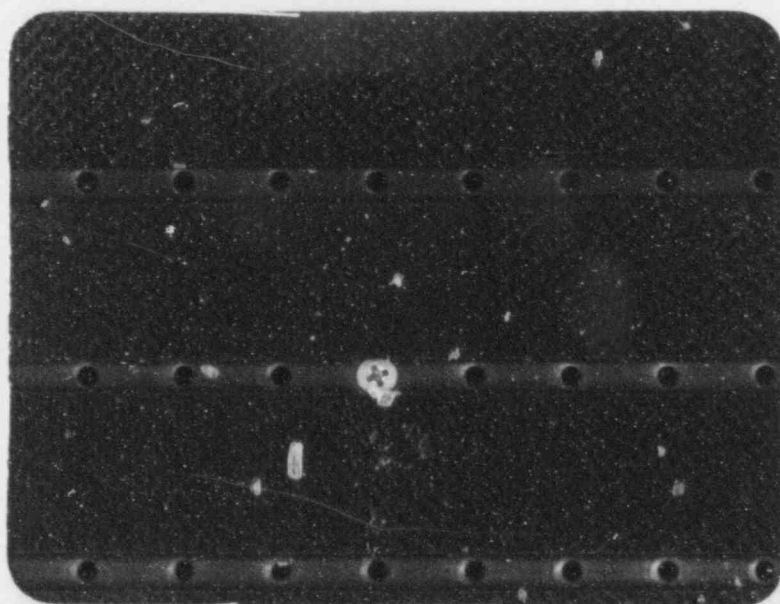




Report



William F. Clapp Laboratories, Inc.
Duxbury, Massachusetts



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PROGRESS REPORT FOR THE SIXTEENTH QUARTER

on

WOODBORER STUDY ASSOCIATED WITH THE
OYSTER CREEK GENERATING STATION

to

JERSEY CENTRAL POWER & LIGHT COMPANY

June 15, 1979

by

B.R. Richards, C.I. Belmore, and R.E. Hillman

Report No. 14918

February 9, 1979 to May 4, 1979

BATTELLE
Columbus Laboratories
William F. Clapp Laboratories
Duxbury, Massachusetts 02332

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WOODBORER STUDY ASSOCIATED WITH THE
OYSTER CREEK GENERATING STATION

by
B.R. Richards, C.I. Belmore, and R.E. Hillman

INTRODUCTION

The William F. Clapp Laboratories of Battelle's Columbus Laboratories is conducting an investigation to determine whether the generating station is affecting the resident marine borer population in Oyster Creek to the extent that that population is contributing significantly to marine borer-caused damage in Barnegat Bay.

A description of the program and procedures used may be found in the First Quarterly Report on Woodborer Study Associated with the Oyster Creek Generating Station, Report No. 14646, dated October 31, 1975, with the exception that the marine borer larvae program was discontinued in November, 1977.

This report presents the summary data for the sixteenth quarterly period from February 9, 1979, through May 4, 1979.

PROCEDURES AND INTERIM DATA

Exposure Panels

The long-term and short-term exposure panels were retrieved and replaced with new untreated pre-soaked (for two weeks) panels at the 20 exposure sites in Barnegat Bay and adjacent waters (Figure 1) during the periods of March 6-8, April 3-6, and April 30 to May 1, 1979. Long-term and short-term panels at all stations were retrieved and replaced.

Table 1 describes the geographical locations of the exposure sites. The summary data for the laboratory examination of the panels may be found in Tables 2 through 5.

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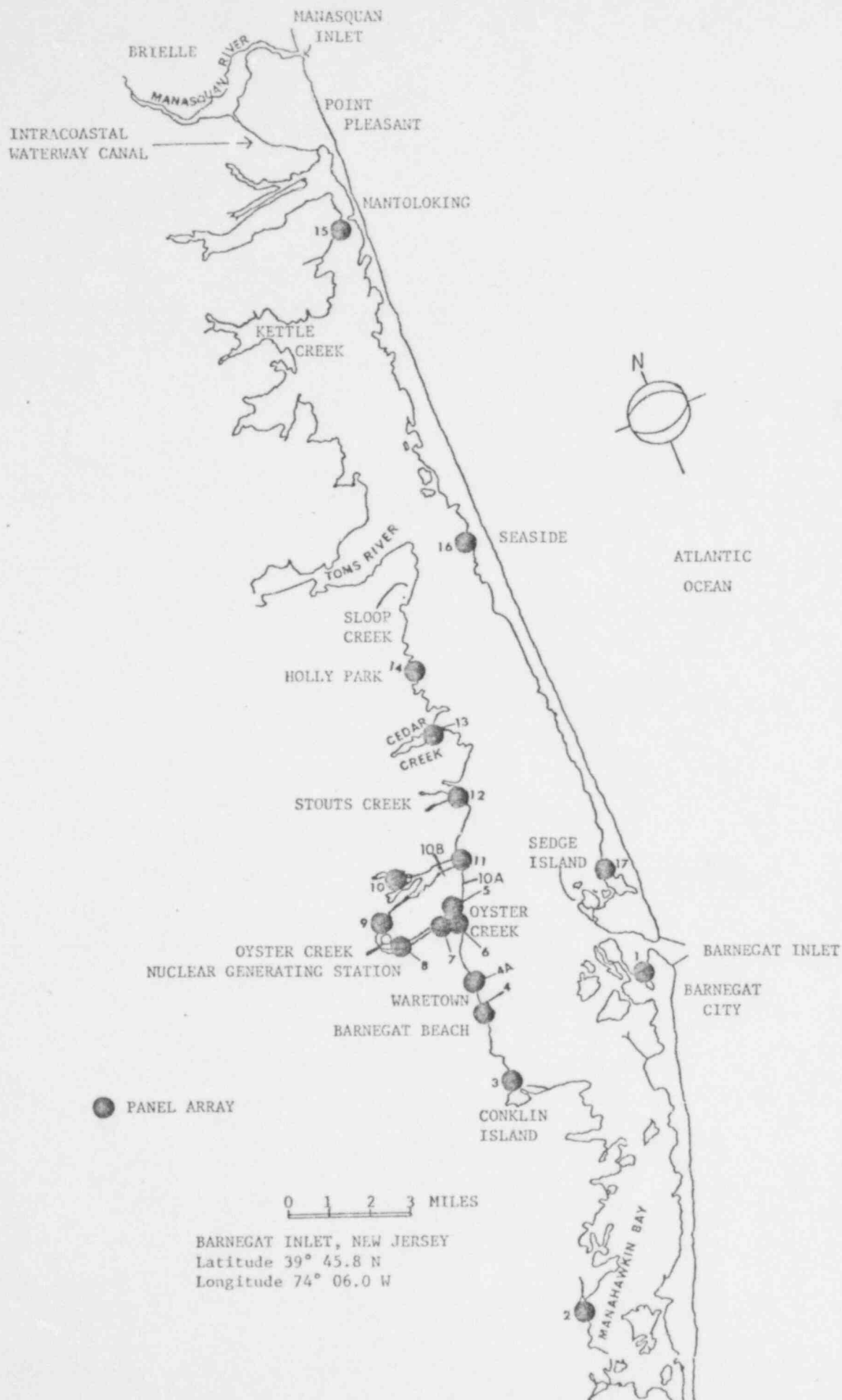


FIGURE 1. OUTLINE OF BARNEGAT BAY SHOWING GEOGRAPHICAL LOCATIONS OF EXPOSURE PANELS

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TABLE 1. GEOGRAPHICAL LOCATIONS OF WILLIAM F. CLAPP LABORATORIES' EXPOSURE
PANEL ARRAYS SUBMERGED JUNE, 1975, BARNEGAT BAY, NEW JERSEY

Site No.	Site	Structure to be used for Suspension of Rack	Nearest Previous Data Stations	Approximate Latitude and Longitude
1.	Barnegat Coast Guard Station, Barnegat Inlet	Finger Pier	WC 1 WFCL 1948-1967	Lat. 39° 45.8'N Long. 74° 06.5'W
2.	Ashton Marina 1450 Bay Ave. Manahawkin	Bulkhead	WC 13,14	Lat. 39° 40'N Long. 74° 13'W
3.	Iggie's Marina East Bay Ave. Barnegat (Conklin Island)	Bulkhead	WC 16,17,18,19	Lat. 39° 45'N Long. 74° 12.5'W
4.	Liberty Harbor Marina Washington Ave. Waretown	Bulkhead	WC 21 R. Turner Rutgers U.	Lat. 39° 47'N Long. 74° 11'W
4-A*.	Holiday Harbor Marina Lighthouse Drive Waretown	Bulkhead	WC 21 R. Turner Rutgers U.	Lat. 39° 48'N Long. 74° 11'N
5.	Mouth of Oyster Creek, Lot 4, Compass Road Offshore End	Dock	WC 29,30 Rutgers U.	Lat. 39° 48.5'N Long. 74° 10.3'W
6.	Oyster Creek #1 Lagoon, Inshore End 37 Capstan Drive	Dock		Lat. 39° 48.5'N Long. 74° 10.35'W
7.	Private Dock Dock Ave. Oyster Creek Sands Pt. Harbor Waretown	End of Dock	WC 27,28 R. Turner Rutgers U.	Lat. 39° 48.5'N Long. 74° 11.1'W

TABLE 1. (continued)

Site No.	Site	Structure to be used for Suspension of Rack	Nearest Previous Data Stations	Approximate Latitude and Longitude
8.	Oyster Creek-R.R. Bridge Discharge Canal	Cross Member Bridge	WC 26 Rutgers U.	Lat. 39° 48.7'N Long. 74° 12'W
9.	Forked River South Branch Intake Canal	Cross Member R.R. Bridge	WC 31 Rutgers U.	Lat 39° 49.2'N Long. 74° 12.2'W
10.	Teds Marina Bay Ave. Forked River	Pier	WC 33,34	Lat. 39° 50.1'N Long. 74° 11.6'W
10A*.	Private Dock 1-16 Aquarius Ct. Forked River	Under Dock		Lat. 39° 49'N Long. 74° 10'W
10B*.	Private Dock 1307 Beach Blvd. Forked River	Under Dock		Lat. 39° 49.4'N Long. 74° 10.1'W
11.	Forked River (near mouth) 1413 River View Drive	Bulkhead	WC 35 Rutgers U.	Lat. 39° 49.7'N Long. 74° 10'W
12.	Stouts Creek 1273 Capstan Drive	Bulkhead	WC 38,40,41 R. Turner Wurtz Rutgers U.	Lat 39° 50.5'N Long. 74° 08.8'W
13.	Rocknak's Yacht Basin Seaview Ave. Lanoka Harbor Cedar Creek	End of Pier	WC 46	Lat. 39° 52'N Long. 74° 09'W

TABLE 1. (continued)

Site No.	Site	Structure to be used for Suspension of Rack	Nearest Previous Data Stations	Approximate Latitude and Longitude
14.	Dicks Landing Island Drive Bayville (Holly Park)	Pier	WC 49 R. Turner Nelson	Lat. 39° 54'W Long. 74° 08.1'W
15.	Winter Yacht Basin Inc. Rt. 528 Mantoloking Bridge W. Mantoloking	Pier	WC 57	Lat. 40° 02.5'N Long. 74° 03.5'W
16.	Berkely Yacht Basin J. Street Leaside	Pier	WC 60,61	Lat. 39° 55.9'N Long. 74° 04.9'W
17.	Island Beach State Park (Sedge Island)	Pier	WC 68	Lat. 39° 47.1'N Long. 74° 05.9'W

All exposure panel racks suspended in a minimum water depth at mean low water of at least three feet. Racks hung with nylon line from existing structures so the bottom panels are close to, but not touching the bottom. Racks at Forked River railroad bridge and Oyster Creek railroad bridge suspended with wire rope.

WC = Woodward-Clyde

WFCL = William F. Clapp Laboratories

*Site 4-A installed April, 1977

Sites 10 A, 10 B installed April, 1978.

TABLE 2. SUMMARY DATA FOR INCIDENCE OF TEREDINIDAE IN PANELS
REMOVED MARCH 6-7, 1979

Site	Panel	No. of Specimens ⁺	Percent Filled	Size Range in mm.	Species Identification
1	P	235	25	<1-40	30 <i>T. navalis</i>
	C	0			205 Teredinidae
5	P	110	2	<1-3	
	C	0			
6	P	26	<1	<1-2	
	C	0			
7	P	30	1	<1-5	
	C	0			
11	P	1	<1	16	1 <i>T. navalis</i>

Sites 2-4A, 8-10B, 12-17, no Teredinidae present.

P = Long-term panel, submerged September 6-7, 1978.

C = Short-term panel, submerged February 5-6, 1979.

TABLE 3. SUMMARY DATA FOR INCIDENCE OF TEREDINIDAE IN PANELS
REMOVED APRIL 4-5, 1979

Site	Panel	No. of Specimens [†]	Percent Filled	Size Range in mm.	Species Identification
1	P	370	2	1-3	
	C	0			

Sites 2-7, no Teredinidae present.

P = Long-term panel, submerged October 3, 1978.

C = Short-term panel, submerged March 7, 1979.

TABLE 4. SUMMARY DATA FOR INCIDENCE OF TEREDINIDAE IN PANELS
REMOVED APRIL 30 AND MAY 1, 1979

Site	Panel	No. of Specimens [†]	Percent Filled	Size Range in mm.	Species Identification
1-17	(No Teredinidae Present)				

TABLE 5. SUMMARY DATA FOR INCIDENCE OF *Limnoria* IN PANELS
REMOVED, MARCH, APRIL, AND MAY, 1979

Month	Site	Panel	No. of Tunnels	No. of Specimens	Identification
March	1	P	3	6	<i>L. tripunctata</i>
		C	0		
March	2	P	2	2	<i>L. tripunctata</i>
		C	0		
March	3-17		No <i>Limnoria</i> present		
April	1-17		No <i>Limnoria</i> present		
May	1-17		No <i>Limnoria</i> present		

Water Quality

Salinity, water temperature, dissolved oxygen, and pH were determined with a Hydrolab (Model II B). The results for March, April, and May, 1979, may be found in Tables 6 through 8.

Teredinid Gonadal Development Studies

Table 9 shows the gonad condition of the teredinid borers collected from March through May, 1979. Included are results from special long-term panels exposed for periods ranging from ; to 12 months.

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TABLE 6. WATER QUALITY AT EXPOSURE PANEL STATIONS, MARCH, 1979

Station	Date	Time	Depth in Feet	Salinity-o/oo	Temp.-°C	O ₂	pH
1	3/7/79	0930	6.0	24.1	4.8	10.4	8.2
2	3/7/79	1005	2.0	14.5	7.5	11.2	7.8
3	3/7/79	1030	3.0	19.9	6.0	13.6	8.3
4	3/7/79	1055	3.5	18.5	5.9	9.7	7.5
4A	3/7/79	1110	3.5	17.9	6.3	13.6	8.2
5	3/7/79	1125	4.0	11.8	12.2	10.4	7.5
6	3/7/79	1135	4.0	6.9	12.5	11.0	7.4
7	3/7/79	1205	3.0	12.5	11.8	11.2	7.6
8	3/7/79	1245	6.0	14.5	11.0	13.0	8.0
9	3/7/79	1253	6.0	15.2	6.7	12.0	8.3
10	3/7/79	1500	3.0	6.4	8.0	13.0	7.4
10A	3/7/79	1412	3.5	16.5	7.0	12.0	8.6
10B	3/7/79	1427	3.5	16.5	7.0	12.0	8.6
11	3/7/79	1440	4.0	16.5	7.0	13.0	8.7
12	3/7/79	1534	3.5	16.5	6.0	13.0	8.0
13	3/7/79	1537	3.0	14.5	7.0	11.2	8.1
14	3/7/79	1620	3.0	11.8	7.5	13.0	8.2
15	3/6/79	1540	3.5	12.7	7.0	12.8	8.2
16	3/6/79	1644	4.5	13.3	8.0	13.2	8.2
17	3/6/79	1712	1.5	17.0	8.0	10.8	8.2

TABLE 7. WATER QUALITY AT EXPOSURE PANEL STATIONS, APRIL, 1979

Station	Date	Time	Depth in Feet	Salinity-o/oo	Temp.-°C	O ₂	pH
1	4/5/79	0820	6.0	19.9	7.0	12.0	7.7
2	4/5/79	0945	2.0	17.2	9.0	11.0	7.5
3	4/5/79	1015	3.0	10.4	8.5	11.1	7.9
4	4/5/79	1100	3.5	17.7	8.0	8.9	7.1
4A	4/5/79	1130	3.5	18.8	8.0	11.2	7.3
5	4/5/79	1150	4.0	12.0	11.0	11.1	8.5
6	4/5/79	1210	4.0	10.4	11.0	11.4	8.6
7	4/5/79	1235	3.0	11.8	10.5	11.2	8.7
8	4/5/79	1330	6.0	13.3	9.5	10.7	9.0
9	4/5/79	1350	6.0	13.8	9.5	11.0	8.7
10	4/4/79	1045	3.0	11.0	10.1	11.8	8.1
10A	4/5/79	1450	3.5	14.9	11.5	10.9	9.0
10B	4/5/79	1510	3.5	14.6	10.5	11.0	9.1
11	4/5/79	1520	4.0	17.2	10.0	11.4	7.3
12	4/4/79	1015	3.5	6.9	10.0	12.2	8.6
13	4/4/79	0940	3.0	23.3	9.0	10.2	7.5
14	4/4/79	0900	3.0	4.7	9.0	10.6	7.1
15	4/4/79	1330	3.5	18.5	8.0	11.6	9.0
16	4/4/79	1415	4.5	8.0	10.0	10.4	8.6
17	4/4/79	1500	1.5	19.2	8.0	11.0	7.3

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TABLE 8. WATER QUALITY AT EXPOSURE PANEL STATIONS, MAY, 1979

Station	Date	Time	Depth in Feet	Salinity-o/oo	Temp.-°C	O ₂	pH
1	5/1/79	0955	6.0	22.9	14.0	8.9	8.3
2	5/1/79	1030	2.0	12.7	15.8	10.2	8.5
3	5/1/79	1100	3.0	20.6	15.8	10.2	8.1
4	5/1/79	1155	3.5	22.7	15.5	10.6	8.1
4A	5/1/79	1215	3.5	19.2	17.0	10.4	8.1
5	5/1/79	1315	4.0	18.5	19.5	8.5	7.7
6	5/1/79	1329	4.0	17.9	21.0	10.0	7.7
7	5/1/79	1339	3.0	19.5	20.5	10.0	7.7
8	5/1/79	1405	6.0	19.9	20.5	10.4	7.9
9	5/1/79	1417	6.0	21.3	16.0	10.4	8.1
10	5/1/79	1448	3.0	19.9	15.0	10.8	7.5
10A	5/1/79	1450	3.5	16.5	16.0	11.0	8.0
10B	5/1/79	1507	3.5	21.3	16.0	11.4	8.0
11	5/1/79	1523	4.0	21.3	17.5	11.6	8.1
12	5/1/79	1515	3.5	13.8	18.0	11.2	8.1
13	5/1/79	1542	3.0	21.3	18.0	10.8	7.4
14	5/1/79	1608	3.0	19.2	18.1	10.9	7.8
15	4/30/79	1543	3.5	15.8	16.0	10.1	8.0
16	4/30/79	1613	4.5	17.5	17.0	10.2	8.0
17	4/30/79	1648	1.5	17.9	16.0	10.0	8.1

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TABLE 9 . CONDITION OF GONADS OF TEREDINID BORERS REMOVED FROM EXPOSURE PANELS IN BARNEGAT BAY FROM MARCH THROUGH MAY, 1979

EA = Early Active; LA = Late Active; R = Ripe; PS = Partially Spawned; S = Spent; M = Male; F = Female; H = Hermaphrodite

Specimen No.	Station	Month Removed	Number of Months Exposed	Species	Sex	Gonad Conditions	Comments
473 a	1	Mar 79	6	<i>Teredo navalis</i>	M	EA	
b				<i>Teredo navalis</i>	H	EA	
c				<i>Teredo navalis</i>	H	EA	Autolysis of Leydig cells; necrotic gonad follicles
d				<i>Teredo navalis</i>	M	EA	
e				<i>Teredo navalis</i>	H	EA	
f				<i>Teredo navalis</i>	M	EA	
g				<i>Teredo navalis</i>	M	EA	
h				<i>Teredo navalis</i>			No discernable gonad
i				<i>Teredo navalis</i>	M	EA	Unidentified material in intestine
474 a	2	Mar 79	12	<i>Teredo navalis</i>	F	LA	Special panel; general necrosis
b				<i>Teredo navalis</i>	F	LA	Most tissues necrotic
c				<i>Teredo navalis</i>	H	EA	General necrosis
d				<i>Teredo navalis</i>	H	EA	
475 a	7	Mar 79	7	<i>Teredo bartschi</i>			Special panel; no discernable gonad
b				<i>Teredo bartschi</i>			No discernable gonad
c				<i>Teredo bartschi</i>			No discernable gonad; general necrosis
d				<i>Teredo bartschi</i>	M	S	
e				<i>Teredo bartschi</i>	F	S	General necrosis
f				<i>Teredo bartschi</i>	H	S	General necrosis
g				<i>Teredo bartschi</i>	H	S	
h				<i>Teredo bartschi</i>	H	S	
476 a	11	Mar 79	6	<i>Teredo navalis</i>	H	LA	Gonads undergoing cytolysis
b				<i>Teredo navalis</i>	H	EA	Some cytolysis of gonads
477 a	17	Mar 79	12	<i>Teredo navalis</i>			Special panel; no discernable gonad
b				<i>Teredo navalis</i>	M	LA	Necrotic patches along typhlosole
c				<i>Teredo navalis</i>	F	LA	Gonads undergoing cytolysis; metaplasia of digestive gland

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TABLE 9. (continued)

Specimen No.	Station	Month Removed	Number of Months Exposed	Species	Sex	Gonad Conditions	Comments
478 a	11	Mar 79	6	<i>Bankia gouldi</i>	M	EA	Special panel; No discernable gonad
b				<i>Bankia gouldi</i>	M	EA	Cytolysis of gonad
c				<i>Bankia gouldi</i>			
479	11	Mar 79	6	<i>Teredo navalis</i>	M	EA	
480 a	7	Apr 79	8	<i>Teredo bartschi</i>	M	S	Special panel; Old follicles; No new development
b				<i>Teredo bartschi</i>	M	S	Old follicles
c				<i>Teredo bartschi</i>	M	S	No discernable gonad
d				<i>Teredo bartschi</i>	M	S	
e				<i>Teredo bartschi</i>	H	S	
f				<i>Teredo bartschi</i>	F	S	No discernable gonad
g				<i>Teredo bartschi</i>	F	S	Eggs almost completely lysed
h				<i>Teredo bartschi</i>	F	PS	Cytolysis of gonad
i				<i>Teredo bartschi</i>	H	S	
j				<i>Teredo bartschi</i>	H	PS	Cytolysis of gonad
k				<i>Teredo bartschi</i>	H	PS	Cytolysis of gonad
l				<i>Teredo bartschi</i>	H	PS	No discernable gonad
m				<i>Teredo bartschi</i>	H	PS	Cytolysis of gonad
n				<i>Teredo bartschi</i>	H	PS	Cytolysis of gonad
o				<i>Teredo bartschi</i>	M	S	Cytolysis of gonad
481 a	11	Apr 79	8	<i>Bankia gouldi</i>	M	EA	Special panel
b				<i>Bankia gouldi</i>	M	EA	
c				<i>Bankia gouldi</i>	M	EA	
d				<i>Bankia gouldi</i>	M	EA	
482 a	2	Apr 79	12	<i>Teredo navalis</i>	F	R	Special panel; cytolysis of eggs; gonad did not progress past ripe condition
b				<i>Teredo navalis</i>	F	R	Cytolysis of gonad
c				<i>Teredo navalis</i>	H	LA	Cytolysis of gonad
483 a	17	Apr 79	12	<i>Teredo navalis</i>	H	R	Special panel; cytolysis of gonad
b				<i>Teredo navalis</i>	H	LA	Cytolysis

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TABLE 9, (continued)

Specimen No.	Station	Month Removed	Number of Months Exposed	Species	Sex	Gonad Condition	Comments
484	12	Apr 79	8	<i>Bankia gouldi</i>	M	EA	Special panel
485 a	14	May 79	12	<i>Bankia gouldi</i>	M	EA	Special panel; leukocytosis in gonad Necrosis of intestinal epithelium, typhlosole No discernable gonad
b				<i>Bankia gouldi</i>	M	EA	
c				<i>Bankia gouldi</i>			
486 a	2	May 79	12	<i>Teredo navalis</i>	F	PS	Special panel; Eggs undergoing cytolysis Typhlosole necrotic; sperm undergoing cytolysis Typhlosole necrotic; eggs undergoing cytolysis Eggs undergoing cytolysis
b				<i>Teredo navalis</i>	M	PS	
c				<i>Teredo navalis</i>	F	R	
d				<i>Teredo navalis</i>	F	R	
487	4	May 79	12	<i>Bankia gouldi</i>	M	EA	Special panel
488 a	11	May 79	12	<i>Bankia gouldi</i>	M	EA	Special panel
b				<i>Bankia gouldi</i>	M	EA	
489	10A	May 79	12	<i>Bankia gouldi</i>	M	EA	
490	7	May 79	9	<i>Teredo bartschi</i>			Special panel; no discernable gonad
491 a	1	May 79	12	<i>Teredo navalis</i>	F	R	Special panel; Eggs undergoing cytolysis; abscesses; necrotic debris Eggs undergoing cytolysis Gametes undergoing cytolysis Gametes undergoing cytolysis Gametes undergoing cytolysis Gametes undergoing cytolysis Minohinia; new ova in old follicle New development in old follicle New development in old follicle New development in old follicle
b				<i>Teredo navalis</i>	F	R	
c				<i>Teredo navalis</i>	H	PS	
d				<i>Teredo navalis</i>	F	R	
e				<i>Teredo navalis</i>	H	PS	
f				<i>Teredo navalis</i>	F	PS	
g				<i>Teredo navalis</i>	F	EA	
h				<i>Teredo navalis</i>	F	EA	
i				<i>Teredo navalis</i>	H	EA	
j				<i>Teredo navalis</i>	H	EA	

TABLE 9 . (continued)

Specimen No.	Station	Month Removed	Number of Months Exposed	Species	Sex	Gonad Condition	Comments
492	17	May 79	12	<i>Teredo navalis</i>	H	PS	Special panel; gametes undergoing cytolysis
493 a	2	May 79	12	<i>Teredo navalis</i>	H	EA	Special panel; old gametes undergoing cytolysis
b				<i>Teredo navalis</i>	F	R	Old eggs undergoing cytolysis
c				<i>Teredo navalis</i>	F	R	Old eggs undergoing cytolysis
d				<i>Teredo navalis</i>	M	EA	Old sperm still there; undergoing cytolysis
e				<i>Teredo navalis</i>	F	R	Old eggs, undergoing cytolysis; typhlo- sole necrotic
494 a	11	May 79	9	<i>Bankia gouldi</i>	M	EA	Special panel
b				<i>Bankia gouldi</i>	M	EA	
495 a	11	May 79	9	<i>Teredo navalis</i>	F	R	Special panel; larvae in brood pouch; old eggs undergoing cytolysis
b				<i>Teredo navalis</i>	F	R	Old eggs undergoing cytolysis
c				<i>Teredo navalis</i>	M	S	