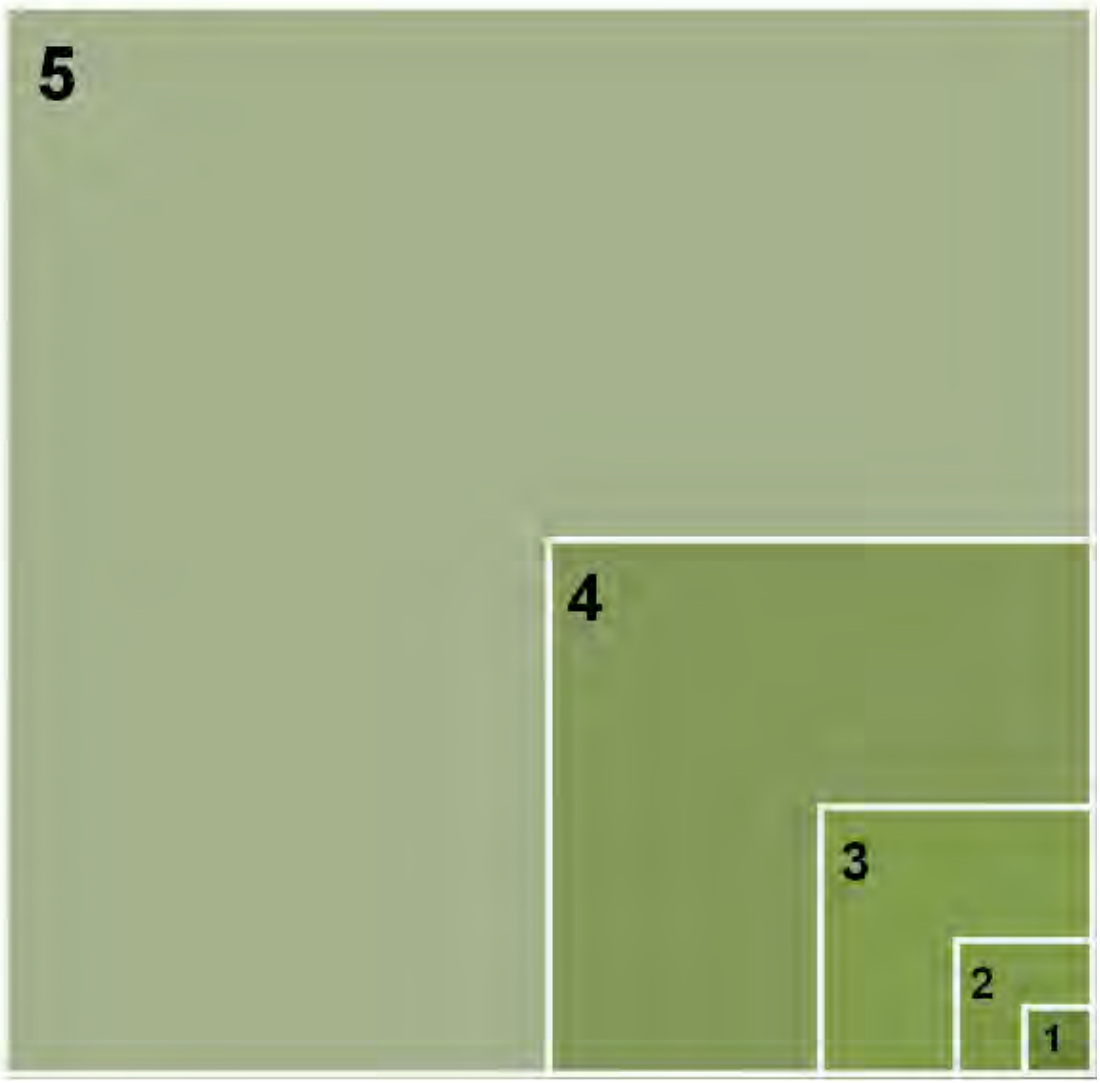
This chart should be used as a guide to help estimate the size of marine debris during surveys (see **Items List** datasheet)

The squares below represent different size classes. To estimate size class, determine which square the object's longest dimension will fit into. Objects should be measured on the diagonal.

1 = 0–1 cm^2 **2** = 1–2 cm^2 **3** = 2–4 cm^2 **4** = 4–8 cm^2
5 = 8–16 cm^2 **6** = 16-21 cm^2 **7** = >22 cm^2

7 *(larger than page)*

6 *(whole of page)*



Appendix B. Methods for gathering data during a clean-up

If you are conducting a clean-up, our suggestion is that you complete transect surveys in advance of your clean up. Please follow the **Transect Methodology** (see page 12), and gather data along 3-6 transects before you conduct the clean-up. Debris from these transects can of course be cleaned up as you go, as long as you record the data while you are conducting the survey. However, if you are conducting a larger sized clean-up, and would like to record data on the debris you have collected during your clean-up, then please follow the methods in this Appendix.

A few things to note before you start:

1. It is very important to have accurate measurements of the area cleaned, and an accurate count of ALL of the debris found within the survey area. If you are cleaning a very large area, choose a smaller section of it to collect data on. Take the time to thoroughly clean this area, picking up even the tiniest pieces of debris visible.
2. Choose the survey area randomly, without taking into account the amount of debris inside. A good way to do this is to walk 50m from the access point of the beach, then choose a random number and walk that many steps further. Then start the survey at that point.
3. Make sure that any debris collected for data purposes is placed in clearly marked bags with the beach name and survey number. Note that we can accept International Coastal Cleanup (ICC) or other similar clean-up data, if a few simple guidelines are followed.
    a. Report the area cleaned (length x width.
    b. Report the number of people participating in the clean-up.
    c. Report the total amount of time spend conducting the clean-up.
1. For the purposes of data collection, please ensure that you only report on debris that has been collected within the fixed area survey boundaries. If additional items are cleaned from outside the survey area, please ensure they are kept in separate, labelled bags to ensure high data quality.
2. Write in the comments area on the **Coastal Site Information** sheet that you have conducted a clean-up of transects or clean-up of a fixed area.

Equipment List

1. GPS (or GPS app on phone)
2. Compass (on your phone)
3. Camera (on phone)
4. 2 x 50m tape measures
5. Three markers that you can use to mark points on the ground (such as stakes, sticks, or rocks)
6. Pen/pencil
7. Data sheets - one **Site Information** sheet and at least 7 **Survey Data**/**Items List** datasheets
8. Gloves (optional), noting you will probably pick up many pieces of litter/rubbish to inspect them

Methodology

1. Walk to the spot where you access the site. This may be where you parked the car and can first see the beach/shore/river, it may be the boardwalk where you enter the site. It is often useful to take the first photo here, especially if there is a sign that names the site/beach.

Figure 4.1 Example access point for a coastal fixed area survey, where your first GPS waypoint is recorded

2. Take a GPS reading and record the latitude and longitude under the "Access point location" box and the GPS accuracy on the **Site Information** sheet.
3. Before you move on, fill out the rest of the details on the **Site Information** sheet in the sections SURVEYOR DETAILS and SITE DETAILS.

COASTAL SITE INFORMATION

SURVEYOR DETAILS		
Organisation:	CSIRO	*Organisation responsible for survey*
Surveyor name:	John Jackson	*Name of data recorder*
Contact number:	+61 234 567 890	*Contact number for data recorder*
Contact email:	John.Smith@csiro.au	*Contact email for data recorder*
Access point location:	Latitude: ..... -42.5678° S..... Longitude: .....142.5678° E	*Latitude and longitude of access point where you enter the beach (dd.dddd). Ensure GPS is in WGS 84.*
GPS accuracy:	+/- 3m	*Accuracy (metres) of GPS at time of reading.*

SITE DETAILS		
Location/Municipality	Hobart	*Town location of site*
Country:	Australia	*Country in which site was sampled*
Survey date:	16/10/2017	*Date survey undertaken (dd/mm/yyyy).*
Site name:	Dodges Ferry	*Unique name of site*
Photo number/s:	P1005	*The name of photographer and photo #s from the site*
Number of humans:	Time of day (00:00): .....09:30..... Visible distance (m): ...400..... No. of people: .....20.....	*Number of people counted in the visible area measured by instantaneous count. Visible distance is length of shore with a clear and unobstructed view.*

Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather.*
Wind speed:	0 1 2 **3** 4 5	*0: calm (flat ocean)* *1: light breeze (wavelets, <10km/h, <6 knots)* *2: moderate breeze (small waves braking crests, 10-25km/h, 6-20 knots)* *3: strong breeze (waves and many white caps, 25-49km/h, 21- 26 knots)* *4: high wind (white caps and airborne spray, 50-65 km/h, 27-35 knots)* *5: gale (high waves, foam and spray present, 65-85 km/h, 35-45 knots)*
Wind direction: *(compass)*	N NE E **SE** S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Wind direction: *(relative to shore)*	onshore offshore sideshore **side-on** side-off	*Onshore: wind blowing towards shore* *Offshore: wind blowing towards sea* *Sideshore: wind blowing parallel to shore* *Side-onshore: wind blowing sideways and towards shore* *Side-offshore: wind blowing sideways and towards sea*
Date of last clean up:	Unknown	*If known.*
Access to site	Paved Unpaved **Trail** Other (specify):	
Trash cans or rubbish bins present?	**Yes** No	
Cleanliness **at first glance**:	No debris visible **Scattered debris visible** Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	**None** Construction Household Other(specify):	
Evidence of recent activities at site: (circle one or more)	Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood **High winds** Public event Mowing	
Comments: Conducting clean up at site		

4. Have a look at the environment around you. If you plan to do only one survey, site it in the most abundant habitat type. If you plan to do additional surveys, and there are several different habitats or land use types at your site, site your surveys in different habitat types. (see Site Selection, page 6).
5. Walk 50m away from the access point. Once you are 50m from the access point, use a random method to select the location of the first survey at the water's edge (for example pick up a stone and throw it over your shoulder or pick a random number and walk that number of steps down the beach). Put in one of your survey markers here at the water's edge. This is the 'Transect Start' for transect 1 on your **Coastal Transect Data** sheet.
6. Fill in as much of the first page of the **Coastal Transect Data** sheet as you can BEFORE you begin to collect data on your survey. Make a note in the comments section that this is a fixed area clean-up survey.

Coastal Transect Data

Site Name: Dodges Ferry	Date 26/09/2017	Transect Number: 1 of 1
Transect length (m):	Transect width (m): 30 m	Total No. of surveyors: 10
Subsampled? Y (N)	Subsample measurement: N/A	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

Transect start:	Latitude: ..... -42.5678° S..... Longitude: .....142.5678° E ..... Start Time (00:00): .....09:30..... Photo #/photog. name: ..... John Jackson P1298.....	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record Start Time of Transect* *Photographer name and number of photo, taken from transect start point*
Transect end:	Latitude: ..... Longitude: ..... End Time (00:00): ..... Photo #/photog. name:	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo,, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line (in meters) at time of survey. If no obvious debris line use NA.*
Beach gradient:	A (B) C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height)* *B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length)* *D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Substrate type:	Mud (Sand) Pebble / Gravel Boulders Rock slab Mangrove	*Major substrate type*
Substrate colour (if visible):	White / cream (Yellow) Orange Brown Black Grey Red	*Predominant colour of substrate*
Backshore type:	(Cliff) Seawall Urban building Forest / Tree (> 3m) Shrub (< 3m) Dune Grass - tussock Grass - pasture Mangrove	*Physical structure of backshore, where beach meets terrestrial vegetation*
Shore exposure or shape:	Cove/bay (Straight) Headland	*Shape of beach where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE (S) SW W NW	*Direction when you are facing the water*
Evidence of dumping? (circle one or more)	(None) Construction Household Other(specify):	
Evidence of recent activities within transect area: (circle one or more)	Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	

Comments:

Debris collected as part of fixed area clean up

Name of data recorder: John Jackson

Name of person who entered data:

7. Start the tape at the water's edge and lay the tape down from the marker to 2m beyond the line of continuous vegetation (see Figure 4.2) and put second marker here (this will be the 'Transect end'). When laying out the tape try not to walk along the path of the transect line, because debris along the transect could be buried or uncovered as a result of walking along the line. Instead, walk the tape out in an arc and straighten the tape once at the end of the transect. Note the total length of the survey (to the nearest whole meter) and record it on the datasheet.

Coastal Transect Data

Site Name: Dodges Ferry	Date 26/09/2017	Transect Number: 1 of 1
Transect length (m): 48 m	Transect width (m): 30 m	Total No. of surveyors: 10
Subsampled? Y (N)	Subsample measurement: N/A	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

Figure 4.2 The survey transect should run 2m into backshore vegetation

8. Run a second tape along the water's edge, for as wide as you would like your survey to be. We recommend 30m, but you can select a larger area for larger groups, as long as you can confidently collect all of the debris within that area in your available time period.
9. Put in a third marker at the end of the survey. Record the width of your survey (to the nearest whole meter) on the **Coastal Survey Data** form in the "Transect width" field. The fixed area survey should look like Figure 4.3 below

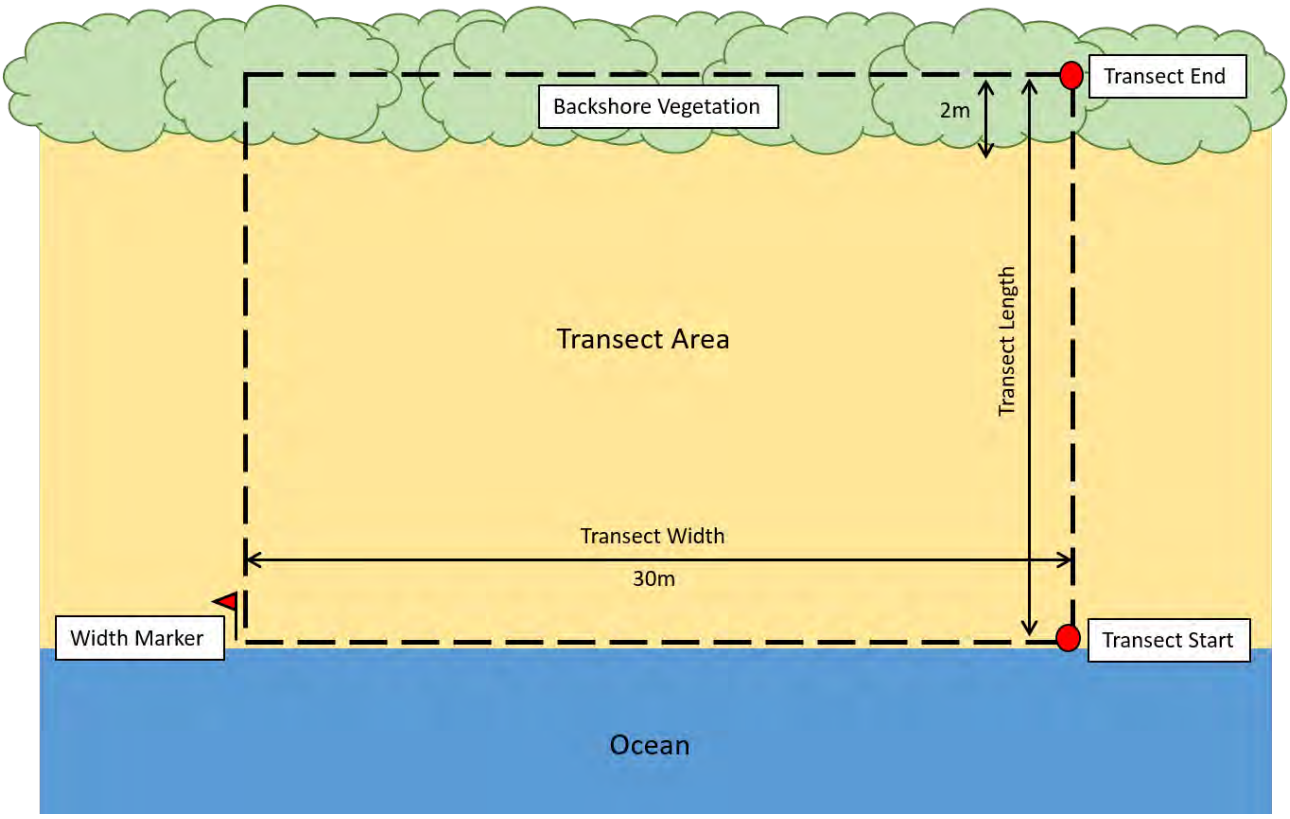


Figure 4.3 Diagram showing how to lay out a fixed area transect

10. Take a GPS reading at the marker at the water's edge, and record the Latitude, Longitude, and start time on the **Coastal Survey** Data sheet. Take a photo(s) of the survey area, and ensure you write down the number of the photo(s).
11. Participants should line up shoulder to shoulder starting at the water's edge and walk in a line along the width of the survey, picking up every piece of debris they see. When looking for debris, DO NOT bend over. Walk upright and look down with your eyes. Pick up anything you are unsure of for closer inspection, as lots of shells look like plastic and vice versa.
12. Once one line is done down the beach all observers then move up the transect length and come back down the width of the transect so the whole area (including 2m into the backshore vegetation) is cleaned. Please ensure that when the group returns back down the beach, that no areas are skipped or double counted. The best way to do this is for the line of observers to pivot around the last person in line. They will mark the area that has already been counted, and then the next sweep can start just beyond.

Figure 4.4 Surveying a fixed area, walking shoulder-to-shoulder

13. When you reach the dominant or high tide debris line record the distance along the transect. Often the dominant debris line may be several meters wide along the site. Choose what you think is the 'central' point to record in the datasheet. Note that in some cases there may be no debris line, or there may be more than one dominant debris line.

Transect start:	Latitude: ..... -42.5678° S..... Longitude: .....142.5678° E ..... Start Time (00:00): .....09:30..... Photo #/photog. name: ..... John Jackson P1298.....	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record Start Time of Transect* *Photographer name and number of photo, taken from transect start point*
Transect end:	Latitude: ..... Longitude: ..... End Time (00:00):..... Photo #/photog. name:	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo,, taken from transect end point*
Distance to dominant debris line (m):	13 m	*Distance from water edge to major debris line (in meters) at time of survey. If no obvious debris line use NA.*

14. When you reach the transect end marker in the backshore vegetation, take another GPS reading and this will be your 'Transect End'. Also record the End time and take a photo(s).
15. Now you have completed one fixed area survey. REMEMBER: to mark the bags of collected debris with beach name and fixed area survey number.
16. If time allows and you want to do another survey, move 50m or more down the beach and repeat for another transect. Remember to mark bags collected with beach name and fixed area survey #2 and keep debris in a separate bag(s) to survey #1
17. When you have completed as many surveys as you wish, it's time to itemise and count the collected debris. Get the bags of debris from fixed area survey #1 and place them on the ground (somewhere where they will not be blown away, in a room/shelter is best).
    a. You will need to have 7 of the **Items List** datasheets – one for each size class
    b. Write the size category (Size class 1, Size class 2, etc). on the top of the **Items List** datasheet
    c. Sort the rubbish into respective size classes (page 28).
    d. For each size class record each item in the 'whole' or 'fragment' column next to the corresponding item, on the **Items List** datasheet which corresponds to that size class.
    e. If there is no debris found on the survey, please tick the box "no debris found" on the items list.
18. Enter the data into the Global Plastics Database

Appendix C. Datasheets

- Coastal Site Information sheet
- Coastal Transect Datasheet
- River Site Information sheet
- River Transect Datasheet
- Inland Site Information sheet
- Inland Transect Datasheet
- Items List
- Surface Trawl Site Information Datasheet
- Surface Trawl Collection Datasheet

COASTAL SITE INFORMATION

SURVEYOR DETAILS		
Organisation:		*Organisation responsible for survey*
Surveyor name:		*Name of data recorder*
Contact number:		*Contact number for data recorder*
Contact email:		*Contact email for data recorder*
Access point location:	Latitude: …… Longitude: ……	*Latitude and longitude of access point where you enter the beach (dd.dddd). Ensure GPS is in WGS 84.*
GPS accuracy:		*Accuracy (metres) of GPS at time of reading.*

SITE DETAILS		
Location/Municipality		*Town location of site*
Country:		*Country in which site was sampled*
Survey date:		*Date survey undertaken (dd/mm/yyyy).*
Site ID code:		*Site ID code (provided by CSIRO)*
Site name:		*Unique name of site*
Photo info:		*The name of photographer and photo #s from the site*
Number of humans:	Time of day (00:00): …… Visible distance (m): …… No. of people: ……	*Number of people counted in the visible area measured by instantaneous count. Visible distance is length of shore with a clear and unobstructed view.*
Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather.*
Wind speed:	0 1 2 3 4 5	*0: calm (flat ocean)* *1: light breeze (wavelets, <10km/h , <6 knots)* *2: moderate breeze (small waves braking crests, 10-25km/h, 6-20 knots)* *3: strong breeze (waves and many white caps, 25-49km/h, 21- 26 knots)* *4: high wind (white caps and airborne spray, 50-65 km/h , 27-35 knots)* *5: gale (high waves, foam and spray present, 65-85 km/h, 35-45 knots)*
Wind direction: *(compass)*	N NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Wind direction: *(relative to shore)*	onshore offshore sideshore side-on side-off	*Onshore: wind blowing towards shore* *Offshore: wind blowing towards sea* *Sideshore: wind blowing parallel to shore* *Side-onshore: wind blowing sideways and towards shore* *Side-offshore: wind blowing sideways and towards sea*
Date of last clean up:		*If known.*
Access to site	Paved Unpaved Trail Other (specify):	
Trash cans or rubbish bins present?	Yes No	
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Coastal Transect Data

Site ID Code:	Date	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record Start Time of Transect* *Photographer name and number of photo, taken from transect start point*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo,, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line (in meters) at time of survey. If no obvious debris line use NA.*
Beach gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height)* *B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length)* *D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Substrate type:	Mud Sand Pebble / Gravel Boulders Rock slab Mangrove	*Major substrate type*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Backshore type:	Cliff Seawall Urban building Forest / Tree (> 3m) Shrub (< 3m) Dune Grass - tussock Grass - pasture Mangrove	*Physical structure of backshore, where beach meets terrestrial vegetation*
Shore exposure or shape:	Cove/bay Straight Headland	*Shape of beach where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*

Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing

Comments:

Name of data recorder: Name of person who entered data:

RIVER SITE INFORMATION

SURVEYOR DETAILS		
Organisation:		*Organisation responsible for survey*
Surveyor name:		*Name of data recorder*
Contact number:		*Contact number for data recorder*
Contact email:		*Contact email for data recorder*
Access point location:	Latitude: …… Longitude: ……	*Latitude and longitude of access point where you enter the beach (dd.dddd). Ensure GPS is in WGS 84.*
GPS accuracy:		*Accuracy (metres) of GPS at time of reading.*

SITE DETAILS		
Location/Municipality		*Town location of site*
Country:		*Country in which site was sampled*
Survey date:		*Date survey undertaken (dd/mm/yyyy)*
Site ID code:		*Site ID code (provided by CSIRO)*
River name:		*Unique name of site*
Photo info:		*The name of photog. and photo #s from the site*
Dominant land use	Industrial Residential Commercial/Municipal Natural/Parkland Agricultural Roadway	*Circle best option to describe the dominant land use at the site*
Number of humans:	Time of day (00:00): …… Visible distance (m): …… No. of people: ……	*Number of people counted in the visible area measured by instantaneous count. Visible distance is length of shore with a clear and unobstructed view.*
Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather*
Wind speed:	0 1 2 3 4 5	*0: calm* *1: light breeze (<10km/h , <6 knots)* *2: mod. breeze (10-25km/h, 6-20 kn)* *3: strong breeze (25-49km/h, 21- 26 kn)* *4: high wind (50-65 km/h , 27-35 kn)* *5: gale (65-85 km/h, 35-45 kn)*
Wind direction: *(compass)*	N NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Wind direction: *(relative to shore)*	onshore offshore sideshore side-on side-off	*Onshore: wind blowing towards shore* *Offshore: wind blowing away from shore* *Sideshore: wind blowing parallel to shore* *Side-on: wind blowing sideways and towards shore* *Side-off: wind blowing sideways and away from shore*
Date of last clean up:		*If known*
Access to river:	Paved Unpaved Trail Other (specify):	

Trash cans or rubbish bins present?	Yes No
Cleanliness **at first glance:**	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

River Transect Data

Site ID Code:	Date:	Transect No. _____ of _____
Transect length (m):	Transect width (m):	No. of surveyor(s):
Subsampled: Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Start Time of Transect* *Photographer name and number of photo, taken from transect start point.*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line. If not obvious, use NA.*
Distance to top of bank (m):		*Distance from water edge to top of the bank*
Distance of river influence/erosion line (m):		*Height that water comes up the bank/erosion line*
River gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height, B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length) D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Bank type:	Mud Sand Pebble/Gravel Cobble Boulders Rock slab Mangrove Dirt bank Vegetated Cement	*Major substrate type*
Bank substrate colour (if visible):	White/cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Bank vegetation:	Grass/Reeds Broadleaf/herb Shrub (< 3m) Tree (> 3m) Forest None	*Circle the best option to describe the type of vegetation on the transect*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation on the transect*
Percent (%) Bare ground %		*How much of the transect is bare ground (i.e. unvegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area, what was sampled (in 10% intervals)*
Shore exposure or shape:	Cove / bay Straight Headland	*Shape of river where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*
River bank channelized? (e.g. human intervention changes course of river)	Yes No	Storm water drains present? Yes No
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within survey area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder:

Name of person who entered data:

INLAND SITE INFORMATION

SURVEYOR DETAILS		
Organisation:		*Organisation responsible for survey*
Surveyor name:		*Name of data recorder*
Contact number:		*Contact number for data recorder*
Contact email:		*Contact email for data recorder*
Site location:	Latitude: …… Longitude: ……	*Latitude and longitude of site location (dd.dddd). Ensure GPS is in WGS 84.*
GPS Accuracy		*Accuracy (metres) of GPS at time of reading*

SITE DETAILS		
Location/Municipality:		*Town location of site*
Country:		*Country in which site was sampled*
Survey date:		*Date survey undertaken (dd/mm/yyyy)*
Site ID code:		*Site ID code (provided by CSIRO)*
Site name:		*Unique name of site*
Photo number/s and name of photographer		*The name of photographer and numbers of photos taken at the site*
Dominant land use:	Industrial Residential Commercial/Municipal Natural/Parkland Agricultural Roadway	*Circle best option to describe the dominant land use at the site*
Number of humans:	Time of day (00:00): …… No. of people: ……	*Number of people counted in a 100 x 100m area*
Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather.*
Wind speed:	0 1 2 3 4 5	*0: calm* *1: light breeze (<10km/h , <6 knots)* *2: mod. breeze (10-25km/h, 6-20 kn)* *3: strong breeze (25-49km/h, 21- 26 kn)* *4: high wind (50-65 km/h , 27-35 kn)* *5: gale (65-85 km/h, 35-45 kn)*
Wind direction: *(compass)*	N NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Date of last clean up:		If known
Access to site:	Paved Unpaved Trail Other (specify):	

Trash cans or rubbish bins present?	Yes No
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

Inland Transect Data

Site ID Code:	Date:	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect Start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd) Ensure GPS is in WGS 84* *Record Start Time of transect* *Photographer name and number of photo, taken from transect start point*
Transect End:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of transect* *Photographer name and number of photo, taken from transect end point*
Type of transect:	Walkway Car park Roadway School Public transport Drain Natural Veg. Wetland Park Disused Ag/ pasture Ag/ cultivated Other (specify):	*Circle the best option to describe the type of land use of the transect area*
Slope/gradient:	A B C D E F	*Difference in elevation from start to end of transect.* *A = Flat (no difference) B = 5-50cm (ankle to knee height)* *C = 50-100cm (knee to hip) D = 100-150cm (hip to chest)* *E = 150-180cm (chest to head) F = > 180cm (above head height)*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation in the transect area*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red	*Predominant colour of substrate (not vegetation)*
Percent (%) Bare ground		*How much of the transect area is bare ground (i.e. un-vegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area what was sampled (in 10% intervals)*
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

SURFACE TRAWL SITE INFORMATION

STATION DETAILS			
Country			
Location		*(e.g. river name, nearest city, etc)*	
Station Number			
Surveyor name and organisation			
Date *(local; dd/mm/yyyy)*			
Net type			
Net mesh size			
Net mouth dimensions			
Salinity *(if known, ppt)*		**Sea surface temperature** *(℃)*	

TOW DETAILS			
Tow Number	**1**	**2**	**3**
Wind speed *(true, kn)*			
Wind direction (degrees)			
Start latitude (decimal deg)			
Start longitude (decimal deg)			
Start time *(local / UTC)*			
Start flow meter count			
End latitude *(-S)*			
End longitude *(E)*			
End time *(local / UTC)*			
End flow meter count			
Average vessel speed *(ground, kn)*			
Average vessel direction (degrees)			
Average depth *(local, m)*			
Notes			

Surface Trawl Collection Data

Country	
Location *(e.g. river name, nearest city, etc)*	
Station Number	

Collection Data	Separate the three sorts for each sample in the boxes provided								
Tow Number	**1**			**2**			**3**		
Sorted By (name)									
Sort number	1	2	3	1	2	3	1	2	3
Hard plastic									
Soft plastic									
Plastic line / fibres									
Foam / Styrofoam									
TOTAL PLASTIC									
Photo details									
Notes									

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2.2 Coastal Datasheets

COASTAL SITE INFORMATION

SURVEYOR DETAILS		
Organisation:		*Organisation responsible for survey*
Surveyor name:		*Name of data recorder*
Contact number:		*Contact number for data recorder*
Contact email:		*Contact email for data recorder*
Access point location:	Latitude: …… Longitude: ……	*Latitude and longitude of access point where you enter the beach (dd.dddd). Ensure GPS is in WGS 84.*
GPS accuracy:		*Accuracy (metres) of GPS at time of reading.*

SITE DETAILS		
Location/Municipality		*Town location of site*
Country:		*Country in which site was sampled*
Survey date:		*Date survey undertaken (dd/mm/yyyy).*
Site ID code:		*Site ID code (provided by CSIRO)*
Site name:		*Unique name of site*
Photo info:		*The name of photographer and photo #s from the site*
Number of humans:	Time of day (00:00): …… Visible distance (m): …… No. of people: ……	*Number of people counted in the visible area measured by instantaneous count. Visible distance is length of shore with a clear and unobstructed view.*
Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather.*
Wind speed:	0 1 2 3 4 5	*0: calm (flat ocean)* *1: light breeze (wavelets, <10km/h , <6 knots)* *2: moderate breeze (small waves braking crests, 10-25km/h, 6-20 knots)* *3: strong breeze (waves and many white caps, 25-49km/h, 21- 26 knots)* *4: high wind (white caps and airborne spray, 50-65 km/h , 27-35 knots)* *5: gale (high waves, foam and spray present, 65-85 km/h, 35-45 knots)*
Wind direction: *(compass)*	N NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Wind direction: *(relative to shore)*	onshore offshore sideshore side-on side-off	*Onshore: wind blowing towards shore* *Offshore: wind blowing towards sea* *Sideshore: wind blowing parallel to shore* *Side-onshore: wind blowing sideways and towards shore* *Side-offshore: wind blowing sideways and towards sea*
Date of last clean up:		*If known.*
Access to site	Paved Unpaved Trail Other (specify):	
Trash cans or rubbish bins present?	Yes No	
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

7 *(larger than page)*

Marine Debris Size Chart

Guidelines:

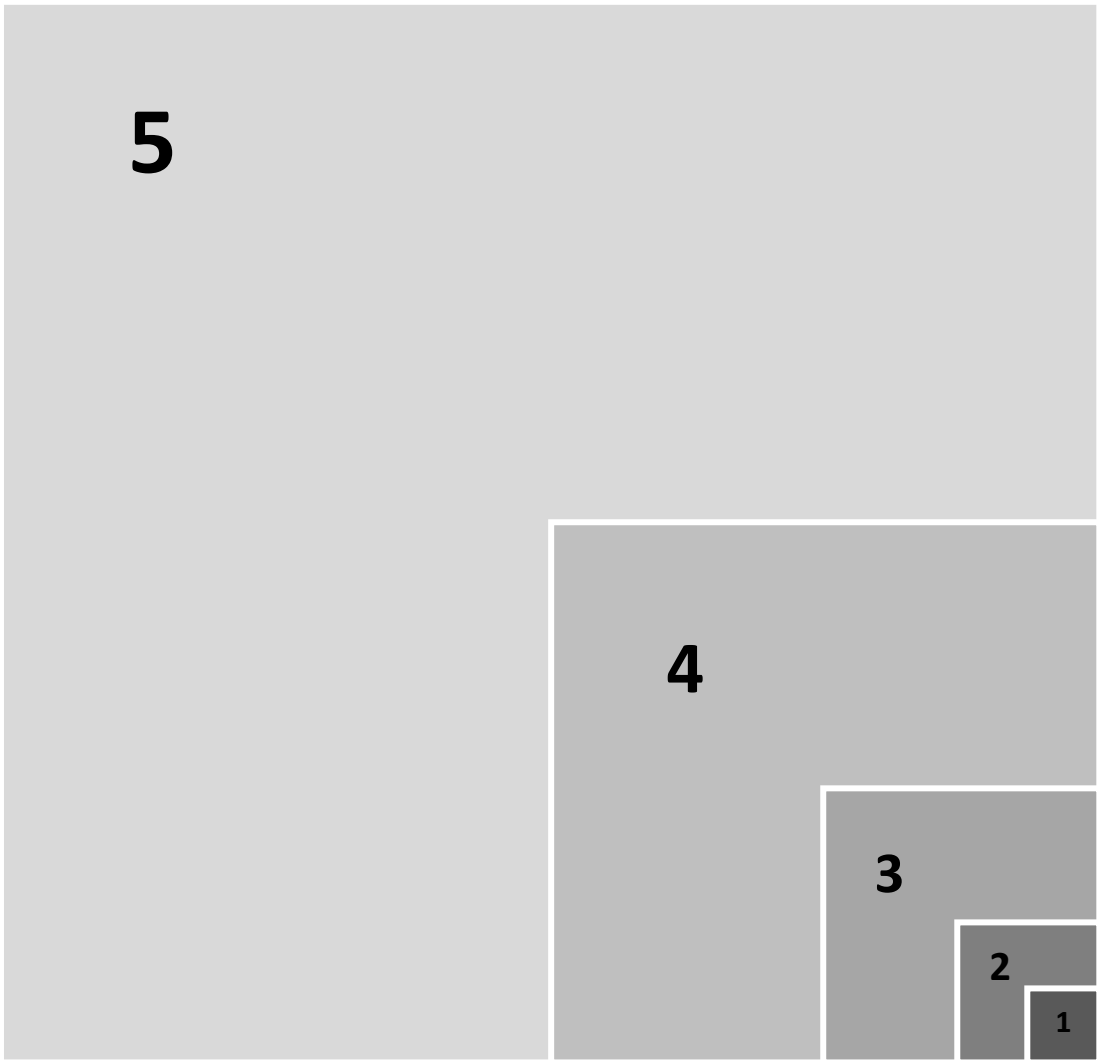
* This chart should be used as a guide to help estimate the size of marine debris during each beach transect (see transect sheet)

* The squares below represent different size classes

1 = 0–1 cm^2 ; **2** = 1–2 cm^2 ; **3** = 2–4 cm^2 ; **4** = 4–8 cm^2 ; **5** = 8–16 cm^2 ; **6** = 16-21 cm^2; **7** = >22 cm^2

* To estimate size, the longest dimension of an item must fit wholly within a size class.

6 *(whole of page)*



Coastal Transect Data

Site ID Code:	Date	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record Start Time of Transect* *Photographer name and number of photo, taken from transect start point*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo,, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line (in meters) at time of survey. If no obvious debris line use NA.*
Beach gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height)* *B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length)* *D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Substrate type:	Mud Sand Pebble / Gravel Boulders Rock slab Mangrove	*Major substrate type*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Backshore type:	Cliff Seawall Urban building Forest / Tree (> 3m) Shrub (< 3m) Dune Grass - tussock Grass - pasture Mangrove	*Physical structure of backshore, where beach meets terrestrial vegetation*
Shore exposure or shape:	Cove/bay Straight Headland	*Shape of beach where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*

Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

Coastal Transect Data

Site ID Code:	Date	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record Start Time of Transect* *Photographer name and number of photo, taken from transect start point*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo,, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line (in meters) at time of survey. If no obvious debris line use NA.*
Beach gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height)* *B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length)* *D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Substrate type:	Mud Sand Pebble / Gravel Boulders Rock slab Mangrove	*Major substrate type*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Backshore type:	Cliff Seawall Urban building Forest / Tree (> 3m) Shrub (< 3m) Dune Grass - tussock Grass - pasture Mangrove	*Physical structure of backshore, where beach meets terrestrial vegetation*
Shore exposure or shape:	Cove/bay Straight Headland	*Shape of beach where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*

Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

Coastal Transect Data

Site ID Code:	Date	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample area (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record Start Time of Transect* *Photographer name and number of photo, taken from transect start point*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo,, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line (in meters) at time of survey. If no obvious debris line use NA.*
Beach gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height)* *B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length)* *D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Substrate type:	Mud Sand Pebble / Gravel Boulders Rock slab Mangrove	*Major substrate type*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Backshore type:	Cliff Seawall Urban building Forest / Tree (> 3m) Shrub (< 3m) Dune Grass - tussock Grass - pasture Mangrove	*Physical structure of backshore, where beach meets terrestrial vegetation*
Shore exposure or shape:	Cove/bay Straight Headland	*Shape of beach where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*

Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
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	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
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	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
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	Cups	P9		
	Plates/bowls	P10		
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	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
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Other		O1		
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		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

2.3 Inland Datasheet

INLAND SITE INFORMATION

SURVEYOR DETAILS		
Organisation:		*Organisation responsible for survey*
Surveyor name:		*Name of data recorder*
Contact number:		*Contact number for data recorder*
Contact email:		*Contact email for data recorder*
Site location:	Latitude: …… Longitude: ……	*Latitude and longitude of site location (dd.dddd). Ensure GPS is in WGS 84.*
GPS Accuracy		*Accuracy (metres) of GPS at time of reading*

SITE DETAILS		
Location/Municipality:		*Town location of site*
Country:		*Country in which site was sampled*
Survey date:		*Date survey undertaken (dd/mm/yyyy)*
Site ID code:		*Site ID code (provided by CSIRO)*
Site name:		*Unique name of site*
Photo number/s and name of photographer		*The name of photographer and numbers of photos taken at the site*
Dominant land use:	Industrial Residential Commercial/Municipal Natural/Parkland Agricultural Roadway	*Circle best option to describe the dominant land use at the site*
Number of humans:	Time of day (00:00): …… No. of people: ……	*Number of people counted in a 100 x 100m area*
Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather.*
Wind speed:	0 1 2 3 4 5	*0: calm* *1: light breeze (<10km/h , <6 knots)* *2: mod. breeze (10-25km/h, 6-20 kn)* *3: strong breeze (25-49km/h, 21- 26 kn)* *4: high wind (50-65 km/h , 27-35 kn)* *5: gale (65-85 km/h, 35-45 kn)*
Wind direction: *(compass)*	N NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Date of last clean up:		If known
Access to site:	Paved Unpaved Trail Other (specify):	

Trash cans or rubbish bins present?	Yes No
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

7 *(larger than page)*

Marine Debris Size Chart

Guidelines:

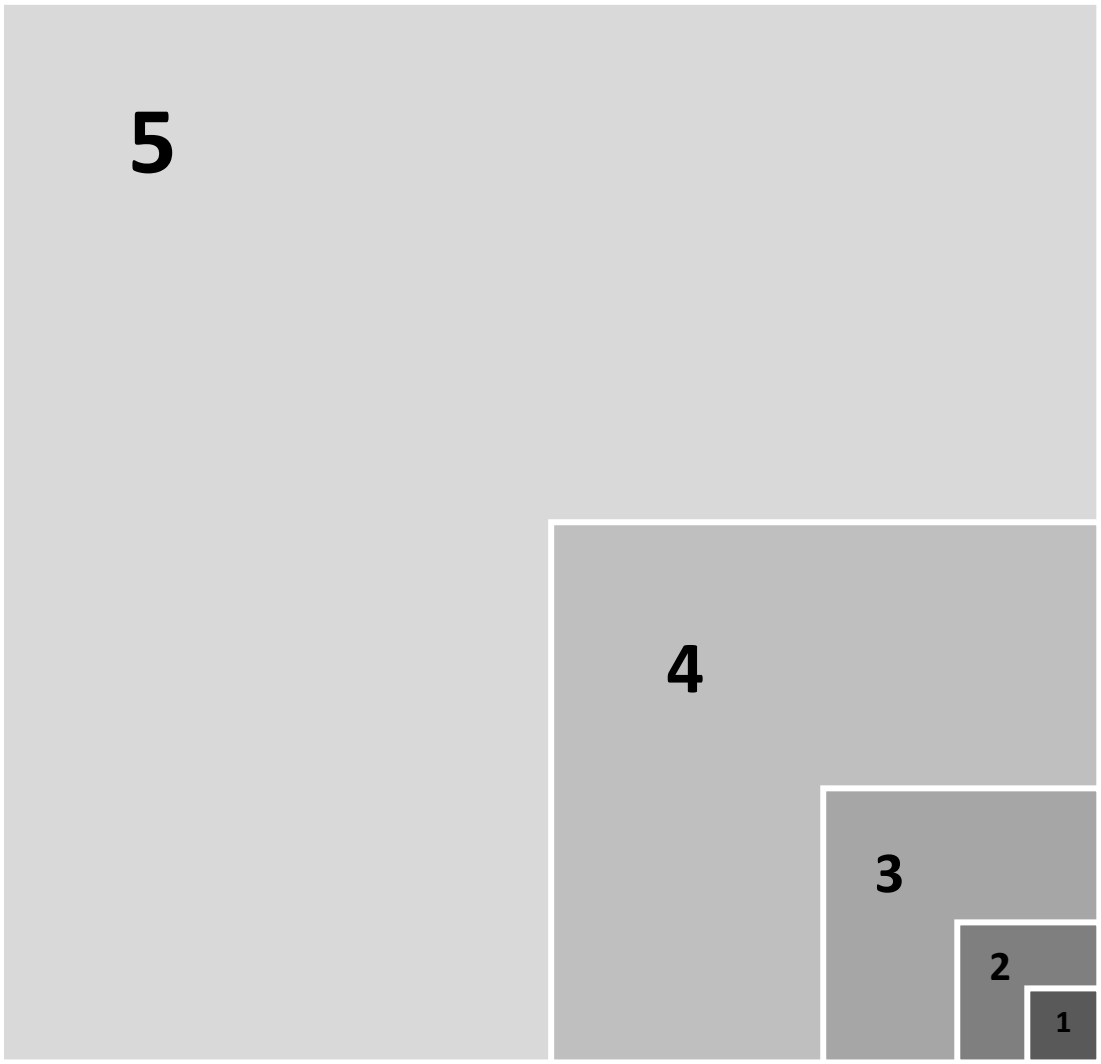
* This chart should be used as a guide to help estimate the size of marine debris during each beach transect (see transect sheet)

* The squares below represent different size classes

1 = 0–1 cm^2 ; **2** = 1–2 cm^2 ; **3** = 2–4 cm^2 ; **4** = 4–8 cm^2 ; **5** = 8–16 cm^2 ; **6** = 16-21 cm^2; **7** = >22 cm^2

* To estimate size, the longest dimension of an item must fit wholly within a size class.

6 *(whole of page)*



Inland Transect Data

Site ID Code:	Date:	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect Start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd) Ensure GPS is in WGS 84* *Record Start Time of transect* *Photographer name and number of photo, taken from transect start point*
Transect End:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of transect* *Photographer name and number of photo, taken from transect end point*
Type of transect:	Walkway Car park Roadway School Public transport Drain Natural Veg. Wetland Park Disused Ag/ pasture Ag/ cultivated Other (specify):	*Circle the best option to describe the type of land use of the transect area*
Slope/gradient:	A B C D E F	*Difference in elevation from start to end of transect.* *A = Flat (no difference) B = 5-50cm (ankle to knee height)* *C = 50-100cm (knee to hip) D = 100-150cm (hip to chest)* *E = 150-180cm (chest to head) F = > 180cm (above head height)*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation in the transect area*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red	*Predominant colour of substrate (not vegetation)*
Percent (%) Bare ground		*How much of the transect area is bare ground (i.e. un-vegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area what was sampled (in 10% intervals)*
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
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Plastic Straps	String/rope/ribbon	BP1		
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Metal	Pipe	M1		
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	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

Inland Transect Data

Site ID Code:	Date:	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect Start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd) Ensure GPS is in WGS 84* *Record Start Time of transect* *Photographer name and number of photo, taken from transect start point*
Transect End:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of transect* *Photographer name and number of photo, taken from transect end point*
Type of transect:	Walkway Car park Roadway School Public transport Drain Natural Veg. Wetland Park Disused Ag/ pasture Ag/ cultivated Other (specify):	*Circle the best option to describe the type of land use of the transect area*
Slope/gradient:	A B C D E F	*Difference in elevation from start to end of transect.* *A = Flat (no difference) B = 5-50cm (ankle to knee height)* *C = 50-100cm (knee to hip) D = 100-150cm (hip to chest)* *E = 150-180cm (chest to head) F = > 180cm (above head height)*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation in the transect area*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red	*Predominant colour of substrate (not vegetation)*
Percent (%) Bare ground		*How much of the transect area is bare ground (i.e. un-vegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area what was sampled (in 10% intervals)*
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

Inland Transect Data

Site ID Code:	Date:	Transect Number: _____ of _____
Transect length (m):	Transect width (m):	Total No. of surveyors:
Subsampled? Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect Start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd) Ensure GPS is in WGS 84* *Record Start Time of transect* *Photographer name and number of photo, taken from transect start point*
Transect End:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of transect* *Photographer name and number of photo, taken from transect end point*
Type of transect:	Walkway Car park Roadway School Public transport Drain Natural Veg. Wetland Park Disused Ag/ pasture Ag/ cultivated Other (specify):	*Circle the best option to describe the type of land use of the transect area*
Slope/gradient:	A B C D E F	*Difference in elevation from start to end of transect.* *A = Flat (no difference) B = 5-50cm (ankle to knee height)* *C = 50-100cm (knee to hip) D = 100-150cm (hip to chest)* *E = 150-180cm (chest to head) F = > 180cm (above head height)*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation in the transect area*
Substrate colour (if visible):	White / cream Yellow Orange Brown Black Grey Red	*Predominant colour of substrate (not vegetation)*
Percent (%) Bare ground		*How much of the transect area is bare ground (i.e. un-vegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area what was sampled (in 10% intervals)*
Cleanliness **at first glance**:	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris	
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within transect area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

2.4 River Datasheet

RIVER SITE INFORMATION

SURVEYOR DETAILS		
Organisation:		*Organisation responsible for survey*
Surveyor name:		*Name of data recorder*
Contact number:		*Contact number for data recorder*
Contact email:		*Contact email for data recorder*
Access point location:	Latitude: …… Longitude: ……	*Latitude and longitude of access point where you enter the beach (dd.dddd). Ensure GPS is in WGS 84.*
GPS accuracy:		*Accuracy (metres) of GPS at time of reading.*

SITE DETAILS		
Location/Municipality		*Town location of site*
Country:		*Country in which site was sampled*
Survey date:		*Date survey undertaken (dd/mm/yyyy)*
Site ID code:		*Site ID code (provided by CSIRO)*
River name:		*Unique name of site*
Photo info:		*The name of photog. and photo #s from the site*
Dominant land use	Industrial Residential Commercial/Municipal Natural/Parkland Agricultural Roadway	*Circle best option to describe the dominant land use at the site*
Number of humans:	Time of day (00:00): …… Visible distance (m): …… No. of people: ……	*Number of people counted in the visible area measured by instantaneous count. Visible distance is length of shore with a clear and unobstructed view.*
Current weather:	Clear Rain/Storm Overcast Drizzle	*Circle best option to describe the weather*
Wind speed:	0 1 2 3 4 5	*0: calm* *1: light breeze (<10km/h , <6 knots)* *2: mod. breeze (10-25km/h, 6-20 kn)* *3: strong breeze (25-49km/h, 21- 26 kn)* *4: high wind (50-65 km/h , 27-35 kn)* *5: gale (65-85 km/h, 35-45 kn)*
Wind direction: *(compass)*	N NE E SE S SW W NW N/A	*Direction from which wind is coming measured by the compass. N/A if no wind.*
Wind direction: *(relative to shore)*	onshore offshore sideshore side-on side-off	*Onshore: wind blowing towards shore* *Offshore: wind blowing away from shore* *Sideshore: wind blowing parallel to shore* *Side-on: wind blowing sideways and towards shore* *Side-off: wind blowing sideways and away from shore*
Date of last clean up:		*If known*
Access to river:	Paved Unpaved Trail Other (specify):	

Trash cans or rubbish bins present?	Yes No
Cleanliness **at first glance:**	No debris visible Scattered debris visible Lots of debris visible Large amounts of dumped debris
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):
Evidence of recent activities at site: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing
Comments:	

7 *(larger than page)*

Marine Debris Size Chart

Guidelines:

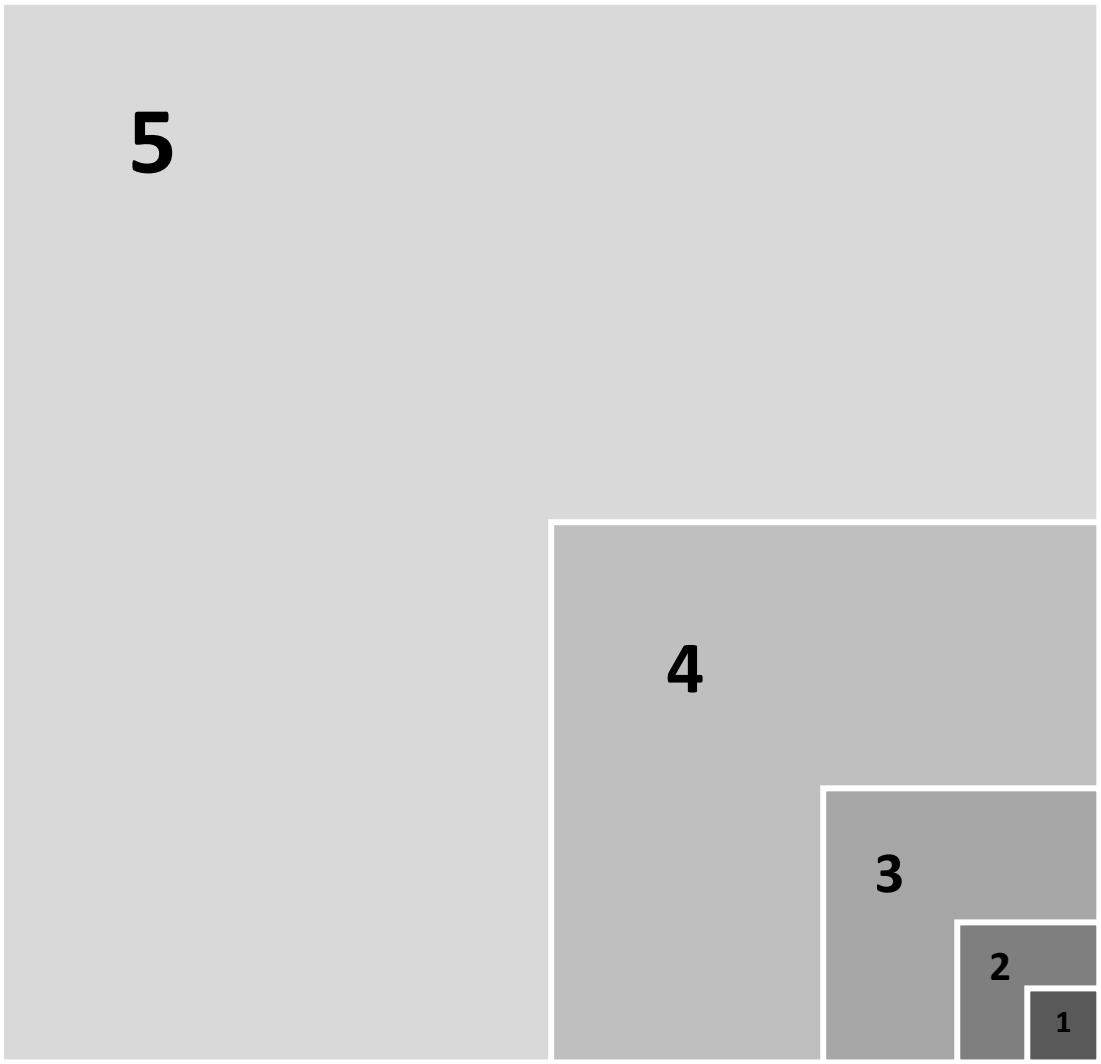
* This chart should be used as a guide to help estimate the size of marine debris during each beach transect (see transect sheet)

* The squares below represent different size classes

1 = 0–1 cm^2 ; **2** = 1–2 cm^2 ; **3** = 2–4 cm^2 ; **4** = 4–8 cm^2 ; **5** = 8–16 cm^2 ; **6** = 16-21 cm^2; **7** = >22 cm^2

* To estimate size, the longest dimension of an item must fit wholly within a size class.

6 *(whole of page)*



River Transect Data

Site ID Code:	Date:	Transect No. _____ of _____
Transect length (m):	Transect width (m):	No. of surveyor(s):
Subsampled: Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Start Time of Transect* *Photographer name and number of photo, taken from transect start point.*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line. If not obvious, use NA.*
Distance to top of bank (m):		*Distance from water edge to top of the bank*
Distance of river influence/erosion line (m):		*Height that water comes up the bank/erosion line*
River gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height, B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length) D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Bank type:	Mud Sand Pebble/Gravel Cobble Boulders Rock slab Mangrove Dirt bank Vegetated Cement	*Major substrate type*
Bank substrate colour (if visible):	White/cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Bank vegetation:	Grass/Reeds Broadleaf/herb Shrub (< 3m) Tree (> 3m) Forest None	*Circle the best option to describe the type of vegetation on the transect*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation on the transect*
Percent (%) Bare ground %		*How much of the transect is bare ground (i.e. unvegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area, what was sampled (in 10% intervals)*
Shore exposure or shape:	Cove / bay Straight Headland	*Shape of river where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*
River bank channelized? (e.g. human intervention changes course of river)	Yes No	Storm water drains present? Yes No
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within survey area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
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Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
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	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
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7			
8			
9			
10 - (end)			

River Transect Data

Site ID Code:	Date:	Transect No. _____ of _____
Transect length (m):	Transect width (m):	No. of surveyor(s):
Subsampled: Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Start Time of Transect* *Photographer name and number of photo, taken from transect start point.*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line. If not obvious, use NA.*
Distance to top of bank (m):		*Distance from water edge to top of the bank*
Distance of river influence/erosion line (m):		*Height that water comes up the bank/erosion line*
River gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height, B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length) D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Bank type:	Mud Sand Pebble/Gravel Cobble Boulders Rock slab Mangrove Dirt bank Vegetated Cement	*Major substrate type*
Bank substrate colour (if visible):	White/cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Bank vegetation:	Grass/Reeds Broadleaf/herb Shrub (< 3m) Tree (> 3m) Forest None	*Circle the best option to describe the type of vegetation on the transect*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation on the transect*
Percent (%) Bare ground %		*How much of the transect is bare ground (i.e. unvegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area, what was sampled (in 10% intervals)*
Shore exposure or shape:	Cove / bay Straight Headland	*Shape of river where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*
River bank channelized? (e.g. human intervention changes course of river)	Yes No	Storm water drains present? Yes No
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within survey area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
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	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

River Transect Data

Site ID Code:	Date:	Transect No. _____ of _____
Transect length (m):	Transect width (m):	No. of surveyor(s):
Subsampled: Y N	Subsample measurement:	*Dimension of **each** subsample (e.g. 50cm x 200cm)*

Transect start:	Latitude: …… Longitude: …… Start Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Start Time of Transect* *Photographer name and number of photo, taken from transect start point.*
Transect end:	Latitude: …… Longitude: …… End Time (00:00): …… Photo #/photog. name: ……	*Latitude and longitude recorded in decimal degrees (dd.dddd)* *Record End Time of Transect* *Photographer name and number of photo, taken from transect end point*
Distance to dominant debris line (m):		*Distance from water edge to major debris line. If not obvious, use NA.*
Distance to top of bank (m):		*Distance from water edge to top of the bank*
Distance of river influence/erosion line (m):		*Height that water comes up the bank/erosion line*
River gradient:	A B C D E	*Difference in elevation from start to end of transect.* *A = < 1 m (less than hip height, B = 1-2 m (hip to head height)* *C = 2-4 m (1-2 body length) D = 4-8 m (2-4 body lengths)* *E = > 8 m (more than 4 body lengths)*
Bank type:	Mud Sand Pebble/Gravel Cobble Boulders Rock slab Mangrove Dirt bank Vegetated Cement	*Major substrate type*
Bank substrate colour (if visible):	White/cream Yellow Orange Brown Black Grey Red Green	*Predominant colour of substrate (not vegetation)*
Bank vegetation:	Grass/Reeds Broadleaf/herb Shrub (< 3m) Tree (> 3m) Forest None	*Circle the best option to describe the type of vegetation on the transect*
Vegetation height:	No vegetation 0 – 5cm 5 – 50cm 50 – 100cm 100 – 200cm >200cm	*Height of the vegetation on the transect*
Percent (%) Bare ground %		*How much of the transect is bare ground (i.e. unvegetated) (in 10% intervals)*
Percent (%) of area surveyed:		*If unable to survey the whole area, what was sampled (in 10% intervals)*
Shore exposure or shape:	Cove / bay Straight Headland	*Shape of river where survey is conducted. Based on 50m each side of transect.*
Aspect:	N NE E SE S SW W NW	*Direction when you are facing the water*
River bank channelized? (e.g. human intervention changes course of river)	Yes No	Storm water drains present? Yes No
Evidence of dumping? (circle one or more)	None Construction Household Other(specify):	
Evidence of recent activities within survey area: (circle one or more)	None Clean-up or removal of rubbish Apparent spilled trash or rubbish Storm or flood High winds Public event Mowing	
Comments:		

Name of data recorder: Name of person who entered data:

Site ID Code: **ITEMS LIST** **Page _____ of _____**

Date: ☐ **No debris found** **Transect No. ____ of ____** **Subsampled? Y N**

	ITEMS	ID	Fragment	Whole
Hard Plastic	Pipe/PVC	H1		
	Beverage bottle <1 L	H2		
	Other bottle	H3		
	Bottle cap/lid	H4		
	Food container	H5		
	Utensil/plate/bowl	H6		
	Bucket/Crate	H7		
	Lighter	H8		
	Lollipop stick/earbud	H9		
	Unknown/other hard	H10		
Soft Plastic	Thin film carry bag	S1		
	Food wrapper/label	S2		
	Sheeting	S3		
	Cup/lid	S4		
	Straw	S5		
	Unknown/other soft	S6		
	Other plastic bag	S7		
Plastic Straps	String/rope/ribbon	BP1		
	Packing strap	BP2		
	Cable ties	BP3		
	Unknown/other strap	BP4		
Metal	Pipe	M1		
	Wire	M2		
	Aerosol	M3		
	Beverage can	M4		
	Food can/tin	M5		
	Lid/cap	M6		
	Food wrapper	M7		
	Aluminium foil	M8		
	Bucket/drum	M9		
	Unknown/other hard	M10		
	Unknown/other soft	M11		
Glass	Beverage bottle	G1		
	Jar	G2		
	Light globe/tube	G3		
	Unknown/other glass	G4		
Rubber	Thong/shoe	R1		
	Tyre	R2		
	Balloon	R3		
	Rubber band	R4		
	Unknown/other	R5		
Cloth	String/rope/strap	C1		
	Clothing/towel	C2		
	Wipes/cloths	C3		
	Insulation/stuffing	C4		
	Unknown/other	C5		
Timber	Wood/timber	T1		
	Utensil/food stick	T2		
	Bottle cork	T3		
	Pallet	T4		
	Unknown/other	T5		

	ITEMS Cont.	ID	Fragment	Whole
Foam	Food container	D1		
	Cup/plates/bowls	D2		
	Polystyrene	D4		
	Unknown/other	D5		
Paper	Cigarette/butt	P1		
	Paper/cardboard	P2		
	Magazine/newspaper	P3		
	Bag	P4		
	Box	P5		
	Food container/box	P6		
	Food wrapper/bag	P7		
	Beverage container	P8		
	Cups	P9		
	Plates/bowls	P10		
	Unknown/other	P11		
Fishing	Net	F1		
	Fishing line	F2		
	Fishing Lures	F3		
	Buoys/floats	F4		
	Glow stick	F5		
	Fishhook/sinker	F6		
	Unknown/other	F7		
Miscellaneous	Battery	Z1		
	Brick/cement	Z2		
	Carpet	Z3		
	Ceramic	Z4		
	E Waste	Z5		
	Furniture	Z6		
	Appliances	Z7		
	Large car parts	Z9		
	Large boat parts	Z10		
	Bag/box dom. waste	Z11		
	Nurdles	Z12		
Other		O1		
		O2		
		O3		
		O4		
		O5		
		O6		

Size class (and sub-sampling intervals)

Interval start (m)	Dist on tran	ID (F/W)	Size class
1 0 -			
2			
3			
4			
5			
6			
7			
8			
9			
10 - (end)			

2.5 Surface Trawl Datasheet

SURFACE TRAWL SITE INFORMATION

STATION DETAILS			
Country			
Location		*(e.g. river name, nearest city, etc)*	
Station Number			
Surveyor name and organisation			
Date *(local; dd/mm/yyyy)*			
Net type			
Net mesh size			
Net mouth dimensions			
Salinity *(if known, ppt)*		**Sea surface temperature** *(℃)*	

TOW DETAILS			
Tow Number	**1**	**2**	**3**
Wind speed *(true, kn)*			
Wind direction (degrees)			
Start latitude (decimal deg)			
Start longitude (decimal deg)			
Start time *(local / UTC)*			
Start flow meter count			
End latitude *(-S)*			
End longitude *(E)*			
End time *(local / UTC)*			
End flow meter count			
Average vessel speed *(ground, kn)*			
Average vessel direction (degrees)			
Average depth *(local, m)*			
Notes			

Surface Trawl Collection Data

Country	
Location *(e.g. river name, nearest city, etc)*	
Station Number	

Collection Data	Separate the three sorts for each sample in the boxes provided								
Tow Number	**1**			**2**			**3**		
Sorted By (name)									
Sort number	1	2	3	1	2	3	1	2	3
Hard plastic									
Soft plastic									
Plastic line / fibres									
Foam / Styrofoam									
TOTAL PLASTIC									
Photo details									
Notes									

2.6 Methods for Analysis of Microplastic in Sediment, Water and Fish

Collecting and Analyze Microplastic in Sediment

Equipment

1. GPS
2. Corer pipe
3. Basket
4. Plastic bag
5. Label
6. Beaker glass
7. Oven
8. Aluminium foil tray
9. Squirt bottle
10. Aquades/distilled water
11. Aluminium foil
12. Sieve (5 mm and 0.3 mm)
13. Whatman paper No.1
14. Disecting set
15. NaCL (aq)
16. NaCL (s)
17. Microscope
18. OptiLab.
19. Mortar and pestle
20. Glove
21. Masker
22. Petri dish
23. Ruler
24. Scales
25. Permanent board marker
26. Hot plate
27. Stir bar

Collecting the Sediment Sample

(Masura, J., Baker, J. E., Foster, G. D., Arthur, C., & Herring, C. (2015). Laboratory methods for the analysis of microplastics in the marine environment: recommendations for quantifying synthetic particles in waters and sediments) (NOAA)

1. Turn on the GPS and go to the site in the GPS.
2. If the site on the GPS hard to access, tag the new location in the GPS near the GPS site before (2 or 3 meter around the site).
3. Sediment sample collected using hand shovel and stored into the plastic bag. (Make sure the sediment collected is half kg, and take in the sediment surface).
4. Transfer all the sample in the basket into the plastic bag, and add label on it.

Methods for the Analysis of Microplastic in Sediment

(Masura, J., Baker, J. E., Foster, G. D., Arthur, C., & Herring, C. (2015). Labo ratory methods for the analysis of microplastics in the marine environment: recommendations for quantifying synthetic particles in waters and sediments) (NOAA)

Dry Bed Sediment

1. Weigh and label a clean and dry 800-mL beaker to the nearest 0.1 mg. (a)
2. Weigh 400 g of wet sediment to the nearest 0.1 mg and add to the beaker.
3. Dry in a drying oven at 90°C overnight or until sample dryness.
4. Weigh the dried beaker and material to determine the dry sample weight. (b)
5. Subtract the mass of the tared beaker (a) to provide the mass of total solids (c). (Formula: b –a = c).

Density Separation

6. Puree the dried sediment using mortar.
7. Add 400 mL of aqueous NaCL solution to the dried sediments in the beaker.
8. Vigorously stir the sand-water mixture in the beaker for several minutes with a spatula to float out the microplastics.
9. Transfer all floating solids in the beaker to the custom 0.3 mm sieve. Rinse beaker with distilled water to transfer all residual solids to the sieves. Repeat steps 7 until nothing floating.
10. Weigh and label a clean and dry 500-mL beaker to the nearest 0.1 mg. (a).
11. Transfer the solids collected on the 0.3-mm sieve into tared 500-mL beaker.
12. Dry the beaker and solids in a drying oven at 60ºC for 24 hours or longer to sample dryness.

WPO

14. Add 20 mL of aqueous 0.05 M FeSO4.7H2O solution to the beaker containing the 0.3 mm size fraction of collected solids.
15. Add 20 mL of 30% hydrogen peroxide.
16. Let mixture stand on lab bench at room temperature for 5 minutes prior to proceeding to the next step.
17. Add a stir bar to the beaker.
18. Heat to 75ºC on a hotplate

19. As soon as gas bubbles are observed at the surface, remove the beaker from the hotplate and place it in the fume hood until boiling subsides. If reaction appears to have the potential to overflow the beaker, add distilled water to slow the reaction.
20. Heat to 75oC for an additional 30 minutes.
21. If natural organic material is visible, add another 20 mL of 30% hydrogen peroxide.
22. Repeat until no natural organic material is visible.
23. Add ~6 g of salt (NaCl) per 20 mL of sample to increase the density of the aqueous solution (~5 M NaCl).
24. Heat mixture to 75^{o}C until the salt dissolves

Density Separation

25. Transfer the WPO solution to the tall glass
26. Rinse the WPO beaker with distilled water to transfer all remaining solids to the tall glass.
27. Add $NaCL_{(aq)}$ until ¾ size of the tall glass.
28. Cover loosely with aluminum foil.
29. Allow solids to settle overnight.
30. Collect floating solids in a clean 0.3-mm custom sieve.
31. Visually inspect settled solids for any microplastics. If any are present, drain the settled solids from the separator and remove microplastics using forceps, and transfer to the 0.3-mm sieve.
32. Allow the sieve to air dry while loosely covered with aluminum foil for 24 hours.

Microscope Analysis

33. The identification process was carried out using an ocular microscope (Olympus CX21).
34. .The dried samples on sieve were transferred to a petri dish to ease the identification process. The petri dish is placed on the object table.
35. To facilitate the viewing and documenting of microplastic particles, the OptiLab software can be connected to a microscope.
36. After microplastic particles were obtained, the particles were documented and then measured using Image Raster software.

Collecting and Analyze Microplastic in Sea Surface

Equipment

1. GPS
2. Manta trawl
3. Manta trawl's rope
4. Stopwatch
5. Bottle sample
6. Plastic bag
7. Label
8. Beaker glass/tall glass
9. Oven
10. Squirt bottle
11. Aquades/distilled water
12. Aluminium foil
13. Sieve (5 mm and 0.3 mm)
14. Whatman paper No.1
15. Disecting set
16. NaCL (aq)
17. NaCL (s)
18. Microscope
19. OptiLab
20. Glove
21. Masker
22. Funnel
23. Spoon
24. Petri dish
25. Ruler
26. Permanent board marker
27. FeSO4.7H2O
28. H2O2 30%
29. Hot plate
30. Stir bar

Collecting the Sea Surface Sample

Bergmann, M., Gutow, L., & Klages, M. (Eds.). (2015). *Marine anthropogenic litter*. Springer.

1. Turn on the GPS and put in the tracking mode (to know the boat route, time, speed of the boat).
2. Attach the cod end in the tip of the manta trawl.
3. Tied the manta trawl in the boat using rope.
4. Before put the trawl in the sea, make sure fill the blank in the worksheet.
5. Tag the location using GPS and use the stopwatch to noted the time.
6. Make sure the trawl far enough from the boat machine, to make sure the flow didn't affect the flow through the manta trawl.
7. Do the trawl for 10 minutes at boat speed 3.7-5.5 km/h
8. 30 second before 10 minutes stop the boat, and pull the rope of the manta trawl to take the trawl back.
9. Rinse the trawl using sea water from the outside of the trawl net (so it is does not affect the sample in inside), and make sure all the sample collected in the cod end.
10. After that, release the cod end, and transfer the sample into the bottle sample, help this using funnel and spoon, discard all the organic matter (visible).
11. Add a label on the bottle sample.
12. Tag the end location using GPS, to know where the site is ended.

Methods for the Analysis of Microplastic in Sea Surface

(Masura, J., Baker, J. E., Foster, G. D., Arthur, C., & Herring, C. (2015). Labo ratory methods for the analysis of microplastics in the marine environment: recommendations for quantifying synthetic particles in waters and sediments) (NOAA)

Wet Sieveing

1. Pour the sample through a stacked arrangement of 5-mm and 0.3-mm stainless steel mesh sieves.
2. Rinse sample with squirt bottle filled with distilled water to transfer all residual solids to the sieves. This also removes salts from the field sample. Repeat as necessary.
3. Rinse sieves thoroughly using distilled water. Ensure all material has been well washed, drained, and sorted.
4. Discard or archive material retained on 5-mm sieve, as appropriate, depending on individual study objectives.

Transfer Sieved Solids

5. Transfer solids collected in the 0.3-mm sieve into the tared beaker using a spatula and minimal rinsing with a squirt bottle containing distilled water.
6. Ensure all solids are transferred into the beaker.
7. Place beaker in 60ºC drying oven for 24 hours or longer to sample dryness

WPO

8. Add 20 mL of aqueous 0.05 M FeSO4.7H2O solution to the beaker containing the 0.3 mm size fraction of collected solids.
9. Add 20 mL of 30% hydrogen peroxide.
10. Let mixture stand on lab bench at room temperature for 5 minutes prior to proceeding to the next step.
11. Add a stir bar to the beaker.
12. Heat to 75ºC on a hotplate
13. As soon as gas bubbles are observed at the surface, remove the beaker from the hotplate and place it in the fume hood until boiling subsides. If reaction appears to have the potential to overflow the beaker, add distilled water to slow the reaction.
14. Heat to 75ºC for an additional 30 minutes.
15. If natural organic material is visible, add another 20 mL of 30% hydrogen peroxide.

16. Repeat until no natural organic material is visible.
17. Add ~6 g of salt (NaCl) per 20 mL of sample to increase the density of the aqueous solution (~5 M NaCl).
18. Heat mixture to 75^{o}C until the salt dissolves

Density Separation

19. Transfer the WPO solution to the tall glass
20. Rinse the WPO beaker with distilled water to transfer all remaining solids to the tall glass.
21. Add $NaCL_{(aq)}$ until ¾ size of the tall glass.
22. Cover loosely with aluminum foil.
23. Allow solids to settle overnight.
24. Collect floating solids in a clean 0.3-mm custom sieve.
25. Visually inspect settled solids for any microplastics. If any are present, drain the settled solids from the separator and remove microplastics using forceps, and transfer to the 0.3-mm sieve.
26. Allow the sieve to air dry while loosely covered with aluminum foil for 24 hours.

Microscope Analysis

27. The identification process was carried out using an ocular microscope (Olympus CX21).
28. .The dried samples on sieve were transferred to a petri dish to ease the identification process. The petri dish is placed on the object table.
29. To facilitate the viewing and documenting of microplastic particles, the OptiLab software can be connected to a microscope.
30. After microplastic particles were obtained, the particles were documented and then measured using Image Raster software.

Collecting and Analyze Microplastic in Fish

Equipment

1. Fish
2. Tray
3. Camera
4. Dissecting set
5. Microscope
6. Glove
7. Masker
8. Squirt bottle
9. Aquades/distilled water
10. Whatman paper No.1
11. Petri dish
12. Ruler
13. GPS
14. Coolbox
15. Ice-cube
16. KOH 10%
17. H2O2 30%

Collecting the Fish Sample

(*Rochman, C. M., Tahir, A., Williams, S. L., Baxa, D. V., Lam, R., Miller, J. T., ... & Teh, S. J. (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. Scientific reports, 5, 14340.* and *Rochman, C. M., Hoh, E., Kurobe, T., & Teh, S. J. (2013). Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress. Scientific reports, 3, 3263.*)

1. Fish can be buy from the fisherman or by fishing it.
2. When fishing the fish, remember to tag the location in the GPS.
3. Fish stored in the coolbox and added by ice cube to slow the decomposition of it.
4. Fish samples were brought back to the laboratory and immediately processed for analysis.

Methods of Microplastics Investigation in Fish Body

(*Rochman, C. M., Tahir, A., Williams, S. L., Baxa, D. V., Lam, R., Miller, J. T., ... & Teh, S. J. (2015). Anthropogenic debris in seafood: Plastic debris and fibers from textiles in fish and bivalves sold for human consumption. Scientific reports, 5, 14340.* and *Rochman, C. M., Hoh, E., Kurobe, T., & Teh, S. J. (2013). Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress. Scientific reports, 3, 3263.*)

1. Fishes were identified to species where possible and pictures were taken of individual fish for subsequent identification.
2. Fish were then dissected and the GI tract was removed.
3. The GI tract was placed into individual polypropylene sample jars.
4. Following a modified method from Foekema et al. (2018), to extract anthropogenic debris from the gut content of fish, each sample jar containing the GI tract was filled to 3× the volume of the tissue with a 10% KOH solution in ultrapure water and incubated overnight at 60°C to digest organic material.
5. To avoid cross contamination between samples, all tools and glassware were rinsed with ultrapure water three times between samples.
6. To destroy the remaining digestive tract of fish, after 24 hours, the residual of digestive tract added 5 ml of 30% H2O2 solution.
7. The digestive tract of fish that has been filled with 30% H2O2 solution is then allowed to return for 24 hours at room temperature.
8. After the digestive tract of the fish has been destroyed, it is then filtered using plankton net (200 µm) filter cloth first to ease screening of the sample.
9. The filtered sample was rinsed with distilled water while being transferred to Whatman filter paper.
10. Whatman paper that already contains the sample is coated with aluminum foil, then oven-dried at 60°C.

Microscope Analysis

12. The identification process was carried out using an ocular microscope (Olympus CX21),
13. The dried samples on Whatman paper were transferred to a petri dish to ease the identification process. The petri dish is placed on the object table, then the macrometer and micrometer are arranged to focus the object.

14. To facilitate the viewing and documenting of microplastic particles, the OptiLab software can be connected to a microscope.
15. After microplastic particles were obtained, the particles were documented and then measured using Image Raster software.

2.7 Marine Debris Shoreline Survey and Monitoring in Vietnam

Marine Debris Shoreline Survey and Monitoring In Vietnam

Introduction

The “Plastic waste from land into the ocean report” published in Science in 2015 by a group of researchers from the US and Australia pointed out that in 2010, with 1.8 million tons of plastic waste, Vietnam ranked fourth, after China, Indonesia and the Philippines, among 20 countries which contributed the highest amounts of plastic waste. The report of the Ocean Conservancy in 2015 also showed the same conclusion: 60 percent of ocean plastic waste came from China, Indonesia, Thailand, the Philippines and Vietnam. According to a report of the Plastic Association, in 2015, Vietnam produced and consumed about 5 million tons of plastic, of which, about 80% of imported materials used from scrap plastic. Plastic consumption index per capita in Vietnam increased rapidly from 3.8kg / year / person in 1990, to 41kg / year / person in 2015, of which 37.43% of products were packaging and 29.26 % is a household appliance. Only the two big cities, Hanoi and Ho Chi Minh City, release about 80 tons of plastic and plastic bags daily. Recognizing the serious risk of plastic waste to the environment, many legal documents have been issued. Many coastal provinces and cities also integrate pollution and disposal of marine plastic waste into local socio-economic development plans. However, in reality Vietnam does not have national data identifying plastic sources from the mainland or the sea and no quantitative research or statistics on the amount of plastic waste in coastal areas, including Marine Protected Areas, which is the most seriously affected by pollution of marine waste.

Thus, GreenHub in collaboration with IUCN Vietnam have developed standardized marine debris shoreline survey protocols in Vietnam. With the goal of building a method at local level, which can be applied to all sites on shorelines, has developed a document "Guidelines for plastic waste monitoring at shoreline” based on guidelines from the United States Oceanic Atmospheric Administration (NOAA) and the United Nations Environment Program (UNEP) and making appropriate adjustments to conditions. reality in Vietnam. Monitoring data can be used to set the baseline and evaluate the effectiveness of policies to mitigate debris and provide insight into priority targets for prevention. The monitoring results will be analyzed, shared and recommended for general application to collect national datasets for marine waste monitoring in Vietnam.

Shoreline sites should have the following characteristics:

- Sandy beach or pebble shoreline
- Clear, direct, year-round access
- No breakwaters or jetties
- At least 100 m in length parallel to the water (note that standing-stock surveys require a 100-m shoreline site)
- No regular cleanup activities

These characteristics should be met where possible, but can be modified.

Types of Shoreline Surveys

The objectives of your study will determine how you monitor for marine debris. There are two main types of shoreline surveys: accumulation and standing-stock surveys.

- Accumulation studies provide information on the rate of deposition (flux) of debris onto the shoreline. These studies are more suited to areas that have beach cleanups, as debris is removed from the entire length of shoreline during each site visit. This type of survey is more labor-intensive and is used to determine the rate of debris deposition (# of items per unit area, per unit time). Accumulation studies can also provide information about debris type and weight. These surveys cannot be used to measure the density of debris on the shoreline because removal of debris biases the amount of debris present during subsequent surveys.
- Standing-stock studies provide information on the amount and types of debris on the shoreline. Debris within discrete transects at the shoreline site is tallied during standing- stock surveys. This is a quick assessment of the total load of debris and is used to determine the density (# of items per unit area) of debris present. Debris density reflects the long-term balance between debris inputs and removal and is important to understanding the overall impact of debris.

Table 1. Salient characteristics of standing-stock and accumulation surveys.

	is deposition rate (# of items / unit area / unit time) • Debris material types • Debris weight

Before You Begin Your Surveys

Before any data collection begins, the Shoreline Characterization Sheet should be completed for each shoreline site. On this data sheet you will note:

- GPS coordinates in decimal degrees at the beginning and end of your shoreline site, or at the site's four corners if the width of the beach is > 6 m;
- Shoreline characteristics (e.g. tidal range and substrate); and
- Surrounding land-use characteristics that may influence the delivery of land-based debris to the site (e.g., farmland 5 km from a small town or urban parkland 50 m from a river mouth).

The Shoreline Characterization Sheet needs to be completed only once per site per year unless major changes occur to the shoreline.

Shore IDs (on the Shoreline Characterization Sheet) should be created based on the initials of the shoreline name (e.g., Cu Lam Cham = CLC). This will make it easier to keep track of multiple sampling sites.

The Shoreline Characterization Sheet and Debris Density Data Sheet were adapted from Sarah Opfer, NOAA 2012)

You will need the following supplies in order to complete your surveys:

- Digital camera
- Hand-held GPS unit (or SMART PHONE)
- Extra batteries for GPS and camera (we recommend rechargeable batteries)
- Surveyor's measuring wheel - *for standing-stock surveys only*
- Flag markers or stakes
- 100' fiberglass measuring tape
- Work gloves
- Clipboards for data sheets
- Data sheets (on waterproof paper)
- Pencils
- Trash bag or bucket - *for accumulation surveys only*
- Weight: electronic hand scale
- First aid kit (including sunscreen, bug spray, drinking water)

Safety is a priority. Do not touch or lift potentially hazardous or large, heavy items. Notify your local officials if such items are encountered.

ll of the data collection forms you will need are included in Appendix A at the end of this document. The same data collection forms are used for accumulation and standing-stock surveys.

- Shoreline Characterization Sheet
- Debris Density Data Sheet

In Vietnam for first set of baselines 2019. All sites we selected Standing-stock Surveys

Following this protocol:

1. Sketch your 100-m shoreline site and divide the 100 m into 5-m segments. There should be 20 of them. Number each section (left to right) from 1 to 20. Each 5-m segment should run from the water's edge to the back of the shoreline (Figure 2). The back of the shoreline is where the primary substrate (e.g., sand) changes (e.g., sand becomes gravel) or at the first barrier (e.g., vegetation line).
2. BEFORE arriving at the site, select four numbers from the Random Number Table (below) by first choosing a number between 1 and 5, and then a number between 1 and 4. The corresponding number in the table (1–20) is one of the four transects you will survey. Complete this exercise four times to choose four random transects (each transect can be used only once per survey). These numbers correspond to the 5-m segments you drew on your sketch and are called transect ID numbers (see Debris Density Data Sheet).

Random Number Table					
	1	2	3	4	5
1	4	8	17	9	1
2	7	19	2	12	20
3	18	14	6	16	11
4	3	5	15	10	13

Transect ID and distance along shore from start of 100-m shoreline section (see Figure 2 above)

On any sampling day, 20 m of your 100-m shoreline site is analyzed (i.e., 20% coverage of the area). In addition, check local tide tables and plan to arrive at your site during low tide.

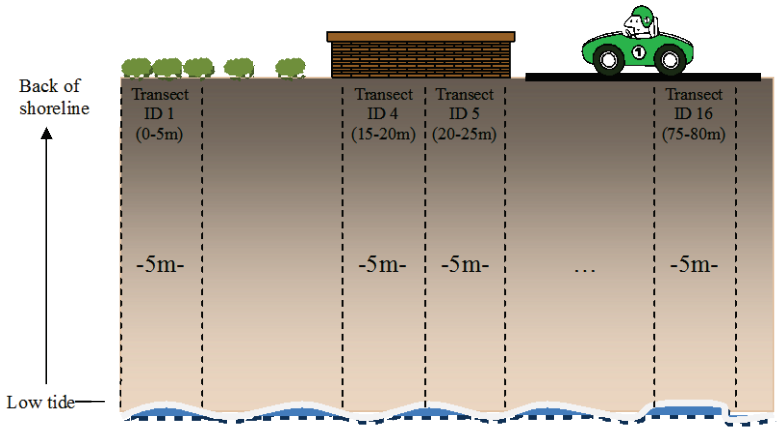

Figure 2. Shoreline section (100 m) displaying perpendicular transects from water's edge at low tide to the first barrier at the back of the shoreline section.

3. ONCE ARRIVED, begin filling out the Debris Density Data Sheet Additional Information section. Using your measuring wheel, begin at the start of your shoreline section and mark the four selected transect boundaries with flags according to the distances provided in the Transect ID table (for example, transect 12 covers 55 to 60 m from the start of your shoreline section).

4. Measure the width of each transect from water's edge to the back of the shoreline. Record GPS coordinates for each transect in decimal degree format. For shoreline segments that are less than 6 m wide from the water's edge to the back of the shoreline, GPS coordinates should be taken at the center (Figure 3). For shoreline segments that are over 6 m wide, take GPS coordinates at two spots—one nearer the back of the shoreline and one nearer the water.

5. Collecting all marine debris items that you found in your Transect in trash bag and mark seperately each of Transect with Transect ID. If any part of the item is within the sample transect, collect the item.

    - counts of debris items that measure over 2.5 cm, or 1 inch (~bottle cap size), in the longest dimension (below).
    - weights debris items that measure over 2.5 cm, or 1 inch (~bottle cap size), in the longest dimension (below).
    - record all data of counting and weighting on your Debris Density Data Sheet
    - record large debris items, anything bigger than 1 foot (~ 0.3 m, typical forearm length from palm to elbow) in the large debris section of the Debris Density Data Sheet.
    - remember that for standing-stock surveys, debris is not removed from the shoreline.

mark the selected transect boundaries with stakes

Collect all marine debris items

Counts and weight all the items

6. Take photos of each transect and some of the debris items!

Submitting Your Shoreline Debris Data to GreenHub and IUCN

Marine debris monitoring groups (GreenHub, IUDCN) should plan to compile and analyze the survey results.

Appendix A: Data Forms

SHORELINE DEBRIS **Shoreline Characterization Sheet**	Organization		Name of organization responsible for collecting the data
	Surveyor name		Name of person responsible for filling in this sheet
	Phone number		Phone contact for surveyor
Complete this form **ONCE** for each site location	Date		Date of this survey

SAMPLING AREA

Shore ID			Unique code for the shoreline
Shoreline name			Name by which the section of shoreline is known (e.g., beach name, park)
State/County			State and county where your site is located
Coordinates at start of shoreline section	Latitude	Longitude	Recorded as XXX.XXXX (decimal degrees) at start of shoreline section (in both corners if width > 6 meters)
Coordinates at end of shoreline section	Latitude	Longitude	Recorded as XXX.XXXX (decimal degrees) at end of shoreline section (in both corners if width > 6 meters)
Photo number/ID			The digital identification number(s) of photos taken of shoreline section

SHORELINE CHARACTERISTICS – from beginning of shoreline site

Length of sample area (should be 100 m if standing-stock survey)		Length measured along the midpoint of the shoreline (in meters)
Substratum type		For example, a sandy or gravel beach
Substrate uniformity		Percent coverage of the main substrate type (%)
Tidal range		Maximum & minimum vertical tidal range. Use tide chart (usually in feet).
Tidal distance		Horizontal distance (in meters) from low- to high-tide line. Measure on beach at low and high tides or estimate based on wrack lines.
Back of shoreline		Describe landward limit (e.g., vegetation, rock wall, cliff, dunes, parking lot)
Aspect		Direction you are facing when you look out at the water (e.g., northeast)

LAND-USE CHARACTERISTICS – within shoreline location

Location & major usage	Urban		Select one and indicate major usage (e.g., recreation, boat access, remote)
	Suburban		
	Rural		
Access			Vehicular (you can drive to your site), pedestrian (must walk), isolated (need a boat or plane)
Nearest town			Name of nearest town
Nearest town distance			Distance to nearest town (miles)
Nearest town direction			Direction to nearest town (cardinal direction)
Nearest river name			If applicable, name of nearest river or stream. If blank, assumed to mean no inputs nearby
Nearest river distance			Distance to nearest river/stream (km)
Nearest river direction			Direction to nearest river/stream (cardinal direction from site)
River/creek input to beach	YES	NO	Whether nearest river/stream has an outlet within this shoreline section
Pipe or drain input	YES	NO	If there is a storm drain or channelized outlet within shoreline section
Notes (including description, landmarks, fishing activity, etc.):			

SHORELINE DEBRIS **Debris Density Data Sheet**	Organization		Name of organization responsible for data collection
	Surveyor name		Name of person responsible for filling in this sheet
	Phone number		Phone contact for surveyor
Complete this form during **EACH** survey or transect	Email address		Email contact for surveyor
	Date		Date of this survey

ADDITIONAL INFORMATION

Shoreline name			Name for section of shoreline (e.g., beach name, park)
Survey Type	Accumulation ☐	Standing-stock ☐	Type of shoreline survey conducted (check box)
Transect ID # (N/A if accumulation survey)			Transect ID (include shoreline ID, date, and transect #)
Number of persons			Number of persons conducting the survey
Large items	YES	NO	Did you note large items in the large debris section?
Photo ID #s			The digital identification number(s) of debris photos taken during this survey.

Notes: Evidence of cleanup, sampling issues, etc.

DEBRIS DATA: (continued on back)

ITEM	TOTAL Count			TOTAL Weight
PLASTIC				
Plastic fragments	Hard	Foamed	Film	
Food wrappers				
Beverage bottles				
Other jugs or containers				
Bottle or container caps				
Cigar tips				
Cigarettes				
Disposable cigarette lighters				
Bags				
Plastic rope/small net pieces				
Hard plastic float				
Buoys				
Fishing lures & line				
Cups (including polystyrene/foamed plastic)				
Plastic utensils				
Straws				
Balloons				
Personal care products				
Other:				
METAL				
Aluminum/tin cans				
Aerosol cans				
Metal fragments				
Other:				
GLASS				
Beverage bottles				
Jars				

Glass fragments		
Other:		
RUBBER		
Flip-flops		
Gloves		
Tires		
Rubber fragments		
Other:		
PROCESSED LUMBER		
Cardboard cartons		
Paper and cardboard		
Paper bags		
Lumber/building material		
Other:		
CLOTH/FABRIC		
Clothing & shoes		
Gloves (non-rubber)		
Towels/rags		
Rope/net pieces (non-nylon)		
Fabric pieces		
Other:		
OTHER/UNCLASSIFIABLE		

LARGE DEBRIS ITEMS **(> 1 foot or ~ 0.3 m)**

Item type (vessel, net, etc.)	Status (sunken, stranded, buried)	Approximate width (m)	Approximate length (m)	Description / photo ID #

Notes on debris items, description of “Other/unclassifiable” items, etc:

2.8 Guidelines for Sampling and Analysis of Microplastics in Beach Sediment

United Nations Educational, Scientific and Cultural Organization

Intergovernmental Oceanographic Commission

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

Guidelines for Sampling and Analysis of Microplastics in Beach Sediment

WESTPAC Microplastic Research Programme:

Distribution, Source, Fate and Impacts of Marine Microplastics in Asia and the Pacific

IOC Sub-Commission for the Western Pacific (WESTPAC)
Intergovernmental Oceanographic Commission of UNESCO

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1. INTRODUCTION

Marine microplastics (plastic particles smaller than 5 mm in size) are a growing concern worldwide, due to their ubiquitous presence in the environment and potential serious threats to marine organisms and human health. Scientific knowledge on spatio-temporal distribution and concentration of microplastics in the environment is critical for developing effective management plans and mitigation measures at the national, regional and global level.

As the microplastic pollution has just emerged over the past decade, there are several methods for MP sampling and analysis with a considerable amount of methodological variability. Methodological variation currently limits comparisons as there is no a standard method for microplastic sampling and laboratory analysis in the region.

In this regard, the UNESCO/IOC Sub-Commission for the Western Pacific (WESTPAC) endeavors to harmonize the methods for microplastic sampling and analysis in order to understand and compare spatiotemporal microplastic abundance, composition and distribution across marine environment in the region and beyond. This harmonization constitutes one key element of the WESTPAC programme entitled "Distribution, Source, Fate and Impacts of Microplastics in the Asia and Pacific Region" (referred to as "WESTPAC Microplastic Research and Monitoring Programme) which was initiated at its 11th Intergovernmental Session (21-23 April 2017, Qingdao) with a view to assisting the Member States in developing the knowledge base on the entire cycle and impacts of marine microplastics, and providing scientific evidence for mitigation and remediation measures.

As per the expert discussions at the WESTPAC microplastics inception workshop (20-22 September 2017, Phuket, Thailand), the initial focus is to monitor microplastic abundance and distribution in sandy beach, given the tendency of microplastics to accumulate in the beach sediment and a relatively low sampling cost.

This document, intended to be used as a practical technical manual, provides step-by-step guidance for sampling, analyzing and quantifying microplastics in beach sediment. The Sub-Commission wishes to thank Wonjoon Shim, Daoji Li, Wenxi Zhu and Chengjun Sun for the preparation of this document, and

Nachapa Saransuth and Orathai Pongruktham for the support provided to this output.

2. SITE SELECTION AND FREQUENCY OF SAMPLING

To allow the comparison of microplastic abundance and distribution among the participating countries across the vast region, **it is recommended** that three types of beaches be selected in each country:

I) highly populated or urbanized site with extensive human activities, such as harbor and estuary;

II) moderately impacted site by human activities, such as small fishing village, beach outside the city or small-scale aquaculture area; and

III) pristine site with limited human activities, such as remote island or protected area.

It is strongly suggested that a minimum of two beaches under each type be studied in each country with samples collected during the dry season prior to monsoon, in order to better reflect the impacts of human activities on the coasts.

3. MICROPLASTIC SAMPLING IN BEACH SEDIMENT

3.1 Materials

- Quadrats: 0.5 m × 0.5 m
- Stainless sieves: 1 mm and 5 mm mesh size
- A stainless tray: to contain 1mm sieve filtrates
- A stainless scoop: to collect sand samples
- A scrapper:
- Sample bottles: >1 L glass or metal bottles to store the 1 mm sieve filtrates
- Ziplock bags: to store solid particles of 1-5 mm size range (*materials retained on a 1 mm sieve)

3.2 Sample collection

1) At each studied beach, select three 100 m referent stretches (Figure 1 and Figure 2);

- Backshore line (B-line): the last point before vegetation or artificial structure where a quadrat can be placed
- High strandline (S-line): the high-water mark line in between B-line and W-line
- Water-edge (W-line): line closest to the sea side where dry sands can be taken from surface

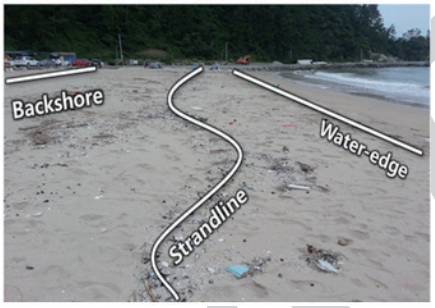

Figure 1: The referent lines for beach sediment sampling

Figure 2: Marking a 100 m stretch on a selected reference line

2) Divide each referent line into four sections at intervals of 25 meters, and place a 0.5 m x 0.5 m quadrat randomly in each section to avoid bias sampling (Figure 3 and Figure 4);

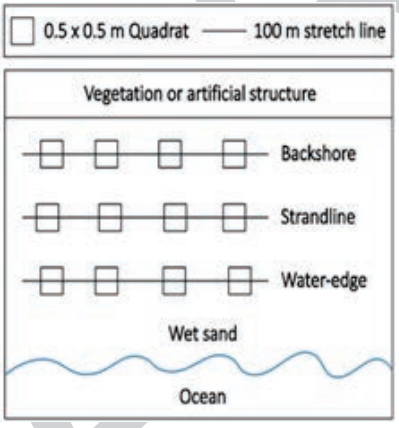

Figure 3: A simplified diagram of the referent lines and sampling locations on the lines

Figure 4: Placing a 0.5 m x 0.5 m quadrat on a beach for MP sample collection

3) Make uneven beach surface flat using a stainless scrapper to keep sampling depth equal for each quadrat;

4) Take sand samples from the top 2.5 cm of the surface within the quadrat using a scoop and a scrapper (Figure 5);

Figure 5: Taking sand samples from the top 2.5 cm of the quadrat area

5) Sequentially sieve the samples through a stack of 5 mm and 1 mm sieves on top of a stainless tray (Figure 6);

Figure 6: A simplified diagram of sieved fractions and sample collection

6) Store in a ziplock bag the retained materials on the 1 mm sieve, and label the ziplock bag properly; This is a sample for large microplastic analysis (L-MP; 1 -5 mm);

7) Mix thoroughly the filtrates passing through the 1 mm sieve in the stainless tray, transfer about 80 ml of the sand to a sampling bottle, and label the bottle properly; This is a sample for small microplastic analysis (S-MP; < 1 mm).

8) Repeat steps 3) through 7) in a total of 12 quadrats on a studied beach;

9) make a large microplastic (L-MP; 1-5 mm in size) and a small microplastic (S-MP; < 1 mm) composite sample, respectively on a studied beach;

9) Bring the samples to the laboratory for further analysis.

Note 1:

In the case of wet sand, two of the following options are recommended:
a) use distilled water or filtered sea water (through < 1 mm pore size filter) to facilitate sieving; or

b) bring the sand that could not be sieved to the laboratory, and dry them in an oven at 60℃ (avoid air contamination). After drying the sample, proceed to the step 5) through 7) above in the laboratory.

4. LABORATORY ANALYSIS OF LARGE MICROPLASTICS (L-MP; 1-5 MM)

4.1 Visual Quantification of L-MP

1) Pour the sediment samples from a ziplock bag into a stainless tray in the laboratory;

2) Visually select plastic like particles using forceps;

3) Sort the plastic like particles into the following categories: pellet, fragment, fiber/filament, sphere, sheet/film, foamed plastic, and others. Store the particles in each category in a glass petri dish (Figure 7);

4) Confirm if the plastic like particles are plastics by:

a) If a bench-top Fourier Transform Infrared Spectroscope (FT-IR) is available, check each plastic like particle with the FT-IR using Attenuated Total Reflectance (ATR) mode;

b) If a FT-IR is not available, cross check each plastic like particle with another expert;

5) Count the plastic particles by category and weight them separately.

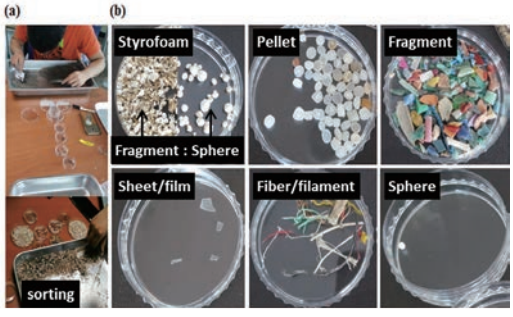

Figure 7: a) Visual Quantification of L-MP in the laboratory, and b) plastic's

4.2 Determination of L-MP abundance/ density/concentration

Sampling area, sampling depth, number and weight of L-MP are used for calculation of abundance/density/concentration of L-MP in beach sediment. The abundance of L-MP on a beach can be reported in the following units: number/ m^2 (n/m^2), n/m^3, gram/m^2(g/m^2), and g/m^3.

1) Determination of L- MP abundance per unit area (n/m^2 and g/m^2)

Note 2:

If there are many suspended fine particle in the solution, the sedimentation can take longer than 10 min, wait until the supernatant looks clean.

5) Wash off the plastic particles attached to the bottle wall with a squeeze bottle containing LMT solution;

6) Repeat two more times the steps 3), through 5) to extract more plastic particles from the sand sample;

7) Cover the 1 L beaker with aluminum foil and keep the combined supernatant overnight for additional settlement of the suspended fine particles (Figure 8b);

8) Gently pour only the supernatant from the 1 L beaker onto a 20 μm or 300 μm sieve (Figure 8c), and wash off the particles attached to the beaker wall;

9) Rinse the sample on the sieve with enough amount of distilled water to remove LMT solution (Figure 8d).

Note 3:

To avoid cross contamination among the samples from S-MP residuals on the sieves, the used 20 μm sieve must be back-flushed with plenty of distilled water and cleaned with high pressure air gun.

10) Transfer particles on the 20 μm or 300 μm sieve into a 250 ml glass beaker with distilled water, and the glass beaker should be weighed before sample transfer;

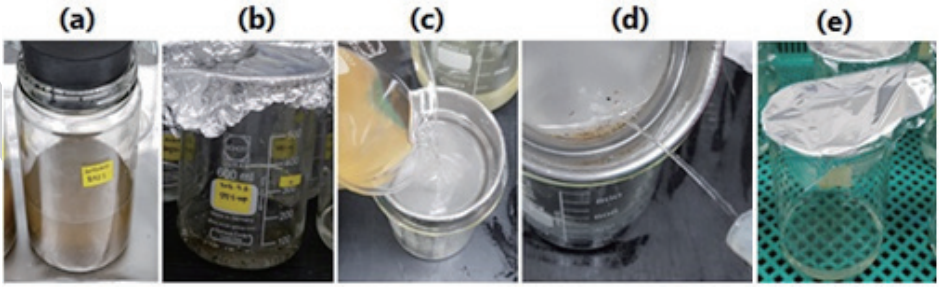

Figure 8: Sample pre-treatment steps for S-MP analysis: first density separation; a) sedimentation of heavy particles; b) sedimentation of fine particles; c) collecting supernatant; d) removing LMT solution; and e) Drying the sieved particles in a dry oven at 60°C

11) Dry sample in the beaker at 60℃ in a dry oven;

Note 4:

To avoid air contamination, cover the beaker with aluminum foil, but slightly open one edge. Generally, it takes 1-3 days for dryness.

12) After dryness, weigh the cooled beaker to determine the mass of S-MP with the density separated residue.

5.2.2 Removal of organic matter/ wet peroxide oxidation

Caution

Highly reactive reagents are used in these steps. Please review the laboratory safety practice before proceeding to this analysis.

1) Put magnetic stirring bar in the 250 ml beaker with the sieved particles, add 20 ml of 0.05 M Fe (II) solution and 20 ml of 35% H2O2 solution to the beaker, respectively, and cover the beaker with aluminum foil;

2) Place the beaker on a magnetic stirrer with 180 rpm at 75℃ in a fume hood (Figure 9);

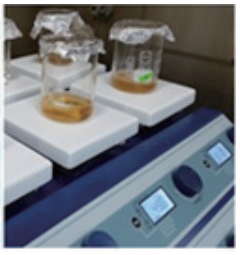

Figure 9: Beakers on magnetic stirrers in a fume hood during removal of organic matter

Caution

This solution can boil violently if heated >75℃.

3) When the solution boils, remove the beaker from the hot plate. Open the aluminum foil cover to let the steam escape (handle the hot beaker with care);
4) Place the beaker on the stirrer for another 30 min;
5) If the solution still has brown color (remaining organic matter), add another 20 ml of 35% H_2O_2 solution to the beaker;
6) Repeat 2), 3), 4) and 5) until the brown color disappears.

5.2.3 The second density separation

1) Pour the solution in the 250 ml beaker to the 20 μm or 300 μm sieve, rinse

the beaker several times with distilled water, and transfer all the remaining particles in the beaker to the sieve;

2) Transfer the particles on the sieve to a 250 ml glass funnel using LMT solution;

3) Fill the glass funnel with additional LMT solution up to about 100 ml;

4) Cover the funnel with aluminum foil, and set the funnel overnight for density separation (Figure 10);

5) Very gently drain and discard only bottom part of the solution.

Figure 10: Set up of funnel for the second density

5.2.4 Filtration and weighing

Prior to S-MP identification and quantification, the pre-treated and isolated S-MP samples are filtered and weighed.

1) Weigh a polycarbonate filter paper (D);

2) Drain and collect the remaining supernatant in the funnel directly to a vacuum filtration apparatus (Figure 11);

3) Rinse the funnel with distilled water to collect all residue;

4) Rinse the filtration apparatus cup with distilled water and collect all residue;

5) Put the filter paper with S-MP particles in a petri dish and cover with a lid;

6) dry the filter paper in petri dishes, either in air or in a dry oven;

7) Weigh the dried filter paper (C) and calculate the weight of the particles (E) on the filter paper.

Figure 11: Filtration apparatus set up for final filtration of the S-MP particles.

Weight of the particles (E) = C-D (gram)

5.2.5 Identification and quantification of S-MP

Discrimination and identification of S-MP from other non-plastic particles requires a microscope and/or a spectroscope. Spectroscope confirmation using micro-FTIR or Raman for S-MP is strongly recommended for the identification of S-MP particles in 0.001-1 mm size range (class II and III). However, a microscope can be used for the identification of S-MP in 0.3-1 mm size range (class II) if the micro-FTIR or Raman are not available.

Microscope identification

1) Identify the particles on a filter under a dissecting microscope

2) Measure the longest dimension of the particle and record the shape, maximum length and color

3) Classify and count the plastic particles by category (fragment, fiber/filament, sphere, and others);

4) If micro-FTIR or Raman is available, it is recommended that a subset of the plastic particle samples (10-20% of the total S-MP counts or very typical and major types of plastics) be confirmed with the spectroscopy.

Spectroscope identification (micro-FTIR)

Note 6:

To identify the particles on a filter using a micro-FTIR, Attenuated Total Reflectance (ATR) mode, rather than transmission and reflection mode, is recommended for a clear spectrum.

1) Place the filter under a micro-FTIR.

2) Measure the longest dimension of the particle and record its shape, maximum length and color (Figure 12 :examples of MP types and measurement);

3) identify the particle, and switch the objective lens to ATR tip;

4) Gently contact the particle to get the spectrum.

8. REFERENCE

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Lee, J., Lee, J., Hong, S., Hong, S.H., Shim, W.J., Eo, S., 2017. Characteristics of meso-sized plastic marine debris on 20 beaches in Korea. Marine Pollution Bulletin, 123:92-96.

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