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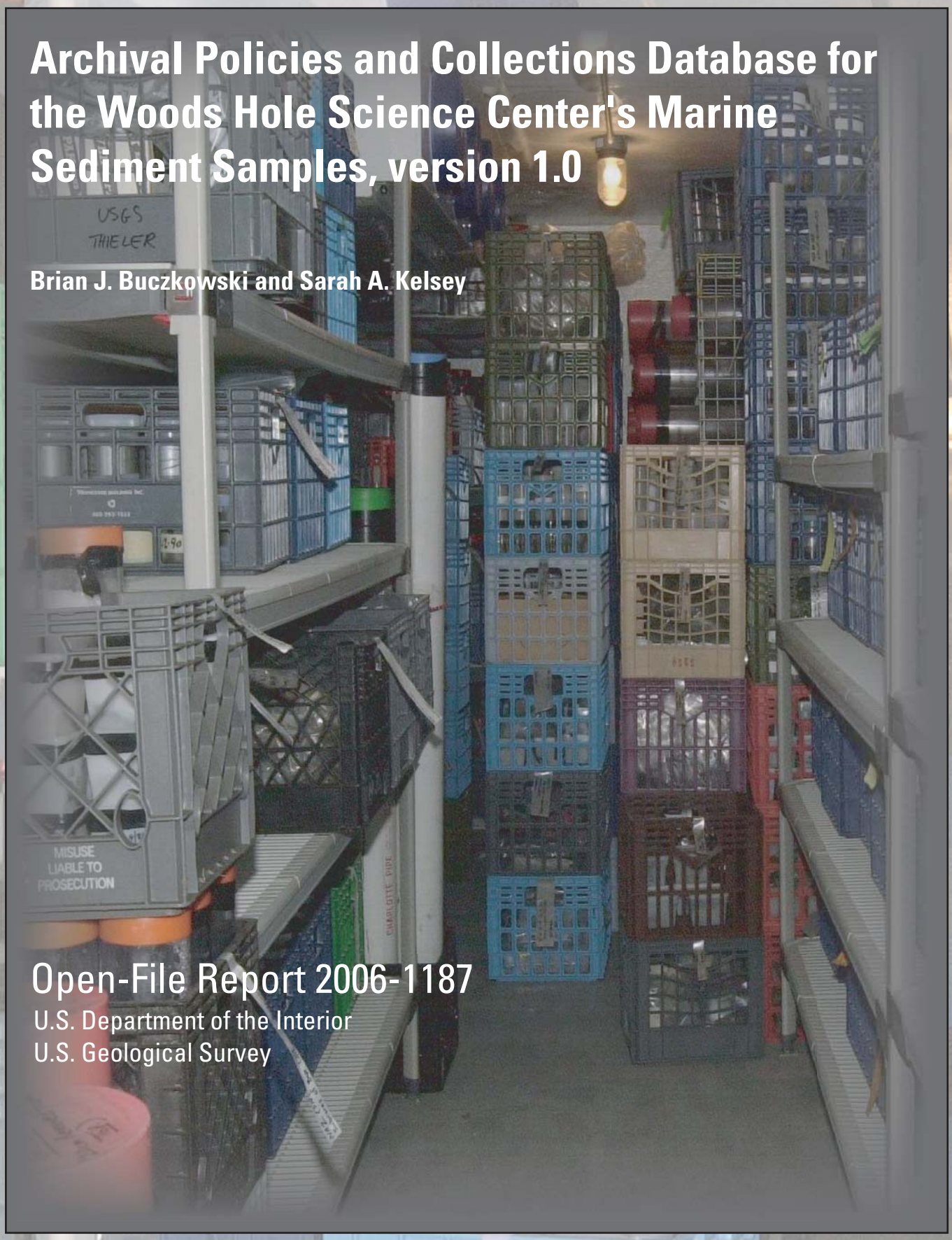
Archival Policies and Collections Database for the Woods Hole Science Center's Marine Sediment Samples, version 1.0

Brian J. Buczkowski and Sarah A. Kelsey



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Archival Policies and Collections Database for the Woods Hole Science Center's Marine Sediment Samples, version 1.0

By Brian J. Buczkowski and Sarah A. Kelsey

Abstract

The Woods Hole Science Center of the U.S. Geological Survey (USGS) has been an active member of the Woods Hole research community, Woods Hole, Massachusetts, for over 40 years. In that time there have been many projects that involved the collection of sediment samples conducted by USGS scientists and technicians for the research and study of seabed environments and processes. These samples were collected at sea or near shore and then brought back to the Woods Hole Science Center (WHSC) for analysis. While at the center, samples are stored in ambient temperature, refrigerated and freezing conditions ranging from +2° Celsius to –18° Celsius, depending on the best mode of preparation for the study being conducted or the duration of storage planned for the samples. Recently, storage methods and available storage space have become a major concern at the WHSC. The core and sediment archive program described herein has been initiated to set standards for the management, methods, and duration of sample storage.

Figure 1: The Woods Hole Science Center's Sample Storage Facility: Marine samples are stored in ambient, refrigerated, and freezing atmospherically controlled vans adjacent to the USGS offices on the Quissett Campus, Woods Hole.

A need has arisen to maintain organizational consistency and define storage protocol. This handbook serves as a reference and guide to all parties interested in using and accessing the WHSC's sample archive and also defines all the steps necessary to construct and maintain an organized collection of geological samples. It answers many questions as to the way in which the archive functions.

Introduction

This report details the policies and procedures implemented for the USGS Woods Hole Science Center's (WHSC) sediment sample archive over the past four years. It was created in an effort to define the methods of curation whereby staff, scientists and administrators are guided. This handbook establishes accountability for the samples in the WHSC's care (Neal and others, 1994).

Development of collections management policies and the maintenance of this document are the responsibility of the curator, with significant assistance from members of the WHSC. The Team Chief Scientist must approve all collections management policies. These policies are subject to comprehensive official reviews to remain compliant with federally recommended practices.

However, recommendations for changes or additions may be submitted at any time to the curator and, upon approval by the Team Chief Scientist, the policies will be revised and updated.

This guide defines the steps necessary to construct and maintain an organized sample archive. It attempts to answer frequent questions regarding archival policy and methodology used in the USGS WHSC. Suggestions for improvement are always welcome, and contact information is provided for the authors.

Sample Acquisition & Registration

Incoming Samples

One of the WHSC's primary methods of obtaining field data is through the collection of sediment samples. This is accomplished by the use of corers, grabs, dredges and other devices designed for the purpose of seabed sampling.

Once the samples have been collected, it is essential to preserve their physical integrity. The facilities in the WHSC sediment archives provide conditions that impede the growth of organics as well as preserve the samples in the physical state in which they were collected.

Reserving Storage Space

It is the responsibility of the project scientist to ensure that there is ample storage space to accommodate the incoming samples before collection commences.

The Principal Investigator (PI) should contact the curator to inform him that they will be collecting samples at least two weeks before the field work begins. The scientist should also give the curator an approximate number of samples to be recovered and what type of storage will be required. The curator will then make appropriate arrangements to house the incoming samples.

During this two-week time period, the curator will reserve space for the new samples and notify the project scientist where their samples will be stored upon return.

Preliminary Inventorying

After the field activity has been completed and the samples have been placed in storage, the curator will inventory the samples collected and log this inventory into the sediment archive database. Preliminary inventories shall include: sample number, field activity number, platform, positional data, navigational method, Principal Investigator (PI), storage location, and date of accession.

Archiving Metadata

Within one month from the date of storage, the collecting scientist must submit pertinent metadata relating to the collection and condition of the samples to the curator for addition into the sediment archive database.

Submission of data can be made in various ways. The recommended method is for researching parties to send field data electronically directly to the curator promptly after returning from the field. Spreadsheets can be sent, and a Microsoft Excel template is available from the WHSC's archive Web page, as well as included in this report. The data submitted in this form will be sent to the curator for addition to the preliminary inventory. These data will then be made available online to all parties for inquiry and accession of the physical samples through the center's internal archive Web site.

Sample Storage

The Facilities

The sample storage facility consists of two refrigerated vans (RE), each maintaining a temperature of +2º Celsius, one freezer van (FR) which maintains a temperature of –18º Celsius, and one ambient temperature laboratory van (LV) to house all dried samples[*]. These vans located adjacent to the USGS WHSC buildings are designed to exclude the external environment, as fluctuations in air temperature and humidity can degrade the viability of the samples for geochemical and geophysical properties research, as well as promote organic growth (Bachmann and Rushfield, 1992). The vans in the Freezer Farm have been designated RE01, RE02, FR01 and LV01, respectively. Samples stored at the WHSC's Marine Operations Facility are designated MOF.

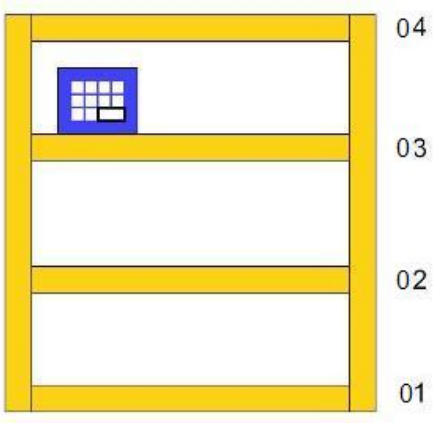

Figure 2. Example of shelving unit in the WHSC's Sample Archive. Numbered shelves begin from the bottom up.

Storage Concerns

Next to the main entrance within each van is a schematic map designating storage sections into which the van has been divided (01 through however many units are present). These sections contain shelving units, four shelves high (01 through 04, starting from the bottom upward).

These identifiers are combined to form a storage identification number, locally referred to as the *Bucky Decimal System*. An example is as follows:

RE 01.02.03

This number identifies the location of the sample to reside in refrigerated van number **01**, section **02** of that van, and shelf number **03** within section **02**.

Samples are stored in durable plastic milk crates and are labeled with an identification tag denoting the samples contained therein as well as collection information and a

[*] At the time of publication, the Freezer Farm was moved to a temporary location adjacent to the WHOI McLean Core Storage Facility to facilitate construction of an addition to the USGS Gosnold Laboratory. The above link provides a map of the current/ temporary van locations.

storage identification number. These labels are placed in protective plastic sleeves, which are attached to each milk crate.

Conditions of Storage

Overcrowding is a major concern in any archive, especially if both space and budgets are tight. It is the job of any curator to maintain order and ease of access in their archives. Part of accomplishing this task in a limited scientific storage facility involves prioritizing samples according to date collected and relevance to further research. To avoid consuming needed room occupied by samples that have outlived their immediate scientific usefulness and to maintain ample space for incoming samples, it is necessary to create and implement a ”rotating stock“ policy.

Samples will be assigned a finite shelf life, one that gives ample time to conduct all pertinent analyses but also limits the amount of time in which the samples occupy storage space, thereby ensuring room for newly acquired samples. If the samples are deemed viable and in good condition, they will be transported to the USGS Marine Operations Facility (MOF) for long-term storage.

Storage Duration

Since the average length for a typical project is approximately five years, it is necessary that sediment samples be retained at the WHSC for a minimum of five years.

It is also the duty of the USGS to make data and samples available to the public for research. It would be appropriate to announce publicly that a project has been completed and these samples are available for study to interested parties. Methods of announcing available samples will be through data releases, announcements on the WHSC's Web site and through emails to USGS researchers and other institutions such as, but not limited to the National Oceanic and Atmospheric Administration (NOAA), the Integrated Ocean Drilling Program (IODP), and WHOI. This five year period will then be extended by an additional two years to accommodate outside parties wishing to access them.

One-year extensions to the retention period may be applied for with descriptive reasons for keeping samples longer. The curator and a collections committee will then review this extension application.

These extensions may be applied for up to three times, thereby giving any sample a maximum shelf life of ten years. After that time period, mandatory deaccessioning procedures will occur.

Sharing Samples

The Loaning Process

All loan requests shall be directed to the curator. The curator will check the availability of the samples and confer with the collecting scientist regarding the sample's status and availability.

If the sample is available for loan, the borrower, the responsible scientist, and the curator shall sign a Sample Loan Agreement form, acknowledging conditions of the loans. A copy of the Loan Conditions will be provided to the borrower for their own records.

Conditions of the Loan

The borrowing party will be subject to the following conditions:

- **Term of Loan**: The samples shall be returned to the Woods Hole Science Center at the borrower's expense no later than the due date agreed upon and stated on the Loan Agreement or within one week after an earlier return is requested by the WHSC.
- **Use of Property**: The samples loaned shall be used for research and data extraction purposes. The borrower shall not loan, deliver, lease, or transfer the samples to any other institution, and the borrower shall clearly state that the sample belongs to the USGS Woods Hole Science Center sediment archive.
- **Alteration of Sample**: The borrower is responsible for notifying the WHSC of all tests and any alterations done to the sample while in the borrowers' care.
- **Loss or Damage**: It is recognized that analyses are generally destructive in nature. However, if the borrower intends to return the sample, the borrower shall be responsible to report any damage or loss of sediment due to any cause.

Sample Return Policy

Upon return of the sediment sample to the WHSC, the borrowing institution and the curator will sign the Outgoing Loan Agreement Form and the date of return shall be marked.

The Chain of Custody

Outside institutions shall be allowed to come into the USGS sediment archive to retrieve portions of samples for research. All requests shall be directed to the curator and the curator will check the availability of the requested sediment for sampling.

Upon arrival, the curator will have prepared a Chain of Custody form. This form will include the following information:

1. Researcher and affiliation
2. Date of sampling from WHSC Archives
3. Amount of sample taken
4. Locations of taken samples on core

The curator as well as the principal investigator from the outside institution sampling the core will then sign the Chain of Custody form. All alterations and samplings will then be recorded in the sediment archive database.

Deaccession & Disposal

Deaccession Preliminaries

Before deaccessionary procedures can even begin, an annual review of the entire archive must take place. This review will determine which, if any, samples are eligible for removal. Samples which have remained in storage for the prescribed seven-year term will be added to a list of samples eligible for deaccession.

Also added to the list are any samples deemed unsuitable for further study due to lack of physical integrity from absence or loss of sample information or deterioration beyond usefulness for adequate scientific examination.

Once a sample has been determined to be eligible for disposition, it can be removed only through proper completion of the deaccession process.

Decision Making and the Committee

Samples in the WHSC's sediment archive eligible for deaccession will be recommended by the curator to an annual collections committee consisting of the curator, Principal Investigator, and any parties interested in the future of the samples in question, who will then decide the final fate of the samples. This decision in turn will be presented to the WHSC's Team Chief Scientist for final approval.

Deaccession Criteria

To be considered for deaccession, a sample must meet at least one of the following criteria:

- **Poor Condition**: The sample has deteriorated or been damaged beyond any useful value for further scientific study. Condition also applies to adequate documentation of the sample. Sediment samples of unknown origin are scientifically useless.
- **Storage Limitations**: The Archive is not able to provide ample storage space for samples collected up to more than ten years with storage extensions. Samples that have exceeded this time will be disposed of.
- **Duplication**: The sample is a duplicate of another sample currently stored in the archive (i.e. working and archive halves).

Announcement

Upon consensus by the Principal Investigator and curator, with the approval from the Team Chief Scientist, a list of all samples to be deaccessioned will be made available to Center scientists and to the public.

This announcement will take the form of both internal and external emails. Messages will be sent to all research staff within the WHSC and USGS as well as interested institutions such as IODP, NOAA, WHOI and universities to which these samples may prove useful.

After the announcement has gone out, there will be a one-month waiting period during which requests for sample acquisition will be processed.

Sample Disposition

The condition and status of the samples will be assessed and proposed for deaccession from this, final disposition will be determined. If the samples proposed for deaccession are in such a state that they are deemed unusable for further study due to natural deterioration or through extensive research conducted on the sample thereby destroying its integrity, the sample will be subject to appropriate disposal.

If the samples appropriate for disposal are deemed appropriate for preservation or prove valuable for long-term storage, the samples shall be referred to the approved collections committee alternate which may investigate local alternate storage options.

Another alternative would be to contact collaborating institutions involved with the collection of the samples to inquire whether their institution would find the samples useful to any ancillary research.

Geochemical samples may contain heavy metals, poisonous chemicals or other hazardous pollutants. The curator, in conjunction with the samples' Principal Investigator will determine any special needs the disposal will require, and consult the WHSC's safety officer to determine the appropriate course of action.

The Deaccession Recommendation form and records of all disposition actions will be retained permanently in the archive database. The curator will provide an annual report on all deaccession actions and place it on file at the end of the fiscal year.

Database

A Web-accessible database has been created to store metadata pertaining to the samples collected by WHSC scientists and researchers. This database contains information relating to the collection process, location information, research interests, and storage notes for each sample entry.

The sample database was originally constructed using Microsoft Access and is continuously maintained and updated using information derived from the WHSC's Data Library's field activity database and data sets provided by the Principal Investigators. The database and its associated shapefile can be accessed in the Data Catalog section of this report as a Microsoft Excel workbook. The currentness of the data in this publication is provided in the database metadata file.

The database is also accessible online and is available at the USGS Woods Hole Science Center's Ocean Floor Samples access page. This webpage allows for text-based searching of the archive database, and provides links to the field activity pages and cruise metadata. Inquiries may be directed to the curator, Brian Buczkowski (bbuczkowski@usgs.gov).

Data Fields

The data fields described here contain recommended metadata topics, as chosen by WHSC scientists, as well as agreed parameters decided upon by the Curators of Marine and Lacustrine Geological Samples group from standard presented data. Attributes and their definitions are shown in Table 1.

Blank cells in the database entries indicate information that is either unavailable, due to no data, or to preserve the proprietary nature of the samples as research is currently being conducted on them..

Data Catalog

The data supplied on this CD-ROM are made available with geographic coordinates to allow the data to be incorporated into a Geographic Information System (GIS). The data layers along with additional base map layers have been compiled into an Environmental Systems Research Institute (ESRI) project file (***Sed_Archive.apr***), which is located at the top-level directory of this publication. The project file serves to provide an example of how the data can be displayed in a GIS. A variety of basemap layers that can be used to accompany these data can be found on the Coastal and Marine Geology Program's Internet Map Server. Several have been included below and are used in the project file.

The project ***Sed_Archive.apr*** is setup to "hotlink" to online descriptions of the samples in the WHSC's archives. The EvokeBrowser extension provided by Flat World Technologies must be loaded for this to work. This extension will be loaded by default within the project file.

For those who do not have the ESRI software or a compatible GIS data browser available on their computer, a free viewer, ArcExplorer™, is available from ESRI. The ArcExplorer™ software is available for both Microsoft Windows and Mac OSX operating systems.

Clicking on the layer name under the column header "Data Layer Name & Description" in the table below will open a new window with a graphical representation of that layer. Federal Geographic Data Committee (FGDC) metadata are included with data layers in three formats in the table below: (HTML, FAQ, and text).

A downloadable zip archive file containing the elements that comprise the ESRI shapefile for each data layer is also provided. Each zip file includes:

1. ESRI shapefile for each layer (with associated files)
2. Comma-delimited text version of the data file
3. All three standard versions of the metadata
4. Browse graphic of the data layer

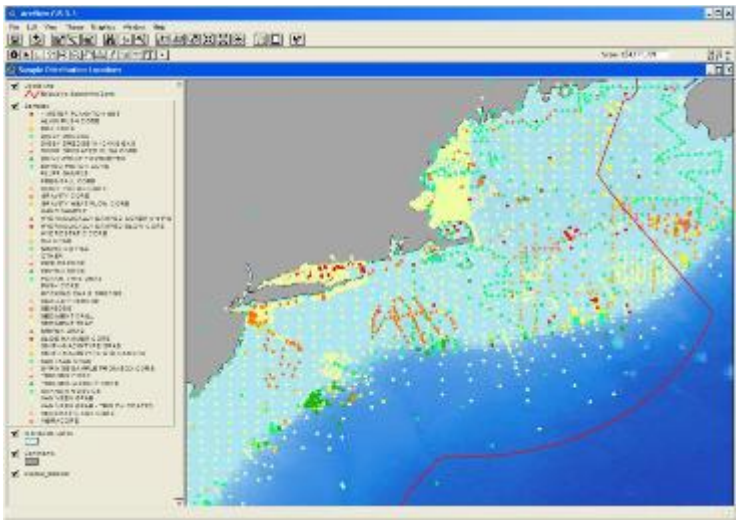

Figure 3. Example of geographic display of the Sediment Archive database, with classification of sample points based on the type of collection device used.

The zip files were created using WinZip v. 8.1. Users may obtain a free copy of the software from WinZip. In addition to the *sed_archive* ESRI shapefile, the archive database is available in Microsoft Excel workbook, and an ASCII text format as alternate ways to view and examine the data set. The first record of the ASCII file contains the name of the data fields for that file.

Data Files

The data and basemaps provided below may be entered into a GIS to gain a visual perspective of the distribution of collection sites, and links to images and associated data, information and descriptions, where available.

The Database

Data Layer Name & Description	Metadata	Files	File Size
sed_archive - The WHSC Sediment Archive's sample database, including collection metadata, storage information and links to relevant materials	HTML FAQ txt	sed_archive.zip	3.76 MB

Basemap Layers

Data Layer Name & Description	Metadata	Files	File Size
World Continents - Medium resolution digital vector shoreline for the world continents (Source: ESRI)	HTML FAQ txt	continents.zip	1.34 MB
World Lakes - Vectorized world lakes (Source: ESRI)	HTML FAQ txt	lakes.zip	199 KB
etopo2 Global Bathymetry - Image representation of etopo2 bathymetry (MrSid format) (Source: NOAA)	HTML FAQ txt	etopo2.zip	6.82 MB
U.S. EEZ Boundary - Boundaries of the Exclusive Economic Zone (EEZ) (Source: NOAA)	HTML FAQ txt	useez.zip	180 KB

Glossary of Terms

Many of the following terms and definitions were taken, or modified from the National Research Council, Committee on the Preservation of Geoscience Data and Collections (2002). For a more comprehensive listing of terminology relating to geophysical archives, consulting this reference is suggested.

ACCESSION The process by which a sample is formally entered into a collection. Accession includes listing the specimen in the collection's permanent inventory.
ALTERATIONS Any changes to the physical integrity of samples due to purposeful means.
AMBIENT TEMPERATURE A term describing the temperature of samples to be the same as the current atmospheric temperature. The samples are neither refrigerated, nor frozen. Such samples are usually desiccated and preserved from rot and other harmful occurrences that freezing and refrigeration help prevent.
BUCKY DECIMAL SYSTEM A location identification number created by the WHSC's curator to identify the specific location of a sample in storage. This number is a combination of a cold box identifier, storage unit identifier and shelf identifier.
CHAIN OF CUSTODY A condition where outside researchers may obtain portions of samples collected by the WHSC for their own use without the condition of having the samples returned (see **Loan**).
CORE A long cylindrical sample of sediment or rock (usually 2 inches or more in diameter) taken of sediments using gravity corers, piston corers, or vibracores, or of rock by means of a diamond core drill.
COLLECTIONS MANAGEMENT A set of policies and protocol relating to the way and manner in which the collections should be organized and cared for.
COLLECTION A group of objects organized for ready access and study. Geoscience collections are groupings of individual geoscience items that may be related by sample type, geographic location, or scientific or applied interests. Museum collections commonly contain specimens of local interest or samples that reflect the research interests of curators of the museum.
COLLECTIONS COMMITTEE An organized group of scientists and technicians who work with samples. This committee meets to decide the future of samples in the WHSC's sample archive.

DEACCESSION The procedure by which a sample is formally and permanently removed from a collection.
DESICCATION The process of dehydration.
DISPOSITION The ultimate removal of samples from the collection. Usually refers to the disposal of samples due to lack of integrity or exhaustion.
FIELD ACTIVITY SERIAL NUMBER A five-digit number assigned to a specific field activity by the Data Librarian. This number is used to catalogue field reports, data sets, and physical samples for each activity.
GEOSCIENCE(S) A short term for the collective subdisciplines of the geological (solid Earth) sciences, including engineering geology, geobiology, geochemistry, geohydrology, geophysics, sedimentology, and stratigraphy, among others.
LOAN Samples distributed to facilities, institutions and researchers outside the WHSC with the intent that the samples should be returned after a set time in a reasonable condition to accommodate future study by other parties.
METADATA Term used to describe a dataset and bring value to the scientific data represented. Examples include collecting conditions, instrumentation parameters, location, depth, range, and the names of the analysts and techniques they employed.
PLATFORM Any vessel or rig used to collect samples. A platform can be ocean-going or terrestrial.
PRINCIPAL INVESTIGATOR The researcher responsible for the collection of the samples and the research performed on them.
SAMPLE NUMBER Any identifier assigned to a specific sample during a field activity.
TEAM CHIEF SCIENTIST The Center Chief, responsible for all final decisions regarding sample fates.

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Knell, S.J., ed., 1994, Care of Collections (Leicester Readers in Museum Studies): New York, Routledge, 282 p.
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Contacts

Feedback on this handbook and database is appreciated, both in usefulness and error detection. Please use the following contact information for issues and (or) questions.

Current contact information can be found on the project pages:

USGS Woods Hole Science Center's Ocean Floor Samples
(*http://woodshole.er.usgs.gov/operations/ia/samples.php*)
The Information Archives of the USGS Woods Hole Science Center
(*http://woodshole.er.usgs.gov/operations/ia/index.html*)

Brian Buczkowski: *for information on archival policy and marine sample holdings*
USGS, Woods Hole Science Center
384 Woods Hole Road
Woods Hole, MA 02543-1598
Tel: 508-548-8700 ext. 2361
bbuczkowski@usgs.gov

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Nancy Soderberg: *for information regarding field activities and data library holdings*
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browser. Thank you to thank Donna Newman for her expertise in producing this publication, and for her patience with the editing and review processes.

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This report has benefited from critical reviews by Larry Poppe, Nancy Soderberg, and Jim Robb (all USGS).

Appendices

Table 1: Data Available in the Sediment Archive database:

ATTRIBUTE	DEFINITION
serial_no	Five-digit field activity number assigned to the collection cruise by the WHSC's Data Librarian.
alt_cruise_id	Any alternate identifier used to refer to the collection cruise on which the selected sample was taken.
platform	Ship, or vessel (marine or terrestrial) upon which the sample was collected.
sample_id	Sample identifier assigned in the field.
sample_type	Type of sample collected.
device	Collection device.
device_code	Abbreviated code for the collection device.
top_section	Top of sectioned interval, measured in centimeters from the top of the core sample.
bottom_section	Bottom of sectioned interval, measured in centimeters from the top of the core sample.
pri_sed_tex	Primary sediment texture according to the Folk classification scheme (1954, 1974).
sec_sed_tex	Secondary sediment texture according to the Folk Classification scheme (1954, 1974).
latitude_dd	Latitude in decimal degrees, for GIS display.
longitude_dd	Longitude in decimal degrees, for GIS display.
year_taken	Year of sample collection.
date	Date of sample collection.
time_taken	Time reading when sediment was collected.
core_l	Core length, measured in centimeters.
core_d	Core barrel diameter, measured in centimeters.
water_dm	Water depth, measured in meters.
water_df	Water depth, measured in feet.
area	Location of sample collection.
notes	Additional information pertaining to the sample.
fate	Destination of sample after analyses have taken place.
pi_name	Name of scientist in charge of sample collection.
pi_contact	Email address to contact for sampling information.
cruise_url	Field activity page on the Woods Hole server providing supplementary information on the collection cruise. Information given includes PI and personnel aboard the platform, purpose of field activity, area of operations, and links to materials in the Data Library also derived from this cruise.
description_available	Yes or No, is there a page with a sample description available for the public?
desc_page	Link to the description page, if available.
data_available	Types of data collected from this sample.
published	Yes or No, have data from this sample been published?
publication	Citation and link to published materials.
in_collections	Yes or No, do we have the sample available in our collections?
storage_facility	Storage facility housing the sample.
storage_location	Location of sample within the facility.
entry_date	Date sample information was entered/ updated in the sediment archive database.