1. Identification Information

1.2 Description

1.2.1 Abstract:
A group of eight intertidal creeks with high densities of oysters, *Crassostrea virginica*, in North Inlet Estuary, South Carolina, USA were studied using a replicated BACI (Before - After Control - Incident) design in which all creeks are sampled simultaneously. The study known as the CREEK Project began in January 1996. Based on preliminary geomorphological observations of North Inlet creeks, by fall of 1996, eight creeks similar in size and configuration were selected for the study. Geomorphological observations were made in four stages ranging from general to detailed: 1) a general reconnaissance and the selection of the eight creeks, 2) Chris Corbett and Leroy Humphries conducted detailed survey of the internal geomorphology of the selected eight creeks using GIS equipment, 3) Leah Gregory produced a oyster reef map and oyster biomass determination, and 4) Dennis Allen measured and classified all creek bottoms (referred to as Internal Creek Habitat Survey). In January 1997, after the first three stages were complete, oysters were added or removed from each creek to equalize oyster biomass at 8 grams dry body weight per cubic meter of bank full water volume in each creek. This stage of the project is referred to as the "pre-manipulation" period where all creeks have the same amount of oyster biomass. Sampling of water and nektom began in March 1997. In February 1998, about one year after the first set of water quality, chemistry, nektom and other measurements were made, living oysters were removed from four of the eight creeks (creeks 1, 4, 5, and 8), resulting in zero dry body weight per cubic meter of water at bank full volume. This was done to investigate the role of oyster reefs in controlling levels of dissolved and particulate materials in the water and to evaluate relationships between living oysters and nektom in the creeks. During the year following oyster removal, all measurements made in the first year were repeated. The second year of the project during which four of the creeks were without oyster biomass was known as the "manipulation" stage. The BACI analysis was used to compare data between the two years.
As part of the study to determine the role of oyster reefs in tidal creek ecosystems, an oyster growth and survival research subproject was initiated in August 1997 and completed in November 1999. Four bags of 25 oysters each were placed along the mainstem of each creek at approximately the same elevation; bags were placed between 24 and 150 m from each creek mouth (see 97 Deployment Data file). For each oyster bag deployment, the distance in meters from the mouth of the creek and relative intertidal height was determined. Oyster growth and survival were measured primarily monthly during the pre-manipulation and manipulation stage. During the pre-manipulation stage, after adjusting oyster biomass to 8g dry weight per m³ bank full water volume, the bags of oysters were placed on or near oyster reefs in each creek and the growth and survival were measured. Shell height was used to determine growth, and survival (mortality) was determined by counting the number of dead oysters in each bag. To determine how the presence or absence of mature oyster reefs (manipulation stage) affects oyster growth and survival, the same oyster variables were measured. Pre-manipulation growth and survival data cover the dates from August 18, 1997 through October 16, 1997 and October 21, 1997 through January 23, 1998. Manipulation data are from April 21, 1998 through November 6, 1999. The database also includes calculated daily growth, average growth, and percent survival values.

1.2.2 Purpose: The objective of the CREEK Project’s Oyster growth and survival subproject was to identify existing growth and survival variability and its potential sources prior to and after experimental removal of oyster reefs from four of the eight creeks. Oyster reefs likely impact growing conditions such as hydrodynamics, food availability and food quality, but differences in oyster growth and survival among creeks may exist due to factors other than oyster reefs.

1.2.3. Supplemental Information:
Significant Publications and Presentations:


Southeastern Estuarine Research Society (SEERS)


Other Creek Datasets:
Several other datasets were collected over varying periods during the four years. Oyster biomass data was collected to determine the natural average biomass of oysters within intertidal creeks so that all creeks could be adjusted to that average level and subsequently to monitor changes in oyster biomass since elucidating the role of oysters was the primary purpose of the overall study. Intensive planktonic - microbial loop sampling and experiments were conducted in selected creeks at various times. Collections of all nekton in creeks during bankfull neap tides were conducted seasonally during two years of the project, one pre-manipulation year and one post-manipulation year. The habitat survey was initiated to determine what percentage of mud, shell, and live oyster reef made up of each of the eight creek bottoms. The habitat types were used to help relate how and if the bottom habitat type influenced the nekton utilization of the creek. The microzooplankton subproject was initiated to determine the effects of oyster grazing on microbial communities in the eight creeks. The water chemistry project was initiated to monitor nutrient cycling in the eight creeks. A larger purpose of this monitoring program was to combine the water chemistry, chlorophyll a, and suspended sediment monitoring data with other aspects of the CREEK Project (i.e. nekton, oyster and phytoplankton) ecologial monitoring data to provide ecosystem level information and understanding about the role of oyster reefs. Infection intensities of the oyster parasite, Perkinsus marinus, were made in fall of the pre-manipulation year and once following the manipulation. See the Creek Project Overview documentation for information on publications, presentations, and other undergraduate and graduate research project topics.

Summary of important results:
Preliminary analysis indicated no effect of distance from creek mouth on growth or survival. However, differences in growth among creeks roughly corresponded to differences in chlorophyll concentrations, a measure of food availability. Growth was also higher for creeks that drained middle marsh habitats into a large main channel compared to creeks that drained the uplands of a marsh island into a smaller channel.

Pre-manipulation year observations show that oyster growth and survivorship were normal.

Post-manipulation year observations show that oyster growth and recruitment were slightly higher in creeks with oysters removed.

Oyster growth was higher in summer than in winter and was not significantly different between creeks. Oyster survivorship was higher in winter than summer and no significant differences between creeks were evident.

Although covering 25-70% (avg.40%) of intertidal creek bottoms, oysters do not dominate faunal biomass or the remineralization of nutrients.

Totally unexpected was the finding that summer nekton (fishes, shrimps, crabs) biomass is higher than oyster biomass.

El Niño, a global environmental event, was clearly evident from the analysis of three years of weekly chlorophyll and nutrient data (1997-2000).

Utilizing limited literature values and preliminary experiments, a simple budget for ammonium indicated that nekton inputs were considerably greater than oyster excretion as a source to intertidal creeks.

Map of the eight creek sites can be found at http://links.baruch.sc.edu/data/CREEK/CreekOysterBiomass/OysterBio.htm or in the printed version of the Creek Project Overview documentation that is in a Project notebook at the BFML.
1.3 Time Period of Content:
9.3 Range of Dates/Times
9.3.1 Beginning Date: 19970817
9.3.3 Ending Date: 19991106

1.3.1 Currentness Reference: Ground condition.

1.4 Status:
1.4.1 Progress: Complete
1.4.2 Maintenance and update frequency: As needed

99.1.5.1 Description of Geographic Extent:
All eight creeks reside in North Inlet Estuary, four off of Clambank Creek, and four off of Town Creek. The North Inlet Estuary (33.20°N, 79.10°W) lies east of the uplands of Hobcaw Barony (also known as the Belle W. Baruch Property). The Estuary is located in Georgetown County, South Carolina.

1.5.1 West Bounding Coordinate: -79.192
1.5.1.2 East Bounding Coordinate: -79.167
1.5.1.3 North Bounding Coordinate: 33.350
1.5.1.4 South Bounding Coordinate: 33.327

1.6 Keywords
1.6.1 Theme
1.6.1.1 Theme Keyword Thesaurus: None
1.6.1.2 Theme Keyword: COASTAL
1.6.1.2 Theme Keyword: CREEK
1.6.1.2 Theme Keyword: CREEK PROJECT
1.6.1.2 Theme Keyword: ECOSYSTEMS
1.6.1.2 Theme Keyword: ESTUARINE COMMUNITIES
1.6.1.2 Theme Keyword: ESTUARINE
1.6.1.2 Theme Keyword: ESTUARY
1.6.1.2 Theme Keyword: INTERTIDAL CREEK
1.6.1.2 Theme Keyword: MARSH
1.6.1.2 Theme Keyword: EASTERN OYSTER
1.6.1.2 Theme Keyword: SALT MARSH
1.6.1.2 Theme Keyword: INTERTIDAL HABITAT
1.6.1.2 Theme Keyword: FIELD EXPERIMENT
1.6.1.2 Theme Keyword: OYSTER SHELL
1.6.1.2 Theme Keyword: OYSTER GROWTH
1.6.1.2 Theme Keyword: OYSTER SURVIVAL
1.6.1.2 Theme Keyword: MUD BOTTOM

1.6.2 Place
1.6.2.1 Place Keyword Thesaurus: None
1.6.2.2 Place Keyword: NORTH INLET ESTUARY
1.6.2.2 Place Keyword: SOUTH CAROLINA
1.6.2.2 Place Keyword: TOWN CREEK
1.6.2.2 Place Keyword: CLAMBANK CREEK
1.6.2.2 Place Keyword: EAST COAST
1.6.2.2 Place Keyword: SOUTHEAST COAST
1.6.2.2 Place Keyword: COASTAL
1.6.2.2 Place Keyword: GEORGETOWN COUNTY
1.6.2.2 Place Keyword: USA

1.6.3 Stratum
1.6.3.1 Stratum Keyword Thesaurus: None
1.6.3.2 Stratum Keyword: BOTTOM
1.6.3.2 Stratum Keyword: BENTHIC

1.6.4 Temporal
1.6.4.1 Temporal Keyword Thesaurus: None
1.6.4.2 Temporal Keyword: 1997
1.6.4.2 Temporal Keyword: 1998
1.6.4.2 Temporal Keyword: 1999
1.6.4.2 Temporal Keyword: 1997-1999
1.6.4.2 Temporal Keyword: MONTHLY

99.1.7 Taxonomy
99.1.7.1 Taxonomic Keyword Thesaurus: None
99.1.7.2 Taxonomic Keywords CRASSOSTREA VIRGINICA
99.1.7.2 Taxonomic Keywords: INVERTEBRATE
99.1.7.2 Taxonomic Keywords: BIVALVE
99.1.7.2 Taxonomic Keywords: OSTREIDAE

99.1.7.4 Taxonomic Classification
99.1.7.4.1 Taxon Rank Name: Kingdom
99.1.7.4.1 Taxon Rank Value: Animalia
99.1.7.4.3 Applicable Common Name: Animals

1.7 Access Constraints:
None; however, it is strongly recommended that these data be acquired directly from the Belle W. Baruch Institute for Marine and Coastal Sciences and not indirectly through other sources which may have changed the data in some way.

1.8 Use Constraints:
Following academic courtesy standards, the PIs (originators), the University of South Carolina's Belle W. Baruch Institute for Marine and Coastal Sciences, Coastal Carolina University, and Grantor (see Data Set Credit section) should be fully acknowledged in any subsequent publications in which any part of these data are used. Use of the data without completely reading and understanding the metadata is not recommended. The Baruch Institute, Coastal Carolina University, Baruch Institute and Coastal Carolina researchers, and Grantor are not responsible for the use and/or misuse of data from this database. See the section on Distribution Liability for more information.

1.9 Point of Contact:
10.2 Contact Organization Primary
10.2.1 Contact Organization: Rutgers University
10.2.2 Contact Person: Dr. David Bushek
10.3 Contact Position: Assistant Professor
10.4 Contact Address
10.4.1 Address Type: Mailing Address
10.4.2 Address: Haskin Shellfish Research Lab
10.4.2 Address: 6959 Miller Avenue
10.4.3 City: Port Norris
10.4.4 State or Province: New Jersey
10.4.5 Postal Code: 08349
10.4.6 Country: USA
10.5 Contact Voice Telephone: 856-785-0074 x 4327
10.7 Contact Facsimile Telephone: 856-785-1544
10.8 Contact Electronic Mail Address: bushek@hsrl.rutgers.edu

1.11 Data Set Credit:
Funding was provided by the National Science Foundation, grant DEB_95_0957 to Coastal Carolina University and the University of South Carolina’s Belle W. Baruch Institute, with Dr. Richard Dame as project director. Numerous researchers and students contributed to these datasets.

1.14 Native Data Set Environment
Data are in Microsoft Excel 2000 Professional spreadsheet and comma separated values (CSV) formats. Metadata are in MS Word 2000 Professional and text (TXT) formats. Data and graphics are in EXCEL and jpg formats.
1.15 Cross Reference:
8. Citation Information
8.1 Originator: Richard Dame
8.1 Originator: David Bushek
8.1 Originator: Dennis Allen
8.1 Originator: Leah Gregory
8.1 Originator: Don Edwards
8.1 Originator: Alan Lewitus
8.1 Originator: Sarah Crawford
8.1 Originator: Eric Koepfler
8.1 Originator: Bjorn Kjerfve
8.1 Originator: Theo Prins
8.1 Originator: Chris Corbett
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, Department of Statistics of the University of South Carolina
8.2 Publication Date: 20000730
8.4 Title: The experimental analysis of tidal creeks dominated by oyster reefs: the premanipulation year
8.6 Geospatial Data Presentation Form: Scientific publication
8.8 Publication Information:
8.8.1 Publication Place: Unknown
8.8.2 Publisher: Journal of Shellfish Research
8.9 Other Citation Details: Volume 19:1, pages 361-369.

1.15 Cross Reference:
8. Citation Information
8.1 Originator: Richard Dame
8.1 Originator: David Bushek
8.1 Originator: Dennis Allen
8.1 Originator: Alan Lewitus
8.1 Originator: Sarah Crawford
8.1 Originator: Eric Koepfler
8.1 Originator: Leah Gregory
8.1 Originator: Don Edwards
8.1 Originator: Bjorn Kjerfve
8.1 Originator: Theo Prins
8.1 Originator: Chris Corbett
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences, Department of Statistics of the University of South Carolina
8.2 Publication Date: 200201
8.4 Title: Ecosystem response to bivalve density reduction: management implications
8.6 Geospatial Data Presentation Form: Scientific publication
8.8 Publication Information:
8.8.1 Publication Place: Netherlands
8.8.2 Publisher: Aquatic Ecology
8.9 Other Citation Details: Volume 36:1, pages 51-65.

1.15 Cross Reference:
8. Citation Information
8.1 Originator: David Bushek
8.1 Originator: Richard Dame
8.1 Originator: Leah Gregory
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina
8.2 Publication Date: 20030808
8.4 Title: CREEK Project’s Oyster Biomass Database for Eight Creeks in the North Inlet Estuary, South Carolina: 1996-2000.
8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet
8.8 Publication Information:
8.8.1 Publication Place: Belle W. Baruch Marine Field Laboratory, Georgetown, South Carolina USA
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: http://links.baruch.sc.edu/data/
**1.15 Cross Reference:**

**8. Citation Information**

8.1 Originator: Richard Dame
8.1 Originator: Leah Gregory
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences

8.2 Publication Date: 20000701


8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet

8.8 Publication Information:

8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: [http://links.baruch.sc.edu/data/](http://links.baruch.sc.edu/data/)

---

**1.15 Cross Reference:**

**8. Citation Information**

8.1 Originator: Michael Wetz
8.1 Originator: Alan Lewitus
8.1 Originator: Richard Dame
8.1 Originator: Eric Koepfler
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina

8.2 Publication Date: 20041216

8.4 Title: CREEK Project’s Microzooplankton Seasonal Monitoring Database for Eight Creeks in the North Inlet Estuary, South Carolina: 1997-1999

8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet

8.8 Publication Information:

8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: [http://links.baruch.sc.edu/data/](http://links.baruch.sc.edu/data/)

---

**1.15 Cross Reference:**

**8. Citation Information**

8.1 Originator: Dennis Allen
8.1 Originator: David Bushek
8.1 Originator: Brian Milan
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina

8.2 Publication Date: 20040726

8.4 Title: CREEK Project’s Internal Creek Habitat Survey for Eight Creeks in the North Inlet Estuary, South Carolina: January 1998.

8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet

8.8 Publication Information:

8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: [http://links.baruch.sc.edu/data/](http://links.baruch.sc.edu/data/)

---

**1.15 Cross Reference:**

**8. Citation Information**

8.1 Originator: Raphael Tymowski
8.1 Originator: Ivy Collins
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina

8.2 Publication Date: 20050228

8.4 Title: CREEK Project’s Phytoplankton Pigment Monitoring Database for Eight Creeks in the North Inlet Estuary, South Carolina: 1997-1999

8.6 Geospatial Data Presentation Form: comma delimited digital data and Microsoft Excel spreadsheet

8.8 Publication Information:
8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC  USA
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: http://links.baruch.sc.edu/data/

1.15 Cross Reference:
8. Citation Information
8.1 Originator: Becky Ellin
8.1 Originator: David Bushek
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina
8.2 Publication Date: 2005
8.4 Title: CREEK Project’s Oyster Disease Monitoring Database for Eight Creeks in the North Inlet Estuary, South Carolina
8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet
8.8 Publication Information:
8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: http://links.baruch.sc.edu/data/

1.15 Cross Reference:
8. Citation Information
8.1 Originator: Chris Corbett
8.1 Originator: Bjorn Kjerfve
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina
8.2 Publication Date: 2005
8.4 Title: CREEK Project’s Tidal Creek Geomorphology Database for Eight Creeks in the North Inlet Estuary, South Carolina
8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet
8.8 Publication Information:
8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: http://links.baruch.sc.edu/data/

1.15 Cross Reference:
8.1 Originator: Dennis Allen
8.1 Originator: Richard Dame
8.1 Originator: Leah Gregory
8.1 Originator: Department of Marine Science, Coastal Carolina University
8.1 Originator: Belle W. Baruch Institute for Marine and Coastal Sciences and Department of Statistics of the University of South Carolina
8.2 Publication Date: 20040615
8.4 Title: CREEK Project’s Nekton Database for Eight Creeks in the North Inlet Estuary, South Carolina: 1997-1998.
8.6 Geospatial Data Presentation Form: comma delimited digital data and spreadsheet
8.8 Publication Information:
8.8.1 Publication Place: Baruch Marine Field Laboratory, Georgetown, SC  USA
8.8.2 Publisher: Belle W. Baruch Institute for Marine and Coastal Sciences, University of South Carolina
8.10 Online linkage: http://links.baruch.sc.edu/data/

2. Data Quality Information
2.1 Attribute Accuracy
2.1.1 Attribute Accuracy Report:
There were no tests to determine technician or caliper variability or accuracy. However, negative values occurred in the dataset when subtracting the “recovery” shell height from the “initial” value. The negative values could have been the result of various things such as a measurement error by the technician, the calipers used to measure the
oysters, and/or weathering of the oyster shell. The shell edges of the Eastern Oyster are very thin and razor sharp, so that handling, measuring, or bumping together in the bags could have broken off the shell edges, thereby effecting the measurement. In addition, the oysters in the first deployment (August 18, 1997) were measured to the nearest whole (1) millimeter with manual calipers. The rest of the oysters were measured with electronic calipers, which measure to the nearest 0.01 millimeter.

2.1.2 Quantitative Attribute Accuracy Assessment
2.1.2.1 Attribute Accuracy Value

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Number of Decimal Places in Original Database</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Oyster Growth</td>
<td>2 (reported in millimeters)</td>
</tr>
<tr>
<td>Mean Oyster Growth</td>
<td>2 (reported in millimeters)</td>
</tr>
<tr>
<td>Percent Survival</td>
<td>2 (no decimal places listed in the Final/Rescued Database)</td>
</tr>
</tbody>
</table>

2.1.2.2 Attribute Accuracy Explanation
The electronic calipers were able to measure oyster height to the nearest 0.01mm; however, the accuracy of the measurements at this resolution should be questioned, given the fact that there were negative Growth values (Initial Deployment shell height minus Recovery shell height). See more about this in the Logical Consistency Report and the Anomalous Data report in this section.

2.2 Logical Consistency Report: The originators (original authors - not data rescue team) applied the following rules to their pre-manipulation (only) oyster growth calculations to provide an adjusted growth value. These adjusted values are listed in the original database (in the Process Directory), but not in the final 2005 (rescued) database. The “Adjusted Growth Rules” were:

- If the growth value is > zero then keep the value.
- If the growth value is ≥-2 and ≤0 then the value equals zero.
- If the growth value is < -2 then discard the value. This value is probably due to a measurement error.

In the final/rescued graphics, only the raw growth values were used to create the data plots, not the adjusted values.

2.3 Completeness Report:

Missing Data:

Raw/Original database (in Raw Directory) - Zeros on the raw hardcopy data sheets (electronic caliper output sheets) indicate that the oyster was dead or missing.

Original database (in Process Directory) - Blanks or zeros in the spreadsheet cells denote missing data values in the original digital database. “ND” or “nd” also denote “no data”.

Final/Rescued database (in Final Directory) - Periods (.) denote missing data values in the digital database.

Oyster bag 4D on October 16, 1997 was never found. There are no data for these oysters.

When the oyster bags were recovered and oysters were missing from the bags, they were assumed dead.

In the final digital file (.xls and .csv versions), there are missing initial and final growth values, but calculated daily growths were reported. It is likely that the oyster died during the previous month and, when it was discovered during measurement collection, it was replaced for the following month. See the Anomalous Data section below for these missing values.

Anomalous Data:

When the “Daily Growth” calculation value was not based on the initial and final measurement of the same oyster, the value was considered anomalous. Anomalous “Daily Growth” values, which occurred in the final oyster growth data file, were copied and placed into the file, DailyMissing. This file was archived in the OYSAGROWTH.Final/Final.Documentation/AnomalousData directory during the data rescue process. In the example below, the final oyster growth value for 6/18/1998 and the initial oyster growth value for 7/23/1998 were both missing; however,
final oyster height and “Daily Growth” values for 7/23/1998 are listed and are most likely based on data from a replacement oyster.

Date           Creek       Bag       Oyster# Initial Final Growth Daily Growth

6/18/1998 4 B 20 67.51
7/23/1998 4 B 20 66.82 66.82 2.67

Negative “Daily” and negative “Average Growth” values were also considered anomalous. These negative (anomalous) “Growth” values were also copied from the final data and listed in the files, DailyNegative and AvgGrowth, which have been archived in the same directory as the DailyMissing file above. These anomalous files can be viewed and/or downloaded at http://links.baruch.sc.edu/data/CREEK/CreekOysterGrowth/metadata.

2.5 Lineage
2.5.1 Methodology
2.5.1.1 Methodology Type: Field Collection & Workup Procedures
2.5.1.3 Methodology Description: Oyster Growth and Survival
During the pre-manipulation year, oyster growth and survivorship were observed by placing plastic mesh bags containing 25 marked and measured oysters in each of the eight experimental tidal creeks. As the creeks are ephemeral and tidal exposure is a critical factor in bivalve physiology, bags were placed at four locations along the mainstem of each creek at approximately the same measured elevation. Bags were placed between 24 and 150 m from each creek mouth. Summer observations were between July and October, and fall-winter observations were from October to February.

Eight hundred oysters were collected, cleaned, and randomly distributed among the 32 mesh bags (8 creeks x 4 bags/creek). Oysters in each bag were numbered 15-43 in the pre-manipulation stage and 1-25 in the post-manipulation stage, so that individual growth and survival could be determined. Bags were assigned numbers and letters (for example: 1A, 1B, 1C, 1D, 2A, 2B, etc.) corresponding to the creek in which they would be placed and their relative proximity to the creek mouth (A’s closest, D’s farthest). Shell height was determined for the right valve (top or flat valve) of each oyster, initially with manual vernier calipers (only on August 18, 1997) to the nearest millimeter, and later (after August 18, 1997) with electronic calipers to the nearest 0.01 millimeter. Bags were deployed in the creeks on racks about 10 cm above the sediment, on or adjacent to reefs. Attempts were made to keep racks at approximately the same intertidal height using the watermark on the marsh grass as a reference. Reef locations were selected because oysters recruit and grow well at these locations as evidenced by the presence of reefs. Distance in meters from the mouth of the creek and the relative intertidal height were determined for each bag. When recovered, oysters were arranged according to identification number on a pre-numbered pan to facilitate reading numbers that had become less legible. Dead oysters were counted and discarded. New live oysters were labeled to replace the dead oysters and their shell height measured to the nearest 0.01 millimeter. Growth was measured as change in length from the initial deployment to the recovery date (about 1 month).

2.5.1 Methodology
2.5.1.1 Methodology Type: Laboratory Protocols
2.5.1.3 Methodology Description: Oyster Numbering (Pre- and post-manipulation)
In the pre-manipulation stage, oysters were numbered beginning with the value 15 and ending with the value 43; also the oyster numbers skip from 20 to 25 (unknown why). In the post-manipulation stage, oysters were numbered continuously from 1 to 25 with no skip or break in the numbering. Therefore, oysters 15 and 43 in the pre-manipulation stage correspond to oyster 1 and 25 in the post-manipulation stage. See details below.

<table>
<thead>
<tr>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
<th>Pre</th>
<th>Post</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>1</td>
<td>20</td>
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<td>18</td>
</tr>
<tr>
<td>18</td>
<td>4</td>
<td>27</td>
<td>9</td>
<td>32</td>
<td>14</td>
<td>37</td>
<td>19</td>
</tr>
<tr>
<td>19</td>
<td>5</td>
<td>28</td>
<td>10</td>
<td>33</td>
<td>15</td>
<td>38</td>
<td>20</td>
</tr>
</tbody>
</table>

2.5.3.1 Process Description:

Overall Description: Original workup
Oyster measurements were transcribed onto hardcopy data sheets by creek and bag number. These numbers were entered by hand into a Microsoft Excel spreadsheet. It is unknown how the digital data were verified for correctness. Formulas were written into the spreadsheet to calculate growth and survival. Graphics were also created in MS Excel.
Data Rescue Process Description:  2004 workup

Data Capture and Processing of Original Raw and Final Data Files (October 2004)
The original raw hardcopy data sheets, original process, and original final digital data were obtained from the project PI, Dr. David Bushek. The original final digital data called OysGrowth was used to create the data rescue process file, OysterGrowth, by the Data Rescue Manager. The original final digital files, PreOysterGrowth and PostOysterGrowth were used to create the data rescue process file, OysterGrowthSurvivalData. The files, OysterGrowthData and OysterGrowthSurvivalData, were both used to create the final graphics, which are based on raw growth values and not on adjusted growth values.

Data Verification and Creation of Final Rescued Databases (February 2005)
The folder, OYSGROWTH.FINAL, contains the final graphics, documentation, and data directories. The final rescued digital data file, Final.Data, contains 2 worksheets (tabs): DailyOysGrowth and AvgOysGrowth, which were created from the OysterGrowth and OysterGrowthSurvivalData in the process folder. In the file, OysterGrowthSurvivalData, (in the “Aug-Oct97 Oys Growth” worksheet/tab), the Data Rescue Manager deleted the formula for raw growth (cell 264D) for oyster # 35 within creek 8a. Raw growth can only be calculated when there are 2 oysters to compare and in this case, there was only one oyster. Other anomalous data were identified by referring to the oyster growth graphics and were further verified by referring to the raw data. All rescued final data were verified using the original raw hardcopy data and the original final digital data. The original and rescued final file, 97 deployment data contains the distance (m) and elevations of each growth bag in each creek. This database was recorded by a Topcon GTS-2R SN#T01351. The DeploymentRecoveryDates file was created by the Data Rescue Manager and contains the deployment and recovery dates for all eight creeks from August 1997 through November 1999.

Data Archival of Final Rescued Databases (March 2005)
All final documentation, graphics, and data were printed out in hardcopy and placed into the CREEK Project’s 3-ring binder; the digital versions of the final products are also kept on Baruch’s Web Site. The 3-ring binder and the web site are maintained at the Baruch Marine Field Laboratory (BMFL) in Georgetown, SC. Also, all of the original and rescue products for the Oyster Growth and Survival database were copied to Compact Disk; one set of the CDs are kept with the hardcopy printouts and the other set is kept in the fireproof cabinet in the Data Manager’s Office at the BMFL. The entire rescue project is also archived on the BMFL’s Rescue Server’s Hard Drive.

2.5.2.3 Process Date: 20041015

3. Spatial Data Organization Information:
3.1 Indirect Spatial Reference:
North Inlet Estuary, which is part of Hobcaw Barony, is located in Georgetown County, South Carolina, USA

3.2 Direct Spatial Reference Method:  Point

5. Entity_and_Attribute_Information:
5.2 Overview_Description:
5.2.1 Entity_and_Attribute_Overview:
On the raw data sheets, zeros indicate that the oysters were dead or missing, ** means that the oyster was dead at deployment, and nd corresponds to no data.

<table>
<thead>
<tr>
<th>Date</th>
<th>Creek</th>
<th>Bag</th>
<th>Oyster#</th>
<th>Initial</th>
<th>Final</th>
<th>Growth</th>
<th>Days</th>
<th>Daily Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/18/1997</td>
<td>1</td>
<td>A</td>
<td>20</td>
<td>47</td>
<td>58.84</td>
<td>11.84</td>
<td>64</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Date = the date that the growth bag was either deployed or recovered.

Creek = The numbering identification of each tidal creek within North Inlet Estuary where water samples were collected; creeks 1-4 were creeklets running into Clambank Creek; creeks 5-8 were creeklets running into Town Creek. See map for creek numbering and location within North Inlet Estuary (located in the Supplemental Information).

Bag = the letter identification of each of the four bags deployed in the creeks. Bag A was closest to the creek mouth, B was the next deployed bag, and D was the bag deployed furthest up into the creek.

Oyster# = the numbering identification of each of the 25 oysters in each bag.
Initial = the shell height measurement at the deployment date.

Final = the shell height measurement after each deployment.

Growth=Final Oyster Shell Height – Initial Oyster Shell Height. (This calculation was done for all of the oysters on each date.)

Days = the number of days between the deployment date and the recovery date.

Daily growth=Growth divided by the number of elapsed days, i.e. 8/18/97 – 10/21/97 = 64 days.

The mean and standard deviation were calculated from all of the raw growths.

Percent survival was calculated from the number of recovered oysters which were alive divided by the initial number of live oysters.

5.2.2 Entity and Attribute Detail Citation:
Definitions were developed by the Baruch Institute’s and Coastal Carolina University’s researchers, data managers, and technicians; no published standards for entity definitions were used to define the entities used in this dataset. However, some of the entity type definitions are standard for the field of estuarine ecology.

6. Distribution Information
6.1 Distributor:
10.2 Contact Organization Primary
10.2.1 Contact Organization: Univ. of South Carolina’s Baruch Institute
10.2.1 Contact Person: Ginger Ogburn-Matthews
10.3 Contact Position: Research Data Manager & Analyst
10.4 Contact Address
10.4.1 Address Type: Mailing Address
10.4.2 Address: USC Baruch Marine Field Lab
10.4.2 Address: PO Box 1630
10.4.3 City: Georgetown
10.4.4 State or Province: South Carolina
10.4.5 Postal Code: 29442
10.4.6 Country: USA
10.5 Contact Voice Telephone: (843) 546-6219 extension 225
10.7 Contact Facsimile Telephone: (843) 546-1632
10.8 Contact Electronic Mail Address: ginger@belle.baruch.sc.edu
10.9 Hours of Service: 8:30 am to 4:30 pm EST/EDT Mon.- Friday

6.2 Resource Description:
Dataset Identification names:
CREEK OYSTER GROWTH AND SURVIVAL

Final Rescued and Archived Directory and File Names (February 2005)

Directory: OYSGROWTH.ORIGINAL.RAW: (Total size 95.2 Mb, 46 Folders, 1516 files)

CONTENTS: Scanned images of raw datasheets and digital electronic caliper output files

Directory: OysGrowthBagLocations: all files are in .jpg format. This directory contains scanned images of the maps that show oyster growth bag locations in each of the 8 creeks.

Directory: OysGrowthNotes: all files are in .jpg format. This directory contains scanned images of notes regarding oyster mortality, missing observations/oysters, labeling notes, replacement notes and oyster growth datasheets. Further, the files are listed by the date the oyster bags were deployed and/or recovered.

Directory: RawData: contains subdirectories, named by month and year, for each month that oyster growth data were collected. The months sampled (subdirectories) include: Aug 97, Oct 97, Jan 98, May 98 through Dec 98, and Jan 99 through Nov 99. Each subdirectory contains files with the electronic caliper oyster shell height measurement output data (.dat file) for each bag, at each creek location. The individual files are named by the deployment date, creek, and oyster bag designation (A,
found the raw printouts and scanned the images in .JPG format. June 6, 1998, creek 1, all bags (0618981A - 0618981D) were missing so the Data Rescue manager as appropriate. Further, the subdirectory Jun98 contains .JPG images. The files for deployment date August 1997, October 1997 and January 1998. The file also contains the count, sum, average, and variance for each bag in the creeks.

Directory: OysterGrowth: the files are in Microsoft Excel and Comma Separate Value (.csv) format. File: Original Growth Bag Site Selection and 97 deployment data (MS Excel file which contains twelve worksheets: Summary1, Creek1, Creek2, Creek3, Creek4, Creek5, Creek6, Creek7, Creek8, Deploy ANOVA, Oct Summary and Jan Summary.) These worksheets were saved in CSV format in the OysterGrowth Directory (see below for contents).

Directory: OysterGrowth: the files are in Microsoft Excel and Comma Separate Value (.csv) format. File: OystGrowth (MS Excel file which contains seven worksheets: Tab Delimited pre-removal Data, Tab Delimited Data, Aug-Oct 97 Oys Growth, Oct97-Jan98 Oys Growth, Chart 1, Means Summary and Sheet 2.) These worksheets, except for Chart 1, were saved in CSV format in the PreOysterGrowth Directory (see below for contents).

Directory: OysterGrowth: the files are in Microsoft Excel and Comma Separate Value (.csv) format. File: Tab Delimited pre-removal Data (CSV version of worksheet above) contains the oyster number, deployment date, creek number, bag, initial and final oyster shell height, oyster shell growth, number of days that the oyster is deployed, daily oyster growth, mortality, elevation and distance.

Files: Aug-Oct 97 Oys Growth and Oct97-Jan98 Oys Growth (CSV version of worksheet above) contain the oyster shell heights for the deployment and recovery dates, raw and adjusted oyster growth, and the number of oysters deployed and recovered for all of the oysters in each bag in all eight creeks. Further, the mean growth, standard deviation and percent survival were also calculated.

File: Sheet 2 (CSV version of worksheet above) contains the mean raw growths for all of the bags in all of the creeks.

Directory: PostOysterGrowth: the files are in Microsoft Excel and Comma Separate Value (.csv) format. File: PostOysterGrowth: Is a MS Excel file which contains 23 worksheets; these worksheets were saved in CSV format and saved in the PostOysterGrowth Directory (see below for contents).

bag in all eight creeks. Further, the mean growth, standard deviation and percent survival were also calculated.

**File: sum wint98** contains the date, creek number, bag, elevation, distance, oyster number, initial and final shell height, shell growth and the number of days deployed.

**File: Mean Summary** contains mean oyster growths, i.e. the oyster growth means from all 4 bags in creek 1 were averaged together. Further, the averages were only calculated for April 1998 through July 1999.

**File: OysGrowth:** contains multiple worksheets and is in Microsoft Excel format. This file contains the distance and elevation for all of the bags in each creek, the deployment date, creek number, bag, elevation, distance, oyster number, initial and final oyster shell height, oyster shell growth, number of days that the oyster is deployed, daily oyster growth, and mortality for all of the oysters in each creek for all of the dates. Further, all of the dated worksheets within this workbook, i.e. Apr-May 98, contain the bags, creek and oyster number, deployment and recovery dates, raw growth, the number of oysters deployed and recovered, mean growth, standard deviation and percent survival.

**Directory: OYSGROWTH.PROCESS:** (Total size 30.8 Mb, 3 Folders, 57 files)

**CONTENTS:** the files created/compiled by the 2004 data rescue process.

**Directory: OysterGrowthData:** the files are in Microsoft Excel and Comma Separate Value (.csv) format.

**File: Oyster Growth:** Is a MS Excel file which contains 12 worksheets; these worksheets were saved in CSV format and saved to the OysterGrowthData Directory (see below for contents).

**Files:** CombinedGrowthBagData, AllCreekData, Creek1, Creek2, Creek3, Creek4, Creek5, Creek6, Creek7, Creek8, 1998 and 1999 (CSV versions from above MS Excel file). **Combined Growth Bag Data** contains the distance and elevation for all of the bags in each creek. **All Creek Data** contains the deployment date, creek number, bag, elevation, distance, oyster number, initial and final oyster shell height, oyster shell growth, number of days that the oyster was deployed, daily oyster growth, and mortality for all of the oysters in each creek for all of the dates. **Creek 1** through **Creek 8** files contain the deployment date, creek number, bag, elevation, distance, oyster number, initial and final oyster shell height, oyster shell growth, number of days that the oyster was deployed, daily oyster growth, and mortality for all of the oysters in each of the respective creeks for all of the dates. **1998 and 1999** contain the deployment date, creek number, bag, elevation, distance, oyster number, initial and final oyster shell height, oyster shell growth, number of days that the oyster is deployed, daily oyster growth, and mortality for all of the oysters in each creek for the respective years.

**Directory: OysterGrowthSurvival:** files are in Microsoft Excel and Comma Separate Value (.csv) format.

**File: OysterGrowthSurvivalData:** Is a MS Excel file which contains 42 worksheets; these worksheets were saved in CSV format in the OysterGrowthSurvival Directory. Twenty-one of the CSV files contain the oyster growth data for each deployment/recovery (named by date range and Oys Growth) and the other 21 are summary data for all of the sampled dates (named by date range and Summary). All of the Oys Growth files contain the bags, creek and oyster number, deployment and recovery dates, raw growth, the number of oysters deployed and recovered, mean growth, standard deviation and percent survival. **Note:** Aug-Oct97 and Oct97-Jan98OysGrowth contain both raw and adjusted growth. All of the Summary files contain the date of deployment and recovery, creek number, bag, elevation, distance, oyster number, initial and final oyster shell height, oyster shell growth, average, standard deviation, and percent survival.

**Directory: Graphics:** This directory contains the estimated daily oyster growth plots for creeks 1-8 and oyster growth and percent survival graphics for Oct 97, Jan 98, and April 98-Oct 99.

**File: OysGrowth,** is in SIGMAPLOT 8.0 format.

**Directory: OYSGROWTH.FINAL:** (Total size 18.2 Mb, 6 Folders, 115 files)

**CONTENTS:** all final data, documentation, and graphics files created and published as part of the 2004 Data Rescue Project.

**Directory: FINAL.DOCUMENTATION:**

**Directory: AnomalousData:** the files in this directory are in Microsoft Excel and Comma Separate Value (CSV) formats.

**Files:** AvgGrowth contains the average oyster growth anomalous data. DailyMissing and DailyNegative files contain the daily oyster growth anomalous data for the missing initial oyster shell values and the negative daily growth values, respectively.

**Files: CREEK.OysterGrowth.Metadata** is the documentation for the entire database; the file is in Microsoft word, text, and .pdf formats.
Files: *Deploymentrecoverydates* are files in Microsoft Excel and Comma Separate Value (.csv) formats and contain the deployment and recovery dates for the entire project.

**Directory: FINAL.DATA**: all files are in Microsoft Excel format with duplicate Comma Separate Value (CSV) versions.

**File: Final.Data** is a MS Excel Workbook which contains two worksheets called *AvgOysGrowth* and *DailyOysGrowth*. Duplicates of these worksheets were saved as CSV formatted files and placed in the FINAL.DATA directory (see below for contents).

**Files: AvgOysGrowth** contains the creek, bag code, distance, elevation, average oyster growth in each bag, standard deviation and percent survival for all deployments, all creeks. *DailyOysGrowth* contains date, creek, bag, elevation, distance, initial, final, growth, days, daily growth and mortality for each oyster in each bag for each creek.

**Files: 97 deployment data** contains the distance (m) and elevations of each growth bag in each creek, which was recorded by a Topcon GTS-2R SN#T01351. This file is in Excel and CSV text formats.

**Directory: FINAL.GRAPHICS**: all files are in .jpg format.

**Directory: EstOysGrowth**: this directory contains .JPG images of estimated daily oyster growth graphics for each creek (1 through 8).

**Directory: OysGrowthandSurvival**: this directory contains .JPG images of the mean oyster growth and survival data graphics for each date sampled (84 files).

### 6.3 Distribution Liability:
The datasets are only as good as the quality assurance and quality control procedures outlined in the Metadata. The user bears all responsibility for its subsequent use in any further analyses or comparisons. No warranty expressed or implied is made regarding the accuracy or utility of any data collected, managed, or disseminated for general or scientific purposes by the Belle W. Baruch Institute for Marine and Coastal Sciences. This disclaimer applies both to individual use of the data and aggregate use with other data. It is strongly required that these data be directly acquired from the Belle W. Baruch Institute for Marine and Coastal Sciences and not indirectly through other sources which may have changed the data in some way. It is strongly recommended that careful attention be paid to the contents of the metadata file associated with these data. Neither the Belle W. Baruch Institute for Marine and Coastal Sciences, Coastal Carolina University, nor the National Science Foundation shall be held liable for the use and/or misuse of the data described and/or contained herein.

### 6.4 Standard Order Process

6.4.2. Digital Form

6.4.2.1 Digital Transfer Information

6.4.2.1.1 Format Name: EXCEL (.XLS), WORD (.DOC), .CSV, .TXT (text only), pdf, sigmaplot and jpg.

6.4.2.1.2 Format Version Number: Microsoft Office Professional 2000

6.4.2.1.6 File Decompression Technique: No compression applied

6.4.2.2 Digital Transfer Option

6.4.2.2.1.1 Computer Contact Information

6.4.2.2.1.1.1 Network Address

6.4.2.2.1.1.1.1 Network Resource Name: http://links.baruch.sc.edu/data/

6.4.3 Fees: None

### 6.5 Custom Order Process:
If requesting Non-digital (Paper (hard copy) printout), a fee of $50 per hour (with a one-hour minimum) plus the cost of supplies will be imposed. As an offline option, CD-ROMs are available at the cost of $5.00 each. This fee pays for the CD, the creation of the CD, and mailing charges.

### 7. Metadata Reference Information

7.1 Metadata Date: 20041011

7.2 Metadata Review Date: 20050420

7.4 Metadata Contact:

10.2 Contact Organization Primary

10.2.1 Contact Organization: Univ. of South Carolina’s Baruch Institute

10.1.2 Contact Person: Ginger Ogburn-Matthews

10.3 Contact Position: Research Data Manager & Analyst

10.4 Contact Address

10.4.1 Address Type: Mailing Address

10.4.2 Address: USC Baruch Marine Field Lab
10.4.2 Address: PO Box 1630
10.4.3 City: Georgetown
10.4.4 State or Province: South Carolina
10.4.5 Postal Code: 29442
10.4.6 Country: USA
10.5 Contact Voice Telephone: (843) 546-6219 extension 225
10.7 Contact Facsimile Telephone: (843) 546-1632
10.8 Contact Electronic Mail Address: ginger@belle.baruch.sc.edu
10.9 Hours of Service: 8:30 am to 4:30 pm EST/EDT Mon. - Friday

7.5 Metadata Standard Name:
Content Standard for Digital Geospatial Metadata, Part 1: Biological Data Profile