

NATURAL HISTORY OF ELIPTIO COMPLANATUS  
1942-CONTINUATION

INTRODUCTION

In working out the life history of Eliptio complanatus and certain ecological relationships of interest I have come to the conclusion that such a study will require a great amount of time. Life processes in the clam work very slowly. Many years will be required to find out the span of life, changes in the clam due to environmental conditions, as well as many other phases of the study. In fact, I believe that I have acquired in this clam alone unsolved mysteries enough to expend at least one fourth of my own life span.

During the winter of 1941-42 the data on shell measurements and total clam weight from the preceding summer were analyzed. Several observations of varying importance may be made from the graphs completed from this data (included in the previous section).

The summer of 1942 was spent in gathering information on the following objectives:

- (1) Studying general habits of all clams of the region;
- (2) Studying specifically the habits of Eliptio complanatus;
- (3) Attempting to fill in certain stages in the life history of Eliptio complanatus;
- (4) Continuing the morphological and ecological study on the clam from colonies planted in other lakes.

GENERAL OBSERVATIONS ON ELIPTIO COMPLANATUS

All observations listed were made at Occueoc Lake and Occueoc River as those waters are the natural habitat of the clam in this region. Behaviors noticed on other lakes where the clams were planted might have been influenced by abnormal conditions of some kind.

Eliptio complanatus has occupied the lake for many years. Dead shells were observed protruding from the face of a bank about eight feet above the present water level. When these shells were alive the bottom of the outlet was correspondingly higher. As this material is composed of a very firm substance (very firm blue clay intermixed with limestone) a considerable

amount of time was required for the necessary erosion.

Natural enemies of Eliptio complanatus are comparatively few. The solidness of the shell and the fact that it is usually buried deeply in the bottom are to its advantage in protecting it from larger enemies. In this area where clams are of little economic importance man is liable to choose it as a novelty instead of other clams because of its sturdy beautifully tinted shell out of which he can make ash trays and other trinkets. The muskrat probably is the only other large enemy.

In examining piles of clams killed by muskrats for food I found the shells of Eliptio complanatus comparatively few in numbers. This clam is at least as plentiful as any other one species of clam in the lake. In the order of frequency of shells present in the piles examined Anadonta grandis was easily most common. Then came Ligumia nasuta, Lampsilis silicoides, and finally Eliptio complanatus. I believe the heavy shell proves too discouraging even though it has been dug from the bottom.

No evidence of parasitic arthropods, helminthes, or other invertebrates have been observed in Eliptio complanatus so far, although further observation may show their presence. A few numbers of other genera (Lampsilis, Anadonta) have been examined during the summer and showed considerable numbers of parasitic hydrachnids.

Added observation shows that Eliptio complanatus tends to be most happy when living on the brink of a steep declivity. Clams placed on the shelf above the brink move restlessly until they reach this brink and then bury themselves.

The most vital factor, other than turbidity, to which they are sensitive is probably temperature. They may show varying degrees of activity below a certain temperature but show signs of distress when temperature rises above this point. This critical temperature is about 25°C. I suspect that they can stand wide ranges of oxygen concentration. There is also a decided optimum for pH, CO<sub>2</sub>, and HCO<sub>3</sub>. The pH of Ocqueoc Lake is 8.2. This must be near the optimum as the clams are so plentiful there. The CO<sub>2</sub> concentration is about 15 ppm., and that of HCO<sub>3</sub> is about 0.55 ppm.

Limited examination of stomach contents showed the presence of mostly planktonic algae. The blue-green algae were most common. The food probably consists mostly of blue-green algae and smaller amounts of green algae, free-swimming protozoans, rotifers, other miscellaneous microscopic animals, and small amounts of organic detritus.

The clams thrive as well in the river which has considerable current (very powerful at times) as in the lake. Reasonable current is not then a limiting factor.

As the water warms in the spring there may be certain slight changes in position by the clam but the distance moved is too small to show any significance. Some of the clams staked didn't move from the position placed in the fall while others moved upward to one foot. As the clam normally is buried deeply imbedding for the winter is unnecessary.

Migration along the shore over a period of years by adult clams is probably very slight. Any migration is not directional but the result of chance movements.

Clams deliberately placed in very shallow water often made one or more actual circles before going to the deeper water. This is an indication that perhaps gravity is an aid for moving toward a suitable location.

#### OBSERVATIONS ON THE LIFE HISTORY OF ELIPTIO COMPLANATUS

Considerable time was spent on trying to locate examples representing the immature stages of the clam. A set of bottom samples were taken in a favorable location at Occoec Lake. Samples were taken consecutively from an area where fish were liable to frequent. Upon examining the samples no signs of immature clams were found.

Although the breeding period was over when the station opened an attempt was made to parasitize fish hoping for some late breeders. As many kinds of small mature pan fish were placed over as many adult clams as possible. The fish totaled thirty, composed of blackbass, rock-bass, blue gills, perch, long and short-eared sunfish. About 200 adult clams of both sexes were also in the pen. To my knowledge no parasitization occurred. The fish were examined on 8-day intervals.

Further attempts were made to discover the immature stages under natural conditions. On July 8 a clam about 1cm. was located. In the same area others ranging from 3 cm. to the adult stage were gathered in small numbers. The same procedure was repeated on July 15, starting with the discovery of another clam measuring about 1 cm. All stages were found in the same area at the same depth. The smallest were undoubtedly dropped early this summer. As to whether or not the juvenile clams were dropped in deeper water and traveled to the location where caught was not ascertained but sounds reasonable.

The number of larger mature clams is far greater than the combined number of smaller ones (less than two or three years of age). This can be explained in the following manner:

Many glochidia (several thousand) are given off by the spawning female clam. A few may find a suitable fish host. Still fewer emerge from the host. This leaves very few newly emerged juvenile clams ready to develop to adulthood. Those falling on unfavorable bottoms die. Out of a great number of glochidia, then, we see that one is fortunate to be favored to begin development toward adulthood.

The mortality rate after dropping from the host fish is quite low. However, the very young are still quite frail. All specimens of about 1 cm. in length died shortly after capture while those of three or more centimeters continued to live.

After reaching two or three years of age rapid rate of growth ceases. In following years very little shell is added. Indications tend to show that this clam (as most clams) live many years.

So we can visualize a line of very very few immature clams quickly arriving at young adulthood. Then we see a slow growth through a long period of time, finally reaching the end of the span. Thus we find very few immature clams and great numbers of adult ones.

Clam populations can be compared to bubbles rising from a broken plant stem under water during photosynthesis: a long single line of bubbles accumulating on top in a mass of froth.

#### DATA ON COLONIES OF ELLIPTIC COMPLANATUS FOR 1942

##### Ocqueoc Lake

A colony of 200 marked clams was established on July 15 in the feeder lake. The purpose of this colony is to act as a control. By observing behavior of the clams in their original environment, which has proven to be quite ideal I hope to notice changes more easily in my other colonies. Also I shall be able to study them under normal (ideal) conditions. The colony was planted in an area where there were originally a concentration of the species. The unmarked ones were removed as much as possible.

### Bar Lake Station No. 1

On July 29 and 30 the clams were reclaimed and measured. No evidence of growth was present in any of the clams but a few small ones. Shell quite incrustated with lime and blue-green algae. Some shells (25-35) taken by boys before they were reclaimed. Clams in 4-6 feet of water probably due to early warming of surface water. Water at surface was 24°C., at bottom 22°C.

### Bar Lake Station No. 2

Colony covered with intense growth of Chara. Clams in 2½-5 feet of water. Shells protruded frequently due to much gravel on bottom. Some growth in evidence in both large and small clams. Mantle often protruding from between shell margin. Three dead shells. Colony doing well.

### North Fishtail Bay, Douglas Lake

Sandy bottom; aquatic flowering plants in deeper water beyond clams on declivity; no plant life among clams; most clams buried deeply in sand; considerable movement among colony; some clams in shallow water moving in circles; little growth in evidence; little incrustation on shell; shore protected; few dead ones; Although little growth colony appears healthy.

### Lancaster Lake

Reclaimed comparatively few; signs of muskrat depleting colony; one valve perforated with bullet holes; One live clam found in Bessy Creek ½-¾ miles away; clams buried deeply in shallow water under ½ inch layer of fine red-black humus. Many clams lost; much evidence of growth in the number found.

Following is a chart which is self-explanatory:

	Number Reclaimed	Number Unreclaimed	Number Dead	Possible Num- ber left
Bar Lake Sta.# 1	126	74	1	199
Bar Lake Sta.# 2	147	53	3	197
S. Fish- tail Bay, Douglas Lake	143	57	5	195
Lancaster Lake	<u>78</u>	<u>122</u>	<u>5</u>	<u>195</u>
TOTAL	494	306	14	786

Computing of statistics of all types will be deferred until next winter.

Max R. Matteson

REMOVED FROM OCQUECC LAKE JULY 15, 1942

MARKED AND RECORDED JULY 15, 1942

PLANTED IN OCQUECC LAKE JULY 15, 1942

<u>Number</u>	<u>Code</u>	<u>Length</u>	<u>Height</u>	<u>Width</u>	<u>Weight</u>
1	a	127	64	28	132
2	ab	134	68	35	204
3	ac	122	61	31	139
4	ad	103	51	27	74
5	ae	121	65	34	169
6	af	133	68	34	200
7	ag	126	63	33	155
8	ah	111	62	30	124
9	ai	118	63	34	102
10	aj	120	67	35	185
11	ak	130	71	33	180
12	al	122	58	35	147
13	b	131	70	32	191
14	bc	122	67	34	155
15	bd	120	64	36	177
16	be	119	66	35	181
17	bf	118	66	37	181
18	bg	118	65	33	148
19	bh	123	68	33	160
20	bi	129	65	32	153
21	bj	104	50	25	68
22	bk	86	45	23	49
23	bl	80	41	20	34
24	c	97	49	22	56
25	cd	91	47	22	50
26	ce	99	52	24	65
27	cf	99	50	25	67
28	cg	105	55	28	91
29	ch	105	56	24	79
30	ci	95	50	25	69
31	cj	101	53	26	80
32	ck	110	57	28	110
33	cl	112	58	29	108
34	d	111	61	26	101
35	de	112	59	26	93

<u>Number</u>	<u>Code</u>	<u>Length</u>	<u>Height</u>	<u>Width</u>	<u>Weight</u>
36	df	116	58	31	<del>122</del>
37	dg	107	54	27	89
38	dh	114	60	28	110
39	di	104	54	29	104
40	dj	112	61	29	118
41	dk	100	49	22	61
42	dl	127	70	29	153
43	e	135	69	32	175
44	ef	138	71	30	167
45	eg	128	64	34	159
46	eh	126	66	39	220
47	ei	137	67	38	208
48	ej	132	67	34	200
49	ek	139	74	37	237
50	el	139	74	36	257
51	f	140	70	40	258
52	fg	132	65	38	216
53	fh	135	66	38	202
54	fi	134	66	37	203
55	fj	124	64	34	172
56	fk	128	63	36	170
57	fl	130	65	32	151
58	f	131	64	35	169
59	gh	112	65	37	198
60	gi	122	63	32	144
61	gj	131	64	35	185
62	gk	130	65	38	196
63	gl	124	69	33	187
64	h	130	62	34	167
65	hi	128	66	30	153
66	hj	121	62	35	174
67	hk	124	68	35	192
68	hl	133	71	35	202
69	i	126	61	30	129
70	ij	115	67	28	135
71	ik	120	64	29	130
72	il	124	64	31	162
73	j	115	60	33	144
74	jk	132	60	32	151
75	jl	128	67	38	208
76	k	119	64	31	147
77	kl	122	61	30	130
78	l	114	60	30	128
79	aa	125	64	29	138
80	aabb	123	64	28	122



<u>Number</u>	<u>Code</u>	<u>Length</u>	<u>Height</u>	<u>Width</u>	<u>Weight</u>
81	sacc	135	75	37	227
82	aadd	125	70	37	223
83	asee	124	62	32	146
84	aaff	123	64	30	134
85	aagg	132	68	35	207
86	sahh	113	62	32	133
87	saai	131	68	34	188
88	asjj	125	65	31	153
89	askk	124	64	36	177
90	sall	119	66	34	161
91	bb	137	74	34	197
92	bbcc	131	68	37	196
93	bbdd	136	73	36	236
94	bbee	120	67	34	201
95	bbff	128	65	30	159
96	bbgg	126	63	34	164
97	bthh	125	65	35	184
98	bbii	101	50	25	72
99	bbjj	99	50	25	69
100	bbkk	99	50	23	70
101	bbll	100	51	26	79
102	cc	97	51	24	63
103	ccdd	83	44	23	48
104	ccce	115	58	33	142
105	ccff	115	59	30	134
106	ccgg	124	64	34	158
107	cchh	129	66	31	147
108	ccii	113	58	30	131
109	ccjj	116	61	26	112
110	cckk	116	60	31	129
111	ccll	129	68	32	188
112	dd	120	63	33	160
113	ddee	124	61	37	172
114	ddff	131	63	28	145
115	ddgg	125	69	32	173
116	ddhh	127	67	28	153
117	ddii	122	65	30	143
118	ddjj	112	62	29	125
119	ddkk	113	58	26	101
120	dlll	122	61	28	115
121	ee	122	63	28	128
122	eeff	124	63	28	138
123	eegg	122	61	31	139
124	eehh	111	59	31	130
125	eeii	110	58	29	118

<u>Number</u>	<u>Code</u>	<u>Length</u>	<u>Height</u>	<u>Width</u>	<u>Weight</u>
126	eejj	108	53	26	82
127	eekk	110	57	26	98
128	ee11	130	66	35	175
129	ff	141	74	37	245
130	ffgg	126	75	41	282
131	ffhh	118	70	39	212
132	ffii	128	70	42	268
133	ffjj	90	49	22	55
134	ffkk	90	44	20	46
135	ff11	100	52	26	78
136	gg	103	54	25	80
137	gghh	110	56	25	87
138	g11	137	75	38	260
139	ggjj	134	74	39	248
140	gkkk	123	66	35	193
141	g111	120	65	37	193
142	hh	96	50	23	64
143	hhii	96	45	24	57
144	hhjj	98	52	25	70
145	hhkk	118	63	27	125
146	hh11	118	61	27	120
147	ii	110	57	24	91
148	iijj	113	61	29	122
149	iikk	116	62	29	124
150	ii11	109	58	29	109
151	jj	118	56	25	107
152	jjkk	110	58	26	100
153	jj11	128	65	28	139
154	kk	125	62	31	145
155	kk11	123	65	32	160
156	ll	128	70	35	186
157	abb	113	60	32	138
158	acc	119	62	33	165
159	add	121	58	32	149
160	see	122	62	35	169
161	eff	131	68	32	188
162	app	127	73	36	212
163	ahh	131	73	32	189
164	aii	136	72	33	197
165	ajj	130	69	29	147
166	akk	136	66	33	177
167	all	125	68	35	200
168	baa	125	72	31	183
169	bcc	123	65	31	172
170	bdd	117	68	33	161

<u>Number</u>	<u>Code</u>	<u>Length</u>	<u>Height</u>	<u>Width</u>	<u>Weight</u>
171	bee	112	60	29	120
172	bff	121	64	28	129
173	bff	116	58	31	120
174	bhh	118	65	28	128
175	bii	130	62	39	196
176	bjj	90	45	21	47
177	bkk	95	51	22	58
178	bll	106	54	25	73
179	caa	112	55	26	94
180	cbb	110	58	27	91
181	cdd	152	76	39	281
182	cee	119	64	34	158
183	cff	129	65	33	171
184	cfg	113	59	30	131
185	chh	118	62	32	140
186	cii	113	61	36	167
187	cjj	127	64	34	185
188	ckk	127	71	39	235
189	cll	122	67	38	193
190	daa	122	67	37	187
191	dbb	127	65	34	185
192	dec	130	66	34	187
193	dee	127	65	30	152
194	dff	125	69	30	145
195	dff	114	65	33	152
196	dhh	116	63	32	152
197	dii	120	62	28	138
198	djj	113	67	28	141
199	dkk	114	62	26	113
200	dll	114	60	27	111

RECLAIMED AND MEASURED FROM BAR LAKE JULY 29 AND JULY 30, 1942

STATION NO. 1

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	<u>WEIGHT</u>
1	a	119	60	33	168
2	ab				
3	ac	131	68	37	215
4	ad	126	65	32	153
5	*ae	126	70	36	201
6	af	150	76	41	306
7	ag				
8	ah				
9	ai	138	76	43	306
10	aj	132	68	34	180
11	ak				
12	al	121	66	37	185
13	b	122	66	33	175
14	bc				
15	bd				
16	be	115	60	29	117
17	bf	136	68	37	196
18	bg				
19	*bh	120	66	32	146
20	*bi	122	69	38	222
21	bj				
22	bk				
23	bl				
24	c	129	64	35	170
25	cd	125	67	35	182
26	ce				
27	cf	122	63	30	144
28	cg	121	60	28	128
29	ch				
30	ci				
31	cj				
32	ck	115	58	27	89
33	*cl	114	62	29	122
34	d				
35	de	146	71	36	210
36	df	124	67	34	163
37	dg				
38	dh	118	60	34	158
39	di	125	65	30	145
40	dj	124	67	40	223

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	<u>WEIGHT</u>
41	dk				
42	dl	131	67	40	220
43	e	124	70	35	188
44	ef	114	58	28	116
45	eg				
46	*eh	119	64	29	126
47	ei	116	68	32	159
48	ej				
49	*ek	132	69	34	184
50	el	128	70	39	-
51	f	110	57	30	114
52	fg	129	67	36	200
53	fh	137	68	34	202
54	fi	133	69	41	230
55	*fj	124	70	37	208
56	fk	109	54	30	104
57	fl	129	66	34	173
58	f	137	73	40	290
59	gh	129	64	35	186
60	gi	121	64	39	190
61	gj				
62	gk	130	65	35	171
63	gl	124	70	35	209
64	h				
65	hi				
66	hj	118	63	32	140
67	hk	121	63	33	147
68	hl				
69	i	126	66	34	168
70	ij				
71	ik	114	58	30	121
72	il	115	57	30	110
73	*j	112	56	32	119
74	jk	113	60	30	118
75	jl				
76	k	98	52	23	65
77	kl	141	75	37	261
78	*l	113	61	28	98
79	aa	131	70	44	274
80	aabb	138	74	39	262
81	aacc	134	73	40	261
82	aadd				
83	aaee	132	69	35	191
84	aaff	125	66	37	188
85	aagg				

Dead; in  
boys yard

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	<u>WEIGHT</u>
86	aahh	121	66	36	182
87	aaif				
88	aajj				
89	aakk				
90	aall				
91	*bb	120	67	35	167
92	bbcc				
93	bbdd				
94	bbee				
95	bbff				
96	bbgg				
97	bbhh				
98	bbii				
99	bbjj	114	63	30	132
100	bbkk				
101	bbll	131	73	40	287
102	cc	122	66	31	156
103	ccdd				
104	cc ee				
105	*ccff	116	60	34	141
106	ccgg	125	66	34	181
107	cc hh	118	64	33	149
108	ccii	127	68	42	235
109	ccjj	122	63	31	148
110	cckk				
111	*ccll	113	57	27	98
112	dd	124	69	37	195
113	ddee				
114	ddff				
115	ddgg	117	63	31	156
116	ddhh				
117	ddii	121	69	32	169
118	*ddjj	120	63	31	148
119	ddkk	110	58	30	106
120	ddl l				
121	ee	123	65	32	158
122	*eeff	107	59	30	110
123	ee gg	126	62	37	185
124	ee hh				
125	eeii	125	66	34	161
126	eejj				
127	eekk	125	66	38	207
128	ee ll				
129	ff	110	59	27	101
130	*ffgg	112	56	26	92

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	<u>WEIGHT</u>
131	ffhh				
132	ffii	106	60	29	113
133	ffjj				
134	ffkk	124	67	39	194
135	*ffll	85	45	20	39
136	gg				
137	gghh				
138	ggii	141	75	38	255
139	ggjj	128	71	39	235
140	*ggkk	123	61	32	130
141	glll				
142	hh	120	60	33	131
143	hhii	113	63	33	132
144	hhjj	119	67	34	174
145	hhkk	112	59	33	127
146	hhll	121	61	36	160
147	ii	120	65	34	156
148	iijj	125	63	34	158
149	iikk	109	58	31	111
150	ii ll	126	65	36	185
151	jj				
152	jjkk				
153	jjll				
154	kk	116	59	33	149
155	kkll	111	60	32	124
156	ll	125	66	34	173
157	abb				
158	acc				
159	add				
160	ae	85	46	23	49
161	eff	135	69	33	180
162	agg	139	78	42	294
163	*ahh	118	60	34	155
164	sii				
165	ajj				
166	akk				
167	*all	126	65	32	140
168	baa	126	67	34	185
169	bcc				
170	bdd				
171	bee	136	72	35	206
172	bff	136	71	34	183
173	bgg				
174	bhh				
175	bii	120	66	39	216

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	<u>WEIGHT</u>
176	bjj	125	61	30	128
177	bkk	126	70	35	205
178	*bll	123	66	35	197
179	*caa	113	60	31	137
180	cbb	111	62	27	105
181	cdd				
182	*cee	139	74	39	253
183	cff	137	71	37	216
184	*cgg	131	68	32	173
185	chh				
186	cii				
187	cjj	135	66	37	184
188	*ckk	130	73	34	201
189	cll	137	70	35	194
190	daa				
191	dbb				
192	*dcc	119	66	35	176
193	*dee	132	66	32	154
194	dff				
195	dgg	120	66	31	150
196	dhh	133	70	34	191
197	*dii	132	69	36	197
198	djj				
199	dkk	114	57	28	102
200	dll	119	60	30	127

NOTE: \* clams secured on July 30, 1942, others secured on July 29, 1942.



RECLAIMED FROM BAR LAKE AUGUST 5, 1942

MEASURED FOR LENGTH, WIDTH, AND HEIGHT AUGUST 9, 1942

STATION NO. 2

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>
1	aaa	126	64	34
2	abb	132	67	38
3	acc	136	71	37
4	*add	119	58	27
5	eff			
6	egg			
7	ehh			
8	eii			
9	ejj	130	72	36
10	ekk	121	63	32
11	ell	120	63	33
12	faa	125	72	35
13	fab	125	67	39
14	fac	130	70	37
15	fad	128	68	36
16	fae	132	69	35
17	faf			
18	fah	130	68	37
19	fai			
20	faj	127	65	33
21	fak	123	67	33
22	fal			
23	gaa	130	69	34
24	gab	120	66	30
25	gac	123	64	34
26	gad	107	57	29
27	gae	125	65	31
28	gaf	130	70	35
29	gah	123	65	34
30	gai	113	61	33
31	gaj	120	62	33
32	gak			
33	gal			
34	haa			
35	hab			
36	hac	139	70	36
37	had	126	63	37
38	hae	122	60	33
39	haf	146	73	38
40	hag	126	66	36

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>
41	hii			
42	hjj	113	61	33
43	hkk			
44	hll	122	60	33
45	iaa	126	64	35
46	ibb	140	72	35
47	icc			
48	idd	142	72	37
49	iee			
50	iff	111	61	33
51	igg	133	66	38
52	ihh	125	65	30
53	ijj	122	56	28
54	ikk	128	67	36
55	ill			
56	jaa	120	65	31
57	jbb	120	62	32
58	jcc	125	69	35
59	jdd			
60	jee	145	74	40
61	jff			
62	<del>jgg</del>	140	68	40
63	*jhh	119	68	32
64	jii			
65	jkk	132	70	39
66	jll	117	65	32
67	kaa			
68	kbb	128	69	30
69	kcc			
70	kdd	122	62	33
71	kee			
72	kff	122	65	35
73	kgg	111	54	27
74	khh	128	70	38
75	kii	108	57	29
76	kjj			
77	kll			
78	laa			
79	lbb			
80	lcc	130	67	36
81	ldd	128	67	32
82	lee	134	71	38
83	lff	118	63	31
84	lgg	122	63	31
85	lhh	118	62	29

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
86	lil	128	69	37	
87	ljj	124	69	38	
88	lkk	128	70	33	
89	abc	129	72	35	
90	dbc	129	65	34	
91	ebc	120	61	34	
92	fbc	134	70	37	
93	gbc	140	67	37	
94	hbc	129	66	37	
95	ibc	132	73	38	
96	jbc				
97	kbc	153	77	45	
98	lbc	131	69	38	
99	*acd	126	65	36	dead
100	ecd	132	66	33	
101	fed	123	60	35	
102	gcd	113	61	40	
103	*hcd	118	64	29	
104	icd	128	70	36	
105	jcd				
106	kcd	120	59	33	
107	ade	135	73	39	
108	bde	130	66	32	
109	ede	114	57	32	
110	ede	143	77	48	
111	hde				
112	ide				
113	jde	124	65	33	
114	kde				
115	lde	130	71	39	
116	aef				
117	*bef	126	65	35	
118	cef	115	63	31	
119	gef				
120	hef	136	78	37	
121	ief				
122	jef				
123	kef	129	65	35	
124	lef				
125	afg				
126	bfg	134	73	37	
127	cfg	126	63	33	
128	dfg	115	63	32	
129	hfg	131	70	33	
130	ifg	132	66	37	

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
131	jfg	125	72	34	
132	kfg	127	70	40	
133	lfg	127	69	35	
134	agh	132	70	35	
135	bgh	122	62	35	
136	cg	120	65	32	
137	dgh	125	69	32	
138	cg	119	64	35	
139	igh	135	68	36	
140	jgh	121	59	34	
141	kgh				
142	lgh				
143	shi	129	67	36	
144	bhi	106	59	28	
145	chi	133	71	40	
146	*dhi	118	59	29	
147	ehi	127	69	35	
148	fhi	134	67	39	
149	jhi				
150	khi	131	76	39	
151	lhi				
152	aij	128	72	34	
153	bij				
154	cij				
155	dij				
156	eij	125	67	33	
157	fij	119	63	33	
158	gij	120	63	36	
159	kij				
160	lij	125	65	39	
161	ajk	109	59	29	
162	bjk	129	71	32	dead
163	*ckj	133	65	38	
164	djk				
165	ejk	129	69	31	
166	fjk	121	65	33	
167	gjk	130	72	37	
168	hjk	123	68	36	
169	ljk				
170	akl	128	67	35	
171	bkl	140	68	38	
172	ckl				
173	dkl				
174	ekl	106	59	31	
175	fk	137	68	39	

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
176	pkl				
177	hkl				
178	*ikl	114	61	32	
179	abcd	125	65	41	
180	bbcd	117	62	34	
181	cbcd	125	67	35	
182	dbcd	115	63	33	
183	ebcd				
184	*fbcd	125	64	31	dead-muskrat?
185	gbcd	121	65	34	
186	hbcd	123	65	35	
187	ibcd				
188	jbcd	136	70	38	
189	kbcd	138	71	37	
190	lbcd	120	65	30	
191	acde	133	69	38	
192	*ccde	128	66	35	
193	dcde	140	76	41	
194	ecde	120	62	31	
195	fcde	125	71	35	
196	gcde	128	69	35	
197	hcde	123	67	35	
198	icde	137	72	33	
199	jcde	137	66	34	
200	kcde	131	76	38	

NOTE: \* clams secured on August 9, 1942, others secured on August 5, 1942.

RECLAIMED FROM NORTH FISHTAIL BAY, DOUGLAS LAKE, AUGUST 12, 1942

MEASURED FOR LENGTH, WIDTH, HEIGHT, AND RETURNED AUGUST 12, 1942

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
1	a				
2	ab				
3	ac				
4	ad	152	77	43	
5	ae	123	62	30	
6	af				
7	ag				
8	ah				
9	ai	116	60	29	
10	aj	132	69	34	
11	ak	125	65	37	
12	al				
13	b	120	64	33	dead
14	bc	122	63	33	
15	bd	134	67	39	
16	be				
17	bf	119	64	31	
18	bg	100	52	24	
19	bh	114	57	28	
20	bi				
21	bj	115	59	28	
22	bk				
23	bl	114	58	32	
24	c	119	63	31	
25	cd	117	57	30	
26	ce				
27	cf				
28	cg	129	66	38	
29	ch	116	60	31	
30	ci				
31	cj				
32	ck				
33	cl	117	62	34	
34	d	127	65	33	
35	de				
36	df	118	65	34	
37	dg	129	69	32	
38	dh				
39	di				
40	dj	127	68	30	

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
41	dk	141	71	38	
42	dl				
43	e	113	60	30	
44	ef				
45	eg	127	69	33	
46	eh	129	67	35	
47	ei	131	70	35	dead
48	ej				
49	ek	122	67	34	
50	el	127	60	32	
51	f	108	58	29	
52	fg				
53	fh	130	69	37	
54	fi	138	71	32	
55	fj	119	59	34	
56	fk	133	69	38	dead
57	fl	117	61	32	
58	g	122	63	35	
59	gh	128	68	34	
60	gi				
61	gj				
62	gk	118	61	34	
63	gl				
64	h	110	55	27	
65	hi				
66	hj	131	68	41	
67	hk				
68	hl	114	56	30	
69	i				
70	ij	126	62	32	
71	ik	129	70	37	
72	il	110	62	31	
73	j	100	52	24	
74	jk				
75	jl	118	62	27	
76	k	114	61	32	
77	kl	120	69	30	
78	l	128	73	37	
79	na	120	58	29	
80	nabb				
81	naacc	129	70	34	
82	naadd	118	66	30	
83	naeee	135	71	34	
84	naeff	123	62	36	
85	naegg	112	58	28	

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
86	aahh				
87	aaif	91	48	23	
88	aaif	119	64	30	
89	aakk	125	63	30	dead
90	aall	135	69	39	dead
91	bb	118	61	30	
92	bbcc	125	61	38	
93	bbdd	114	61	29	
94	bbcc				
95	bbff				
96	bbgg				
97	bbhh				
98	bbif	113	62	35	
99	bbif				
100	bbkk	114	61	33	
101	bbll	117	62	29	
102	cc	122	65	36	
103	ccdd				
104	ccce				
105	ccff				
106	ccgg	140	70	31	
107	cchh	114	58	29	
108	ccif	97	56	22	
109	ccif	131	67	35	
110	cckk				
111	ccll	112	62	33	
112	dd				
113	ddee	135	73	43	
114	ddff	125	72	33	
115	ddgg	131	69	38	
116	ddhh	121	67	34	
117	ddif	128	65	33	
118	ddif	126	69	35	
119	ddkk	120	63	31	
120	ddll	113	63	28	
121	ee				
122	eeff	122	36	16	
123	eeff	130	67	31	
124	eehh	128	65	40	
125	eeif				
126	eeif				
127	eejj	137	67	34	
128	eejj	140	74	40	
129	ff	134	68	39	
130	ffff	138	72	34	



<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>
131	ffhh			
132	ffii	109	57	25
133	ffjj	130	72	35
134	ffkk	120	67	39
135	ffll	125	66	31
136	gg			
137	gghh	119	61	36
138	giii	115	62	27
139	ggjj			
140	ggkk	112	60	39
141	ggll	124	64	35
142	hh	124	74	35
143	hhii			
144	hhjj	122	66	30
145	hhkk	119	60	29
146	hhll	122	61	34
147	ii	116	61	31
148	iijj	139	74	34
149	iikk	123	66	32
150	ii ll	121	63	30
151	jj	115	60	28
152	jjkk	138	69	30
153	jjll	131	73	36
154	kk	124	64	34
155	kkll	129	68	33
156	ll	131	64	35
157	abb	120	63	32
158	acc	133	64	35
159	add			
160	see	124	64	30
161	aff			
162	agg	120	66	33
163	abh	121	66	31
164	aii	110	56	27
165	ajj	135	69	39
166	akk	118	56	28
167	all	106	54	31
168	baa	123	66	33
169	bcc	125	67	41
170	bdd	137	69	41
171	bee	122	67	31
172	bff	120	68	30
173	bgg	124	66	35
174	bhh	110	58	27
175	bii			

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>
176	bjj	122	66	33
177	bkk	117	62	35
178	bll	127	62	29
179	caa			
180	cbb	122	62	31
181	cdd	116	61	32
182	cee	116	60	30
183	cff	129	70	36
184	gge			
185	chh	128	66	36
186	cii			
187	cjj	105	62	30
188	ckk	109	57	32
189	cll	118	61	32
190	daa	133	68	43
191	dbb			
192	dcc			
193	dee	128	66	39
194	dff	131	66	35
195	dgg	114	65	30
196	dhh			
197	dii	109	57	27
198	djj	93	47	23
199	dkk	115	63	29
200	dll	122	64	35

RECLAIMED FROM LANCASTER LAKE AUGUST 13, 1942

MEASURED FOR LENGTH, WIDTH, HEIGHT, AND RETURNED AUGUST 13, 1942

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
1	a				
2	ab	133	68	34	
3	ac				
4	ad	127	65	32	
5	ae	122	63	34	
6	af				
7	ag	120	62	34	
8	ah	117	60	28	
9	ai	139	70	35	
10	aj				
11	ak				
12	al				
13	b				
14	bc	135	67	32	
15	bd	121	62	31	
16	be				
17	bf	114	63	35	
18	bg	107	56	27	
19	bh	124	73	32	
20	bi				
21	bj	125	65	36	
22	bk	128	65	30	
23	bl	116	62	30	
24	c	125	65	30	
25	cd	122	66	32	
26	ce	134	65	40	
27	cf				
28	cg				
29	ch				
30	ci				
31	cj	113	61	30	
32	ck				
33	cl	132	66	37	
34	d				
35	de	124	64	31	
36	df				
37	dg	147	74	37	
38	dh	132	67	31	
39	di	115	57	33	
40	dj				

dead; bullet holes;  
1/2 shell.

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
41	dk				
42	dl				
43	e				
44	ef				
45	eg				
46	eh				
47	ei				
48	ej				
49	ek				
50	el				
51	f	129	65	35	
52	fg				
53	fh	120	61	30	dead
54	fi	115	61	28	
55	fj				
56	fk				
57	fl				
58	f				
59	gh	127	69	36	
60	gi	114	62	28	
61	gj	110	58	28	
62	gk	111	60	30	
63	gl				
64	h				
65	hi	121	65	28	
66	hj	998	50	27	
67	hk				
68	hl				
69	i				
70	ij	93	47	26	
71	ik				
72	il				
73	j				
74	jk				
75	jl	107	55	29	
76	k				
77	kl				
78	l				
79	aa	130	72	37	
80	aabb	112	54	26	
81	aacc				
82	aadd	127	74	33	dead; on
83	aaaa				muskrat pile
84	aaff				
85	aagg				

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>
86	aahh			
87	aaii			
88	ajjj			
89	aakk			
90	aall			
91	bb	106	55	27
92	bbcc			
93	bbdd			
94	bbee			
95	bbff			
96	bbgg	125	70	34
97	bbhh			
98	bbii			
99	bbjj	136	67	36
100	bbkk	120	68	32
101	bbll			
102	cc			
103	ccdd			
104	cc ee			
105	ccff			
106	ccgg			
107	cc hh			
108	ccii	108	61	34
109	ccjj	125	66	34
110	cckk	106	55	26
111	cc ll	124	66	35
112	dd			
113	ddee	118	62	39
114	ddff			
115	ddgg			
116	ddhh	96	50	24
117	ddii	124	62	35
118	ddjj	91	49	24
119	ddkk			
120	ddll			
121	ee	123	69	36
122	eeff	128	64	29
123	ee gg			
124	eehh			
125	eeii			
126	eejj			
127	eekk	127	67	36
128	ee ll	117	66	33
129	ff			
130	ffgg			

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>
131	ffhh	114	63	32
132	ffii			
133	ffjj	127	69	30
134	ffkk	129	66	37
135	ffll			
136	gg	128	69	34
137	gghh	119	64	32
138	ggii			
139	ggjj			
140	gkkk			
141	ggll			
142	hh			
143	hhii			
144	hhjj			
145	hhkk			
146	hhll			
147	ii			
148	iijj			
149	iikk			
150	ii ll	111	57	30
151	jj			
152	jjkk	125	63	30
153	jjll			
154	kk			
155	kkll	115	65	32
156	ll	123	67	33
157	abb			
158	acc	128	66	37
159	add	129	68	34
160	eee	131	71	38
161	fff			
162	ggg	128	65	35
163	ahh			
164	aii	114	64	36
165	ajj			
166	akk			
167	all			
168	baa			
169	bcc	122	66	36
170	bdd			
171	bee			
172	bff	137	72	34
173	bgg			
174	bhh			
175	bii	128	69	37

<u>NUMBER</u>	<u>CODE</u>	<u>LENGTH</u>	<u>HEIGHT</u>	<u>WIDTH</u>	
176	bjj				
177	bkk				
178	bll	120	69	36	
179	caa				
180	cbb				
181	cdd	111	57	30	
182	cee				
183	cff				
184	ogg	98	52	22	dead
185	chh	115	63	33	
186	cii				
187	cjj				
188	ckk				
189	cll				
190	daa				
191	dbb	128	68	35	dead
192	dcc				
193	dee	120	69	32	
194	dff				
195	dgg				
196	dhh				
197	dii	127	68	35	
198	djj	90	51	24	
199	dkk				
200	dll				