

**Region 4**  
**U.S. Environmental Protection Agency**  
**Science and Ecosystem Support Division**  
**Athens, Georgia**

**OPERATING PROCEDURE**

**Title: Marine Macroinvertebrate Field Sampling**


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**Number:** SESDPROC-511-R3

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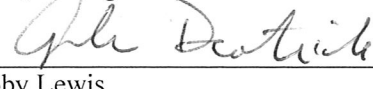
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## Revision History

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The top row of this table shows the most recent changes to this controlled document. For previous revision history information, archived versions of this document are maintained by the SESD Document Control Coordinator on the SESD local area network (LAN).

History	Effective Date
<p>SESDPROC-511-R3, <i>Marine Macroinvertebrate Field Sampling</i>, replaces SESDPROC-511-R2.</p> <p><b>General:</b> Corrected any typographical, grammatical, and/or editorial errors. Throughout document, modified references to reflect current referencing practices.</p> <p><b>Cover Page:</b> Changed the Ecological Assessment Branch Chief from Bill Cosgrove to John Deatrick. Changed the FQM from Laura Ackerman to Bobby Lewis.</p> <p><b>Revision History:</b> Changes were made to reflect the current practice of only including the most recent changes in the revision history.</p> <p><b>Section 1.2:</b> Added the following statement – “Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.”</p>	<p>June 28, 2013</p>
<p>SESDPROC-511-R2, <i>Marine Macroinvertebrate Field Sampling</i>, replaces SESDPROC-511-R1.</p> <p><b>Revision History:</b> Changed Field Quality Manager to Document Control Coordinator.</p> <p><b>Section 1.3:</b> Omitted reference to the H: drive. Changed the Field Quality Manager to the Document Control Coordinator.</p> <p><b>Section 1.5:</b> Updated references.</p>	<p>December 7, 2009</p>
<p>SESDPROC-511-R1, <i>Marine Macroinvertebrate Field Sampling</i>, replaces SESDPROC-511-R0.</p> <p><b>General</b> Corrected any typographical, grammatical, and/or editorial errors.</p> <p><b>Title Page</b> Changed title for Bill Cosgrove from Acting Chief to Chief.</p> <p><b>Table of Contents</b></p>	<p>November 1, 2007</p>

<p>Revised with new sections added.</p> <p><b>Section 1.2</b> Definition of SESD added. Referenced procedure for logbooks added.</p> <p><b>Section 1.3</b> Updated information to reflect that procedure is located on the H: drive of the LAN. In addition, text has been revised in this section.</p> <p><b>Section 1.4</b> Deleted (SESDPROC/06-200R1) from first sentence of second paragraph.</p> <p><b>Section 1.5</b> Revised to be alphabetical, and references added.</p>	
<p>SESDPROC-511-R0, <i>Marine Macroinvertebrate Field Sampling</i>, Original Issue</p>	<p>February 05, 2007</p>

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# **1 General Information**

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## **1.1 Purpose**

The purpose of this procedure is to document both general and specific procedures, methods and considerations to be used and observed when collecting marine macroinvertebrate samples.

## **1.2 Scope/Application**

This document describes specific methods to be used by field personnel when collecting marine macroinvertebrate samples. On the occasion that Science and Ecosystem Support Division (SESD) field personnel determine that any of the procedures described in this section are inappropriate, inadequate or impractical and that another procedure must be used to obtain a marine macroinvertebrate sample, the variant procedure will be documented in the field log book, in accordance with the SESD Operating Procedure for Logbooks (SESDPROC-010), along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

## **1.3 Documentation/Verification**

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and has been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on the SESD Local Area Network (LAN). The Document Control Coordinator (DCC) is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

## **1.4 General Background and Considerations**

Characterization of the marine benthic community and associated sediment particle size/chemistry, followed by analysis of community parameters via statistical treatment, may allow for identification and interpretation of changes in the community structure brought about by changes due to ocean dredged material disposal.

Marine benthic macroinvertebrate samples may be collected for species identification and associated metrics either by diving or by utilizing a grab sampler such as a Young grab (Figure 1). Samples are typically collected from either a ship or a boat large enough to go offshore with enough space and means to deploy sampling equipment and/or divers as well as space to process samples. The standard sample size is 0.05 m<sup>2</sup> by 15 cm deep. The small Young grab produces a sample of approximately this size. If samples are collected by diving, the number of cores taken should approximate a similar surface area and volume as the Young grab.

If collecting macroinvertebrates for chemical analysis, a different sampling approach must be utilized due the amount of tissue required for the various analyses. Typically, a minimum of 30 grams of tissue is required for any individual analysis, so for a typical suite of organic and inorganic analyses, 90-120 grams of each type of tissue to be analyzed is required. Collecting this amount of tissue generally requires some type of dredge that is towed behind a vessel for a distance of several hundred yards, typically digging into the upper 15-30 cm of substrate. The dredge normally consists of a grated box type frame with a rectangular opening in front and rear (Figure 2). Attached to the rear of the dredge is a retaining net. The dredge normally will have teeth which dig into the sediment, loosening it up and directing it back into the frame or it may have water jets which hydraulically loosen the sediment. The hydraulic dredge will generally provide a more intact sample, but is more difficult to set up and use. Sediment and macroinvertebrates living therein are scooped into the dredge as it is towed along and washed back into the retaining net attached to the dredge.

## **1.5 References**

SESD Operating Procedure for Logbooks, SESDPROC-010, Most Recent Version.

SESD Operating Procedure for Field Sampling Quality Control, SESDPROC-011, Most Recent Version.

SESD Operating Procedure for Sediment Sampling, SESDPROC-200, Most Recent Version.

United States Environmental Protection Agency (USEPA). Diving Safety Manual. v 1.1. US Environmental Protection Agency, Washington, DC. Most Recent Version.

USEPA. Safety, Health and Environmental Management Program Procedures and Policy Manual. Science and Ecosystem Support Division, Region 4, Athens, Georgia, Most Recent Version.

## **1.6 General Precautions**

### ***1.6.1 Safety***

When deploying a grab sampler or dredge from the stern of a ship, a hard hat and floatation work vest must be worn. If samples are collected by diving, all diving must be conducted in accordance with EPA's Diving Safety Manual v 1.1 (USEPA). A dive safety plan will be generated by the EPA divemaster in charge of diving on the survey prior to departure. An EPA divemaster must be on site during diving activities. Care must be taken when transferring personnel and

equipment from the ship to a small boat or vice versa, especially during heavy seas.

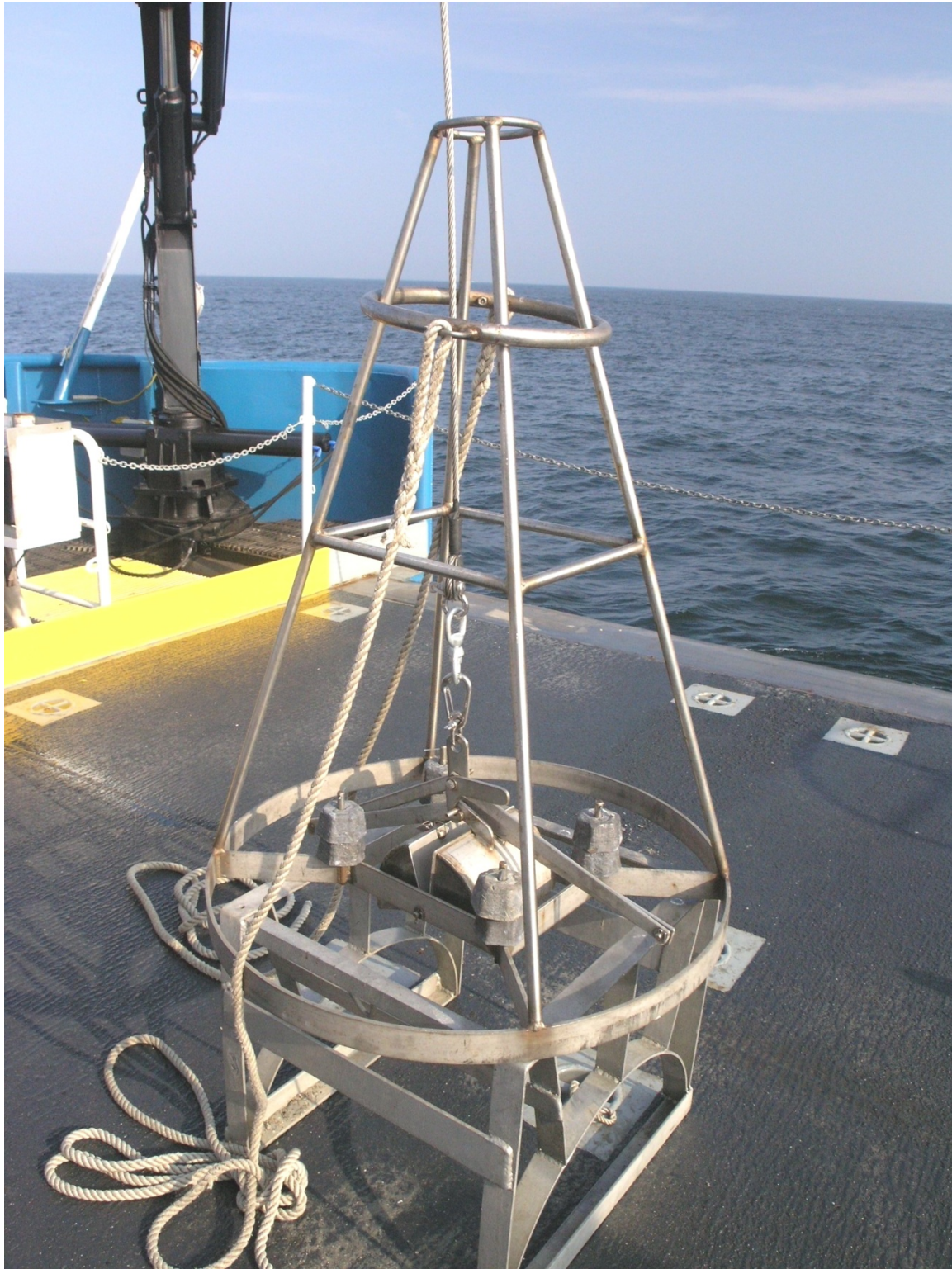
When pouring the formaldehyde to make up the 10% formalin preservative solution, latex gloves and safety glasses should be worn and pouring and mixing should only be done outside in a well ventilated area or in a vented fume hood.

### ***1.6.2 Procedural Precautions***

The following precautions should be considered when collecting samples.

- Documentation of field sampling is done in a bound logbook.
- Chain-of-custody documents shall be filled out and remain with the samples until custody is relinquished.

**Figure 1: Young Grab**





**Figure 2: Rocking Chair Clam Dredge**



## **2 Marine Benthic Macroinvertebrate Collection**

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### **2.1 Macroinvertebrates Collected for Species Identification**

Once samples are brought onboard either by diver or by grab, the samples are transferred to a screened (0.5 mm) sieve bucket. A sample may be split into multiple buckets and recombined after sieving in order to expedite the process. The samples are rinsed and washed with ambient sea water either by the raw sea water system aboard the survey vessel or by a 12 volt submersible pump if working from a small boat. All of the sediment smaller than 0.5 mm is washed through the screen leaving the benthic macroinvertebrates and remaining sediment on the screen. The sample retained on the screen after washing is carefully placed in a sample bag, labeled internally and externally, and placed in a five gallon bucket with a rubber gasket sealed lid. The buckets are pre-filled, approximately half full, with preservative consisting of a 10% seawater formalin solution. Rose Bengal may be added to the formalin solution as a stain in order to make later identification easier. The five gallon buckets can typically hold several stations worth of samples; therefore, each bucket is labeled with the station names contained therein. Sample buckets are sealed and stored for transfer to a laboratory facility for taxonomic identification.

### **2.2 Macroinvertebrates Collected for Chemical Analyses**

Samples being collected by dredge for chemical analyses are brought on board in the collection net attached to the dredge. This is normally very heavy and must be lifted by means of the winch or crane used for deployment. Since samples are being collected for chemical analyses, care must be taken not to contaminate the samples, i.e. only pre-cleaned equipment is used, personnel handling and sorting samples should wear latex gloves and the net containing the samples is laid on several large pieces of aluminum foil in order to avoid contact with the deck. Once on board, the net is detached from the dredge and the sample is divided up into sorting pans in order to pick the appropriate species out of the sample. Bivalves are opened to remove the tissue and polychaetes are removed from their tubes. Once sufficient sample is collected for analysis, it is placed on aluminum foil and frozen for transport back to a laboratory facility.