Best Practices for Determining Volumetric Data of Fresh Sargassum Wracks

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Abstract

The purpose of this procedure is to identify the best practices for measuring and quantifying the size of Sargassum wracks, or piles of beached "seaweed" as it is often referred to, found along the coastlines surrounding the Gulf of Mexico and Caribbean islands. This method was utilized by graduate and undergraduate students from Texas A&M University Galveston Campus (TAMUG) during the historical 2015 Sargassum season in Galveston, Texas

Introduction

Whether you are a park board manager preparing a financial proposal prior to a predictably heavy season or a curious beachfront property owner, there is an inherent necessity in quantifying the amount of Sargassum that has an effect on our coastlines.

Prerequisites

Prior to taking measurements, it is important to establish the following prerequisites in order to ensure your data is accurate and unbiased while reflecting a majority of the Sargassum that made landfall at your site of interest.

First, Sargassum accumulation needs to have been occurring for approximately 24 hours. This is important for two reasons; establishing a goal of 24 hours will keep your data consistent, and measuring Sargassum after it has been beached for much longer than 24 hours will introduce a decomposition factor. With respect to the second goal, we have observed that Sargassum will decompose at a rate of approximately 4.39% volume/day, therefore yielding a volume slightly less than what is desired for an accurate measurement.

It is also crucial that you ensure that there are no external influences that would either impede or accelerate the accumulation of Sargassum for that 24 hour period. Examples of this may be beach raking and other collection efforts, heavy rain or flooding weather phenomena that may wash the Sargassum back into the water, and movement of Sargassum from one location to another.

Finally, it is important that your measurements reflect a random sampling of the area with no favoritism given to any particular site when data is desired from multiple locations.

Procedure

The process of measuring the Sargassum wrack is relatively simple and straight forward as only (3) points need to be recorded; the length (l) of the wrack parallel to the waterline, the breadth (b) of the wrack perpendicular, and the depth of the crest (h) at the center of the wrack (see fig. a). With this information the wrack's volume is calculated as an elongated prism due to the shape it naturally trends towards with the help of tidal run-up:

$$V_{wrack} = \frac{1}{2} lbh \text{ (eq. 1)}$$

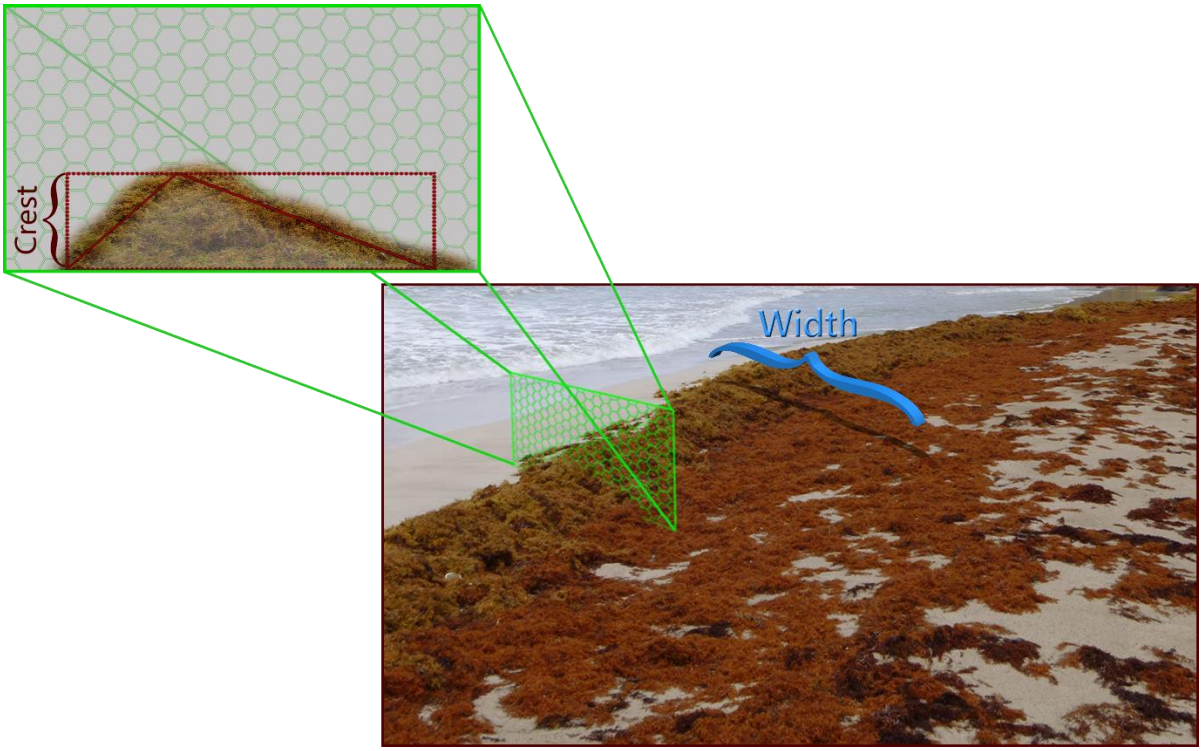

Figure (a): Wrack dimensioning diagram for crest depth (*h*) and width (*b*)

Wrack Mass Calculations

To obtain the mass of a Sargassum wrack we followed the classic Archimedes' principle,

$m_{wrack} = \rho_{sargassum} * V_{wrack}$ (eq. 2)

, where $\rho_{sargassum}$ is the density of Sargassum [89.98 kg/m^3], and V_{wrack} is the wrack's volume obtained from (eq. 1).

Before proceeding, there is one caveat that needs to be addressed regarding the density value given above. Prior to our research at TAMUG, there was little density information that existed for Sargassum. That said, the value provided represents what was obtained through field tests alone and should be used recognizing that further testing needs to be done.

Field Test Results

This procedure was utilized during the heavy Summer 2014 season in Galveston, Texas between South Jetty on East Beach to the west end of the seawall. Our results concluded that the area handled 3,271,104.47 ft^3 of Sargassum, equating to approximately 49,445.83 tons totaled.