CLEAN OCEANS INTERNATIONAL

Environmental Plastic Assessment Program (EPAP) Field Training Guide

In accordance with Clean Oceans International (COI) protocol

Introduction:

EPAP survey with Cabrillo College students at New Brighton Beach State Park, Ca

Plastic has become a large problem for marine and freshwater systems worldwide. It is critical that we collectively understand how and why it has gotten to this point. Through COI's plastic assessment program, trash on a beach or coastline illustrates a deeper representation of the global debris problem. The process described in this guidebook is the first step in understanding where plastic in a given area may have come from. For example, is it litter from beachgoers, or was it in the ocean for several years? Through scientifically assessing plastic waste from various locations and publicly displaying the data, we create a baseline for scientific study, policy change, and a deeper understanding of the plastic pollution issue, all leading toward a cleaner ocean.

EPAP training programs under COI began in Santa Cruz and surveys continued in Oregon, Lake Tahoe CA, and Cuba. As a scientific training tool, the process explained in this guidebook creates a platform for students, instructors, and citizen scientists to enhance their data collection techniques.

COI maintains an online database of Environmental Plastic Assessments performed around the globe.

Choosing an area to study

STOP – SAFETY FIRST is our most important consideration. Is the survey area safe from high surf, flooding, dangerous animals, rain, cold, political unrest, or disease outbreak? Are you prepared to find sharp objects, medical waste, poison, or illegal contraband? Do you have First Aid supplies, communication? Thinking through all possible scenarios ahead of time can save time, money, or a potentially dangerous situation.

Considerations for selecting monitoring sites include accessibility, resource availability, and the presence of other beachgoers. It is important to choose a site that is easily accessible to you and your surveyors, even if it has lower debris levels compared to other locations. Data collected from any site is valuable, not just those sites that have the most debris. Additionally, consider the level of other users and the potential disruption conducting a survey may cause, particularly on popular beaches or during peak times. Prioritize safety, accessibility, and the ability to address your research questions when choosing an area for monitoring.

Types of Surveys: *What survey works best for you*?*

1. Basic Survey - The simplest procedure only requires recording the date, the pounds of trash collected, and the number of people at the cleanup. Most people are familiar with these being called "Beach Cleanups". We also use the term "Coastal Cleanups" because a lot of trash is found along streets, creeks, and wooded areas.
2. Rib Surface Scan Survey (RSS) - A good survey method for areas with a large amount of debris or a smaller data collection team. The rib surface scan is ideal for 2 or 3 surveyors, though it can be performed with larger groups as well. RSS surveys four 5m sections (ribs). This equals a 20% portion of the 100m spine, statistically representing the entire area.
    a. Micro-debris Survey (MDS) - The micro-debris survey follows the RSS and involves the use of a 1mm mesh sieve to sift out 5mm or smaller micro debris from the beach sand. MDS surveys four 1/16 m x 1/16 m segments along each rib.
    b. Accumulation Sweep Survey (AS) - The accumulation sweep survey also follows the RSS if there are enough people and you have enough time. This survey is good for a larger group wishing to do a cleanup effort as well as gather informative scientific data. The AS is based on a 100 m spine, just as in the RSS.

    * EPAP data and blank Field Data Sheets can be found here.

1. Basic Survey

The basic survey is often used to measure the quantity (weight) of plastic collected in a beach or coastal cleanup. Care must be taken to weigh the debris collected and not water or sand. Record the date of the cleanup, the weight, and the number of volunteers. The primary goal of the basic survey is the trend of weight over an extended period. When disposing the debris, please recycle if possible and dispose of dangerous objects appropriately.

Cabrillo College Coastal Cleanup

Rib Surface Scan Survey (RSS)


Capitola Rib Surface Scan

The RSS is a beach survey whose boundaries are the change in substrate at the back of the beach (seawall, road, parking lot, etc.) and 1 m away from the water's edge. It is the preferred survey for data collection; it covers 20% of the survey area and can easily be accomplished with 2 or 3 people. With a minimal tool kit, you can easily gather data in a short period of time in most any location. As with all our surveys, be sure to fill out every space on the data sheet - preferably with a pen!

Choosing where to set the *Spine*

The first thing to do when you get to your beach or field area is to choose where to put the spine. On a shoreline survey - the closer to the change in the substrate (cliff, parking lot, or vegetation) the better (see Fig. 1). Remember that safety is the first goal; ensure that you place the spine away from potentially dangerous terrain. In addition, consider beach access - a survey area set closer to your vehicle or beach access point may be useful. It is highly recommended that you or someone from your survey team does prior reconnaissance. The goal of any continual survey is consistency. Once a start point for the spine is set, ideally this will be the spine location for future data collections.

After you have determined which portion of the beach you want to survey, lay out a 100 m tape parallel to the shore. This is called the "*spine*", a transect line which defines your survey area, and <u>should be at or near the back of the beach</u>, where there is a change of substrate. The spine should be able to be laid out straight to serve as a root for perpendicular lines, called "*ribs*" (see "Choosing where to set the *Ribs*", below) to emanate from.

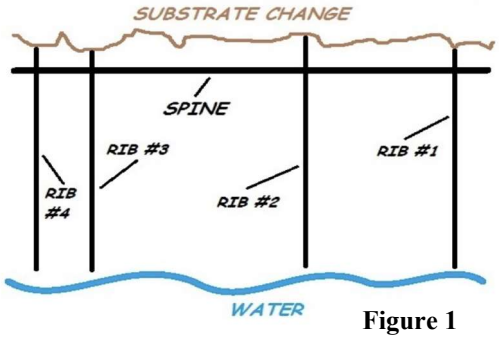

Figure 1

What to do if the beach is very wide

If the beach is over 75-100 m wide from the back of the beach to the water's edge, there are two options, both of which ideally would include the wrack line (area where seaweed accumulates). Note that there may not be an obvious wrack line on every beach:

1. Move the spine closer to the water to include the wrack line and head toward the water, only surveying 50 m out from the spine.
2. Stay at the back of the beach and go 50 m toward the water's edge, ideally including the wrack line in your rib, as in number 1 above.

Over the course of a year, winter storm waves may erode and decrease the width of your beach. If your spine was closer to the water, you may have to move the spine back to the change in substrate. If this is the case, record your changes in the 'comments section' on the Field Data Sheet.

Choosing where to set the *Ribs*

Now that the spine is set, determine the location of the ribs, which run perpendicular to the spine (see Fig. 1). Ribs are created by picking 4 random numbers, between 1-100 *at least 5m apart* (a random number generator app is easily downloaded for apple or android). Each random number defines where each *rib* is located along the *spine.* Starting at these random numbers, place a marker, such as a flag or a stick, next to the corresponding meter number on the spine.

There are different scenarios determining if the rib will start *at the spine* or run *across* it. In some cases, there may be a meter or two of beach located behind the spine where you want to survey, so you will place the rib *across* the spine. In cases where the spine runs right against the change in substrate, or if you place the spine out toward the center of a very wide beach, you will place the rib right *at the spine*.

Conducting the RSS

When conducting the RSS, take a pole or a stick exactly 2.5 m in length and extend it out perpendicular from the rib. As you head toward the water, only collect and record trash that is within 2.5 m of the rib. When you get to the water, or the end of your rib, turn around and repeat the survey on the other side as you head back to the spine (see Fig. 2).

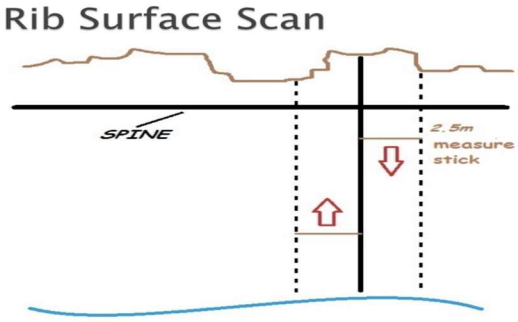

Figure 2

It is best if one person holds the 2.5 m stick, and the other participants *follow behind* removing and recording trash. Only plastic larger than 5mm and within 2.5 m of the rib should be recorded on your data sheet for the RSS section.

- If you know you are going to do an accumulation sweep survey, please leave any debris outside the 2.5 m area, as you will be recording it later. If you know you are not going to do an accumulation sweep survey, you can pick up and dispose of the debris WITHOUT recording it.
- If you know you are going to do a micro-debris survey, plastic smaller than 5mm will be recorded in that survey, so please leave any micro-debris in the 2.5 m area until you are done with your micro-debris survey. After the micro-debris survey, you can pick up and dispose of any remaining micro-debris WITHOUT recording it.

For a more thorough description of types of plastic, refer to the EPAP Data Sheet Glossary. Glass, metal, and organic compounds (e.g., orange peels, driftwood) can be picked up and discarded but *not counted.*

Consistency is key for these surveys; each time you survey, you should go to the same location as last time, using the random number generator to change the rib start points. Recording debris as fresh or weathered can be somewhat subjective to the surveyor, however, the guidelines we use are as follows: **'Fresh' debris is considered something dropped on the beach recently, unscratched, and brightly colored. 'Weathered' debris would show physical signs of being in the environment for some time, such as faded colors, pitted surfaces, and disintegration.**

2a. Micro-Debris Survey (MDS)

As a part of the RSS, you may choose to perform a micro debris survey. This survey method collects data for items smaller than 5mm and is conducted on each of the 4 RSS ribs. Within each rib of your surface scan, find the wrack line where a recent high tide deposited debris. From where each rib crosses the wrack line and within 2.5 m of the rib, lay down your sieve closest to the wrack line but preferably in the sand (see Fig. 3). Make an outline of the sieve in the sand, remove the sieve from that square area and dig 1 inch down within that entire square area, placing each scoop of sand in the sieve. Shake the sieve so the sand falls through; look carefully to see if you find any micro debris. Collect and record all micro debris items found.

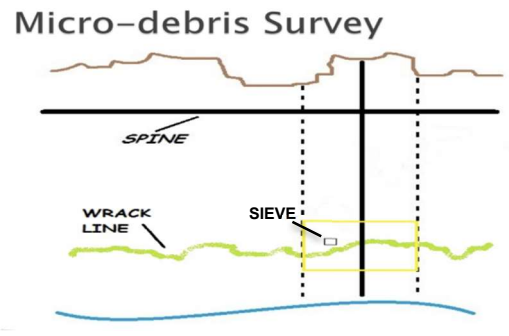

Figure 3

2b. Accumulation Sweep Survey (AS)

New Brighton Accumulation Sweep Survey

The AS is only done if you have enough people to cover the beach within arm's length of each other, and will cover the remaining 80% of the beach, increasing the quality of data. However, if there are not enough people, or there is too much debris to pick up and count in a reasonable amount of time, this survey should not be completed.

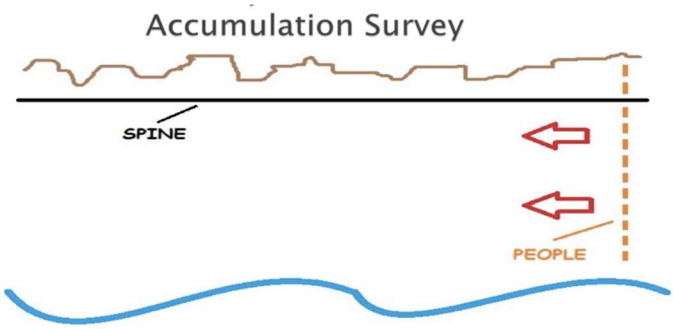

Figure 4

Best used after and in conjunction with the RSS, this method uses the same spine as the RSS (see Fig. 4). Begin at one end of the spine and line up your team, spread out as equally as possible (see image above). Collect plastic within 100 m from the change in the substrate to the water's edge. It works well for one individual to record all the debris while the other members collect. Follow directions on the EPAP data sheet to record all plastic that is 5 mm or larger. Record whether plastic is fresh or weathered and remember to weigh the trash.

Itemized List of Survey Equipment. TOTAL COST = $100 + shipping

- (2) 100 m tape measures: Stanley100 m 'PowerWinder' Tape Measure = $20 each
- (1) 2.5 m expandable stick: = $10 each*
  -   
- 3 m of 3.2 mm polyester elastic shock cords = $15
- 1/16 m x 1/16 m sieve with a 1mm mesh screen (roughly equal to a "20-mesh screen") = $15*
- (1) Garden Trowel = $10 
- (1) Clipboard = $5
  - *Optional: 4 stakes for marking rib locations = ~$10?*

*Assembly Instructions

- Expandable stick: 2.5m of narrow (~ 12.7mm) PVC pipe + (3) couplings which fit over your PVC, cut to approx. 4cm + (2) PVC pipe caps which fit over your PVC pipe.
  - Each PVC is cut into four 0.625 m pieces and threaded together with elastic cord, 3 couplings, 2 caps.
  - Caps may need a hole drilled through them to thread the cord. Once threaded, ensure the cord is tight enough to keep the stick straight and able to fold for storage.
  - Use PVC glue to affix caps on each end of PVC pipe along with each of the 3 couplings.
  - When expanded, stick length is approximately 2.5 m. If you wanted to be exact, you can cut the amount needed off one of the pieces, taking into account the length of couplings and caps.
- Micro-debris sieve: construct your 1/16 m x 1/16 m frame out of metal or wood and attach the mesh screen inside the frame.