



## Environmental Plastic Assessment Program (EPAP) Field Training Guide

In accordance with Clean Oceans International (COI) protocol

**Introduction:** Plastic poses a significant threat to marine and freshwater systems worldwide, necessitating a collective effort to understand its root causes. COI's plastic assessment program reveals that shoreline litter mirrors the broader issue of global debris. Our objective is to create a comprehensive model of plastic pollution along coastlines worldwide.

This guidebook outlines the initial steps to identify the sources of plastic in specific areas. For example, is it litter from beachgoers, or was it in the ocean for several years? By scientifically analyzing plastic waste from diverse locations and sharing the results publicly, we establish a baseline for scientific research, policy reform, and a deeper understanding of the plastic pollution problem, all aimed at achieving cleaner oceans.

COI EPAP surveys began in Santa Cruz and extended to SF Bay CA, Lake Tahoe CA, Oregon, Hawaii, Ulithi, and Cuba. As a scientific training tool, EPAP offers students, instructors, and citizen scientists a platform to hone their data collection skills. You can access and compare data from completed global Environmental Plastic Assessments on our [online database](#).



New Brighton Beach State Park EPAP Survey  
conducted by Cabrillo College students

**Choosing an area to study: STOP – SAFETY FIRST** is our most important consideration.

Is the survey area safe from high surf, flooding, dangerous animals, or political unrest? Are you prepared to find sharp objects, medical waste, poison, or illegal contraband? Do you have First Aid supplies and communication? Thinking through all possible scenarios ahead of time can save time, money, or prevent a potentially dangerous situation.

- **Never turn your back on the sea!** Even a small wave can knock you down, cause injury, or drag you off the beach.
- **Do not dig into the surface of the sand with your hands!**
  - If you see medical waste or sharp objects, ask the team lead to collect them safely.
- **Wear masks and gloves.** Weathered plastic can carry chemicals such as insecticides, radiation, etc.
  - If you touch weathered plastic, you could unintentionally expose yourself to dangerous chemicals.
- **Do not bother animals** in the survey area.
- **Use caution when moving rocks.** Rope and nets may be captured under or between stones.
  - Special tools may be required.
- **Prepare proper clothing, hats and glasses, masks, sunscreen, personal medications, water, food.**
  - **Wear shoes** – do NOT go barefoot.

In addition to safety, consider accessibility as well as the presence of other beachgoers. It is important to choose a site that is easily accessible, 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.

→ **YOU REPRESENT CLEAN OCEANS INTERNATIONAL**  
**PLEASE CONDUCT YOURSELF PROFESSIONALLY** ←

## Pre-trip:

### 1. Research survey site:

- Historical weather / geographical conditions
- Identify river and local inflow / outflow
- Identify population size and demographic
- Obtain proper clearance or permits

### 2. Confirm plan and meeting time:

- Recheck trip route and travel time and plan accordingly for traffic.

### 3. Secure the ‘Survey Toolkit’:

- Clean, check, pack equipment
- Include data sheets, insurance, permits, and waivers

### 4. Equipment Checklist:

- Phone / Digital camera / Compass / GPS unit
- Trash buckets or bags
- Work gloves / masks / eye protection
- Data sheets & Clip board (s) / Pens
- 2.5m measuring sticks (1 for each team)
- 100m measuring tape
- 50m measuring tape
- Sharps Container (for needles found on beach)
- Micro-debris sieves (1mm and 5mm)
- Small shovels
- First aid kit
- Sunscreen / water / hand sanitizer / other personal items

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

1. **Basic Survey** - The simplest procedure only requires recording the date, the weight 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. **Macro-Debris Surface Rib Survey (SRS)** - A good survey method for areas with a large amount of debris or a smaller data collection team. The SRS is ideal for 2 - 3 surveyors, though it can be conducted with larger groups as well. This method surveys four 5m sections (ribs), which equals 20m or 20% of the 100m spine, statistically representing the entire area.
  - a. **Micro-Debris Surface Rib Survey (MDS)** - The micro debris survey follows along with the SRS and involves sifting beach sand through a stack of 5mm and 1mm mesh sieves to isolate micro debris that is 5mm or smaller. This process is conducted within four random locations along each rib of the survey.
  - b. **Macro-Debris Surface Accumulation Survey (AS)** - The accumulation survey is conducted after the SRS 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. It is based on the 100m spine just as in the SRS and represents the remaining 80% of the survey area.

\* EPAP information and blank Field Data Sheets can be found [here](#).

## 1. Basic Survey

The basic survey is 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 documenting the trend of weight over an extended period. When disposing the debris, please consider recycling whenever feasible and ensure that hazardous items are disposed of properly.



Cabrillo College Coastal Cleanup

## 2. Macro-Debris Surface Rib Survey (SRS)



Capitola Surface Rib Survey

The SRS is a beach survey whose boundaries are: the change in substrate at the back of the beach (seawall, road, parking lot, etc.) and at least 1m 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 the field area is to determine the location of the “*spine*”, a transect line which defines your survey. On a shoreline survey - the closer to the change in the substrate (cliff, parking lot, or vegetation) the better (see Fig. 1). Remember SAFETY FIRST - ensure that you place the spine away from potentially dangerous terrain. Additionally, consider beach access: choosing a survey area near your vehicle or the beach access point could be advantageous. It is highly recommended that someone from your survey team do 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.

Once you have determined the location of the spine, lay out a 100m tape parallel to the shore. As stated above, it should be at or near the back of the beach where there is a change of substrate. It 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.

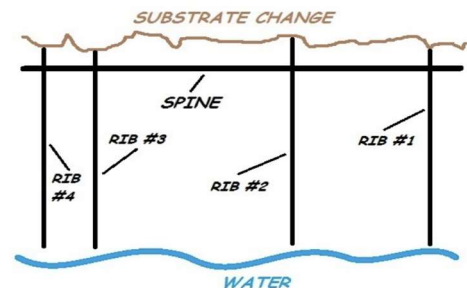


Figure 1

### What to do if the beach is very wide

If the beach is over 75-100m 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, surveying 50m out from the spine.
2. Stay at the back of the beach and go 50m 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 can be readily downloaded onto smart phones). Each random number defines where each *rib* is located along the *spine*. It is best to have Rib 1 at the low end of the 100m spine and Rib 4 at the high end of the spine. In figure 1 above, 0m is on the right and 100m is on the left.

## Conducting the Macro-Debris SRS

When conducting the SRS, take your 2.5m measuring stick and extend it out perpendicular from the rib (see Fig. 2). As you head toward the water, only collect and record trash that is within 2.5m 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.

It is best if one person holds the 2.5m stick, and the other participants *follow behind* removing and recording trash. For the Macro-Debris SRS, only plastic larger than 5mm and within 5m of the rib should be recorded on your data sheet.

- During Surface Rib Surveys, surveyors should keep a careful eye out for microplastic particles ( $\leq 5\text{mm}$ ) in the sand, particularly those located away from the wrack line. In the comments section of the data sheet, please note the relative abundance, color, and fresh / weathered descriptors for these. Collect the pieces in your bag. However, only microplastics found in the designated micro-debris section will contribute to the official count (see section 2a.).
- If conducting an accumulation survey, please do not collect any plastic debris outside the 5m area, as you will be recording it later. If you know you are *not* going to do an accumulation survey, you can collect and dispose of the debris *in a separate bag* WITHOUT recording it.

For a more thorough description of types of plastic, refer to the EPAP Data Sheet Glossary. Items such as glass, metal, and organic compounds (e.g., orange peels) can be collected *in a separate bag* 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 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 SRS, the Micro-Debris Survey collects data for items  $\leq 5\text{mm}$  and like the Macro-Debris Survey, is conducted on each of the 4 ribs. *The categories derived from this process will indicate the relative abundance of microplastics observed.*

Upon completing each rib in the Macro-Debris Survey, locate the wrack line, marked by a recent high tide's deposit of organic and inorganic materials. Position one of your sieves within the 5m rib swath near this line, ideally on bare sand (see Fig. 3), pressing it lightly into the sand to make an outline.

### Surface Rib Survey

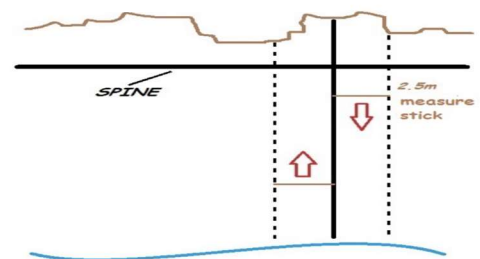


Figure 2

### Micro-debris Survey

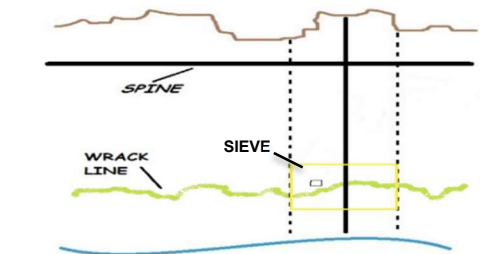


Figure 3



Remove the sieve and excavate to a depth of 2.5cm (1 inch) within the outline boundary, transferring the sand into the sieve stack, with the larger hole sieve on top. Shake the sieve stack so the sand falls through; look carefully to see if you find any micro debris. Collect and record all such items found.

Micro debris relative abundance per survey are categorized as follows:

- 'Low' - 5 or fewer pieces / areas with minimal presence of debris
- 'Medium' - 6 - 25 pieces / areas with a noticeable but not overwhelming amount of debris
- 'High' - more than 25 pieces / areas heavily impacted by micro debris

## 2b. Macro-Debris Surface Accumulation Survey (AS)



New Brighton Accumulation Survey

The AS is conducted only 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.

Best used *after and in conjunction with* the SRS, this method uses the same spine as the SRS (see Fig. 4). As seen in the above image, begin at one end of the spine and line up your team, spread out as equally as possible. Collect plastic within 50m 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 5mm or larger. Record whether plastic is fresh or weathered and remember to weigh the trash.

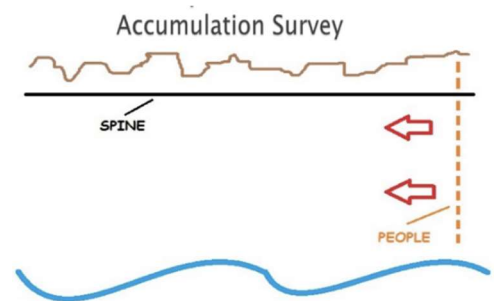


Figure 4

→ REMEMBER TO WASH HANDS / SANITIZE AFTER SURVEYING ←

### Conclusion / Leaving Site:

- Take all equipment and trash with you / Leave no trace.
- Take pictures for documentation.
- Weigh trash using hand-held scale and record amount.

### After Cleanup / Data Entry:

- Properly recycle / dispose of litter collected.
- Reset EPAP Kit:
  - Clean, repack and refill all necessary supplies.
- Store refilled EPAP Kit in proper location.
- Enter data in the [COI Database](#).



### Important Notes:

- **The team leader must ensure** no steps are skipped and all tools are cleaned and replaced at the end of the day.
- **If you find that your data is unusable for any reason**, that's perfectly acceptable. Please document all your information and provide an explanation for why the data is flawed and send to the Education Director at [davids@cointl.org](mailto:davids@cointl.org). The exercise holds merit, regardless of the data's quality.

**Share your story:** Post photos and stories on social media describing your day's adventure and discoveries. Having fun is highly recommended!

We strive to make our program safe, simple, repeatable, affordable, and encompassing all current standards. If you have any questions / suggestions about issues / improvements please reach out to David Schwartz, Education Director at [davids@cointl.org](mailto:davids@cointl.org), or call 831-476-8267. We are proud to be working with so many dedicated ocean advocates.

### Itemized List of Survey Equipment with cost approximations\*:

- (1) 100m tape measures: \$25 -\$50 each
- (1) 50m tape measure: \$15 - \$25 each
- (1) 2.5m expandable stick: = \$8 See assembly instructions below\*\*
  - 2.5m of narrow (~ 12.7mm) PVC pipe
  - (3) PVC couplings (approximately 42mm)
  - (2) PVC pipe caps (approximately 28mm)
  - 3m of 5mm elastic shock cords = \$5
- (1) 5mm stainless steel sieve = \$35
- (1) 1mm stainless steel sieve = \$35
- (1) Garden Trowel = \$10 
- (1) Clipboard = \$5
- (1) Hand-Held Scale = \$15 

*\*To order a full kit, please contact David Schwartz, Education Director at [davids@cointl.org](mailto:davids@cointl.org)*

### \*\*Assembly Instructions for 2.5m Expandable Stick:



- Each PVC pipe is cut into (4) 62cm pieces and threaded together with the elastic cord, couplings, and caps.
- Drill a hole through the PVC caps for the cord to thread through.
- Place couplings in between each piece of PVC pipe so the stick is now in one piece.
- Thread the elastic cord through the stick, place caps on each end and thread cord through. Ensure the cord is tight enough to keep the stick straight and flexible enough to fold for storage and tie a knot on each end of the cord. Cut the excess.
- When expanded, the stick length is 2.5m. If you need to shorten the length, cut the needed amount from one of the pieces, carefully considering the length of couplings and caps.