US ARMY CORPS
OF ENGINEERS
New England District

Contract No. DACW33-01-D-0004
Delivery Order No. 02
April 9, 2003

Final Survey and Data Report

FALL 2002
LOBSTER SURVEY

RHODE ISLAND REGION LONG-TERM DREDGED MATERIAL DISPOSAL SITE EVALUATION PROJECT

FINAL SURVEY AND DATA REPORT

Fall 2002 Lobster Survey

Rhode Island Region
Long-Term Dredge Material Disposal Site Evaluation Project

Contract Number DACW33-01-D-0004
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to

U.S. Army Corps of Engineers
North Atlantic Division
New England District
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1.0 INTRODUCTION

As part of the Rhode Island Region Long-Term Dredged Material Disposal Site Evaluation Project, Battelle conducted a lobster survey from October 22 through October 29, 2002 of four locations in Rhode Island Sound (Sites 16, 18, 69A and 69B). This is the second lobster survey conducted under this Project in an attempt to characterize lobster resources in terms of abundance, size ranges, sex, and extent of chitinoclasia (shell disease). The initial survey, conducted from July 30, 2002 through August 3, 2002 at the same 4 sites, also included collection of lobster for chemical analysis of tissues.

The methods employed in both surveys were similar. For this survey, a total of 120 lobster traps (30 at each of the four proposed sites) were deployed. On October 22, thirty lobster pots (15 vented and 15 un-vented) were deployed at Site 69A. Thirty pots (15 vented and 15 un-vented) were also deployed at Site 69B. All pots were successfully recovered from Sites 69A and 69B on October 25, 2002 and redeployed at Sites 16 and 18. Lobster pots from Sites 16 and 18 were recovered on October 29, 2002. All lobsters collected during this operation were counted, sexed, examined for shell disease, V-notching, and other anomalies, and returned to the ocean. Mobilization for the survey was accomplished on October 21.

The activities performed during mobilization, trap deployment, trap recovery, and on board characterization are described below under survey methods. This report describes daily survey activities and provides a summary of lobster abundance, sex, carapace length, and extent of shell disease. Survey methods are described in Section 2. A chronological summary of survey activities and observations is provided in Section 3. Section 4 presents preliminary survey results and compares results of this survey to the initial lobster survey conducted July-August, 2002. Survey problems encountered, corrective actions taken, and recommendations for future surveys are described in Section 5.

2.0 SURVEY METHODS

Sampling and analytical methods are described in the Final Quality Assurance Project Plan (QAPP) Rhode Island Region Disposal Site Study (Battelle, 2001). Details of the sampling methods for this survey are described in the section below.

2.1 Methods

The F/V *Mister G*, owned and operated by Captain Michael Marchetti, served as the sampling platform during the survey. During trap deployment on October 22, the scientific crew included Mr. Wayne Trulli and Mr. Robert Mandeville from Battelle. During recovery on October 25, the scientific crew included Mr. Wayne Trulli and Mr. Robert Mandeville of Battelle, Mr. Michael Keegan of the U. S. Army Corps of Engineers (the Corps), and Mr. Thomas Angell of the State of Rhode Island Department of Environmental Management (RIDEM). During recovery on October 29, the scientific crew included Mr. Wayne Trulli and Mr. Chris Gagnon of Battelle, Mr. Michael Keegan of the U. S. Army Corps of Engineers, and Mr. Scott Olszewski of the RIDEM. Survey personnel are listed in Table 1. The entire survey consisted of several phases

including mobilization, navigation, trap deployment, trap recovery and characterization. Each of these phases is described below.

Table 1. Survey Personnel for Lobster Trawl Deployments in Rhode Island Sound during the Fall 2002 Lobster Survey, October 22 through October 29, 2002.

Activity: / Date: / Port:	Deployment / Tues 10/22 / Point Judith	Recover and Re-deploy / Mon 10/25 / Point Judith	Recover and Demobilization / Wed 10/29 / Point Judith
Battelle Staff			
Chief Scientist	W. Trulli	W. Trulli	C. Gagnon
NavSam© Operator	R. Mandeville	R. Mandeville	W. Trulli
Contractors			
F/V *Mister G*	M. Marchetti	M. Marchetti	M. Marchetti
F/V *Mister G*	D. Harrington	D. Harrington	D. Harrington
Other Scientists			
USACE		M. Keegan	M. Keegan
RIDEM		T. Angell	S. Olszewski

Mobilization: Activities conducted one day prior to trap deployment consisted of the following:

- Rigging 60 pots with bridles that attached to the ground lines. This consisted of back-splicing the bridles to the pots.
- Rigging the groundlines, buoys, and up-and-down lines for all 60 pots. Fifteen trawls consisting of six pots, alternating vented and un-vented – three of each type in each trawl, were rigged for the study.
- Baiting each trap with skate or red hake.
- Loading and stacking the pots on the vessel.

Deployment: On October 22, five, six-trap trawls were deployed at Site 69A and Site 69B. All ten trawls were deployed in a single day. On October 25, the five, six-trap trawls hauled from Site 69A and 69B were redeployed at Site 16 and Site 18. One trawl was deployed in each of the four corners as well as in the center of each site. Trawls were rigged with alternating vented and un-vented lobster pots. Vented pots are normally used by lobstermen to allow juveniles to escape and enhance their chance of survival and growth to legal sized adult lobsters. Un-vented pots were used for this study to capture juvenile lobsters and study the resource in terms of abundance of those juveniles. Each trawl was oriented along a northeast to southwest track, which conformed to the orientation of other lobster trawls in the area. Table 2 lists the start and end times and coordinates for each trawl deployed. Figure 1 shows a map of the sites that were surveyed. Figures 2 through 5 show the location of the trawl lines for each Sites 16, 18, 69A and 69B respectively.

Table 2. Summary Field Data for Lobster Trawl Deployments in Rhode Island Sound during the Fall 2002 Lobster Survey, October 22 through October 29, 2002.

Site	Trawl#	Date	Time	Start Location Lat/Long	Finish Location Lat/Long	Depth (Ft.)
69B	1	10/22/2002	1353	41º14.158'N 71º22.300'W	41º14.045'N 71º22.354'W	119
69B	2	10/22/2002	1401	41º13.500'N 71º22.517'W	41º13.577'N 71º22.475'W	118
69B	3	10/22/2002	1407	41º13.768'N 71º23.043'W	41º13.883'N 71º23.004'W	118
69B	4	10/22/2002	1415	41º13.477'N 71º23.327'W	41º13.527'N 71º23.299'W	118
69B	5	10/22/2002	1421	41º14.109'N 71º23.316'W	41º14.196'N 71º23.285'W	117
69A	1	10/22/2002	1447	41º15.020'N 71º19.106'W	41º15.107'N 71º19.063'W	114
69A	2	10/22/2002	1453	41º14.579'N 71º19.061'W	41º14.653'N 71º19.010'W	117
69A	3	10/22/2002	1459	41º14.780'N 71º19.716'W	41º14.863'N 71º19.672'W	116
69A	4	10/22/2002	1505	41º15.112'N 71º20.174'W	41º15.201'N 71º20.112'W	114
69A	5	10/22/2002	1512	41º14.490'N 71º20.146'W	41º14.565'N 71º20.120'W	110
18	1	10/25/2002	1058	41º17.284'N 71º17.494'W	41º17.356'N 71º17.426'W	118
18	2	10/25/2002	1105	41º16.827'N 71º17.448'W	41º16.903'N 71º17.414'W	118
18	3	10/25/2002	1111	41º17.191'N 71º18.062'W	41º17.277'N 71º18.003'W	123
18	4	10/25/2002	1116	41º17.436'N 71º18.647'W	41º17.518'N 71º18.595'W	112
18	5	10/25/2002	1123	41º16.873'N 71º18.599'W	41º16.961'N 71º18.538'W	119
16	1	10/25/2002	1418	41º23.335'N 71º18.555'W	41º23.434'N 71º18.495'W	82
16	2	10/25/2002	1423	41º23.915'N 71º18.191'W	41º24.004'N 71º18.139'W	98
16	3	10/25/2002	1431	41º23.535'N 71º17.178'W	41º23.609'N 71º17.126'W	93
16	4	10/25/2002	1440	41º23.361'N 71º18.130'W	41º23.443'N 71º18.084'W	90
16	5	10/25/2002	1448	41º23.101'N 71º17.667'W	41º23.198'N 71º17.612'W	99

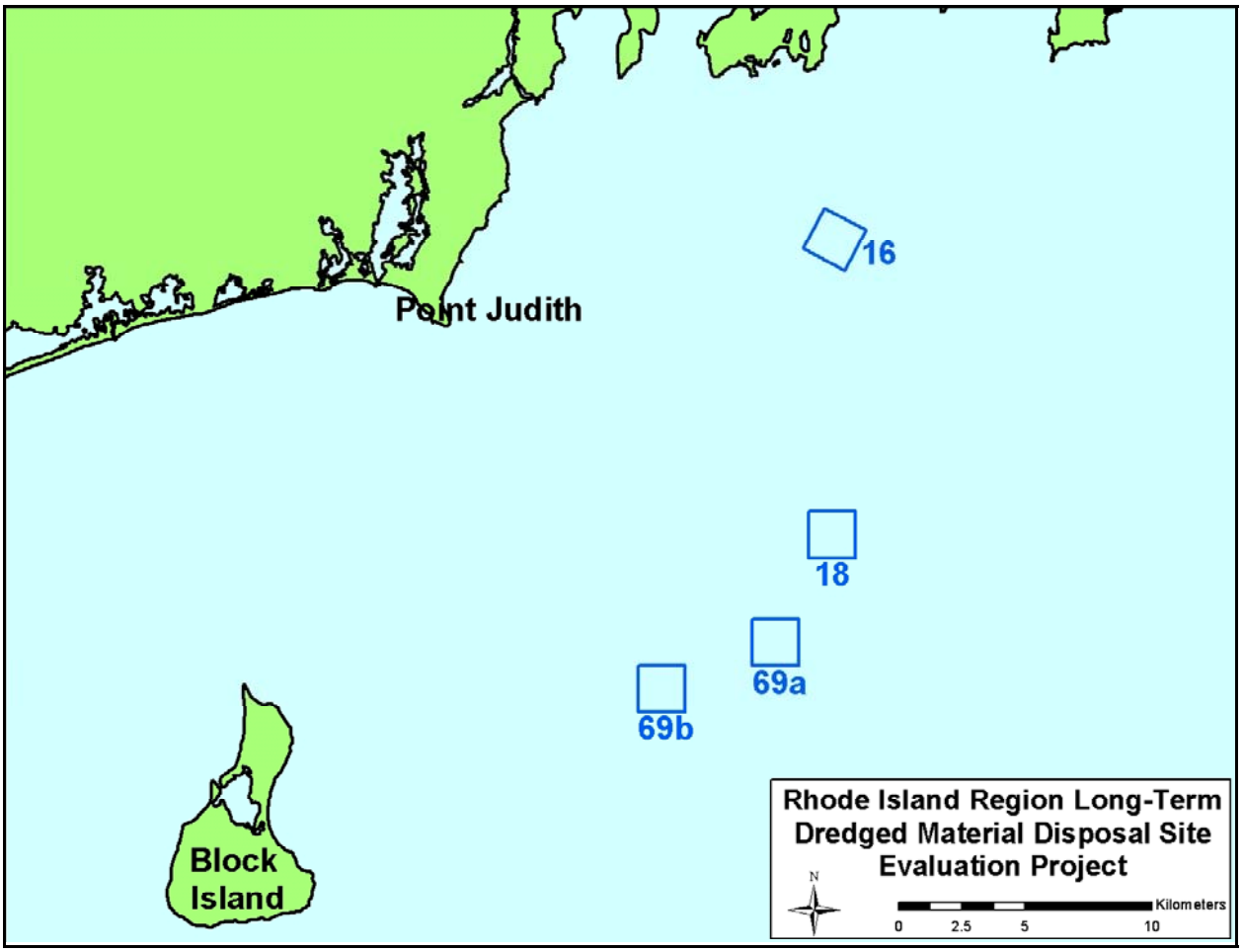

Figure 1. Location of the Areas Sampled for Lobster in Rhode Island Sound During the Fall 2002 Lobster Survey, October 22 through October 29, 2002.

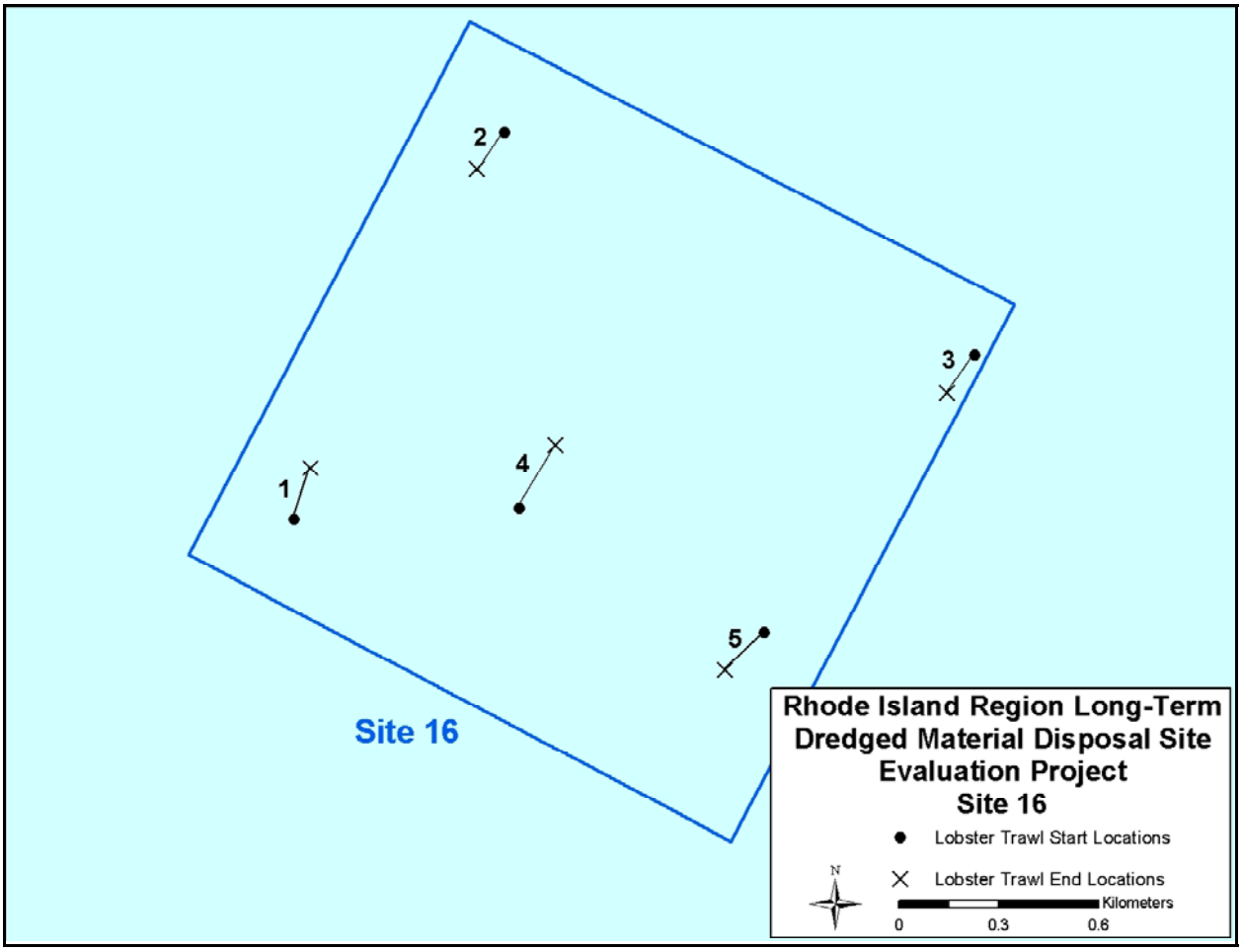

Figure 2. Location of Lobster Pot Trawls Within Site 16.

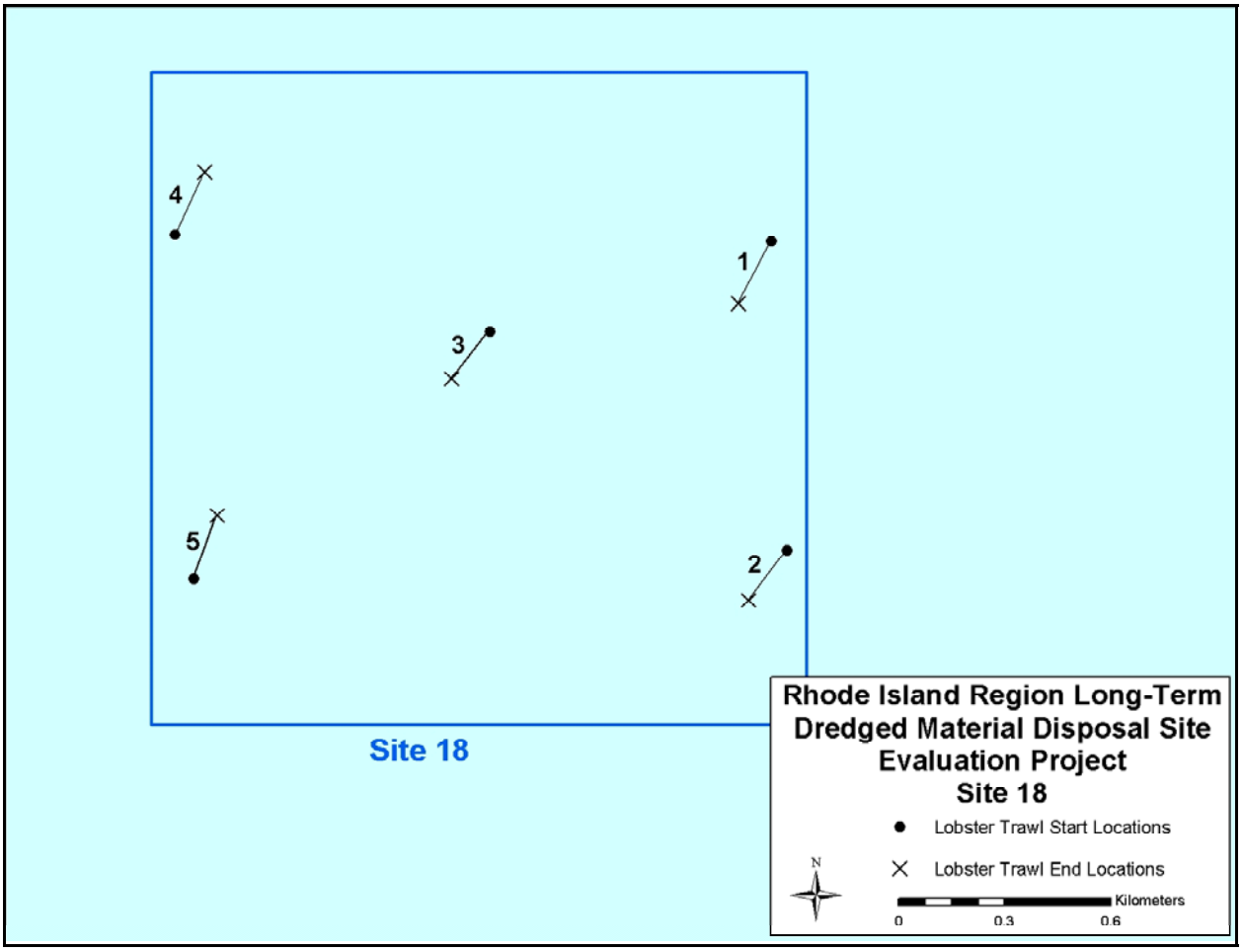

Figure 3. Location of Lobster Pot Trawls Within Site 18.

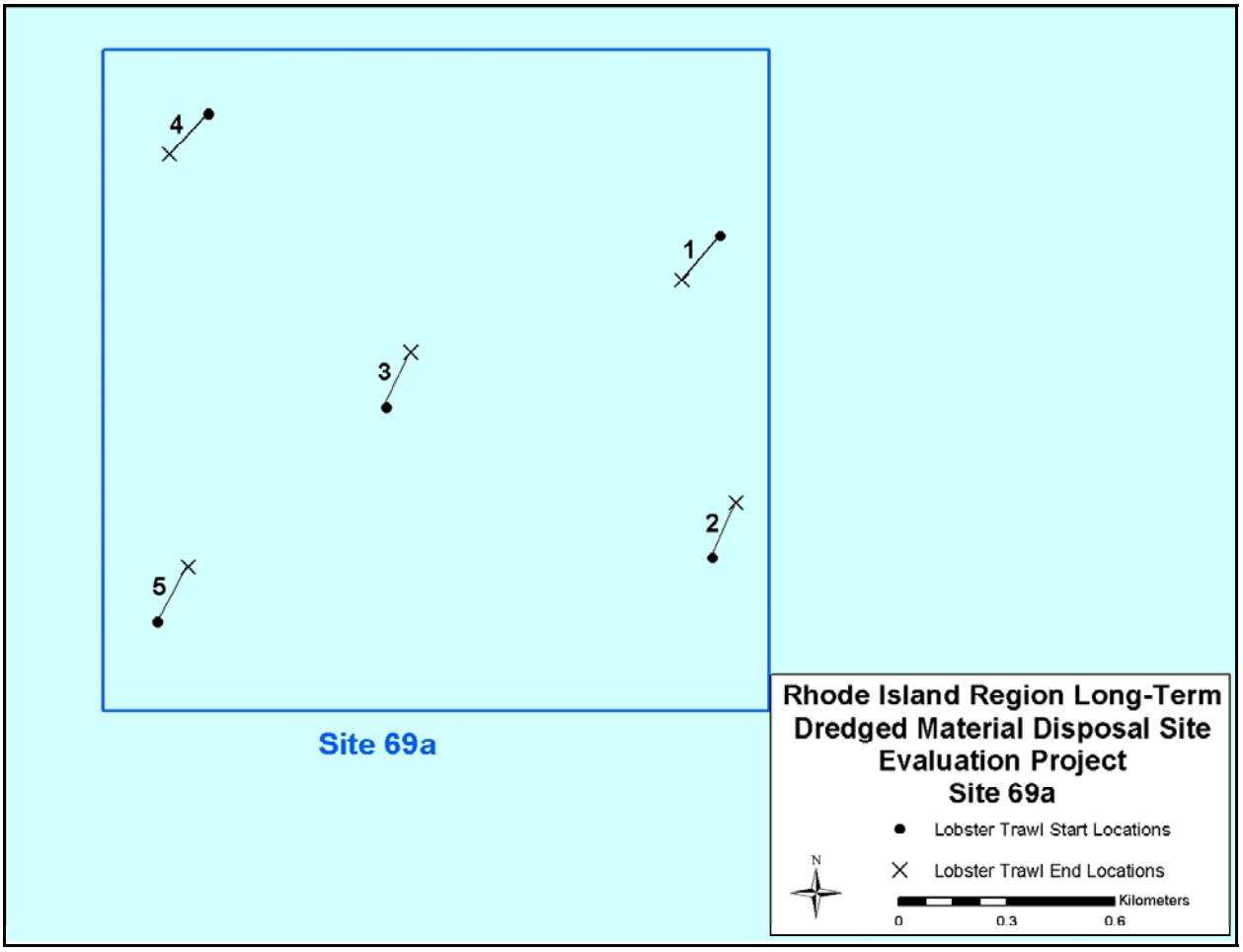

Figure 4. Location of Lobster Pot Trawls Within Site 69A.

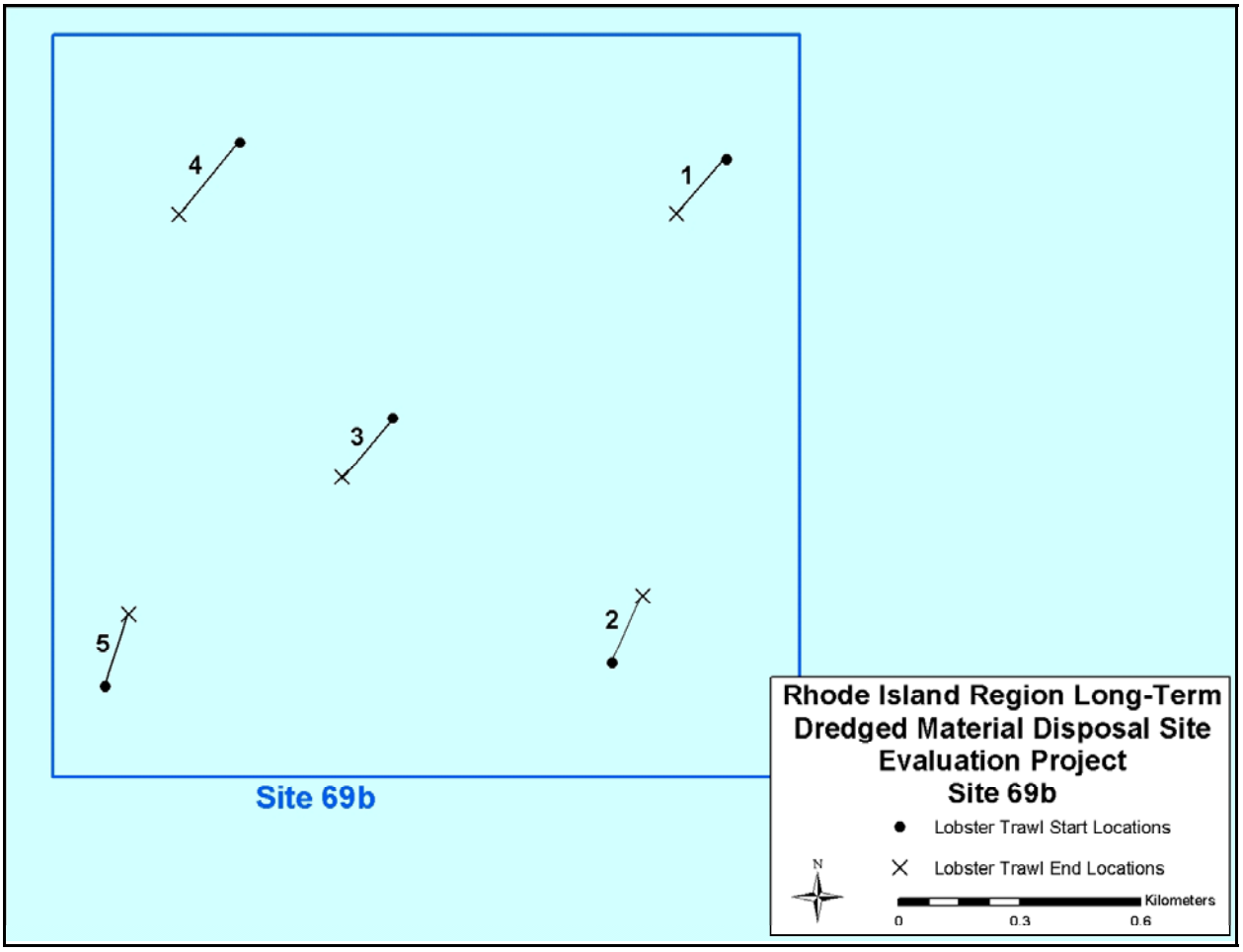

Figure 5. Location of Lobster Pot Trawls Within Site 69B.

Upon arrival at each location within a site, the surface buoys of the first six-trap trawl were attached to the up-down lines. As the vessel made weigh, the first buoy was released at the stern of the vessel and the attached up-down line was allowed to straighten prior to deployment of the first trap in the trawl. Upon a signal from the captain, the first trap in each trawl was deployed and the latitude/longitude coordinates were recorded in NavSam©. The ground line (approximately 100 m long) between the first and second trap was allowed to run and pull the second trap into the water. This process continued until the last trap in the trawl was deployed. When the last trap in the trawl entered the water, the latitude/longitude coordinates were again recorded in NavSam© to mark the end of the trawl. This process was repeated for each of the five trawls deployed at each of the four sites.

All trawls were set for three days on each site. It was determined in discussions among EPA, the Corps, Battelle, and Mike Marchetti that three days was the optimum set time to afford the greatest catch size and minimize cannibalism among the lobsters, particularly cannibalism by adults on juveniles in the un-vented pots.

Recovery and On-board Processing: On October 25 and October 29, 2002, lobster pots were recovered following the three-day set period. Lobster pots at Sites 69A and 69B were recovered on October 25 and pots at Sites 16 and 18 were recovered on October 29. Pots were recovered by capturing one of the floats tied to the up-down line and hauling the line and attached pots to the gunwale of the vessel using a pot hauler. All lobsters were removed from each individual trap by hand and stored in bins until they could be processed. Processing involved measuring carapace length of each individual, sexing, and examining for shell disease, V-notching and other surficial anomalies. All by-catch (including crabs and fish) harvested along with lobsters from the individual pots were identified, counted, recorded, and discarded. Measurements, sexing, and further examination of by-catch were not required.

On October 25, Mr. Tom Angell of the RIDEM performed all carapace measurements, sexing, and examinations for shell disease, V-notching, shell hardness, cull status, and surficial damage in accordance with the methods routinely used on lobster surveys for the State of Rhode Island. On October 29, Mr. Scott Olszewski of RIDEM performed this task. All field data were recorded both by hand and tape recorder. Processing methods are provided below:

Carapace length for each lobster (including juveniles) was determined by measuring the length from the posterior of the eye-socket to the end of the carapace where the tail begins. These measurements and inspections were made as soon as possible after capture to improve the chances for organism survival. [Note: measurements and inspections are identical with commercial practice]. Measurements were made to the nearest 1mm using a metric ruler.

Sexing was performed by examining the first pair of modified swimmerets on the tail of each lobster. A long stiff pair of swimmerets is indicative of a male lobster and a soft feathery pair is indicative of a female.

V-notching of legal sized berried female lobsters has been conducted by fisheries staff and lobstermen over the past several years as a means to protect the resource. Current regulation prohibits the taking of V-notched individuals. V-notching is done using a special tool that notches the telson (tail) of appropriate individuals. The lobsters are released back into the

environment and cannot be harvested until the notch reaches a size of approximately 0.25 in. following several molts. During this study, V-notched status was recorded, and all notched individuals were returned to the environment.

Other surficial anomalies such as cull status and surficial damage (other than due to shell disease) were recorded on the survey field log forms but not transferred to the database table (this information was not required in the scope of work). Survey field logs can be provided on request by Battelle.

Percent chitinoclasia (shell disease) was determined by estimating the range of coverage on each individual lobster. All specimens were examined for signs of disease, which was noted in the field log. Gross signs of the disease are similar in all crustacean species; the exoskeleton is pitted and marred with necrotic lesions. Also, weak or soft parts found on an otherwise apparently healthy lobster's shell is often indicative of shell disease. The shell disease index developed in 2000 and briefly described below was be used to assess shell disease for individual lobster. This index is based on the percent shell coverage of disease symptoms (pitting, erosions, lesions) on the total surface area of the lobster. The index includes the following categories: 0 = No shell disease symptoms; 1 = Shell disease symptoms on 1 to 10% of the shell surface; 2 = Shell disease symptoms on 11 to 50% of the shell surface; 3 = Shell disease symptoms on more than 50% of the shell surface; and 4 = New shell shows scars of a shell erosion from the previous shell.

2.2 Deviations

Due to rough seas on October 28, 2002 the final collection day was postponed one day until October 29, 2002.

3.0 SURVEY CHRONOLOGY

Tuesday, October 22, 2002 – Deployment Sites 69A and 69B

0900 Depart Battelle Duxbury for Snug Harbor, Jerusalem, RI
1115 Arrive at F/V *Mister G* and mobilize navigation equipment.
1237 Perform navigation calibration.
1240 Depart dock for Site 69B.
1353 Site 69B -Trawl 1 deployment started. Western corner of site.
1401 Site 69B - Trawl 2 deployment started. Northern corner of site.
1407 Site 69B - Trawl 3 deployment started. Eastern corner of site.
1415 Site 69B - Trawl 4 deployment started. Center of site.
1421 Site 69B - Trawl 5 deployment started. Southern corner of site.
1422 Depart Site 69B for Site 69A.
1447 Site 69A - Trawl 1 deployment started. NE corner of site.
1453 Site 69A - Trawl 2 deployment started. SE corner of site.
1459 Site 69A - Trawl 3 deployment started. Center of site.
1505 Site 69A - Trawl 4 deployment started. NW corner of site.
1512 Site 69A - Trawl 5 deployment started. SW corner of site.

1514 Depart Site 69A for Snug Harbor.
1640 Arrive dock. Depart for Battelle

Friday, October 25, 2002 – Recovery Sites 69A and 69B, Redeployment Sites 16 and 18

0700 Arrive at F/V *Mister G* and mobilize navigation equipment.
0740 Perform navigation check. Depart for Site 69B.
0857 Site 69B - Trawl 5 recovery started.
0911 Site 69B - Trawl 3 recovery started.
0926 Site 69B - Trawl 4 recovery started.
0948 Site 69B - Trawl 2 recovery started.
1010 Site 69B - Trawl 1 recovery started.
1025 Depart Site 69B for Site 18.
1058 Site 18 - Trawl 1 deployment started. NE corner of site.
1105 Site 18 - Trawl 2 deployment started. SE corner of site.
1111 Site 18 - Trawl 3 deployment started. Center of site.
1116 Site 18 - Trawl 4 deployment started. NW corner of site.
1123 Site 18 - Trawl 5 deployment started. SW corner of site.
1125 Depart Site 18 for Site 69A.
1139 Site 69A - Trawl 1 recovery started.
1205 Site 69A - Trawl 2 recovery started.
1233 Site 69A - Trawl 3 recovery started.
1249 Site 69A - Trawl 5 recovery started.
1311 Site 69A - Trawl 4 recovery started.
1320 Depart Site 69A for Site 16.
1418 Site 16 - Trawl 1 deployment started. NE corner of site.
1423 Site 16 - Trawl 2 deployment started. SE corner of site.
1431 Site 16 - Trawl 3 deployment started. Center of site.
1440 Site 16 - Trawl 4 deployment started. NW corner of site.
1448 Site 16 - Trawl 5 deployment started. NW corner of site.
1450 Depart Site 16 for Snug Harbor.
~1550 Depart Snug Harbor for Battelle.

Tuesday October 29, 2002 – Recovery Sites 16 and 18

0700 Arrive at F/V *Mister G* and mobilize navigation equipment.
0720 Perform navigation check.
0740 Depart for Site 16.
0859 Site 16 - Trawl 1 recovery started.
0925 Site 16 - Trawl 2 recovery started.
0945 Site 16 - Trawl 3 recovery started.
1015 Site 16 - Trawl 4 recovery started.
1036 Site 16 - Trawl 5 recovery started.
1045 Depart Site 16 for Site 18.
1120 Site 18 - Trawl 1 recovery started.

1140 Site 18 - Trawl 2 recovery started.
1150 Site 18 - Trawl 3 recovery started.
1205 Site 18 - Trawl 4 recovery started.
1220 Site 18 - Trawl 5 recovery started.
1230 Depart Site 18 for Snug Harbor. Survey completed.
1400 Arrived Point Judith work dock. Off-loaded lobster pots.
~1430 Depart for Battelle.

4.0 SURVEY RESULTS

4.1 Overview

All trawls and pots were recovered according to plan. Recovery of gear at Sites 16 and 18 was delayed one day due to rough seas. Table 3 summarizes all lobster data by site in terms of trap type, total numbers of lobsters collected, sex, mean carapace length, and percent chitinoclasia. Appendix A provides data by site and trap type for individual lobsters collected during the study.

During this fall survey, a total of 526 lobsters were collected. Of the 526 lobsters, 432 were females and 94 were males. Figure 6 presents the proportion of male and female lobsters collected from the four targeted sites during this survey. Female lobsters constituted the largest proportion of the total catch for any given site. The highest proportion of females was observed at Site 69A, where eighty-eight percent of the catch was female. A total of 58 V-notched females were collected in the entire catch, 11 specimens at Site 69B, 13 specimens at 69A, 25 specimens at Site 16, and 9 specimens at Site 18.

Table 3. Summary of Lobster Data (Collective by Site) Gathered During the Fall 2002 Lobster Survey in Rhode Island Sound, October 22 through October 29, 2002.

Site ID	Trap Type Un-Vented/Vented	Organisms per Site No.	Females No.	Males No.	Mean Carapace Length (mm)	CL Std. dev (mm)	Shell Disease # Organisms	Shell Disease % of Organisms
16	Un-Vented	176	141	35	76.3	6.62	80	45%
16	Vented	42	39	3	82.3	6.69	17	40%
Site 16 Totals		**218**	**180**	**38**	**77.5**	**7.03**	**97**	**44%**
18	Un-Vented	57	39	18	76.0	10.80	19	33%
18	Vented	17	14	3	81.8	4.79	4	24%
Site 18 Totals		**74**	**53**	**21**	**77.4**	**10.03**	**23**	**31%**
69A	Un-Vented	122	105	17	77.3	6.64	64	52%
69A	Vented	45	42	3	83.0	3.57	26	58%
Site 69A Totals		**167**	**147**	**20**	**78.8**	**6.47**	**90**	**54%**
69B	Un-Vented	57	43	14	77.6	6.88	28	49%
69B	Vented	10	9	1	87.6	4.96	3	30%
Site 69B Totals		**67**	**52**	**15**	**79.1**	**7.50**	**31**	**46%**
All Sites Totals		**526**	**432**	**94**	**78.1**	**6.8**	**241**	**46%**

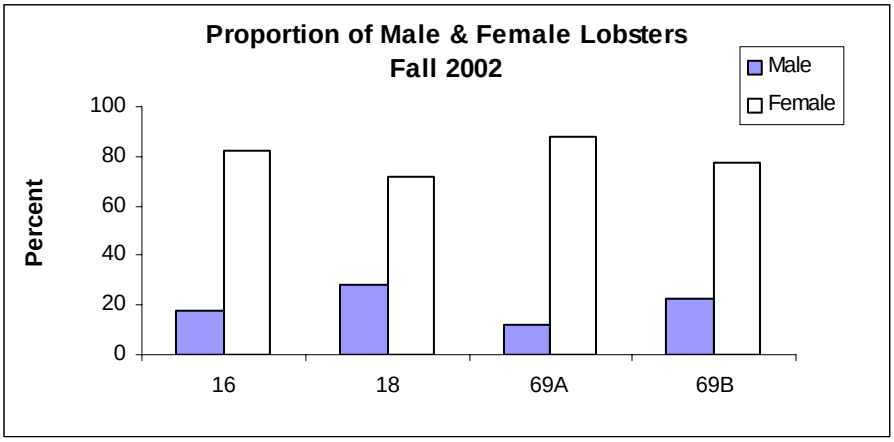

Figure 6. Proportion of the Total Lobster Catch from the Fall 2002 Lobster Survey Made Up by Females and Males.

As anticipated, the number of lobster collected also varied by trap type. More lobsters were harvested from un-vented pots than vented pots because lobsters cannot escape un-vented traps. A total of 412 lobsters (328 females and 84 males) were harvested from un-vented pots. In the vented pots, a total 114 lobsters (104 female and 10 male) were collected.

Catch Per Unit Effort (CPUE) is calculated as the number of lobsters collected per lobster pot and is used for comparisons of lobsters among the sites as opposed to total numbers of lobsters. Mean CPUE for Sites 16, 18, 69A and 69B is presented in Figure 7 for vented, un-vented, and all traps combined. As expected, CPUE is higher for un-vented traps than vented traps. Catches in

un-vented traps ranged from a low of 4.1 lobsters/trap at Site 18 to a high of 11.7 lobsters per trap at Site 16. Catches in vented traps ranged from a low of 0.7 lobsters/trap at site 69B to 2.8 lobsters/trap at Site 16.

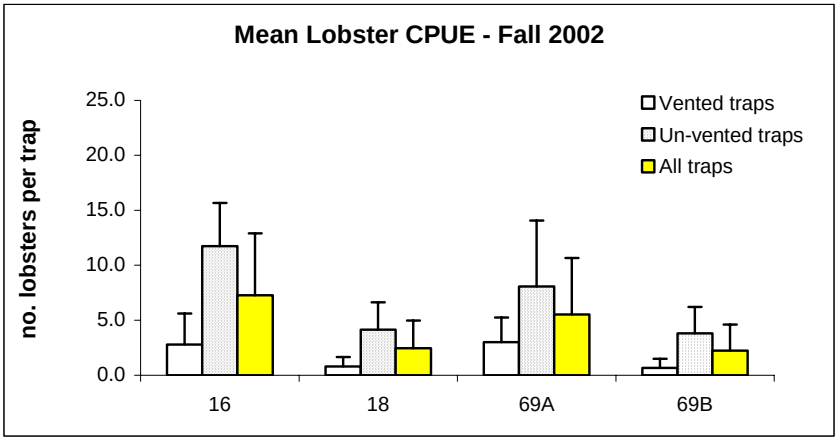

Figure 7. Mean Lobster Catch Per Unit Effort from Sites 16, 18, 69A and 69B during the Fall 2002 Lobster Survey in Rhode Island Sound.

Regardless of trap type (vented + un-vented), CPUE of lobsters is significantly different between sites (ANOVA p <0.001). Lobster CPUE in all traps (vented + un-vented) is significantly greater at Site 16 (mean CPUE = 7.3 lobsters/trap) and lowest at Site 18 (mean CPUE = 2.5 lobsters/trap) and Site 69B (mean CPUE = 2.2 lobsters/trap).

The population of lobsters collected during this fall survey ranged in size (carapace length; CL) from 53 mm CL to 94 mm CL. The overall mean carapace length was 78.1 mm CL ± 6.8 mm. There was, however, little variation in the mean carapace length among sites (Figure 8). The smallest lobsters were observed in un-vented traps from Site 18 (mean CL = 76.0 mm) and Site 16 (mean CL = 76.3 mm). The largest lobsters were collected from vented traps at Site 69B (mean CL = 87.6 mm).

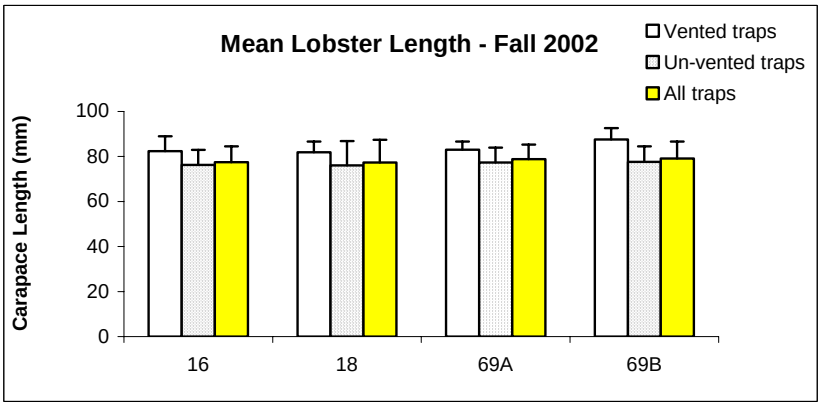

Figure 8. Mean Lengths of Lobsters Harvested from Sites 16, 18, 69A and 69B During the Fall 2002 Lobster Survey in Rhode Island Sound.

Chitinoclasia (shell disease) lesions were evident on almost one-half of the specimens (241 individuals) collected, approximately 46% during the fall survey. This included all diseased individuals as well as those with scars only and no sign of active disease. Occurrences of diseased individuals were: 119 specimens fell within shell disease Category 1 (1 to10% range); 43 occurrences fell within Category 2 (11 to 50% range); and 14 occurrences fell within Category 3, (> 50% range). There were 90 occurrences of old shell disease scars. Most of the diseased individuals were females because they tend to molt less than males and their shells experience a greater period of exposure.

4.2 Comparison with Summer 2002 Lobster Survey

The overall CPUE of lobsters was significantly less during the fall survey compared to the summer sampling effort. Combining all trap types (i.e., vented and un-vented) and sites, CPUE during the summer sampling effort was significantly greater (mean CPUE = 7.9 lobsters/trap) compared to the fall sampling effort (mean CPUE = 4.4 lobsters/trap). During the summer lobster survey, CPUE of lobsters did not vary significantly among sites (ANOVA $p > 0.05$). CPUE ranged from a high of 9.6 lobsters/trap at Site 69A to a low of 6.7 lobsters/trap at Site 16. As mentioned above, for the fall lobster survey, CPUE of lobsters did vary significantly between sites (ANOVA $p < 0.001$). In contrast to the summer survey, Site 16 showed the highest CPUE (mean CPUE = 7.3 lobsters/trap) during the fall while catches at Sites 18, 69A and 69B were lower (Figure 9). The CPUE at Site 16 however, is similar in both seasons (summer = 6.7 lobster/trap and fall = 7.3 lobsters/trap).

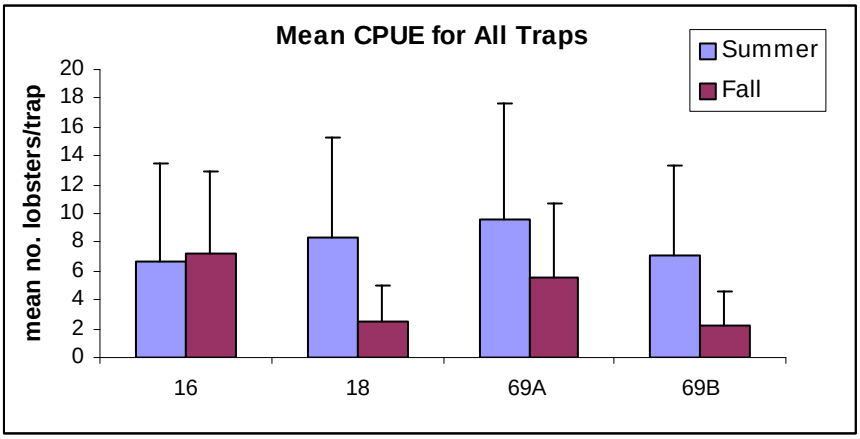

Figure 9. Mean CPUE for All Traps at Sites 16, 18, 69A and 69B for the Summer Sampling Effort and Fall Sampling Effort.

The mean size of lobsters collected during the summer and fall surveys is significantly different (t-test $p < 0001$). Combining all traps and sites, mean lobster length during the fall (78.1 mm CL) is significantly greater than the mean lobster length observed from lobsters collected during the summer effort (74.6 mm CL). Lobster size did, however, show similar patterns in both surveys (Figure 10). The overall mean size of lobsters did not vary much between sites in the summer or fall. The smallest lobsters were collected from the un-vented traps and the largest lobsters were observed in the vented traps.

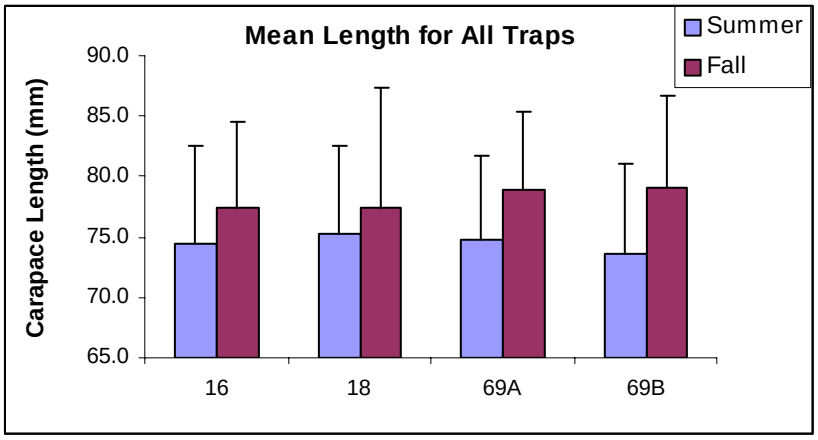

Figure 10. Mean Carapace Length of Lobsters from All Traps at Sites 16, 18, 69A and 69B during the Summer Sampling Effort and Fall Sampling Effort.

The proportion of female and male lobsters collected during the summer and fall surveys varied. Females constituted a larger percentage of the total catch for any given site for both surveys. During the fall survey, 82% of the catch was female compared to 63% of the catch during the summer survey. Of the females observed during the summer, 4% were v-notched. During the fall, 13% of the females observed were v-notched.

Shell disease was prevalent in lobsters from both surveys. During the summer, 299 lobsters (32%) of all lobsters collected contained lesions from Chitinoclasia. The proportion of lobsters observed with Chitinoclasia increased during the fall to 46% (241 of 526 lobsters)

5.0 DISCUSSION

The lobsters in the waters off Rhode Island appear to exhibit seasonal movements from more offshore areas in the mid-shelf and canyon regions to those inshore in Rhode Island Sound and Narragansett Bay (Cooper and Uzmann, 1971; Uzmann et al., 1977). As water temperatures warm during spring and summer (May through September), many offshore lobsters will begin to move into Rhode Island Sound areas, particularly to mate. As water temperatures cool in the fall and early winter, the reverse migration occurs (Fogarty *et al.*, 1980). Karnofsky *et al.* (1989) have suggested that although many lobsters do undergo migrations into more shallow waters, some inshore populations may have local residents that remain in local areas for considerable time periods.

The sampling conducted in July 2002 and then again in October 2002 cannot verify lobster migratory activities because the sampling events only provide a “snapshot” in time and space of lobster abundance and distribution. By evaluating the catch (i.e. CPUE), sex ratio and size of the lobsters at the sites, however, some inferences can be made as to lobster movements. During the July sampling, lobster catch (in vented + un-vented traps) was similar at all sites, suggesting fairly equal use of the sites by the RI lobster population. During the October sampling, however, lobster catch was lower than that observed during the summer, particularly at Sites 18,

69A and 69B. Lobster catch at Site 16, however, was similar during the July and October sampling efforts.

The similar catch (i.e., CPUE) at Site 16 during both sampling periods suggests a local resident population at this particular site, as opposed to a transient population. Lobsters may still move into and out of Site 16, but the movement in and out is continual so that lobster abundance remains essentially equal over an extended period. Additionally, the similar abundance of lobsters at this site provides evidence that the habitat at this site is sufficient to support lobsters from the July through October time frame.

The lower fall catch at Sites 18, 69A and 69B may suggest several things. First, the lower catch at these particular sites may indicate that these areas are somewhat transient for lobsters as opposed to the more "inshore" Site 16. The lobsters that move into these areas from further offshore regions during the summer months may begin moving away from them during the fall, thus resulting in the lower catches observed during the October sampling. The lower fall values may, however, also be a result of harvesting. If lobsters at these sites are continually harvested from July through October and no new lobsters are moving into the region, the lower catch in the fall would be expected.

The size of lobsters harvested from vented traps are comparable to those reported by RIDEM for lobsters in the inshore fishery in RIS from 1991 through 2001 (Angell and Olszewski, 2002). It is not appropriate to compare lobster sizes in un-vented traps since these traps were modified to sample the smaller lobsters and a mean size from these traps would be biased to smaller sizes. Evaluating mean lobster size from vented traps collected during the July and October sampling efforts may also provide insight into lobster movements. Lobsters in the offshore regions tend to be larger than inshore populations, and it is the larger lobsters that are expected to engage in the inshore-offshore migratory behaviors more readily than smaller individuals. During the July sampling, the largest lobsters were observed at Sites 16 and 18 with smaller lobsters observed at Sites 69A and 69B. These larger lobsters may have moved from the more offshore areas, as well as Sites 69A and 69B, to the more inshore sites (i.e., Sites 16 and 18). During the October sampling, the largest lobsters were observed at the more offshore sites (i.e., Sites 69A and 69B), which may suggest they were harvested while migrating out of the inshore areas to deeper offshore waters.

Lobster sizes observed at Site 16 during the July and October sampling events may also suggest a more resident population at that site. During both the July and October surveys at Site 16, mean lobster size in vented traps was similar (81.8 and 82.3 mm CL, respectively). The mean lobster size at Sites 69A and 69B during the two sampling efforts was very different, possibly indicating a more transient population of lobsters at those locations. Transient populations are likely to consist of larger lobsters and because lobsters at Sites 69A and 69B were much larger in the fall, as mentioned above, they may have been harvested while moving offshore during the fall offshore migration.

Because migratory activities to inshore areas is thought to occur, in part, for mating activities, the ratio of males to females at the sites may also provide some evidence of local or transient populations in the area. Karnofsky et al. (1989) noted that in the shallow inshore areas of Buzzards Bay, the male to female ratio for the local lobster population was approximately 2:1.

The results of the July and October, 2002 sampling efforts suggest the opposite. At all sites during both surveys, females outnumbered males. During the July survey, the sex ratio of females to males was approximately 1:1 at Sites 69A and 69B only. If lobsters, both males and females, are migrating to these sites, or are simply passing through these sites to more inshore areas to spawn, then the 1:1 ratio might be expected. During the fall, however, the ratio of females to males was very high, ranging from approximately 3:1 at Site 18 and 4:1 at Site 69A to 5:1 at Site 16 and 7:1 at Site 69B.

The large numbers of females at all these sites probably are not related to migratory activities, but may be a result of fishing practices. If any of the females caught during the earlier months contained eggs, these females were likely returned to the ocean and not harvested. Only males and non-egged females would be harvested, resulting in a reduced male (as well as non-egged female) population. Additionally, any females collected with a v-notch would be returned to the water and not harvested, thereby not depleting the female population to the extent that the male population may be depleted.

Shell disease was observed on approximately 32% of the lobsters harvested during the summer effort and on 46% of the lobsters harvested during the fall. Angell and Olszewski (2002) stated that the shell disease was noticed on lobsters in both the RI inshore and offshore areas in 1996. RIDEM monitors both the incidence as well as the severity of shell disease and have observed a dramatic increase in both incidence and severity from 1997 through 2001. The results of both the summer and fall sampling efforts support an increased observance of shell disease. In fact, the proportion of lobsters observed with lesions on the exoskeleton appears much higher than that observed by RIDEM in 2001. RIDEM calculated that approximately 17% of the lobsters observed had shell disease (Angell and Olszewski, 2002). Whether shell disease influences a lobster's local movements and/or migratory behaviors is unknown. Shell disease has been reported for both inshore and offshore populations, so evidence of shell disease in the inshore areas of RIS cannot be linked to movements of the offshore population.

In summary, the results of the summer and fall lobster surveys suggest that fewer lobsters are present at Sites 18, 69A and 69B during October than during July. The size and abundance data suggests that these areas may contain transient populations of lobsters. If local populations exist at these sites, they are low in abundance which may indicate that the habitat at the sites may not be adequate to support large densities of lobsters. Those that are caught at these locations may, in fact, be harvested during migrations through the region to more inshore areas. Lobsters at Site 16, however, may be a more resident population. It is likely that lobsters from surrounding areas move into and off the site, but the consistent catch numbers and size frequency distribution does suggest that the lobster population in July is similar to that observed in October. Because the lobsters at Site 16 population may be a more resident population, the benthic habitat at the site may be more conducive to lobsters than the benthic habitat at the other sites.

6.0 PROBLEMS EXPERIENCED AND CORRECTIVE ACTIONS

6.1 Schedule

Due to rough seas on October 28, the final collection day was postponed one day until October 29.

6.2 Technical

None.

7.0 REFERENCES

Angell, T.E. and S.D. Olzewski. 2002. Rhode Island Lobster Research and Management Project, 2001 Annual Report/Segment 2 Completion Report. February 1, 2001 – January 31, 2002. Rhode Island Division of Fish and Wildlife.

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Uzmann, J.R., R.A. Cooper, and K.J. Pecci. 1977. Migration and dispersion of tagged American lobsters, *Homarus americanus*, on the Southern New England continental shelf. U.S. Department of Commerce, NOAA Technical Report NMFS SSRF-705, 92 p.

APPENDIX A

Summary of Data on Individual Lobsters Collected During the Fall 2002 Lobster Survey

APPENDIX A

Summary of Data on Individual Lobsters Collected During the Fall 2002 Lobster Survey

Sample ID	Study	Survey	Site	Trawl No.	Pot No.	Sample No.	Sex	Carapace length (mm)	External Disease % /Category	Pot Type	Comments
RIS2L69B001	RIS	2L	69B	5	1	001	M	76	0	Non-Vented	Hard Shell
RIS2L69B002	RIS	2L	69B	5	1	002	F	81	20%/2,4	Non-Vented	Hard Shell, gravid
RIS2L69B003	RIS	2L	69B	5	2	003	M	91	0	Vented	New Shell
RIS2L69B004	RIS	2L	69B	5	2	004	F	94	4	Vented	New Shell, V-notch
RIS2L69B005	RIS	2L	69B	5	3	005	F	79	4	Non-Vented	New Shell, gravid
RIS2L69B006	RIS	2L	69B	5	5	006	M	64	1-2%/1	Non-Vented	Hard Shell
RIS2L69B007	RIS	2L	69B	5	5	007	F	80	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69B008	RIS	2L	69B	5	6	008	F	90	0	Vented	Hard Shell, v-notch
RIS2L69B009	RIS	2L	69B	5	6	009	F	90	0	Vented	Hard Shell
RIS2L69B010	RIS	2L	69B	3	1	010	F	80	1%/1	Vented	Hard Shell
RIS2L69B011	RIS	2L	69B	3	2	011	M	76	0/4	Non-Vented	New Shell
RIS2L69B012	RIS	2L	69B	3	2	012	M	70	0	Non-Vented	New Shell
RIS2L69B013	RIS	2L	69B	3	3	013	F	82.7	0	Vented	Hard Shell, v-notch
RIS2L69B014	RIS	2L	69B	3	4	014	M	61	5-10%/1	Non-Vented	New Shell
RIS2L69B015	RIS	2L	69B	3	4	015	M	74	0	Non-Vented	Hard Shell
RIS2L69B016	RIS	2L	69B	3	4	016	F	77	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B017	RIS	2L	69B	3	4	017	M	81	0	Non-Vented	New Shell
RIS2L69B018	RIS	2L	69B	3	6	018	F	87	0	Non-Vented	New Shell
RIS2L69B019	RIS	2L	69B	3	6	019	F	72	0/4	Non-Vented	New Shell
RIS2L69B020	RIS	2L	69B	3	6	020	F	78	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B021	RIS	2L	69B	4	1	021	F	77	0	Non-Vented	New Shell
RIS2L69B022	RIS	2L	69B	4	1	022	F	81	0	Non-Vented	Hard Shell
RIS2L69B023	RIS	2L	69B	4	1	023	F	71	5-10%/4,1	Non-Vented	Hard Shell
RIS2L69B024	RIS	2L	69B	4	3	024	M	73	0	Non-Vented	New Shell
RIS2L69B025	RIS	2L	69B	4	3	025	F	79	0/4	Non-Vented	New Shell, gravid
RIS2L69B026	RIS	2L	69B	4	5	026	M	79	<5%/4,1	Non-Vented	Hard Shell
RIS2L69B027	RIS	2L	69B	4	5	027	M	54	<1%/1	Non-Vented	Hard Shell
RIS2L69B028	RIS	2L	69B	2	1	028	F	81	0	Non-Vented	Hard Shell
RIS2L69B029	RIS	2L	69B	2	1	029	F	77	0	Non-Vented	New Shell
RIS2L69B030	RIS	2L	69B	2	1	030	F	82	0/4	Non-Vented	Hard Shell
RIS2L69B031	RIS	2L	69B	2	1	031	F	90	0	Non-Vented	New Shell, filled in v-notch
RIS2L69B032	RIS	2L	69B	2	1	032	F	90	0	Non-Vented	New Shell, v-notch
RIS2L69B033	RIS	2L	69B	2	1	033	F	90	5-10%/4,1	Non-Vented	New Shell, v-notch, gravid
RIS2L69B034	RIS	2L	69B	2	1	034	F	78	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69B035	RIS	2L	69B	2	1	035	F	82	0	Non-Vented	New Shell

Sample ID	Study	Survey	Site	Trawl No.	Pot No.	Sample No.	Sex	Carapace length (mm)	External Disease % /Category	Pot Type	Comments
RIS2L69B036	RIS	2L	69B	2	1	036	M	70	0	Non-Vented	New Shell
RIS2L69B037	RIS	2L	69B	2	3	037	F	77	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69B038	RIS	2L	69B	2	3	038	F	81	<10%/1	Non-Vented	Hard Shell, gravid
RIS2L69B039	RIS	2L	69B	2	3	039	F	84	<1%/1	Non-Vented	New Shell, v-notch
RIS2L69B040	RIS	2L	69B	2	4	040	F	91	0/4	Vented	New Shell, v-notch
RIS2L69B041	RIS	2L	69B	2	4	041	F	90	0	Vented	New Shell, filled in v-notch
RIS2L69B042	RIS	2L	69B	2	5	042	F	88	0/4	Non-Vented	New Shell
RIS2L69B043	RIS	2L	69B	2	5	043	F	82.7	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L69B044	RIS	2L	69B	2	5	044	F	75	<5%/4,1	Non-Vented	Hard Shell, gravid
RIS2L69B045	RIS	2L	69B	2	5	045	F	81	0	Non-Vented	New Shell
RIS2L69B046	RIS	2L	69B	2	5	046	F	77	0	Non-Vented	Hard Shell
RIS2L69B047	RIS	2L	69B	2	5	047	F	81	0	Non-Vented	Hard Shell
RIS2L69B048	RIS	2L	69B	2	5	048	F	80	0	Non-Vented	Hard Shell
RIS2L69B049	RIS	2L	69B	2	6	049	F	87	<5%/1	Vented	Hard Shell, v-notch, gravid
RIS2L69B050	RIS	2L	69B	1	2	050	F	80	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B051	RIS	2L	69B	1	2	051	F	66	0	Non-Vented	Hard Shell
RIS2L69B052	RIS	2L	69B	1	2	052	F	75	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B053	RIS	2L	69B	1	2	053	F	82.6	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B054	RIS	2L	69B	1	3	054	F	80	0	Vented	Hard Shell, gravid
RIS2L69B055	RIS	2L	69B	1	4	055	F	82	<5%/1	Non-Vented	Hard Shell, New Shell
RIS2L69B056	RIS	2L	69B	1	4	056	M	75	0	Non-Vented	New Shell
RIS2L69B057	RIS	2L	69B	1	4	057	F	81	0/4	Non-Vented	New Shell
RIS2L69B058	RIS	2L	69B	1	4	058	F	80	0	Non-Vented	New Shell
RIS2L69B059	RIS	2L	69B	1	4	059	F	76	0	Non-Vented	Hard Shell
RIS2L69B060	RIS	2L	69B	1	6	060	F	78	5%/4,1	Non-Vented	Hard Shell, gravid
RIS2L69B061	RIS	2L	69B	1	6	061	M	82	0	Non-Vented	Hard Shell
RIS2L69B062	RIS	2L	69B	1	6	062	F	76	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B063	RIS	2L	69B	1	6	063	F	78	1%/1	Non-Vented	Hard Shell
RIS2L69B064	RIS	2L	69B	1	6	064	F	86	0	Non-Vented	New Shell
RIS2L69B065	RIS	2L	69B	1	6	065	M	75	0	Non-Vented	New Shell
RIS2L69B066	RIS	2L	69B	1	6	066	F	65	0	Non-Vented	New Shell
RIS2L69B067	RIS	2L	69B	1	6	067	F	70	0	Non-Vented	New Shell, gravid
RIS2L69B068	RIS	2L	69A	1	1	068	F	80	0	Vented	New Shell
RIS2L69B069	RIS	2L	69A	1	1	069	F	89	0	Vented	New Shell
RIS2L69B070	RIS	2L	69A	1	1	070	F	88	0	Vented	Hard Shell, v-notch, gravid
RIS2L69B071	RIS	2L	69A	1	2	071	F	82	0/4	Vented	New Shell, gravid
RIS2L69B072	RIS	2L	69A	1	2	072	F	88	0/4	Vented	New Shell
RIS2L69B073	RIS	2L	69A	1	2	073	F	81	0/4	Vented	New Shell, gravid
RIS2L69B074	RIS	2L	69A	1	2	074	F	91	0	Vented	New Shell

Sample ID	Study	Survey	Site	Trawl No.	Pot No.	Sample No.	Sex	Carapace length (mm)	External Disease % /Category	Pot Type	Comments
RIS2L69B075	RIS	2L	69A	1	3	075	F	89	0	Vented	Hard Shell, v-notch, gravid
RIS2L69B076	RIS	2L	69A	1	3	076	F	81	0	Vented	Hard Shell, gravid
RIS2L69B077	RIS	2L	69A	1	3	077	F	81	0/4	Vented	Hard Shell, gravid
RIS2L69B078	RIS	2L	69A	1	3	078	F	77	0/4	Vented	New Shell
RIS2L69B079	RIS	2L	69A	1	3	079	F	92	0/4	Vented	New Shell
RIS2L69B080	RIS	2L	69A	1	3	080	F	83	0	Vented	New Shell, v-notch, gravid
RIS2L69B081	RIS	2L	69A	1	4	081	F	59	1%/1	Non-Vented	Hard Shell
RIS2L69B082	RIS	2L	69A	1	4	082	F	82.7	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L69B083	RIS	2L	69A	1	4	083	F	84	0	Non-Vented	New Shell
RIS2L69B084	RIS	2L	69A	1	4	084	F	77	0/4	Non-Vented	Hard Shell, gravid
RIS2L69B085	RIS	2L	69A	1	4	085	F	71	75%/3	Non-Vented	Hard Shell, gravid
RIS2L69B086	RIS	2L	69A	1	4	086	F	77	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69B087	RIS	2L	69A	1	4	087	F	77	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69B088	RIS	2L	69A	1	4	088	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L69B089	RIS	2L	69A	1	4	089	F	72	15%/2	Non-Vented	Hard Shell, gravid
RIS2L69B090	RIS	2L	69A	1	4	090	F	81	5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A091	RIS	2L	69A	1	4	091	F	80	0	Non-Vented	New Shell, gravid
RIS2L69A092	RIS	2L	69A	1	4	092	F	77	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A093	RIS	2L	69A	1	4	093	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L69A094	RIS	2L	69A	1	4	094	F	75	0	Non-Vented	New Shell
RIS2L69A095	RIS	2L	69A	1	5	095	F	84	0	Vented	New Shell, v-notch, gravid
RIS2L69A096	RIS	2L	69A	1	5	096	F	83.7	40-45%/4,2	Vented	Hard Shell, v-notch, gravid
RIS2L69A097	RIS	2L	69A	1	5	097	F	87	0	Vented	New Shell
RIS2L69A098	RIS	2L	69A	1	6	098	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L69A099	RIS	2L	69A	1	6	099	F	82	0	Non-Vented	Hard Shell, gravid
RIS2L69A100	RIS	2L	69A	1	6	100	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L69A101	RIS	2L	69A	1	6	101	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L69A102	RIS	2L	69A	1	6	102	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L69A103	RIS	2L	69A	1	6	103	F	74	0	Non-Vented	Hard Shell
RIS2L69A104	RIS	2L	69A	1	6	104	F	78	0/4	Non-Vented	New Shell
RIS2L69A105	RIS	2L	69A	1	6	105	F	78	0/4	Non-Vented	Hard Shell, gravid
RIS2L69A106	RIS	2L	69A	1	6	106	F	70	0	Non-Vented	Hard Shell
RIS2L69A107	RIS	2L	69A	1	6	107	F	77	0	Non-Vented	New Shell
RIS2L69A108	RIS	2L	69A	1	6	108	F	74	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A109	RIS	2L	69A	1	6	109	F	82.7	0	Non-Vented	Hard Shell, gravid
RIS2L69A110	RIS	2L	69A	1	6	110	F	78	0	Non-Vented	Hard Shell, gravid
RIS2L69A111	RIS	2L	69A	1	6	111	F	76	0	Non-Vented	Hard Shell, gravid
RIS2L69A112	RIS	2L	69A	1	6	112	F	74	0	Non-Vented	Hard Shell
RIS2L69A113	RIS	2L	69A	1	6	113	F	77	1%/1	Non-Vented	Hard Shell, gravid

Sample ID	Study	Survey	Site	Trawl No.	Pot No.	Sample No.	Sex	Carapace length (mm)	External Disease % /Category	Pot Type	Comments
RIS2L69A114	RIS	2L	69A	2	1	114	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L69A115	RIS	2L	69A	2	1	115	F	82.9	0/4	Non-Vented	New Shell, v-notch, gravid
RIS2L69A116	RIS	2L	69A	2	1	116	M	80	5%/1	Non-Vented	Hard Shell
RIS2L69A117	RIS	2L	69A	2	1	117	F	86	0/4	Non-Vented	Hard Shell
RIS2L69A118	RIS	2L	69A	2	1	118	F	77	0	Non-Vented	New Shell
RIS2L69A119	RIS	2L	69A	2	1	119	F	71	0/4	Non-Vented	Hard Shell
RIS2L69A120	RIS	2L	69A	2	1	120	F	75	0	Non-Vented	Hard Shell
RIS2L69A121	RIS	2L	69A	2	1	121	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L69A122	RIS	2L	69A	2	1	122	F	88	0/4	Non-Vented	New Shell
RIS2L69A123	RIS	2L	69A	2	1	123	F	91	0	Non-Vented	New Shell
RIS2L69A124	RIS	2L	69A	2	1	124	F	79	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A125	RIS	2L	69A	2	1	125	F	72	<5%/4,1	Non-Vented	New Shell, gravid
RIS2L69A126	RIS	2L	69A	2	1	126	F	76	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A127	RIS	2L	69A	2	1	127	M	79	0	Non-Vented	New Shell
RIS2L69A128	RIS	2L	69A	2	1	128	F	71	0	Non-Vented	Hard Shell
RIS2L69A129	RIS	2L	69A	2	1	129	M	61	15%/2	Non-Vented	Hard Shell
RIS2L69A130	RIS	2L	69A	2	1	130	F	83.1	1%/4,1	Non-Vented	v-notch, gravid
RIS2L69A131	RIS	2L	69A	2	2	131	F	82	0/4	Vented	Hard Shell
RIS2L69A132	RIS	2L	69A	2	3	132	F	79	<5%/4,1	Non-Vented	Hard Shell, gravid
RIS2L69A133	RIS	2L	69A	2	3	133	F	69	0	Non-Vented	Hard Shell, gravid
RIS2L69A134	RIS	2L	69A	2	3	134	F	77	0	Non-Vented	New Shell, gravid
RIS2L69A135	RIS	2L	69A	2	32	135	F	82	1%/1	Non-Vented	New Shell, gravid
RIS2L69A136	RIS	2L	69A	2	3	136	F	79	0	Non-Vented	New Shell, gravid
RIS2L69A137	RIS	2L	69A	2	3	137	F	87	0	Non-Vented	Hard Shell, v-notch
RIS2L69A138	RIS	2L	69A	2	3	138	F	72	0	Non-Vented	New Shell, gravid
RIS2L69A139	RIS	2L	69A	2	3	139	F	78	5%/4,1	Non-Vented	Hard Shell, gravid
RIS2L69A140	RIS	2L	69A	2	3	140	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L69A141	RIS	2L	69A	2	3	141	F	89	<5%/4,1	Non-Vented	New Shell, v-notch
RIS2L69A142	RIS	2L	69A	2	3	142	F	78	<5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A143	RIS	2L	69A	2	3	143	F	80	0/4	Non-Vented	Hard Shell, gravid
RIS2L69A144	RIS	2L	69A	2	3	144	F	78	0	Non-Vented	Hard Shell, gravid
RIS2L69A145	RIS	2L	69A	2	3	145	F	73	<5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A146	RIS	2L	69A	2	3	146	F	69	0	Non-Vented	Hard Shell, gravid
RIS2L69A147	RIS	2L	69A	2	3	147	F	76	5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A148	RIS	2L	69A	2	3	148	F	82	0/4	Non-Vented	New Shell, gravid
RIS2L69A149	RIS	2L	69A	2	3	149	F	69	0	Non-Vented	Hard Shell, gravid
RIS2L69A150	RIS	2L	69A	2	3	150	F	76	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A151	RIS	2L	69A	2	3	151	F	80	<5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A152	RIS	2L	69A	2	4	152	F	79	0	Vented	New Shell
RIS2L69A153	RIS	2L	69A	2	4	153	F	79	1%/1	Vented	Hard Shell, gravid
RIS2L69A154	RIS	2L	69A	2	4	154	F	83.6	1%/4,1	Vented	New Shell, gravid

Sample ID	Study	Survey	Site	Trawl No.	Pot No.	Sample No.	Sex	Carapace length (mm)	External Disease % /Category	Pot Type	Comments
RIS2L69A155	RIS	2L	69A	2	4	155	F	81	<5%/1	Vented	Hard Shell, gravid
RIS2L69A156	RIS	2L	69A	2	4	156	F	81	<5%/4,1	Vented	Hard Shell, gravid
RIS2L69A157	RIS	2L	69A	2	4	157	F	80	0	Vented	Hard Shell, gravid
RIS2L69A158	RIS	2L	69A	2	4	158	F	82	0	Vented	Hard Shell, gravid
RIS2L69A159	RIS	2L	69A	2	4	159	F	78	0	Vented	New Shell, gravid
RIS2L69A160	RIS	2L	69A	2	5	160	F	68	1%/1	Non-Vented	Hard Shell
RIS2L69A161	RIS	2L	69A	2	5	161	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L69A162	RIS	2L	69A	2	5	162	F	80	1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A163	RIS	2L	69A	2	5	163	F	78	0	Non-Vented	New Shell, gravid
RIS2L69A164	RIS	2L	69A	2	5	164	F	75	5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A165	RIS	2L	69A	2	5	165	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L69A166	RIS	2L	69A	2	6	166	F	80	1%/1	Vented	Hard Shell, gravid
RIS2L69A167	RIS	2L	69A	2	6	167	F	82	0	Vented	Hard Shell
RIS2L69A168	RIS	2L	69A	2	6	168	F	82.6	<5%/4,1	Vented	Hard Shell, gravid
RIS2L69A169	RIS	2L	69A	2	6	169	F	81	1%/1	Vented	Hard Shell, gravid
RIS2L69A170	RIS	2L	69A	3	1	170	M	82	0/4	Vented	New Shell
RIS2L69A171	RIS	2L	69A	3	2	171	M	74	0	Non-Vented	New Shell
RIS2L69A172	RIS	2L	69A	3	2	172	F	80	60%/3	Non-Vented	Hard Shell, gravid
RIS2L69A173	RIS	2L	69A	3	2	173	F	78	1%/4,1	Non-Vented	Hard Shell, gravid
RIS2L69A174	RIS	2L	69A	3	2	174	F	72	<5%/4,1	Non-Vented	Hard Shell
RIS2L69A175	RIS	2L	69A	3	2	175	M	76	75-80%/3	Non-Vented	Hard shell, crackback
RIS2L69A176	RIS	2L	69A	3	2	176	F	85	0	Non-Vented	v-notch
RIS2L69A177	RIS	2L	69A	3	2	177	M	79	0	Non-Vented	New Shell
RIS2L69A178	RIS	2L	69A	3	2	178	M	68	0	Non-Vented	Hard Shell
RIS2L69A179	RIS	2L	69A	3	2	179	F	61	0/4	Non-Vented	Hard Shell
RIS2L69A180	RIS	2L	69A	3	3	180	F	85	0	Vented	New Shell, v-notch
RIS2L69A181	RIS	2L	69A	3	4	181	F	89	0	Non-Vented	New Shell
RIS2L69A182	RIS	2L	69A	3	4	182	F	76	1%/4,1	Non-Vented	Gravid
RIS2L69A183	RIS	2L	69A	3	4	183	F	72	1%/1	Non-Vented	Hard Shell
RIS2L69A184	RIS	2L	69A	3	5	184	F	82	1%/1	Vented	Hard Shell, gravid
RIS2L69A185	RIS	2L	69A	3	5	185	M	87	0	Vented	New Shell
RIS2L69A186	RIS	2L	69A	3	5	186	F	82.8	15%/2	Vented	Gravid
RIS2L69A187	RIS	2L	69A	3	6	187	F	76	<1%/1	Non-Vented	Hard Shell, gravid
RIS2L69A188	RIS	2L	69A	3	6	188	F	81	0/4	Non-Vented	Hard Shell, gravid
RIS2L69A189	RIS	2L	69A	3	6	189	F	82.9	<5%/4,1	Non-Vented	New Shell
RIS2L69A190	RIS	2L	69A	3	6	190	M	76	5%/4,1	Non-Vented	Hard Shell
RIS2L69A191	RIS	2L	69A	3	6	191	M	75	0	Non-Vented	New Shell
RIS2L69A192	RIS	2L	69A	5	2	192	F	85	0	Non-Vented	New Shell
RIS2L69A193	RIS	2L	69A	5	2	193	F	90	0	Non-Vented	New Shell
RIS2L69A194	RIS	2L	69A	5	3	194	F	81	1%/4,1	Vented	Hard Shell, gravid
RIS2L69A195	RIS	2L	69A	4	4	195	M	64	60-70%/3	Non-Vented	New Shell

Sample ID	Study	Survey	Site	Trawl No.	Pot No.	Sample No.	Sex	Carapace length (mm)	External Disease % /Category	Pot Type	Comments
RIS2L69A196	RIS	2L	69A	4	4	196	M	69	5%/1	Non-Vented	Hard Shell
RIS2L69A197	RIS	2L	69A	5	6	197	F	86	0/4	Non-Vented	New Shell, gravid
RIS2L69A198	RIS	2L	69A	5	6	198	M	77	0	Non-Vented	Hard Shell
RIS2L69A199	RIS	2L	69A	5	6	199	F	57	<5%/4,1	Non-Vented	Hard Shell
RIS2L69A200	RIS	2L	69A	5	6	200	M	74	5%/1	Non-Vented	Hard Shell
RIS2L69A201	RIS	2L	69A	5	6	201	M	70	1%/4,1	Non-Vented	Hard Shell
RIS2L69A202	RIS	2L	69A	5	6	202	M	79	1%/4,1	Non-Vented	Hard Shell
RIS2L69A203	RIS	2L	69A	4	1	203	F	74	0	Non-Vented	Hard Shell
RIS2L69A204	RIS	2L	69A	4	1	204	F	78	0	Non-Vented	New Shell
RIS2L69A205	RIS	2L	69A	4	1	205	F	83.9	0	Non-Vented	New Shell
RIS2L69A206	RIS	2L	69A	4	1	206	F	82.6	0/4	Non-Vented	New Shell, v-notch
RIS2L69A207	RIS	2L	69A	4	1	207	F	74	0/4	Non-Vented	New Shell
RIS2L69A208	RIS	2L	69A	4	1	208	F	77	0	Non-Vented	Hard Shell, gravid
RIS2L69A209	RIS	2L	69A	4	1	209	F	75	0	Non-Vented	New Shell, gravid
RIS2L69A210	RIS	2L	69A	4	1	210	M	78	1%/1	Non-Vented	Hard Shell
RIS2L69A211	RIS	2L	69A	4	2	211	F	92	0	Vented	Hard Shell, gravid, v-notch
RIS2L69A212	RIS	2L	69A	4	3	212	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L69A213	RIS	2L	69A	4	3	213	F	79	0/4	Non-Vented	New Shell
RIS2L69A214	RIS	2L	69A	4	3	214	F	59	0	Non-Vented	Hard Shell
RIS2L69A215	RIS	2L	69A	4	3	215	F	94	0/4	Non-Vented	Hard Shell, v-notch
RIS2L69A216	RIS	2L	69A	4	4	216	F	82	1%/4,1	Vented	New Shell, gravid
RIS2L69A217	RIS	2L	69A	4	4	217	F	82	0	Vented	Hard Shell
RIS2L69A218	RIS	2L	69A	4	4	218	F	82	0/4	Vented	New Shell, gravid
RIS2L69A219	RIS	2L	69A	4	4	219	F	82	<5%/1	Vented	
RIS2L69A220	RIS	2L	69A	4	4	220	M	82	0/4	Vented	Hard Shell
RIS2L69A221	RIS	2L	69A	4	5	221	F	87	0/4	Non-Vented	New Shell
RIS2L69A222	RIS	2L	69A	4	5	222	F	91	5%/1	Non-Vented	Hard Shell, v-notch, gravid
RIS2L69A223	RIS	2L	69A	4	5	223	M	78	0	Non-Vented	Hard Shell
RIS2L69A224	RIS	2L	69A	4	5	224	F	69	0	Non-Vented	New Shell
RIS2L69A225	RIS	2L	69A	4	5	225	F	81	1%/1	Non-Vented	New Shell, gravid
RIS2L69A226	RIS	2L	69A	4	5	226	F	84	<5%/1	Non-Vented	Hard Shell, gravid
RIS2L69A227	RIS	2L	69A	4	5	227	F	87	0	Non-Vented	Hard Shell
RIS2L69A228	RIS	2L	69A	4	5	228	F	91	0/4	Non-Vented	Hard Shell, v-notch, gravid
RIS2L69A229	RIS	2L	69A	4	5	229	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L69A230	RIS	2L	69A	4	5	230	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L69A231	RIS	2L	69A	4	6	231	F	81	5-10%/1	Vented	Hard Shell, gravid
RIS2L69A232	RIS	2L	69A	4	6	232	F	80	0	Vented	Hard Shell, gravid
RIS2L69A233	RIS	2L	69A	4	6	233	F	82	<5%/4,1	Vented	Hard Shell, gravid
RIS2L69A234	RIS	2L	69A	4	6	234	F	82	0/4	Vented	Hard Shell, gravid
RIS2L16235	RIS	2L	16	1	1	235	F	81	50%/3	Vented	Hard Shell

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RIS2L16236	RIS	2L	16	1	1	236	F	91	50-70%/3	Vented	v-notch, gravid
RIS2L16237	RIS	2L	16	1	1	237	F	82.5	0	Vented	Hard Shell
RIS2L16238	RIS	2L	16	1	2	238	F	79	0	Non-Vented	Hard Shell
RIS2L16239	RIS	2L	16	1	2	239	F	83	0	Non-Vented	
RIS2L16240	RIS	2L	16	1	2	240	F	59	0	Non-Vented	Hard Shell
RIS2L16241	RIS	2L	16	1	2	241	F	73	30%/2	Non-Vented	Hard Shell
RIS2L16242	RIS	2L	16	1	2	242	F	82	0	Non-Vented	Hard Shell, gravid
RIS2L16243	RIS	2L	16	1	2	243	M	86	10%/1	Non-Vented	Hard Shell
RIS2L16244	RIS	2L	16	1	2	244	F	77	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16245	RIS	2L	16	1	2	245	M	57	<5%/1	Non-Vented	Hard Shell
RIS2L16246	RIS	2L	16	1	2	246	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L16247	RIS	2L	16	1	2	247	F	78	30%/2	Non-Vented	Gravid
RIS2L16248	RIS	2L	16	1	2	248	F	82	1%/1	Non-Vented	Hard Shell, gravid
RIS2L16249	RIS	2L	16	1	2	249	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L16250	RIS	2L	16	1	2	250	F	74	0	Non-Vented	Hard Shell
RIS2L16251	RIS	2L	16	1	2	251	F	58	0	Non-Vented	Hard Shell
RIS2L16252	RIS	2L	16	1	2	252	F	73	0	Non-Vented	Hard Shell, gravid
RIS2L16253	RIS	2L	16	1	3	253	F	82.9	0/4	Vented	V-notch
RIS2L16254	RIS	2L	16	1	3	254	F	88	0	Vented	Hard Shell, gravid
RIS2L16255	RIS	2L	16	1	4	255	F	77	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16256	RIS	2L	16	1	4	256	F	61	0	Non-Vented	Hard Shell
RIS2L16257	RIS	2L	16	1	4	257	F	67	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16258	RIS	2L	16	1	4	258	F	81	0	Non-Vented	Hard Shell, gravid
RIS2L16259	RIS	2L	16	1	4	259	M	74	40%/2	Non-Vented	Hard Shell
RIS2L16260	RIS	2L	16	1	4	260	F	78	0/4	Non-Vented	Hard Shell, gravid
RIS2L16261	RIS	2L	16	1	4	261	F	73	0/4	Non-Vented	Hard Shell
RIS2L16262	RIS	2L	16	1	4	262	F	77	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16263	RIS	2L	16	1	4	263	F	81	0/4	Non-Vented	Hard Shell
RIS2L16264	RIS	2L	16	1	4	264	F	81	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16265	RIS	2L	16	1	4	265	F	73	1%/4,1	Non-Vented	
RIS2L16266	RIS	2L	16	1	4	266	F	71	0	Non-Vented	Hard Shell, gravid
RIS2L16267	RIS	2L	16	1	4	267	F	70	0	Non-Vented	Hard Shell, gravid
RIS2L16268	RIS	2L	16	1	4	268	F	77	0	Non-Vented	Hard Shell, gravid
RIS2L16269	RIS	2L	16	1	4	269	F	69	0	Non-Vented	Hard Shell, gravid
RIS2L16270	RIS	2L	16	1	4	270	F	70	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16271	RIS	2L	16	1	4	271	F	83.5	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16272	RIS	2L	16	1	4	272	F	65	0	Non-Vented	Hard Shell
RIS2L16273	RIS	2L	16	1	6	273	F	71	1%/1	Non-Vented	Hard Shell
RIS2L16274	RIS	2L	16	1	6	274	F	89	0	Non-Vented	Hard Shell, gravid
RIS2L16275	RIS	2L	16	1	6	275	M	79	5%/1	Non-Vented	Hard Shell
RIS2L16276	RIS	2L	16	1	6	276	F	68	5%/1	Non-Vented	Hard Shell

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RIS2L16277	RIS	2L	16	1	6	277	F	71	50%/2	Non-Vented	New Shell, gravid
RIS2L16278	RIS	2L	16	1	6	278	F	80	0	Non-Vented	Hard Shell
RIS2L16279	RIS	2L	16	1	6	279	M	83.3	5%/1	Non-Vented	Hard Shell
RIS2L16280	RIS	2L	16	1	6	280	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L16281	RIS	2L	16	1	6	281	F	81	0	Non-Vented	Hard Shell, gravid
RIS2L16282	RIS	2L	16	1	6	282	F	76	0/4	Non-Vented	Hard Shell, gravid
RIS2L16283	RIS	2L	16	1	6	283	M	53	0	Non-Vented	Hard Shell
RIS2L16284	RIS	2L	16	1	6	284	M	63	0/4	Non-Vented	Hard Shell
RIS2L16285	RIS	2L	16	1	6	285	F	73	0	Non-Vented	Hard Shell
RIS2L16286	RIS	2L	16	1	6	286	F	80	0/4	Non-Vented	Gravid
RIS2L16287	RIS	2L	16	1	6	287	M	61	0/4	Non-Vented	Hard Shell
RIS2L16288	RIS	2L	16	1	6	288	F	61	0	Non-Vented	Hard Shell
RIS2L16289	RIS	2L	16	1	6	289	M	78	40%/4,2	Non-Vented	Hard Shell
RIS2L16290	RIS	2L	16	1	6	290	F	74	0/4	Non-Vented	Hard Shell
RIS2L16291	RIS	2L	16	2	1	291	F	81	50%/2	Non-Vented	Hard Shell, gravid
RIS2L16292	RIS	2L	16	2	1	292	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L16293	RIS	2L	16	2	1	293	M	82.5	1%/1	Non-Vented	Hard Shell
RIS2L16294	RIS	2L	16	2	1	294	F	84	1%/1	Non-Vented	Hard Shell, gravid
RIS2L16295	RIS	2L	16	2	1	295	M	61	0	Non-Vented	Hard Shell
RIS2L16296	RIS	2L	16	2	1	296	M	71	0	Non-Vented	Hard Shell
RIS2L16297	RIS	2L	16	2	1	297	F	82.7	10%/2	Non-Vented	Hard Shell
RIS2L16298	RIS	2L	16	2	1	298	M	80	0/4	Non-Vented	Hard Shell
RIS2L16299	RIS	2L	16	2	1	299	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L16300	RIS	2L	16	2	1	300	F	87	0	Non-Vented	Hard Shell
RIS2L16301	RIS	2L	16	2	1	301	F	64	0	Non-Vented	Hard Shell
RIS2L16302	RIS	2L	16	2	2	302	F	61	0	Vented	Hard Shell
RIS2L16303	RIS	2L	16	2	2	303	F	83.7	0/4	Vented	V-notch, gravid
RIS2L16304	RIS	2L	16	2	3	304	F	73	25%/2	Non-Vented	Hard Shell, gravid
RIS2L16305	RIS	2L	16	2	3	305	F	78	0	Non-Vented	Hard Shell, gravid
RIS2L16306	RIS	2L	16	2	3	306	F	86	0	Non-Vented	Hard Shell, gravid
RIS2L16307	RIS	2L	16	2	3	307	F	77	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16308	RIS	2L	16	2	3	308	F	82	0	Non-Vented	Hard Shell
RIS2L16309	RIS	2L	16	2	3	309	F	79	5%/1	Non-Vented	Hard Shell, gravid
RIS2L16310	RIS	2L	16	2	3	310	M	82	0/4	Non-Vented	Hard Shell
RIS2L16311	RIS	2L	16	2	3	311	F	78	5%/1	Non-Vented	Hard Shell, gravid
RIS2L16312	RIS	2L	16	2	3	312	F	70	1%/1	Non-Vented	Hard Shell
RIS2L16313	RIS	2L	16	2	3	313	M	66	1%/1	Non-Vented	Hard Shell
RIS2L16314	RIS	2L	16	2	4	314	F	81	0	Vented	New Shell
RIS2L16315	RIS	2L	16	2	4	315	M	87	0	Vented	New Shell
RIS2L16316	RIS	2L	16	2	4	316	F	81	40%/2	Vented	Gravid
RIS2L16317	RIS	2L	16	2	5	317	M	84	0	Non-Vented	Hard Shell

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RIS2L16318	RIS	2L	16	2	5	318	F	82	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16319	RIS	2L	16	2	5	319	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L16320	RIS	2L	16	2	5	320	F	88	0	Non-Vented	Hard Shell, gravid
RIS2L16321	RIS	2L	16	2	5	321	F	72	5%/1	Non-Vented	Hard Shell
RIS2L16322	RIS	2L	16	2	5	322	F	82	0	Non-Vented	Hard Shell, gravid
RIS2L16323	RIS	2L	16	2	5	323	F	82	0	Non-Vented	Hard Shell, gravid
RIS2L16324	RIS	2L	16	2	5	324	M	70	0	Non-Vented	Hard Shell
RIS2L16325	RIS	2L	16	2	5	325	F	80	40%/2	Non-Vented	Hard Shell
RIS2L16326	RIS	2L	16	2	5	326	F	73	0	Non-Vented	Hard Shell, gravid
RIS2L16327	RIS	2L	16	2	6	327	F	80	0	Vented	Hard Shell, gravid
RIS2L16328	RIS	2L	16	3	1	328	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L16329	RIS	2L	16	3	1	329	F	81	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16330	RIS	2L	16	3	1	330	F	81	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16331	RIS	2L	16	3	1	331	F	76	0	Non-Vented	Hard Shell, gravid
RIS2L16332	RIS	2L	16	3	1	332	F	90	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16333	RIS	2L	16	3	1	333	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L16334	RIS	2L	16	3	1	334	F	72	0	Non-Vented	Hard Shell, gravid
RIS2L16335	RIS	2L	16	3	1	335	F	76	5%/1	Non-Vented	Hard Shell, gravid
RIS2L16336	RIS	2L	16	3	1	336	F	77	5%/1	Non-Vented	Hard Shell, gravid
RIS2L16337	RIS	2L	16	3	1	337	F	78	0	Non-Vented	Hard Shell, gravid
RIS2L16338	RIS	2L	16	3	1	338	F	80	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16339	RIS	2L	16	3	1	339	F	71	0	Non-Vented	Hard Shell
RIS2L16340	RIS	2L	16	3	2	340	F	81	0	Vented	Hard Shell, gravid
RIS2L16341	RIS	2L	16	3	2	341	F	80	0	Vented	Hard Shell, gravid
RIS2L16342	RIS	2L	16	3	2	342	F	86	0	Vented	Hard Shell, gravid, v-notch
RIS2L16343	RIS	2L	16	3	2	343	F	88	0	Vented	Hard Shell
RIS2L16344	RIS	2L	16	3	3	344	F	83	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16345	RIS	2L	16	3	3	345	M	80	0	Non-Vented	Hard Shell
RIS2L16346	RIS	2L	16	3	3	346	F	81	0	Non-Vented	Hard Shell, gravid
RIS2L16347	RIS	2L	16	3	3	347	F	81	0	Non-Vented	New Shell, gravid
RIS2L16348	RIS	2L	16	3	3	348	F	86	0	Non-Vented	Hard Shell, gravid
RIS2L16349	RIS	2L	16	3	3	349	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L16350	RIS	2L	16	3	5	350	F	81	0/4	Non-Vented	Hard Shell, gravid
RIS2L16351	RIS	2L	16	3	5	351	M	73	0	Non-Vented	Hard Shell
RIS2L16352	RIS	2L	16	3	5	352	F	72	1%/1	Non-Vented	Hard Shell
RIS2L16353	RIS	2L	16	3	5	353	F	78	0	Non-Vented	Hard Shell, gravid
RIS2L16354	RIS	2L	16	3	5	354	F	81	50%/2	Non-Vented	Hard Shell, gravid
RIS2L16355	RIS	2L	16	3	5	355	F	81	0	Non-Vented	Hard Shell, gravid
RIS2L16356	RIS	2L	16	3	5	356	M	76	50%/2	Non-Vented	Hard Shell
RIS2L16357	RIS	2L	16	3	5	357	F	86	0	Non-Vented	Hard Shell

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RIS2L16358	RIS	2L	16	3	5	358	M	72	0	Non-Vented	Hard Shell
RIS2L16359	RIS	2L	16	3	5	359	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L16360	RIS	2L	16	3	5	360	F	76	50%/2	Non-Vented	Hard Shell, gravid
RIS2L16361	RIS	2L	16	3	6	361	F	86	0	Vented	Hard Shell, gravid, v-notch
RIS2L16362	RIS	2L	16	3	6	362	F	76	0	Vented	Hard Shell, v-notch, gravid
RIS2L16363	RIS	2L	16	3	6	363	F	83	0	Vented	Hard Shell, gravid
RIS2L16364	RIS	2L	16	3	6	364	F	86	0	Vented	Hard Shell, v-notch
RIS2L16365	RIS	2L	16	3	6	365	F	89	0	Vented	Hard Shell, v-notch, gravid
RIS2L16366	RIS	2L	16	3	6	366	F	85	0	Vented	Hard Shell, gravid
RIS2L16367	RIS	2L	16	3	6	367	F	86	0	Vented	Hard Shell, v-notch, gravid
RIS2L16368	RIS	2L	16	3	6	368	F	83	0/4	Vented	New Shell, gravid
RIS2L16369	RIS	2L	16	3	6	369	F	83	20%/2	Vented	Hard Shell, v-notch, gravid
RIS2L16370	RIS	2L	16	4	1	370	F	89	50%/2	Vented	Hard Shell, v-notch, gravid
RIS2L16371	RIS	2L	16	4	1	371	F	79	25%/2	Vented	Hard Shell, gravid
RIS2L16372	RIS	2L	16	4	1	372	F	82	5%/1	Vented	Hard Shell, gravid
RIS2L16373	RIS	2L	16	4	2	373	F	80	0	Non-Vented	Hard Shell
RIS2L16374	RIS	2L	16	4	2	374	F	85	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16375	RIS	2L	16	4	2	375	F	77	40%/2	Non-Vented	Hard Shell, gravid
RIS2L16376	RIS	2L	16	4	2	376	F	81	0	Non-Vented	Hard Shell, gravid
RIS2L16377	RIS	2L	16	4	2	377	F	72	0	Non-Vented	Hard Shell, gravid
RIS2L16378	RIS	2L	16	4	2	378	F	82	25%/2	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16379	RIS	2L	16	4	2	379	M	79	0	Non-Vented	Hard Shell
RIS2L16380	RIS	2L	16	4	2	380	M	79	0	Non-Vented	Hard Shell
RIS2L16381	RIS	2L	16	4	2	381	F	82	5%/1	Non-Vented	Hard Shell, gravid
RIS2L16382	RIS	2L	16	4	2	382	F	71	0	Non-Vented	Hard Shell, gravid
RIS2L16383	RIS	2L	16	4	2	383	F	81	5%/1	Non-Vented	Hard Shell
RIS2L16384	RIS	2L	16	4	2	384	F	85	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16385	RIS	2L	16	4	3	385	F	86	25%/2	Vented	Hard Shell, gravid
RIS2L16386	RIS	2L	16	4	3	386	F	83	0	Vented	Hard Shell, v-notch, gravid
RIS2L16387	RIS	2L	16	4	3	387	F	82	50%/2	Vented	Hard Shell, gravid
RIS2L16388	RIS	2L	16	4	3	388	F	88	0	Vented	Hard Shell
RIS2L16389	RIS	2L	16	4	3	389	F	88	0	Vented	Hard Shell, gravid
RIS2L16390	RIS	2L	16	4	3	390	F	82	0	Vented	Hard Shell, v-notch, gravid
RIS2L16391	RIS	2L	16	4	3	391	F	81	50%/2	Vented	Hard Shell, gravid
RIS2L16392	RIS	2L	16	4	3	392	F	83.5	0	Vented	Hard Shell, v-notch, gravid

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RIS2L16393	RIS	2L	16	4	3	393	F	59	0	Vented	Hard Shell
RIS2L16394	RIS	2L	16	4	4	394	F	85	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16395	RIS	2L	16	4	4	395	F	72	0/4	Non-Vented	Hard Shell
RIS2L16396	RIS	2L	16	4	4	396	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L16397	RIS	2L	16	4	4	397	F	70	25%/2	Non-Vented	Hard Shell, gravid
RIS2L16398	RIS	2L	16	4	4	398	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L16399	RIS	2L	16	4	4	399	F	64	0	Non-Vented	Hard Shell
RIS2L16400	RIS	2L	16	4	4	400	F	79	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16401	RIS	2L	16	4	4	401	F	74	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16402	RIS	2L	16	4	4	402	F	76	0	Non-Vented	Hard Shell
RIS2L16403	RIS	2L	16	4	4	403	F	72	0	Non-Vented	Hard Shell
RIS2L16404	RIS	2L	16	4	5	404	M	64	75%/3	Vented	Hard Shell
RIS2L16405	RIS	2L	16	4	5	405	F	82	0	Vented	Hard Shell, v-notch, gravid
RIS2L16406	RIS	2L	16	4	5	406	F	84	0	Vented	Hard Shell, gravid
RIS2L16407	RIS	2L	16	4	6	407	F	75	0	Non-Vented	Hard Shell, gravid
RIS2L16408	RIS	2L	16	4	6	408	F	76	0	Non-Vented	New Shell, gravid
RIS2L16409	RIS	2L	16	4	6	409	F	73	10%/1	Non-Vented	Hard Shell, gravid
RIS2L16410	RIS	2L	16	4	6	410	F	83	0	Non-Vented	Hard Shell, gravid
RIS2L16411	RIS	2L	16	4	6	411	F	81	0	Non-Vented	Hard Shell
RIS2L16412	RIS	2L	16	4	6	412	F	81	0	Non-Vented	Hard Shell, gravid
RIS2L16413	RIS	2L	16	4	6	413	F	82	15%/2	Non-Vented	Hard Shell, gravid
RIS2L16414	RIS	2L	16	4	6	414	F	54	0	Non-Vented	Hard Shell
RIS2L16415	RIS	2L	16	4	6	415	M	80	10%/1	Non-Vented	Hard Shell
RIS2L16416	RIS	2L	16	4	6	416	F	81	0/4	Non-Vented	Hard Shell, gravid
RIS2L16417	RIS	2L	16	4	6	417	F	82	0	Non-Vented	Hard Shell, v-notch
RIS2L16418	RIS	2L	16	4	6	418	M	75	0	Non-Vented	Hard Shell
RIS2L16419	RIS	2L	16	4	6	419	F	74	0/4	Non-Vented	Hard Shell, gravid
RIS2L16420	RIS	2L	16	4	6	420	F	75	0/4	Non-Vented	Hard Shell, gravid
RIS2L16421	RIS	2L	16	4	6	421	F	76	1%/1	Non-Vented	Hard Shell, gravid
RIS2L16422	RIS	2L	16	4	6	422	M	75	0	Non-Vented	Hard Shell
RIS2L16423	RIS	2L	16	5	1	423	F	82	25%/2	Non-Vented	Hard Shell, gravid
RIS2L16424	RIS	2L	16	5	1	424	F	80	0	Non-Vented	Hard Shell
RIS2L16425	RIS	2L	16	5	1	425	M	78	0	Non-Vented	Hard Shell
RIS2L16426	RIS	2L	16	5	1	426	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L16427	RIS	2L	16	5	1	427	F	72	50%/2	Non-Vented	Hard Shell
RIS2L16428	RIS	2L	16	5	1	428	F	67	25%/2	Non-Vented	Hard Shell, gravid
RIS2L16429	RIS	2L	16	5	1	429	M	78	15%/2	Non-Vented	Hard Shell
RIS2L16430	RIS	2L	16	5	1	430	F	78	0/4	Non-Vented	Hard Shell, gravid
RIS2L16431	RIS	2L	16	5	1	431	F	83.2	0	Non-Vented	Hard Shell, gravid
RIS2L16432	RIS	2L	16	5	1	432	M	76	0	Non-Vented	Hard Shell

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RIS2L16433	RIS	2L	16	5	1	433	M	70	75%/3	Non-Vented	Hard Shell
RIS2L16434	RIS	2L	16	5	1	434	F	81	50%/2	Non-Vented	Hard Shell, gravid
RIS2L16435	RIS	2L	16	5	1	435	F	81	15%/1	Non-Vented	Hard Shell, v-notch, gravid
RIS2L16436	RIS	2L	16	5	1	436	F	76	75%/3	Non-Vented	Hard Shell, gravid
RIS2L16437	RIS	2L	16	5	2	437	F	82	50%/2	Vented	Hard Shell
RIS2L16438	RIS	2L	16	5	3	438	F	81	0	Non-Vented	New Shell
RIS2L16439	RIS	2L	16	5	3	439	F	76	0	Non-Vented	Hard Shell
RIS2L16440	RIS	2L	16	5	3	440	F	72	50%/2	Non-Vented	Hard Shell
RIS2L16441	RIS	2L	16	5	3	441	M	73	40%/2	Non-Vented	Hard Shell
RIS2L16442	RIS	2L	16	5	3	442	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L16443	RIS	2L	16	5	3	443	M	71	0	Non-Vented	Hard Shell
RIS2L16444	RIS	2L	16	5	3	444	F	78	20%/2	Non-Vented	Hard Shell, gravid
RIS2L16445	RIS	2L	16	5	3	445	M	72	0	Non-Vented	Hard Shell
RIS2L16446	RIS	2L	16	5	5	446	M	68	0	Non-Vented	Hard Shell
RIS2L16447	RIS	2L	16	5	5	447	F	80	0	Non-Vented	Hard Shell
RIS2L16448	RIS	2L	16	5	5	448	F	75	0	Non-Vented	Hard Shell
RIS2L16449	RIS	2L	16	5	5	449	F	74	0	Non-Vented	New Shell, gravid
RIS2L16450	RIS	2L	16	5	5	450	M	78	5%/1	Non-Vented	Hard Shell
RIS2L16451	RIS	2L	16	5	6	451	F	85	10%/1	Vented	Hard Shell, v-notch, gravid
RIS2L16452	RIS	2L	16	5	6	452	M	87	75%/3	Vented	Hard Shell
RIS2L18453	RIS	2L	18	1	1	453	F	82	0	Non-Vented	New Shell
RIS2L18454	RIS	2L	18	1	1	454	M	81	0	Non-Vented	Hard Shell
RIS2L18455	RIS	2L	18	1	1	455	F	69	0	Non-Vented	New Shell
RIS2L18456	RIS	2L	18	1	3	456	F	78	0	Non-Vented	Hard Shell
RIS2L18457	RIS	2L	18	1	3	457	F	70	10%/1	Non-Vented	Hard Shell, gravid
RIS2L18458	RIS	2L	18	1	3	458	M	79	75%/3	Non-Vented	Hard Shell
RIS2L18459	RIS	2L	18	1	3	459	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L18460	RIS	2L	18	1	3	460	F	74	0	Non-Vented	Hard Shell
RIS2L18461	RIS	2L	18	1	5	461	F	78	0	Vented	Hard Shell, gravid
RIS2L18462	RIS	2L	18	1	5	462	F	88	0	Vented	Hard Shell, v-notch, gravid
RIS2L18463	RIS	2L	18	1	5	463	F	73	0	Vented	Hard Shell
RIS2L18464	RIS	2L	18	1	5	464	M	76	0	Vented	Hard Shell
RIS2L18465	RIS	2L	18	1	5	465	F	78	0	Vented	Hard Shell, gravid
RIS2L18466	RIS	2L	18	1	6	466	F	90	0	Vented	Hard Shell, v-notch, gravid
RIS2L18467	RIS	2L	18	2	2	467	F	87	0	Non-Vented	Hard Shell, v-notch
RIS2L18468	RIS	2L	18	2	2	468	M	68	0	Non-Vented	Hard Shell
RIS2L18469	RIS	2L	18	2	2	469	M	68	0	Non-Vented	Hard Shell
RIS2L18470	RIS	2L	18	2	2	470	F	87	0	Non-Vented	New Shell
RIS2L18471	RIS	2L	18	2	4	471	M	65	0	Non-Vented	Hard Shell

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RIS2L18472	RIS	2L	18	2	4	472	F	81	0/4	Non-Vented	Hard Shell, gravid
RIS2L18473	RIS	2L	18	2	4	473	F	72	0	Non-Vented	Hard Shell, gravid
RIS2L18474	RIS	2L	18	2	4	474	M	72	0	Non-Vented	Hard Shell
RIS2L18475	RIS	2L	18	2	4	475	M	76	0	Non-Vented	Hard Shell
RIS2L18476	RIS	2L	18	2	4	476	F	73	1%/1	Non-Vented	Hard Shell, gravid
RIS2L18477	RIS	2L	18	2	5	477	F	82.5	0	Vented	Hard Shell, v-notch, gravid
RIS2L18478	RIS	2L	18	2	6	478	F	79	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L18479	RIS	2L	18	2	6	479	F	77	15%/2	Non-Vented	Hard Shell, gravid
RIS2L18480	RIS	2L	18	2	6	480	F	73	0	Non-Vented	Hard Shell
RIS2L18481	RIS	2L	18	3	1	481	F	83.7	0	Vented	Hard Shell, v-notch
RIS2L18482	RIS	2L	18	3	2	482	F	81	0	Non-Vented	Hard Shell
RIS2L18483	RIS	2L	18	3	2	483	F	74	0/4	Non-Vented	Hard Shell
RIS2L18484	RIS	2L	18	3	2	484	F	75	50%/2	Non-Vented	Hard Shell, gravid
RIS2L18485	RIS	2L	18	3	2	485	F	79	0	Non-Vented	Hard Shell, gravid
RIS2L18486	RIS	2L	18	3	2	486	F	83.3	0	Non-Vented	Hard Shell
RIS2L18487	RIS	2L	18	3	3	487	F	88	0	Vented	Hard Shell, v-notch
RIS2L18488	RIS	2L	18	3	4	488	F	80	40%/2	Non-Vented	Hard Shell, gravid
RIS2L18489	RIS	2L	18	3	5	489	F	80	50%/2	Vented	Hard Shell
RIS2L18490	RIS	2L	18	3	5	490	M	75	0	Vented	New Shell
RIS2L18491	RIS	2L	18	3	6	491	F	89	0	Non-Vented	Hard Shell
RIS2L18492	RIS	2L	18	3	6	492	M	81	0	Non-Vented	Hard Shell
RIS2L18493	RIS	2L	18	3	6	493	F	74	0	Non-Vented	New Shell, gravid
RIS2L18494	RIS	2L	18	3	6	494	M	82.9	50%/2	Non-Vented	Hard Shell
RIS2L18495	RIS	2L	18	3	6	495	F	73	0	Non-Vented	Hard Shell, gravid
RIS2L18496	RIS	2L	18	3	6	496	F	83.1	10%/1	Non-Vented	Hard Shell, v-notch
RIS2L18497	RIS	2L	18	4	1	497	F	75	30%/2	Non-Vented	Hard Shell, gravid
RIS2L18498	RIS	2L	18	4	1	498	F	80	0	Non-Vented	Hard Shell, gravid
RIS2L18499	RIS	2L	18	4	1	499	F	76	0	Non-Vented	New Shell, gravid
RIS2L18500	RIS	2L	18	4	1	500	F	88	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L18501	RIS	2L	18	4	1	501	F	82	0	Non-Vented	Hard Shell, v-notch, gravid
RIS2L18502	RIS	2L	18	4	1	502	F	82	0	Non-Vented	Hard Shell
RIS2L18503	RIS	2L	18	4	1	503	F	73	0/4	Non-Vented	Hard Shell, gravid
RIS2L18504	RIS	2L	18	4	1	504	F		1%/1	Non-Vented	Hard Shell
RIS2L18505	RIS	2L	18	4	2	505	F	85	0	Vented	Hard Shell, gravid
RIS2L18506	RIS	2L	18	4	3	506	F	81	0	Non-Vented	Hard Shell
RIS2L18507	RIS	2L	18	4	3	507	F	74	0	Non-Vented	Hard Shell, gravid
RIS2L18508	RIS	2L	18	4	3	508	M	73	0	Non-Vented	Hard Shell
RIS2L18509	RIS	2L	18	4	3	509	F	79	5%/1	Non-Vented	Hard Shell, gravid
RIS2L18510	RIS	2L	18	4	3	510	F	66	0	Non-Vented	Hard Shell

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RIS2L18511	RIS	2L	18	4	3	511	M	70	80%/3	Non-Vented	Hard Shell
RIS2L18512	RIS	2L	18	4	3	512	M	72	0	Non-Vented	Hard Shell
RIS2L18513	RIS	2L	18	4	3	513	M	75	0	Non-Vented	Hard Shell
RIS2L18514	RIS	2L	18	4	4	514	F	84	0	Vented	New Shell
RIS2L18515	RIS	2L	18	4	5	515	F	74	5%/1	Non-Vented	Hard Shell, gravid
RIS2L18516	RIS	2L	18	4	5	516	M	83.4	75%/3	Non-Vented	Hard Shell
RIS2L18517	RIS	2L	18	4	5	517	M	80	0/4	Non-Vented	Hard Shell
RIS2L18518	RIS	2L	18	4	6	518	M	85	75%/3	Vented	Hard Shell
RIS2L18519	RIS	2L	18	5	1	519	F	82	0	Vented	Hard Shell, gravid
RIS2L18520	RIS	2L	18	5	1	520	F	83	0/4	Vented	Hard Shell, gravid
RIS2L18521	RIS	2L	18	5	1	521	F	80	5%/1	Vented	Hard Shell
RIS2L18522	RIS	2L	18	5	2	522	M	78	5%/1	Non-Vented	Hard Shell
RIS2L18523	RIS	2L	18	5	2	523	M	83.5	0	Non-Vented	Hard Shell
RIS2L18524	RIS	2L	18	5	2	524	M	78	0	Non-Vented	Hard Shell
RIS2L18525	RIS	2L	18	5	2	525	F	78	0	Non-Vented	Hard Shell, gravid
RIS2L18526	RIS	2L	18	5	2	526	F	80	5%/1	Non-Vented	Hard Shell, gravid