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US ARMY CORPS
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New England District

Contract No. DACW33-03-D-0004
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Final Report

SURF CLAM SURVEY IN SUPPORT OF FEASIBILITY STUDY:

Hydraulic Clam Dredging Nantasket Beach Hull, MA



FINAL REPORT

for

**Hydraulic Clam Dredging—Nantasket Beach,
Hull, MA**

Submitted to

**Department of the Army
U.S. Army Corps of Engineers
North Atlantic Division
New England District**

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1.0 INTRODUCTION

1.1 Project Description

Nantasket Beach is located in the city of Hull, Massachusetts, which is located approximately 25 miles southeast of Boston, Massachusetts. The US Army Corps of Engineers New England District (NAE) and the Massachusetts Department of Conservation and Recreation (DCR) have been partnered in a Section 103 Storm Damage Reduction Study for the area behind Nantasket Beach and the DCR Seawall since the 1990's. Numerous alternatives have been investigated during the extended study period for the Nantasket Beach Feasibility Study. A leading candidate has been the construction of a beach fill project in front of the 5,500 foot seawall. This alternative involves placing sandy material along Nantasket Beach. To evaluate the potential impacts of this alternative to surf clam (*Spisula solidissima*) populations in the project area, an abundance survey of surf clams is necessary.

1.2 Scope of Work

The project scope of work consisted of hydraulic clam dredging along six transect lines (approximately 2,072 meters (6,800 feet) long) parallel to Nantasket Beach. The six transect lines were located at 6-foot depth intervals (mean lower low water (MLLW)). The transects followed the 1, 7, 13, 19, 25, and 31 feet MLLW depth intervals. Commercial grade hydraulic clam dredge equipment was used to survey the transects for surf clam resources. Dredge tows were accomplished at alternate 100-meter (328 feet) increments along the length of each transect. Tows were completed along each transect with an overall project total of 53 tows at the intervals specified in the Statement of Work (SOW). Andy Lynn Boats performed the hydraulic clam dredging activities under the supervision of a Battelle Chief Scientist.

1.3 Organization of this Report

This report was prepared in accordance with the requirements outlined in the NAE SOW for Nantasket Beach, Hull, MA. This report is organized in four sections. Section 1.0 is an introduction and describes the project and scope of work. A summary of the materials and methods used in support of this project is presented in Section 2.0. Results of sampling effort are discussed in Section 3.0. References are provided in Section 4.0. Appendix A contains the Field Sampling Logs (Tow Log Form and Shellfish Measurement Data Form).

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2.0 MATERIALS AND METHODS

2.1 Sample Collection/Processing

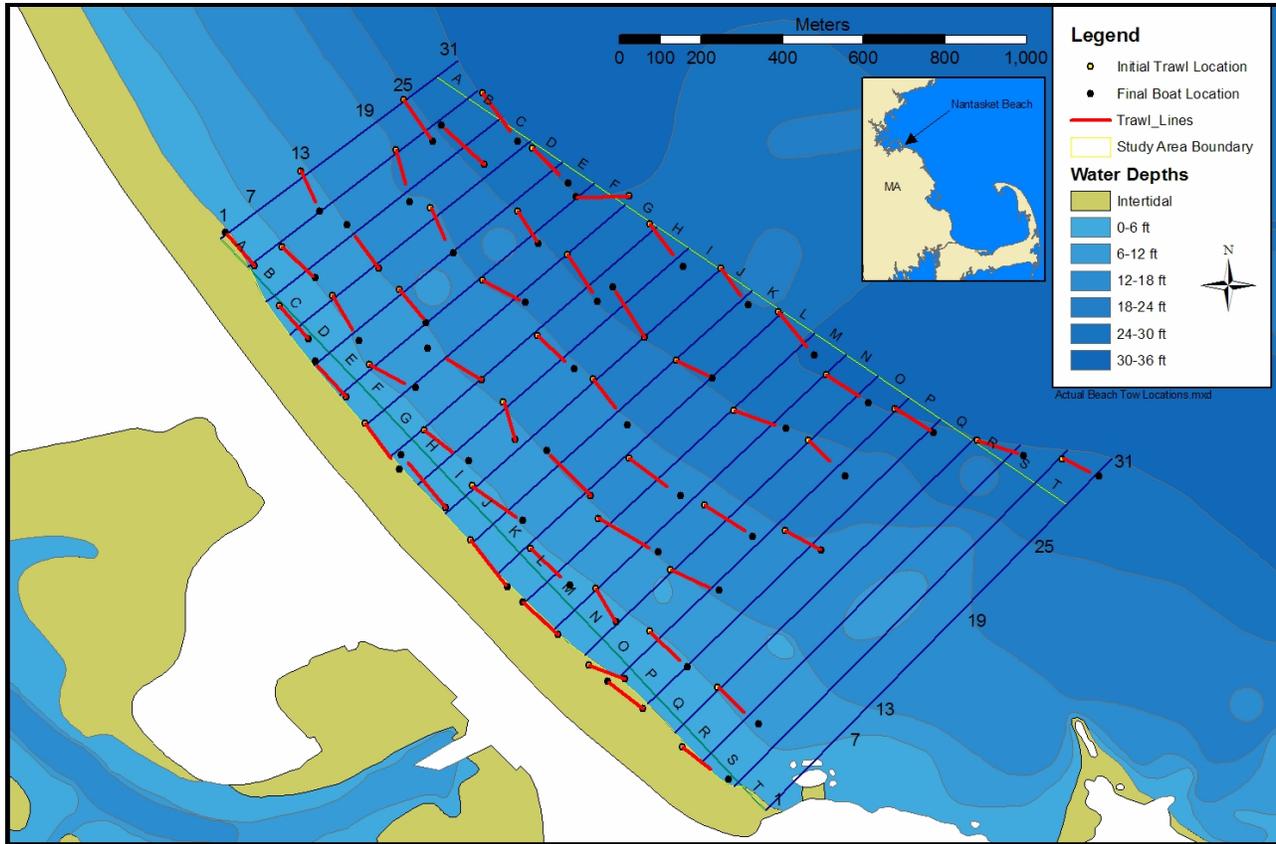
On December 11, 12, 14, 15, and 16, 2006, hydraulic tows were conducted at each of the 6 transects located in Nantasket Beach. A total of 53 tows for a distance of approximately 100 meters each were conducted along the 6 transects. On December 16, 2006; a representative from NAE (Todd Randall) observed the dredging operations and provided guidance regarding conducting tows in a rocky portion of the sampling area. The transects were located at 6-foot depth intervals (mean lower low water (MLLW)) and followed the 1, 7, 13, 19, 25, and 31 feet MLLW depth intervals (Figure 2-1). Table 2-1 provides the coordinates of each tow.

Hydraulic dredging methods are summarized below. Complete details on the survey/sampling methods can be found in the Nantasket Beach Sampling and Analysis Plan (SAP) (Battelle 2006).

Table 2-1. Actual Tow Locations and Coordinates.

Tow ID	End Tow Time	Begin Longitude	Begin Latitude	End Longitude	End Latitude
1-A	12/11/06 15:11	-70.864265	42.280701	-70.865097	42.281399
1-C	12/15/06 10:12	-70.863503	42.279751	-70.862633	42.279018
1-E	12/11/06 14:58	-70.861504	42.277817	-70.862450	42.278515
1-G	12/15/06 9:20	-70.860718	42.276966	-70.859947	42.276100
1-I	12/11/06 14:46	-70.858780	42.275368	-70.859901	42.276417
1-K	12/15/06 9:32	-70.857880	42.274448	-70.856750	42.273449
1-M	12/11/06 14:34	-70.855270	42.272400	-70.856300	42.273117
1-O	12/15/06 9:45	-70.854332	42.271702	-70.853264	42.271385
1-Q	12/11/06 14:17	-70.852783	42.270718	-70.853798	42.271332
1-S	12/16/06 8:35	-70.851181	42.269585	-70.850197	42.269115
7-B	12/15/06 10:29	-70.863365	42.281017	-70.862419	42.280384
7-D	12/16/06 9:01	-70.861885	42.279701	-70.861130	42.278965
7-F	12/15/06 10:57	-70.860580	42.278316	-70.859451	42.277916
7-H	12/16/06 9:13	-70.858833	42.276833	-70.857880	42.276268
7-J	12/16/06 10:24	-70.857765	42.275551	-70.856285	42.274933
7-L	12/16/06 9:27	-70.855835	42.274166	-70.854897	42.273483
7-N	12/11/06 14:01	-70.854134	42.273384	-70.853516	42.272652
7-P	12/16/06 9:43	-70.852348	42.272266	-70.851402	42.271633
7-R	12/16/06 9:59	-70.850151	42.270950	-70.849297	42.270351
13-A	12/11/06 12:02	-70.862632	42.282665	-70.862281	42.281867
13-C	12/12/06 14:08	-70.860664	42.280849	-70.861450	42.281551
13-E	12/11/06 12:19	-70.859886	42.279999	-70.859116	42.279366
13-G	12/12/06 13:50	-70.858147	42.278252	-70.859070	42.278782
13-I	12/11/06 13:42	-70.856834	42.277584	-70.856499	42.276733
13-K	12/12/06 13:29	-70.854187	42.275551	-70.855553	42.276482
13-M	12/15/06 14:17	-70.853981	42.274750	-70.852249	42.274216
13-O	12/15/06 14:34	-70.851799	42.273602	-70.850433	42.273335
19-B	12/12/06 14:34	-70.860085	42.282818	-70.859581	42.282051

Tow ID	End Tow Time	Begin Longitude	Begin Latitude	End Longitude	End Latitude
19-D	12/12/06 14:58	-70.858734	42.281666	-70.858299	42.280918
19-F	12/12/06 15:27	-70.857536	42.280182	-70.856148	42.279800
19-H	12/16/06 10:44	-70.855553	42.278915	-70.854713	42.278301
19-J	12/16/06 11:07	-70.853882	42.277733	-70.853134	42.277050
19-L	12/15/06 13:20	-70.852783	42.276115	-70.851570	42.275467
19-N	12/15/06 13:39	-70.850647	42.275166	-70.849419	42.274532
19-P	12/14/06 14:55	-70.848434	42.274651	-70.847382	42.274216
25-A	12/14/06 12:47	-70.859718	42.284233	-70.858887	42.283401
25-C	12/15/06 15:00	-70.857452	42.282951	-70.858635	42.283768
25-E	12/14/06 13:03	-70.856300	42.281799	-70.855766	42.281101
25-G	12/14/06 13:15	-70.854668	42.280750	-70.853996	42.279800
25-I	12/15/06 14:49	-70.852585	42.279133	-70.853554	42.280132
25-K	12/14/06 13:29	-70.851570	42.278435	-70.850586	42.278084
25-M	12/14/06 13:50	-70.849800	42.277134	-70.848396	42.276951
25-O	12/16/06 11:32	-70.847267	42.276566	-70.846664	42.275867
31-B	12/14/06 9:30	-70.857117	42.284382	-70.856354	42.283382
31-D	12/14/06 11:38	-70.855652	42.283100	-70.854851	42.282452
31-F	12/12/06 12:24	-70.853050	42.282150	-70.854614	42.282135
31-H	12/14/06 9:48	-70.852753	42.281399	-70.851448	42.280567
31-J	12/14/06 11:51	-70.850136	42.280315	-70.849503	42.279701
31-L	12/14/06 10:05	-70.848701	42.279301	-70.847534	42.278568
31-N	12/14/06 12:03	-70.847237	42.277882	-70.845947	42.277500
31-P	12/14/06 10:28	-70.845100	42.277302	-70.844017	42.276817
31-R	12/14/06 12:12	-70.842651	42.276501	-70.841316	42.276299
31-T	12/14/06 10:48	-70.839935	42.276134	-70.839081	42.275818



*Nantasket Beach in relation to Massachusetts is shown in the inset.

Figure 2-1. Actual Tow Locations Conducted at Nantasket Beach, Hull, MA.

2.1.1 Surf Clam Collections

Hydraulic dredge tows were conducted to the depth intervals specified in the SOW and summarized in the Nantasket Beach SAP (Battelle 2006). Battelle’s subcontractor, Andy Lynn Boats, was responsible for conducting the hydraulic tows.

A commercial hydraulic dredge, which measured 30” W X 15”H, was used to collect surf clams. The dredge was equipped with 4” steel rings and a 2-3/4” mesh catch net. Due to the size of the catch net, clams less than 3 inches in size could have been potentially lost during the retrieval of the dredge. The dredge sampled about 4 feet below the sediment. The catch bag size was estimated to hold 12 bushels of clams. However, it should be noted that the catch bag was not retrieved full for any of the tows. To verify the actual distance of the tow, 4 events were marked in the NavSam© system. The 4 events that were marked in the NavSam© system were 1) when the dredge was on the bottom, 2) when the pump for the tow began, 3) when the pump was stopped, and 4) when the dredge was off the bottom. In most cases, the tows were conducted longer than 100 meters to ensure that the distance of 100 meters was achieved. The vessel was positioned to follow the 6-foot depth intervals by subtracting the tidal height from the measured water depth. The tidal heights were determined from an incremental tide chart. The water depth was measured from reading the echo sounder.

Commercial shellfish species retained in the dredge of each tow were identified and divided into separate bushel baskets by species. If the catch for a species was less than one bushel basket for a tow, the entire

catch was counted. If the entire catch for a species for a single tow was more than one bushel basket, the total number of baskets for that tow was recorded and one bushel basket was counted. In cases where partial bushels were collected, the amount of organisms in the bushel were visually estimated. Custody forms were not applicable. For surf clams, the individuals counted were also measured. Surf clams measured were sorted into three size classes (less than 3 inches in length, 3 to 5 inches in length, and greater than 5 inches in length), enumerated, and recorded. Surf clam length was measured at the longest dimension of the surf clam shell. Other commercial shellfish species collected were not measured. Once the clams were enumerated and measured (surf clams only), the entire catch were discarded overboard where tows were not being conducted to ensure that the discarded species were not captured in another tow.

2.2 Quality Assurance/Quality Control Procedures

Field activities used in the collection of surf clams followed approved SOPs or the SAP (Battelle 2006).

2.2.1 Chain of Custody

Surf Clams and all other organisms were collected for measurements and counts only and returned to collection locations.

2.2.2 Data Audits/QA Review

All collection data from the field received internal verification and validation.

2.2.3 Protocol Deviations

A total of seven (7-T, 13-Q, 13-S, 19-R, 19-T, 25-Q, and 25-S) tows were not conducted in the southern area of Nantasket Beach due to the area being rocky (Figure 2-1). During the survey, several attempts were made to conduct tows in the rocky area, however, the dredge became lodged in the rocks on each attempt. On the last day of the survey, the NAE Project Manager, Todd Randall was aboard the vessel and made the decision not conduct the last seven tows, which were identified as rocky areas through use of the vessel's echo sounder, so as to not damage the dredge.

3.0 RESULTS

This section summarizes results obtained from Surf Clam Abundance survey at Nantasket Beach, Hull, MA. During the five days of sampling, a total of 53 tows out of 60 tows were conducted along 6 transects parallel to the shore. Seven tows (7-T, 13-Q, 13-S, 19-R, 19-T, 25-Q, and 25-S) were not conducted in the southern end of the sampling area due rocky conditions per discussions with the NAE Project Manager Todd Randall (see Figure 2-1).

3.1.1 Tow Data

Table 3-1 provides details on the tow lengths, the target water depths, and the start and end water depths for each tow. The average tow length for all tows was 110.82 meters. The shortest tow length of 78.71 meters was conducted at tow location 31-T, which was due to rocks breaking the dredge knife. The longest tow length of 154.54 meters was conducted at tow location 13-M.

There were four tows (13-A, 25-I, 31-H, and 31-J) where the measured water depth was 2 feet greater than the target water depth at some point during the tow. The +2 foot difference in water depth for three of the tows (13-A, 25-I, 31-H) occurred at the end of the tow. However, tow 31-J was conducted with a +2 foot difference for both the start and end water depths of the tow. However, all four tows were within 4 feet of the target water depths. It should be noted that both tows 31-H and 31-J did not follow the target contour depth because for portions of transect 31, that depth contour curved further east outside of the sampling area (see Figure 2-1). The NAE Project Manager, Todd Randall, instructed the crew to stay within the sampling area rather than follow the contours of transect 31 in this area.

Table 3-1. Tow Data, including Length of Tow and Water Depths.

Tow ID	Length of tow (m)	Target Water Depth ¹ (FT)	Start Water Depth (FT)	End Water Depth (FT)	Target Water Depth Minus Start Water Depth (FT)	Target Water Depth Minus End Water Depth (FT)
1-A	103.59	7.2	8	8	-0.82	-0.82
1-C	108.53	4.5	5	5.5	-0.51	-1.01
1-E	110.05	7.0	8	8	-0.96	-0.96
1-G	115.41	5.7	5	5.5	0.69	0.19
1-I	148.90	6.9	8	8.5	-1.13	-1.63
1-K	145.01	5.5	6	6	-0.53	-0.53
1-M	116.50	6.5	7	7	-0.53	-0.53
1-O	94.78	5.0	5.5	6	-0.5	-1
1-Q	107.98	6.2	7	7	-0.76	-0.76
1-S	96.44	7.3	9	9	-1.67	-1.67
7-B	105.07	11.0	11	10	-0.04	0.96
7-D	102.89	13.9	14	13	-0.07	0.93
7-F	103.14	10.1	9	11	1.13	-0.87
7-H	100.60	13.9	13	14	0.93	-0.07
7-J	139.98	12.2	12	13	0.2	-0.8
7-L	108.41	13.6	12	12	1.6	1.6
7-N	96.12	12.7	13	13	-0.27	-0.27
7-P	105.08	13.4	14	14	-0.6	-0.6

Tow ID	Length of tow (m)	Target Water Depth ¹ (FT)	Start Water Depth (FT)	End Water Depth (FT)	Target Water Depth Minus Start Water Depth (FT)	Target Water Depth Minus End Water Depth (FT)
7-R	96.95	12.7	14	14	-1.3	-1.3
13-A	93.34	15.3	13.5	12	1.82	3.32
13-C	101.46	17.3	17	17	0.3	0.3
13-E	94.85	16.0	15	16.5	1.02	-0.48
13-G	96.26	16.7	17	16	-0.3	0.7
13-I	98.65	18.2	18	17	0.19	1.19
13-K	152.93	16.2	17	17	-0.8	-0.8
13-M	154.54	13.7	13	14	0.66	-0.34
13-O	116.35	13.9	14	14	-0.1	-0.1
19-B	94.90	23.8	25	23	-1.22	0.78
19-D	90.61	24.6	25	25	-0.43	-0.43
19-F	121.99	25.3	25	26	0.25	-0.75
19-H	97.22	23.7	24	24	-0.3	-0.3
19-J	97.83	23.2	23	22	0.16	1.16
19-L	123.27	19.4	18	18	1.41	1.41
19-N	123.31	19.4	18	18	1.4	1.4
19-P	99.32	21.4	21	21	0.38	0.38
25-A	115.15	25.7	25	25	0.65	0.65
25-C	133.20	26.3	28	28	-1.66	-1.66
25-E	89.30	25.8	27	27	-1.24	-1.24
25-G	119.32	25.8	27	26	-1.16	-0.16
25-I	136.92	26.0	27	28.5	-0.97	-2.47
25-K	89.99	25.9	26	26	-0.06	-0.06
25-M	117.41	26.2	25	27	1.18	-0.82
25-O	92.21	28.6	29	29	-0.42	-0.42
31-B	127.77	35.2	36	35	-0.79	0.21
31-D	97.80	32.1	33	34	-0.91	-1.91
31-F	128.82	33.0	33	33	-0.03	-0.03
31-H	141.83	34.7	33	32	1.69	2.69
31-J	85.99	31.8	28	28	3.83	3.83
31-L	126.06	34.2	33	36	1.17	-1.83
31-N	114.37	31.7	32	33	-0.26	-1.26
31-P	104.26	33.6	35	35	-1.36	-1.36
31-R	112.25	31.7	32	32	-0.32	-0.32
31-T	78.71	33.1	33	32	0.13	1.13

¹ Target Depth is Mean Lower Low Water (MLLW) plus tidal height.

The photos below provide a photo sequence of the dredging process. The first photo is of the dredge, catch bag, and water pump hose attached to the dredge. The second photo shows the dredge being deployed into the water with the water pump activated. In the third photo, the crew is hauling back the dredge containing catch from a tow. Lastly, the fourth photo shows a small surf clam catch in a bushel basket.

Photo 1



Photo 2



Photo 3



Photo 4



3.1.2 Abundance Data

This section provides detail on the abundance of surf clams as well as other species collected in the dredge. Table 3-2 presents detailed information on the numbers and sizes of surf clams caught in each tow. The tows with the largest number of bushels of surf clams were 1-G and 1-I, each with five bushels, and 1-C retained almost six bushels of surf clams. In contrast, there were 11 tows where no surf clams were retained. Of these 11 tows, nine of the tows were from transect 31. The other two tows were from locations on transects 19 and 25.

Table 3-2 also provides the abundance of clams per square meter (clams/m²). There were two calculations used to calculate clams/m² based on the number of bushels per catch. In the calculation, the width of the dredge is 0.762 meters.

- 1) If the number of bushels is greater than one:

$$(\text{number of clams in one bushel} * \text{number of bushels}) / (\text{length of tow(m)} * \text{width of dredge (m)})$$

- 2) If the number of bushels is less than one:

$$(\text{number of clams}) / (\text{length of tow} * \text{width of dredge (m)})$$

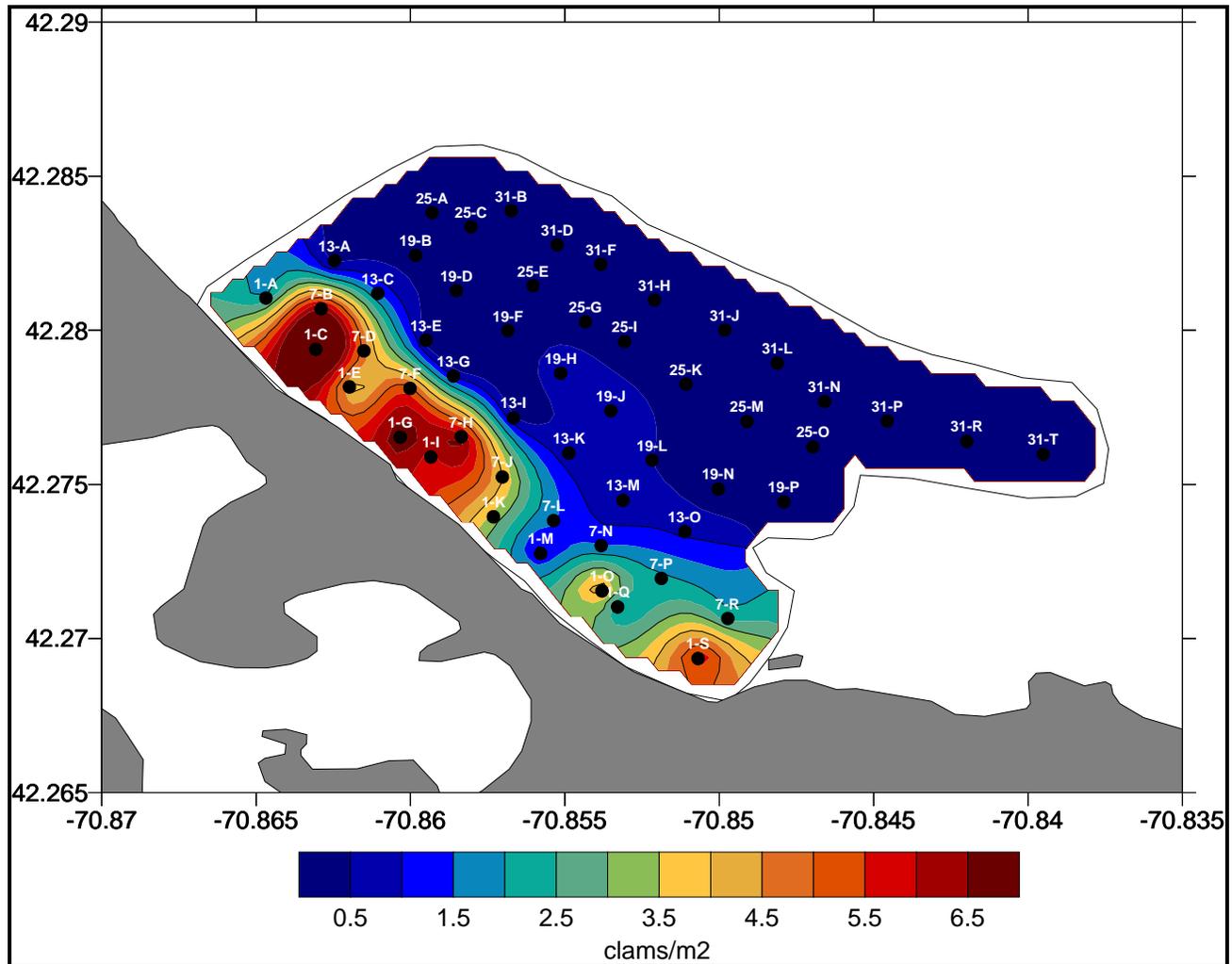
Table 3-2. Surf Clam Abundance Data per Trawl for the Three Class Sizes.

Tow ID	# of Bushels	# of <3" Clams/ Bushel	# of 3-5" Clams/ Bushel	# of >5" Clams/ Bushel	Surf Clams Not Measured ¹	Total # of Surf Clams/ Bushel	# of Clams/ m ²	# of <3" Clams/ m ²	# of 3-5" Clams/ m ²	# of >5" Clams/ m ²
1-A	1.10	2	115	15	1	133	1.85	0.03	1.60	0.21
1-C	5.75	3	112	13	0	128	8.90	0.21	7.79	0.90
1-E	2.67	5	92	20	3	120	3.82	0.16	2.93	0.64
1-G	5.00	4	100	17	0	121	6.88	0.23	5.69	0.97
1-I	5.00	7	114	13	0	134	5.91	0.31	5.02	0.57
1-K	2.75	5	104	15	0	124	3.09	0.12	2.59	0.37
1-M	0.75	1	63	11	8	83	0.94	0.01	0.71	0.12
1-O	2.50	4	88	31	2	125	4.33	0.14	3.05	1.07
1-Q	1.75	0	61	41	4	106	2.25	0.00	1.30	0.87
1-S	3.75	1	86	26	1	114	5.82	0.05	4.39	1.33
7-B	4.33	6	78	31	1	116	6.27	0.32	4.22	1.68
7-D	3.00	13	84	28	0	125	4.78	0.50	3.21	1.07
7-F	3.75	4	77	26	3	110	5.25	0.19	3.67	1.24
7-H	4.75	2	68	34	2	106	6.57	0.12	4.21	2.11
7-J	3.33	0	96	25	2	123	3.84	0.00	3.00	0.78
7-L	1.00	6	88	39	0	133	1.61	0.07	1.07	0.47
7-N	1.00	4	74	39	1	118	1.61	0.05	1.01	0.53
7-P	2.00	0	23	61	0	84	2.10	0.00	0.57	1.52
7-R	2.00	1	28	54	2	85	2.30	0.03	0.76	1.46
13-A	0.75	0	22	18	3	43	0.60	0.00	0.31	0.25
13-C	1.50	0	21	63	1	85	1.65	0.00	0.41	1.22

Tow ID	# of Bushels	# of < 3" Clams/ Bushel	# of 3-5" Clams/ Bushel	# of >5" Clams/ Bushel	Surf Clams Not Measured ¹	Total # of Surf Clams/ Bushel	# of Clams/ m ²	# of <3" Clams/ m ²	# of 3-5" Clams/ m ²	# of >5" Clams/ m ²
13-E	0.25	0	4	17	5	26	0.36	0.00	0.06	0.24
13-G	1.00	0	3	57	1	61	0.83	0.00	0.04	0.78
13-I	0.25	1	7	11	1	20	0.27	0.01	0.09	0.15
13-K	1.00	0	16	63	4	83	0.71	0.00	0.14	0.54
13-M	1.00	0	17	61	0	78	0.66	0.00	0.14	0.52
13-O	1.00	3	16	67	1	87	0.98	0.03	0.18	0.76
19-B	0.25	0	5	12	3	20	0.28	0.00	0.07	0.17
19-D	0.25	0	5	15	1	21	0.30	0.00	0.07	0.22
19-F	0.13	0	0	10	0	10	0.11	0.00	0.00	0.11
19-H	1.00	0	10	60	3	73	0.99	0.00	0.13	0.81
19-J	1.00	1	16	52	4	73	0.98	0.01	0.21	0.70
19-L	0.75	0	14	35	1	50	0.53	0.00	0.15	0.37
19-N	0.25	0	5	20	1	26	0.28	0.00	0.05	0.21
19-P	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
25-A	0.13	0	0	8	0	8	0.09	0.00	0.00	0.09
25-C	0.06	0	2	3	1	6	0.06	0.00	0.02	0.03
25-E	0.13	0	2	8	0	10	0.15	0.00	0.03	0.12
25-G	0.06	0	0	1	0	1	0.01	0.00	0.00	0.01
25-I	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
25-K	0.06	0	1	1	0	2	0.03	0.00	0.01	0.01
25-M	0.06	0	1	0	1	2	0.02	0.00	0.01	0.00
25-O	0.06	0	1	3	1	5	0.07	0.00	0.01	0.04
31-B	0.06	0	1	1	0	2	0.02	0.00	0.01	0.01
31-D	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-F	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-H	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-J	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-L	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-N	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-P	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-R	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00
31-T	0.00	0	0	0	0	0	0.00	0.00	0.00	0.00

¹ Surf Clams were either not measured because they were broken or were observed falling out of the dredge while the dredge was being retrieved.

Figure 3-1 shows the total abundance of surf clams over the sampling area. For illustration of abundance on this and the following abundance maps, the tow start and stop coordinates were averaged to obtain one point in the center of the tow. The highest total abundance of surf clams collected per square meter was concentrated along transects 1 and 7 in the northern end of the sampling area. It should be noted that only one tow along transect 31 collected any surf clams (Table 3-2). The scale used on Figure 3-1 is from 0.5 to 6.5 clams/m².



Note: Abundance of Surf Clams in this figure provided includes all 3 class sizes (<3", 3-5", and >5"). The beginning and end coordinates were averaged to obtain one point in the center of the tow for the abundance map.

Figure 3-1. Total Abundance of Surf Clams Collected Per Square Meter

Figure 3-2 presents the distribution of the total abundance and three size classes (<3", 3-5", and >5") of surf clams along each transect. The greatest number of surf clams collected at any transect was the 3-5 inch size class. The smallest number of clams found overall was the < 3 inch size class and these were only found in the two innermost transects (< 7 feet MLLW). However, the number of <3 inch size clams collected could be biased low as discussed in Section 2.1.1. The larger surf clams were found further off shore, however, abundance decreased rapidly at water depths greater than 7 feet MLLW. Beyond the 13 foot MLLW depth, the abundance of the largest surf clams (> 5 inches) appeared to increase compared to the 3-5 inch surf clams. In addition, the smaller surf clams appeared to be concentrated in the northernmost section of the shallower water (Figure 3-3) while the larger surf clams were more evenly distributed along the sampling transects, with greater numbers found in the northernmost sections (Figures 3-4 and 3-5).

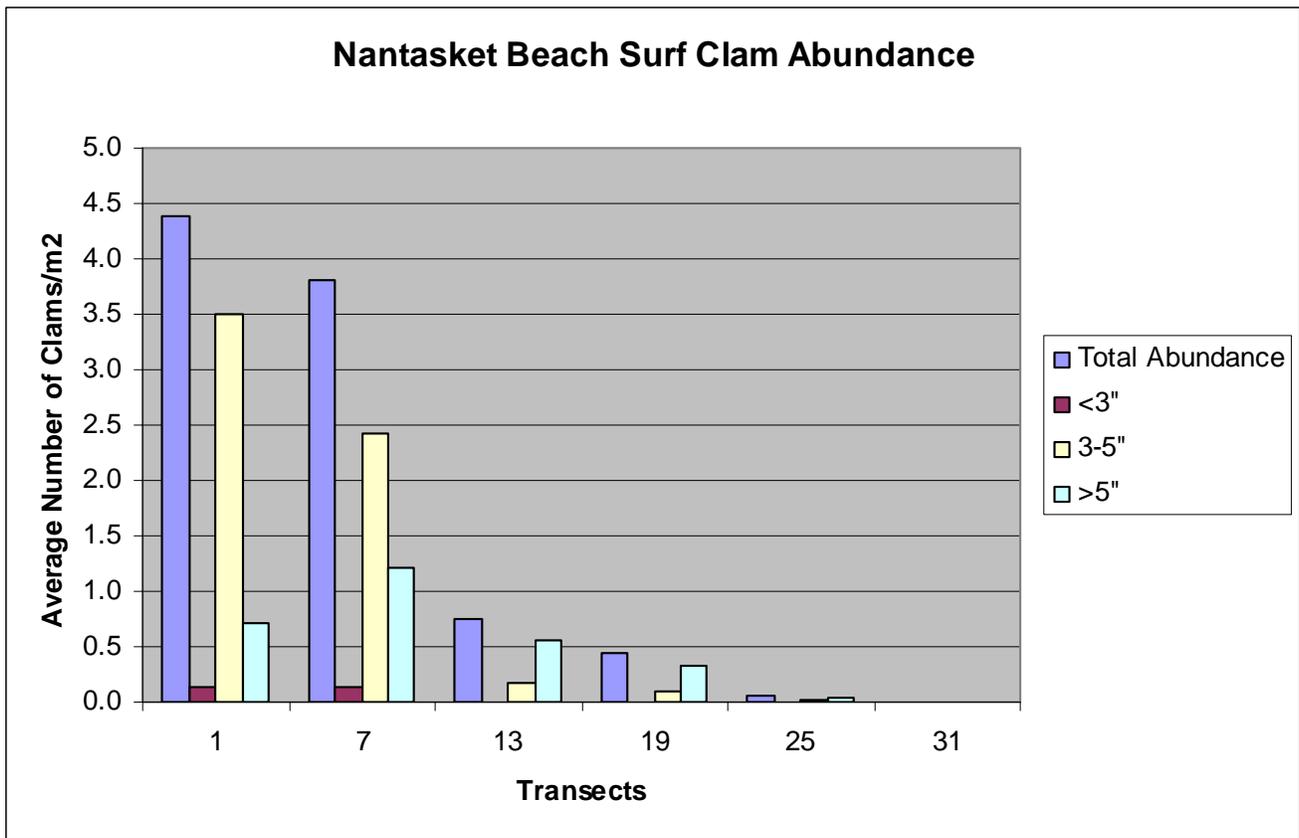
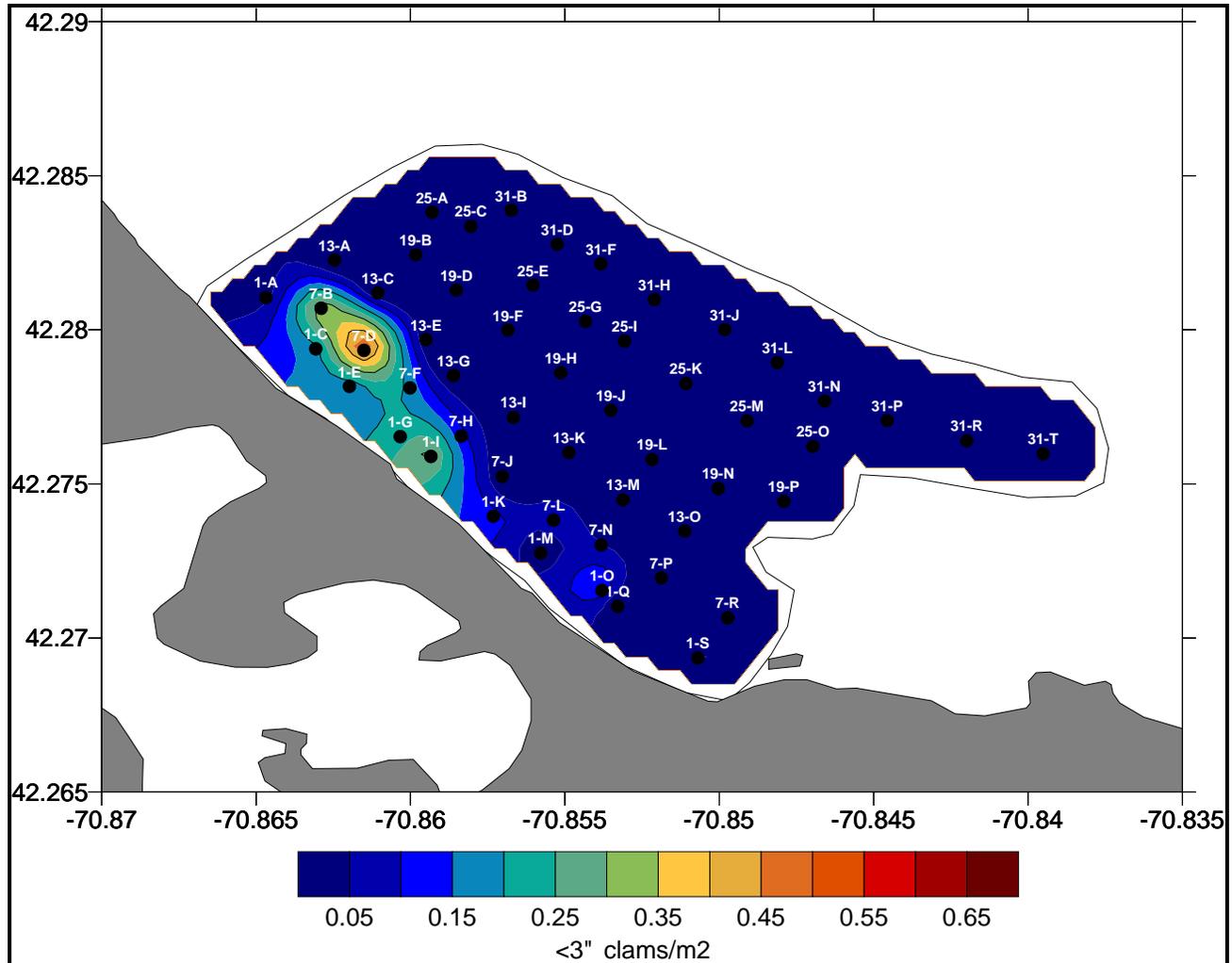


Figure 3-2. Distribution of Surf Clams and Size Classes for Each Transect

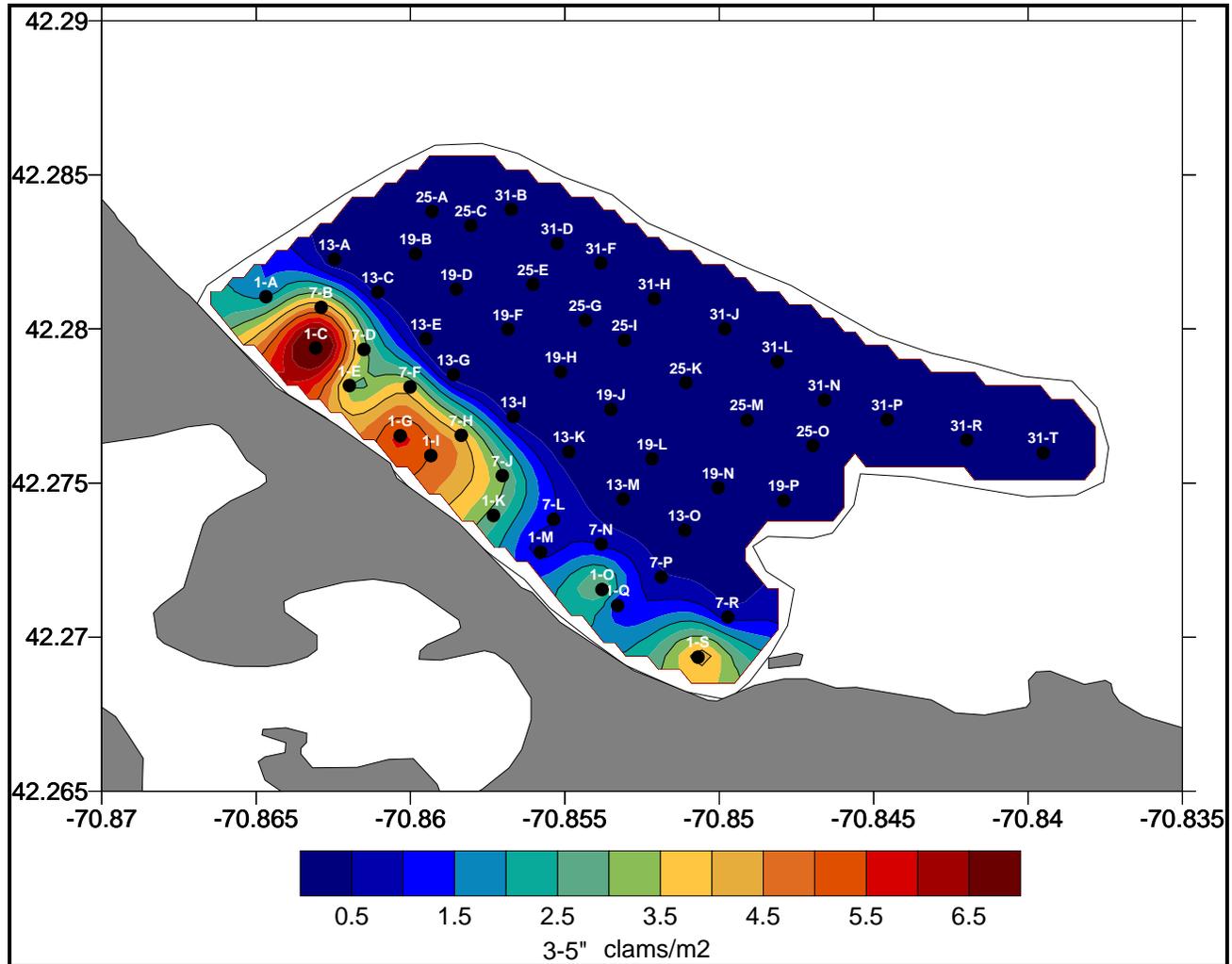
The smaller surf clams, those that were less than 3 inches in size, were concentrated in the northern end of transects 1 and 7 (Figure 3-3). The highest concentration of less than 3 inch surf clams was found in the area of tow 7-D. The scale used on Figure 3-2 is from 0.05 to 0.65 clams/m².



Note: The beginning and end coordinates were averaged to obtain one point in the center of the tow for the abundance map.

Figure 3-3. Abundance of <3" Surf Clams Collected Per Square Meter

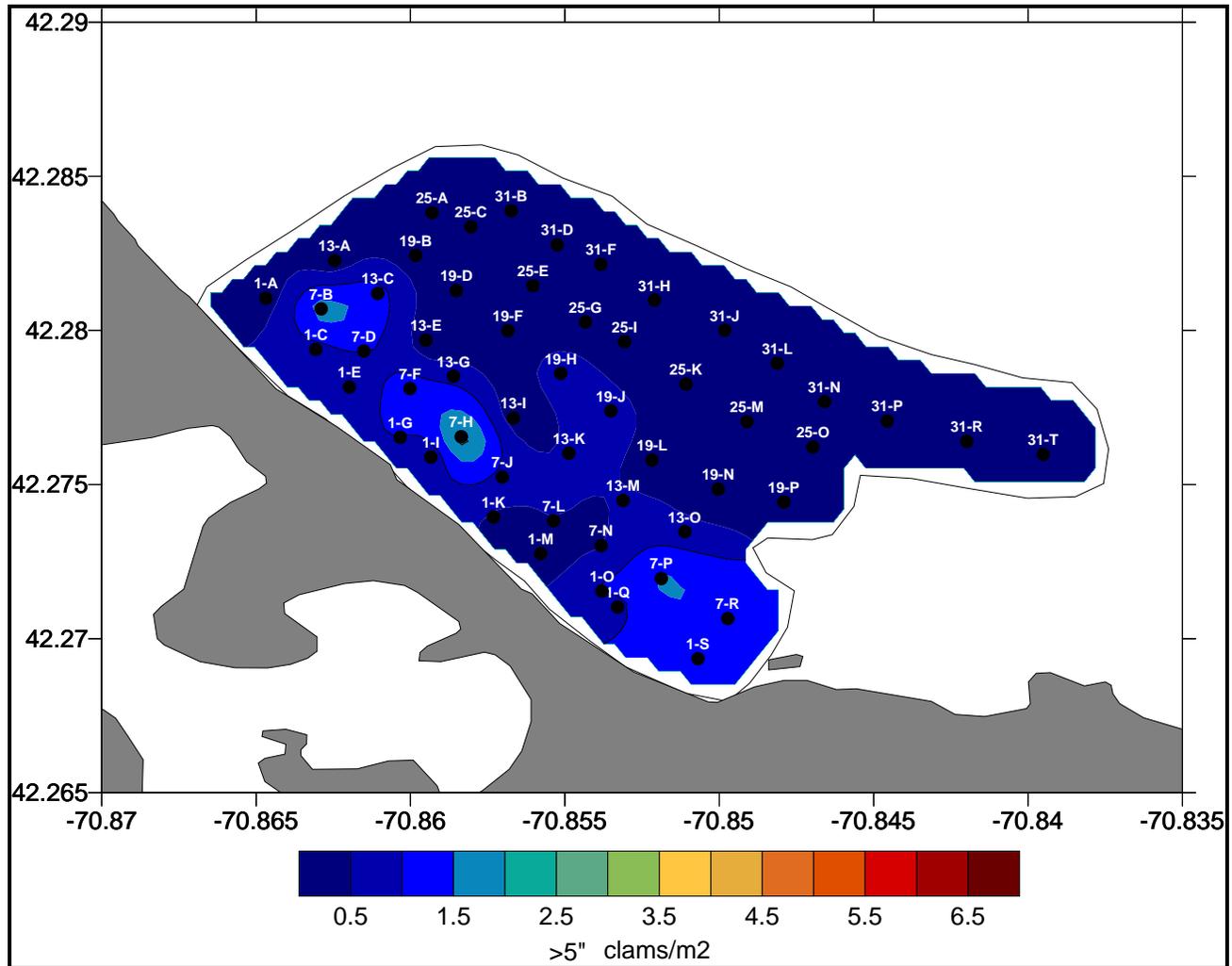
Surf clams that were 3-5 inches in size were also concentrated in the northern end of the sampling area (Figure 3-4). Higher concentrations of the 3-5 inch size class of surf clams were observed on transect 1. The highest concentration of the 3-5 inch surf clams was found in the area of tow 1-C. The scale used on Figure 3-3 is from 0.5 to 6.5 clams/m².



Note: The beginning and end coordinates were averaged to obtain one point in the center of the tow for the abundance map.

Figure 3-4. Abundance of 3-5" Surf Clams Collected Per Square Meter

Figure 3-5 provides the abundance of surf clams that were greater than 5 inches. The largest size class of surf clams collected was concentrated along transects 1 and 7 with most instances occurring on transect 7. The highest concentration of the greater than 5 inch surf clams was found in several areas; 7-B, 7-H, and 7-P. The scale used on Figure 3-4 is from 0.5 to 6.5 clams/m².



Note: The beginning and end coordinates were averaged to obtain one point in the center of the tow for the abundance map.

Figure 3-5. Abundance of >5" Surf Clams Collected Per Square Meter

During the survey, species other than surf clams were also collected in the tows. Table 3-3 provides data for these species including the tow ID and count per tow for each species. As with the surf clams, the other species collected were returned to the sampling area once counted. There were seven different types of species collected besides surf clams. However, none of the species were collected in significant numbers. There were two other species of shellfish collected, razor clams and blue mussels. In addition, two different species of crabs were collected, sand crabs and lady crabs. Furthermore, window pane flounder, black-back flounder, moon snails, and worms were also collected in some of the tows.

Table 3-3. Data for Other Species Collected During the Survey.

Tow ID	Species	Count per tow
1-C	sand crab (<i>Cancer irroratus</i>)	3
	worms	numerous
1-G	sand crab (<i>Cancer irroratus</i>)	1
1-I	moon snail (<i>Polinices duplicatus</i>)	1
	razor clam (<i>Ensis directus</i>)	1
1-K	window pane flounder (<i>Scophthalmus aquosus</i>)	1
1-M	window pane flounder (<i>Scophthalmus aquosus</i>)	1
	sand crab (<i>Cancer irroratus</i>)	1
	razor clam (<i>Ensis directus</i>)	1
1-O	window pane flounder (<i>Scophthalmus aquosus</i>)	1
	sand crab (<i>Cancer irroratus</i>)	1
1-S	lady crab (<i>Ovalipes ocellatus</i>)	1
	moon snail (<i>Polinices duplicatus</i>)	1
	razor clam (<i>Ensis directus</i>)	2
7-B	lady crab (<i>Ovalipes ocellatus</i>)	6
	razor clam (<i>Ensis directus</i>)	4
	sand crab (<i>Cancer irroratus</i>)	1
7-D	razor clam (<i>Ensis directus</i>)	1
	sand crab (<i>Cancer irroratus</i>)	3
	moon snail (<i>Polinices duplicatus</i>)	1
7-F	worms	numerous
7-H	lady crab (<i>Ovalipes ocellatus</i>)	2
	sand crab (<i>Cancer irroratus</i>)	1
	razor clam (<i>Ensis directus</i>)	2
7-J	sand crab (<i>Cancer irroratus</i>)	4
	razor clam (<i>Ensis directus</i>)	1
7-L	sand crab (<i>Cancer irroratus</i>)	1
13-C	window pane flounder (<i>Scophthalmus aquosus</i>)	2
13-M	moon snail (<i>Polinices duplicatus</i>)	1
	razor clam (<i>Ensis directus</i>)	1
13-0	razor clam (<i>Ensis directus</i>)	8
	window pane flounder (<i>Scophthalmus aquosus</i>)	1
	worms	numerous
19-H	moon snail (<i>Polinices duplicatus</i>)	2
	razor clam (<i>Ensis directus</i>)	9

Tow ID	Species	Count per tow
19-J	razor clam (<i>Ensis directus</i>)	4
19-L	moon snail (<i>Polinices duplicatus</i>)	1
	sand crab (<i>Cancer irroratus</i>)	3
	razor clam (<i>Ensis directus</i>)	1
	worms	numerous
19-N	black-back flounder (<i>Pseudopleuronectes americanus</i>)	1
25-E	razor clam (<i>Ensis directus</i>)	1
	worms	numerous
25-K	blue mussel (<i>Mytilus edulis</i>)	1
	worms	numerous
	razor clam (<i>Ensis directus</i>)	14
25-O	razor clam (<i>Ensis directus</i>)	1
	sand crab (<i>Cancer irroratus</i>)	1
31-D	blue mussel (<i>Mytilus edulis</i>)	1
	moon snail (<i>Polinices duplicatus</i>)	1
31-H	sand crab (<i>Cancer irroratus</i>)	1
31-J	blue mussel (<i>Mytilus edulis</i>)	2
	sand crab (<i>Cancer irroratus</i>)	1
31-L	blue mussel (<i>Mytilus edulis</i>)	2
31-N	blue mussel (<i>Mytilus edulis</i>)	1

4.0 REFERENCES

Battelle. 2006. Final Sampling and Analysis Plan, Surf Clam Survey In Support Of Feasibility Study: Hydraulic Clam Dredging, Nantasket Beach, Hull MA. Prepared under Contract No. DACW33-03-D-0004, Delivery Order No. 25. December 1, 2006. 20 pp + Appendices.

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Appendix A

Field Logs (Tow Log Form and Shellfish Measurement Data Form)

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Day 1
December 11, 2006

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**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>13</u>	Recorded By: <u>Math Fitzpatrick</u>
Tow #:	<u>A</u>	Date: <u>12/11/06</u>
PSI of Dredge:	<u>40 PSI</u>	Water Depth (ft): <u>Ⓢ 9.0 13-14 12</u> <i>off bottom</i>
Width of Dredge:	<u>30" x 30" 30" w x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind: <u>~10-15</u>
Tow Data		
Sta	 NS061008 Station Log Survey: NS061 Station: 13AB Light Red 12/11/2006 11:46:54 AM Depth: -9 -70.86283 42.28277	 NS061009 Station Log Survey: NS061 Station: 13AB Light Yellow 12/11/2006 11:48:00 AM Depth: -9 -70.86263 42.28267
End	 NS06100A Station Log Survey: NS061 Station: 13AB Light Green 12/11/2006 12:02:08 PM Depth: -9 -70.86228 42.28187	 NS06100B Station Log Survey: NS061 Station: 13AB Light Blue 12/11/2006 12:02:21 PM Depth: -9 -70.86227 42.28183
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi</i>		
Comments: <i>begin: water depth: 13-14'</i> <i>End: water depth: 12'</i> <i>Target depth: 15.32'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By: <u><i>MR F</i></u>	
Transect #: <u><i>13</i></u>	Trawl #: <u><i>A</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>51</i> <i>3/4</i>	<i>40</i> <i>43</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>22</i>	<i>18</i>
Total Number of Organisms Collected: <i>43</i>		
Comments/Observations: <i>3 broken - can't be measured surf clams</i>		

0 W O L S. 12/11/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>				
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>				
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>				
Transect #:	<u>13</u>	Recorded By: <u>MRF</u>				
Tow #:	<u>E</u>	Date: <u>12/11/06</u>				
PSI of Dredge:	<u>40</u>	Water Depth (ft): <u>see comments</u>				
Width of Dredge:	<u>30" x 30" 30" w x 15" H</u>	Sea State: <u>Calm</u>				
Catch Bag Size:	<u>~12 Bushels</u>	Wind: <u>W ~ 5-10</u>				
<table border="0"> <tr> <td style="width: 50%; vertical-align: top;">  NS06100E Station Log Survey: NS061 Station: 13EB Light Red 12/11/2006 12:09:39 PM Depth: -9 [redacted] -70.85992 42.28010 </td> <td style="width: 50%; vertical-align: top;">  NS06100F Station Log Survey: NS061 Station: 13EB Light Yellow 12/11/2006 12:09:52 PM Depth: -9 [redacted] -70.85989 42.28000 </td> </tr> <tr> <td style="vertical-align: top;">  NS061010 Station Log Survey: NS061 Station: 13EB Light Green 12/11/2006 12:19:04 PM Depth: -9 [redacted] -70.85912 42.27937 </td> <td style="vertical-align: top;">  NS061011 Station Log Survey: NS061 Station: 13EB Light Blue 12/11/2006 12:19:07 PM Depth: -9 [redacted] -70.85912 42.27937 </td> </tr> </table>			 NS06100E Station Log Survey: NS061 Station: 13EB Light Red 12/11/2006 12:09:39 PM Depth: -9 [redacted] -70.85992 42.28010	 NS06100F Station Log Survey: NS061 Station: 13EB Light Yellow 12/11/2006 12:09:52 PM Depth: -9 [redacted] -70.85989 42.28000	 NS061010 Station Log Survey: NS061 Station: 13EB Light Green 12/11/2006 12:19:04 PM Depth: -9 [redacted] -70.85912 42.27937	 NS061011 Station Log Survey: NS061 Station: 13EB Light Blue 12/11/2006 12:19:07 PM Depth: -9 [redacted] -70.85912 42.27937
 NS06100E Station Log Survey: NS061 Station: 13EB Light Red 12/11/2006 12:09:39 PM Depth: -9 [redacted] -70.85992 42.28010	 NS06100F Station Log Survey: NS061 Station: 13EB Light Yellow 12/11/2006 12:09:52 PM Depth: -9 [redacted] -70.85989 42.28000					
 NS061010 Station Log Survey: NS061 Station: 13EB Light Green 12/11/2006 12:19:04 PM Depth: -9 [redacted] -70.85912 42.27937	 NS061011 Station Log Survey: NS061 Station: 13EB Light Blue 12/11/2006 12:19:07 PM Depth: -9 [redacted] -70.85912 42.27937					
<p>* All coordinates are recorded in NAD 83 decimal degrees</p>						
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi</i>						
Comments: <p style="margin-left: 40px;"><i>start depth: 15'</i> <i>End depth: 16-17'</i></p> <p style="margin-left: 100px;"><i>Target Depth: 16.02'</i></p>						
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.						

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>13</i></u>	Trawl #: <u><i>E</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>ET^{01/4}</i>	<i>26</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>24</i>	<i>17</i>
Total Number of Organisms Collected: <i>26</i>		
Comments/Observations: <i>5 broken surf clams</i>		

D W O L S. 12/11/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>13</u>	Recorded By: <u>MRF</u>
Tow #: <u>I</u>	Date: <u>12/11/06</u>
PSI of Dredge: <u>42 60</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" W x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size: <u>~ 12 Bushels</u>	Wind: <u>NW ~ 10</u>

 NS061017 Station Log Survey: NS061 Station: 131B Light Red 12/11/2006 1:29:07 PM Depth: -99 -70.85683 42.27758	 NS061018 Station Log Survey: NS061 Station: 131B Light Yellow 12/11/2006 1:29:08 PM Depth: -99 -70.85683 42.27758
Ei  NS061019 Station Log Survey: NS061 Station: 131B Light Green 12/11/2006 1:42:35 PM Depth: -99 -70.85650 42.27673	 NS06101A Station Log Survey: NS061 Station: 131B Light Blue 12/11/2006 1:42:55 PM Depth: -99 -70.85648 42.27670

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *L. Short, M. Walsh, M. Patrick, A. Costa, D. Sylvia, M. Manfredi*

Comments:
start water depth : 18'
End water depth : 17'

Target Depth: 18.19'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>13</i></u>	Trawl #: <u><i>I</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>ST⁰ 1/4</i>	<i>X⁹ 20</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>7</i>	<i>11</i>
Total Number of Organisms Collected: <i>20</i>		
Comments/Observations:		
<i>1 broken SURF CLAM</i>		

0 wo d.s. 12/11/06

APPENDIX A-3 Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>7</u>	Recorded By: <i>MRF</i>
Tow #:	<u>N</u>	Date: <i>12/11/06</i>
PSI of Dredge:	<u>60</u>	Water Depth (ft): <i>see below</i>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State: <i>Calm</i>
Catch Bag Size:	<u>~12 Bustels</u>	Wind: <i>N~S</i>

 NS06101D Station Log Survey: NS061 Station: 7NB Light Red 12/11/2006 1:52:40 PM Depth: -99 [redacted] -70.85413 42.27340	 NS06101E Station Log Survey: NS061 Station: 7NB Light Yellow 12/11/2006 1:52:43 PM Depth: -99 [redacted] -70.85413 42.27338
 NS06101F Station Log Survey: NS061 Station: 7NB Light Green 12/11/2006 2:01:59 PM Depth: -99 [redacted] -70.85352 42.27265	 NS061020 Station Log Survey: NS061 Station: 7NB Light Blue 12/11/2006 2:02:01 PM Depth: -99 [redacted] -70.85352 42.27265

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *x. short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi*

Comments:
Begin water depth: 13'
End water depth: 13'

Target depth: 12.73'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>1</u>	Recorded By:	<u>MBP</u>
Tow #:	<u>Q</u>	Date:	<u>12/11/06</u>
PSI of Dredge:	<u>G0</u>	Water Depth (ft):	<u>See below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>Calm</u>
Catch Bag Size:	<u>~ 12 Bushels</u>	Wind:	<u>N=5</u>

 NS061023 Station Log Survey: NS061 Station: 1QB Light Red 12/11/2006 2:10:37 PM Depth: -98 [redacted] -70.85275 42.27072	 NS061024 Station Log Survey: NS061 Station: 1QB Light Yellow 12/11/2006 2:10:39 PM Depth: -98 [redacted] -70.85278 42.27072
 NS061025 Station Log Survey: NS061 Station: 1QB Light Green 12/11/2006 2:17:00 PM Depth: -98 [redacted] -70.85380 42.27133	 NS061026 Station Log Survey: NS061 Station: 1QB Light Blue 12/11/2006 2:17:03 PM Depth: -98 [redacted] -70.85380 42.27133

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi*

Comments:

Begin water depth: 7'

Anchor water depth: 7'

Target Depth: 6.24'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By: <u><i>MRP</i></u>	
Transect #: <u><i>1</i></u>	Trawl #: <u><i>Q</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1.75</i>	<i>106</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>61</i>	<i>41</i>
Total Number of Organisms Collected: <i>106</i>		
Comments/Observations: <i>4 Broken Surf clams</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>1</u>	Recorded By:	<u>MRP</u>
Tow #:	<u>M</u>	Date:	<u>12/11/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>Calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>N 210</u>

 NS061029 Station Log Survey: NS061 Station: 1ME Light Red 12/11/2006 2:25:25 PM Depth: -99 [redacted] -70.85527 42.27238	 NS06102A Station Log Survey: NS061 Station: 1ME Light Yellow 12/11/2006 2:25:26 PM Depth: -99 -70.85527 42.27240
 NS06102B Station Log Survey: NS061 Station: 1ME Light Green 12/11/2006 2:34:24 PM Depth: -99 [redacted] -70.85630 42.27312	 NS06102C Station Log Survey: NS061 Station: 1ME Light Blue 12/11/2006 2:34:27 PM Depth: -99 [redacted] -70.85630 42.27312

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi*

Comments:
Begin water depth: 9'
End water depth: 7'

Target Depth: 6.47'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By:	<u><i>MRF</i></u>
Transect #: <u><i>1</i></u>	Trawl #:	<u><i>M</i></u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>27 3/4</i>	<i>83</i>
<i>Window pane flounder</i>	<i>1 1/16</i>	<i>1</i>
<i>Razor Clam</i>	<i>1 1/16</i>	<i>1</i>
<i>Rock Crab</i> ②	<i>1 1/16</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>63</i>	<i>11</i>
Total Number of Organisms Collected: <i>86 (4 species)</i>		
Comments/Observations:		
<i>1 Window pane flounder ~ 3.5"</i>		
<i>8 broken SURF clams</i>		
<i>1 razor clam 1 rock crab</i> ②		

0 wo z.s. 12/11/06

② *Rock crabs & sand crabs are the same*

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>
Transect #:	<u> <i>2</i> </u>	Recorded By: <u> <i>MRF</i> </u>
Tow #:	<u> <i>I</i> </u>	Date: <u> <i>12/11/06</i> </u>
PSI of Dredge:	<u> <i>60</i> </u>	Water Depth (ft): <u> <i>See below</i> </u>
Width of Dredge:	<u> <i>30" W x 15" H</i> </u>	Sea State: <u> <i>Calm</i> </u>
Catch Bag Size:	<u> <i>~ 12 Bushels</i> </u>	Wind: <u> <i>NWS</i> </u>
Tow Data		
		
NS06102F Station Log Light Red Survey: NS061 Station: 11E 12/11/2006 2:40:59 PM Depth: -99 [redacted] -70.85858 42.27523		NS061030 Station Log Light Yellow Survey: NS061 Station: 11E 12/11/2006 2:41:13 PM Depth: -99 [redacted] -70.85878 42.27537
		
NS061031 Station Log Light Green Survey: NS061 Station: 11E 12/11/2006 2:46:17 PM Depth: -99 [redacted] -70.85990 42.27642		NS061032 Station Log Light Blue Survey: NS061 Station: 11E 12/11/2006 2:46:18 PM Depth: -99 [redacted] -70.85992 42.27642
<small>* All coordinates are recorded in feet and seconds to two decimal degrees</small>		
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi</i>		
Comments: <div style="margin-left: 40px;"> Begin Depth: <i>8'</i> End Depth: <i>8-9'</i> </div> <div style="margin-left: 100px; margin-top: 20px;"> <i>Target Depth: 6.87'</i> </div>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/04</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>1</i></u>	Trawl #: <u><i>I</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>5</i>	<i>134</i>
<i>moon snail</i>	<i>NA</i>	<i>1</i>
<i>razor clam</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>7</i>	<i>114</i>	<i>13</i>
Total Number of Organisms Collected: <i>136 (3 species)</i>		
Comments/Observations: <i>1 moon snail</i> <i>1 razor clam</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>1</u>	Recorded By:	<i>MRF</i>
Tow #:	<u>E</u>	Date:	<i>12/11/06</i>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<i>see below</i>
Width of Dredge:	<u>30" W X 15" H</u>	Sea State:	<i>Calm</i>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<i>N ~ 5-10</i>
 NS061035 Station Log Survey: NS061 Station: 1EE Light Red 12/11/2006 2:51:07 PM Depth: -99 [redacted] -70.86153 42.27772		 NS061037 Station Log Survey: NS061 Station: 1EE Light Yellow 12/11/2006 2:51:31 PM Depth: -99 [redacted] -70.86150 42.27782	
 NS061038 Station Log Survey: NS061 Station: 1EE Light Green 12/11/2006 2:58:09 PM Depth: -99 [redacted] -70.86245 42.27851		 NS061039 Station Log Survey: NS061 Station: 1EE Light Blue 12/11/2006 2:58:12 PM Depth: -99 [redacted] -70.86245 42.27851	
<small>* All coordinates are in NAD 83 datum.</small>			
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, J. Sylvia, M. Manfredi</i>			
Comments: <div style="text-align: center;"> <p><i>Begin depth : 8'</i></p> <p><i>End depth : 8'</i></p> <p><i>Target Depth: 7.04'</i></p> </div>			
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.			

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>1</i></u>	Trawl #: <u><i>E</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>2.667</i>	<i>177-120</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>5</i>	<i>92</i>	<i>20</i>
Total Number of Organisms Collected: <i>120</i>		
Comments/Observations: <i>3 broken surf clams</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>				
Transect #:	<u> <i>E 1</i> </u>	Recorded By: <u> <i>MRF</i> </u>				
Tow #:	<u> <i>A</i> </u>	Date: <u> <i>12/11/06</i> </u>				
PSI of Dredge:	<u> <i>60</i> </u>	Water Depth (ft): <u> <i>See Below</i> </u>				
Width of Dredge:	<u> <i>30" W x 15" H</i> </u>	Sea State: <u> <i>Calm</i> </u>				
Catch Bag Size:	<u> <i>~12 Bushels</i> </u>	Wind: <u> <i>N ~ 5-10</i> </u>				
<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none; vertical-align: top;">  NS06103C Station Log Survey: NS061 Station: 1AE Light Red 12/11/2006 3:04:50 PM Depth: -95 [redacted] -70.86423 42.28065 </td> <td style="width:50%; border: none; vertical-align: top;">  NS06103D Station Log Survey: NS061 Station: 1AE Light Yellow 12/11/2006 3:04:55 PM Depth: -95 [redacted] -70.86427 42.28070 </td> </tr> <tr> <td style="border: none; vertical-align: top;">  NS06103E Station Log Survey: NS061 Station: 1AE Light Green 12/11/2006 3:11:30 PM Depth: -95 [redacted] -70.86510 42.28140 </td> <td style="border: none; vertical-align: top;">  NS06103F Station Log Survey: NS061 Station: 1AE Light Blue 12/11/2006 3:11:31 PM Depth: -95 [redacted] -70.86510 42.28140 </td> </tr> </table> <p><small>* All coordiantes are recorded in NAD 83 deciamal degrees</small></p>			 NS06103C Station Log Survey: NS061 Station: 1AE Light Red 12/11/2006 3:04:50 PM Depth: -95 [redacted] -70.86423 42.28065	 NS06103D Station Log Survey: NS061 Station: 1AE Light Yellow 12/11/2006 3:04:55 PM Depth: -95 [redacted] -70.86427 42.28070	 NS06103E Station Log Survey: NS061 Station: 1AE Light Green 12/11/2006 3:11:30 PM Depth: -95 [redacted] -70.86510 42.28140	 NS06103F Station Log Survey: NS061 Station: 1AE Light Blue 12/11/2006 3:11:31 PM Depth: -95 [redacted] -70.86510 42.28140
 NS06103C Station Log Survey: NS061 Station: 1AE Light Red 12/11/2006 3:04:50 PM Depth: -95 [redacted] -70.86423 42.28065	 NS06103D Station Log Survey: NS061 Station: 1AE Light Yellow 12/11/2006 3:04:55 PM Depth: -95 [redacted] -70.86427 42.28070					
 NS06103E Station Log Survey: NS061 Station: 1AE Light Green 12/11/2006 3:11:30 PM Depth: -95 [redacted] -70.86510 42.28140	 NS06103F Station Log Survey: NS061 Station: 1AE Light Blue 12/11/2006 3:11:31 PM Depth: -95 [redacted] -70.86510 42.28140					
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi</i>						
Comments: <div style="font-size: 1.2em; margin-left: 40px;"> Begin Depth: <i>8'</i> End Depth: <i>8'</i> Target Depth: <i>7/8'</i> </div>						
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.						

APPENDIX A-4

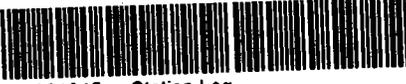
Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/11/06</i></u>	Recorded By:	<u><i>MRF</i></u>
Transect #: <u><i>1</i></u>	Trawl #:	<u><i>A</i></u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1.1</i>	<i>133</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>2</i>	<i>115</i> <i>98</i>	<i>15</i>
Total Number of Organisms Collected: <i>133</i>		
Comments/Observations: <i>1 Broken Surf Clam</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>1</u>	Recorded By: <u>MRF</u>
Tow #: <u>C</u>	Date: <u>12/11/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" w x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>N ~ 5</u>

Tow Data	
 NS061042 Station Log Survey: NS061 Station: 1CB Light Red 12/11/2006 3:25:16 PM Depth: -99 -70.86383 42.27982	 NS061043 Station Log Survey: NS061 Station: 1CB Light Yellow 12/11/2006 3:25:17 PM Depth: -99 -70.86383 42.27982
 NS061044 Station Log Survey: NS061 Station: 1CB Light Green 12/11/2006 3:30:16 PM Depth: -99 -70.86320 42.27902	 NS061045 Station Log Survey: NS061 Station: 1CB Light Blue 12/11/2006 3:30:17 PM Depth: -99 -70.86320 42.27902

* All coordinates are referenced to NAD 83 or WGS 84 datum, as appropriate.

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, D. Sylvia, M. Manfredi*

Comments:
Begin depth: 8'
End depth: 7'
Target Depth: 7.38'
**low # of surf clams caught - possibly redo tow*

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

Day 2
December 12, 2006

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**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>31</u>	Recorded By: <u>MRF</u>	
Tow #: <u>B</u>	Date: <u>12/12/06</u>	
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>	
Width of Dredge: <u>30" w x 15" l</u>	Sea State: <u>2' chop</u>	
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>NE ~10</u>	
Tow Data		
Start Tow		
Time:		
Latitude:		Label
Longitude:		
End Tow		
Time:		
Latitude:		Label
Longitude:		
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfredi</i>		
Comments:		
<i>Start Depth: 37 33' - repositioned</i> <i>End Depth: 29'</i> <i>Target Depth: 3261'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

No good off transect

APPENDIX A-4

Shellfish Measurement Data Form

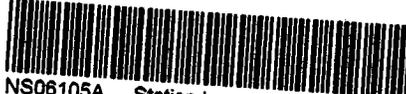
Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/12/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>31</i></u>	Trawl #: <u><i>B</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>21</i>	<i>4</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
	<i>1</i>	<i>3</i>
Total Number of Organisms Collected:		
Comments/Observations:		

No good off transect

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>31</u>	Recorded By:	<u>MRF</u>
Tow #:	<u>F</u>	Date:	<u>12/12</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see Below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>~ 2'</u>
Catch Bag Size:	<u>~ 12 Bushels</u>	Wind:	<u>NE ~ 10</u>

 NS061058 Station Log Survey: NS061 Station: 31FE Light Red 12/12/2006 12:21:13 PM Depth: -g [redacted] -70.85303 42.28215	 NS061059 Station Log Survey: NS061 Station: 31FE Light Yellow 12/12/2006 12:21:29 PM Depth: -g [redacted] -70.85305 42.28215
 NS06105A Station Log Survey: NS061 Station: 31FE Light Green 12/12/2006 12:24:50 PM Depth: -g [redacted] -70.85461 42.28214	 NS06105B Station Log Survey: NS061 Station: 31FE Light Blue 12/12/2006 12:24:51 PM Depth: -g [redacted] -70.85464 42.28214

* All coordinates are [redacted]

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfredi*

Comments:
 Begin Depth: *33'*
 End Depth: *33'*

Target Depth: 3297'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

No shellfish

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/12/06</u>	Recorded By:	<u>MRF</u>
Transect #: <u>31</u>	Trawl #:	<u>F</u>
Species Data		
Species	Number of Bushels	Count per Bushel
	<i>0</i>	<i>0</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
Total Number of Organisms Collected: <i>0</i>		
Comments/Observations:		
<i>No shellfish</i>		

**APPENDIX A-3
Tow Log Form**

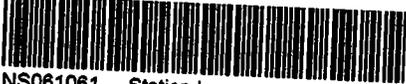
Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>19</u>	Recorded By: <u>MRF</u>
Tow #:	<u>R</u>	Date: <u>12/12/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft): <u>See below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State: <u>~ 2'</u>
Catch Bag Size:	<u>~ 12 Bushels</u>	Wind: <u>Calm</u>
<u>Tow Data</u>		
Start Tow		
	Time:	
	Latitude:	Label
	Longitude:	
End Tow		
	Time:	
	Latitude:	Label
	Longitude:	
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Mantzari</i>		
Comments:		
<i>Start Depth: 27'</i>		
<i>End Depth:</i>		
<i>Depths are off for this transect</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

Target depth: 21.8'

large rocks in the area. Dredge knife broke

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>13</u>	Recorded By:	<u>MRF</u>
Tow #:	<u>K</u>	Date:	<u>12/12/06</u>
PSI of Dredge:	<u>60 50</u>	Water Depth (ft):	<u>See Below</u>
Width of Dredge:	<u>30" W X 15" H</u>	Sea State:	<u>2'</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>calm</u>

 NS061060 Station Log Survey: NS061 Station: 13KE Light Red 12/12/2006 1:20:26 PM Depth: -99 [redacted] -70.85426 42.27547	 NS061061 Station Log Survey: NS061 Station: 13KE Light Yellow 12/12/2006 1:20:37 PM Depth: -99 [redacted] -70.85419 42.27555
 NS061062 Station Log Survey: NS061 Station: 13KE Light Green 12/12/2006 1:29:58 PM Depth: -99 [redacted] -70.85555 42.27648	 NS061063 Station Log Survey: NS061 Station: 13KE Light Blue 12/12/2006 1:30:07 PM Depth: -99 [redacted] -70.85558 42.27650

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *d. Short, m. Walsh, m. Fitzpatrick, a. Costa, M. Manfredi*

Comments:
Start Tow: 17'
End Tow: 17'

Target Depth: 16.2'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/12/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>13</i></u>	Trawl #: <u><i>K</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1</i>	<i>83</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>16</i>	<i>63</i>
Total Number of Organisms Collected: <i>83</i>		
Comments/Observations: <i>4 Broken Surf Clams</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>13</u>	Recorded By: <u>MRF</u>
Tow #: <u>G</u>	Date: <u>12/12/06</u>
PSI of Dredge: <u>80</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" W x 15" H</u>	Sea State: <u>~2'</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>Calm</u>

<p>I</p>  <p>NS061068 Station Log Survey: NS061 Station: 13GE Light Red 12/12/2006 1:44:02 PM Depth: -99 [redacted] -70.85748 42.27807</p>	<p>S</p>  <p>NS061069 Station Log Survey: NS061 Station: 13GE Light Yellow 12/12/2006 1:44:49 PM Depth: -99 [redacted] -70.85815 42.27825</p>
<p>E</p>  <p>NS06106A Station Log Survey: NS061 Station: 13GE Light Green 12/12/2006 1:50:25 PM Depth: -99 [redacted] -70.85907 42.27878</p>	 <p>NS06106B Station Log Survey: NS061 Station: 13GE Light Blue 12/12/2006 1:50:45 PM Depth: -99 [redacted] -70.85917 42.27896</p>

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfredi*

Comments:
begin Depth: 17'
End Depth: 16'

Target depth: 16.7'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>M.R.P. 12/12/06</i> </u>	Recorded By:	<u> <i>12/12/06</i> </u>
Transect #: <u> <i>13</i> </u>	Trawl #:	<u> <i>6</i> </u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1</i>	<i>61</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>3</i>	<i>57</i>
Total Number of Organisms Collected: <i>61</i>		
Comments/Observations: <i>1 Broken SURF Clams</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>					
Transect #:	<u>13</u>	Recorded By:	<u>MRF</u>				
Tow #:	<u>C</u>	Date:	<u>12/12/06</u>				
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>				
Width of Dredge:	<u>30"W x 15"H</u>	Sea State:	<u>~ 2'</u>				
Catch Bag Size:	<u>~ 12 bushels</u>	Wind:	<u>Calm</u>				
Tow Data <table style="width:100%; border: none;"> <tr> <td style="width:50%; vertical-align: top;"> <p>S</p>  NS06106E Station Log Survey: NS061 Station: 13CE Light Red 12/12/2006 2:01:55 PM Depth: -99 [redacted] -70.86052 42.28058 </td> <td style="width:50%; vertical-align: top;"> <p>S</p>  NS06106F Station Log Survey: NS061 Station: 13CE Light Yellow 12/12/2006 2:02:25 PM Depth: -99 [redacted] -70.86066 42.28085 </td> </tr> <tr> <td style="vertical-align: top;"> <p>E</p>  NS061070 Station Log Survey: NS061 Station: 13CE Light Green 12/12/2006 2:08:36 PM Depth: -99 [redacted] -70.86145 42.28155 </td> <td style="vertical-align: top;"> <p>E</p>  NS061071 Station Log Survey: NS061 Station: 13CE Light Blue 12/12/2006 2:09:13 PM Depth: -99 [redacted] -70.86152 42.28160 </td> </tr> </table> <p>* All coordinates are recorded in NAD 83 decimal degrees</p>				<p>S</p>  NS06106E Station Log Survey: NS061 Station: 13CE Light Red 12/12/2006 2:01:55 PM Depth: -99 [redacted] -70.86052 42.28058	<p>S</p>  NS06106F Station Log Survey: NS061 Station: 13CE Light Yellow 12/12/2006 2:02:25 PM Depth: -99 [redacted] -70.86066 42.28085	<p>E</p>  NS061070 Station Log Survey: NS061 Station: 13CE Light Green 12/12/2006 2:08:36 PM Depth: -99 [redacted] -70.86145 42.28155	<p>E</p>  NS061071 Station Log Survey: NS061 Station: 13CE Light Blue 12/12/2006 2:09:13 PM Depth: -99 [redacted] -70.86152 42.28160
<p>S</p>  NS06106E Station Log Survey: NS061 Station: 13CE Light Red 12/12/2006 2:01:55 PM Depth: -99 [redacted] -70.86052 42.28058	<p>S</p>  NS06106F Station Log Survey: NS061 Station: 13CE Light Yellow 12/12/2006 2:02:25 PM Depth: -99 [redacted] -70.86066 42.28085						
<p>E</p>  NS061070 Station Log Survey: NS061 Station: 13CE Light Green 12/12/2006 2:08:36 PM Depth: -99 [redacted] -70.86145 42.28155	<p>E</p>  NS061071 Station Log Survey: NS061 Station: 13CE Light Blue 12/12/2006 2:09:13 PM Depth: -99 [redacted] -70.86152 42.28160						
Crew Members: <i>d. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfredi</i>							
Comments: <p align="center"><i>Start Depth: 17'</i> <i>En Depth: 17'</i></p> <p align="center"><i>Target Depth: 17.5'</i></p>							
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.							

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/12/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>13</i></u>	Trawl #: <u><i>C</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>1.5</i>	<i>85</i>
<i>Windowpane Flounder</i>	<i>NA</i>	<i>2</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>21</i>	<i>63</i>
Total Number of Organisms Collected: <i>87 (2 species)</i>		
Comments/Observations: <i>2 windowpane flounder</i> <i>1 Broken surf clam</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>19</u>	Recorded By: <u>MRF</u>
Tow #: <u>B</u>	Date: <u>12/12/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see Below</u>
Width of Dredge: <u>30" W X 15" H</u>	Sea State: <u>~2'</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>Calm</u>

 NS061075 Station Log Light Red Survey: NS061 Station: 19BB 12/12/2006 2:19:42 PM Depth: -99 -70.85999 42.28322	 NS061076 Station Log Light Yellow Survey: NS061 Station: 19BB 12/12/2006 2:20:40 PM Depth: -99 -70.86008 42.28282
 NS061077 Station Log Light Green Survey: NS061 Station: 19BB 12/12/2006 2:34:25 PM Depth: -99 -70.85958 42.28205	 NS061078 Station Log Light Blue Survey: NS061 Station: 19BB 12/12/2006 2:34:32 PM Depth: -99 -70.85963 42.28190

* All coordinates are recorded in NAD 83 datum.

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfredi*

Comments:
Begin Depth: 25'
End Depth: 23'

Target Depth: 23.78'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/12/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>19</i></u>	Trawl #: <u><i>B</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1/4</i>	<i>20</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>5</i>	<i>12</i>
Total Number of Organisms Collected: <i>20</i>		
Comments/Observations: <i>3 went over as the net was Dumped</i>		

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>19</u>	Recorded By:	<u>MRF</u>
Tow #:	<u>D</u>	Date:	<u>12/12/06</u>
PSI of Dredge:	<u>40</u>	Water Depth (ft):	<u>see Below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>1-2'</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>Calm</u>

 NS06107D Station Log Survey: NS061 Station: 19DB Light Red 12/12/2006 2:50:44 PM Depth: -99 [redacted] -70.85896 42.28192	 NS06107E Station Log Survey: NS061 Station: 19DB Light Yellow 12/12/2006 2:51:28 PM Depth: -99 [redacted] -70.85873 42.28167
 NS06107F Station Log Survey: NS061 Station: 19DB Light Green 12/12/2006 2:58:42 PM Depth: -99 [redacted] -70.85830 42.28092	 NS061080 Station Log Survey: NS061 Station: 19DB Light Blue 12/12/2006 2:59:10 PM Depth: -99 [redacted] -70.85800 42.28083

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfredi*

Comments:
Begin Depth: 25'
End Depth: 25'

Target Depth: 24.57'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/12/06</i></u>	Recorded By:	<u><i>MRF</i></u>
Transect #: <u><i>19</i></u>	Trawl #:	<u><i>D</i></u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1/4</i>	<i>21</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>5</i>	<i>15</i>
Total Number of Organisms Collected: <i>21</i>		
Comments/Observations:		
<i>1 Broken SURF Clam</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>19</u>	Recorded By:	<u>MRF</u>
Tow #:	<u>F</u>	Date:	<u>12/12/06</u>
PSI of Dredge:	<u>40 - lost prime 80</u>	Water Depth (ft):	<u>see Below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>1-2'</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SE ~ 5-10</u>

 NS061085 Station Log Survey: NS061 Station: 19FB Light Red 12/12/2006 3:21:05 PM Depth: -99 [redacted] -70.85744 42.28030	 NS061086 Station Log Survey: NS061 Station: 19FB Light Yellow 12/12/2006 3:21:34 PM Depth: -99 [redacted] -70.85754 42.28018
 NS061087 Station Log Survey: NS061 Station: 19FB Light Green 12/12/2006 3:27:58 PM Depth: -99 [redacted] -70.85615 42.27980	 NS061088 Station Log Survey: NS061 Station: 19FB Light Blue 12/12/2006 3:28:01 PM Depth: -99 [redacted] -70.85610 42.27977

* All coordinates are recorded in NAD 83 datum.

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, M. Manfiredi*

Comments:
Begin Depth: 25'
End Depth: 26'

Target Depth: 25.25'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

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Day 3
December 14, 2006

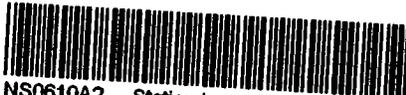
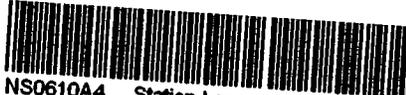
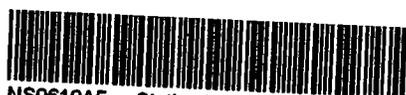
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**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> 31 </u>	Recorded By: <u> JMF </u>	
Tow #: <u> B </u>	Date: <u> 12/14/06 </u>	
PSI of Dredge: <u> 60 </u>	Water Depth (ft): <u> see below </u>	
Width of Dredge: <u> 30" w x 15" h </u>	Sea State: <u> calm @ < 1 ft </u>	
Catch Bag Size: <u> ~12 Bushels </u>	Wind: <u> SW @ 12 mph </u>	
Tow Data		
<p>S</p>  <p>NS06109B Station Log Survey: NS061 Station: 31BB Light Red 12/14/2006 9:25:52 AM Depth: -95 -70.85738 42.28448</p>	 <p>NS06109C Station Log Survey: NS061 Station: 31BB Light Yellow 12/14/2006 9:26:17 AM Depth: -95 -70.85712 42.28438</p>	
<p>P</p>  <p>NS06109D Station Log Survey: NS061 Station: 31BB Light Green 12/14/2006 9:30:48 AM Depth: -95 -70.85635 42.28338</p>	 <p>NS06109F Station Log Survey: NS061 Station: 31BB Light Blue 12/14/2006 9:31:32 AM Depth: -95 -70.85603 42.28320</p>	
Crew Members: <i>L. Short, M. Walsh, A. Costa, M. Manfredi, D. Howard, J. Ealy</i>		
Comments: <i>Begin Depth - 36 ft</i> <i>End Depth - 35 ft</i> <i>Target Depth: 35.21'</i> <i>* lots of big rocks</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

APPENDIX A-3 Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>31</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>H</u>	Date:	<u>12/14/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15 H</u>	Sea State:	<u>< 1 ft</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10-12</u>

Tow Data	
Start Tow <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  NS0610A2 Station Log Survey: NS061 Station: 31HB Light Red 12/14/2006 9:41:10 AM Depth: -99 -70.85242 42.28152 </div> <div style="text-align: center;">  NS0610A3 Station Log Survey: NS061 Station: 31HB Light Yellow 12/14/2006 9:41:40 AM Depth: -99 -70.85275 42.28140 </div> </div>	End Tow <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;">  NS0610A4 Station Log Survey: NS061 Station: 31HB Light Green 12/14/2006 9:48:55 AM Depth: -99 -70.85145 42.28057 </div> <div style="text-align: center;">  NS0610A5 Station Log Survey: NS061 Station: 31HB Light Blue 12/14/2006 9:49:12 AM Depth: -99 -70.85140 42.28057 </div> </div>
* All coc	
Crew Members: <i>P. Howard, L. Short, M. Walsh, J. Foley, A. Costa, M. Murphy</i>	
Comments: <div style="text-align: center; font-size: 1.2em;"> Start depth - 33' end depth - 32' Target Depth: 34.69' </div>	

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

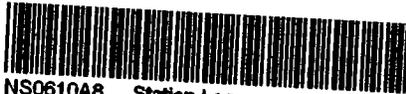
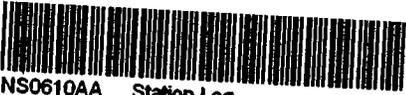
Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>12/14/06</i> </u>	Recorded By: <u> <i>JMF</i> </u>	
Transect #: <u> <i>31</i> </u>	Trawl #: <u> <i>H</i> </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Crab</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>1</i>		
Comments/Observations: <i>all rocks + 1 crab</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>31</u>	Recorded By: <u>JMP</u>
Tow #: <u>LF</u>	Date: <u>12/14/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30w x 15H</u>	Sea State: <u>4ft</u>
Catch Bag Size: <u>~12 Bustals</u>	Wind: <u>SW @ 10-12</u>

Tow Data	
Start Tow  NS0610A8 Station Log Survey: NS061 Station: 31LB Light Red 12/14/2006 10:00:49 AM Depth: -9 -70.84860 42.27955	 NS0610A9 Station Log Survey: NS061 Station: 31LB Light Yellow 12/14/2006 10:01:11 AM Depth: -6 -70.84870 42.27930
End T  NS0610AA Station Log Survey: NS061 Station: 31LB Light Green 12/14/2006 10:05:08 AM Depth: -9 -70.84753 42.27857	 NS0610AB Station Log Survey: NS061 Station: 31LB Light Blue 12/14/2006 10:05:14 AM Depth: -9 -70.84750 42.27855

* All

Crew Members: *Lynda Short, M. Walsh, J. Fahay, A. Costa, M. Mumford, D. Howe*

Comments:
Start depth - 33'
End depth - 36'

Target Depth: 34'17'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> 12/14/06 </u>	Recorded By: <u> JMI </u>	
Transect #: <u> 31 </u>	Trawl #: <u> L </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Mussel</i>	<i>NA</i>	<i>2</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>2</i>		
Comments/Observations: <i>Rocks + 2 mussels</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> 31 </u>	Recorded By: <u> JMF </u>	
Tow #: <u> P </u>	Date: <u> 12/14/06 </u>	
PSI of Dredge: <u> 60 </u>	Water Depth (ft): <u> see below </u>	
Width of Dredge: <u> 30" x 15" </u>	Sea State: <u> calm < 1 ft </u>	
Catch Bag Size: <u> ~12 Bushels </u>	Wind: <u> SW @ 10-12 </u>	
Tow Data		
Start T	 NS0610B0 Station Log Survey: NS061 Station: 31PB Light Red 12/14/2006 10:23:45 AM Depth: -9 -70.84515 42.27737	 NS0610B1 Station Log Survey: NS061 Station: 31PB Light Yellow 12/14/2006 10:23:52 AM Depth: -9 -70.84510 42.27730
End T	 NS0610B2 Station Log Survey: NS061 Station: 31PB Light Green 12/14/2006 10:28:26 AM Depth: -9 -70.84402 42.27682	 NS0610B3 Station Log Survey: NS061 Station: 31PB Light Blue 12/14/2006 10:28:34 AM Depth: -9 -70.84399 42.27682
* All t		
Crew Members:	<i>L. Short, M. Walsh, J. Faly, H. Carr, M. Manfredi, D. Howard</i>	
Comments:	Start depth: 30 ^① 35' end depth: 35' Target Depth: 33.64'	
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

① ~~skip~~ 1st try - no good - rocks, clay + mussels - went in the wrong direction + messes

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> 12/14/06 </u>	Recorded By: <u> JMF </u>	
Transect #: <u> 31 </u>	Trawl #: <u> P </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>NA</i>	<i>NA</i>	<i>0</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>0</i>		
Comments/Observations: <i>Rocks</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>31</u>	Recorded By: <u>JMF</u>	
Tow #: <u>T</u>	Date: <u>12/14/06</u>	
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>	
Width of Dredge: <u>30" w x 15" H</u>	Sea State: <u>calm</u>	
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>SW @ 10-12</u>	
Tow Data		
Start Tow	 NS061086 Station Log Survey: NS061 Station: 31TB Light Red 12/14/2006 10:39:22 AM Depth: -9 -70.84016 42.27622	 NS061087 Station Log Survey: NS061 Station: 31TB Light Yellow 12/14/2006 10:39:42 AM Depth: -9 -70.83994 42.27613
End Tow	 NS061088 Station Log Survey: NS061 Station: 31TB Light Green 12/14/2006 10:48:57 AM Depth: -9 -70.83908 42.27582	 NS061089 Station Log Survey: NS061 Station: 31TB Light Blue 12/14/2006 10:49:07 AM Depth: -9 -70.83905 42.27578
* All coordinates are recorded in UTM		
Crew Members: <i>L. Short, M. Walsh, J. Foley, A. Costa, M. Manfredi, D. Harsard</i>		
Comments: <i>Start depth - 33' End depth - 32' Target depth: 33/3'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

① due to rocks, 1.2' of dredge slightly + continued dredging

APPENDIX A-4

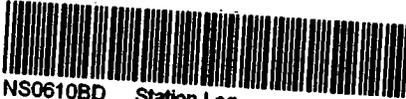
Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> 12/14/06 </u>	Recorded By: <u> JMF </u>	
Transect #: <u> 31 </u>	Trawl #: <u> T </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>NA</i>	<i>NA</i>	<i>0</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>0</i>		
Comments/Observations: <p align="center"><i>all rocks</i></p>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>31</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>D</u>	Date:	<u>12/14/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30.0 x 15" H</u>	Sea State:	<u>Calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10-12</u>

Tow Data			
Start Tow	 NS0610BD Station Log Survey: NS061 Station: 31DB Light Red 12/14/2006 11:29:57 AM Depth: -9 -70.85590 42.28323	 NS0610BE Station Log Survey: NS061 Station: 31DB Light Yellow 12/14/2006 11:30:21 AM Depth: -9 -70.85565 42.28310	
End Tow	 NS0610BF Station Log Survey: NS061 Station: 31DB Light Green 12/14/2006 11:38:29 AM Depth: -9 -70.85485 42.28245	 NS0610C0 Station Log Survey: NS061 Station: 31DB Light Blue 12/14/2006 11:38:34 AM Depth: -9 -70.85484 42.28245	

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members:	<i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfrin, D. Howard</i>
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Comments:	<p><i>Start depth: 33'</i></p> <p><i>End depth: 34'</i></p> <p><i>Target Depth: 32.09'</i></p>
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Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/14/06</u>	Recorded By:	<u>JMP</u>
Transect #: <u>31</u>	Trawl #:	<u>D</u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Mussel</i>	<i>NA</i>	<i>1</i>
<i>Moonsnail</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>2</i>		
Comments/Observations: <i>Rocks + half clam shell + 1 mussel + 1 moonsnail</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> 31 </u>	Recorded By: <u> JMF </u>	
Tow #: <u> J </u>	Date: <u> 12/14/06 </u>	
PSI of Dredge: <u> 60 </u>	Water Depth (ft): <u> sw below </u>	
Width of Dredge: <u> 30" w x 15" H </u>	Sea State: <u> calm </u>	
Catch Bag Size: <u> ~12 Bushels </u>	Wind: <u> sw @ 10-12 </u>	
Tow Data		
Start Tow	 NS0610C3 Station Log Survey: NS061 Station: 31JB Light Red 12/14/2006 11:47:58 AM Depth: -S [redacted] -70.85032 42.28052	 NS0610C4 Station Log Survey: NS061 Station: 31JB Light Yellow 12/14/2006 11:48:32 AM Depth: -S [redacted] -70.85014 42.28032
End Tow	 NS0610C5 Station Log Survey: NS061 Station: 31JB Light Green 12/14/2006 11:51:41 AM Depth: -S [redacted] -70.84950 42.27970	 NS0610C6 Station Log Survey: NS061 Station: 31JB Light Blue 12/14/2006 11:51:48 AM Depth: -S [redacted] -70.84948 42.27968
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, J. Fabey, A. Costa, M. Manfredi, D. Howard</i>		
Comments: <i>start depth - 28'</i> <i>end depth - 28'</i> <i>Target Depth: 31.83'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/14/06</u>	Recorded By:	<u>JMF</u>
Transect #: <u>31</u>	Trawl #:	<u>5</u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Mussel</i>	<i>NA</i>	<i>2</i>
<i>Crab</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>3</i>	<i>0</i>
Total Number of Organisms Collected: <i>3</i>		
Comments/Observations: <i>Rocks + 2 mussels + 1 crab</i>		

APPENDIX A-3 Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>31</u>	Recorded By:	<u>12/14/06 JMF</u>
Tow #:	<u>N</u>	Date:	<u>12/14/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10-12</u>
Tow Data			
Start Tow	 NS0610C9 Station Log Survey: NS061 Station: 31NB Light Red 12/14/2006 11:57:52 AM Depth: -9 -70.84718 42.27813	 NS0610CA Station Log Survey: NS061 Station: 31NB Light Yellow 12/14/2006 11:58:20 AM Depth: -9 -70.84724 42.27788	
End Tow	 NS0610CB Station Log Survey: NS061 Station: 31NB Light Green 12/14/2006 12:03:06 PM Depth: -9 -70.84595 42.27750	 NS0610CC Station Log Survey: NS061 Station: 31NB Light Blue 12/14/2006 12:03:09 PM Depth: -9 -70.84595 42.27750	
* All coordinates are recorded in NAD 83 decimal degrees			
Crew Members:			
<i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, D. Howard</i>			
Comments:			
<i>start depth: 32'</i> <i>end depth 33'</i> <i>Target Depth: 31.74'</i>			
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.			

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>31</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>B</u>	Date:	<u>12/14/06</u>
PSI of Dredge:	<u>50</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10-12</u>

Tow Data		
Start Tow	 NS0610CF Station Log Light Red Survey: NS061 Station: 31RB 12/14/2006 12:08:21 PM Depth: -9 -70.84270 42.27665	 NS0610D0 Station Log Light Yellow Survey: NS061 Station: 31RB 12/14/2006 12:08:34 PM Depth: -9 -70.84265 42.27650
End Tow	 NS0610D1 Station Log Light Green Survey: NS061 Station: 31RB 12/14/2006 12:12:17 PM Depth: -9 -70.84132 42.27630	 NS0610D2 Station Log Light Blue Survey: NS061 Station: 31RB 12/14/2006 12:12:19 PM Depth: -9 -70.84130 42.27628

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members:	<i>L. Short, J. Fahy, M. Walsh, H. Coara, M. Manfredi, D. Housac'</i>
Comments:	<p><i>start depth - 32'</i></p> <p><i>end depth - 32'</i></p> <p align="center"><i>Target Depth: 31.68'</i></p>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>			
Project Name:	<i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location:	<i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client:	<i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date:	<u><i>12/14/06</i></u>	Recorded By:	<u><i>JMF</i></u>
Transect #:	<u><i>31</i></u>	Trawl #:	<u><i>R</i></u>
Species Data			
Species	Number of Bushels	Count per Bushel	
<i>NA</i>	<i>NA</i>	<i>0</i>	
Surf Clam Measurements			
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.			
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches	
<i>0</i>	<i>0</i>	<i>0</i>	
Total Number of Organisms Collected: <i>0</i>			
Comments/Observations: <i>all Rocks</i>			

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>25</u>	Recorded By: <u>JNIF</u>
Tow #: <u>A</u>	Date: <u>12/14/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" W x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>SW @ 10-12</u>

Tow Data	
Start Tow	 NS0610D5 Station Log Survey: NS061 Station: 25AB Light Red 12/14/2006 12:38:38 PM Depth: -9 -70.85975 42.28433
	 NS0610D6 Station Log Survey: NS061 Station: 25AB Light Yellow 12/14/2006 12:38:48 PM Depth: -9 -70.85972 42.28423
End Tow	 NS0610D7 Station Log Survey: NS061 Station: 25AB Light Green 12/14/2006 12:47:24 PM Depth: -9 -70.85889 42.28340
	 NS0610D8 Station Log Survey: NS061 Station: 25AB Light Blue 12/14/2006 12:47:39 PM Depth: -9 -70.85882 42.28335

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *L. Short, M. Walsh, J. Fahey, M. Manfredi, A. Costa, D. Mancini*

Comments:
start depth - 85'
end depth - 25'

Target Depth: 25.65'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>12/14/06</i> </u>	Recorded By: <u> <i>JMF</i> </u>	
Transect #: <u> <i>25</i> </u>	Trawl #: <u> <i>A</i> </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>1/8</i>	<i>8</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>8 0</i>	<i>8</i>
Total Number of Organisms Collected: <i>8</i>		
Comments/Observations:		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>25</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>E</u>	Date:	<u>12/14/06</u>
PSI of Dredge:	<u>50</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10</u>

Tow Data		
Start Tow	 NS0610DB Station Log Survey: NS061 Station: 25EB Light Red 12/14/2006 12:54:41 PM Depth: -9 -70.85637 42.28183	 NS0610DC Station Log Survey: NS061 Station: 25EB Light Yellow 12/14/2006 12:54:48 PM Depth: -9 -70.85630 42.28180
End Tow	 NS0610DD Station Log Survey: NS061 Station: 25EB Light Green 12/14/2006 1:03:12 PM Depth: -99 -70.85577 42.28110	 NS0610DE Station Log Survey: NS061 Station: 25EB Light Blue 12/14/2006 1:03:20 PM Depth: -99 -70.85574 42.28110

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members:

Comments:
start depth - 27'
end depth - 27'

Target Depth: 25.76'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/14/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>25</u>	Trawl #: <u>E</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clams</i>	<i>1/8</i>	<i>10</i>
<i>Razor clam</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>2</i>	<i>8</i>
Total Number of Organisms Collected: <i>10/8 11</i>		
Comments/Observations: <i>1 razor clam</i> <i>lots of worms + tubes</i> <div style="text-align:right; font-size: small;"><i>JMF 12/14/06</i></div>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>25</u>	Recorded By: <u>JMF</u>
Tow #: <u>6</u>	Date: <u>12/14/06</u>
PSI of Dredge: <u>50</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" x 15"</u>	Sea State: <u>calm</u>
Catch Bag Size: <u>~ 12 Bushels</u>	Wind: <u>SW @ 10</u>

Tow Data	
Start Tow	 NS0610E1 Station Log Survey: NS061 Station: 25GB Light Red 12/14/2006 1:08:20 PM Depth: -95 [redacted] -70.85490 42.28085
	 NS0610E2 Station Log Survey: NS061 Station: 25GB Light Yellow 12/14/2006 1:08:41 PM Depth: -95 [redacted] -70.85467 42.28075
End Tow	 NS0610E3 Station Log Survey: NS061 Station: 25GB Light Green 12/14/2006 1:15:58 PM Depth: -95 [redacted] -70.85400 42.27980
	 NS0610E4 Station Log Survey: NS061 Station: 25GB Light Blue 12/14/2006 1:16:05 PM Depth: -95 [redacted] -70.85398 42.27979

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members:

Comments:
Start depth - 27'
end depth - 26'

Target Depth: 25.84'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> 12/14/06 </u>	Recorded By: <u> JMF </u>	
Transect #: <u> 25 </u>	Trawl #: <u> 6 </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	1/8 <i>1/16</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>1</i>
Total Number of Organisms Collected: <u> 1 </u>		
Comments/Observations:		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>25</u>	Recorded By: <u>JMF</u>
Tow #: <u>K</u>	Date: <u>12/14/06</u>
PSI of Dredge: <u>50</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" x 15"</u>	Sea State: <u>calm</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>SW @ 10</u>

Tow Data	
<p>Start Tow</p>  <p>NS0610E7 Station Log Survey: NS061 Station: 25KB Light Red 12/14/2006 1:21:07 PM Depth: -99 -70.85167 42.27848</p>	 <p>NS0610E8 Station Log Survey: NS061 Station: 25KB Light Yellow 12/14/2006 1:21:19 PM Depth: -99 -70.85157 42.27843</p>
<p>End Tow</p>  <p>NS0610E9 Station Log Survey: NS061 Station: 25KB Light Green 12/14/2006 1:29:36 PM Depth: -99 -70.85059 42.27808</p>	 <p>NS0610EA Station Log Survey: NS061 Station: 25KB Light Blue 12/14/2006 1:29:47 PM Depth: -99 -70.85056 42.27807</p>

* All coordian.

Crew Members: <i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, P. Howse</i>
Comments: <i>see start depth: 26' end depth: 26' Target Depth: 25.94'</i>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

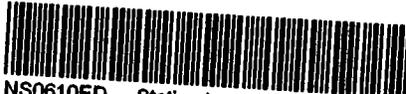
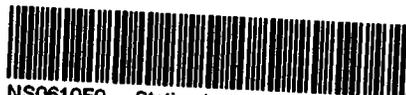
Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> 12/14/06 </u>	Recorded By: <u> JMT </u>	
Transect #: <u> 25 </u>	Trawl #: <u> K </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>1/8⁰ 1/16</i>	<i>2</i>
<i>Razor Clam</i>	<i>NA</i>	<i>1</i>
<i>Jackknife (Razor) clam</i>	<i>NA</i>	<i>13</i>
<i>mussel</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>1</i>	<i>1</i>
Total Number of Organisms Collected: <i>16 17</i>		
Comments/Observations: <i>lobster trap</i> <i>lots of worms + tubes</i> <i>1 mussel</i>		

0 wo d.s. 12/14/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>25</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>M</u>	Date:	<u>12/14/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30w" x 15h</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10</u>

Tow Data			
Start Tow	 NS0610ED Station Log Survey: NS061 Station: 25MB Light Red 12/14/2006 1:41:47 PM Depth: -99 -70.84995 42.27735	 NS0610EE Station Log Survey: NS061 Station: 25MB Light Yellow 12/14/2006 1:42:25 PM Depth: -99 -70.84980 42.27713	
End Tow	 NS0610EF Station Log Survey: NS061 Station: 25MB Light Green 12/14/2006 1:50:05 PM Depth: -99 -70.84840 42.27695	 NS0610F0 Station Log Survey: NS061 Station: 25MB Light Blue 12/14/2006 1:50:18 PM Depth: -99 -70.84815 42.27697	

* All coordinates are in UTM

Crew Members:	<i>L. Short, M. Walsh, J. Foley, A. Costa, M. Manfredi, D. Hourus</i>
Comments:	<p style="font-size: 1.2em; margin-left: 40px;">Start depth: 25'</p> <p style="font-size: 1.2em; margin-left: 40px;">end depth: 27'</p> <p style="font-size: 1.2em; margin-left: 40px;">Target Depth: 2618'</p>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> <i>25</i> </u>	Recorded By: <u> <i>JMF</i> </u>	
Tow #: <u> <i>0</i> </u>	Date: <u> <i>12/14/06</i> </u>	
PSI of Dredge: <u> <i>60</i> </u>	Water Depth (ft): <u> <i>see below</i> </u>	
Width of Dredge: <u> <i>30" x 15"</i> </u>	Sea State: <u> <i>calm</i> </u>	
Catch Bag Size: <u> <i>~12 Bushels</i> </u>	Wind: <u> <i>SW @ 10</i> </u>	
Tow Data		
Start Tow		
Time:		
Latitude:		Label
Longitude:		
End Tow		
Time:		
Latitude:		Label
Longitude:		
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members:		
<i>L. Short, M. Walsh, J. Fahey, A. Coste, M. Monfredi, D. Howard</i>		
Comments:		
<i>Start depth - 26*</i>		
<i>end depth 31*</i>		
<i>Target Depth: 25.94'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

* ~~redo~~
 will redo transect since end depth is off by ~4

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/14/06</u>	Recorded By:	<u>JMP</u>
Transect #: <u>25</u>	Trawl #:	<u>0</u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clams</i>	<i>1/8</i>	<i>2</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>1</i>	<i>1</i>
Total Number of Organisms Collected:		
Comments/Observations:		
<i>1 Broken Surf clam</i>		

1st try - did not keep because sand depth off by ~4 (total 3 organisms)

surf clam
1 3-5
1 7.5
1 - broken

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>13</u>	Recorded By: <u>JMF</u>	
Tow #: <u>S</u>	Date: <u>12/14/06</u>	
PSI of Dredge: _____	Water Depth (ft): <u>see below</u>	
Width of Dredge: <u>30" w x 15" h</u>	Sea State: <u>calm</u>	
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>SW @ 10</u>	
<u>Tow Data</u>		
Start Tow		
Time:		
Latitude:		Label
Longitude:		
End Tow		
Time:		
Latitude:		Label
Longitude:		
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <u>L. Short, M. Walsh, J. Fahy, A. Costa, M. Menfies, D. Howard</u>		
Comments: <u>Start depth: 15'</u> <u>end depth</u> <u>Target depth: 15.7'</u>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

** got stuck in rocks, skipping for now + heading to
19P*

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>19</u>	Recorded By: <u>JMF</u>
Tow #:	<u>P</u>	Date: <u>12/14/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft): <u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State: <u>calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind: <u>SW @ 10-12</u>
Tow Data		
Start Tow	 NS0610FE Station Log Survey: NS061 Station: 19PB Light Red 12/14/2006 2:50:05 PM Depth: -99 [redacted] -70.84845 42.27467	 NS0610FF Station Log Survey: NS061 Station: 19PB Light Yellow 12/14/2006 2:50:07 PM Depth: -99 [redacted] -70.84843 42.27465
End Tow	 NS061100 Station Log Survey: NS061 Station: 19PB Light Green 12/14/2006 2:55:00 PM Depth: -99 [redacted] -70.84738 42.27422	 NS061101 Station Log Survey: NS061 Station: 19PB Light Blue 12/14/2006 2:55:03 PM Depth: -99 [redacted] -70.84737 42.27422
* All coordiantes are recorded in NAD 83 deciamal degrees		
Crew Members:		
Comments: <p style="font-size: 1.2em; margin-left: 40px;">Start depth - 21'</p> <p style="font-size: 1.2em; margin-left: 40px;">end depth - 21'</p> <p style="font-size: 1.5em; margin-left: 40px; margin-top: 20px;">Target Depth: 21.38'</p>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/14/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>25 19</u>	Trawl #: <u>S/P</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>NA</i>	<i>NA</i>	<i>0</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>0</i>		
Comments/Observations: <i>Nothing in the dredge.</i>		

① S/B 19P
12/14/06

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Day 4
December 15, 2006

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APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u>12/15/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>1</u>	Trawl #: <u>G7</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>5</i>	<i>121</i>
<i>crab</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>4</i>	<i>100</i>	<i>17</i>
Total Number of Organisms Collected: <i>121 + 122</i>		
Comments/Observations: <i>1 crab</i>		

OWN d.s. 12/14/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>1</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>K</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>See below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~12 Baskets</u>	Wind:	<u>SW @ 10</u>
Tow Data			
Start Tow	 NS061114 Station Log Survey: NS061 Station: 1KB Light Red 12/15/2006 9:26:22 AM Depth: -95 -70.85785 42.27450	 NS061115 Station Log Survey: NS061 Station: 1KB Light Yellow 12/15/2006 9:26:37 AM Depth: -95 -70.85788 42.27445	
End Tow	 NS061116 Station Log Survey: NS061 Station: 1KB Light Green 12/15/2006 9:32:50 AM Depth: -95 -70.85675 42.27345	 NS061117 Station Log Survey: NS061 Station: 1KB Light Blue 12/15/2006 9:33:02 AM Depth: -95 -70.85674 42.27345	
* All coordinates are recorded in UTM			
Crew Members:			
<i>L. Short, M. Walsh, J. Faluy, A. Costa, M. Manfredi, D. Howard, P. D'Intel</i>			
Comments:			
Start depth - 6' End depth - 6' Target Depth: 5.47'			
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.			

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>12/15/06</i> </u>	Recorded By: <u> <i>JMF</i> </u>	
Transect #: <u> <i>1</i> </u>	Trawl #: <u> <i>K</i> </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clams</i>	<i>2 3/4</i>	<i>124</i>
<i>window pane</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>5</i>	<i>104</i>	<i>15</i>
Total Number of Organisms Collected: <i>125</i> <i>129</i> <i>125</i>		
Comments/Observations: <i>one window pane (fish)</i>		

① Wm JMF 12/15/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>1</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>0</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~ 12 Bushels</u>	Wind:	<u>SW @ 10-12</u>

Tow Data	
Start Tow  NS06111B Station Log Survey: NS061 Station: 1OB Light Red 12/15/2006 9:40:33 AM Depth: -95 -70.85435 42.27170	 NS06111C Station Log Light Yellow Survey: NS061 Station: 1OB 12/15/2006 9:40:35 AM Depth: -95 -70.85433 42.27170
End Tow  NS06111D Station Log Light Green Survey: NS061 Station: 1OB 12/15/2006 9:45:19 AM Depth: -95 -70.85326 42.27139	 NS06111E Station Log Light Blue Survey: NS061 Station: 1OB 12/15/2006 9:45:37 AM Depth: -95 -70.85325 42.27137

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: <i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, D. Howard, P. O'Neil</i>
Comments: <div style="font-size: 1.2em; margin-top: 10px;"> Start depth - 5.5' end depth - 6' </div> <div style="margin-top: 20px;"> Target Depth: 5.00' </div>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/15/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>2 1</u> <small>9B JMF also</small>	Trawl #: <u>6</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clams</i>	<i>2 1/2</i>	^① 123 ^① <i>125</i>
<i>Crab</i>	<i>NA</i>	<i>1</i>
<i>Windowpane flounder</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>4</i>	^① 96 <i>88</i>	<i>31</i>
Total Number of Organisms Collected: ^① 135 <i>127</i>		
Comments/Observations:		
^① <i>1 Window pane flounder</i> <i>1 Crab</i> <i>2 broken - surf clams</i>		

① Please ignore samples were re-counted

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>1</u>	Recorded By: <u>JMF</u>
Tow #:	<u>C</u>	Date: <u>12/15/06</u>
PSI of Dredge:	<u>120</u>	Water Depth (ft): <u>see below</u>
Width of Dredge:	<u>30" w' x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind: <u>SW @ 10-12</u>
Tow Data		
Start Tow	 NS061123 Station Log Survey: NS061 Station: 1CB Light Red 12/15/2006 10:06:10 AM Depth: -9 -70.86350 42.27977	 NS061124 Station Log Survey: NS061 Station: 1CB Light Yellow 12/15/2006 10:06:22 AM Depth: -9 -70.86350 42.27975
End Tow	 NS061125 Station Log Survey: NS061 Station: 1CB Light Green 12/15/2006 10:12:16 AM Depth: -9 -70.86263 42.27902	 NS061126 Station Log Survey: NS061 Station: 1CB Light Blue 12/15/2006 10:12:27 AM Depth: -9 -70.86262 42.27900
* All coordinates are recorded in NAD 83 UTM Zone 18N		
Crew Members:	<i>L. Short, M. Walsh, J. Faly, A. Casra, M. Manfredi, D. Howard, P. Quinter</i>	
Comments:	<p align="center"><i>Start depth: 5'</i></p> <p align="center"><i>end depth: 5.5'</i></p> <p align="center"><i>Target Depth: 4.49'</i></p>	
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

* 2nd attempt due to low numbers on first tow

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/15/06</i></u>	Recorded By: <u><i>JMF</i></u>	
Transect #: <u><i>1</i></u>	Trawl #: <u><i>C</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>5 3/4</i>	<i>128</i>
<i>crabs (sand)</i>	<i>NA</i>	<i>3</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>3</i>	<i>112</i>	<i>13</i>
Total Number of Organisms Collected: <i>131</i>		
Comments/Observations: <i>3 crabs (sand)</i> <i>worms</i>		

* 2nd attempt due to low #'s on 1st tow

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>7</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>B</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>SW @ 10-12</u>

Tow Data	
Start Tow  NS061129 Station Log Light Red Survey: NS061 Station: 7BB 12/15/2006 10:23:03 AM Depth: -9 -70.86340 42.28107	 NS06112A Station Log Light Yellow Survey: NS061 Station: 7BB 12/15/2006 10:23:09 AM Depth: -9 -70.86337 42.28102
End Tow  NS06112B Station Log Light Green Survey: NS061 Station: 7BB 12/15/2006 10:29:59 AM Depth: -9 -70.86242 42.28038	 NS06112C Station Log Light Blue Survey: NS061 Station: 7BB 12/15/2006 10:30:14 AM Depth: -9 -70.86238 42.28035

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members:	<i>L. Short, M. Walsh, J. Foley, A. Cosma, M. Manfredi, D. Howard, P. Quinlan</i>
Comments:	<p style="font-size: 1.2em;"><i>Start depth - 11'</i></p> <p style="font-size: 1.2em;"><i>end depth - 10'</i></p> <p style="font-size: 1.2em; margin-top: 20px;"><i>Target Depth: 1096'</i></p>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>12/15/06</i> </u>	Recorded By: <u> <i>JMF</i> </u>	
Transect #: <u> <i>7</i> </u>	Trawl #: <u> <i>B</i> </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf clams</i>	<i>4 1/3</i>	<i>116</i>
<i>Razor clams</i>	<i>NA</i>	<i>4</i>
<i>Sand Crab</i> ^⓪	<i>NA</i>	<i>1</i>
<i>Lady Crab</i>	<i>NA</i>	<i>6</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>6</i>	<i>78</i>	<i>31</i>
Total Number of Organisms Collected: <i>127</i>		
Comments/Observations: <i>6 ^{Lady} Blunt crabs 1 broken surf clam</i> <i>4 Razor</i> <i>1 Sand Crab</i> ^⓪		

^⓪ Sand crab & Rock crab are the same.

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>7</u>	Recorded By: <u>JMF</u>	
Tow #: <u>F</u>	Date: <u>12/15/06</u>	
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>	
Width of Dredge: <u>30" w x 15" h</u>	Sea State: <u>calm</u>	
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>SW @ 10-12</u>	
Tow Data		
Start Tow	 NS061132 Station Log Survey: NS061 Station: 7FB Light Red 12/15/2006 10:49:18 AM Depth: -9 -70.86082 42.27843	 NS061133 Station Log Survey: NS061 Station: 7FB Light Yellow 12/15/2006 10:49:41 AM Depth: -9 -70.86058 42.27832
End Tow	 NS061134 Station Log Survey: NS061 Station: 7FB Light Green 12/15/2006 10:57:33 AM Depth: -9 -70.85945 42.27792	 NS061135 Station Log Survey: NS061 Station: 7FB Light Blue 12/15/2006 10:57:47 AM Depth: -9 -70.85940 42.27788
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members:	<i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, D. Howard, P. Quintel</i>	
Comments:	<p><i>Start depth - 9'</i> <i>end depth - 11'</i></p> <p align="center"><i>Target Depth: 10.13'</i></p>	
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

- tow was @ 95° w
- dredge was off the boat at night
- ~60 FT SW of Boat transect

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> 7 </u>	Recorded By: <u> JMF </u>	
Tow #: <u> L </u>	Date: <u> 12/15/06 </u>	
PSI of Dredge: <u> 60 </u>	Water Depth (ft): <u> see below </u>	
Width of Dredge: <u> 30" x 15" </u>	Sea State: <u> calm </u>	
Catch Bag Size: <u> ~12 Bushels </u>	Wind: <u> W/SW @ 10-15 </u>	
Tow Data		
Start Tow	 NS06113A Station Log Survey: NS061 Station: 7LB Light Red 12/15/2006 11:32:27 AM Depth: - -70.85595 42.27433	 NS06113B Station Log Survey: NS061 Station: 7LB Light Yellow 12/15/2006 11:32:49 AM Depth: - -70.85582 42.27417
End Tow	 NS06113C Station Log Survey: NS061 Station: 7LB Light Green 12/15/2006 11:42:41 AM Depth: - -70.85426 42.27438	 NS06113D Station Log Survey: NS061 Station: 7LB Light Blue 12/15/2006 11:43:47 AM Depth: - -70.85416 42.27447
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, D. Howard, P. Quindt</i>		
Comments: <i>Start depth: 8'</i> <i>End depth: 13'</i> <i>target water depth is 9ft 9.0' 14'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

* tow is @ an angle west of the boat
(towards beach)
dredge pulled along transect, wind
pushed boat eastward
* Dredge is ~60ft SW of transect

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/15/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>7</u>	Trawl #: <u>20 L</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clams</i>	<i>2 1/2 1 1/2</i>	<i>83 84</i>
<i>razor clams</i>	<i>NA</i>	<i>2</i>
<i>sand crab</i>	<i>NA</i>	<i>2</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>2</i>	<i>37</i>	<i>44</i>
Total Number of Organisms Collected: <i>88</i>		
Comments/Observations: <i>ab</i>		
<i>large rocks in clams</i>		
<i>1 broken surf clam</i>		
<i>2</i>		

OS/B JMF 12/15/06
L

** Do not count species,
 tow was off transect
 & will be redone*

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>7</u>	Recorded By: <u>JMF</u>	
Tow #: <u>P</u>	Date: <u>12/15/06</u>	
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>	
Width of Dredge: <u>30" w x 15" H</u>	Sea State: <u>calm</u>	
Catch Bag Size: <u>~ 12 Baskets</u>	Wind: <u>W @ 10-12 15-20</u>	
Tow Data		
Start Tow	 NS061142 Station Log Survey: NS061 Station: 7PB Light Red 12/15/2006 11:59:30 AM Depth: -9 -70.85217 42.27200	 NS061143 Station Log Survey: NS061 Station: 7PB Light Yellow 12/15/2006 11:59:40 AM Depth: -9 -70.85207 42.27200
End Tow	 NS061144 Station Log Survey: NS061 Station: 7PB Light Green 12/15/2006 12:07:53 PM Depth: -9 -70.85091 42.27243	 NS061145 Station Log Survey: NS061 Station: 7PB Light Blue 12/15/2006 12:08:18 PM Depth: -9 -70.85085 42.27245
* All coordinates are <small>WGS 84</small> decimal degrees		
Crew Members:	<i>L. Short, M. Walsh, J. Fahy, A. Coors, M. Manfredi, D. Howard, P. Quintal</i>	
Comments:	<i>Start depth - 9'</i> <i>End depth - * 12'</i> <i>target water depth 8ft. 8.32ft.</i>	
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

* tow is at an angle to the West
 vessel is being pushed off the
 transect by the wind. Dredge
 is to the West of the boat following
 the transect
 ~ 180 feet of hose

 * Dredge 60ft SW of transect

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/15/06</u>	Recorded By:	<u>JMF</u>
Transect #: <u>7</u>	Trawl #:	<u>P</u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf clam</i>	<i>2</i>	<i>83 87 86</i>
<i>Lady Blue crab</i>	<i>NA</i>	<i>1</i>
<i>Sand crab</i>	<i>NA</i>	<i>1</i>
<i>Coarct clam</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>34</i>	<i>48</i>
Total Number of Organisms Collected: <i>89</i>		
Comments/Observations: <i>lots of rocks</i> <i>3 broken surf clam</i>		

6 S/B JMF 12/15/06

* DO NOT count species
 tow will be redone - off
 transect

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>19</u>	Recorded By: <u>JMF</u>	
Tow #: <u>H</u>	Date: <u>12/15/06</u>	
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>	
Width of Dredge: <u>30" w x 15" h</u>	Sea State: <u>calm</u>	
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>W @ 15-20</u>	
Tow Data		
Start Tow	 NS061149 Station Log Survey: NS061 Station: 19HB Light Red 12/15/2006 12:27:34 PM Depth: -9 -70.85520 42.27918	 NS06114A Station Log Survey: NS061 Station: 19HB Light Yellow 12/15/2006 12:27:40 PM Depth: -8 -70.85515 42.27917
End Tow	 NS06114B Station Log Survey: NS061 Station: 19HB Light Green 12/15/2006 12:34:41 PM Depth: -9 -70.85392 42.27934	 NS06114C Station Log Survey: NS061 Station: 19HB Light Blue 12/15/2006 12:34:57 PM Depth: -9 -70.85387 42.27934
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, J. Foley, A. Costa, M. Menzies, D. Howard, P. Ovinstad</i>		
Comments: <i>Start depth: 22ft*</i> <i>End depth 26ft</i> <i>target water depth is 19ft 19.77ft.</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

- * dredge is angled off the boat to the West. The vessel is being pushed Eastward, Dredge is follows the transect angle. (~150 in hose out)
- * Still appear to be moving along the shoreline. Pulling @ ~45° angle
- * Dredge 60 ft SW of transect

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/15/06</i></u>	Recorded By: <u><i>JMF</i></u>	
Transect #: <u><i>19</i></u>	Trawl #: <u><i>H</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>1/2</i> <i>3/4</i>	<i>46</i> <i>41</i>
<i>Black back Flounder</i>	<i>NA</i>	<i>1</i>
<i>Pezomachus</i>	<i>NA</i>	<i>4</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>3</i>	<i>36</i>
Total Number of Organisms Collected: <i>46</i>		
Comments/Observations: <i>1 broken surf clam</i>		

65/B JMF 12/15/06

* Do not count species -
 tow was off transect &
 will be redone

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>19</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>J</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" h</u>	Sea State:	<u>Calm</u>
Catch Bag Size:	<u>~ 1/2 Bushels</u>	Wind:	<u>W @ 15-20</u>
Tow Data			
Start Tow	 NS06114F Station Log Survey: NS061 Station: 19JB Light Red 12/15/2006 12:54:28 PM Depth: -9 -70.85452 42.27775	 NS061150 Station Log Survey: NS061 Station: 19JB Light Yellow 12/15/2006 12:54:42 PM Depth: -9 -70.85445 42.27770	
End Tow	 NS061151 Station Log Survey: NS061 Station: 19JB Light Green 12/15/2006 1:02:26 PM Depth: -9 -70.85313 42.27813	 NS061152 Station Log Survey: NS061 Station: 19JB Light Blue 12/15/2006 1:02:37 PM Depth: -9 -70.85313 42.27813	
* All coordinates are recorded in NAD 83 decimal degrees			
Crew Members:			
<i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Monfradi, D. Howard, P. Quarta</i>			
Comments:			
<i>Start depth - 19'</i> <i>End depth - 22'</i> <i>target water depth is 19ft. 19.46ft.</i>			
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.			

* Dredge is ~ 60 ft SW of the boat transect.
 The boat is being pushed eastward by the W. wind.
 - Dredge is @ 45° angle to boat

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u>12/15/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>19</u>	Trawl #: <u>5</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>3/4</i>	<i>38 39</i>
<i>Sand crab</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>9</i>	<i>29</i>
Total Number of Organisms Collected: <i>40</i>		
Comments/Observations: <i>1 Broken Surf Clam</i> <i>Worm</i>		

0513 JMF 12/15/06

* Do not count splines,
 how off transect will
 be redone

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>19</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>L</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State:	<u>calm</u>
Catch Bag Size:	<u>~ 12 Bushels</u>	Wind:	<u>W @ 15-20</u>

Tow Data		
Start Tow	 NS061155 Station Log Survey: NS061 Station: 19LB Light Red 12/15/2006 1:15:08 PM Depth: -99 -70.85310 42.27630	 NS061156 Station Log Survey: NS061 Station: 19LB Light Yellow 12/15/2006 1:15:37 PM Depth: -99 -70.85278 42.27612
End Tow	 NS061157 Station Log Survey: NS061 Station: 19LB Light Green 12/15/2006 1:20:04 PM Depth: -99 -70.85157 42.27547	 NS061158 Station Log Survey: NS061 Station: 19LB Light Blue 12/15/2006 1:20:24 PM Depth: -99 -70.85140 42.27537

* All coordinates are recorded in NAD 83 decimarc accuracy

Crew Members:	<i>L. Short, M. Walsh, A. Costa, J. Foley, M. Manfredi, D. Howard, P. Quintel</i>
Comments:	<p style="font-size: large; margin-left: 40px;"><i>Start depth - 18'</i></p> <p style="font-size: large; margin-left: 40px;"><i>End depth - 18'</i></p> <p style="font-size: large; margin-left: 40px;"><i>Target Depth: 19.41'</i></p>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/15/06</u>	Recorded By: <u>JMF</u>	
Transect #: <u>19</u>	Trawl #: <u>L</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clams</i>	<i>3/4</i>	<i>49⁰50</i>
<i>Moon Snail</i>	<i>NA</i>	<i>1</i>
<i>Rock Crab</i> ②	<i>NA</i>	<i>3</i>
<i>Razor Clam</i>	<i>NA</i>	<i>1</i>
<i>Worms</i>	<i>NA</i>	<i>12 worms</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>14</i>	<i>35</i>
Total Number of Organisms Collected: <i>55</i>		
Comments/Observations: <i>1 broken surf clam</i>		

© 5/13 JMF 12/15/06

② rock crab is a sand crab

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>19</u>	Recorded By: <u>JMF</u>
Tow #: <u>N</u>	Date: <u>12/15/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30'w x 15'H</u>	Sea State: <u>calm</u>
Catch Bag Size: <u>~ 12 Bushels</u>	Wind: <u>W @ 15-20</u>

Tow Data	
Start Tow  NS06115B Station Log Survey: NS061 Station: 19NB Light Red 12/15/2006 1:34:33 PM Depth: -99 -70.85085 42.27525	 NS06115C Station Log Survey: NS061 Station: 19NB Light Yellow 12/15/2006 1:34:53 PM Depth: -99 -70.85065 42.27517
End Tow  NS06115D Station Log Survey: NS061 Station: 19NB Light Green 12/15/2006 1:39:25 PM Depth: -99 -70.84942 42.27453	 NS06115E Station Log Survey: NS061 Station: 19NB Light Blue 12/15/2006 1:39:40 PM Depth: -99 -70.84940 42.27453

* All coordinates are in decimal degrees

Crew Members: <i>L. Short, J. Fahy, M. Walsh, A. Costa, M. Mandyredi, D. Howard, P. Quiral</i>
Comments: <div style="font-size: 1.2em; margin-top: 10px;"> Start depth - 18' End depth - 18' </div> <div style="margin-top: 20px;"> Target Depth: 19.4' * just south of Proposed Station - along same transect </div>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/15/06</i></u>	Recorded By: <u><i>JMF</i></u>	
Transect #: <u><i>19</i></u>	Trawl #: <u><i>N</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>43⁰ 1/4</i>	<i>25 26</i>
<i>Blackback flounder</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>20 5</i>	<i>20</i>
Total Number of Organisms Collected: <i>27</i>		
Comments/Observations: <i>1 broken surf clam</i>		

SIB JMF 12/15/06

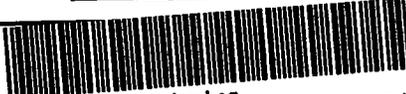
© 2007 S. 12/15/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> 19 </u>	Recorded By: <u> JMF </u>	
Tow #: <u> R </u>	Date: <u> 12/15/06 </u>	
PSI of Dredge: <u> 60 </u>	Water Depth (ft): <u> see below </u>	
Width of Dredge: <u> 30W x 15W </u>	Sea State: <u> < 1 ft </u>	
Catch Bag Size: <u> ~12 Bushels </u>	Wind: <u> W @ 15-20 </u>	
<u>Tow Data</u>		
Start Tow	Time: Latitude: Longitude:	Label
End Tow	Time: Latitude: Longitude:	Label
<small>* All coordinates are recorded in NAD 83 decimal degrees</small>		
Crew Members:		
Comments: <i>Start depth - 2^⓪ ft</i> <i>End depth -</i> <i>Target Depth: 19.49'</i>		
<small>Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.</small>		

⓪ got stuck in rocks - stopped tow

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>		Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>		Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>		Chief Scientist: <i>Lynda Short</i>
Transect #:	<i>13</i>	Recorded By:	<i>JMF</i>
Tow #:	<i>0</i>	Date:	<i>12/15/06</i>
PSI of Dredge:	<i>60</i>	Water Depth (ft):	<i>see below</i>
Width of Dredge:	<i>30" x 15" H</i>	Sea State:	<i>1 ft</i>
Catch Bag Size:	<i>~ 12 Bushels</i>	Wind:	<i>W @ 15-20</i>
Tow Data			
Start Tow			
	NS061165 Station Log Survey: NS061 Station: 13OE 12/15/2006 2:04:15 PM Depth: -99 -70.85097 42.27348	NS061166 Station Log Survey: NS061 Station: 13OE 12/15/2006 2:04:21 PM Depth: -99 -70.85101 42.27352	Light Red Light Yellow
End Tow			
	NS061167 Station Log Survey: NS061 Station: 13OE 12/15/2006 2:06:06 PM Depth: -99 -70.85207 42.27390	NS061168 Station Log Survey: NS061 Station: 13OE 12/15/2006 2:06:08 PM Depth: -99 -70.85208 42.27390	Light Green Light Blue
* All coordinates are recorded in NAD 83 decimal degrees			
Crew Members: <i>L. Short, M. Walsh, J. Foley, A. Costa, M. Mansueti, D. Howard, P. Quintal</i>			
Comments: <i>Start depth - 14'</i> <i>End depth - 14'</i> <i>Target Depth: 1357'</i>			
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.			

Nothing in grab - redo tow

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>13</u>	Recorded By:	<u>JMF</u>
Tow #:	<u>M</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>4050</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" H</u>	Sea State:	<u>< 1 ft</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>W@ 15-20</u>

Tow Data			
Start Tow			
	NS06116D Station Log Survey: NS061 Station: 13MB Light Red 12/15/2006 2:11:37 PM Depth: -99 -70.85402 42.27497	NS06116E Station Log Survey: NS061 Station: 13MB Light Yellow 12/15/2006 2:11:59 PM Depth: -99 -70.85398 42.27475	
End Tow			
	NS06116F Station Log Survey: NS061 Station: 13MB Light Green 12/15/2006 2:17:56 PM Depth: -99 -70.85225 42.27422	NS061170 Station Log Survey: NS061 Station: 13MB Light Blue 12/15/2006 2:18:10 PM Depth: -99 -70.85213 42.27422	

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members:	<i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, D. Howard, P. Quinlan</i>
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Comments:	<p><i>Start depth - 13'</i></p> <p><i>End depth - 14'</i></p> <p align="center"><i>Target Depth: 13.66'</i></p>
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Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

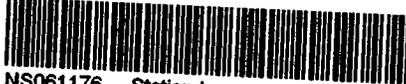
Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/15/06</u>	Recorded By:	<u>JMF</u>
Transect #: <u>M 13</u>	Trawl #:	<u>M</u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clams</i>	<i>1</i>	<i>78</i>
<i>Moon Snail</i>	<i>NA</i>	<i>1</i>
<i>Razor Clam</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>17</i>	<i>61</i>
Total Number of Organisms Collected: <i>80</i>		
Comments/Observations: <i>* Some Rocks</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<u>13</u>	Recorded By:	<u>1215106 JMF</u>
Tow #:	<u>0</u>	Date:	<u>12/15/06</u>
PSI of Dredge:	<u>50</u>	Water Depth (ft):	<u>see below</u>
Width of Dredge:	<u>30" w x 15" h</u>	Sea State:	<u>< 1 ft</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>W @ 15-20</u>

Tow Data			
Start Tow			
	NS061173 Station Log Survey: NS061 Station: 13OB Light Red 12/15/2006 2:27:20 PM Depth: -99 -70.85188 42.27380	NS061174 Station Log Survey: NS061 Station: 13OB Light Yellow 12/15/2006 2:27:39 PM Depth: -99 -70.85180 42.27360	
End Tow			
	NS061175 Station Log Survey: NS061 Station: 13OB Light Green 12/15/2006 2:34:17 PM Depth: -99 -70.85043 42.27333	NS061176 Station Log Survey: NS061 Station: 13OB Light Blue 12/15/2006 2:34:37 PM Depth: -99 -70.85032 42.27330	

* All coord.

Crew Members:	<i>L. Short, M. Walsh, J. Fahy, A. Costa, D. Hernandez, M. Manfredi, P. Quinteral</i>
Comments:	<p style="font-size: 1.2em;"><i>Start depth - 14'</i></p> <p style="font-size: 1.2em;"><i>End depth - 14'</i></p> <p style="font-size: 1.2em;"><i>Target Depth: 13.9'</i></p>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

*2nd attempt - Nothing in 1st attempt
see sl*

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/15/06</i></u>	Recorded By: <u><i>JMF</i></u>	
Transect #: <u><i>019 13</i></u>	Trawl #: <u><i>0 K 0</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1</i>	<i>86 87</i>
<i>Jackknife / Razor Clam</i>	<i>NA</i>	<i>7</i>
<i>Razor Clam</i>	<i>NA</i>	<i>1</i>
<i>Widowspine Flounder</i>	<i>NA</i>	<i>1</i>
<i>Worms</i>	<i>NA</i>	<i>NUMEROUS</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>3</i>	<i>16</i>	<i>67</i>
Total Number of Organisms Collected: <i>86 96</i>		
Comments/Observations: <i>Rocks</i> <i>1 Broken Surf Clams</i>		

① s/B JMF 12/15/06
130

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>25</u>	Recorded By: <u>JMF</u>
Tow #:	<u>I</u>	Date: <u>12/15/06</u>
PSI of Dredge:	<u>40</u>	Water Depth (ft): <u>see below</u>
Width of Dredge:	<u>30" w x 15" h</u>	Sea State: <u>1 ft</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind: <u>W@15-20</u>
Tow Data		
Start Tow	 NS061179 Station Log Survey: NS061 Station: 25IE Light Red 12/15/2006 2:43:34 PM Depth: -99 -70.85260 42.27900	 NS06117A Station Log Survey: NS061 Station: 25IE Light Yellow 12/15/2006 2:43:46 PM Depth: -99 -70.85258 42.27913
End Tow	 NS06117B Station Log Survey: NS061 Station: 25IE Light Green 12/15/2006 2:49:58 PM Depth: -99 -70.85355 42.28013	 NS06117C Station Log Survey: NS061 Station: 25IE Light Blue 12/15/2006 2:50:09 PM Depth: -99 -70.85374 42.28018
* All coordinates		
Crew Members:	<i>L. Short, M. Walsh, J. Fahy, A. Costa, M. Manfredi, D. Howard, P. Quinter</i>	
Comments:	<p><i>Start depth - 27'</i></p> <p><i>End depth - 28.5'</i></p> <p><i>Target Depth: 26.03'</i></p>	
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/15/06</u>	Recorded By:	<u>JMF</u>
Transect #: <u>25</u>	Trawl #:	<u>1</u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>NA</i>	<i>NA</i>	<i>0</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>0</i>	<i>0</i>
Total Number of Organisms Collected: <i>0</i>		
Comments/Observations: <i>No Surf clams - all rocks + mussel shells</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>25</u>	Recorded By: <u>JMF</u>
Tow #: <u>C</u>	Date: <u>12/15/06</u>
PSI of Dredge: <u>50</u>	Water Depth (ft): <u>see below</u>
Width of Dredge: <u>30" x 15"</u>	Sea State: <u>< 1 ft</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>W @ 15-20</u>

Tow Data	
<p>Start Tow</p>  <p>NS06117F Station Log Survey: NS061 Station: 25CE Light Red 12/15/2006 2:57:14 PM Depth: -99 -70.85735 42.28288</p>	 <p>NS061180 Station Log Survey: NS061 Station: 25CE Light Yellow 12/15/2006 2:57:24 PM Depth: -99 -70.85745 42.28295</p>
<p>End Tow</p>  <p>NS061181 Station Log Survey: NS061 Station: 25CE Light Green 12/15/2006 3:00:18 PM Depth: -99 -70.85863 42.28377</p>	 <p>NS061182 Station Log Survey: NS061 Station: 25CE Light Blue 12/15/2006 3:00:36 PM Depth: -99 -70.85875 42.28392</p>

* All coord. decimal degrees

Crew Members: <i>L. Short, M. Walsh, J. Fahey, A. Costa, M. Manfredi, D. Howard, P. Quintana</i>
Comments: <i>Start depth - 28'</i> <i>End depth - 28'</i> <i>Target Depth: 26.34'</i>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>12/15/06</i> </u>	Recorded By: <u> <i>JMF</i> </u>	
Transect #: <u> <i>25</i> </u>	Trawl #: <u> <i>C</i> </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>1/16</i>	<i>6</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>2</i>	<i>3</i>
Total Number of Organisms Collected: <i>6</i>		
Comments/Observations: <i>1 Broken surf clam</i>		

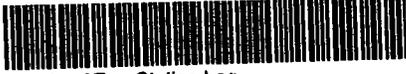
Day 5
December 16, 2006

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**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>1</u>	Recorded By: <u>MRP</u>
Tow #: <u>S</u>	Date: <u>12/16/06</u>
PSI of Dredge: <u>GO</u>	Water Depth (ft): <u>See Below</u>
Width of Dredge: <u>30" W x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>W: 10-15</u>

 NS06118B Station Log Survey: NS061 Station: 1SB Light Red 12/16/2006 8:29:27 AM Depth: -99 [redacted] -70.85157 42.26985	 NS06118C Station Log Survey: NS061 Station: 1SB Light Yellow 12/16/2006 8:30:04 AM Depth: -99 [redacted] -70.85118 42.26958
 NS06118D Station Log Survey: NS061 Station: 1SB Light Green 12/16/2006 8:35:29 AM Depth: -99 [redacted] -70.85020 42.26912	 NS06118E Station Log Survey: NS061 Station: 1SB Light Blue 12/16/2006 8:35:31 AM Depth: -99 [redacted] -70.85020 42.26912

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: <i>L. Short, M. Walsh, M. Atyutrick, A. Costa, P. Quintal, J. Randall</i>
Comments: <div style="font-family: cursive; font-size: 1.2em;"> Start depth: 9' End depth: 9' Target Depth = 7.33 </div>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>1</i></u>	Trawl #: <u><i>5</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>3 3/4</i>	<i>114</i>
<i>Lady Crab</i>	<i>NA</i>	<i>1</i>
<i>Razor Clams</i>	<i>NA</i>	<i>1</i>
<i>Moon snail</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>86</i>	<i>26</i>
Total Number of Organisms Collected: <i>118</i>		
Comments/Observations: <i>1 Lady Crab</i> <i>2 razor clams</i> <i>1 moon snail</i> <i>1 Broken Surf clam</i>		

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>7</u>	Recorded By: <u>MRF</u>
Tow #: <u>D</u>	Date: <u>12/16/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>See below</u>
Width of Dredge: <u>30 w" 15" h</u>	Sea State: <u>Calm</u>
Catch Bag Size: <u>~12 Bushels</u>	Wind: <u>W 10-15</u>

 NS061191 Station Log Survey: NS061 Station: 7DB Light Red 12/16/2006 8:55:39 AM Depth: -99 [redacted] -70.86192 42.27998	 NS061192 Station Log Survey: NS061 Station: 7DB Light Yellow 12/16/2006 8:56:06 AM Depth: -99 [redacted] -70.86189 42.27970
 NS061193 Station Log Survey: NS061 Station: 7DB Light Green 12/16/2006 9:01:46 AM Depth: -99 [redacted] -70.86113 42.27896	 NS061194 Station Log Survey: NS061 Station: 7DB Light Blue 12/16/2006 9:01:49 AM Depth: -99 [redacted] -70.86113 42.27896

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall</i>
Comments: <div style="font-family: cursive; font-size: 1.2em;"> Begin Depth: 14' End Depth: 13' Target depth = 13.93' </div>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>7</i></u>	Trawl #: <u><i>D</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clams</i>	<i>3</i>	<i>125</i>
<i>Razor Clams</i>	<i>NA</i>	<i>1</i>
<i>Rock Crabs</i>	<i>NA</i>	<i>3</i>
<i>moon snail</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>13</i>	<i>84</i>	<i>28</i>
Total Number of Organisms Collected: <i>130</i>		
Comments/Observations: <i>1 razor clam</i> <i>3 rock crabs (sand)</i> <i>1 moon snail</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #:	<u>7</u>	Recorded By: <u>MRF</u>
Tow #:	<u>H</u>	Date: <u>12/16/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft): <u>see Below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State: <u>Calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind: <u>NW ~10</u>



NS061197 Station Log
Survey: NS061 Station: 7HB **Light Red**
12/16/2006 9:06:30 AM Depth: -99
-70.85921 42.27697



NS061198 Station Log
Survey: NS061 Station: 7HB **Light Yellow**
12/16/2006 9:07:26 AM Depth: -99
-70.85883 42.27683



NS061199 Station Log
Survey: NS061 Station: 7HB **Light Green**
12/16/2006 9:13:33 AM Depth: -99
-70.85788 42.27627



NS06119A Station Log
Survey: NS061 Station: 7HB **Light Blue**
12/16/2006 9:13:35 AM Depth: -99
-70.85788 42.27627

Crew Members:

L. Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall

Comments:

*Begin Depth: 13'
End Depth: 14'
target Depth: 13.93'*

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u> <i>12/16/06</i> </u>	Recorded By: <u> <i>MRF</i> </u>	
Transect #: <u> <i>7</i> </u>	Trawl #: <u> <i>H</i> </u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clams</i>	<i>4 3/4</i>	<i>106</i>
<i>Lady Crab</i>	<i>NA</i>	<i>2</i>
<i>Rock Crab</i>	<i>NA</i>	<i>1</i>
<i>Razor Clams</i>	<i>NA</i>	<i>2</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>2</i>	<i>68</i>	<i>34</i>
Total Number of Organisms Collected: <i>111</i>		
Comments/Observations: <i>2 Broken Surf Clams</i> <i>2 Lady crab</i> <i>1 rock crab (sand crab)</i> <i>2 razor clam</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u> <i>T</i> </u>	Recorded By: <u> <i>MRF</i> </u>	
Tow #: <u> <i>L</i> </u>	Date: <u> <i>12/16/06</i> </u>	
PSI of Dredge: <u> <i>60</i> </u>	Water Depth (ft): <u> <i>See Below</i> </u>	
Width of Dredge: <u> <i>30" W x 15" H</i> </u>	Sea State: <u> <i>Calm</i> </u>	
Catch Bag Size: <u> <i>~12 Buckets</i> </u>	Wind: <u> <i>NW ~10</i> </u>	



NS06119D Station Log
 Survey: NS061 Station: 7LB Light Red
 12/16/2006 9:18:32 AM Depth: -99
 -70.85606 42.27431



NS06119E Station Log
 Survey: NS061 Station: 7LB Light Yellow
 12/16/2006 9:18:54 AM Depth: -99
 -70.85583 42.27417



NS06119F NG rep 1
 Survey: NS061 Station: 7LB Light Green
 12/16/2006 9:27:38 AM Depth: -99
 -70.85490 42.27348



NS0611A0 NG rep 1
 Survey: NS061 Station: 7LB Light Blue
 12/16/2006 9:27:39 AM Depth: -99
 -70.85490 42.27348

* All coordinates are recorded in NAD 83 decimal degrees

Crew Members: *d. Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall*

Comments:
Begin Depth: 13'
End Depth: 12'
Target Depth: 13.6'

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

redo of previous 7L

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/16/06</i></u>	Recorded By:	<u><i>MRF</i></u>
Transect #: <u><i>7</i></u>	Trawl #:	<u><i>L</i></u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>1*</i>	<i>133</i>
<i>Sand Crab</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>6</i>	<i>88</i>	<i>39</i>
Total Number of Organisms Collected: <i>134</i>		
Comments/Observations: <i>1 sand crab</i>		

redo of previous 7L

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>7</u>	Recorded By: <i>MRF</i>	
Tow #: <u>8 P</u>	Date: <i>12/16/06</i>	
PSI of Dredge: <u>60</u>	Water Depth (ft): <i>See Below</i>	
Width of Dredge: <u>30' x 15' H</u>	Sea State: <i>Calm</i>	
Catch Bag Size: <u>~12 Buckets</u>	Wind: <i>NW ~10</i>	
 NS0611A3 Station Log Survey: NS061 Station: 7PB Light Red 12/16/2006 9:35:13 AM Depth: -9[redacted] -70.85252 42.27243		
 NS0611A4 Station Log Survey: NS061 Station: 7PB Light Yellow 12/16/2006 9:35:52 AM Depth: -9[redacted] -70.85235 42.27227		
 NS0611A5 Station Log Survey: NS061 Station: 7PB Light Green 12/16/2006 9:43:23 AM Depth: -9[redacted] -70.85140 42.27163		
 NS0611A6 Station Log Survey: NS061 Station: 7PB Light Blue 12/16/2006 9:43:25 AM Depth: -9[redacted] -70.85140 42.27163		
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall</i>		
Comments: <i>Start Depth: 14'</i> <i>End Depth: 14'</i> <i>Target Depth 13.4'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

Redp of previous 7P

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>7</i></u>	Trawl #: <u><i>B P</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>2</i>	<i>84</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>23</i>	<i>61</i>
Total Number of Organisms Collected: <i>84</i>		
Comments/Observations:		

Lots of 7-11" ~~cobble~~ cobble

APPENDIX A-3

Tow Log Form

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i> Location: <i>Hull, MA</i> Client: <i>USACE</i>	Project #: <i>G606425</i> Vessel: <i>Andy Lynn VI</i> Chief Scientist: <i>Lynda Short</i>	
Transect #:	<u>7</u>	Recorded By:	<u>MRF</u>
Tow #:	<u>R</u>	Date:	<u>12/16/06</u>
PSI of Dredge:	<u>60</u>	Water Depth (ft):	<u>See Below</u>
Width of Dredge:	<u>30" W x 15" H</u>	Sea State:	<u>Calm</u>
Catch Bag Size:	<u>~12 Bushels</u>	Wind:	<u>NW ~10</u>

 NS0611A9 Station Log Survey: NS061 Station: 7RB Light Red 12/16/2006 9:54:07 AM Depth: -95 -70.85050 42.27118	 NS0611AA Station Log Survey: NS061 Station: 7RB Light Yellow 12/16/2006 9:54:45 AM Depth: -95 -70.85015 42.27095
E  NS0611AB Station Log Survey: NS061 Station: 7RB Light Green 12/16/2006 9:59:01 AM Depth: -95 -70.84930 42.27035	 NS0611AC Station Log Survey: NS061 Station: 7RB Light Blue 12/16/2006 9:59:01 AM Depth: -95 -70.84930 42.27035

* All coordinates are in UTM Zone 18N, datum NAD 83, units in meters.

Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, R. Costa, P. Quintal, T. Randall</i>
Comments: <div style="font-family: cursive; font-size: 1.2em;"> Begin Depth: 14' End Depth: 14' Target Depth: 12.7' </div>

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/16/06</i></u>	Recorded By:	<u><i>MRF</i></u>
Transect #: <u><i>7</i></u>	Trawl #:	<u><i>R</i></u>
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clams</i>	<i>2</i>	<i>85</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>28</i>	<i>54</i>
Total Number of Organisms Collected: <i>85</i>		
Comments/Observations: <i>2 Broken Surf Clams</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #: <u>7</u>	Recorded By: <u>MRF</u>
Tow #: <u>J</u>	Date: <u>12/16/06</u>
PSI of Dredge: <u>60</u>	Water Depth (ft): <u>See Below</u>
Width of Dredge: <u>30" W # 10" H</u>	Sea State: <u>Calm ~ 1'</u>
Catch Bag Size: <u>~ 12 Buckets</u>	Wind: <u>NW ~ 10-15</u>

Tow Data	
S	E
 NS0611B1 Station Log Survey: NS061 Station: 7JB Light Red 12/16/2006 10:18:50 AM Depth: -9 -70.85778 42.27571	 NS0611B2 Station Log Survey: NS061 Station: 7JB Light Yellow 12/16/2006 10:19:09 AM Depth: -9 -70.85777 42.27555
 NS0611B3 Station Log Survey: NS061 Station: 7JB Light Green 12/16/2006 10:24:13 AM Depth: -9 -70.85629 42.27493	 NS0611B4 Station Log Survey: NS061 Station: 7JB Light Blue 12/16/2006 10:24:17 AM Depth: -9 -70.85623 42.27493

* All coordinates are recorded in meters

Crew Members: *L. Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall*

Comments:

Begin Depth: 12'

End Depth: 13'

Target Depth: 12.2'

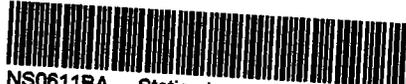
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>7</i></u>	Trawl #: <u><i>5</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>	<i>3 1/3</i>	<i>123</i>
<i>Sand crabs</i>	<i>NA</i>	<i>4</i>
<i>Razor Clams</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>96</i>	<i>25</i>
Total Number of Organisms Collected: <i>128</i>		
Comments/Observations: <i>4 sand crabs</i> <i>1 razor clam</i> <i>2 Broken Surf Clams</i>		

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <i>19</i>	Recorded By: <i>MRF</i>	
Tow #: <i>4</i>	Date: <i>12/16/06</i>	
PSI of Dredge: <i>60</i>	Water Depth (ft): <i>see Below</i>	
Width of Dredge: <i>30" W x 15" h</i>	Sea State: <i>~1</i>	
Catch Bag Size: <i>~12 Bushels</i>	Wind: <i>NW ~15</i>	
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>NS0611B7 Station Log Survey: NS061 Station: 19HB Light Red 12/16/2006 10:37:47 AM Depth: - -70.85580 42.27905</p> </div> <div style="width: 45%;">  <p>NS0611B8 Station Log Survey: NS061 Station: 19HB Light Yellow 12/16/2006 10:38:05 AM Depth: - -70.85555 42.27892</p> </div> </div>		
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;">  <p>NS0611B9 Station Log Survey: NS061 Station: 19HB Light Green 12/16/2006 10:44:38 AM Depth: - -70.85471 42.27830</p> </div> <div style="width: 45%;">  <p>NS0611BA Station Log Survey: NS061 Station: 19HB Light Blue 12/16/2006 10:44:39 AM Depth: - -70.85471 42.27828</p> </div> </div>		
Crew Members: <i>J. Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall</i>		
Comments: <i>Begin Depth: 24'</i> <i>End Depth: 24'</i> <i>Target Depth: 23.7'</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

redo of previous 19H

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>19</i></u>	Trawl #: <u><i>H1</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clam</i>		<i>7.3</i>
<i>moon snails</i>	<i>NA</i>	<i>2</i>
<i>razor clam</i>	<i>NA</i>	<i>9</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>10</i>	<i>60</i>
Total Number of Organisms Collected: <i>84</i>		
Comments/Observations:		
<i>2 moon snails</i>		
<i>9 razor clams (small ~ 4")</i>		
<i>3 Broken Surf clams</i>		

Redo of previous 19H

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>		
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>		
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>		
Transect #: <u> 19 </u>	Recorded By: <u> MRF </u>			
Tow #: <u> J </u>	Date: <u> 12/16/06 </u>			
PSI of Dredge: <u> 55 </u>	Water Depth (ft): <u> See Below </u>			
Width of Dredge: <u> 30" W x 15" H </u>	Sea State: <u> ~1' </u>			
Catch Bag Size: <u> ~12 Bushels </u>	Wind: <u> NW ~15 </u>			
Tow Data				
 				
<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;"> NS0611BD Station Log Survey: NS061 Station: 19JB Light Red 12/16/2006 11:00:27 AM Depth: - -70.85416 42.27808 </td> <td style="width:50%; border: none;"> NS0611BE Station Log Survey: NS061 Station: 19JB Light Yellow 12/16/2006 11:01:00 AM Depth: - -70.85388 42.27773 </td> </tr> </table>			NS0611BD Station Log Survey: NS061 Station: 19JB Light Red 12/16/2006 11:00:27 AM Depth: - -70.85416 42.27808	NS0611BE Station Log Survey: NS061 Station: 19JB Light Yellow 12/16/2006 11:01:00 AM Depth: - -70.85388 42.27773
NS0611BD Station Log Survey: NS061 Station: 19JB Light Red 12/16/2006 11:00:27 AM Depth: - -70.85416 42.27808	NS0611BE Station Log Survey: NS061 Station: 19JB Light Yellow 12/16/2006 11:01:00 AM Depth: - -70.85388 42.27773			
 				
<table style="width:100%; border: none;"> <tr> <td style="width:50%; border: none;"> NS0611BF Station Log Survey: NS061 Station: 19JB Light Green 12/16/2006 11:07:51 AM Depth: - -70.85313 42.27705 </td> <td style="width:50%; border: none;"> NS0611C0 Station Log Survey: NS061 Station: 19JB Light Blue 12/16/2006 11:07:53 AM Depth: - -70.85313 42.27705 </td> </tr> </table>			NS0611BF Station Log Survey: NS061 Station: 19JB Light Green 12/16/2006 11:07:51 AM Depth: - -70.85313 42.27705	NS0611C0 Station Log Survey: NS061 Station: 19JB Light Blue 12/16/2006 11:07:53 AM Depth: - -70.85313 42.27705
NS0611BF Station Log Survey: NS061 Station: 19JB Light Green 12/16/2006 11:07:51 AM Depth: - -70.85313 42.27705	NS0611C0 Station Log Survey: NS061 Station: 19JB Light Blue 12/16/2006 11:07:53 AM Depth: - -70.85313 42.27705			
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, A. Cosra, P. Quintal, T. Randall</i>				
Comments: <i>Begin Depth: 23'</i> <i>End Depth: 22'</i> <i>Target Depth: 23.16'</i>				
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.				

redo of previous 195

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u>12/16/06</u>	Recorded By: <u>MBF</u>	
Transect #: <u>19</u>	Trawl #: <u>J</u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>Surf Clams</i>	<i>1</i>	<i>22⁰ 73</i>
<i>RAZOR Clams</i>	<i>NA</i>	<i>4</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>1</i>	<i>16</i>	<i>52</i>
Total Number of Organisms Collected: <i>77</i>		
Comments/Observations: <i>4 razor clams</i> <i>4 Broken Surf clams</i>		

① *WN MBF 12/16/06*

Redo of previous 19J

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>

Transect #:	<i>25</i>	Recorded By:	<i>MRF</i>
Tow #:	<i>0</i>	Date:	<i>12/16/06</i>
PSI of Dredge:	<i>60</i>	Water Depth (ft):	<i>See Below</i>
Width of Dredge:	<i>30"</i>	Sea State:	<i>~1'</i>
Catch Bag Size:	<i>~12 Bushels</i>	Wind:	<i>NW ~10-15</i>

<p>Tow Data</p>  <p>NS0611C3 Station Log Survey: NS061 Station: 25OB Light Red 12/16/2006 11:22:21 AM Depth: - -70.84773 42.27667</p> <hr/>  <p>NS0611C5 Station Log Survey: NS061 Station: 25OB Light Green 12/16/2006 11:32:09 AM Depth: - -70.84666 42.27587</p>	 <p>NS0611C4 Station Log Survey: NS061 Station: 25OB Light Yellow 12/16/2006 11:22:56 AM Depth: - -70.84727 42.27657</p> <hr/>  <p>NS0611C6 Station Log Survey: NS061 Station: 25OB Light Blue 12/16/2006 11:32:11 AM Depth: - -70.84665 42.27588</p>
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Crew Members: *Lynda Short, M. Walsh, M. Fitzpatrick, A. Costa, P. Quintal, T. Randall*

Comments:
Begin Depth: 29'
End Depth: 29'
Target Depth: ~~28.~~ 28.58' (repositioned)

Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #:	<i>G606425</i>
Location: <i>Hull, MA</i>	Vessel:	<i>Andy Lynn VI</i>
Client: <i>USACE</i>	Chief Scientist:	<i>Lynda Short</i>
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>M.R.F</i></u>	
Transect #: <u><i>25</i></u>	Trawl #: <u><i>0</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
<i>surf clam</i>	<i>2 1/4</i> <i>1 1/6</i>	<i>5</i>
<i>Razor Clam</i>	<i>NA</i>	<i>1</i>
<i>Sand Crab</i>	<i>NA</i>	<i>1</i>
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
<i>0</i>	<i>1</i>	<i>3</i>
Total Number of Organisms Collected: <i>7</i>		
Comments/Observations:		
<i>1 Broken surf clam</i> <i>1 Razor clam</i> <i>1 Sand crab</i>		

© WU & S. 12/16/06

**APPENDIX A-3
Tow Log Form**

Battelle <small>The Business of Innovation</small>	Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>
	Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>
	Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>
Transect #: <u>25</u>	Recorded By: <u>MRF</u>	
Tow #: <u>Q</u>	Date: <u>12/16/06</u>	
PSI of Dredge: <u>—</u>	Water Depth (ft): <u>See Below</u>	
Width of Dredge: <u>30"</u>	Sea State: <u>~1'</u>	
Catch Bag Size: <u>—</u>	Wind: <u>NW 10-15</u>	
<u>Tow Data</u>		
Start Tow		
Time:		Label: <u>—</u>
Latitude: <u>—</u>		
Longitude: <u>—</u>		
End Tow		
Time:		Label: <u>—</u>
Latitude: <u>—</u>		
Longitude: <u>—</u>		
* All coordinates are recorded in NAD 83 decimal degrees		
Crew Members: <i>L. Short, M. Walsh, M. Fitzpatrick, R. Costa, P. Quibral, T. Randall</i>		
Comments: <i>Begin Depth: —</i> <i>End Depth: —</i> <i>target Depth: —</i>		
Note: See Shellfish Data Form for further information on measurement lengths and numbers of individuals.		

Rocky area - NOT doing tow per discussion w/ T. Randall

APPENDIX A-4

Shellfish Measurement Data Form

Battelle <small>The Business of Innovation</small>		
Project Name: <i>Nantasket Surf Clam Survey</i>	Project #: <i>G606425</i>	
Location: <i>Hull, MA</i>	Vessel: <i>Andy Lynn VI</i>	
Client: <i>USACE</i>	Chief Scientist: <i>Lynda Short</i>	
Date: <u><i>12/16/06</i></u>	Recorded By: <u><i>MRF</i></u>	
Transect #: <u><i>25</i></u>	Trawl #: <u><i>G</i></u>	
Species Data		
Species	Number of Bushels	Count per Bushel
—	—	—
Surf Clam Measurements		
All Surf Clams are measured and divided into 3 class sizes: <3 inches, 3-5 inches, and >5 inches in length.		
Total Number Less than 3 inches	Total Number 3-5 inches	Total Number Greater than 5 inches
—	—	—
Total Number of Organisms Collected: <u>—</u>		
Comments/Observations:		
<i>Tow wasn't collected due to rocks in area</i>		