NOAA Technical Memorandum NOS ORCA 82

Evaluation of the Condition of Prince William Sound Shorelines Following the Exxon Valdez Oil Spill and Subsequent Shoreline Treatment:

Volume I 1993 Biological Monitoring Survey

August 1995
Seattle, Washington

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

National Ocean Service

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CHAPTER 1

INTRODUCTION

GENERAL

This document is the fourth annual progress report on studies designed to investigate the ecological implications of shoreline treatments on intertidal and shallow subtidal marine life of Prince William Sound, Alaska, following the March 1989 spill from the T/V *Exxon Valdez*. This program addresses two areas of uncertainty and concern about the effect of oil on shorelines:

1. The length of time required for oil-damaged ecosystems to recover.

2. The effects of shoreline treatment methods on marine life and the extent to which treatment affects recovery.

Information on shoreline recovery from the *Exxon Valdez* spill and the treatments applied has been made available to decision makers during subsequent spills, and some of the lessons learned have already been used as guidance during those spills. The need to obtain and disseminate response-relevant information is the general rationale for the present study, initiated by the National Oceanic and Atmospheric Administration (NOAA) under Contract No. 50ABNC-2-00050. Funding in 1993 was provided by NOAA and the Restitution Fund established as part of the settlement between the *Exxon Valdez* Oil Spill Trustees Council and Exxon.

Several studies conducted shortly after the spill demonstrated the effects of high-pressure, hot-water treatment on shoreline marine life. Exxon-sponsored studies of the short-term effects of two different beach cleaning methods employed in 1989 (the July 1989 Omni-Barge test [Maki and Houghton 1989; Dames & Moore 1989] and the Corexit 9580 test [Lees and Houghton 1990; Lees et al. 1993]) provide data that allow inference of the short-term effects of oiling and describe the short-term impact of hydraulic beach treatments. Both of these high-pressure hot-water washes clearly had significant, similar impacts on intertidal assemblages that had survived extended exposure to heavy oiling.

The 1990 NOAA biological studies in Prince William Sound (Houghton et al. 1991a, b) report conditions on rocky, boulder/cobble, and mixed-soft beaches and in adjacent eelgrass beds in portions of the sound that were oiled or oiled and high-pressure hot-water washed in 1989. Biological conditions on these beaches were compared to those on unoiled beaches of similar habitats. The conclusions were that: 1) the effects of high-pressure hot-water washing remained evident in the biological assemblages 16 to 18 months after the spill, and 2) oiled beaches not treated in this manner showed signs of greater recovery than oiled and treated beaches.

Results of the 1991 and 1992 NOAA biological studies in Prince William Sound (Houghton et al. 1993a, b) have shown that: 1) infaunal and epibiotal assemblages that were not high-pressure hot-water washed, in many respects, resembled communities on beaches that were not oiled, and 2) effects of high-pressure hot-water washing were still evident in some intertidal assemblages 40 months after the spill. Additional conclusions in 1991 were that oiling and subsequent treatment may have altered the spawning cycle of mussels and the reproductive strategy of eelgrass. Continued bioavailability of hydrocarbons was shown in the bioaccumulation of polycyclic aromatic hydrocarbons (PAHs) in transplanted molluscs. PAH levels in mussels had declined by an order of magnitude in 1991 from those seen in 1990, however, and generally continued to decline in 1992.

In companion studies to this one, Michel and Hayes (1991 and 1992) and Michel et al. (1991) documented the changes in beach profiles and hydrocarbon content at many of the sites sampled biologically in this program.

SAMPLING OBJECTIVE AND APPROACH

Objectives

The overall objectives of this study are as follows:

- To assess and compare the impacts of oiling and shoreline treatment activities (specifically: effects of high-pressure hot-water washing) in littoral (intertidal and shallow subtidal) habitats in the fourth year following the spill.
- To evaluate rates of recovery over several years between oiled areas and oiled and treated areas.

For purposes of this study, "recovery" is defined as the return of the ecosystem to a state within the limits of natural variability (Ganning et al. 1984). Detailed information was obtained on the dynamics and ecological forces driving recovery at a relatively small number of carefully selected sites. Data reported herein were gathered in late June and early July 1993, more than four years after the initial spill. It is anticipated that similar studies in the future will continue to document long-term recovery processes.

In 1993, sampling and interpretive efforts were more limited than in previous years of the program. Specific tasks for 1993 included :

- Sample epibiota at selected rocky intertidal stations.
- Recover hardshelled clams (*Protothaca staminea*) transplanted to Block Island in the summer of 1992; obtain data on clam survival, growth, and hydrocarbon bioaccumulation as a function of residual sediment hydrocarbon concentrations.
- Collect core samples for analysis of intertidal infaunal assemblage characteristics for comparisons with data from previous years.
- Analyze infaunal samples collected from lower tidal elevations in May 1991 and archived.
- Integrate into a single database data collected by the principal investigators while under contract with Exxon in 1989 with the 1990-93 NOAA-sponsored data collected at the same stations.
- Assemble photographs taken at selected sites by the principal investigators during the 1989 through 1993 studies into a single catalog representing both individual quadrat (sample point) and general sample area scenes from the early oiling, pre-treatment, post-treatment, and recovery phases of the spill incident.

Approach

The field approach in 1993 involved examination of a limited spectrum of variables to portray the status and trends of intertidal infaunal and epibiotal assemblages and species. The intent was to continue the collection of data characterizing potential

responses to oiling and treatment in several biological indicators. The data were used to compare the effects of hydrocarbon contamination and shoreline treatment and to compare rates and patterns of recovery in treated and untreated areas. The components examined in 1993 were:

- Analyses of PAHs in surficial sediments.
- Analyses of PAHs in *Protothaca staminea* and *Mytilus* cf. *trossulus*.
- Quantitative studies of epibiota (those species living on the substratum surface): abundance and relative cover at selected rocky intertidal sites.
- Quantitative studies of densities of macro-infauna at selected lower mixed-soft stations.

Intertidal sampling was conducted from June 30 to July 6, 1993, with two vessels and crews. About 50 person-days were expended in collecting some 390 samples of all types.

Hypotheses Tested

Three treatment categories were defined at the beginning of the 1990 study: Category 1 (unoiled), Category 2 (oiled but untreated or moderately treated), and Category 3 (treated with high-pressure hot-water wash). Within each of these treatment categories, multiple sites were sampled in each year to provide replication for statistical testing. Based upon the stated objective, several null hypotheses previously formulated were tested to evaluate the continued effects of oiling and shoreline treatment on the intertidal assemblages in selected habitats:

1a. Relative cover of dominant algal taxa does not differ among site categories.

1b. Abundance (density or percent cover) of dominant epifaunal species does not differ among site categories.

2. Total abundance, number of taxa, and diversity of infaunal taxa in lower mixed-soft substrata do not differ among site categories.

3. Sediment hydrocarbon concentrations do not differ among site categories.

4. Size structure, growth, and mortality rates do not differ with sediment hydrocarbon concentration among clams transplanted to the Block Island lower station.

5. There is no difference in the nature of (trends in) recovery between site Categories 2 and 3.

SAMPLING DESIGN

A stratified random sampling design was used in all years to assess important intertidal assemblage and population (individual taxa) characteristics. Sampling was structured following Zeh et al. (1981) to obtain statistically reliable estimates of density or cover of macrobiota inhabiting the surface (epibiota) and, where possible, the subsurface (infauna) within important life zones and within typical habitats.

The intertidal sampling effort was initially stratified according to three habitat types important in Prince William Sound:

1. Sheltered rocky habitats—intertidal substratum composed primarily of bedrock or very large boulders (50 centimeters (cm) or larger).

2. Boulder/cobble habitats—exposed beaches with nearly 100 percent cover by rounded cobbles and boulders ranging from about 10 to 50 cm. Some larger materials and/or bedrock outcroppings were occasionally present.

3. Mixed-soft habitats—typically a mixture of silt, granules, and pebbles with varying amounts of cobbles (5 to 25 cm) or boulders (25 to 50 cm).

Sheltered (low energy) rocky and mixed-soft sites were initially included for two reasons: 1) their biological productivity is high, and 2) their low energy regime reduces the rate of natural weathering of oil (Jahns et al. 1991; Michel et al. 1991). In 1993, sampling was conducted at 10 rocky sites (Table 1-1) and 14 mixed-soft sites (Table 1-2). Exposed boulder/cobble sites were sampled in earlier years because they represented some of the most heavily oiled beaches in the sound: oil often penetrated deeply into the open spaces between the coarse materials. No sampling was conducted at these sites in 1993.

Table 1-1. Intertidal rocky stations sampled in 1989-93 by oiling/treatment category.*

Elevation	Station category: Category 1	Category 2	Category 3
Upper	Bass Harbor	Herring Bay	Mussel Beach South
	Eshamy Bay	Outside Bay	NW Bay Island
	Hogg Bay	Snug	Block Island
			Elrington East
			Mussel Beach North
			Elrington Islet North
			Elrington Islet West
			Elrington Islet East
Middle	Crab Bay	Herring Bay	Block Island
	Eshamy Bay	Outside Bay	NW Bay Island
	Hogg Bay	Snug	NW Bay West Arm
		Bay of Isles	Elrington East
		NW Bay W. Arm **	Elrington West
			Mussel Beach North
Lower	Crab Bay	Snug	NW Bay Island
	Hogg Bay	Outside Bay	Elrington East
	Eshamy Bay		Elrington West
			Mussel Beach North

* Category 1 = Unoiled
* Category 2 = Oiled, untreated
* Category 3 = Oiled, treated with hot water
** There is uncertainty regarding treatment history at this site, thus it was not included in any category.

NOTE: Stations categorized as oiled and treated are known to have been treated with some form of hot-water washing

Table 1-2. Intertidal infauna stations sampled in 1989-93 by oiling/treatment category. *

Elevation	Station Category					
	Category 1		Category 2		Category 3	
Upper					Sleepy Bay	AB
Middle	Crab Bay	ABDF	Snug Harbor	ABDF	NW Bay West Arm	BDF
	Sheep Bay	4ABDF	Mussel Beach S	BDF	Shelter Bay	4ABDF
	Outside Bay	14ABDF	Crafton Island	D	Sleepy Bay	ABCF
					Block Island	BF
Lower	Crab Bay	ABFG	Herring Bay	1234ABCDFG	NW Bay West Arm	23ABCDFG
	Sheep Bay	3ABDFG	Bay of Isles	134BD	Shelter Bay	23ABCDFG
	Outside Bay	13ABCDFG	Snug Harbor	234ABCDFG	Sleepy Bay	DFG
	Bainbridge Bight	CDEFG	Block Island	ABCDFG	Elrington West	FG
			Mussel Beach S	234ADFG		
			Ingot Island	BCFG		
			Crafton Island	ABDG		

* Category 1 = Unoiled
* Category 2 = Oiled, untreated
* Category 3 = Oiled, treated with hot water

1=Cruise April 1,1989
2=Cruise May 2,1989
3=Cruise July 3,1989
4=Cruise September 4,1989

A=July 1990
B=September 1990
C=May 1991
D=July 1991
E= September 1991
F=July 1992
G=July 1993

NOTE: Stations categorized as oiled and treated are known to have been treated with some form of hot-water washing

To represent important life zones (i.e., to further stratify the sampling), three elevations (stations) were typically sampled at each site:

- near the upper limit of attached macrobiota
- in the upper portion of the broad rockweed-dominated zone
- along the lower edge of this rockweed zone.

Thus, in the terminology of this study, a "location," such as Snug Harbor, can have both rocky and mixed-soft "sites," and each site can have up to three "stations" to represent different intertidal zones (Figure 1-1). At each station sampling was conducted at points along a transect line laid parallel to the waterline along the beach contour. Detailed descriptions and discussion of the sample design employed are provided in the 1991 and 1992 reports (Houghton et al. 1993a, b).

SITE CLASSIFICATION, OILING, AND TREATMENT HISTORY

Some 800 kilometers (km) of shoreline received sufficient oiling to require some form of shoreline cleanup or treatment in 1989 (Ciancaglini 1991). Intensive efforts were made to verify the treatment history for each of the sites in this study (see Appendix Table A-1 in Houghton et al. 1993a). Information used to document the site designations was compiled from Exxon and State of Alaska records of treatments applied to various "beach segments" and from conversations with knowledgeable personnel in the field during 1989 (e.g., the authors, NOAA personnel, and field bosses for specific locations). Each site sampled in the present study typically occupied only about 50 meters (m) along a given beach and thus represents only a small fraction of the shoreline segment in question as these segments could range from a few hundred meters to several kilometers in length.

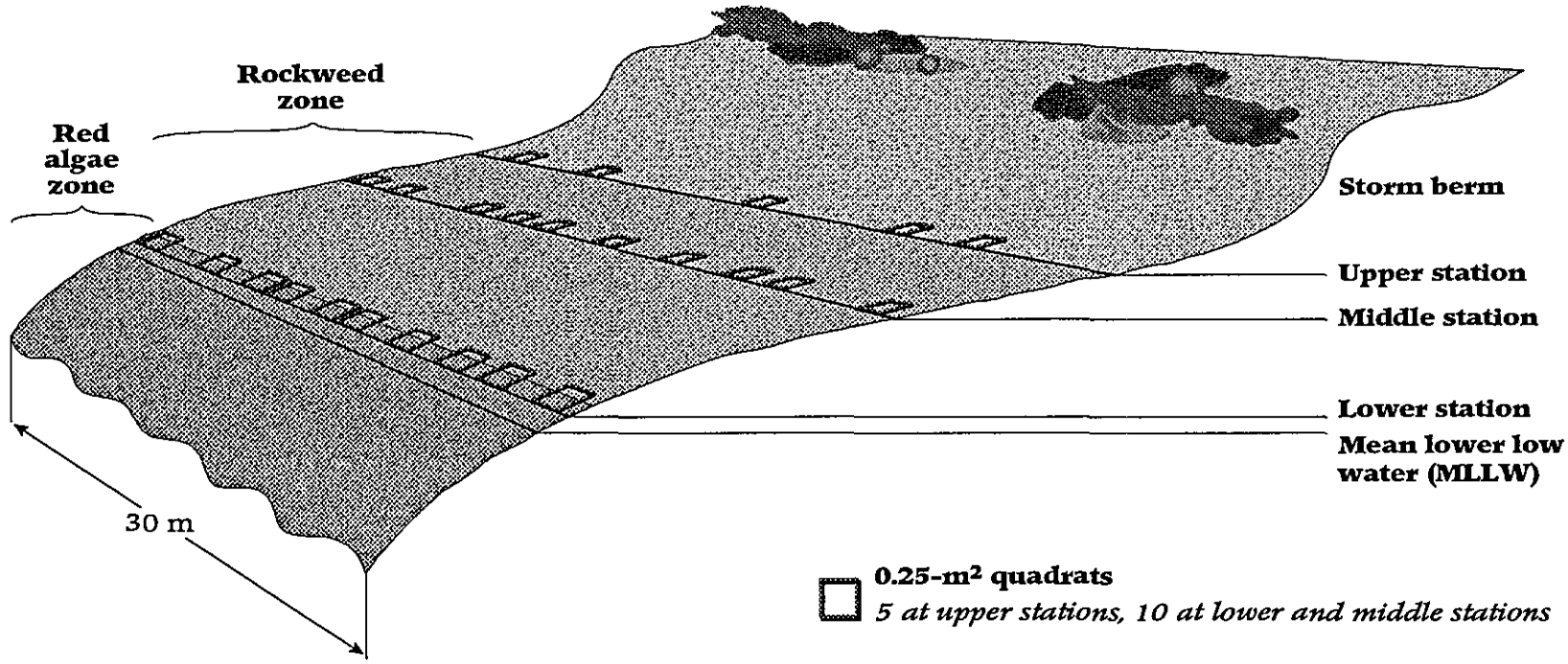


Figure 1-1. Typical site layout.

For statistical testing and for qualitative discussion purposes, sites or stations within each habitat type were assigned to one of three categories to represent the range of possible stresses experienced in 1989. Depending on the site's known treatment history, stations at a given site may or may not be classified in the same category. Stations were classified as Category 1, 2, or 3 based on available information regarding habitat disturbance from oiling and high-pressure hot-water treatment. Replicate stations were assigned to the following three site categories:

- Category 1: Unoiled in 1989—no significant oiling or treatment reported; considered reference stations.
- Category 2: Oiled in 1989—untreated (set aside) or treated with cool-water flushes in 1989 and/or bioremediation in 1989, 1990, or 1991.
- Category 3: Oiled in 1989—treated with high-pressure hot-water wash(es); most, if not all, were also bioremediated in 1989, 1990, and/or 1991.

Some sites or stations (Northwest Bay Islet and West Arm mixed-soft; Shelter Bay) were sampled in 1989 both before and after treatment and thus effectively moved from Category 2 to Category 3. These instances are noted in the appropriate data presentations.

Each intertidal station was classified as to the degree of oiling experienced in 1989. Because oiling was typically very uneven vertically over the intertidal zone and upper elevations were much more heavily oiled, there is little point in mandating the same oiling classification for all stations (elevations) at a site. Moreover, the width of the oiled band on a shoreline has little effect on the specific intertidal assemblage at a station; what is important is the specific degree of oiling to which the plants and animals at that station are actually exposed (cf. Page et al. 1993).

THE STUDY AREA

Prince William Sound is a protected fjord system located on the southcentral coast of Alaska (Figure 1-2). Wave action from North Pacific storms is blocked by the outer line of islands. The winds, however, are only minimally abated by the low-lying peaks of

those islands. This topography generates storm seas and chop that strike exposed shorelines with high intensity wave action during storm events. Within embayments, wave energy may be minimal despite high wind forces because of limited fetch and frequent shifts in wind direction (Bascom 1964; Lethcoe and Lethcoe 1989). Fetch at specific locations within Prince William Sound, including several sites in this study, is provided by Michel and Hayes (1991). Tides are of the mixed semi-diurnal type; mean tide level is about 1.8 m, and extreme range is more than 5 m.

The study area encompassed most of central and southern Prince William Sound from Sheep Bay on the eastern mainland to Eshamy Bay and Bainbridge Passage on the western mainland (Figure 1-2). The sampling focused on the chain of islands stretching from Naked Island (in the central sound), south-southwest through the Knight Island group, to the islands protecting the southwest entrances to the sound. This portion of the sound lay in the path of movement of oil from the *Exxon Valdez*, and many beaches on these islands were oiled.

Unoiled beaches in Prince William Sound support biological communities relatively specific to and characteristic of a given habitat type and range of tidal elevation. Within these communities there are usually several species that, by virtue of their abundance and/or ecological roles (e.g., as an effective grazer or predator), exert a strong influence on other kinds of organisms found in the community. Throughout this report these taxa are termed community or assemblage "dominants."

REPORT ORGANIZATION

The 1993 report is organized into several chapters, each of which reports on methods used and results of specific aspects of the study. Because this is considered a data report rather than an interpretive report, emphasis is placed on tabular and graphical data presentations and narrative discussion of the data is limited. Chapter 2 reports on intertidal epibiota and associated physical and water quality measurements; Chapter 3 reports on intertidal infaunal communities and sediment grain size; Chapter 4 contains partial results of mollusc studies; Chapter 5 briefly discusses major findings and conclusions; and Chapter 6 provides references for literature cited. Sediment and tissue hydrocarbon analyses are discussed in Appendix E .

Figure 1-2. Prince William Sound study area with sampling locations denoted by circles (○). Grounding site marked by asterisk.

CHAPTER 2
INTERTIDAL EPIBIOTA

INTRODUCTION

Epibiotal data were collected in late June and early July 1993 at one or more elevations at 10 rocky sites. A summary of selected 1989-93 intertidal sampling tasks and months of collection is shown in Appendix Table A-1. Only sampling tasks included in 1993 are shown; tasks completed in other years are shown in Appendix Table A-1 in Houghton et al. (1993b). Latitude and longitude coordinates from a global positioning system (GPS) for each of the study sites are found in Appendix Table A-2 in Houghton et al. (1993b). Tidal elevations of stations at each study site are located in Appendix Table A-3 in Houghton et al. (1993b).

Epibiotal data from 1989 Exxon-sponsored sampling at sites we have continued to monitor under this NOAA contract have also been compiled in this report (Appendix Tables C-1-1 through C-4-3). These data are included in tabular and graphic summaries but were not processed further under the 1993 scope of work.

Epibiotal field sampling was conducted by experienced Alaskan intertidal ecologists. Some qualitative observations of trends or patterns observed in the course of field surveys are reported on the basis of this experience without quantitative measurements or without demonstration of statistical significance.

METHODS

Field

Water Quality

Water temperature and salinity were measured with a YSI 33 meter at nine sites visited in June and July 1993 (Appendix Table A-2). The probe was gently lowered to about 0.3 m at some sites, 8 to 10 m below the surface of the water. Water temperature (±1°C) and salinity (parts per thousand [ppt]) were read directly off the meter.

Epibiota

The abundance of epibiota (plants and animals living on or attached to the substratum) was measured in June and July 1993 at two or three elevations on rocky substrata only (Table 1-1). Five to ten 0.25-m^2 quadrats were sampled on 30-m sampling lines (transects) oriented along the beach contour. Quadrats were repositioned at the same orientation as those previously sampled with the aid of previously placed rebar stakes, spikes, or epoxy markers. Where possible, the position of a quadrat was adjusted by referring to photographs taken during previous surveys.

Prior to sampling, each quadrat was photographed with a label showing the site, date, and quadrat number. Most taxa were identified by biologists in the field. Problematic taxa were collected (from outside the sample area, if possible) for cross-comparison among investigators or for identification onboard the support vessel or in the laboratory. Biological variables measured or estimated included algal cover (percent by taxon) and numbers or percent cover of major epibenthic fauna. Relative cover estimates for biota, substratum types, and oiling were based on visual examination of the tops, sides, and overhangs within a quadrat, but rocks were not overturned. Whenever any oil was found, a subjective description of oiling in each quadrat was recorded along with the percentage of oil cover found within the quadrat.

Field Quality Assurance/Quality Control

All members of the field sampling team discussed procedures for field sampling at a mobilization meeting aboard each vessel before sampling to ensure that everyone understood the field methods to be used and that methods were followed consistently. This common understanding, along with the use of the same personnel, maximized consistency with procedures used in previous years.

Several checks were made before data collection in the field. Quadrats sampled at each location were checked against a master list of stations, dates of previous sampling, and quadrats that had previously been sampled destructively and nondestructively since 1989. This check precluded resampling an area previously sampled destructively. Notes on the orientation of the station line and any deviations in the previous samplings were also checked.

Some of the header information required on the data sheets (including location, elevation, date, foot marker numbers of quadrats to be sampled, and sample identification (ID) was filled out onboard the support vessel prior to sampling. The sample ID numbers consisted of an eight-digit designation composed of the year, month, day, and sample serial number. The principal investigator checked these numbers against the computer logs to ensure that numbers were not duplicated. Members of the field team noted these numbers, along with the type of sample to which each was assigned, in their field notebooks for reference in the field. Filling out the computer sample ID log prior to sampling ensured that all desired sampling activities were accomplished at each location.

On the beach, data sheets were checked to be sure header information was correct. The time sampling began was entered, and the data recorder checked quadrat numbers against the master station list to be sure that the quadrat numbers sampled were correct for the elevation. One person laid the tape in the appropriate direction from the station origin stake and checked with the recorder to see if permanent quadrat locations lined up with markers. Deviations from previous samplings were noted on the data sheet. The initials of the recorder were placed at the top of the data sheet, and the initials of the quadrat enumerator were placed at the top of each data column.

There was frequent cross-checking of taxonomic identifications and estimates of percent cover between quadrat enumerators. Invertebrate nomenclature generally followed Kozloff (1987), and algal nomenclature followed Gabrielson et al. (1989). Problematic species and unique fauna and flora were placed in plastic bags, labeled, and returned to the support vessel for identification or for preservation as reference or voucher specimens. When sampling was finished, the recorder checked to ensure all header information was entered on the data sheet, and another person also checked that all information was complete. A final review of the data sheets was made later onboard the support vessel and included checking of the sample ID numbers against those previously assigned.

Statistical Analyses

Inferential Statistics

Various statistical analyses were applied to quantitatively describe the data (number of species, number of individuals, cover, species diversity, evenness) and evaluate the significance of the findings. Parametric and nonparametric tests were applied as appropriate to evaluate the significance of differences observed between station categories. In these tests the mean of all subsamples (replicates) at a given station was used to represent each variable; thus, n = the number of stations within that category where the variable in question was measured.

For tests of category effects and site-to-site differences in intertidal epibiota and environmental variables, a critical value (alpha) of $p = 0.1$ was used. Eberhardt and Thomas (1991) note that the alpha of 0.05 "automatically" selected by most ecologists may be inappropriate in some cases. Use of 0.1 allows that there is a 1-in-10 chance of falsely rejecting the null hypothesis ("no difference between site categories"—Type I error). If there is a greater concern for falsely accepting a null hypothesis that is in fact false (i.e., failure to identify significant effects of oiling or treatment when they exist—Type II error), then a lower critical value may be justified.

Eberhardt and Thomas (1991) note further that a disparity commonly occurs about probability values between analysts on opposing sides of a controversial environmental issue. Those wishing to show "no effect" may ignore Type II error and opt for a critical p value of 0.05 or even 0.01; those concerned with not missing an impact choose a higher probability value to reduce the Type II error. Therefore, the authors have considered probability levels of 0.1 or less to represent significant differences (i.e., to reject the null hypothesis) in most aspects of this study. Use of the randomization approach to analysis of variance (ANOVA) and t-testing (see below) allows computation of exact p values, which are provided in the text and on tables.

Many trends are noted as differences in mean values where no probability value is given. These differences are considered biologically relevant even though they are not statistically significant, often because of the limited replication of stations within site categories. Differences described between site categories also have been tested between pairs of stations representing those categories, often with significant results because of the greater sample size available.

Randomization Tests

Enumeration data were first tested for significant category effects (see null hypotheses page 1-4) using a randomization ANOVA and then tested for significant differences between pairs of site categories with a 2-tailed randomization t-test (Edgington 1987). Randomization tests are distribution-free statistical tests in which the data are repeatedly reassigned among and between treatment groups. First, a test statistic (e.g., t or F statistic) is computed for the initial data set. The data set is then randomly shuffled and the test statistic recalculated. Following a thousand or more passes of this iterative process, the proportion of random test statistics greater than or equal to the initial test value represents the exact significance of the results. All assumptions of normality, homogeneity of variance, and other characteristics of randomly sampled populations are not relevant, with one exception: that the data set truly represents the population of interest (i.e., is sampled randomly; Edgington 1987):

> "Randomization tests, when conventional test statistics are computed, are not alternatives to the conventional tests; rather they are those [same] tests with the significance determined by a special procedure."

Randomization ANOVA tests performed on epibiota (middle rocky stations) data collected in 1990 indicated that, for certain dominant taxa, there were significant category effects—that is, abundance varied significantly among treatment categories. Multiple comparison tests using the 1990 data (Houghton et al. 1991a) identified significant ($p < 0.1$) differences in abundances of certain taxa between various permutation pairs of site categories. The same approach, ANOVA for category effects followed by t-tests for significance of differences between pairs of site categories, was applied in 1991 and 1992. Because a main purpose of this study is to assess the degree of recovery occurring over time, it was considered important to continue to test for differences between pairs of site categories, even for taxa for which no experiment-wise category effect remained in 1991 or 1992. It is recognized that such multiple comparisons have a statistical penalty in the true experiment-wise alpha (Type I error term): differences calculated to have an alpha of 0.1 in the multiple comparison randomization t-tests in fact represent differences that have a greater than 1-in-10 chance of occurring randomly.

For epibiota, detailed abundance data (Appendix C) were used in calculations of total algal cover and total taxa present. Certain taxa were subsequently combined into higher taxonomic groups (e.g., all species of limpets into the Family Lottiidae) for ease of presentation (e.g., Tables 2-1 through 2-11) and for statistical testing. A randomization ANOVA was used to determine if a significant category effect existed and was followed by randomization t-tests for differences among station categories for dominant taxonomic groups.

RESULTS AND DISCUSSION

Physical Measurements

Water temperature and salinity were measured at nine sites from eight locations. Lowest surface water temperature (9.5°C) and highest salinity (27.4 ppt) were recorded at Crab Bay, and highest surface water temperature (14.0°C) and lowest salinity (21.9 ppt) were measured at Eshamy Bay (Appendix Table A-2).

Biological Conditions

1989—Epibiota data from 1989 sampling are contained in Appendix Tables C-1-1 through C-4-3. Data from four different cruises are presented separately by elevation. Upper elevation stations were not sampled until the last cruise. Cruise 1 was from March 30 through April 7; Cruise 2 from April 27 through May 7; Cruise 3 from June 19 through July 6; and Cruise 4 was from September 1 through October 2. Data from 1989 are shown on several of the time series graphs in this chapter. In these graphs, Cruise 1 and Cruise 2 data are combined because only a few stations were sampled in both cruises; for those stations, the Cruise 2 data were considered more accurate and thus were used (except for the Eshamy Bay middle station where only four quadrats were sampled on Cruise 2). Abundances of important taxa are presented by station category in Tables 2-4 through 2-10 but no other data analyses have been completed.

Table 2-1. Mean abundance (% or no./0.25 m^2) of important epibiota at upper rocky stations, June/July 1993.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Encrusting red algae	0.10	—	0.40	0.10	2.20	2.56
Endocladiaceae	0.00	—	3.40	2.87	0.05	0.07
Fucus gardneri	0.80	—	15.37	19.26	12.75	12.37
Fucus gardneri (sporelings)	0.40	—	0.50	0.10	0.30	0.14
Verrucaria spp.	4.60	—	4.23	7.16	8.60	4.38
Total plant cover (%)	**5.90**		**24.07**		**24.20**	
Number of plant taxa [1]	**3.00**		**4.67**		**6.00**	
Animals (% cover or no./0.25m^2)						
Chthamalus dalli (%)	0.60	—	0.93	0.75	0.85	0.78
Littorina scutulata (#)	71.60	—	171.53	191.49	127.70	68.02
Littorina sitkana (#)	157.40	—	73.87	59.42	182.20	45.54
Lottiidae (#)	1.60	–	5.87	6.27	4.60	3.39
Lottidae (juvenile) (#)	0.00	—	3.40	4.42	4.40	6.22.
Mytilus sp. (%)	1.00	—	0.37	0.55	0.30	0.28
Pagurus hirsutiusculus (#)	0.00	—	0.73	1.27	0.50	0.71
Semibalanus balanoides (%)	0.50	—	0.40	0.61	1.20	1.70
Number of animal taxa	**8.00**		**9.67**		**10.50**	
Deadorganisms (% cover or no./0.25m^2)						
Mytilus sp. (dead) (#)	2.00	—	0.07	0.12	0.10	0.14
Other (% cover or no./0.25m^2)						
Boulder/Cobble (%)	19.00	—	33.47	54.54	25.00	35.36
Rock (%)	80.00	—	64.00	55.57	70.00	42.43
Oil scale (#)	0.00	—	2.40	3.17	1.80	2.55
Oil cover (%)	0.00	—	0.33	0.49	0.15	0.21
Number of stations	**1**		**3**		**2**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-2. Mean abundance (% or no./0.25m^2) of important epibiota at middle rocky stations, June/July 1993 (*$p \leq 0.10$; ** $p \leq 0.05$).

Lumped Taxon	Category 1		Category 2		Category 3			t-tests		
	Mean	SD	Mean	SD	Mean	SD	ANOVA	1 vs.2	1 vs. 3	2 vs. 3
Plants (% cover)										
Elachista spp.	0.75	1.06	1.73	3.00	0.07	0.12				
Encrusting red algae	0.30	0.00	1.62	2.63	2.95	3.98				
Endocladiaceae	1.58	0.60	1.40	1.09	1.08	0.83				
Filamentous green algae	1.88	2.23	0.67	0.94	0.47	0.40				
Filamentous brown algae	0.25	0.14	1.65	2.28	0.60	0.53				
Fucus gardneri	33.80	12.73	68.34	20.81	61.78	28.00			*	
Fucus gardneri (sporelings)	1.08	0.39	0.83	1.11	0.47	0.21				
Rhodomelaceae/*Cryptosiphonia*	1.23	1.24	0.62	0.45	3.23	4.59				
Total plant cover (%)	**41.85**		**79.94**		**72.40**					
Number of plant taxa [1]	**12.00**		**13.67**		**12.67**					
Animals (% cover or no./0.25m^2)										
Balanus glandula (%)	3.65	4.60	0.97	1.03	1.95	1.65				
Balanus/Semibalanus spp. (set) (%)	0.28	0.18	4.07	6.40	0.27	0.06				
Chthamalus dalli (%)	2.58	2.86	6.03	8.17	5.67	8.10				
Littorina scutulata (#)	89.25	108.68	94.40	104.75	131.13	198.64				
Littorina sitkana (#)	55.40	34.51	81.87	110.21	45.67	38.36				
Lottiidae (#)	4.70	1.41	27.90	40.99	6.20	4.86				
Lottidae (juvenile) (#)	26.40	5.09	12.00	4.62	28.57	6.30	**	*		•
Mytilus cf. *trossulus* (%)	7.80	1.06	5.30	4.81	5.50	5.78				
Nucella lamellosa (#)	5.55	6.43	2.67	2.25	3.40	5.89				
Nucella lima (#)	0.05	0.07	2.33	2.99	0.03	0.06				
Pagurus hirsutiusculus (#)	23.65	22.27	16.02	12.75	19.37	16.01				
Semibalanus balanoides (%)	1.10	0.64	3.50	3.28	8.35	6.93				
Siphonaria thersites (#)	0.15	0.07	3.67	6.35	0.97	1.59				
Number of animal taxa	**16.0**		**15.70**		**15.67**					
Dead organisms (% cover or no./0.25m^2)										
Chthamalus dalli (dead) (%)	0.33	0.32	1.15	1.99	2.35	4.03				
Mytilus sp. (dead) (#)	13.38	15.03	9.10	9.26	8.00	5.94				
Semibalanus balanoides (dead) (#)	0.33	0.25	0.82	0.80	1.38	1.45				
Other (% cover)										
Boulder/Cobble (%)	44.90	1.84	64.27	55.77	2.23	3.87				*
Gravel/Sand	6.10	2.69	1.73	3.00	0.17	0.29		*		*
Mud	1.00	0.42	0.00	0.00	0.13	0.23	**	*	*	
Rock	48.05	4.03	34.00	57.17	97.60	4.16			*	
Water	1.25	1.77	0.33	0.58	2.83	0.38	*			
Number of stations	**2**		**3**		**3**					

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-3. Mean abundance (% or no./0.25 m^2) of selected epibiota at lower intertidal elevations, rocky sites, June/July 1993.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Articulated coralline algae	1.39	1.73	2.08	2.95	0.05	—
Delesseriaceae	4.65	4.67	8.677	12.26	0.00	—
Elachista spp.	0.35	0.49	0.00	0.00	2.45	—
Encrusting brown algae	2.15	2.69	0.46	0.66	6.55	—
Encrusting red algae	1.18	1.59	0.04	0.06	6.40	—
Encrusting coralline algae	4.30	4.60	0.50	0.71	0.50	—
Filamentous green algae	9.08	0.81	24.96	21.98	1.00	—
Filamentous brown algae	6.83	1.10	11.95	12.19	5.00	—
Filamentous red algae	1.08	0.88	6.54	7.84	0.15	—
Flagelliform brown algae	0.73	0.81	0.39	0.15	1.05	—
Foliose green algae	9.50	11.53	7.73	3.51	3.40	—
Fucus gardneri	31.90	28.14	27.20	28.21	67.00	—
Fucus gardneri (sporelings)	0.25	0.35	0.29	0.40	1.80	—
Gigartinaceae	8.03	5.20	9.29	10.91	2.35	—
Halosaccion glandiforme	8.15	2.33	1.79	2.53	0.90	—
Misc. Phaeophyta	0.50	0.42	2.95	4.07	0.25	—
Misc. Rhodophyta	1.08	1.52	0.00	0.00	0.00	—
Palmaria spp.	5.40	6.08	6.71	8.07	0.10	—
Rhodomelaceae/*Cryptosiphonia*	21.98	12.27	26.73	4.33	14.30	—
Total plant cover (%)	**120.33**		**139.92**		**114.60**	
Number of plant taxa[1]	**39.00**		**26.00**		**31.00**	
Animals (% cover or no./0.25m^2)						
Encrusting bryozoan (%)	3.68	0.74	0.25	0.35	0.15	—
Gnorimosphaeroma oregonensis (#)	0.00	0.00	1.43	2.02	0.00	—
Lacuna spp. (#)	0.05	0.07	2.92	2.71	0.30	—
Littorina scutulata (#)	0.10	0.14	3.64	5.15	2.40	—
Littorina sitkana (#)	0.05	0.07	0.36	0.51	0.00	—
Lottiidae (#)	0.10	0.00	0.58	0.59	0.40	—
Lottidae (juvenile) (#)	1.00	1.27	7.99	10.12	82.00	—
Margarites spp. (#)	2.65	2.47	0.17	0.24	0.00	—
Mytilus cf. *trossulus* (%)	0.00	0.00	0.18	0.14	0.00	—
Mytilidae, (spat) (#)	1.13	1.38	0.55	0.54	0.30	—
Pagurus hirsutiusculus (#)	2.60	2.97	3.02	3.80	25.30	—
Pycnopodia helianthoides (#)	1.00	0.28	0.25	0.35	0.30	—
Searlesia dira (#)	2.70	3.82	0.14	0.20	0.00	—
Spirorbidae (%)	1.83	0.81	0.36	0.31	0.50	—
Number of animal taxa [1]	**32.00**		**13.50**		**22.00**	
Dead organisms (% cover or no./0.25m^2)						
Mytilus sp. (dead) (#)	0.25	0.35	3.55	0.88	2.50	—
Other (% cover)						
Bouder/Cobble	10.35	0.49	89.29	15.15	1.00	—
Gravel/Sand	4.00	5.66	3.57	5.05	2.00	—
Rock	85.50	6.36	7.14	10.10	97.00	—
Water	1.70	2.40	0.00	0.00	0.00	—
Number of stations	**2**		**2**		**1**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-4. Mean abundance (% or no./0.25 m^2) of selected epibiota at middle intertidal elevations, rocky sites, Cruise s 1 and 2, spring 1989.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Encrusting brown algae	0.00	0.00	3.54	7.08	0.00	—
Endocladiaceae	0.17	0.29	1.83	2.64	1.50	—
Filamentous brown algae	0.67	1.15	0.00	0.00	0.00	—
Filamentous green algae	0.47	0.81	0.01	0.03	0.00	—
Fucus gardneri	66.37	6.16	37.21	14.44	79.60	—
Halosaccion glandiforme	1.12	1.93	0.00	0.00	0.00	—
Misc. Rhodophyta	0.82	1.41	0.00	0.00	0.00	—
Palmaria spp.	0.73	1.27	0.00	0.00	0.00	—
Rhodomelaceae	0.52	0.89	0.81	1.63	2.00	—
Total plant cover (%)	**71.40**		**43.68**		**83.30**	
Number of plant taxa[1]	**4.33**		**3.75**		**4.00**	
Animals (% cover or no./0.25m^2)						
Balanus/Semibalanus spp. (%)	4.25	5.60	1.30	2.60	8.95	—
Chthamalus dalli (%)	1.55	1.29	0.54	0.95	0.00	—
Littorina scutulata (#)	6.80	11.43	26.30	52.60	20.40	—
Littorina sitkana (#)	10.77	14.53	17.90	35.80	108.40	—
Lottiidae (#)	1.37	1.72	3.58	5.48	5.00	—
Mytilus cf. *trossulus* (%)	4.38		1.74	1.35	4.55	—
Nucella lima (#)	0.00	0.00	1.28	1.48	0.00	—
Pagurus hirsutiusculus (#)	0.40	0.36	0.38	0.30	0.10	—
Pycnopodia helianthoides (#)	0.03	0.06	0.00	0.00	0.00	—
Semibalanus balanoides (%)	0.00	0.00	4.08	5.75	0.00	—
Semibalanus xariosus (%)	10.28	17.81	0.00	0.00	0.00	—
Siphonaria thersites (#)	1.93	1.72	0.08	0.15	0.00	—
Number of animal taxa[1]	**8.33**		**5.75**		**8.00**	
Dead organisms (% cover or no./0.25m^2)						
Mytilus sp. (dead) (#)	8.60	8.92	1.24	2.34	4.10	—
Other (% cover)						
Oil cover (%) primary	0.00	0.00	23.94	24.30	100.00	—
Oil scale (primary)	0.00	0.00	2.60	2.03	5.00	—
Number of stations	3		4		1	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-5. Mean abundance (% or no./0.25 m^2) of selected epibiota at lower intertidal elevations, rocky sites, Cruises 1 and 2, spring 1989.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Articulated coralline algae	2.55	4.33	5.85	8.27	0.10	—
Delesseriaceae	2.17	2.56	0.95	1.34	0.30	—
Encrusting brown algae	0.38	0.40	0.05	0.07	0.30	—
Encrusting coralline algae	1.95	2.33	2.90	4.10	0.10	—
Filamentous brown algae	0.42	0.72	4.50	6.36	0.00	—
Filamentous green algae	8.30	6.94	0.75	1.06	0.00	—
Filamentous green algae	0.00	0.00	3.10	4.38	20.40	—
Filamentous red algae	9.32	12.00	3.25	4.60	0.00	—
Flagelliform brown algae	0.80	0.70	0.70	0.14	0.00	—
Foliose green algae	17.18	6.87	11.95	12.09	31.00	—
Fucus gardneri	33.50	8.66	16.18	5.41	15.40	—
Gigartinaceae	2.72	0.88	3.55	4.88	13.60	—
Halosaccion glandiforme	2.95	3.57	1.95	2.76	6.80	—
Misc. Rhodophyta	0.67	1.15	0.00	0.00	0.10	—
Palmaria spp.	6.25	7.12	6.78	9.58	8.50	—
Rhodomelaceae	22.93	7.13	14.20	20.08	12.60	—
Rhodomelaceae/*Cryptosiphonia*	10.02	1.88	32.80	13.01	32.00	—
Total plant cover (%)	**122.13**		**110.03**		**141.70**	
Number of plant taxa [1]	**16.33**		**12.00**		**13.00**	
Animals (% cover or no./0.25m^2)						
Chthamalus dalli (%)	1.57	2.25	0.13	0.18	0.00	—
Evasterias troschelii (#)	0.00	0.00	0.05	0.07	0.00	—
Leptasterias spp. (#)	0.00	0.00	0.25	0.35	0.00	—
Littorina scutulata (#)	0.33	0.42	6.80	9.62	0.00	—
Littorina sitkana (#)	0.20	0.17	1.15	1.63	0.00	—
Lottiidae (#)	0.43	0.59	0.40	0.57	3.40	—
Margarites spp. (#)	0.80	1.30	0.00	0.00	0.00	—
Nucella lamellosa (#)	3.73	1.98	1.10	1.56	0.00	—
Pagurus hirsutiusculus (#)	0.27	0.21	0.40	0.57	0.20	—
Pisaster ochraceus (#)	0.10	0.17	0.00	0.00	0.00	—
Pycnopodia helianthoides (#)	0.47	0.25	0.00	0.00	0.00	—
Searlesia dira (#)	0.10	0.17	0.00	0.00	3.60	—
Semibalanus cariosus (%)	0.43	0.75	0.08	0.11	0.00	—
Number of animal taxa	**12.00**		**6.00**		**6.00**	
Other (% cover)						
Oil cover (#) (primary)	0.00	0.00	50.00	70.71	100.00	—
Oil scale (primary)	0.00	0.00	0.50	0.71	3.80	—
Number of stations	**3**		**2**		**1**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-6. Mean abundance (% or no./0.25 m^2) of selected epibiota at middle intertidal elevations, rocky sites, Cruise 3, June 1989.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Encrusting brown algae	4.13	7.07	0.15	0.18	0.00	—
Endocladiaceae	0.53	0.48	1.09	0.86	0.00	—
Filamentous brown algae	0.60	0.76	1.33	2.65	0.00	—
Filamentous green algae	1.30	1.61	0.49	0.36	0.00	—
Fucus gardneri	70.33	8.50	48.08	27.22	10.60	—
Gigartinaceae	0.30	0.52	0.23	0.45	0.00	—
Rhodomelaceae	0.52	0.85	0.00	0.00	0.00	—
Rhodomelaceae/*Cryptosiphonia*	0.07	0.12	0.51	0.58	1.50	—
Total plant cover (%)	**78.78**		**52.40**		**12.10**	
Number of plant taxa [1]	**7.33**		**6.50**		**2.00**	
Animals (% cover or no./0.25m^2)						
Balanus glandula (%)	2.18	3.70	0.00	0.00	2.80	—
Balanus/Semibalanus spp. (%)	5.52	9.51	0.71	1.39	0.00	—
Chthamalus dalli (%)	0.67	0.81	5.33	9.62	0.00	—
Leptasterias spp. (#)	0.30	0.52	0.03	0.05	0.00	—
Littorina scutulata (#)	83.33	42.86	19.60	22.63	0.20	—
Littorina sitkana (#)	98.87	69.62	3.00	3.47	0.30	—
Lottiidae (#)	13.17	10.57	11.63	6.53	0.20	—
Mytilus cf. *trossulus* (%)	1.57	1.35	1.83	1.75	0.00	—
Nucella lameliosa (#)	8.87	5.37	1.25	2.50	0.00	—
Nucella lima (#)	0.17	0.21	2.38	3.02	0.00	—
Onchidella borealis (#)	0.27	0.46	0.43	0.85	0.00	—
Pagurus hirsutiusculus (#)	12.93	12.24	5.03	8.08	0.00	—
Pisaster ochraceus (#)	0.00	0.00	0.10	0.20	0.00	—
Semibalanus balanoides(%)	3.12	3.34	6.91	5.39	0.00	—
Semibalanus cariosus (%)	5.70	9.87	0.75	1.25	0.00	—
Siphonaria thersites (#)	7.20	9.75	1.43	2.85	0.00	—
Number of animal taxa	**13.00**		**9.50**		**4.00**	
Dead organisms (% cover orno./0.25m^2)						
Mytilus sp. (dead) (#)	10.57	10.14	2.10	2.84	36.80	—
Other (% cover)						
Oil cover (#) (primary)	0.05	0.05	5.34	9.06	86.00	—
Oil scale (primary)	0.20	0.26	1.48	1.99	3.50	—
Number of stations	**3**		**4**		**1**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-7. Mean abundance (% or no./0.25 m^2) of selected epibiota at lower intertidal elevations, rocky sites, Cruise 3, June 1989.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Articulated coralline algae	1.18	1.23	0.13	0.18	2.33	—
Delesseriaceae	1.02	1.26	3.85	3.46	0.00	—
Encrusting brown algae	0.83	1.10	0.05	0.07	11.06	—
Encrusting coralline algae	0.90	0.90	0.60	0.85	8.94	—
Enteromorpha spp.	0.00	0.00	1.13	1.59	0.00	—
Filamentous brown algae	3.78	5.67	0.68	0.95	0.00	—
Filamentous green algae	19.25	22.79	22.80	25.74	7.06	—
Filamentous red algae	12.37	10.63	2.15	2.47	1.61	—
Flagelliform brown algae	0.83	1.27	0.18	0.25	0.00	—
Foliose green algae	9.05	7.07	12.40	2.83	0.06	—
Fucus gardneri	25.53	14.64	34.45	12.09	22.44	—
Gigartinaceae	2.32	0.53	2.13	1.31	2.39	—
Halosaccion glandiforme	6.15	1.30	1.40	1.98	1.22	—
Misc. *Rhodophyta*	0.70	1.21	0.05	0.07	0.00	—
Palmaria spp.	5.47	8.69	3.58	2.51	5.00	—
Rhodomelaceae	6.17	7.84	12.80	11.60	0.00	—
Rhodomelaceae/*Cryptosiphonia*	11.90	3.94	11.80	16.12	8.78	—
Soranthera ulvoidea	0.62	0.55	0.80	1.13	0.00	—
Total plant cover (%)	**108.60**		**111.10**		**70.89**	
Number of plant taxa [1]	**19.33**		**17.00**		**11.00**	
Animals (% cover or no./0.25m^2)						
Balanus glandula (%)	0.00	0.00	2.90	4.10	0.00	—
Chthamalus dalli (%)	1.43	1.25	0.33	0.11	0.22	—
Encrusting bryozoan (%)	4.67	3.98	2.33	2.86	0.00	—
Evasterias troschelii (#)	0.07	0.06	0.00	0.00	0.00	—
Leptasterias spp. (#)	0.13	0.15	0.10	0.14	0.00	—
Littorina scutulata (#)	0.97	1.59	15.50	21.92	50.22	—
Littorina sitkana (#)	0.03	0.06	0.45	0.35	12.00	—
Lottiidae (#)	7.63	5.78	3.05	4.31	0.44	—
Mytilus cf. *trossulus* (%)	0.10	0.17	0.05	0.07	1.06	—
Nucella lamellosa (#)	4.97	8.08	3.60	5.09	0.00	—
Onchidella borealis (#)	0.00	0.00	1.05	1.48	0.00	—
Pagurus hirsutiusculus (#)	1.60	1.85	1.15	0.21	2.00	—
Pisaster ochraceus (#)	0.03	0.06	0.00	0.00	0.00	—
Pycnopodia helianthoides (#)	0.17	0.06	0.10	0.14	0.00	—
Searlesia dira #)	0.43	0.75	0.00	0.00	0.56	—
Semibalanus balanoides (%)	0.10	0.17	0.35	0.49	0.39	—
Semibalanus cariosus (%)	5.75	9.74	1.28	1.80	0.00	—
Number of animal taxa [1]	**19.67**		**13.00**		**9.00**	
Dead organisms (% cover or no./0.25m^2)						
Odonthalia sp. (dead) (%)	0.00	0.00	0.00	0.00	0.56	—
Mytilus sp. (dead) (#)	1.30	2.00	0.10	0.14	5.11	—
Nucella lamellosa (dead) (#)	0.00	0.00	0.35	0.49	0.00	—
Other (% cover)						
Oil cover (#) (primary)	0.00	0.00	0.00	0.00	72.78	—
Oil scale (primary)	0.00	0.00	0.00	0.00	2.78	—
Number of stations	**3**		**2**		**1**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-8. Mean abundance (% or no./0.25 m^2) of selected epibiota at upper intertidal elevations, rocky sites, Cruise 4, September 1989.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Filamentous green algae	0.03	0.06	0.00	0.00	0.00	0.00
Fucus gardneri	1.67	1.97	3.73	2.55	0.05	0.07
Fucus gardneri (sporelings)	1.47	2.37	0.73	1.27	0.00	0.00
Misc. Cyanophyta	0.03	0.06	1.80	2.78	9.05	12.80
Verrucaria spp.	32.27	55.89	0.60	1.04	0.00	0.00
Total plant cover (%)	**35.83**		**7.60**		**9.20**	
Number of plant taxa [1]	**3.00**		**3.33**		**1.50**	
Animals (% cover or no./0.25m^2)						
Balanus/Semibalanus spp. (%)	0.63	0.84	0.07	0.12	0.15	0.21
Littorina scutulata (#)	76.60	106.46	26.07	34.93	1.40	1.98
Littorina sitkana (#)	5.93	8.39	9.67	9.17	1.60	2.26
Lottiidae (#)	19.87	25.66	1.47	1.33	0.00	0.00
Mytilus cf. *trossulus* (#)	0.40	0.35	0.37	0.40	0.00	0.00
Nucella lamellosa (#)	2.53	4.39	0.00	0.00	0.00	0.00
Semibalanus balanoides (%)	3.07	3.82	1.27	1.77	0.00	0.00
Number of animal taxa [1]	**7.00**		**5.67**		**2.00**	
Dead organisms (% cover or no./0.25m^2)						
Balanus glandula (dead) (%)	0.70	1.21	0.07	0.12	0.00	0.00
Fucus gardneri (dead) (%)	0.00	0.00	0.73	1.18	0.10	0.14
Mytilus sp. (dead) (#)	7.60	12.31	1.53	2.48	0.00	0.00
Other (% cover)						
Oil cover (#) (primary)	0.00	0.00	45.93	39.80	48.00	12.73
Oil scale (primary)	0.00	0.00	3.13	2.04	3.40	0.28
Number of stations	**3**		**3**		**2**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-9. Mean abundance (% or no./0.25 m^2) of selected epibiota at middle intertidal elevations, rocky sites, Cruise 4, September 1989.

Lumped Taxon	Category 1		Category 2		Category 3	
	Mean	SD	Mean	SD	Mean	SD
Plants (% cover)						
Elachista spp.	2.17	3.29	1.04	1.73	0.00	0.00
Encrusting brown algae	4.90	8.49	0.19	0.23	0.00	0.00
Encrusting red algae	0.03	0.06	0.16	0.24	6.00	8.49
Endocladiaceae	0.38	0.20	0.49	0.59	0.00	0.00
Filamentous brown algae	0.02	0.03	0.20	0.40	0.00	0.00
Filamentous green algae	0.37	0.47	0.81	1.15	0.80	0.99
Fucus gardneri	69.00	2.18	36.01	22.10	3.50	4.96
Fucus gardneri (sporeling)	1.47	0.23	0.74	0.97	0.03	0.04
Gigartinaceae	0.30	0.52	0.05	0.10	0.31	0.44
Halosaccion glandiforme	0.17	0.29	0.56	1.13	0.00	0.00
Misc. Cyanophyta	0.15	0.09	8.10	15.93	0.00	0.00
Palmaria spp.	1.03	1.79	0.01	0.03	0.00	0.00
Rhodomelaceae/*Cryptosiphonia*	1.22	1.89	0.41	0.43	2.00	2.83
Total plant cover (%)	**81.52**		**49.39**		**12.69**	
Number of plant taxa [1]	**8.33**		**9.00**		**4.50**	
Animals (% cover or no./0.25m^2)						
Balanus glandula (%)	0.55	0.48	0.01	0.03	0.00	0.00
Balanus /Semibalanus spp. (%)	0.83	1.10	0.25	0.50	2.23	3.15
Chthamalus dalli (%)	0.52	0.51	0.93	1.78	1.88	2.65
Evasterias troschelii (#)	0.03	0.06	0.00	0.00	0.00	0.00
Gnorimosphaeroma oregonensis (#)	0.03	0.06	0.55	1.10	0.00	0.00
Leptasterias spp. (#)	0.07	0.12	0.03	0.05	0.00	0.00
Littorina scutulata (#)	49.47	35.07	79.30	121.14	9.63	3.71
Littorina sitkana (#)	156.17	169.65	44.88	57.28	0.98	1.10
Lottiidae (#)	18.67	14.06	19.20	10.33	0.48	0.39
Mytilus cf. *trossulus* (%)	2.37	3.41	1.65	1.85	0.16	0.05
Nucella lameliosa (#)	4.23	5.78	0.33	0.65	1.63	2.30
Nucella lima (#)	0.13	0.12	1.05	1.02	0.00	0.00
Pagurus hirsutiusculus (#)	10.90	14.61	6.53	4.37	2.60	3.39
Semibalanus balanoides (%)	7.33	6.04	10.58	11.11	0.00	0.09
Semibalanus cariosus (%)	4.97	8.60	0.05	0.10	0.13	0.18
Siphonaria thersites (#)	1.73	1.50	0.70	1.40	0.05	0.07
Volutharpa ampullacea (#)	0.20	0.35	0.00	0.00	0.00	0.00
Number of animal taxa	**14.67**		**10.25**		**9.00**	
Dead organisms (% cover or no./0.25m^2)						
Balanus glandula (dead) (#)	0.23	0.28	0.03	0.05	0.00	0.00
Encrusting coralline algae(dead) (%)	0.00	0.00	0.00	0.00	4.00	5.66
Fucus gardneri (dead) (%)	0.00	0.00	0.00	0.00	5.56	2.92
Mytilus sp. (dead) (#)	16.43	11.65	3.68	3.02	3.00	4.24
Other (% cover)						
Boulder/Cobble	0.00	0.00	0.00	0.00	1.88	2.65
Oil cover (%) (primary)	0.00	0.00	3.00	3.72	21.83	0.95
Oil scale (primary)	0.00	0.00	1.66	1.63	2.70	0.42
Rock	0.00	0.00	0.00	0.00	45.63	64.52
Water	0.00	0.00	0.00	0.00	2.50	3.54
Number of stations	**3**		**4**		**2**	

[1] Mean number of taxa per station within each category; see detailed data in Appendix C.

Table 2-10. Mean abundance (% or no./0.25 m^2) of important epibiota at the lower rocky station, Cruise 4, September 1989.

Lumped Taxon	Category 3—Northwest Bay Islet Mean [1]	SD [1]
Plants (% cover)		
Algae (juvenile)	1.15	3.13
Encrusting brown algae	0.40	0.66
Encrusting red algae	8.25	9.99
Filamentous green algae	2.95	3.12
Fucus gardneri	16.80	18.44
Gigartinaceae	0.85	2.19
Rhodomelaceae	3.50	9.44
Rhodomelaceae/*Cryptosiphonia*	6.30	9.91
Total plant cover (%)	**40.55**	
Number of plant taxa	**13.00**	
Animals (% cover or no./0.25 m^2)		
Lottiidae (#)	2.30	3.53
Pagurus hirsutiusculus (#)	2.70	4.30
Semibalanus balanoides (%)	0.25	0.35
Dead organisms (% cover or no./0.25 m^2)		
Articulated coralline algae (dead) (%)	0.50	0.94
Encrusting coralline algae (dead) (%)	12.65	21.92
Fucus gardneri (dead) (%)	2.30	3..40
Mytilus sp. (dead) (#)	0.30	0.95
Other (%) cover		
Oil cover (%) (primary)	38.00	45.41
Oil scale (primary)	0.60	0.52
Bare substrate	10.00	16.50
Number of stations	**1**	

[1] Mean abundance and standard deviation for six quadrats sampled at this station.

Summer 1993—Ten rocky sites were sampled at one or more elevations in late June and early July 1993 (see Table 1-1). Mean abundances of selected epibiota at rocky habitats are shown in Tables 2-1, 2-2, and 2-3. Because of the restricted field sampling plan in 1993, a somewhat different group of stations was sampled at each elevation compared to previous years (see Table 1-1). In addition, the data sheet for the Northwest Bay Rocky Islet upper station was lost; data on *Fucus* cover from this station were recovered from quadrat photographs and are used in some analyses; other data could not be reliably obtained from the photographs and are not reported. Detailed data on taxon abundances by individual station are provided in Appendix Tables C-5-1 through C-5-3.

Oil cover remained near zero at all stations at all elevations in 1993 (Figure 2-1).

Upper Stations

In 1993, only one Category 1 upper station was sampled. As a result, no statistical tests comparing categories were conducted for upper elevations.

At upper rocky stations, *Fucus* was found at low abundances at all categories through 1991 (Figure 2-2, upper) reflecting the initial selection of upper stations at the top of the obvious zone of attached macrobiota. By 1992 the percentage of *Fucus* cover at oiled upper stations (both Category 2 and 3) began to increase markedly relative to that at Category 1 stations. By 1993, *Fucus* cover was 15.4 and 12.8 percent at Category 2 and 3 upper stations, respectively, compared to less than 1 percent at the single Category 1 station sampled (Table 2-1). (When the Northwest Bay Rocky Islet upper station data from quadrat photographs are included, the Category 3 cover drops to 8.7 percent as shown in Figure 2-2.) This pattern reflects the substantial recolonization of the oiled stations, especially Snug Harbor and Block Island (Figure 2-2, lower; Appendix Table C-5-1) from a condition of reduced algal cover at these elevations that was not evident when the stations were established (in late 1989 and 1991, respectively).

Recovery of rockweed at Category 2 and 3 upper stations in 1993 was also reflected in increased numbers of some associated fauna such as Lottiidae and *Littorina sitkana* (Table 2-1).

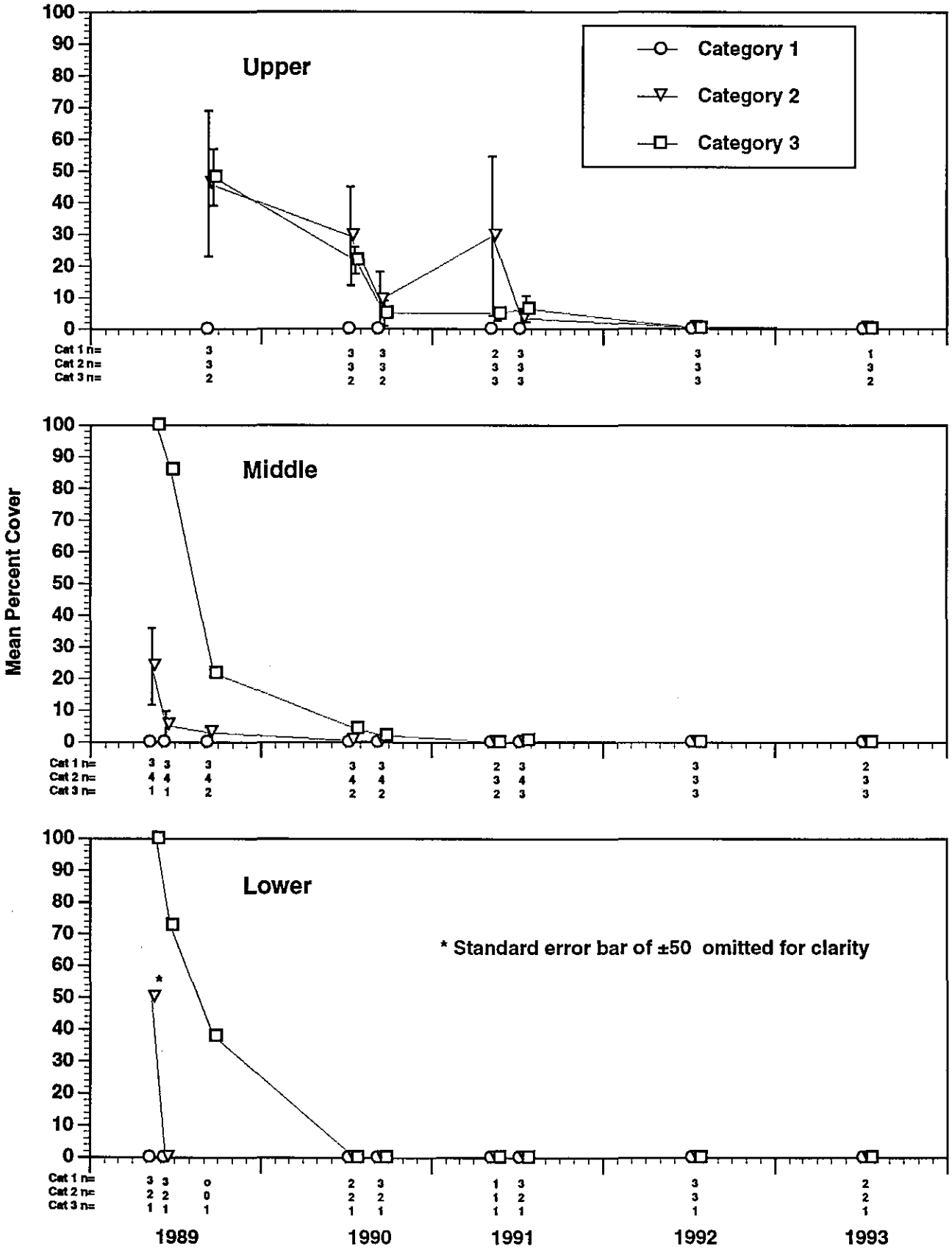
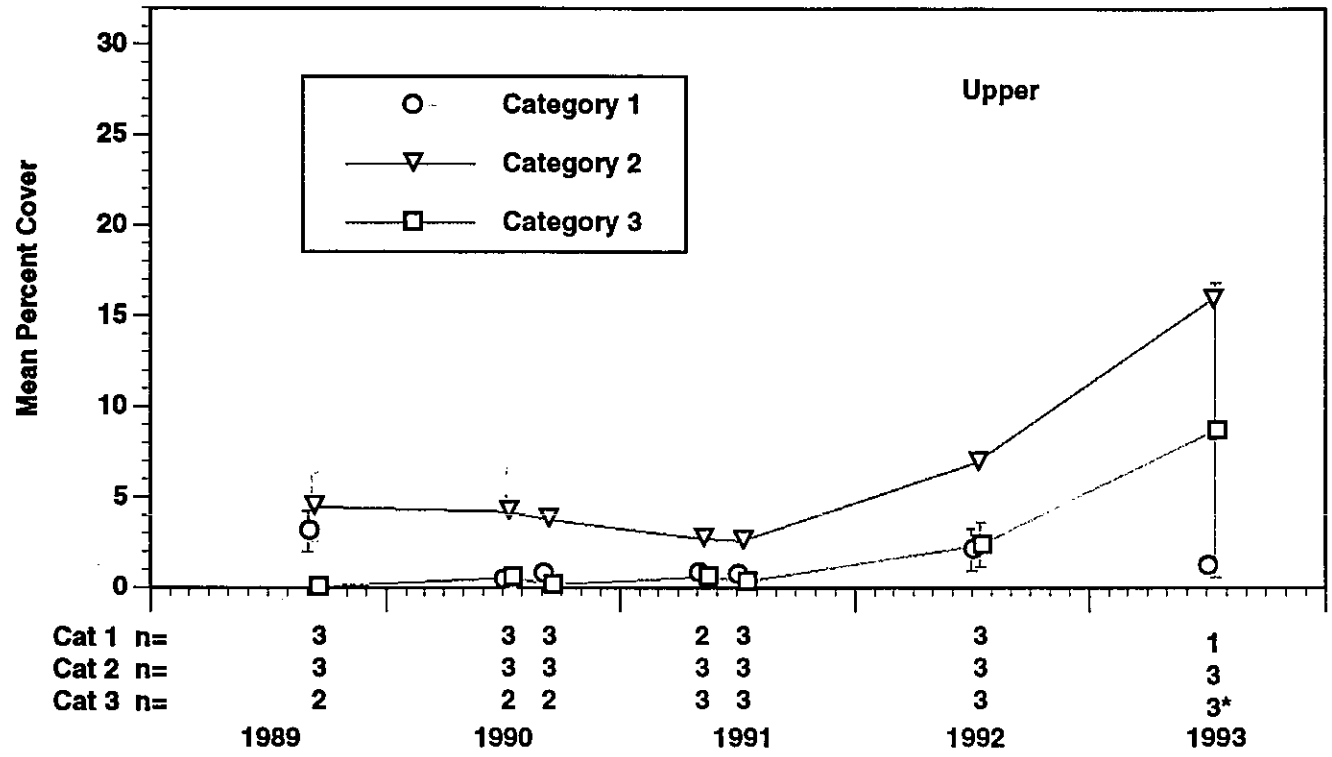


Figure 2-1. Mean percent cover (±1 SE) of oil cover from rocky sites, by category, 1989-93. Number of stations sampled (n) for each category shown below axis.



*Includes estimated Fucus cover for Northwest Bay Rocky Islet determined from quadrat photographs.

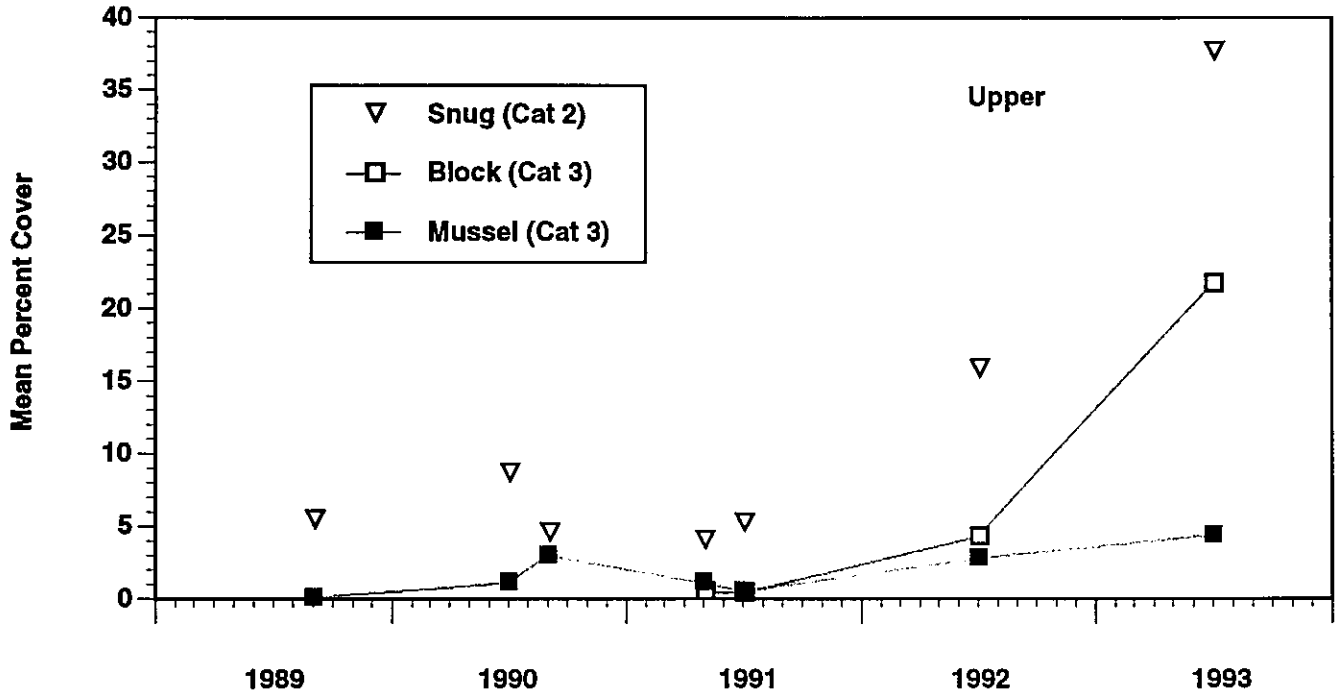


Figure 2-2. Mean percent cover (±1 SE) of *Fucus* from upper rocky stations, by category (mean within category) and from selected upper rocky stations (mean within station), 1989-93.

Middle Stations

In 1993, only one biologically noteworthy category effect remained at middle stations. Although juvenile limpets showed the category effect in ANOVA, and both Category 1 and 3 stations had higher densities than did Category 2 stations (Table 2-2), larger limpets showed an opposite trend (most abundant at Category 2 stations).

By 1992, the significant reduction in mean percent cover of *Fucus* at middle elevations that had existed since shoreline treatments in mid-1989 had disappeared (Figure 2-3). By mid-summer of 1993, *Fucus* cover at previously oiled sites was actually greater than at the unoiled Category 1 middle stations (Table 2-2). This is presumed to be the result of the reduced densities of grazers (e.g., Lottiidae, Figure 2-4; littorines Figure 2-5) at oiled sites in 1990. This reduced grazing presence had allowed establishment of somewhat higher cover of *Fucus* sporelings (Figure 2-6) at oiled sites in 1990 and 1991. These sporelings subsequently produced the larger rockweed plants in 1992 and 1993. In 1993, sporeling cover was significantly greater at Category 1 than at Category 3 middle stations ($p < 0.1$); this probably reflects different stages in cycles of rockweed growth and senescence with most plants at the hot-water washed sites at a mature stage.

Category trends described above are further explained by examination of long-term trends in *Fucus* cover and abundance of limpets and littorines at individual middle stations (Figures 2-7 through 2-10). The increase in *Fucus* was especially sharp at Block Island between 1991 and 1993 but has increased steadily over that time frame at several other oiled middle stations (Figure 2-7). Increases in limpets have been steady since 1989 at all oiled middle stations (Figure 2-8), while changing little at unoiled Crab Bay. Like the limpets, *Littorina sitkana* were eliminated by hot-water washing at the Northwest Bay Rocky Islet middle station in early 1989 and did not begin significant recovery until 1991 (Figure 2-9). *L. sitkana* declined at Herring Bay from 1989 to 1990 and have increased steadily since. The combination of the high numbers of limpets and littorines at Herring Bay in 1993 may begin to reestablish biological control over the algal coverage at that site. At the Northwest Bay Islet middle station, large numbers of *L. scutulata* (Figure 2-10) may be limiting re-establishment of rockweed on the solid bedrock upper portion of the middle intertidal bench (see Figure 41 in Houghton et al. 1993a).

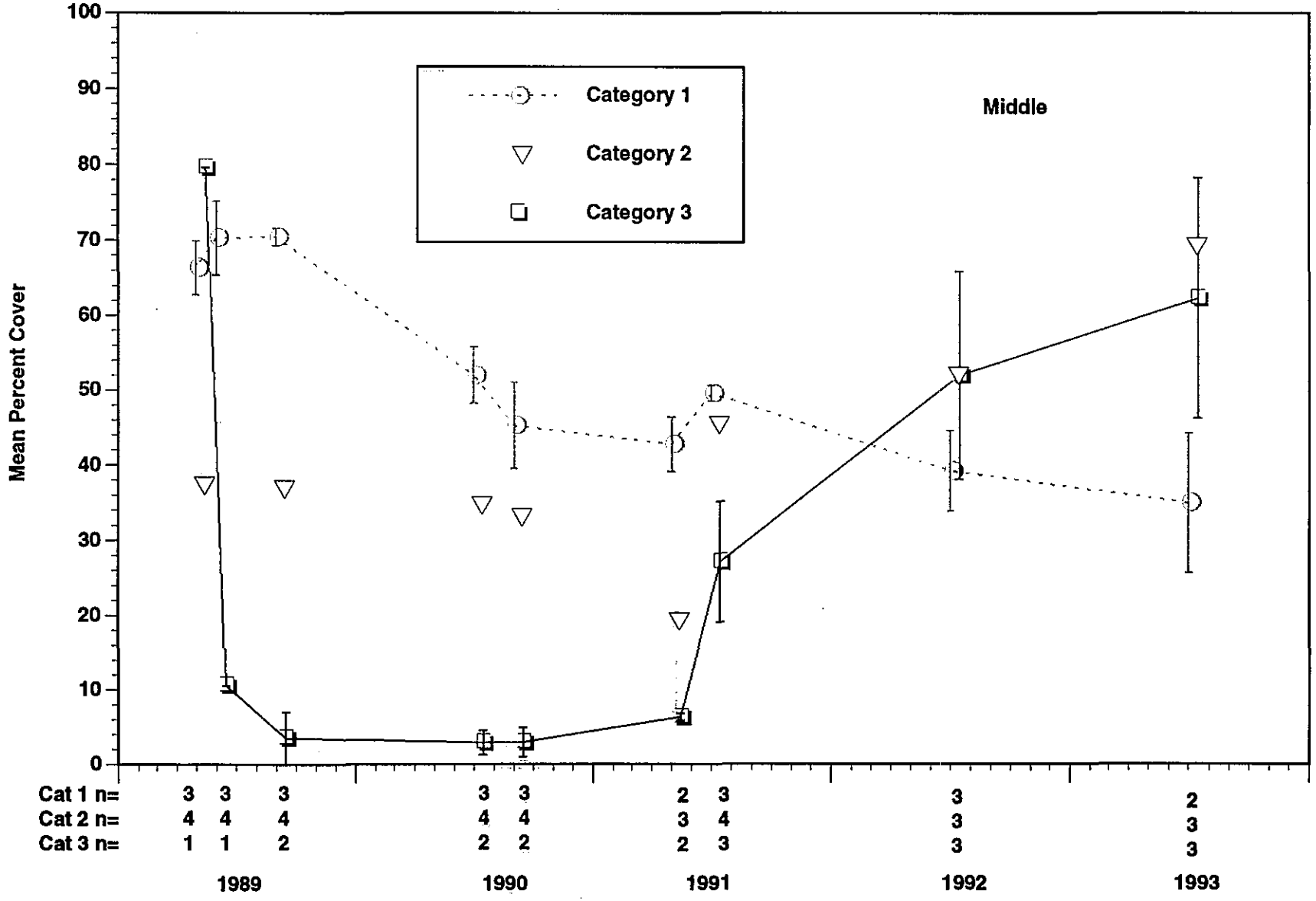


Figure 2-3. Mean percent cover (±1 SE) of *Fucus* from middle intertidal stations at rocky sites, by category, 1989-93.

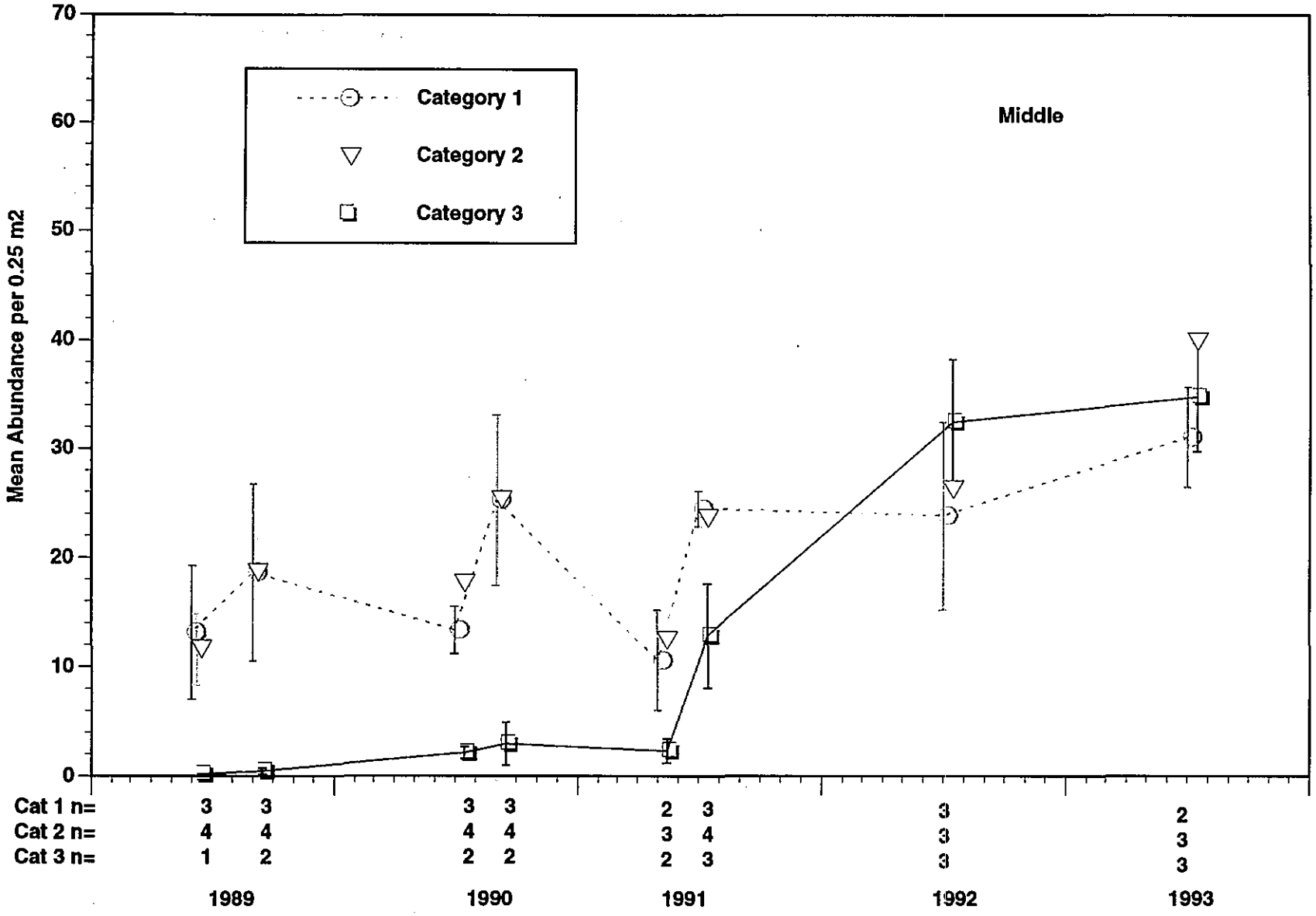


Figure 2-4. Mean abundance (±1 SE) of Lottiidae from middle intertidal stations at rocky sites, by category 1989-93.

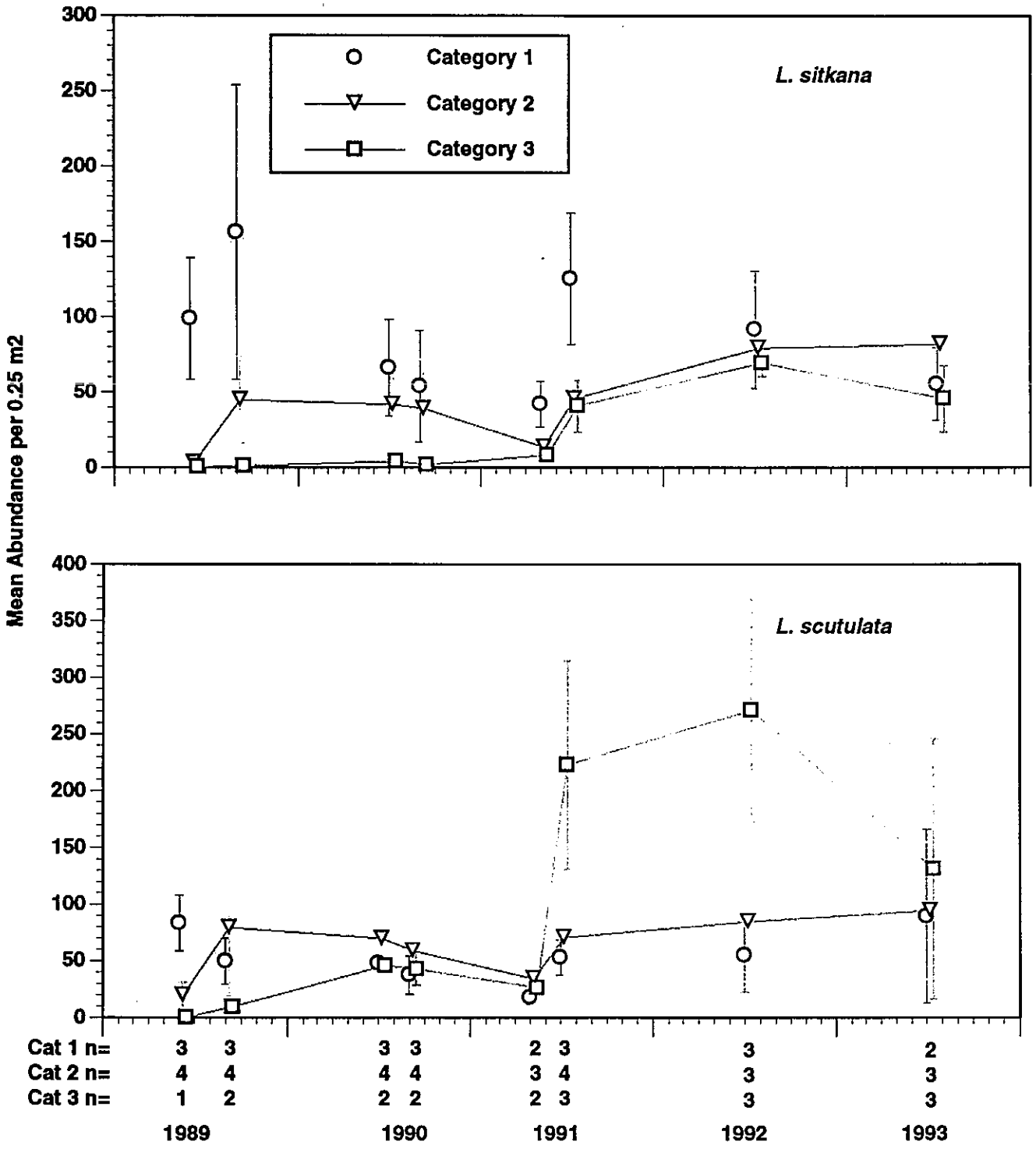


Figure 2-5. Mean abundance (±1 SE) of littorine snails from middle intertidal stations at rocky sites, by category, 1989-93.

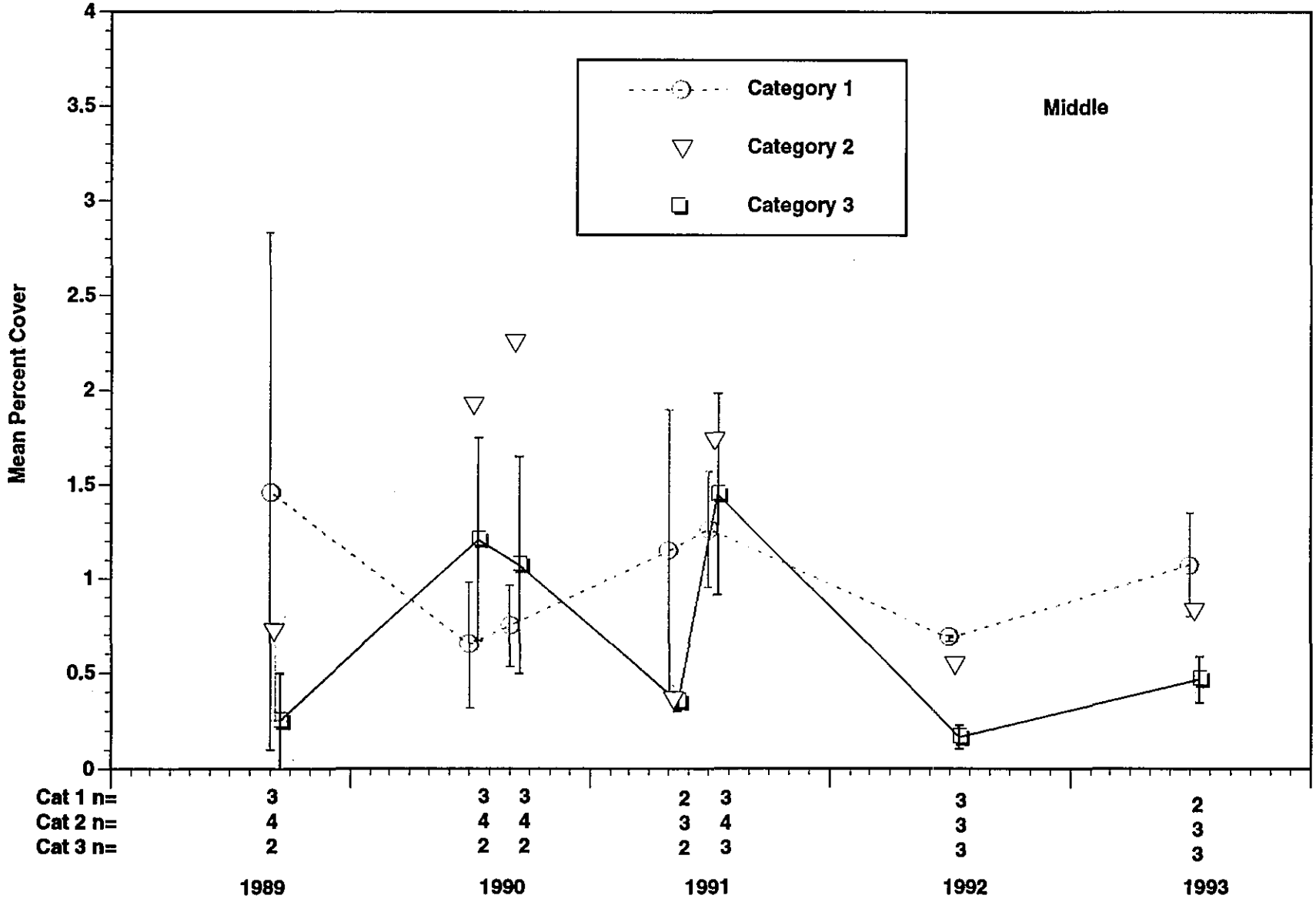


Figure 2-6. Mean percent cover (±1 SE) of *Fucus* sporelings from middle intertidal stations at rocky sites, by category, 1989-93.

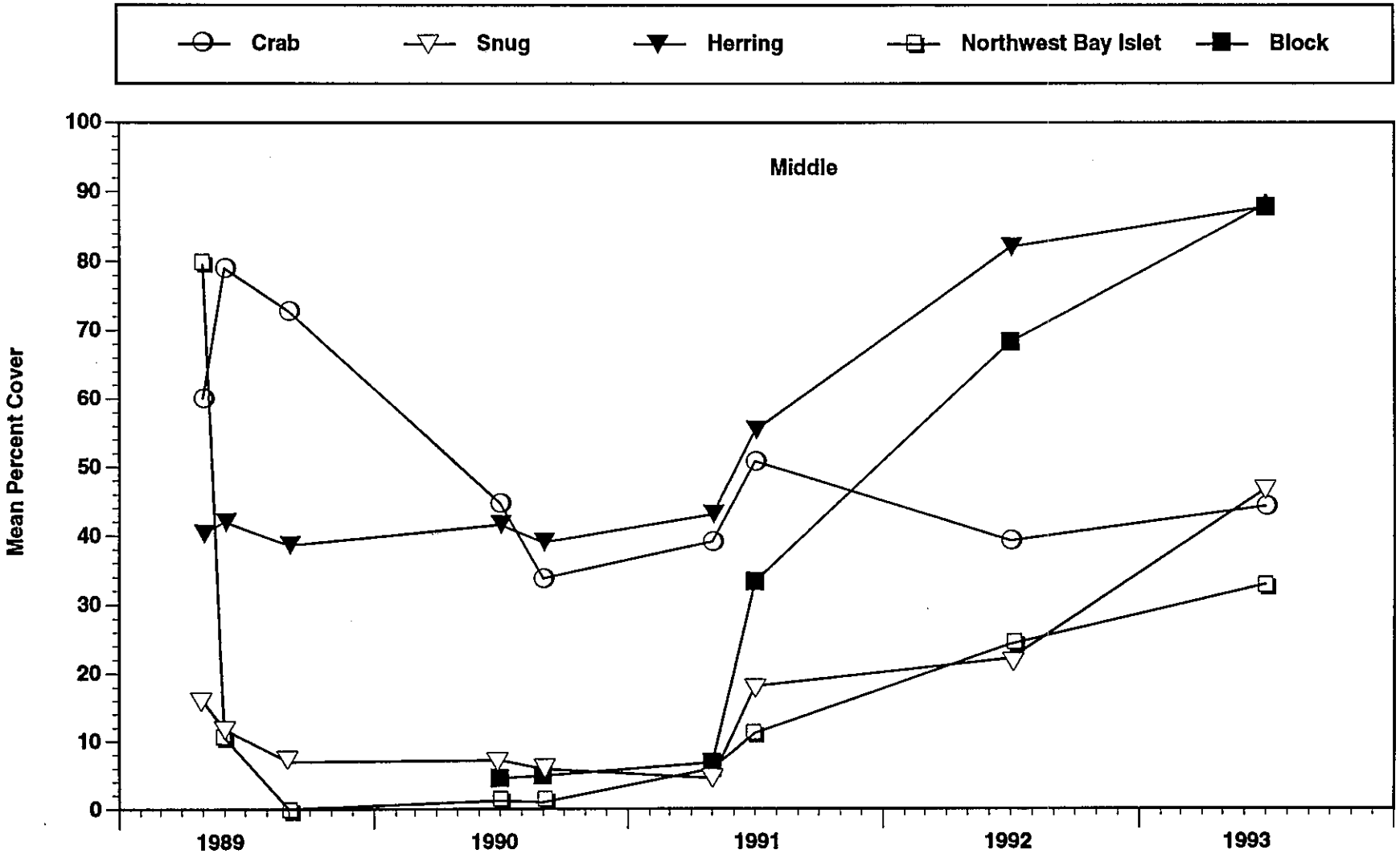


Figure 2-7. Mean percent cover (within station) of *Fucus* from selected middle intertidal rocky stations, 1989-93.

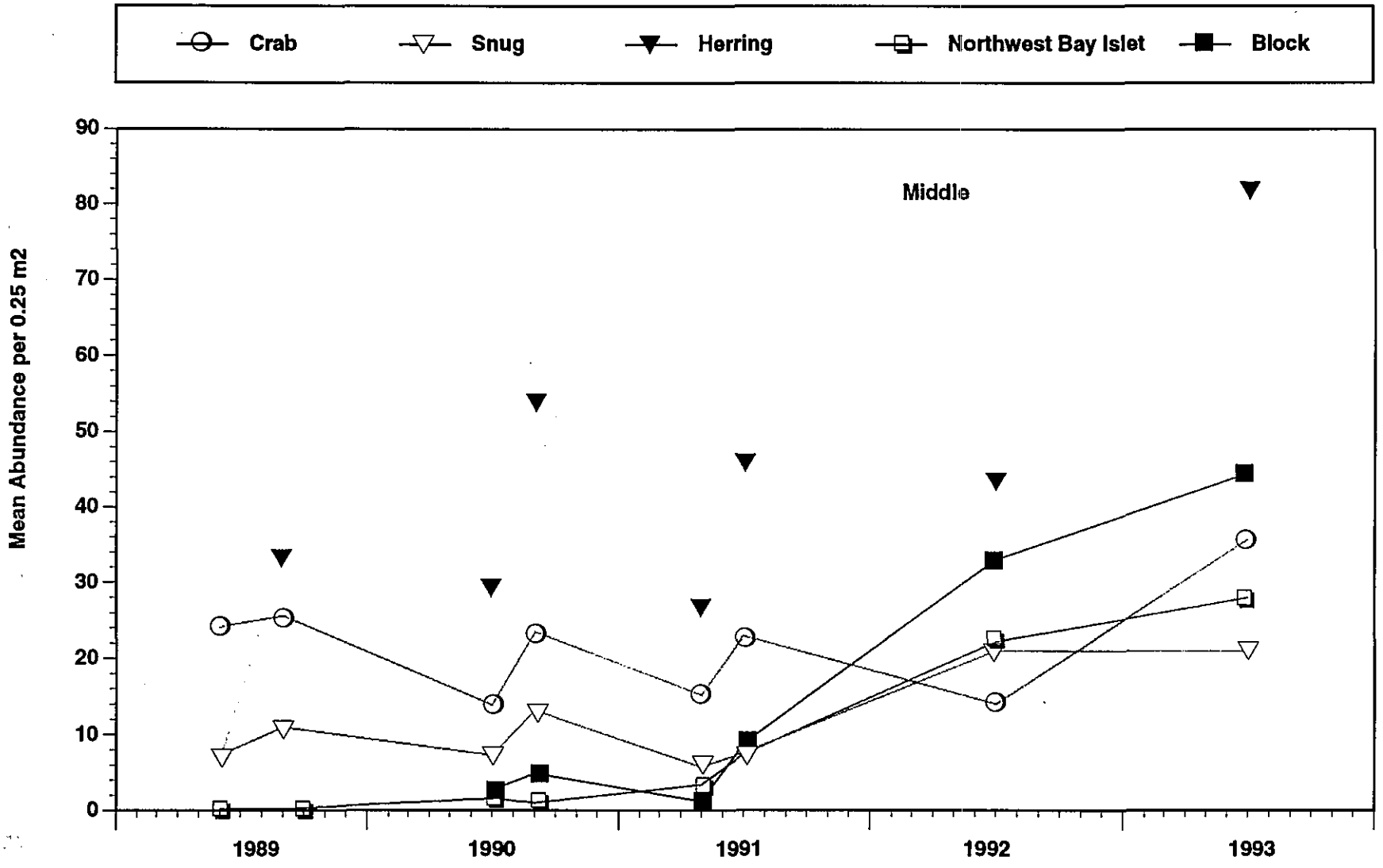


Figure 2-8. Mean abundance (within station) of Lottiidae from selected middle intertidal rocky stations, 1989-93.

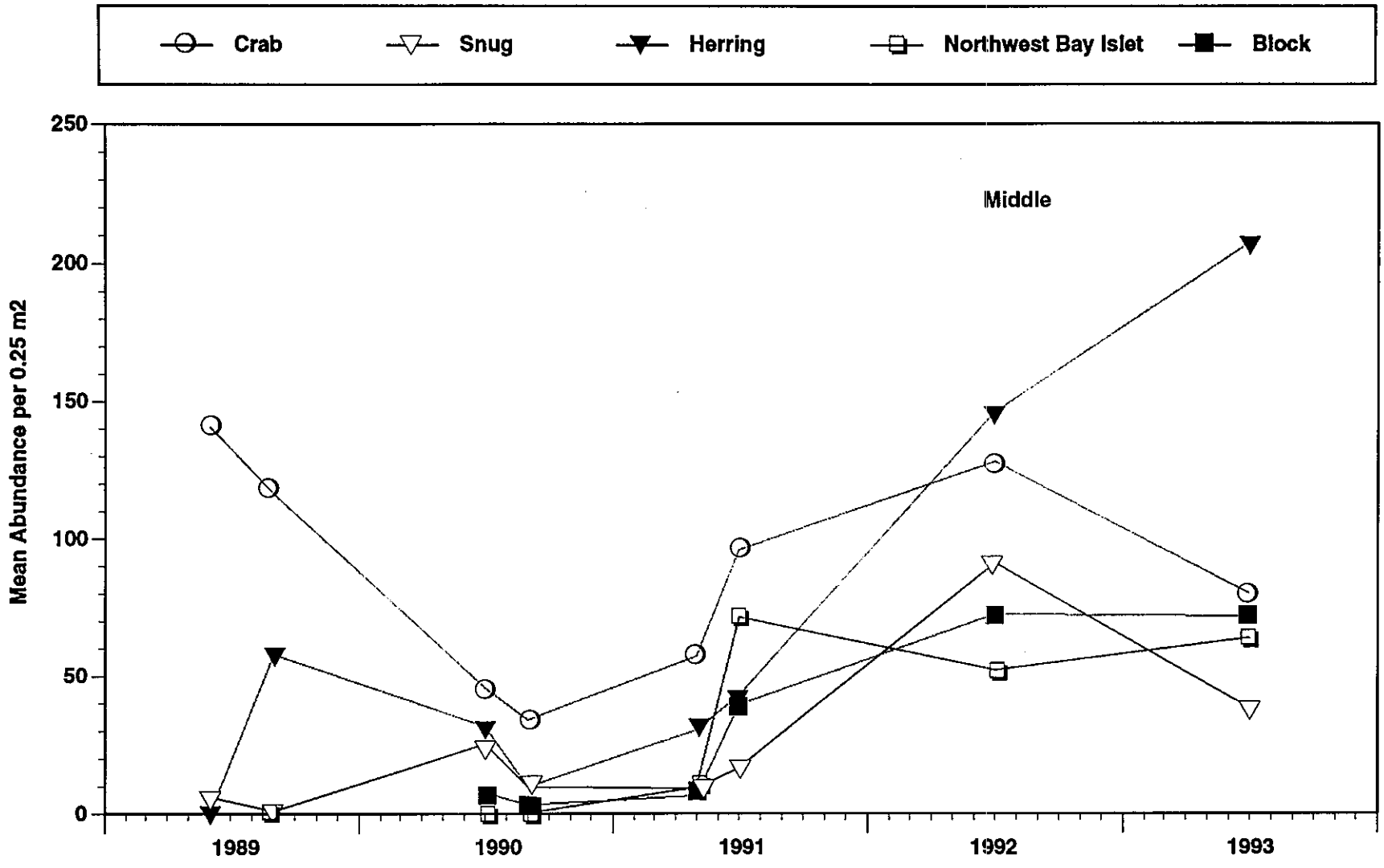


Figure 2-9. Mean abundance (within station) of *Littorina sitkana* from selected middle intertidal rocky stations, 1989-93.

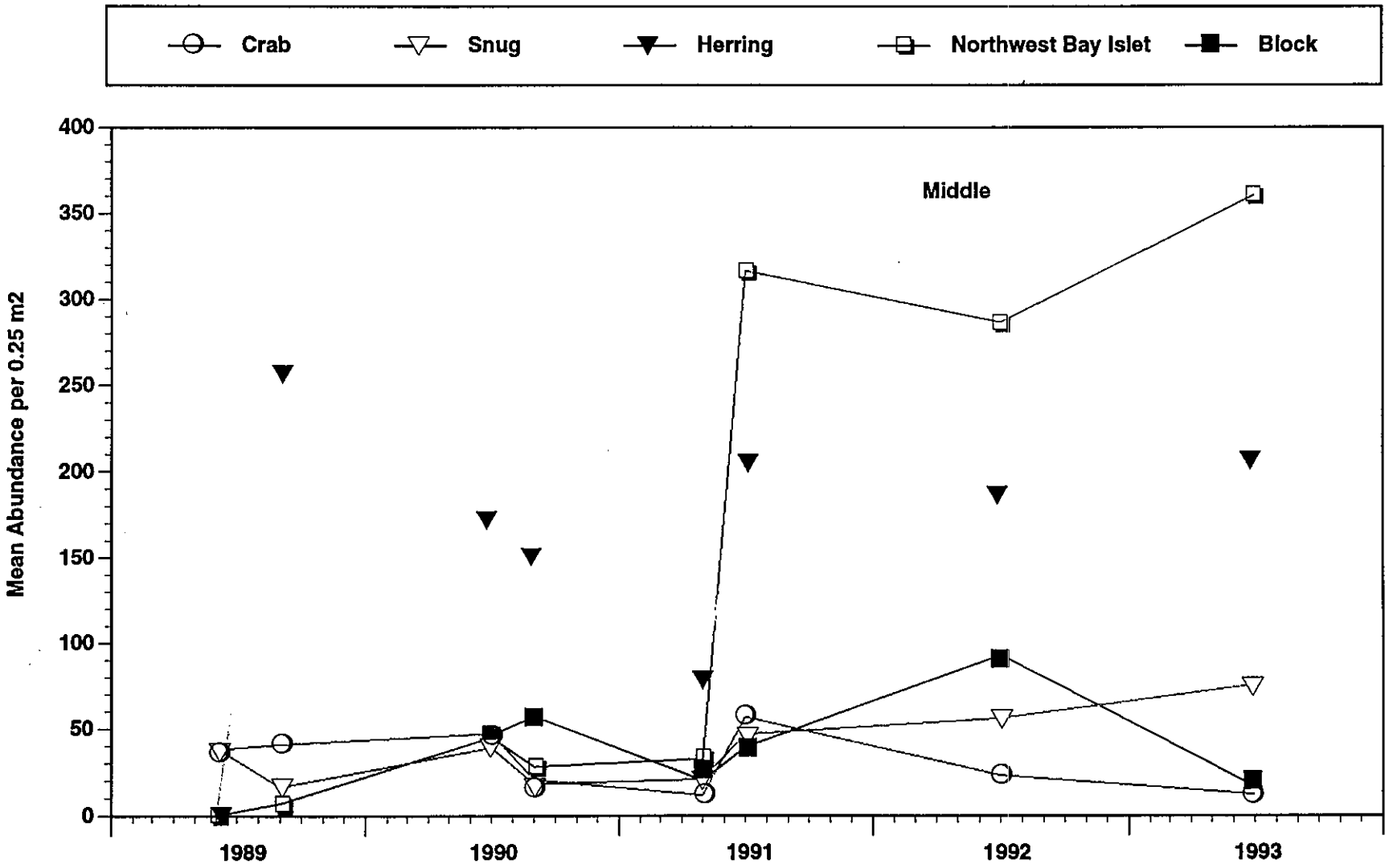


Figure 2-10. Mean abundance (within station) of *Littorina scutulata* from selected middle intertidal rocky stations, 1989-93.

Total abundance of barnacles (Figure 2-11) was severely impacted by treatment at Category 3 middle stations until July 1991 when a substantial set of *Semibalanus balanoides* occurred. In subsequent years, percent cover of barnacles has declined somewhat at Category 3 stations. Cover remains somewhat higher at oiled sites (whether washed or not) than at unoiled unwashed stations. The apparent drop in barnacle cover at Category 1 middle stations in 1993 may be an artifact of not sampling at the Hogg Bay reference site, where barnacle cover has typically been high (> 30 percent; Houghton et al. 1993a, b).

Mussels were eliminated from the Category 3 middle station at Northwest Bay Islet by hot-water washing administered between May and June surveys in 1989 (Figure 2-12). While mussels are still largely absent from this station, mean cover at Category 3 middle stations has not differed significantly from other middle stations since 1990 when additional sites were sampled. Substantial interannual fluctuations in mussel abundance at Category 1 middle stations and a gradual increase at all three station categories in 1992-93 demonstrate that these populations in rocky habitats are subject to cycles in recruitment and predator abundance, as well as exposure-related physical effects.

The primary predator on mussels and barnacles at middle stations is the drill *Nucella* which is represented by two species at our sites (*N. lamellosa, N. lima*). Abundance of drills was severely limited at Category 2 and 3 middle stations through 1991 (Figure 2-13). Increased numbers at Category 3 sites in 1992 likely contributed to the decline in barnacle cover (Figure 2-11). Apparent return to "normal" densities at Category 2 sites in 1993 is expected to contribute to a decline in mussel and barnacle cover in coming years. *Nucella* were only found at one Category 3 middle station in 1993 (Northwest Bay West Arm). An interesting seasonal pattern is revealed in the data from Category 1 stations which experienced a severe drop in numbers in the two spring samplings (1989 and 1991; Figure 2-11).

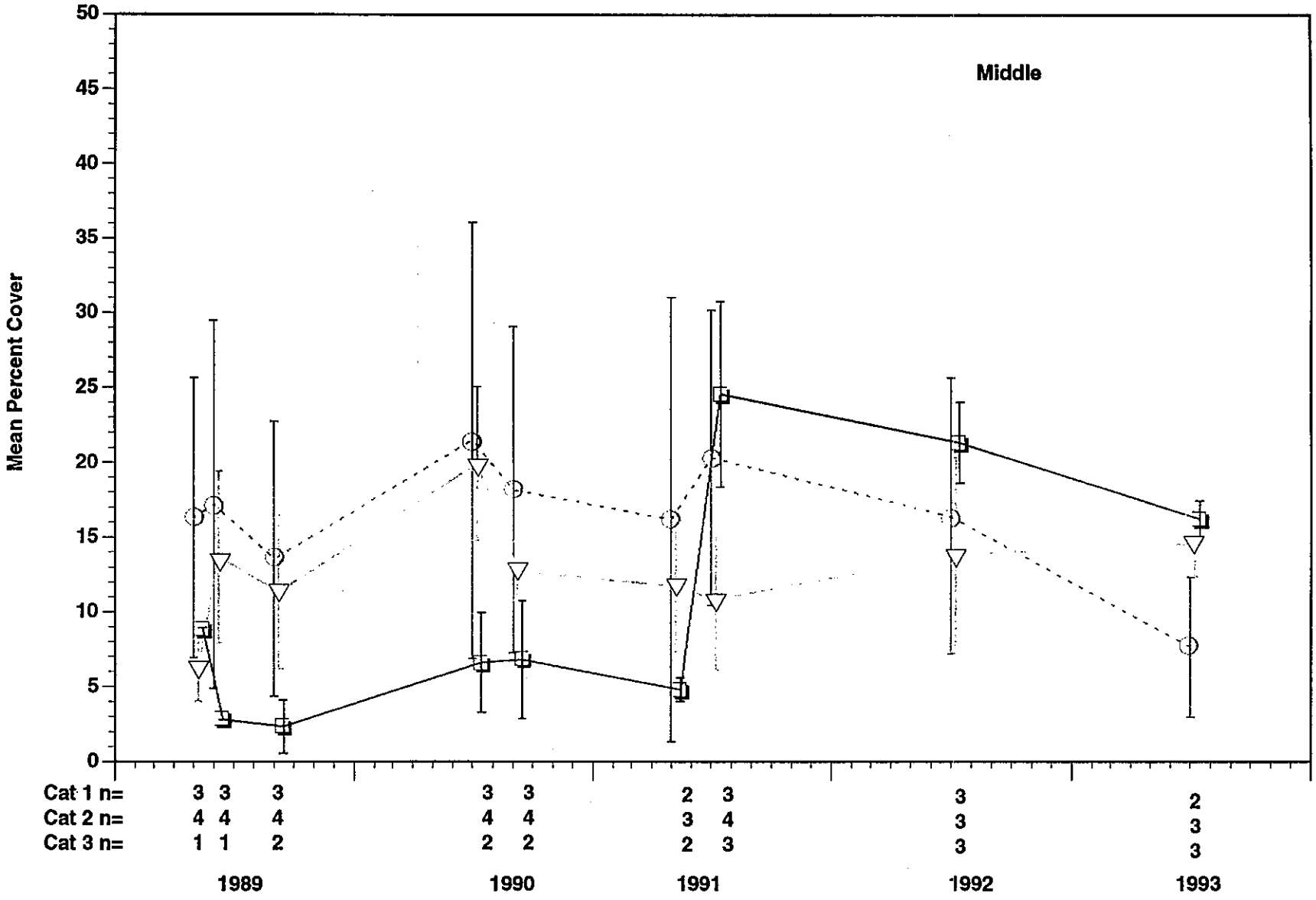


Figure 2-11. Mean percent cover (±1 SE) of Balanomorpha from middle intertidal stations at rocky sites, by category, 1989-93.

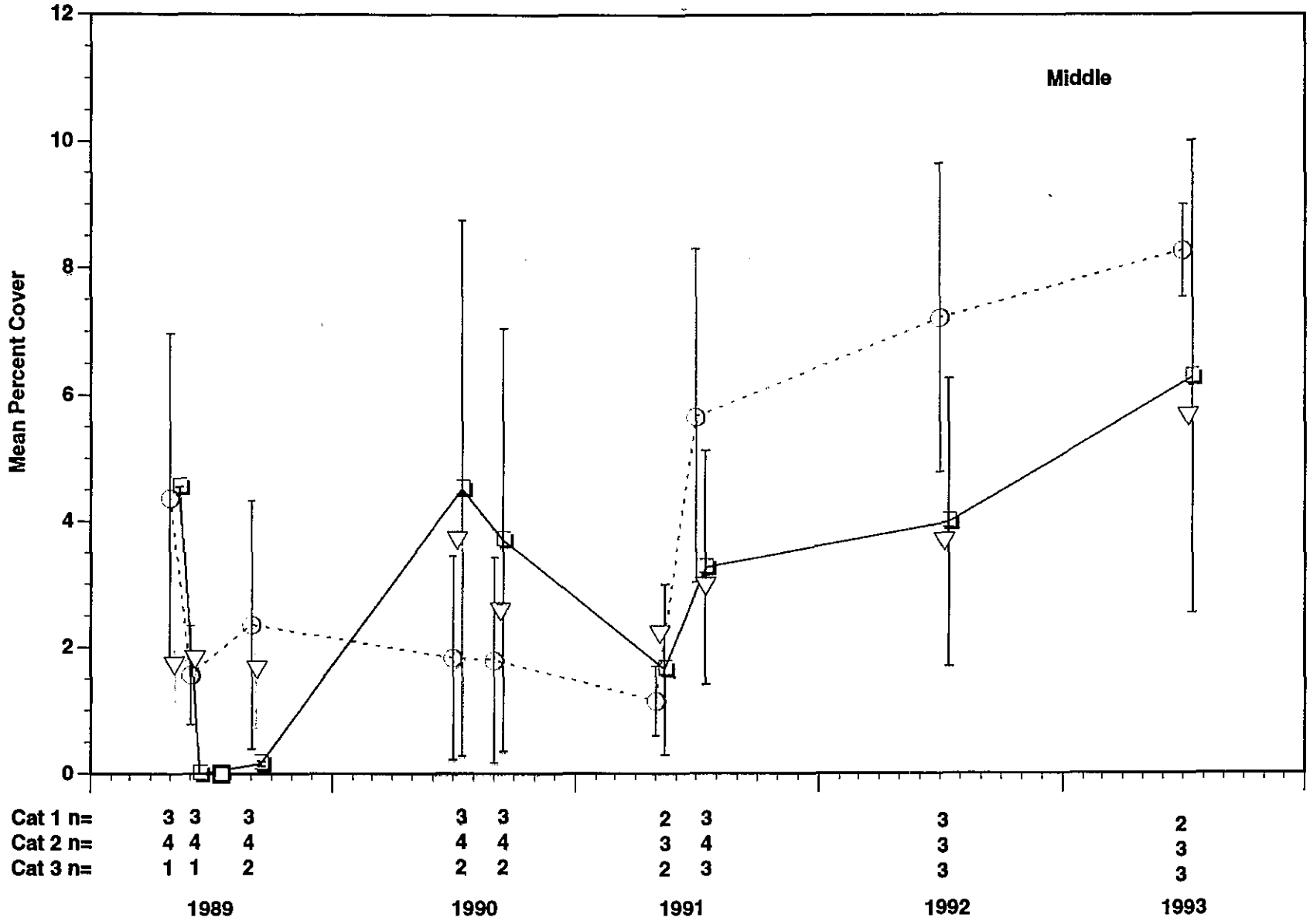


Figure 2-12. Mean percent cover (±1 SE) of mussels from middle intertidal stations at rocky sites, by category, 1989-93.

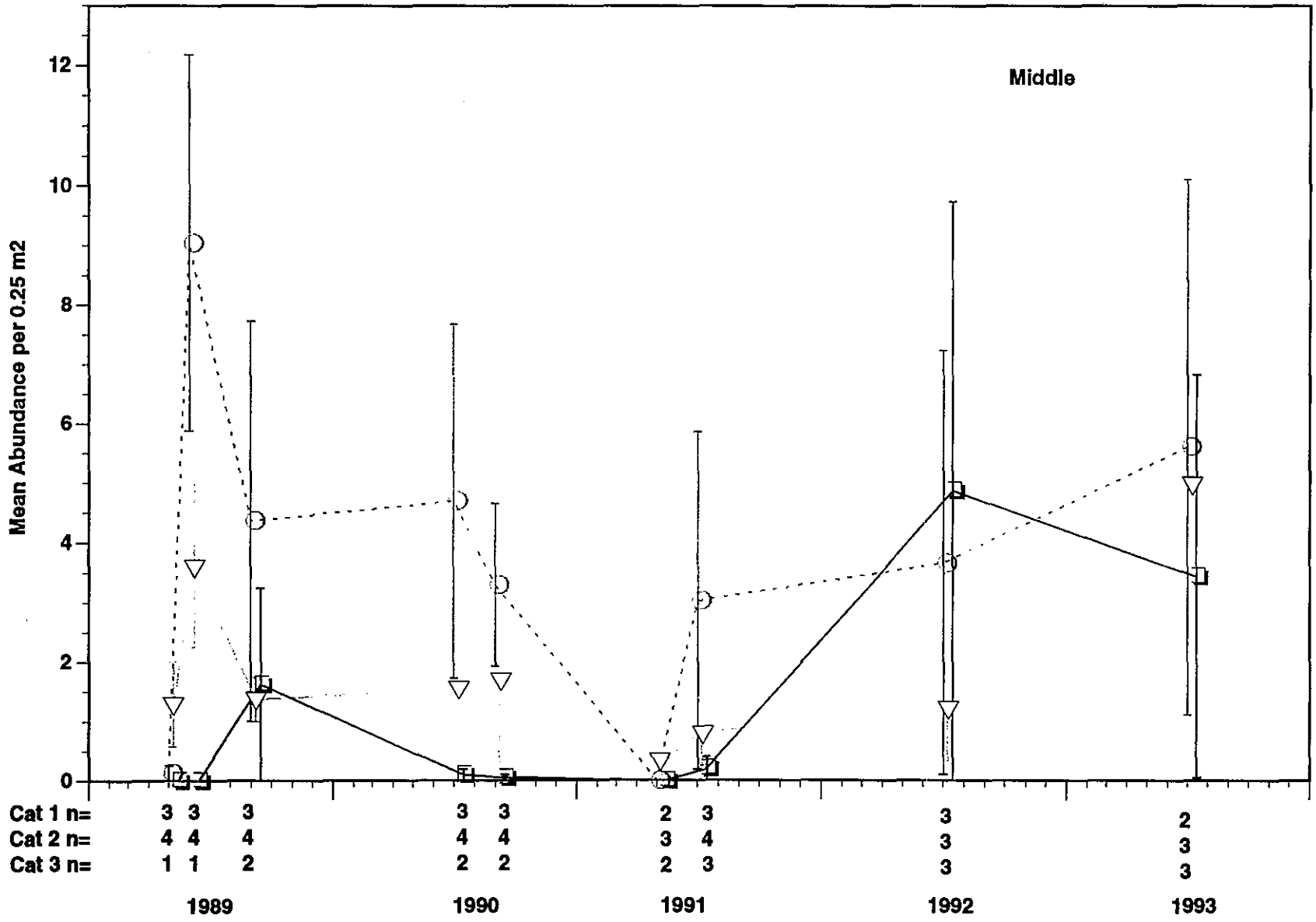


Figure 2-13. Mean abundance (±1 SE) of *Nucella* from middle intertidal stations at rocky sites, by category, 1989-93.

Lower Stations

At lower rocky stations there were no significant differences among site categories in ANOVAs for important epibiota (all $p > 0.10$). *Fucus* cover was similar at Category 1 and 2 sites (27 to 32 percent) but cover at the one lower elevation Category 3 station at Northwest Bay Rocky Islet continued the increase begun following treatment in 1989 (Figure 2-14). Recovery of red algae, including *Palmaria* spp. and the Rhodomelaceae/ *Cryptosiphonia* spp. complex, remained slow (Table 2-3; Figure 2-15). (The Subfamily Rhodomelaceae includes the genera *Odonthalia* and *Neorhodomela*, which can be difficult to distinguish in the field.)

Limpet (Lottiidae) abundances remained very high at the Category 3 lower station in 1993 but had declined somewhat from the peak in 1992 (Figure 2-16). Likewise, large fluctuations in littorine snails that occurred at the lower Rocky Islet station from 1989 through 1991 appear to have ended and densities of both species were very low and comparable to those at other lower stations (Figure 2-17). The densities of the hermit crab *P. hirsutiusculus* were much higher (25.3/0.25 m^2) at Category 3 than at other lower stations (2 to 3/0.25 m^2) but no drills had yet returned to the lower station at the Rocky Islet where there were 3.6 *Searlesia dira* per 0.25 m^2 in May of 1989, prior to treatment (Table 2-5).

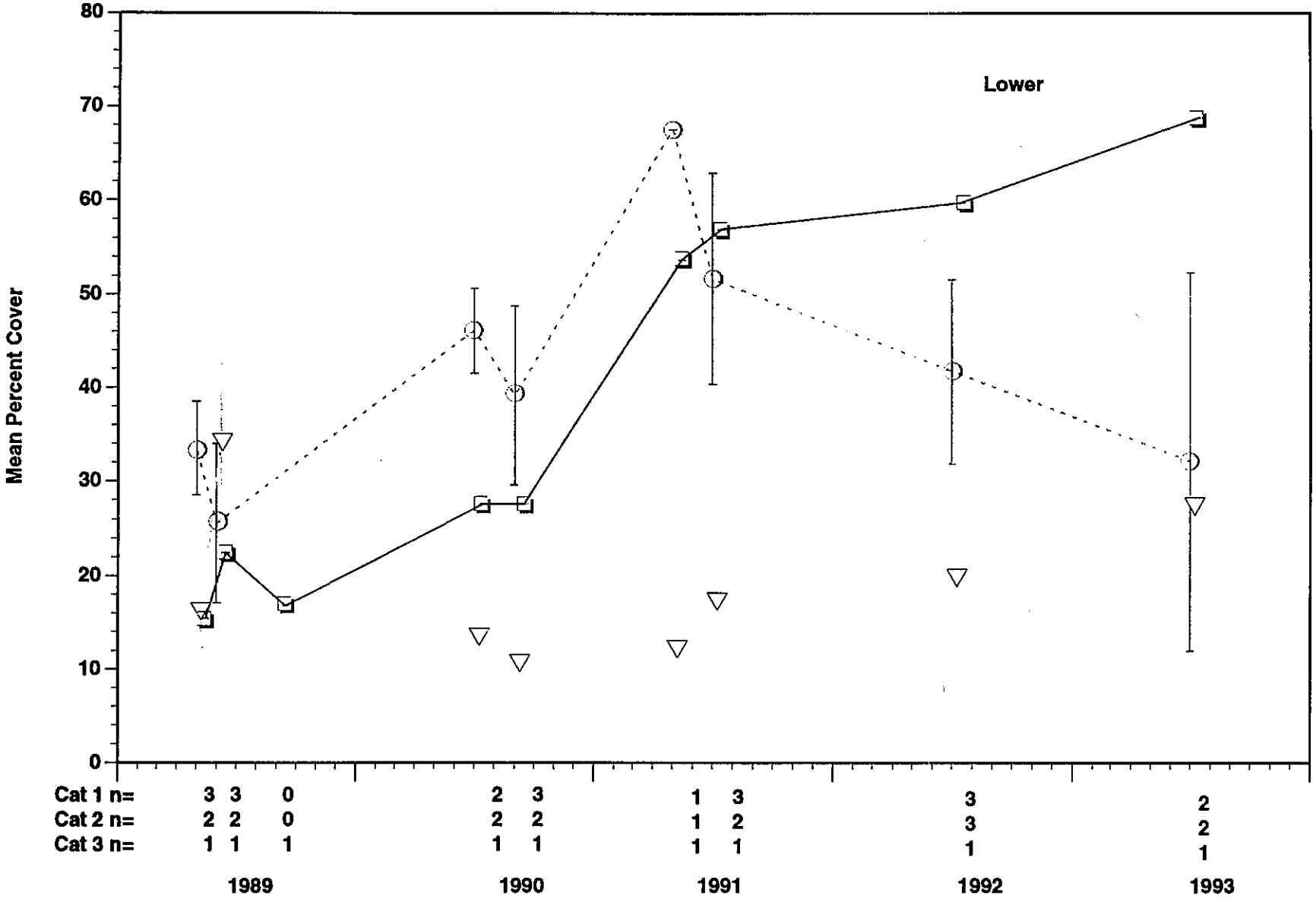


Figure 2-14. Mean percent cover (±1 SE) of *Fucus* from lower intertidal stations at rocky sites, by category, 1989-93.

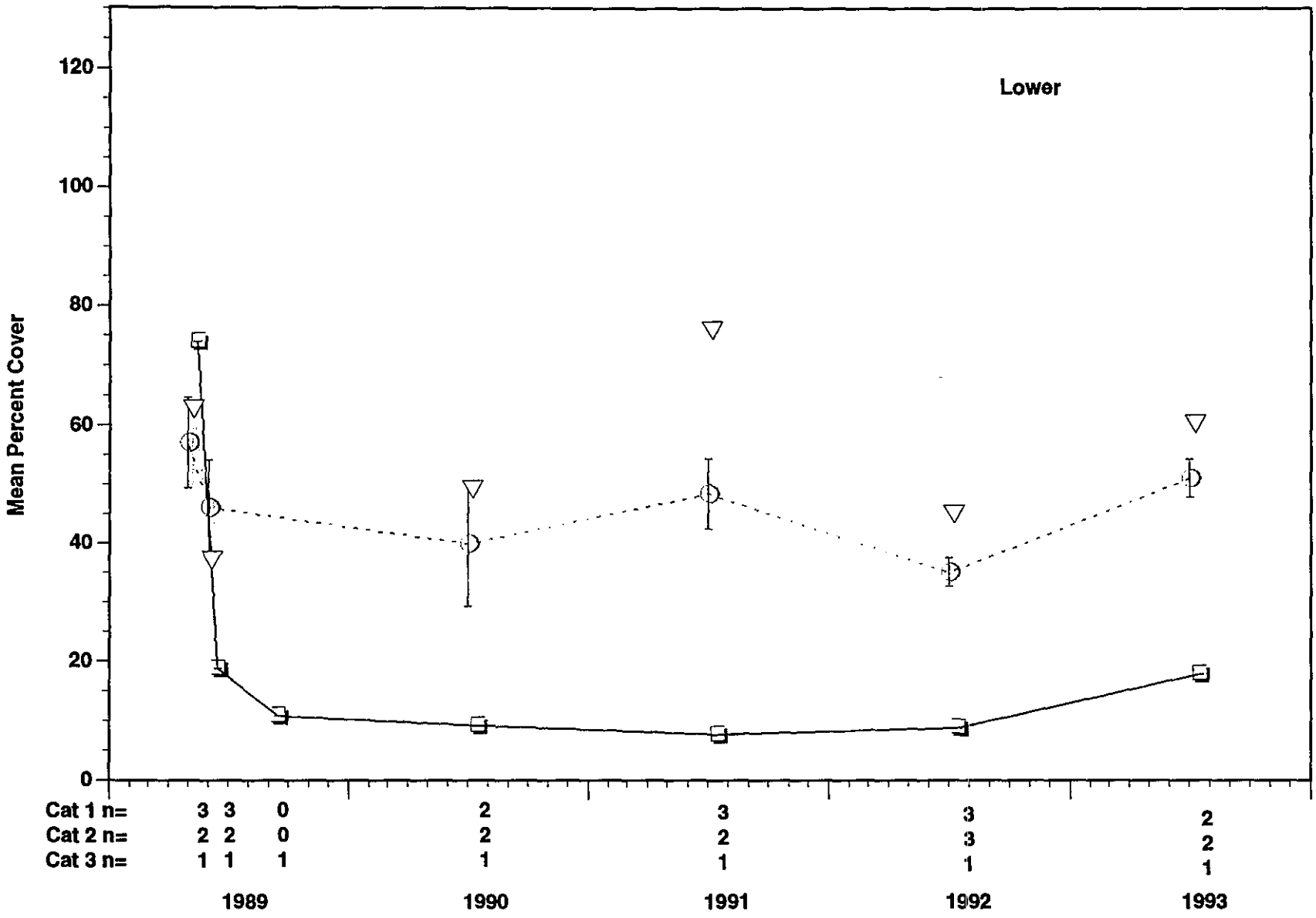


Figure 2-15 Mean percent cover (±1 SE) of total erect red algae from lower intertidal stations at rocky sites, by category, 1989-93.

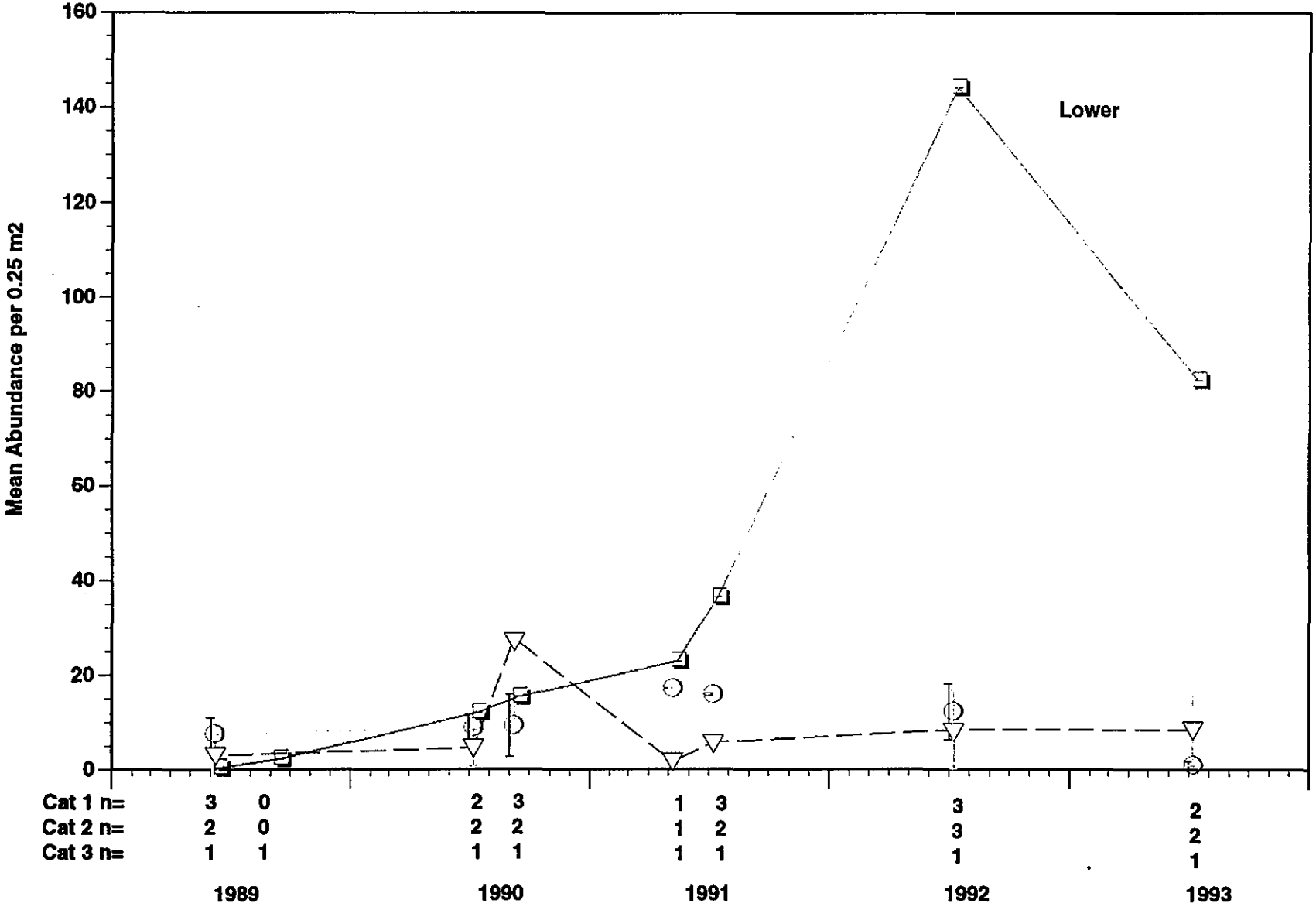


Figure 2-16. Mean abundance (±1 SE) of Lottiidae from lower intertidal stations at rocky sites, by category, 1989-93.

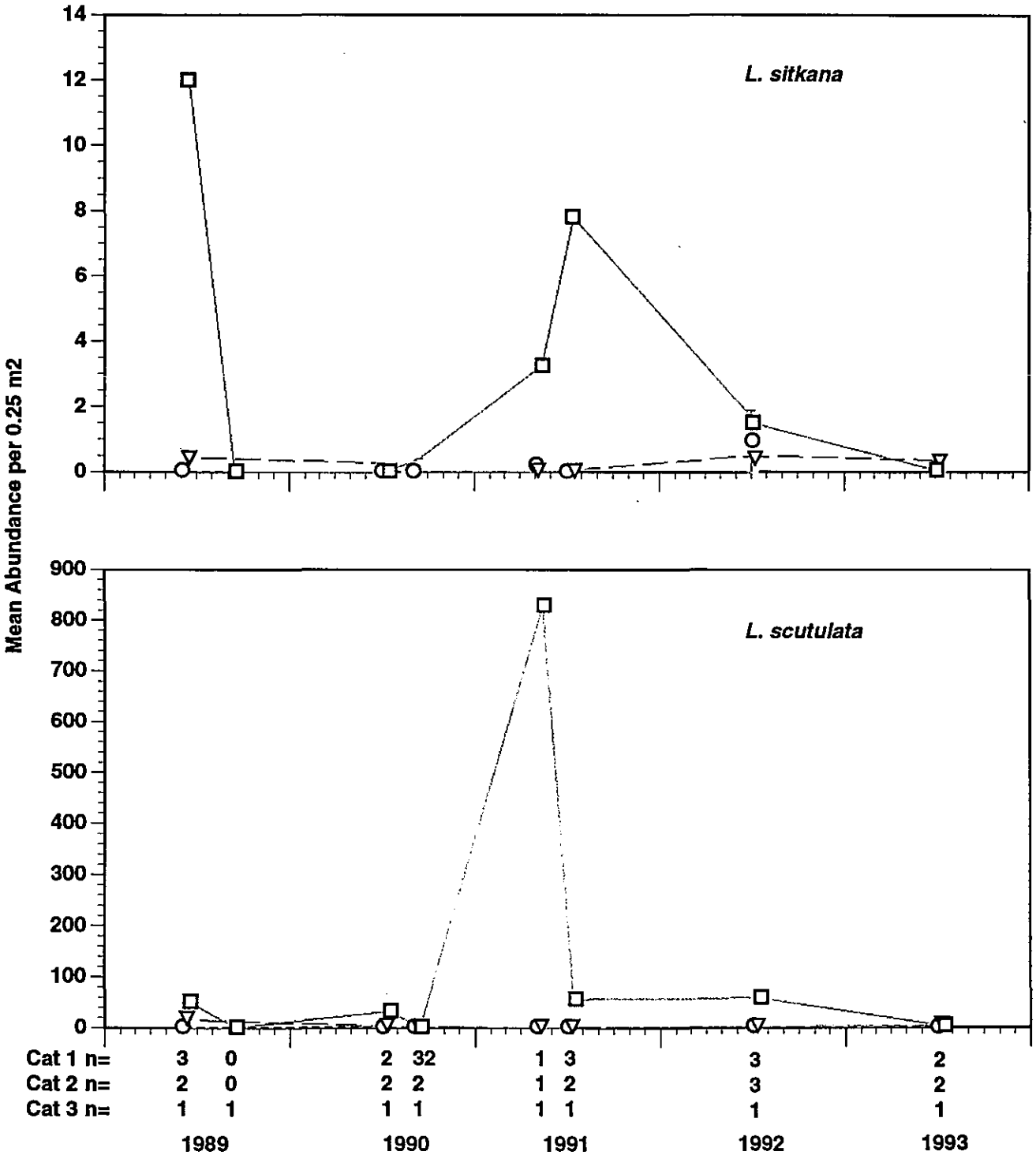


Figure 2-17. Mean abundance (±1 SE) of littorine snails from lower intertidal stations at rocky sites, by category, 1989-93.

Northwest Bay West Arm Middle Stations

A pair of adjacent study sites in the West Arm of Northwest Bay may offer important insights into the effects of intrusive shoreline cleanup. Initial visits to the sites in 1989 indicated that one had received a lesser degree of treatment than had the other. However, it has not been possible to confirm this difference in treatment either from written treatment records or in conversations with cleanup workers. It is quite plausible, and even likely, that the observed differences in oiling and biological conditions have been directly attributable to differences in level of treatment. However, for the sake of consistency we have considered the evaluation of conditions between the adjacent sites in discrete fashion, outside of the broader epibiota analysis. The "treated" site is included in the broader Category 3 group since that is the treatment classification for the entire area based on available records.

When first sampled in September 1989, the Category 3 middle station at the Northwest Bay West Arm rocky site had significantly greater oil cover and significantly greater cover by dead coralline algae (both $p < 0.05$) than did the adjacent reference site that did not appear to have been hot-water washed (Table 2-11). This, and the other patterns described below, suggested that the treatment was both ineffective at oil removal and immediately damaging to the epibiota.

Total algal cover and total *Fucus* cover at the middle elevation reference station remained relatively constant from 1989 through 1993 (Table 2-11; Figures 2-18, 2-19). In contrast, total cover and *Fucus* cover at the Category 3 middle station increased steadily over the five-year period and showed substantial recovery by July 1993 relative to the adjacent middle reference station. The mean number of algal taxa increased at the reference station, possibly showing some recovery from effects of oiling but probably, more significantly, associated with increasing taxonomic sophistication of the investigators. The number of algal taxa declined at the Category 3 station from 1991 to 1992 and increased again in 1993 (Figure 2-18). The difference in mean total number of algal taxa between the two stations had increased in 1992, a trend contrary to the recovery and probably the result of increased *Fucus* dominance that excluded some other species; in 1993 this difference diminished slightly.

Table 2-11. Mean abundance (% or no./0.25 m2) of selected epibiota at Northwest Bay West Arm middle intertidal elevations (rocky site); September 1989 (n=4,4), July 1991 (n=5,5),

	1989				1991				1992				1993			
Lumped taxon	Reference	Category 3	Difference (%)	t-test	Reference	Category 3	Difference (%)	t-test	Reference	Category 3	Difference (%)	t-test	Reference	Category 3	Difference (%)	t-test
Plants (% cover)																
Elachista fucicola	b	b	b		3.8	0.1	-97	**	0.4	0	-100		0	0.2	a	
Encrusting coralline algae	1.4	0	-100		4.6	0.2	-96		2.7	0.2	-93		1.3	1.0	-23	
Encrusting non-coralline algae	9.5	12.0	26		18.0	9.4	-48		10.2	1.1	-89	**	14.1	7.5	-47	
Filamentous Chlorophyta	1.3	1.5	15		1.2	2.0	67		1.5	0.5	-67		6.6	0.9	-86	**
	87.5	7.0	-92	**	88.0	34.4	-61	***	85.0	63.0	-26		74.0	65.4	-12	
Fucus gardneri (sporeling)	b	b	b		2.4	2.4	0		0.8	0.2	-75	*	1.8	0.4	-78	**
Gloiopeltis furcata	b	b	b		0.7	7.2	929	**	2.5	4.6	84		3.3	2.0	-39	
Halosaccion glandiforme	0.4	0	-100		2.1	0	-100	**	1.0	0	-100	***	3.4	0	-100	**
Mastocarpus papillatus	0.9	0.6	-33		1.4	0	-100	**	1.0	0	-100		0	0	0	
Neorhodomela larix	6.3	0	-100		5.6	0.1	-98		6.1	0	-100		2.4	3.3	38	
Neorhodomela oregona	8.3	4.0	-52		11.4	3.4	-70	*	5.2	2.4	-54		5.6	2.2	-61	
Pilayella littoralis	b	b	b		8.4	0.1	-99	**	1.4	0.8	-43		2.2	1.0	-55	
Total plant cover (%)	116.8	25.1	-79	**	149.40	61.8	-59	***	121.2	74.1	-39	***	124.0	88.4	-29	**
Number of plant taxa	7.0	3.5	-50	*	10.6	7.0	-34		12.2	4.8	-61		14.0	7.0	-50	**
Animals (% cover or no./0.25 m2)																
Chthamalus dalli (%)	9.3	3.8	-59		23.6	15.5	-34		9.2	12.6	37		12.9	15.0	16	
Littorina scutulata (#)	0.3	12.3	4000	**	10.2	312.8	2967	**	12.2	433.6	3454	***	2.0	16.2	710	
Littorina sitkana (#)	1.8	1.8	0		62.6	11.6	-81	*	6.2	83.8	1252		0.6	1.6	167	
Lottiidae (#)	22.3	0.8	-96	**	47.0	22.4	-52		45.0	42.2	-6		60.4	31.8	-47	
Mytilus cf. trossulus (%)	0	0.1	a		0.4	0.5	25		2.5	0.9	-64		0	0.1	a	
Nucella lamellosa (#)	10.8	3.3	-69		7.0	0.6	-91	***	7.2	14.6	103		10.4	10.2	-2	
Pagurus hirsutiusculus (#)	3.0	5.0	67		11.2	1.8	-84	**	7.8	2.8	-64	*	9.4	16.8	79	
Semibalanus balanoides (%)	0	0.1	a		0.7	18.9	2600		0.9	11.4	1167	**	0	0.4	a	
Siphonaria thersites (#)	3.8	0	-100	**	21.2	0.2	-99	***	63.2	3.2	-95	***	21.4	2.8	-87	**
Number of animal taxa	6.8	6.0	-12		7.8	6.6	-15		12.6	9.8	-22	**	11.2	16.0	43	*
Dead Plants (% cover)																
Encrusting coralline algae	0.3	8.0	2567	**	0	0	0		0	0	0		0	0	0	
Fucus gardneri	1.5	7.6	407		0.2	0.3	50		0.2	0	-100		0	0.2	a	
Oil Cover (%)	0	22.5	a	**	0	0	0		0	0	0		0	0	0	

a Percent change not calculable

b Abundance not documented

The opportunistic red alga *Gloiopeltis furcata*, which was significantly more abundant at the more disturbed Category 3 station in 1991, declined in abundance there and increased in abundance at the reference station such that cover in 1993 was similar at both stations (Figure 2-20).

The cover of erect red algae (other than *Gloiopeltis*) remained relatively stable at the reference station (Figure 2-20) over the five years of the study; at the Category 3 station, red algal cover declined until 1992 and increased in 1993 but still contributed to the overall difference in cover between the two stations. Thus, despite near full recovery in the rockweed population, the algal community at the Category 3 station remained significantly different from that at the reference station in 1993 ($p < 0.05$).

As with the plants, dominant animals showed continued recovery between 1991 and 1993. Both mean number of individuals and mean number of taxa increased at the Category 3 station, and the difference in species richness (number of animal taxa) evident in 1992 had disappeared (Table 2-11). The opportunistic barnacle *S. balanoides* continued its precipitous decline begun in 1992 and was no longer an important component of the assemblage (Figure 2-21). This sharp decline in barnacles at the Category 3 station preceded a decline in numbers of the drill *Nucella lamellosa*. The large fluctuations in abundance of this predator and its principal prey at the hot-water washed station contrast sharply with the relative stability of these two species at the reference station (Figure 2-21).

Abundances of both species of littorine snails dropped sharply from peaks in 1992 to where there was no difference between the two stations in abundances of either species in 1993 (Figure 2-22). The pulmonate *Siphonaria thersites*, which had been significantly less abundant at the Category 3 station in 1991 and 1992, remained so in 1993 ($p = 0.009$). The hermit crab *Pagurus hirsutiusculus*, however, increased in numbers so that its density was greater at the Category 3 station.

Overall, from 1991 (when the number of quadrats was increased to 5) through 1993, the number and magnitude of significant differences between the two stations progressively declined (Table 2-11). This trend indicates that normal biological controls were becoming re-established at the Category 3 station but full recovery was still a year or more away.

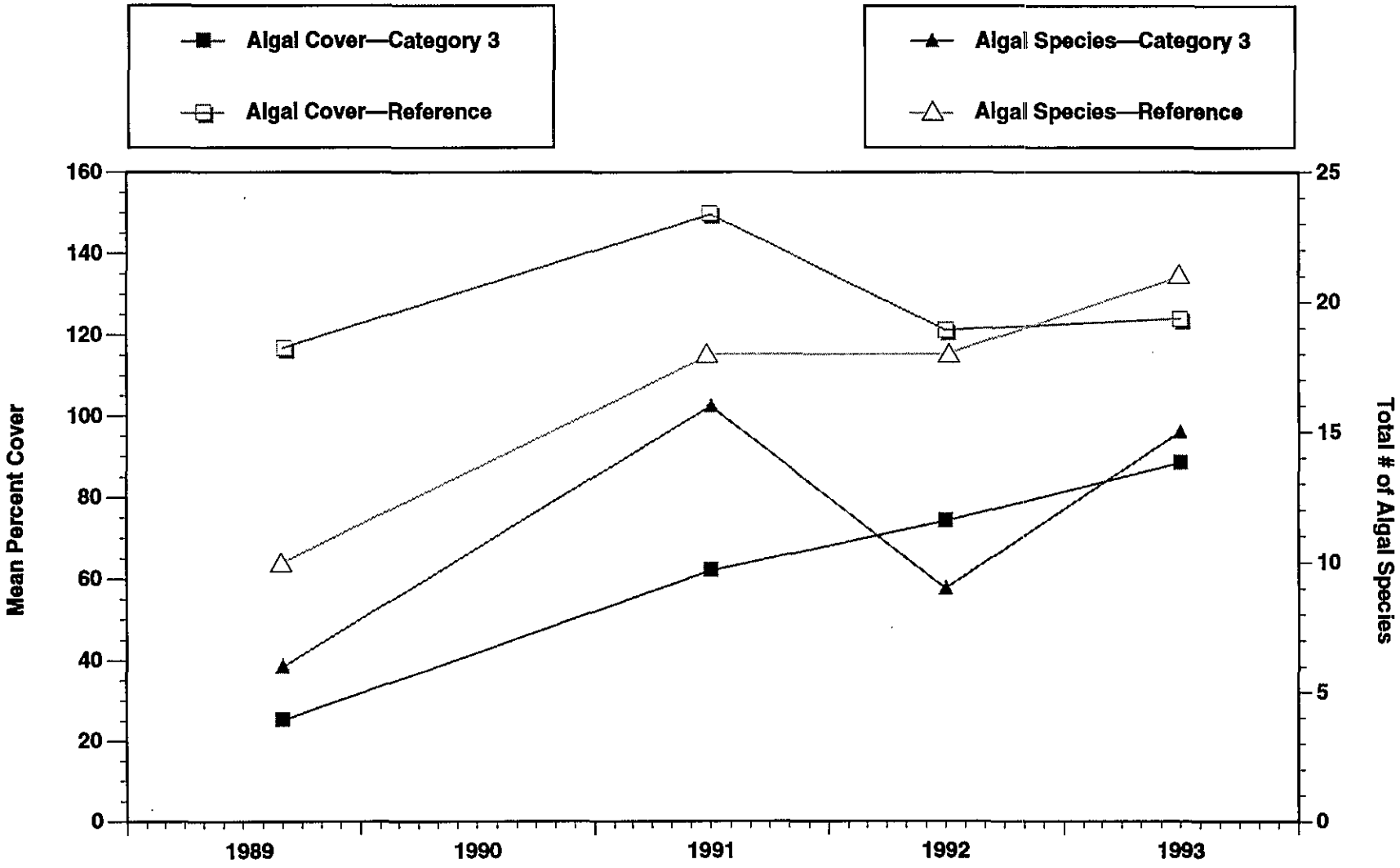


Figure 2-18. Mean percent total algal cover and total number of algal species/site from middle intertidal stations at the Northwest Bay West Arm rocky site, 1989-93.

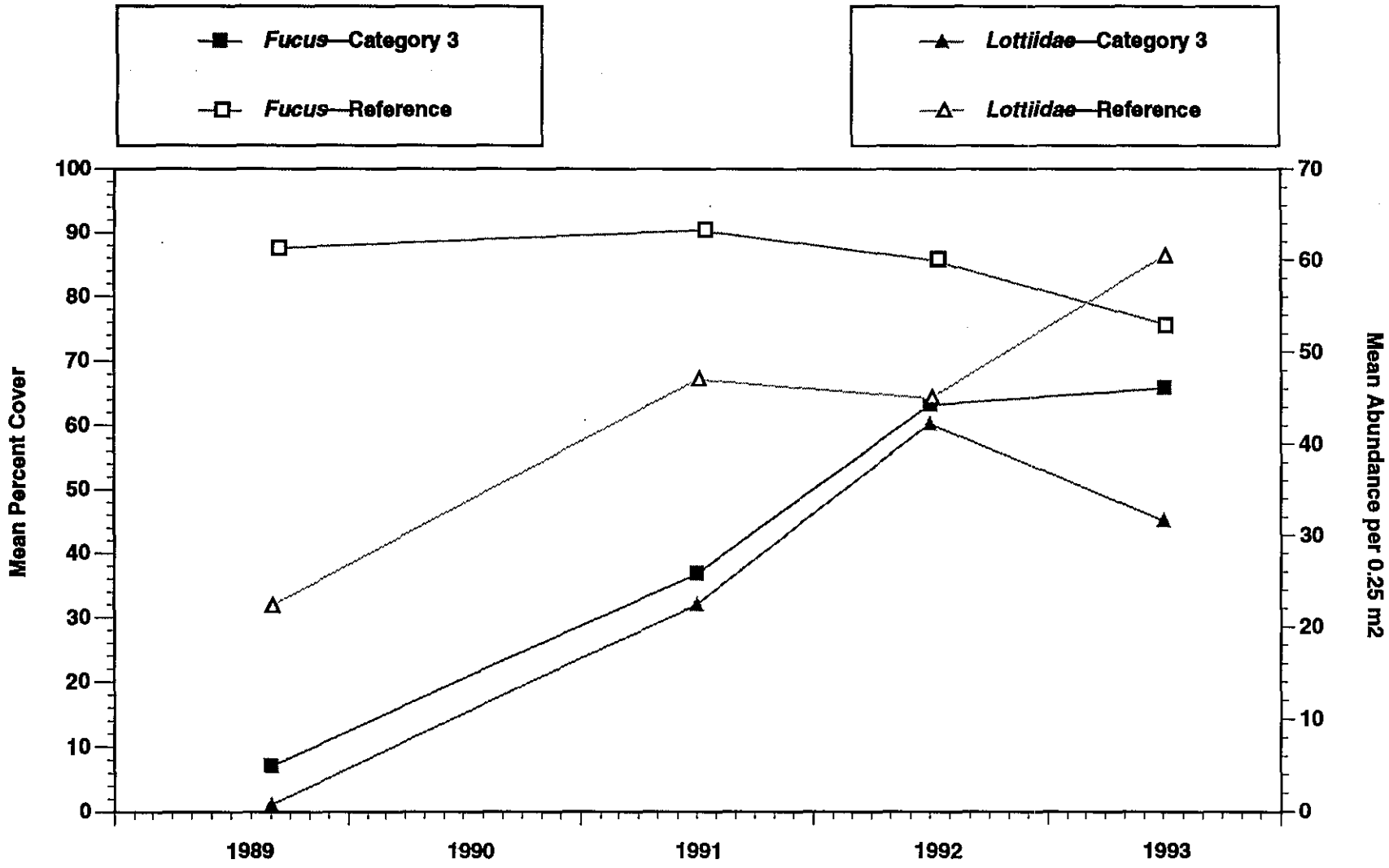


Figure 2-19. Mean percent cover of *Fucus* and mean abundance of Lottiidae from middle intertidal stations at the Northwest Bay West Arm rocky site, 1989-93.

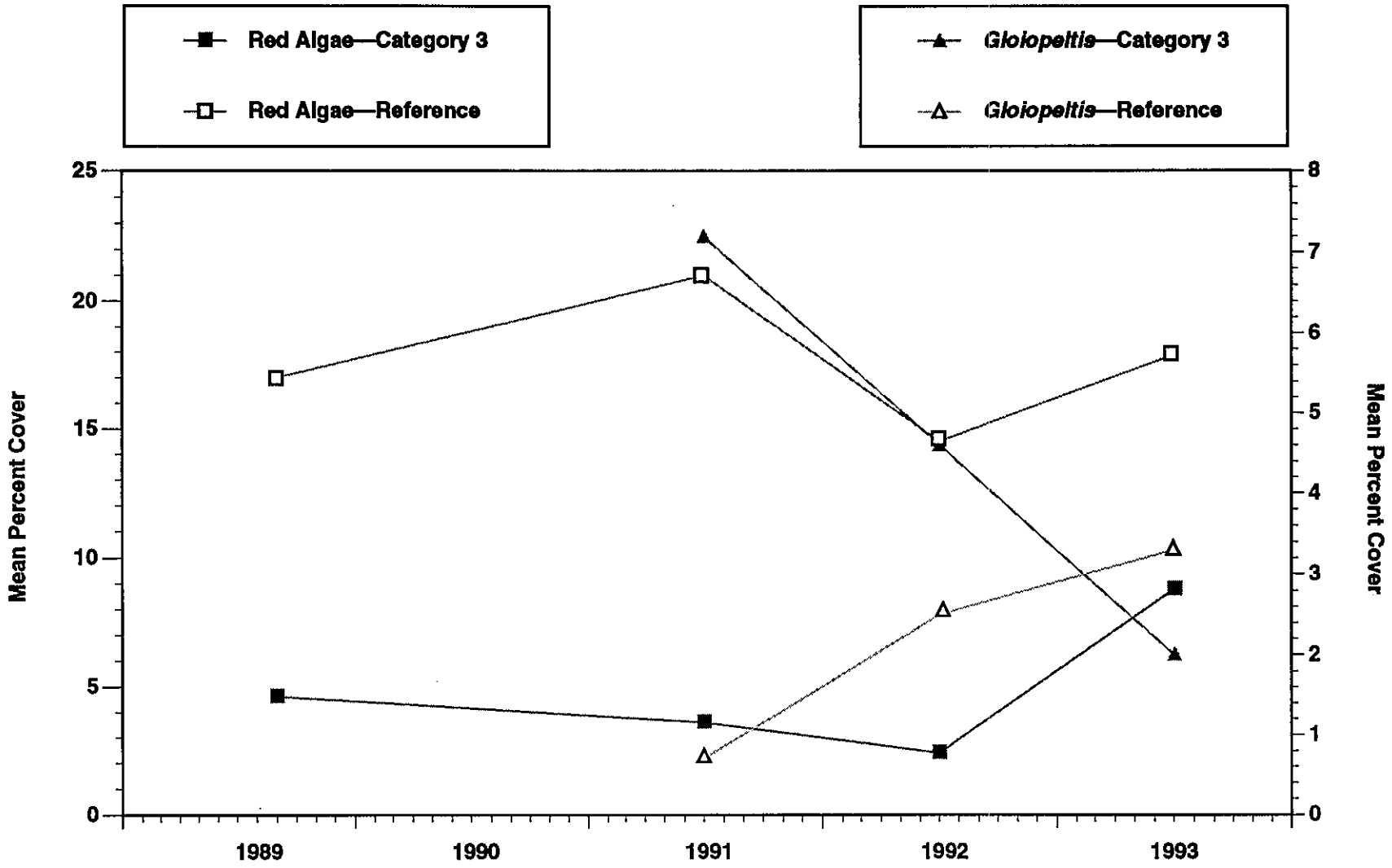


Figure 2-20. Mean percent cover of total erect red algae and *Gloiopeltis* from middle intertidal stations at the Northwest Bay West Arm rocky site, 1989-93.

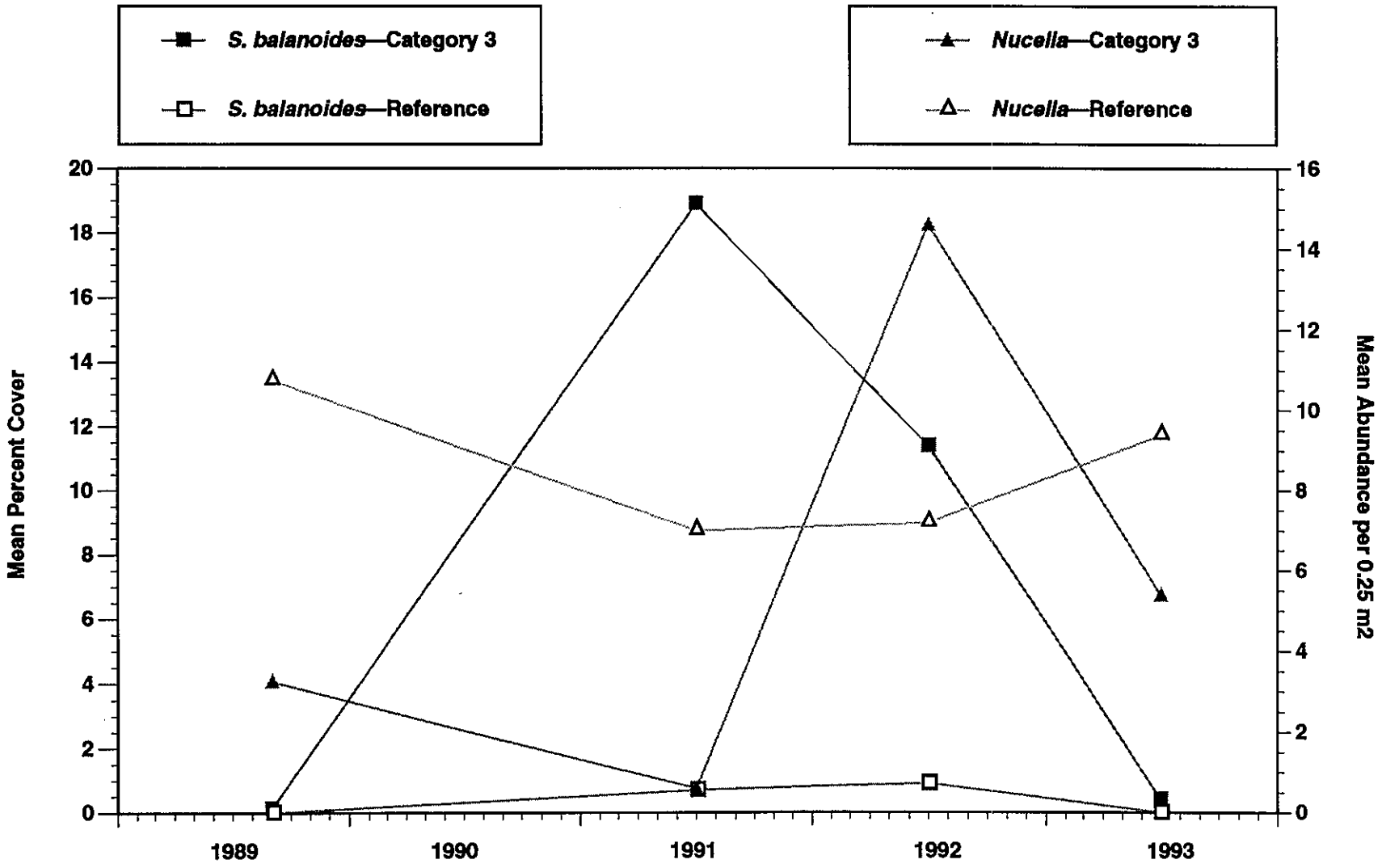


Figure 2-21. Mean percent cover of *Semibalanus balanoides* and mean abundance of *Nucella* from middle intertidal stations at the Northwest Bay West Arm rocky site, 1989-93.

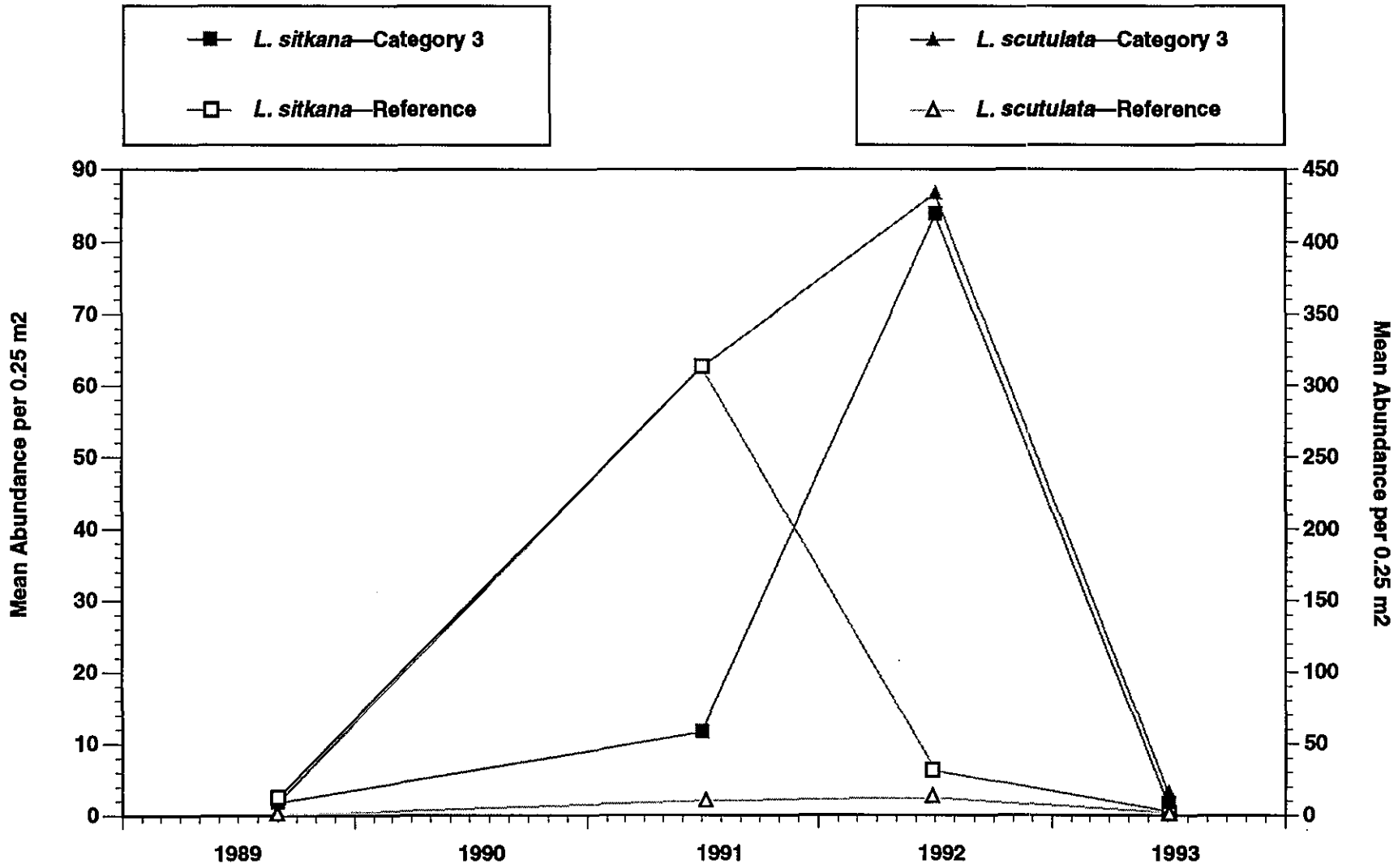


Figure 2-22. Mean abundance of *Littorina sitkana* and *Littorina scutulata* from middle stations at the Northwest Bay West Arm rocky site, 1989-93.

CHAPTER 3
INTERTIDAL INFAUNA

INTRODUCTION

Infaunal data from 1989 Exxon-sponsored sampling at sites we have continued to monitor under this NOAA contract have been compiled in this report by taxon and station (Appendix Tables D-1 through D-4). Samples from lower elevation stations archived in May 1991 were analyzed under the 1993 scope and are provided in Appendix Table D-5. These data have not been processed further under the 1993 scope of work.

Infauna was sampled at lower elevations at 14 mixed gravel, sand, and/or mud (mixed-soft) sites in June and July 1993. Samples from 10 of the lower elevation stations were analyzed, and samples from the remaining four lower stations were archived. Detailed 1993 abundance data are provided in Appendix Table D-6. Limited analysis of these data is included in this chapter.

METHODS

Field Methods

Infauna was sampled with five randomly located 0.009-m^2-by-15-cm-deep cores taken adjacent to the permanently marked 0.25-m^2 quadrat locations used in earlier years to sample epibiota (page 3-1). A different position relative to the quadrat was sampled in each successive sampling trip to avoid resampling the same location.

All five cores were field-sieved through a 1.0-millimeter (mm) screen, and residue was preserved in a 10 percent buffered formalin solution. A sixth sample was taken for grain size analysis, and a seventh sample was taken for analysis of total organic carbon (TOC) and total Kjeldahl nitrogen (TKN). These samples were frozen whole until laboratory analysis.

In 1989, five cores were taken at each station on Cruises 1 and 2, and ten were taken at each station on Cruises 3 and 4.

Laboratory Methods

Samples were washed in the laboratory on a 0.5-mm screen to remove formalin and transferred to 70 percent ethanol. All animals were sorted from debris and identified to the lowest practicable taxon under a dissecting microscope. All sorting and taxonomy were done in the laboratories of Pentec Environmental, Inc. For quality control. 20 percent of each sample was re-sorted. Problematic species were identified by regional specialists (Mr. Jeff Cordell, University of Washington, Seattle, Washington, Crustacea; Mr. Howard Jones, Marine Taxonomic Services, Corvallis, Oregon, Polychaeta; Mr. Allan Fukuyama, Pentec Environmental, Inc., Edmonds, Washington, Mollusca).

Grain Size, Total Organic Carbon, and Total Kjeldahl Nitrogen Analyses

Field-preserved whole sediment samples collected in June and July 1993 from 12 lower elevation mixed-soft stations were analyzed for grain size following the procedures of McNeil and Ahnell (1964). Sediments were wet-sieved through a standard sequence of nine screen sizes (12.5-mm to silt-clay < 63 microns). Each fraction was then placed into a displacement cylinder, and displaced water was measured in a graduated cylinder.

Sediment samples from 13 lower elevation stations were frozen in the field and sent to Analytical Resources, Inc. for total organic carbon and TKN analyses. TOC analysis was done on a Dohrmann DC-180 Carbon Analyzer on samples that were dried (70°C), ground, then sieved (120-micron mesh). Calibration, standardization, and spiking were conducted following manufacturers' directions using potassium phthalate (KHP). Samples were purged of inorganic carbon prior to analysis. TKN analysis was done using methods as referenced by Plumb (1981).

Data Management and Statistical Analyses

Summary of Taxon Deletions and Consolidations Employed for Analysis of the Infaunal Data

To produce tables for consistent analysis and comparison with previous surveys, the primary (raw) infaunal database was revised considerably. The first step in the revision was to delete taxa considered to be typically epifaunal; these included fish, bryozoans, and other taxa (e.g., *Mytilus, Nucella, Pagurus, Turtonia minuta,* several snail taxa, Spirorbidae, Serpulidae, insects, etc.) that, although sampled and in some cases very

abundant, are not truly infaunal. These taxa were eliminated from the laboratory database and are not included in the archived infaunal database or in the data presentations in Appendix D.

The next step was to separate out meiofaunal taxa not adequately sampled by the techniques employed in this study. These included all harpacticoid copepods, nematodes, oligochaetes, and ostracods that are shown separately from the true macro-infaunal data in Appendix D. Although in some areas larger ostracods are a significant component of the infauna, ostracods seen in this study were all relatively small and would not have been consistently retained on our screens. Calculation of total abundance (N) of selected macroinfaunal organisms (those consistently retained on a 1.0-mm screen) was made on this data set and used in subsequent analyses.

The next step was to consolidate taxon designations that were recorded distinctly but that the authors have solid reasons to believe represent a single species and to eliminate ambiguous taxa (i.e., generic or family designations for which more than one species occurs in Prince William Sound). One final step was taken before calculations of species richness (S) and diversity (H'): If, within a higher taxon (e.g., a genus, family, or order), some individuals were only identified to this higher taxonomic level and others were identified to a lower level (e.g., species or family), those identified to the higher level were dropped from the database. These taxa that were dropped for calculation of species richness and diversity are indicated in Appendix D with an asterisk (*). In contrast, if within a higher taxon, no individuals were identified to any lower taxonomic level, the taxon was kept in the database used to calculate S and H'.

Inferential Statistics

Various statistical analyses were applied to quantitatively describe the data (number of species, number of individuals, cover, species diversity, evenness) and evaluate the significance of the findings. Parametric and nonparametric tests were applied as appropriate to evaluate the significance of differences observed between station categories. In these tests, the mean of all subsamples (replicates) at a given station was used to represent each variable; thus, n = the number of stations within that category where the variable in question was measured. Some trends are noted as differences in mean values where no probability value is given. These differences are considered biologically relevant even though they are not statistically significant because of the limited replication of stations within site categories.

Randomization Tests

Infauna were lumped into major taxonomic groups (e.g., Polychaeta, Bivalvia, etc.) for randomization tests (page 3-5) of each taxonomic group to determine significant category effects (ANOVA) and differences between treatment categories (t-tests). Similar procedures were used (without lumping) to compare total abundance, number of taxa, and diversity (Shannon H'). Only 2-tailed test results were considered under the assumption that, depending on the taxon, either increases or decreases could occur with oiling or with treatment. Reformulating null hypotheses as a 1-tailed test (e.g., "oiling does not decrease abundance of molluscs") would increase the number of significant effects found. Because direction of change varied among taxa, however, this was not done. The randomization routines were adapted from algorithms published by Edgington (1987).

RESULTS

Sediment Quality

Grain size analyses were done for Category 1, Category 2, and Category 3 lower mixed-soft stations (n = 4, 4, 3) from frozen samples collected in June and July. Volume displacement data for nine size fractions at each station are provided in Appendix Table A-3.

In a randomization ANOVA there was a significant category effect in the percentage of fines (materials less than 125 microns) among the three categories (Table 3-1). The percentage of fines was lowest at Category 3 lower stations; there was a significant difference between Category 3 and both Category 1 and 2 stations (randomization t-tests, $0.05 < p < 0.1$). Cobbles and larger pebbles (> 12.5 mm) were most prevalent at Category 2 and Category 3 sites (Figure 3-1). Coarse sand fractions (granules and smaller pebbles of 1.0 to 6.3 mm) were slightly more abundant at Category 2 and 3 stations than at Category 1 sites.

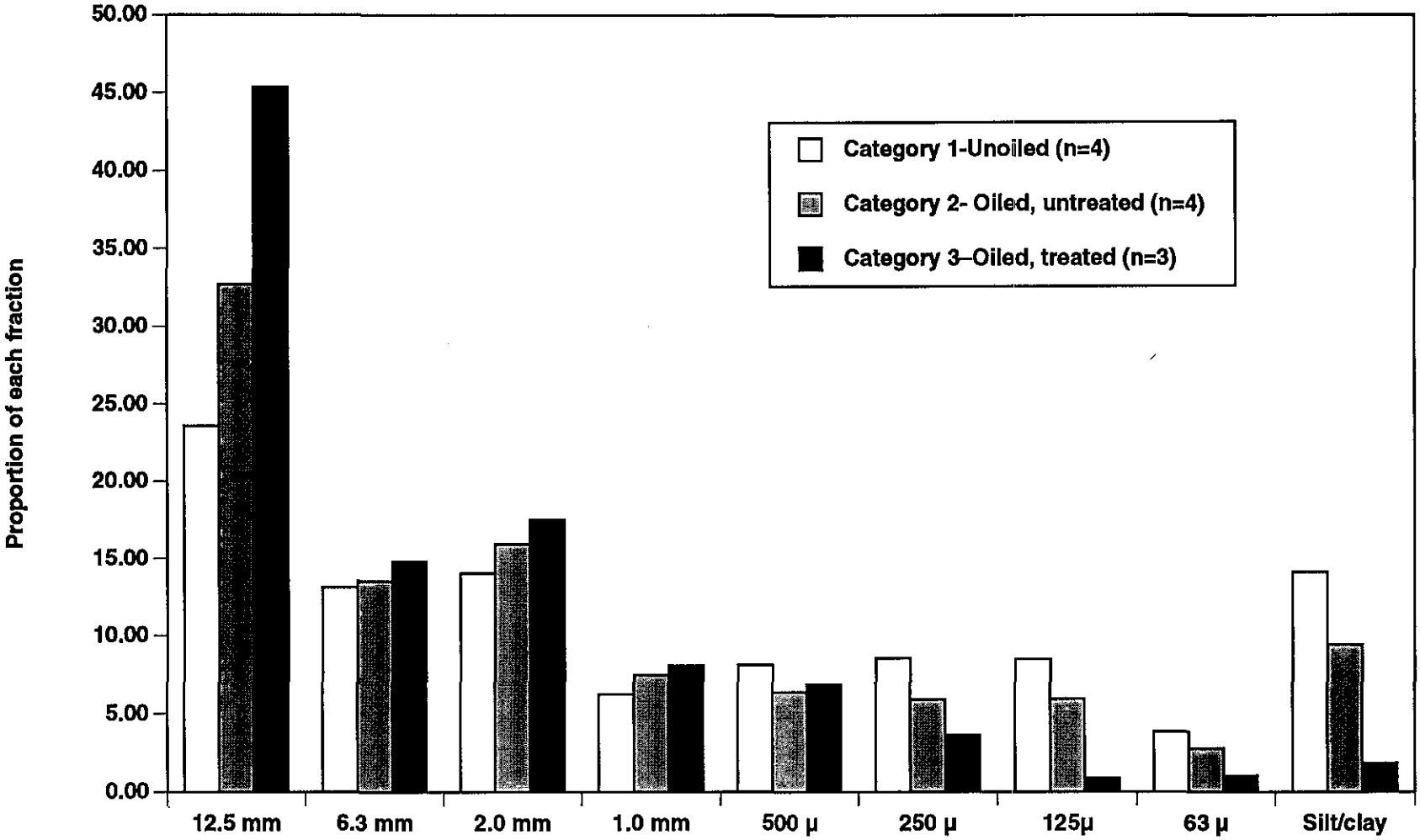


Figure 3-1. Grain size analysis of lower intertidal mixed-soft stations, by category, June-July 1993.

Table 3-1. Sediment TOC, TKN , and percent fines from lower mixed-soft locations, July 1993. (*p ≤ 0.10; **p ≤ 0.05).

Location and category	TKN (ppm)	TOC (ppm)	% Fines (125μ or less)
Category 1 - Unoiled			
Bainbridge Bight	586	—	21.35
Crab Bay	430	11,300	23.06
Outside Bay	546	11,600	29.00
Sheep Bay	470	8,420	32.29
Mean	508	10,440	26.43
SD	71	1,756	5.10
Category 2 - Oiled, untreated			
Block Island	324	14,000	14.16
Herring Bay	502	11,400	25.98
Ingot Island			
Mussel Beach	1,810	37,100	12.34
Snug Harbor	3,410	46,200	20.23
Mean	1,512	27,175	18.18
SD	1,429	17,155	6.20
Category 3 - Oiled, treated			
Elrington Island W			
NW Bay W Arm	122	7,330	3.55
Shelter Bay	156	9,490	4.40
Sleepy Bay	250	29,000	3.48
Mean	176	15,273	3.81
SD	66	11,937	0.51
Statistics			
ANOVA	—	—	**
t-tests	1 vs. 3**	—	1 vs. 3** 2 vs. 3**

Mean TOC and TKN were analyzed from Category 1, 2, and 3 lower stations (n = 3, 4, 3 for TOC and 4, 4, 3 for TKN). Mean TOC was highest at Category 2 sites with a value of 27,175 ppm (Table 3-1). TOC at Category 3 sites had increased from levels measured in 1992 (from 8,675 parts per million (ppm) to 15,273 ppm) due primarily to doubling of the concentration at Sleepy Bay in 1993. Snug Harbor and Mussel Beach, both Category 2, had the highest TOC; the Category 3 Northwest Bay West Arm station was lowest at 7,330 ppm, down slightly from 1992. As in 1992 there was no significant category effect and no significant differences in paired comparisons for TOC.

Highest mean TKN was also at Category 2 lower stations (1,512 ppm), and, as in 1992, Category 3 stations were lowest (176 ppm). Snug Harbor had the highest value for TKN (3,410 ppm); Northwest Bay West Arm (Category 3) had the lowest value (122 ppm) but this was double the concentration measured in 1992 (56 ppm). There was no significant category effect in the ANOVA but Category 1 stations had significantly higher TKN than did Category 3 stations ($p < 0.05$).

Infaunal Communities

1989—Infaunal data from middle elevation stations sampled during Cruise 1 (one station) and Cruise 4 (four stations) are presented in Appendix Table D-1. Infaunal abundances from the middle elevation stations are lumped into major taxonomic groups and presented in Table 3-2. Data from lower elevations are presented in Appendix Tables D-2 through D-4 (Cruise 1 and 2 are combined). Infaunal abundances by major taxonomic groups are presented in Tables 3-3 through 3-5.

1991—Infaunal data from the May 1991 samples are lumped by major taxonomic group and presented in Table 3-6. Detailed abundance data are provided in Appendix Table D-5.

1993—Infaunal data from June to July 1993, lumped by major taxa, are presented in Table 3-7. Detailed abundance data are provided in Appendix Table D-6. The remainder of this section provides brief descriptions of the 1993 results in the context of previously reported data.

Table 3-2. Intertidal macro-infaunal abundance (no./0.009 m^2) from middle mixed-soft stations, Cruise 1, April 1989 and Cruise 4, September 1989.

Lumped Taxa	Category 1 —Cruise 1 Mean	SD	Category 1 —Cruise 4 Mean	SD	Category 3 —Cruise 4 Mean	SD
Bivalvia	0.20	--	10.93	17.99	0.00	--
Crustacea	0.00	--	7.10	8.82	0.30	--
Echinodermata	0.00	--	0.10	0.17	0.00	--
Echiuridae	0.00	--	0.00	0.00	0.00	--
Gastropoda	0.00	--	17.53	30.37	0.00	--
Platyhelminthes	0.00	--	0.00	0.00	0.00	--
Polychaeta	2.20	--	10.63	16.34	0.20	--
Protothaca staminea	0.00	--	1.17	2.02	0.00	--
Sipunculida	0.00	--	0.07	0.12	0.00	--
Other Taxa						
Harpacticoida	0.60	--	0.00	0.00	0.00	--
Nematoda	0.20	--	55.07	82.66	4.80	--
Oligochaeta	0.20	--	9.27	6.70	7.30	--
Ostracoda	0.00	--	0.77	0.86	0.00	--
Excluding Harpacticoida, Nematoda, Oligochaeta, and Ostracoda						
Diversity (H')	0.14		0.85	0.88	0.00	--
Abundance (N)	2.40		47.53	64.15	0.50	--
Number of Taxa (S)	1.20		6.47	8.17	0.30	--
Number of Stations	1		3		1	

Table 3-3. Intertidal macroinfaunal abundance (no./0.009 m^2) from lower mixed-soft stations, Cruise 1 and 2, spring 1989.

Lumped Taxa	Category 1 Mean	SD	Category 2 Mean	SD	Category 3 Mean	SD
Bivalvia	1.40	--	5.07	3.96	0.00	--
Crustacea	0.20	--	6.73	9.75	0.00	--
Echinodermata	2.00	--	2.20	2.45	0.00	--
Echiuridae	0.80	--	0.10	0.24	0.00	--
Gastropoda	8.20	--	17.50	25.69	0.20	--
Platyhelminthes	0.00	--	0.03	0.08	0.00	--
Polychaeta	8.20	--	22.00	18.56	2.40	--
Porifera	0.00	--	0.03	0.08	0.00	--
Protothaca staminea	1.20	--	0.37	0.37	0.00	--
Sipunculida	0.00	--	0.20	0.49	0.00	--
Other Taxa						
Oligochaeta	2.40	--	9.10	15.94	0.60	--
Harpacticoida	0.00	--	8.30	6.30	0.00	--
Nematoda	1.00	--	16.07	21.33	1.00	--
Ostracoda	0.00	--	0.03	0.08	0.00	--
Excluding Harpacticoida, Nematoda, Oligochaeta, and Ostracoda						
Diversity (H')	1.42	--	1.59		0.25	--
Abundance (N)	23.40	--	54.30		2.60	--
Number of Taxa (S)	6.20	--	9.00		1.40	--
Number of Stations	1		6		1	

Table 3-4. Intertidal macroinfaunal abundance (no./0.009 m^2) from lower mixed soft stations, Cruise 3, June 1989.

	Category 1		Category 2		Category 3	
Lumped Taxa	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Bivalvia	8.30	2.12	2.84	3.38	1.00	--
Crustacea	4.75	5.16	2.84	3.38	0.00	--
Echinodermata	0.75	1.06	0.72	0.85	0.00	--
Echiuridae	0.05	0.07	0.10	0.12	0.00	--
Enteropneusta	0.00	0.00	0.00	0.00	0.00	--
Gastropoda	22.85	31.47	48.32	87.32	0.30	--
Phoronidae	0.00	0.00	0.00	0.00	0.00	--
Platyhelminthes	0.00	0.00	0.02	0.04	0.10	--
Polychaeta	19.40	16.12	22.74	25.78	0.50	--
Protothaca staminea	1.90	0.00	1.12	1.06	0.10	--
Sipunculida	0.00	0.00	0.12	0.27	0.00	--
Other taxa						
Oligochaeta	2.45	2.90	12.78	15.09	0.70	--
Harpacticoida	0.20	0.28	0.12	0.27	0.00	--
Nematoda	49.45	33.59	115.22	161.22	2.40	--
Ostracoda	0.15	0.07	5.26	11.00	0.00	--
Excluding Harpacticoida, Nematoda, Oligochaeta, and Ostracoda						
Diversity (H')	2.10	0.10	1.24	0.49	0.22	--
Abundance (N)	58.00	45.54	80.88	89.80	2.00	--
Number of Taxa (S)	12.70	2.97	8.16	3.90	1.00	--
Number of Stations	2		5		1	

Table 3-5. Intertidal macroinfaunal abundance (no./0.009 m^2) from lower mixed-soft stations, Cruise 4, September 1989.

Lumped Taxa	Category 2 Mean	Category 2 SD	Category 3 Mean	Category 3 SD
Bivalvia	3.25	3.20	0.30	--
Crustacea	5.63	5.31	0.50	--
Echinodermata	0.53	0.61	0.00	--
Echiuridae	0.03	0.05	0.00	--
Gastropoda	9.25	14.37	0.40	--
Platyhelminthes	0.03	0.05	0.00	--
Polychaeta	20.00	16.08	11.20	--
Protothaca staminea	1.73	1.56	0.20	--
Sipunculida	0.20	0.40	0.00	--
Other Taxa				
Oligochaeta	4.33	3.54	22.30	--
Harpacticoida	0.10	0.12	0.00	--
Nematoda	87.65	69.13	53.30	--
Ostracoda	0.73	0.85	0.00	--
Excluding Harpacticoida, Nematoda, Oligochaeta, and Ostracoda				
Diversity (H')	1.35	0.67	0.61	--
Abundance (N)	40.60	25.31	12.60	--
Number of Taxa (S)	7.70	4.45	3.00	--
Number of Stations	4		1	

Table 3-6. Intertidal macroinfaunal abundance (no./0.009 m^2) from lower mixed-soft stations, May 1991.

Lumped Taxa	Category 1 Mean	Category 1 SD	Category 2 Mean	Category 2 SD	Category 3 Mean	Category 3 SD
Bivalvia	9.20	12.73	7.27	4.91	0.20	0.00
Crustacea	8.00	11.31	1.33	0.99	1.40	0.57
Echinodermata	1.30	1.27	0.13	0.12	0.00	0.00
Echiuridae	0.00	0.00	0.07	0.12	0.00	0.00
Gastropoda	16.40	20.00	16.13	20.54	0.10	0.14
Platyhelminthes	0.40	0.57	0.00	0.00	0.00	0.00
Polychaeta	37.40	7.07	7.60	4.08	4.10	0.71
Protothaca staminea	1.40	0.57	1.20	0.87	0.00	0.00
Other Taxa						
Oligochaeta	13.50	17.11	3.80	2.50	8.00	10.47
Harpacticoida	0.60	0.28	9.54	9.95	0.00	0.00
Nematoda	4.90	5.80	12.00	4.13	4.70	5.80
Ostracoda	0.00	0.00	0.67	0.83	0.00	0.00
Excluding Harpacticoida, Nematoda, Oligochaeta, and Ostracoda						
Mean Diversity (H')	1.88	0.47	1.67	0.32	0.51	0.12
Mean Abundance (N)	74.10	16.83	33.73	23.97	5.80	1.41
Mean Number of Taxa (S)	12.00	4.53	8.40	2.60	2.00	0.20
Number of Stations	2		3		2	

Table 3-7. Intertidal macroinfaunal abundance (no./0.009 m^2) from lower mixed-soft stations, July 1993. (*$p \leq 0.10$; **$p \leq 0.05$).

Lumped Taxon	Category 1		Category 2		Category 3				t-tests	
	Mean	SD	Mean	SD	Mean	SD	ANOVA	1 vs.2	1 vs. 3	2 vs. 3
Plants (% cover)										
Anthozoa	0.00	0.00	0.00	0.00	0.07	0.12				
Bivalvia	42.53	56.91	18.25	5.56	0.27	0.31			*	
Crustacea	9.33	10.24	6.55	2.76	4.87	7.58				
Echinodermata	1.80	2.03	0.40	0.49	0.00	0.00				
Gastropoda	24.40	27.32	35.40	45.01	8.13	13.40				
Phoronidae	0.13	0.23	0.00	0.00	0.00	0.00				
Platyhelminthes	0.07	0.12	0.00	0.00	0.00	0.00				
Polychaeta	35.93	25.88	25.00	14.24	9.80	8.32				
Protothaca staminea	5.53	5.32	3.30	4.29	0.33	0.12				
Sipunculida	0.00	0.00	0.15	0.30	0.00	0.00				
Other taxa (no statistics analysis)										
Oligochaeta	6.00	7.53	13.20	8.06	9.20	13.06				
Harpacticoida	1.47	1.86	18.70	32.89	32.33	3.37				
Nematoda	8.87	7.18	17.75	26.16	32.47	21.76				
Ostracoda	0.00	0.00	1.60	2.94	0.00	0.00				
Excluding Harpacticolda, Nematoda, Oligochaeta, and Ostracoda										
Diversity (H')	2.07	0.33	1.86	0.19	1.19	0.34	**		*	**
Abundance (N)	119.73	108.97	86.55	50.53	23.47	19.98				
Number of Taxa (S)	14.93	6.00	12.20	3.20	5.53	2.91	*			*
Number of stations	3		4		3					
							3,4,3	3,4	3,3	4,3

General Abundance of Major Infaunal Taxa

On the basis of numerical abundance, the total infaunal component (including meiofauna) of the 1993 samples from lower mixed-soft stations at Category 1 and 2 stations was dominated by bivalves, gastropods and polychaetes; crustaceans (especially harpacticoid copepods) were also important (Table 3-7). On average, gastropods and oligochaetes were most abundant at Category 2 sites, whereas bivalves and polychaetes were most abundant at Category 1 stations. At Category 3 lower stations infauna was dominated numerically by nematodes followed by polychaetes, oligochaetes, and gastropods. Next, in order of decreasing abundance across all categories were gastropods, polychaetes, and bivalves. Because meiofaunal taxa (oligochaetes, harpacticoids, and nematodes) are inconsistently sampled with a 1-mm sieve and are influenced by the quantity of organic debris in the sample, they have been excluded from the quantitative analyses below.

There were no significant category effects in ANOVAs of major taxa abundance (Table 3-7), but bivalves remained significantly more abundant at Category 1 stations than at Category 3 stations in a paired t-test ($p < 0.1$).

Patterns in Community Attributes

Community attributes are presented as averages for all cores from a site. A total of 3,879 specimens representing 104 taxa were identified in macroinfaunal samples collected in Prince William Sound in June and July 1993 (Appendix Table D-6). Abundance varied substantially among cores at many sites and among sites. Mean number of infaunal specimens (N) in cores spanned nearly two orders of magnitude and ranged from 4.6 (Northwest Bay West Arm) to 243.2 (Outside Bay). Because of high variability, apparent differences in N among categories were not significant in ANOVA ($p > 0.1$; Table 3-7).

Mean number of taxa per core (S) varied substantially among sites and site categories (randomization ANOVA for category effect, $p < 0.1$; Table 3-7). Average number of species/core ranged from 2.8 (Northwest Bay West Arm, Category 3) to 20.2 (Outside Bay, Category 1; Appendix Table D-6). In paired t-tests, the number of taxa at Category 2 lower stations was significantly greater than at Category 3 lower stations ($p < 0.1$; Table 4-7).

The mean of the macroinvertebrate species diversity (H') calculations for individual cores also varied among stations ranging from 0.81 (Northwest Bay West Arm) to 2.41 (Sheep Bay; Appendix Table D-6). Species diversity varied significantly among treatment categories (ANOVA $p < 0.05$), and in paired t-tests, both Category 1 and 2 sites had significantly greater diversity than did Category 3 sites ($p < 0.1$ and < 0.05, respectively; Table 3-7).

In summary, treatment category averages for these community attributes were consistently highest in Category 1 and lowest in Category 3 (Table 3-7). Average abundance was four to five times higher, numbers of taxa were more than twice as high, and species diversity was over 50 percent higher at Category 1 and 2 sites than at Category 3 sites.

Infaunal Recovery Patterns

The 1993 infaunal data from lower mixed-soft stations continue to exhibit a strong pattern of dissimilarity between Category 1 and 2 sites, which support higher numbers of organisms, more taxa, and greater species diversity, and Category 3 sites, which generally display a more impoverished infaunal assemblage (Figure 2-2).

Substantial differences in species composition were observed in 1993 among the categories, again between Category 1 and 2 sites compared with Category 3 sites. Generally, clams, gastropods, and polychaetes dominated the infauna at Category 1 and 2 sites; whereas crustaceans replaced bivalves as infaunal dominants at Category 3 sites. The relative importance of gastropods increased at Category 3 sites from 1992, a possible indicator of some recovery.

On the other hand, mean number of infaunal organisms (N), diversity (H') and number of species (S) all declined slightly from 1992 levels, showing that recovery at Category 3 sites is very slow or perhaps has reached some plateau beyond which further recovery may be limited (Figure 3-2). The long-term trends in mid-summer values of H', N and S from 1989 through 1993 showed steady recovery at both Category 2 and 3 sites until 1992. At that time Category 2 sites appeared to have fully recovered and Category 3 sites continued a gradual recovery pattern.

The 1993 interruption in that trend at Category 3 sites may reflect some limitation in the physical or chemical conditions at Category 3 lower mixed-soft stations that is the result of changes in grain size, TOC, TKN, or some other factor related to treatment. It may also be related to combined effects of treatment and the somewhat greater exposure to wave energy at Category 3 mixed-soft sites; in other words, it may be that the ultimate infaunal community at Category 3 sites will never resemble that at Category 1 or 2 sites. For example, Hayes (referenced in Houghton et al. 1993b) has suggested that elevation of these sites in the 1964 earthquake brought silt rich subtidal bottoms into the intertidal zones sampled; removal of these fines by washing has left these beaches with low silt content and few significant sources for replenishment.

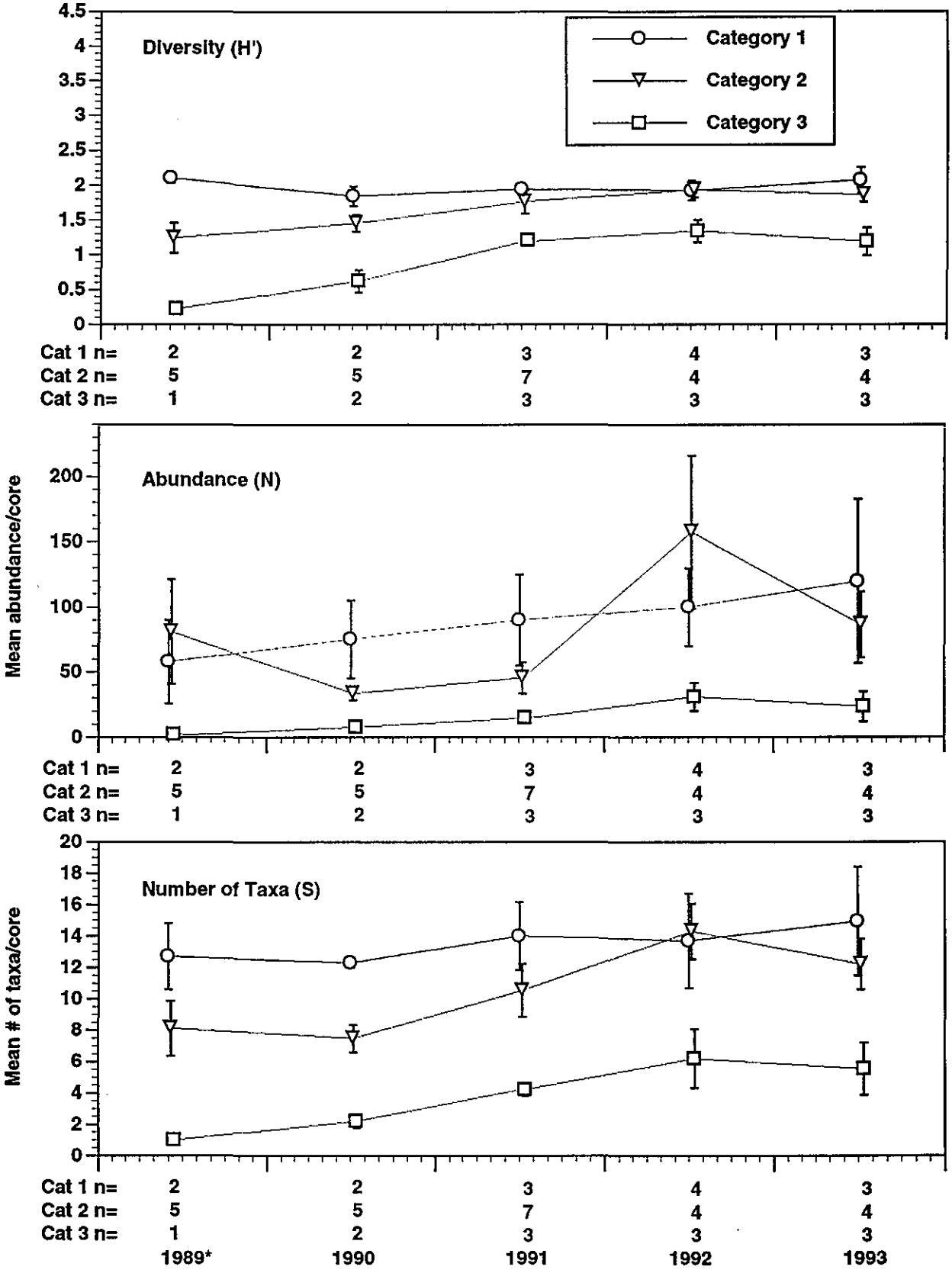


Figure 3-2. Selected attributes (±1 SE) of the macro-infaunal community from lower intertidal stations at mixed-soft sites, 1989-93. Number of stations sampled (n) for each category shown below axes. *Mean values for 1989 stations based on 10 replicates per station.

CHAPTER 4
MOLLUSC STUDIES

INTRODUCTION

An experiment was initiated in July 1992 and completed in July 1993 to further our understanding of the survival and growth of the littleneck clam *Protothaca staminea.* Analyses were also conducted of the tissue hydrocarbon levels in littleneck clam tissues and of the histopathology and reproductive maturity of clams and mussels with different exposure histories.

The 1993 scope did not include age analysis of clams collected in the C-15 core samples and no 0.25-m^2 excavations were made.

METHODS

Field Transplant Experiment

An experiment to examine survival, growth, and hydrocarbon uptake of clams transplanted to previously oiled sites was initiated during 1992 following a similar experiment done in 1991 (Houghton et al. 1993a). Approximately 800 littleneck clams (*Protothaca staminea*) were collected from near the lower reference station at Bainbridge Bight. These animals were immediately placed in a calcein solution for a minimum of 18 hours. At the transplant site at Block Island, wooden quadrats (0.25 m^2) were dug into the sediment flush with the sediment surface. Clams were transplanted into five randomly located quadrats on each of three parallel transects established along the beach contour; two transects were located above the existing lower mixed-soft station, and one was below the station. Sediments within each quadrat were hand-dug 10 to 15 cm deep to loosen the material for planting and to remove indigenous clams for tissue hydrocarbon analysis. A sediment sample was also taken from each of the quadrats for hydrocarbon analysis. Ninety clams of various sizes were buried equally spaced (10 rows of 9) within the quadrats in the middle transect, and 25 clams were buried (5 rows of 5) in the upper and lower transects. An additional quadrat of 40 clams was placed at the lower station at Mussel Beach South to serve as a reference.

All littleneck transplant quadrats were left in place over the winter and in late June and early July 1993 were excavated and hand sorted to remove larger bivalves. Counts of living butter (*Saxidomus giganteus*) and littleneck clams larger than 4 to 5 mm were made in the field. All clams recovered were retained and frozen for hydrocarbon, length, and age analyses, except that one half of the clams from the middle transect (those planted with 90 clams) were preserved in Davidson's solution for histopathology and gonadal analysis. Attempts to open the clams prior to placement in the Davidson's solution were not successful.

Surface sediment samples were taken and frozen from each of the 15 quadrat locations at the time of planting and again at the time of recovery, and forwarded to Louisiana State University for hydrocarbon analysis.

Age and Growth

Because erosion in the umbonal region makes identification of the first annulus difficult on older venerid clams, littleneck and butter clams were aged using a modification of the methods and conventions of Houghton (1973). Specifically, rings less than 2.5 mm in length were not counted as annuli, and no first annulus was recorded as greater than 8 mm. When the first distinct ring was greater than 8 mm, this ring was assumed to be the second annulus, and the first annulus was recorded as 2.5 mm. In addition, the external sculpture was filed to help distinguish true annuli from disturbance checks. Total length and lengths of the last three annuli were measured to the nearest tenth of a millimeter for all clams collected in the 1992 transplant experiment. Shells of clams from the middle transect (those planted with 90 clams) were received by the Pentec laboratory after tissues had been removed for the other analyses.

Histopathological Examination

One half of the clams collected from the middle transect at Block Island were shipped in Davidson's solution to Dr. Kenneth Brooks of Port Townsend, Washington, for sectioning and examination of gill and gonadal tissue.

Statistical Analysis

The residual toxicity of PAH to transplanted clams was examined by regressing the survival of clams against the total sediment concentration in the manner of Houghton et al. (1993a).

RESULTS

The quadrat defining the transplanted clam plot at Mussel Beach South could not be located in 1993. Thus, only clams from the 15 Block Island quadrats have been analyzed.

Protothaca staminea *Survival*

Apparent littleneck clam survival in individual quadrats from the July 1992 to July 1993 transplant experiments ranged from 72 to 224 percent in the upper and lower transects (planted with 25 clams each). More than 25 clams were recovered in all of the lower transects. Apparent survival in the middle transect quadrats (planted with 90 clams) ranged from 73.3 to 92.2 percent (Table 4-1).

The collection of more clams than were transplanted into several quadrats, especially those from the upper and lower transects, indicates that indigenous clams were not completely removed during the transplanting process. Had the dye marking been successful (see below), these data could have been corrected by identification of the number of marked clams recovered. Several things are evident from the data (Table 4-1):

- First, the number of clams recovered was more or less related to the number removed from the quadrat at the start of the experiment; i.e., more indigenous clams were missed in quadrats that had large number of clams at the start of the experiment.

- Second, the upper transect had the fewest indigenous clams. The upper transect also had a low "apparent survival" in the two quadrats closest to the tombolo on the south side of the site; this area was more heavily oiled than areas on the northern portion of the site.

The overall lower survival of clams transplanted into the quadrats at higher densities (90/0.25 m^2) may suggest a density dependent mortality. Although mean densities at many unoiled lower stations are often greater than this (e.g., mean of 132.3/0.25 m^2 at Bay of Isles in 1990), the numbers transplanted were primarily age 3 or older clams while those in areas showing very high densities typically include large numbers of younger (smaller) clams. A second hypothesis that may explain the apparent lower survival of clams from these higher density quadrats is that the need to pack the quadrats with 90 transplanted clams led to a higher rate of discovery and removal of indigenous clams from these plots.

Table 4-1. Survival (%) of littleneck clams transplanted from Bainbridge Bight to Block Island.

	Numbers or survival (%) by quadrat					
Quadrat:	**11**	**12**	**13**	**14**	**15**	**Transect mean**
Upper transect						
Clams removed at start (7/92)	5	5	8	8	25	10.2
Survival of 25 planted clams	72.0%	84.0%	140.0%	116.0%	112.0%	104.8%
Quadrat:	**1**	**2**	**3**	**4**	**5**	**Transect Mean**
Middle transect						
Clams removed at start (7/92)	15	42	15	20	31	24.6
Survival of 25 planted clams	92.2%	73.3%	83.3%	93.3%	78.9%	84.2%
Quadrat:	**6**	**7**	**8**	**9**	**10**	**Transect Mean**
Lower transect						
Clams removed at start (7/92)	8	76	33	34	43	38.8
Survival of 25 planted clams	136.0%	224.0%	108.0%	108.0%	104.0%	136.0%

The higher survival in high density plots from 1992 to 1993 (84.2 percent) compared with that in the quadrats planted with 100 clams at the same location in 1991 (77.5 percent for May to September exposure; Houghton et al. 1993a) could be due to any or all of the following factors:

1. A reduced toxicity of residual oil in the sediments.

2. A greater number of indigenous clams remaining in the plot at the end of the experiment.

3. A density dependency in mortality, although it seems unlikely that this would be evident with only a 10 percent reduction in planting density.

Protothaca staminea *Growth*

Age and growth of *Protothaca* from the 15 Block Island transplant quadrats is pooled and displayed in Appendix Table E-1. Growth of clams from each of the five middle

transect quadrats is summarized separately in Appendix Table E-2 and shown on Figure 4-1.

The 1992-93 transplant period represented a full year of growth; thus, we expected there to be a distinct annulus between the calcein tag location (July 1992) and the outer margin of the shell (July 1993). In general, the calcein marking was not consistently visible, so the size at the time of transplanting could not be reliably ascertained. Either the period of exposure to the calcein solution (18 hours) was insufficient to allow adequate uptake, or the time interval to recovery of the clams (12 months) was long enough that depuration or biodegradation eliminated the mark.

As a result of the lack of a distinct mark at the time of transplant, growth data for the five middle quadrats are presented as total 1992 growth plus 1993 growth to the time of collection (Figure 4-1). Overall growth for all four age classes (age 3 through 6) with sufficient numbers of clams cannot be compared with data from the 1991 transplant because of the extended period between transplant and recovery.

The growth data from the 1992 to 1993 Block Island transplant experiment will be examined in greater detail when sediment hydrocarbon data become available to see if a gradient in hydrocarbons across the site had any effects on growth.

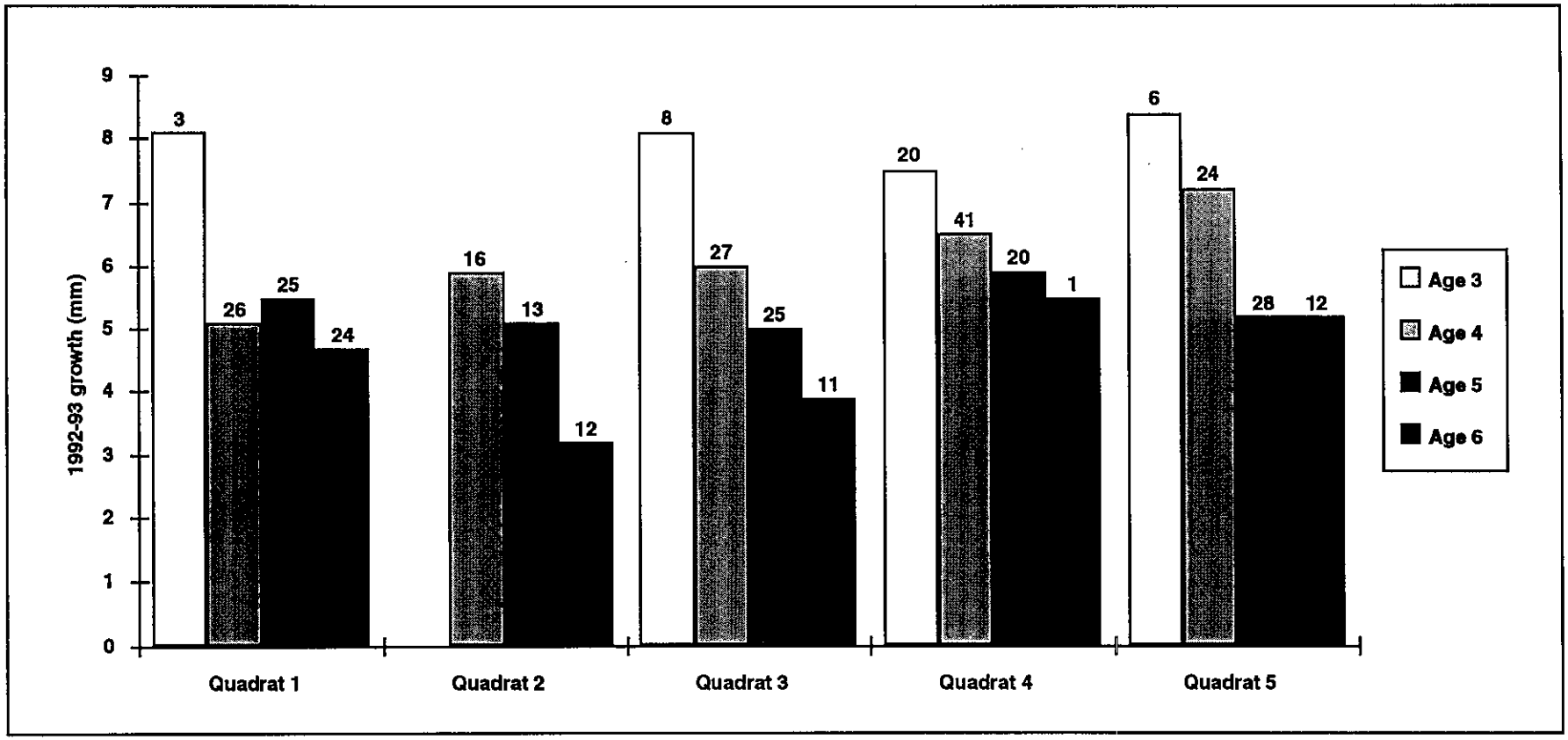


Figure 4-1. Mean growth of *Protothaca staminea* (ages 3 to 6) transplanted from Bainbridge Bight to Block Island, from spring 1992 to July 1993. Number in each age class indicated above each histogram.

CHAPTER 5

GENERAL DISCUSSION, SUMMARY, AND CONCLUSIONS

The general discussions, summary, and conclusions in this section are based on analyses conducted to date on samples collected from 1990 through 1993, as well as preliminary examination of epibiotal and infaunal data from 1989 that are included in the appendices to this report. It is anticipated that more detailed analyses of the 1989 to 1994 database will be conducted following the 1994 field sampling.

OVERALL IMPLICATIONS OF THE FINDINGS

Multiple null hypotheses relating to effects of hydrocarbon contamination from the T/V *Exxon Valdez* and to effects of subsequent shoreline treatments have been tested in the four years of this study (1990 to 1993). Many of these null hypotheses have been rejected; these rejections indicate that significant differences existed in the condition of shorelines among our three categories of sites. For the majority of the variables tested, especially later in the study, conditions did not differ significantly among Category 1 (unoiled) and Category 2 (oiled but not high-pressure hot-water treated) sites. At Category 3 sites (those that were high-pressure hot-water washed), some variables differed significantly from other site categories, especially early in the study, and were not fully recovered in 1993. In other cases, patterns apparent in the field or in the data were not statistically significant, but the data have been included and discussed to provide information on the direction of qualitative relationships among the categories. Time series plots including data from 1989 through 1993 are useful in evaluating these relationships.

Expectations for the qualitative relationships among the treatment categories vary with the nature of the variable. Opportunistic species of epibiota, for instance, would be expected to be more abundant at Category 3 or Category 2 sites in the early years following the spill. This greater abundance was evident in 1991 and 1992 even more than in 1990; high abundances of opportunistic barnacles, littorines (*L. scutulata*), and algae (*Gloiopeltis* and several encrusting forms) were observed at Category 3 middle

rocky stations. For most of these taxa, the "bloom" of opportunistic epibiotal species seen in 1990 through 1992 had disappeared or was no longer as evident in 1993. Of the infauna on mixed-soft beaches, relatively high abundances of nematodes and oligochaetes in Category 3 beaches through 1993 and in Category 2 beaches (especially in 1992) may also represent opportunism. These two meiofaunal taxa ranked 1 and 4 in abundance among all infaunal taxa at Category 2 stations in 1992 but declined to 4 and 5 in 1993, respectively.

The long-lived epibiotal community dominants such as mussels, drills, limpets, and rockweed, known to have suffered heavy losses due to oiling and cleanup, would be expected to be less abundant at Category 2 and 3 sites immediately following the spill. This expectation was realized to a greater degree in 1990 than in 1991; by mid-summer 1991 recovery of many of these dominants had progressed to a greater degree on Category 2 sites than on Category 3 sites. By 1992 recolonization by some of these dominants, most notably limpets and rockweed, had more than restored abundances at Category 3 sites, but other taxa, such as drills and foliose red algae, remained depressed.

Reduced biological controls (grazing, predation, competetion) or altered habitat conditions may cause some species to become more abundant for a time in the post-event assemblage. Reduced grazer populations and perhaps reduced competition for space have allowed rockweed at the oiled middle rocky stations (Categories 2 and 3; Figure 2-3) to achieve coverage greater than at the reference stations; this difference has persisted into 1993. This abundance of rockweed, in turn, will influence recovery of other associated species and may be responsible for the slow recovery of red algae at middle and lower rocky stations. Numbers of primary grazers (Lottiidae, littorines; Figures 2-4, 2-5) and predators (drills; Figure 2-13) no longer differed among the middle rocky stations leading to the expectation that these biological controls will continue to dampen oscillations in abundances of dominant epibiota.

The responses of organisms may be expected to vary between Category 3 and Category 2 sites where differences remain in physical or chemical habitat characteristics that resulted from treatment. For example, recolonization by infauna could be expected to proceed differently on a beach with high residual oil in the sediments and on a beach where washing had removed some oil, along with fines and organic matter. In some cases, information was not available to develop preconceptions on the expected relationships. Thus, the information on the qualitative patterns must be interpreted separately for each taxon, site category, or variate examined. In cases where the existing

data and knowledge do not permit explanation, continued monitoring may clarify the significance (if any) of these patterns.

The statistical testing performed on the 1990 data provided a strong basis to argue that conditions spanning a broad spectrum of biological properties reflected the influence of hydrocarbon contamination on one hand and shoreline treatment on the other; however, the effects of the treatment predominated (Houghton et al. 1991a). Similar testing completed on the 1991, 1992, and 1993 data has provided progressively fewer instances of significant differences between the site categories. These results—plus trends seen over time in key species abundance, directions of movement seen in principal components and multivariate analyses, and general observations during field cruises in the Sound—provide strong evidence that recovery is under way, even at the most severely affected sites. Although differences between unoiled (Category 1) and oiled but untreated (Category 2) stations have been insignificant from 1991 through 1993 in most cases, several significant differences remain between biological conditions at either of those two station categories and conditions at high-pressure hot-water washed (Category 3) stations. Thus, impacts evident in littoral assemblages in 1993 appear to be more the result of the high-pressure hot-water wash treatments than of the oiling itself.

EPIBIOTA ASSEMBLAGES

Analysis of two data sets from shoreline treatment effects studies conducted in 1989 for Exxon show that major components of the intertidal flora and fauna inhabiting Prince William Sound survived at least 3 to 4 months on heavily oiled beaches. Except for a few taxa, these organisms were generally present in abundances comparable to those at unoiled beaches in the sound. Based on these 1989 studies, the short-term effects of the use of high-pressure hot-water on intertidal flora and fauna of the sound were significant: all dominant taxa but one (barnacles) suffered from 60 to 100 percent mortality from treatments of less than 3 hours' duration.

The effects of 1989 shoreline treatments on intertidal biota remained evident and statistically significant at Category 3 rocky sites monitored in 1990 (15 to 17 months following the spill); flora and fauna on Category 2 beaches more closely resembled those on Category 1 beaches. The majority of the community dominants were present on Category 2 beaches in abundances similar to those on Category 1 beaches, but reduced

numbers of some species (e.g., rockweed, *L. sitkana*, *Nucella*) at middle elevation stations indicated continued effects from oiling alone (see Figures 2-2, 2-3, 2-5, and 2-13).

In 1990 statistically significant differences (lower abundances) were seen in several of the dominant taxa of epibiota on rocky and mixed-soft (gravel/sand with some cobbles) beaches. Rockweed and limpets, both community dominants, most commonly exhibited lower abundances on Category 3 beaches (cf. Category 1 beaches) at middle and upper intertidal levels. Other species showing significantly lower abundances at these beaches included littorine snails, hermit crabs, and mussels. At lower intertidal levels effects of hot-water washing were not consistently evident in the epibiota in 1990. Filamentous green algae seem to have been more abundant at Category 2 and 3 stations than at controls; several taxa of red algae showed the opposite pattern.

By July 1991 substantial recovery had occurred at both Category 2 and Category 3 sites, although significant differences still remained (e.g., in limpet and rockweed abundances at middle rocky stations) between unoiled reference sites and Category 3 sites. Colonization of Category 3 sites by opportunistic species had been substantial, and community composition differed noticeably from that at Category 1 and 2 sites.

By 1992 the majority of the high-pressure hot-water washed beaches appeared, superficially at least, to have recovered. This appearance was due to the proliferation of rockweed at middle rocky stations on Category 2 and 3 beaches, where cover exceeded that on Category 1 beaches (Figure 2-3). This increased cover of rockweed is likely the result of reduced numbers of grazers at Category 2 sites in 1989 and 1990 and at Category 3 sites from 1989 through 1991. By 1992 limpet densities had also recovered at middle rocky stations (Figure 2-4), and more normal biological controls can be expected to become reestablished in future years. Abundances of some other important species remained altered at Category 3 middle rocky stations from the expected condition as represented by Category 1 middle stations. Hermit crabs, *Littorina sitkana*, *Balanus glandula*, *Semibalanus cariosus*, and some red algae were all more abundant in 1992 at Category 1 sites; *L. scutulata*, *Gloiopeltis*, *S. balanoides*, and encrusting brown algae were all more abundant at Category 3 sites. This pattern suggested that an earlier stage of ecological succession was still extant at Category 3 middle rocky stations in 1992.

By mid-summer 1993 overall trends indicated continued progress toward recovery with no significant differences in abundant or dominant taxa among categories. Cover of rockweed continued to increase from 1992 levels at Category 2 and 3 middle rocky

stations to well above the average cover at Category 1 stations (Figure 2-3). This suggests that the ecological imbalances created by loss of grazers to oiling and treatment continue to affect this assemblage. The Category 3 Block Island and Northwest Bay West Arm middle stations both continued to be heavily dominated by rockweed (> 65 percent cover; Figure 2-7; Table 2-11) whereas the Northwest Bay Islet middle station (Figure 2-7) continued to be largely devoid of rockweed and associated biota over about half the sampling transect. Thus, it can be expected that the mean rockweed cover at Category 3 middle stations will continue to increase as recolonization of this station progresses from its 1993 level (32 percent) towards its pretreatment cover of 79.6 percent.

As defined by Ganning et al. (1984) and endorsed by this study (Houghton et al. 1993a), recovery will be considered to be complete when variability of measured population and assemblage parameters at oiled sites is consistently within the range of natural fluctuations at unoiled sites. Despite the apparent bloom of rockweed at oiled stations, the trend toward normal (e.g., Category 1) abundance levels for grazers and predators at middle elevation rocky stations suggests that biological controls will become increasingly influential. Thus, we expect a gradual damping of oscillations in abundances of dominant species at affected sites over the coming years.

At the single lower elevation rocky station sampled in 1990 through 1993 (Northwest Bay Islet), examination of pretreatment (May 1989) data provides significant insight into the effects of treatment. Washing conducted at this station had no noticeable immediate effect on cover of rockweed (15.4 percent cover in May before treatment, 22.8 percent cover in June after treatment [Figure 2-19]); this apparent lack of effect suggested that temperatures used may have been lower or that wash durations were reduced (by shorter emersion time) from those experienced at the middle elevation station where rockweed was totally removed. Impacts of washing on a group of long-lived red algae were severe, however. Cover dropped from more than 70 percent to less than 20 percent cover immediately following the washing (Figure 2-20). During the next 4 years, cover of rockweed has expanded to over 65 percent, and nonencrusting red algae have not exceeded 20 percent cover.

Large fluctuations in abundances of limpets and littorine snails (Figures 2-21 and 2-22) at the lower Northwest Bay Islet station have generally been brief, and densities appear to be trending toward the more normal (very low) numbers of these species seen at Category 1 and 2 lower stations.

Substantial recovery of most variables characterizing intertidal epibiotal assemblages was apparent by mid-summer 1993. Few differences remained between unoiled rocky stations and stations that were oiled but not treated with high-pressure hot-water washes. Recovery at high-pressure hot-water washed rocky stations, however, continues to lag behind that at oiled but untreated stations both in terms of reduced abundance of some taxa and increased abundance of others.

INFAUNAL ASSEMBLAGES

Protected sand and gravel beaches were severely affected by hydraulic treatments, which greatly altered beach morphology. Sands and finer gravels were flushed from upper intertidal elevations and often buried the lower beach in several centimeters of sediment. In 1993 differences remained in sediment grain size composition between unoiled, and oiled-but-untreated (Category 1 and 2) beaches compared with treated (Category 3) beaches; the percentage of finer materials remained lower at Category 3 beaches. Category 3 beaches were also lowest in nitrogen (Table 2-1) but organic content, an important energy resource for infauna, had increased from 1992 levels.

Since many of the mixed-soft sites in this study were washed with landing craft vehicles (LCV) and beach crews using fire hoses, it is probable that organisms on these beaches may have experienced somewhat lower maximum temperatures than those on beaches washed with Omni-Barges or Maxi-Barges (see Dames & Moore 1989 for a discussion of equipment commonly used). Lees et al. (1993) have considered LCV treatment to be "warm-water" rather than "hot-water" washes and note reduced impacts on epibiota from such treatments. For the purposes of this study, all three treatment types have been considered "hot-water" in as much as all were capable of heating water to about 60°C.

As discussed at length by Houghton et al. (1993a), the initial impacts of hydraulic treatments on infauna, as well as their effects on recovery of the infaunal community, are probably not heavily dependent on temperature. The majority of the initial loss is likely due to suspension or burial, with the thermal buffering of the sediments themselves protecting much of the infauna from thermal effects. Effects of hydraulic treatments on long-term recovery are likewise dependent on the changes in the physical structure of the beach and are thus unrelated to the temperature of the water used. Thus, the authors do not feel that the specific equipment used affects the infaunal

results in this study; impacts on infauna would likely be similar even if cold- (ambient-) water flushes were used.

In 1993 as in previous years, infauna appeared only moderately affected by the spill on Category 2 (oiled but untreated) beaches with no significant differences between Category 1 (unoiled) and Category 2 stations. The trend of increasing diversity, abundance, and richness within the infaunal assemblage at Category 3 lower stations seen from 1990 through 1992, did not continue in 1993. It is unclear if this leveling off of the recovery signifies a constraint on recovery potential dictated by physical and chemical alterations resulting from treatment or if it reflects inherent differences in the beaches represented in Category 3. Although it is true that the three Category 3 beaches (Northwest Bay, Shelter Bay, and Sleepy Bay) are somewhat more exposed on average than are Category 1 or 2 beaches, some data suggest that these differences are, at least in part, true impacts of treatment that will simply require an extended period for recovery. The disparity in infaunal abundance and diversity at the Northwest Bay West Arm lower mixed-soft station in side-by-side sampling of treated and untreated areas on April 27, 1989, (Appendix Table D-2) indicates a much richer assemblage in the oiled beach before treatment; this assemblage has yet to become re-established at this site. The same pattern was seen in pre- and post-treatment densities of hardshelled clams on a slightly different portion of that site (Pentec 1993).

CHAPTER 6
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ACRONYMS

ANOVA	analysis of variance
cm	centimeter
GPS	global positioning system
H'	diversity
ID	identification
km	kilometer
KPH	potassium phthalate
LCV	landing craft vehicle
m	meter
mm	millimeter
N	abundance
NOAA	National Oceanic and Atmospheric Administration
PAH	polycyclic aromatic hydrocarbon
ppm	parts per million
ppt	parts per thousand
S	richness
TKN	total Kjeldahl nitrogen
TOC	total organic carbon

Appendix A

General Site Information and Characteristics

Table A-1 Location, site, station, habitat type, and tidal height for selected sampling --1989 to 1993.

Location and site	Habitat	Station	Tidal Ht (ft)	Epibiota 1/4 mΔ	Inf. Core 1 mm	Sediment tPAH	Mytilus Tissue	Proto. Tissue	Grn Size Analy.	TOC/ TKN	H20 Qual.
Category 1--Unoiled											
Bass Harbor(NA-27)											
Rocky	Rock	Up	8.83	4ACDF		D					D
Boulder/cobble	Boulder/cobble	Up	7.65	ADF		DF	F				
		Mid	5.37	AD		ABD	ABD				
		Low	1.23	D		ABD					E
Outside Bay (NA-26)											
Soft 1	Gravel/cobble	Up	9.45	ADF		ABDF					
	Gravel/cobble	Mid	4.90	ADF	14ABDF	ABDF	BG		F	F	
	Gravel/sand	Low	0.33	ABDF	13ABCDFG	ABCDFG		DG	FG	FG	DEFG
Soft 2	Gravel/sand	Mid				D	ABDF				
Eshamy Bay (EB-7)											
Rocky	Rock	Up	9.77	4ADFG		ABDF	D				
	Rock	Mid	5.66	1234ADFG		ABDF	ABDFG				
	Rock	Low	2.55	123BEFG		BF					EFG
Hogg Bay											
Rocky	Rock	Up	9.89	4ACDF			F				
	Rock	Mid	7.95	134ABCDF		BDF	ABD				
	Rock	Low	2.62	13ADF		ABDF					CDEF
Sheep Bay											
Soft	Gravel/sand	Up	9.72	ADF		ABDF					
		Mid	4.55	ABDF	4ABDF	ABDF	ABDFG		F	F	
		Low	2.27	ABDF	3ABDFG	ABDFG		DFG	FG	FG	DF
Bainbridge Bight											
Soft	Gravel/sand	Low	1.30	D	CDEFG	CDFG	DFG	CFG	EFG	FG	CDF
Crab Bay (EV-500)											
Rocky	Rock	Mid	6.90	134ACDFG		BDF	ABDFG				
	Rock	Low	0.68	13ADFG		BDF					DEFG
Soft	Gravel/cobble	Up	9.51	DF		BDF					
	Gravel/cobble	Mid	5.49	ADF	ABDF	ABDF	ABDFG		DF	F	
	Gravel/cobble	Low	2.63	AF	ABFG	ABFG		DFG	FG	FG	F
Seward	Boulder/cobble	Mid					D				D
Category 2--Oiled, untreated											
Northwest Bay											
West Arm Rock	Rock	Mid	7.83	4DFG							
	Rock	Low									
Herring Bay (KN-5000)											
Rocky	Rock	Up	9.64	4ACDFG		DG					
	Rock	Mid	5.37	1234ACDFG		BDF	ABDFG				DFG
Soft	Gravel/cobble	Up	7.21	ADF		BDF					
	Gravel/sand	Low	0.23	ACDF	1234ABCDFG	BDFG	DFG	FG	DFG	FG	F
Bay of Isles (KN-07)											
Rocky	Rock	Mid	4.80	134AD		ABD	ABDF				DF
Soft	Gravel/cobble	Up		AD		ABD					
	Gravel/cobble	Low	-0.14	BD	134BD	BD		D	D		D
Snug Harbor (KN-401)											
Rocky	Rock	Up	8.41	4ACDFG		ABDFG					
	Rock	Mid	5.13	234ACDFG		ABDFG	ABDFG				
	Rock	Low	1.52	23ADFG		ABDF					DEFG
Soft	Gravel/cobble	Up	9.28	ADF		ABDF					
	Gravel/sand	Mid	5.74	ACDF	ABDF	ADF	ADF		DF	F	
	Gravel/sand	Low	-0.15	ACDF	234ABCDFG	ABDFG	G	DFG	DFG	FG	F

1 + Cruise 1, April 1989; 2 = Cruise 2, May 1989; 3 = Cruise 3, July 19891; 4 = Cruise 4, September 1989
A = July 1990; B = September 1990; C = May 1991; D = July 1991; E = September 1991; F = July 1992; G = July 1993

Table A-1 continued.

Location and site	Habitat	Station	Tidal Ht. (ft)	Epibiota 1/4 mΔ	Inf. Core 1 mm	Sediment tPAH	Mytilus Tissue	Proto. Tissue	Grn Size Analy.	TOC/ TKN	H20 Qual.
Block Island (EL-11)											
Soft	Gravel/sand	Low	3.59	ABDF	ABCDFG	BCDFG	FG	CDFG	DFG	FG	F
Mussel Beach South											
Soft	Gravel/sand	Mid	4.40	ABDF	BDF	ABDF	ABDF		DF	F	
	Gravel/sand	Low	-0.89	ACDF	234ADFG	ADFG	G	FG	DFG	FG	DF
Crafton Island (CR-5)											
Soft	Gravel/cobble	Up	8.52	AD		ABDF					
	Gravel/cobble	Mid	5.01	AD	D	ABDF	ABDF		D		
	Gravel/cobble	Low	2.95	AD	ABDG	ABDFG	G	G	DG	G	DEF
Outside Bay (NA-26)											
Rocky	Rock	Up	8.96	4ACDFG		ABF					
	Rock	Mid	5.27	134ACDFG		F					
	Rock	Low	0.70	13ACDFG		BDF					CDF
Ingot Island (IN-24)											
Boulder/cobble	Rock/boulder	Mid	6.80	BD		BDF	BDF				
Soft	Gravel/cobble	Low	2.33	DF	BDFG	BDFG	G	DG	DFG	FG	E
Category 3--Oiled, treated											
Point Helen (KN-405) Site 1											
Boulder/cobble	Boulder/cobbl	Up	7.25	AD		F					
	Boulder/cobbl	Mid	4.16	DF		ABDF	ABDF				
	Boulder/cobbl	Low	-1.46	AD		BDF					DEF
Point Helen (KN-405) Site 3											
Boulder/cobble	Boulder/cobbl	Up		F							
	Boulder/cobbl	Mid		F							
	Boulder/cobbl	Low		F							
Northwest Bay											
Rocky Islet (EL-55)	Rock	Up	9.42	4ACDF		ADFG					
	Rock	Mid	6.97	1234ACDFG		ABDFG	ABDFG				
	Rock	Low	2.46	234ACDFG		ABDFG					DEFG
West Arm Rock	Rock	Mid	7.83	4DFG							FG
	Rock	Low									
W. Arm Soft (EL-52	Gravel/cobble	Mid	6.20	ADF	BDF	ABDF	ABDF		DF	F	
	Gravel/sand	Low	0.63	ABDF	23ABCDFG	ABCDFG	G	DFG	DFG	FG	
Shelter Bay (EV-21)											
Soft	Gravel/sand	Up	8.57	BDF		DF					
	Gravel/sand	Mid	6.18	ADF	4ABDF	ABDF	ABDFG		DF	F	
	Gravel/sand	Low	1.02	ABDF	234ABCDFG	ABCDFG		DFG	DFG	FG	DF
Sleepy Bay (LA-18)											
Soft	Gravel/cobble	Up	3.56	ADF	AB	ABDF					
	Gravel/sand	Mid	1.48	ADF	ABDF	ABDF	ABDFG		DF	F	
	Gravel/sand	Low	-0.85	DF	DFG	DFG		DF	DFG	FG	F
Ne Latouche Cobble (LA-15)											
Boulder/cobble	Boulder/cobbl	Mid	3.19	ADF		ABDF	ABDF				D
	Boulder/cobbl	Low	0.71	BDF		BF					F

1 = Cruise 1, April 1989; 2 = Cruise 2, May 1989; 3 = Cruise 3, July 1989; 4 = Cruise 4, September 1989;
A = July 1990; B = September 1990; C = May 1991; D = July 1991; E = September 1991; F = July 1992; G = July 1993

Table A-1 continued.

Location and site	Habitat	Station	Tidal Ht. (ft)	Epibiota 1/4 mΔ	Inf. 1 mm	Sediment tPAH	Mytilus Tissue	Proto. Tissue	Grn Size Analy.	TOC/ TKN	H20 Qual.
Smith Island (SM-06)											
Boulder/cobble	Boulder/cobble	Up	8.35	BD		BD					
N-4	Boulder/cobble	Mid	6.35	ABD		ABD	ABDG				
	Boulder/cobble	Low	2.14	ABD		ABD					DEFG
Mussel Beach South (EL-13)											
Rocky	Rock	Up		4ACDFG		DF					D
Mussel Beach North (EL-13)											
Rocky	Rock	Up		FG							
	Rock	Mid		FG							
	Rock	Mid(ABC)		F							
	Rock	Low		FG							F
Omni Site											
Boulder/cobble	Rock/boulder	Mid		F		F	F				
Block Island (EL-11)											
Rocky	Rock	Up	8.27	CDFG							
	Rock	Mid	3.82	ACDFG		A	ABDFG		F		CDG
Soft	Gravel/sand	Mid	6.49	ADF	BF	ABDF	BG			F	
Elrington Island West											
Rocky	Rock	Up				F					
	Rock	Mid		F		F	F				
	Rock	Low		F		F					F
Soft	Gravel/sand	Mid				F					
	Gravel/sand	Low			FG	FG	G	FG	FG	FG	
Elrington Island East											
Rocky	Rock	Up		F		F					
	Rock	Mid		F		F					
	Rock	Low		F							
Soft	Gravel/sand	Mid				F	F				
	Gravel/sand	Low				F		F			
Elrington Islet--East		Up		F							
Elrington Islet--West		Up		F							
Elrington Islet--North		Up		F							

1 = Cruise 1, April 1989; 2 = Cruse 2, May 1989; 3 = Cruise 3, July 1989; 4 = Cruise 4, September 1989

A = July 1990; B = September 1990; C = May 1991; D = July 1991; E = September 1991; F = July 1992; G = July 1993

Table A-2. Water temperature (°C) and salinity (ppt) at sampling sites in Prince William Sound, 1993.

Site and category	Habitat	Depth	Date	Temperature	Salinity
Category 1--Unoiled					
Eshamy Bay	Rock	Surface	7/6/93	14.0	21.9
		1 m	7/6/93	13.7	22.1
		2 m	7/6/93	13.5	22.7
		3 m	7/6/93	13.2	23.7
		4 m	7/6/93	13.1	23.8
		5 m	7/6/93	13.1	23.8
		6 m	7/6/93	13.1	23.8
Crab Bay	Rock	Surface	7/4/93	9.5	27.4
		1 m	7/4/93	9.1	27.7
		2 m	7/4/93	8.9	27.9
		3 m	7/4/93	8.8	28.0
		4 m	7/4/93	8.8	28.1
		5 m	7/4/93	8.8	28.1
		6 m	7/4/93	8.8	28.1
		7 m	7/4/93	-	-
		8 m	7/4/93	8.8	28.1
Category 2--Oiled, untreated					
Outside Bay	Rock	Surface	7/5/93	13.5	27.2
		1 m	7/5/93	13.2	27.2
		2 m	7/5/93	12.8	27.2
		3 m	7/5/93	12.5	27.3
		4 m	7/5/93	12.1	27.5
		5 m	7/5/93	12.1	27.5
		6 m	7/5/93	11.8	28.0
		7 m	7/5/93	11.4	28.0
Herring Bay	Rock	Surface	6/30/93	13.0	24.8
		1 m	6/30/93	13.0	25.0
		2 m	6/30/93	13.0	25.1
		3 m	6/30/93	12.4	26.1
		4 m	6/30/93	10.1	27.2
		5 m	6/30/93	9.7	27.6
		6 m	6/30/93	9.4	27.8
		7 m	6/30/93	8.5	28.2
Snug Harbor	Rock	Surface	7/3/93	12.7	25.8
		1 m	7/3/93	13.1	25.5
		2 m	7/3/93	13.0	26.3
		3 m	7/3/93	13.0	26.3
		4 m	7/3/93	13.0	26.3
		5 m	7/3/93	13.0	26.5
		6 m	7/3/93	13.0	26.5
		7 m	7/3/93	12.9	26.6
		8 m	7/3/93	12.9	26.6
		9 m	7/3/93	12.9	26.6
		10 m	7/3/93	12.9	26.8

Table A-2 continued

Site and category	Habitat	Depth	Date	Temperature	Salinity
Category 3–Oiled, treated					
Northwest Bay Islet	Rock	Surface	7/3/97	-	-
		1 m	7/3/97	11.9	27.1
		2 m	7/3/97	11.9	27.1
		3 m	7/3/97	11.8	27.1
		4 m	7/3/97	11.8	27.1
		5 m	7/3/97	11.8	27.1
		6 m	7/3/97	11.8	27.1
		7 m	7/3/97	-	-
		8 m	7/3/97	11.6	27.3
		9 m	7/3/97	-	-
		10 m	7/3/97	11.6	27.3
Northwest Bay West Arm	Rock	Surface	7/3/97	12.3	26.3
		1 m	7/3/97	12.3	26.5
		2 m	7/3/97	12.1	26.8
		3 m	7/3/97	12.1	26.8
		4 m	7/3/97	12.0	26.9
		5 m	7/3/97	12.0	27.0
Block Island	Rock	Surface	7/1/97	13.6	26.2
		1 m	7/1/97	13.3	26.3
		2 m	7/1/97	13.2	26.4
		3 m	7/1/97	13.1	26.7
		4 m	7/1/97	13.0	26.8
		5 m	7/1/97	13.0	26.8
		6 m	7/1/97	12.9	26.8
		7 m	7/1/97	12.5	27.0
		8 m	7/1/97	11.5	27.5
		9 m	7/1/97	11.1	27.8
		10 m	7/1/97	10.7	27.8
Smith Island	Boulder/cobble	Surface	7/5/97	12.5	26.2
		1 m	7/5/97	12.0	26.8
		2 m	7/5/97	11.8	27.6
		3 m	7/5/97	11.6	27.5
		4 m	7/5/97	11.5	27.9
		5 m	7/5/97	10.9	28.1
		6 m	7/5/97	10.4	28.2
		7 m	7/5/97	-	-
		8 m	7/5/97	9.9	28.2

Table A-3. Grain size analysis raw data by location, low mixed-soft, July 1993 (data presented as percent of total displacement volume for each size fraction).

	Size fraction								
Category/location	**12.5 mm**	**6.3 mm**	**2.0 mm**	**1.0 mm**	**500 μ**	**250 μ**	**125μ**	**63 μ**	**Silt/clay**
Category 1-Unoiled									
Bainbridge Bight	25.77	24.91	14.36	3.56	5.03	5.03	3.93	2.09	15.34/21.36
Crab Bay	13.13	6.96	13.47	9.47	14.50	19.41	8.22	3.88	10.96/23.06
Outside Bay	37.18	10.47	10.71	4.57	4.33	3.73	11.07	6.62	11.31/29.00
Sheep Bay	18.22	10.05	17.59	7.29	8.54	6.03	10.68	2.76	18.84/32.28
Category 2- Oiled, untreated									
Block Island	15.66	13.78	25.06	14.41	9.65	7.27	6.39	2.13	5.64/14.16
Herring Bay	4.33	19.39	24.11	8.27	9.06	8.86	8.66	5.02	12.30/25.98
Mussel Beach	60.81	7.75	4.48	5.57	4.37	4.69	4.59	1.20	6.55/12.34
Snug Harbor	49.94	13.06	9.99	1.54	2.43	2.82	4.23	2.82	13.19/20.24
Category 3–Oiled, treated									
NW Bay West Arm	33.87	15.32	18.55	13.71	12.10	2.90	0.48	0.81	2.26/3.55
Shelter Bay	51.99	14.99	12.65	4.13	4.81	7.02	1.65	1.93	0.83/4.41
Sleepy Bay	50.10	14.11	21.27	6.34	3.68	1.02	0.61	0.41	2.45/3.47

Appendix B

Intertidal Epibiota

Table B-1. Rocky middle intertidal epibiota, Cruise 1, April 1989.

Taxon	Crab Bay			Eshamy Bay			Herring Bay			Hogg Bay			Bay of Isles			NW Bay Islet			Outside Bay		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Chordariales, unid.	0.00	0.00	10	0.00	0.00	10	0.90	1.73	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Endocladia muricata	0.00	0.00	10	0.50	1.27	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.70	3.16	10
Filamentous green algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.55	1.26	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Foliose red algae	0.00	0.00	10	2.45	4.69	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Fucus gardneri	60.00	25.28	10	72.30	24.17	10	64.50	21.66	10	66.80	21.81	10	47.25	20.74	10	72.10	27.98	10	45.30	27.30	10
Halosaccion glandiforme	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	3.35	5.40	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Mastocarpus papillatus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10
Neorhodomela larix	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.55	2.39	10	0.00	0.00	10	1.50	4.74	10	0.00	0.00	10
Palmaria callophylloides	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.20	6.27	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Pilayella littoralis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.00	3.50	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ralfsia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	14.15	27.75	10
Rhodoglossum/Mastocarpus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.05	1.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ulva/Ulvaria spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.40	2.14	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Balanus glandula (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.65	1.55	10	0.00	0.00	10	0.00	0.00	10	0.80	0.54	10
Balanus/Semibalanus spp. (%)	2.15	3.13	10	10.60	5.42	10	0.00	0.00	10	0.00	0.00	10	5.20	2.67	10	8.50	8.18	10	0.00	0.00	10
Chthamalus dalli (%)	1.10	1.45	10	0.55	0.16	10	0.00	0.00	10	3.00	3.55	10	0.00	0.00	10	0.00	0.00	10	1.95	1.92	10
Encrusting bryozoan (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Mytilus cf. trossulus (%)	3.05	4.48	10	9.40	8.46	10	1.25	1.59	10	0.70	1.55	10	2.08	1.82	10	2.70	6.29	10	0.50	0.58	10
Semibalanus balanoides (%)	0.00	0.00	10	0.00	0.00	10	8.70	6.85	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Semibalanus cariosus (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	30.85	27.13	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Gammaridea, unid.	0.00	0.00	10	0.60	1.58	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Leptasterias hexactis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.90	1.29	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Littorina scutulata	0.00	0.00	10	20.00	35.88	10	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.00	0.00	10	105.20	105.16	10
Littorina sitkana	0.00	0.00	10	27.30	49.32	10	0.00	0.00	10	5.00	10.69	10	0.00	0.00	10	0.00	0.00	10	71.60	50.96	10
Lottiidae, unid.	0.00	0.00	10	3.30	4.55	10	0.00	0.00	10	0.80	0.42	10	0.10	0.32	10	0.00	0.00	10	2.60	3.92	10
Mytilus cf. trossulus #	18.60	39.35	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Nucella lamellosa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	0.70	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10
Nucella lima	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Pagurus hirsutiusculus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.70	1.06	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Protothaca staminea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10
Pycnopodia helianthoides	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Siphonaria thersites	0.00	0.00	10	2.50	6.24	10	0.00	0.00	10	3.30	5.48	10	0.00	0.00	10	0.00	0.00	10	0.30	0.95	10
Mytilus cf. trossulus (dead)	8.00	11.21	10	17.80	14.85	10	0.00	0.00	10	0.00	0.00	10	4.75	2.88	10	0.00	0.00	10	0.00	0.00	10
Oil cover (%)	0.00	0.00	10	0.00	0.00	10	100.00	0.00	10	0.00	0.00	10	0.00	0.00	10	100.00	0.00	10	25.00	0.00	10
Oil scale	0.00	0.00	10	0.00	0.00	10	5.00	0.00	10	0.00	0.00	10	0.00	0.00	10	5.00	0.00	10	2.00	0.00	10

Table B-2. Rocky lower intertidal epibiota, Cruise 1, April 1989.

	Crab Bay			Eshamy Bay			Hogg Bay			Outside Bay		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Ahnfeltia cf. fastigiata	0.00	0.00	10	2.00	4.64	10	0.00	0.00	10	0.00	0.00	10
Articulated coralline algae	0.05	0.16	10	7.55	11.25	10	0.05	0.16	10	11.70	18.45	10
Chordariales, unid.	0.10	0.32	10	0.30	0.35	10	1.60	3.10	10	0.60	0.91	10
Desmarestia sp.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Encrusting coralline algae	1.25	3.09	10	4.55	5.98	10	0.05	0.16	10	5.80	4.69	10
Filamentous green algae	13.15	14.42	10	11.40	10.85	10	0.35	0.94	10	1.50	1.25	10
Filamentous red algae	4.35	7.23	10	0.60	0.57	10	23.00	34.77	10	6.50	5.36	10
Fucus gardneri	25.50	15.54	10	32.30	29.30	10	42.70	23.63	10	12.35	8.30	10
Halosaccion glandiforme	7.05	12.34	10	1.25	0.68	10	0.55	0.90	10	3.90	3.31	10
Mastocarpus papillatus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	7.00	6.58	10
Neorhodomela larix	28.80	32.88	10	25.00	25.11	10	15.00	15.84	10	28.40	26.88	10
Neorhodomela oregona	7.00	14.94	10	7.40	3.86	10	3.80	6.51	10	21.90	16.82	10
Odonthalia floccosa	2.90	3.92	10	0.80	1.62	10	6.15	8.03	10	1.70	4.69	10
Palmaria callophylloides	8.30	12.78	10	4.65	5.94	10	0.00	0.00	10	0.00	0.00	10
Palmaria hecatensis	5.70	9.09	10	0.10	0.32	10	0.00	0.00	10	13.55	12.21	10
Phycodrys riggii	0.00	0.00	10	0.15	0.34	10	1.30	3.12	10	1.90	2.08	10
Pilayella littoralis	0.00	0.00	10	0.00	0.00	10	1.25	3.14	10	0.00	0.00	10
Ptilota filicina	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.35	0.67	10
Ralfsia spp.	0.00	0.00	10	0.80	0.79	10	0.35	0.63	10	0.10	0.32	10
Rhodoglossum/Mastocarpus	1.80	2.20	10	2.80	4.53	10	3.55	3.18	10	0.00	0.00	10
Scytosiphon lomentaria	0.40	0.94	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Tokidadendron kurilensis	5.05	9.40	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ulva/Ulvaria spp.	9.90	12.49	10	23.55	19.38	10	18.10	18.14	10	20.50	23.63	10
Chthamalus dalli (%)	0.05	0.16	10	0.50	0.58	10	4.15	5.89	10	0.25	0.35	10
Encrusting bryozoan (%)	0.05	0.16	10	0.00	0.00	10	0.25	0.63	10	0.20	0.42	10
Halichondria panicea (%)	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10
Semibalanus cariosus (%)	0.00	0.00	10	0.00	0.00	10	1.30	2.03	10	0.15	0.34	10
Anthopleura artemisia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10
Anthopleura spp.	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10
Evasterias troschelii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10
Gammaridea, unid.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10
Hiatella arctica	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Lacuna spp.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Leptasterias hexactis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.50	0.97	10
Littorina scutulata	0.00	0.00	10	0.80	1.87	10	0.20	0.63	10	13.60	37.52	10
Littorina sitkana	0.30	0.95	10	0.30	0.95	10	0.00	0.00	10	2.30	5.12	10
Lottiidae, unid.	0.20	0.42	10	1.10	1.29	10	0.00	0.00	10	0.80	1.62	10
Margarites marginatus	0.10	0.32	10	2.30	6.24	10	0.00	0.00	10	0.00	0.00	10
Nucella lamellosa	4.10	6.79	10	1.60	1.17	10	5.50	3.47	10	2.20	4.26	10
Nucella lima	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Pagurus hirsutiusculus	0.20	0.42	10	0.10	0.32	10	0.50	0.71	10	0.80	1.93	10
Pentidotea wosnesenskii	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10
Pholidae/Stichaeidae	0.00	0.00	10	0.30	0.48	10	0.00	0.00	10	0.00	0.00	10
Pisaster ochraceus	0.00	0.00	10	0.00	0.00	10	0.30	0.95	10	0.00	0.00	10
Pycnopodia helianthoides	0.20	0.63	10	0.70	1.25	10	0.50	0.71	10	0.00	0.00	10
Searlesia dira	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Serpulidae, unid.	0.00	0.00	10	0.30	0.35	10	0.00	0.00	10	0.00	0.00	10
Strongylocentrotus droebachiensis	0.10	0.32	10	0.40	0.70	10	0.00	0.00	10	0.00	0.00	10

Table B-3. Rocky middle intertidal epibiota, Cruise 2, May 1989.

	Eshamy Bay			Herring Bay			NW Bay Islet			Snug Harbor		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Chordariales, unid.	0.00	0.00	4	0.60	1.07	10	0.00	0.00	10	0.10	0.22	5
Endocladia muricata	0.50	1.00	4	0.00	0.00	10	1.50	4.74	10	5.60	8.26	5
Enteromorpha spp.	0.00	0.00	4	0.00	0.00	10	0.00	0.00	10	0.10	0.22	5
Filamentous green algae	0.13	0.25	4	0.10	0.32	10	0.00	0.00	10	0.00	0.00	5
Fucus gardneri	88.25	7.68	4	40.30	24.87	10	79.60	23.44	10	16.00	16.36	5
Neorhodomela oregona	0.38	0.25	4	0.00	0.00	10	0.20	0.63	10	0.00	0.00	5
Neorhodomela larix	0.00	0.00	4	3.25	6.64	10	2.00	6.32	10	0.00	0.00	5
Odonthalia floccosa	0.00	0.00	4	0.10	0.32	10	0.00	0.00	10	0.00	0.00	5
Ulva/Ulvaria spp.	0.00	0.00	4	0.05	0.16	10	0.00	0.00	10	0.00	0.00	5
Balanus/Semibalanus spp. (%)	8.13	5.17	4	0.00	0.00	10	8.95	9.09	10	0.00	0.00	5
Balanus/Semibalanus spp., (% set)	0.13	0.25	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Chthamalus dalli (%)	0.50	0.00	4	0.00	0.00	10	0.00	0.00	10	0.20	0.27	5
Mytilus cf. trossulus (%)	14.75	10.05	4	0.90	0.61	10	4.55	5.23	10	3.50	3.74	5
Semibalanus balanoides (%)	0.00	0.00	4	12.20	11.12	10	0.00	0.00	10	4.10	3.81	5
Anthopleura artemisia	1.75	2.87	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Asterozoa, unid. (juv.)	0.25	0.50	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Buccinum baeri	1.75	3.50	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Gnorimosphaeroma oregonensis	0.00	0.00	4	0.00	0.00	10	0.10	0.32	10	0.00	0.00	5
Hemigrapsus oregonensis	0.00	0.00	4	0.00	0.00	10	0.00	0.00	10	0.20	0.45	5
Littorina scutulata	0.00	0.00	4	0.00	0.00	10	20.40	15.25	10	0.00	0.00	5
Littorina sitkana	0.00	0.00	4	0.00	0.00	10	108.40	91.20	10	0.00	0.00	5
Lottiidae, unid.	11.00	3.92	4	11.60	13.98	10	5.00	4.08	10	0.00	0.00	5
Nucella lamellosa	3.50	4.73	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Nucella lima	0.00	0.00	4	2.70	2.87	10	0.00	0.00	10	2.40	5.37	5
Pagurus hirsutiusculus	0.00	0.00	4	0.80	1.03	10	0.10	0.32	10	0.40	0.55	5
Pagurus spp.	2.00	1.83	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Pholidae/Stichaeidae	0.25	0.50	4	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Strongylocentrotus droebachiensis	0.00	0.00	4	0.00	0.00	10	0.10	0.32	10	0.00	0.00	5
Lottiidae (dead)	0.00	0.00	4	0.00	0.00	10	0.20	0.63	10	0.00	0.00	5
Mytilus cf. trossulus (dead)	21.50	16.44	4	0.20	0.63	10	4.10	6.77	10	0.00	0.00	5
Oil cover (%) (primary)	0.00	0.00	4	57.00	27.00	10	100.00	0.00	10	13.75	2.50	4
Oil scale (primary)	0.00	0.00	4	4.40	0.52	10	5.00	0.00	10	4.00	0.00	4

Table B-4. Rocky lower intertidal epibiota, Cruise 2, May 1989.

	Eshamy Bay			NW Bay Islet			Snug Harbor		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Acrosiphonia saxatilis	0.00	0.00	10	20.40	16.44	5	6.20	7.92	5
Ahnfeltia cf. fastigiata	0.90	1.73	10	0.10	0.22	5	0.00	0.00	5
Articulated coralline algae	3.85	4.37	10	0.10	0.22	5	0.00	0.00	5
Chordariales, unid.	0.35	0.63	10	0.00	0.00	5	0.80	1.30	5
Encrusting coralline algae	2.65	2.20	10	0.10	0.22	5	0.00	0.00	5
Enteromorpha spp.	0.00	0.00	10	0.00	0.00	5	0.80	1.10	5
Filamentous green algae	13.50	11.26	10	0.00	0.00	5	0.00	0.00	5
Filamentous red algae	0.55	1.26	10	0.00	0.00	5	0.00	0.00	5
Fucus gardneri	25.00	24.57	10	15.40	11.33	5	20.00	13.69	5
Halosaccion glandiforme	2.95	3.80	10	6.80	7.85	5	0.00	0.00	5
Neorhodomela oregona	9.85	14.71	10	32.00	24.14	5	42.00	30.54	5
Neorhodomela larix	8.05	10.48	10	12.60	12.40	5	0.00	0.00	5
Palmaria callophylloides	1.20	3.11	10	6.40	5.94	5	0.00	0.00	5
Palmaria hecatensis	0.30	0.67	10	2.10	4.42	5	0.00	0.00	5
Phycodrys riggii	0.35	0.47	10	0.30	0.27	5	0.00	0.00	5
Pilayella littoralis	0.50	1.58	10	0.00	0.00	5	9.00	10.84	5
Ralfsia spp.	2.40	4.60	10	0.80	1.30	5	0.00	0.00	5
Rhodoglossum/Mastocarpus	2.55	1.71	10	13.60	26.01	5	0.10	0.22	5
Ulva/Ulvaria spp.	28.00	26.89	10	31.00	32.29	5	3.40	3.97	5
Balanus crenatus (%)	0.00	0.00	10	0.00	0.00	5	0.20	0.27	5
Balanus glandula (%)	0.00	0.00	10	0.00	0.00	5	0.40	0.89	5
Balanus/Semibalanus spp. (%)	0.00	0.00	10	0.10	0.22	5	0.00	0.00	5
Balanus/Semibalanus spp., (% set)	0.20	0.26	10	0.00	0.00	5	0.00	0.00	5
Chthamalus dalli (%)	0.65	1.06	10	0.00	0.00	5	0.00	0.00	5
Mytilus cf. trossulus (%)	0.20	0.35	10	0.00	0.00	5	0.00	0.00	5
Semibalanus cariosus (%)	0.10	0.21	10	0.00	0.00	5	0.00	0.00	5
Anthopleura artemisia	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5
Evasterias troschelii	0.30	0.67	10	0.00	0.00	5	0.00	0.00	5
Hiatella arctica	0.30	0.95	10	0.00	0.00	5	0.00	0.00	5
Lacuna variegata	0.40	0.52	10	0.00	0.00	5	0.00	0.00	5
Lottiidae, unid.	6.30	6.45	10	3.40	3.91	5	0.00	0.00	5
Margarites marginatus	0.50	0.85	10	0.00	0.00	5	0.00	0.00	5
Margarites pupillus	1.70	4.69	10	0.00	0.00	5	0.00	0.00	5
Nucella lamellosa	4.20	3.26	10	0.00	0.00	5	0.00	0.00	5
Nucella lima	0.20	0.63	10	0.00	0.00	5	0.00	0.00	5
Pagurus hirsutiusculus	0.10	0.32	10	0.20	0.45	5	0.00	0.00	5
Pagurus spp.	0.60	1.26	10	0.00	0.00	5	0.00	0.00	5
Paranemertes peregrina	0.10	0.32	10	0.20	0.45	5	0.00	0.00	5
Pholis laeta	0.30	0.67	10	0.00	0.00	5	0.00	0.00	5
Pisaster ochraceus	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5
Pisces, unid.	0.00	0.00	10	0.00	0.00	5	0.20	0.45	5
Polyplacophora	0.00	0.00	10	0.20	0.45	5	0.00	0.00	5
Pycnopodia helianthoides	0.30	0.48	10	0.00	0.00	5	0.00	0.00	5
Searlesia dira	0.00	0.00	10	3.60	3.58	5	0.00	0.00	5

Table B-4 continued.

	Eshamy Bay			NW Bay Islet			Snug Harbor		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Strongylocentrotus droebachiensis	0.70	1.34	10	0.00	0.00	5	0.00	0.00	5
Tonicella spp.	0.20	0.42	10	0.00	0.00	5	0.00	0.00	5
Mytilus cf. trossulus (dead)	1.90	4.01	10	0.00	0.00	5	0.00	0.00	5
Oil cover (%) (primary)	0.00	0.00	10	100.00	0.00	5	100.00	0.00	5
Oil scale (primary)	0.00	0.00	10	3.80	1.64	5	1.00	0.00	5

Table B-5. Rocky middle intertidal epibiota, Cruise 3, June 1989.

	Crab Bay			Esharny Bay			Herring Bay			Hogg Bay			Bay of Isles			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Encrusting brown algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	12.30	17.15	10	0.35	0.94	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Endocladia muricata	1.00	3.15	10	0.00	0.00	10	0.20	0.35	10	0.06	0.16	10	1.75	1.84	10	0.00	0.00	10	0.30	0.46	10	0.00	0.00	5
Enteromorpha linza	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	5
Enteromorpha spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.60	0.66	10	0.00	0.00	10	0.00	0.00	10	0.30	0.42	10	0.00	0.00	5
Filamentous green algae	0.00	0.00	10	3.10	6.70	10	0.85	2.17	10	0.80	1.75	10	0.00	0.00	10	0.00	0.00	10	0.60	1.24	10	0.50	0.87	5
Filamentous red algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.45	5
Flagelliform brown algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	5
Fucus gardneri	79.00	15.60	10	62.00	22.01	10	42.00	26.37	10	70.00	12.02	10	74.50	15.17	10	10.60	9.41	10	64.00	18.23	10	11.80	12.56	5
Gloiopeltis furcata	0.00	0.00	10	0.55	0.83	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.60	3.05	10	0.00	0.00	5
Halosaccion glandiforme	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.90	1.60	10	0.00	0.00	10	0.00	0.00	10	0.95	1.50	10	0.00	0.00	5
Neorhodomela larix	0.05	0.16	10	1.50	3.37	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Neorhodomela oregona	0.00	0.00	10	0.20	0.35	10	0.40	0.66	10	0.00	0.00	10	0.15	0.24	10	1.50	3.37	10	1.30	3.47	10	0.00	0.00	5
Odonthalia floccosa	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.,00	10	0.00	0.00	10	0.00	0.00	5
Pikea californica	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.15	3.13	10	0.00	0.00	10	0.00	0.,00	10	0.00	0.00	10	0.00	0.00	5
Pilayella littoralis	0.00	0.00	10	0.35	0.94	10	0.00	0.00	10	1.45	1.44	10	0.00	0.00	10	0.00	0.,00	10	5.30	9.31	10	0.00	0.00	5
Ralfsia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.,00	10	0.25	0.63	10	0.00	0.00	5
Rhodoglossum/Mastocarpus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.90	0.88	10	0.00	0.00	10	0.00	0.,00	10	0.90	1.91	10	0.00	0.00	5
Soranthera ulvoidea	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.,00	10	0.10	0.21	10	0.00	0.00	5
Ulva/Ulvaria spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.14	0.34	10	0.00	0.00	10	0.00	0.,00	10	0.35	0.63	10	0.00	0.00	5
Balanus glandula (%)	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	6.45	11.30	10	0.00	0.00	10	2.80	2.29	10	0.00	0.00	10	0.00	0.00	5
Balanus/Semibalanus spp. (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	5
Balanus/Semibalanus spp., (% set)	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	16.50	28.09	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.80	4.38	5
Chthamalus dalli (%)	0.10	0.32	10	0.30	0.26	10	19.75	19.03	10	1.60	1.31	10	0.65	0.24	10	0.00	0.00	10	0.90	0.70	10	0.00	0.00	5
Mytilus cf. trossulus (%)	1.25	1.64	10	3.05	3.08	10	2.10	1.60	10	0.40	0.66	10	4.15	2.43	10	0.00	0.00	10	0.15	0.24	10	0.90	0.22	5
Semibalanus balanoides (%)	2.70	6.27	10	6.65	4.32	10	6.95	7.80	10	0.00	0.00	10	14.30	11.76	10	0.00	0.00	10	1.60	2.45	10	4.80	5.02	5
Semibalanus cariosus (%)	0.00	0.00	10	0.00	0.00	10	2.60	3.06	10	17.10	17.22	10	0.00	0.00	10	0.00	0.00	10	0.40	0.39	10	0.00	0.00	5
Anthopleura artemisia	0.00	0.00	10	0.60	1.26	10	0.30	0.67	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Buccinum baeri	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Gnorimosphaeroma oregonensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Leptasterias hexactis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.90	1.52	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	5
Littorina scutulata	38.00	33.28	10	123.20	120.32	10	0.00	0.00	10	88.80	108.14	10	0.00	0.00	10	0.20	0.63	10	39.40	60.78	10	39.00	41.30	5
Littorina sitkana	140.80	121.89	10	137.30	110.50	10	0.00	0.00	10	18.50	27.33	10	0.00	0.00	10	0.30	0.95	10	5.80	13.49	10	6.20	12.21	5
Lottiidae, unid.	24.10	17.14	10	12.40	4.01	10	6.70	7.78	10	3.00	3.27	10	11.80	6.60	10	0.20	0.42	10	20.80	26.36	10	7.20	8.93	5
Nemertea, pink	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Nucella lamellosa	12.50	17.08	10	2.70	4.64	10	0.00	0.00	10	11.40	19.91	10	0.00	0.00	10	0.00	0.00	10	5.00	5.08	10	0.00	0.00	5
Nucella lima	0.40	1.28	10	0.10	0.32	10	3.20	2.94	10	0.00	0.00	10	6.30	7.04	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Onchidella borealis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.80	1.87	10	0.00	0.00	10	0.00	0.00	10	1.70	2.71	10	0.00	0.00	5
Pagurus hirsutiusculus	11.80	10.81	10	25.70	58.92	10	0.80	1.32	10	1.30	1.57	10	2.00	2.67	10	0.00	0.00	10	17.10	23.67	10	0.20	0.45	5
Pentidotea wosnesenskii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Pholidae/Stichaeidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Pholis laeta	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	5
Pisaster ochraceus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	0.97	10	0.00	0.00	5
Siphonaria thersites	3.30	6.27	10	0.00	0.00	10	0.00	0.00	10	18.30	15.14	10	0.00	0.00	10	0.00	0.00	10	5.70	7.15	10	0.00	0.00	5
Mytilus cf. trossulus (dead)	5.90	9.89	10	22.20	23.66	10	0.00	0.00	10	3.60	8.78	10	6.20	7.94	10	36.80	55.51	10	1.80	3.91	10	0.40	0.89	5
Oil cover (%) (primary)	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	2.55	4.61	10	86.00	15.78	10	0.00	0.00	10	18.80	19.87	5
Oil scale (primary)	0.10	0.32	10	0.00	0.00	10	1.70	1.34	10	0.50	1.58	10	4.20	1.62	10	3.50	0.71	10	0.00	0.00	10	0.00	0.00	5

Table B-6. Rocky lower intertidal epibiota, Cruise 3, June 1989.

Taxon	Crab Bay			Eshamy Bay			Hogg Bay			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Agarum cribrosum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	20.00	0.63	10	0.00	0.00	5
Ahnfeltia cf. fastigiata	0.00	0.00	10	2.10	3.03	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Articulated coralline algae	0.35	0.67	10	2.60	4.59	10	0.60	1.58	10	2.33	5.02	9	0.25	0.63	10	0.00	0.00	5
Constantinea subulifera	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.10	0.32	10	0.00	0.00	5
Cryptosiphonia woodii	9.30	10.71	10	4.20	4.02	10	4.25	3.05	10	0.00	0.00	9	6.20	7.02	10	0.00	0.00	5
Desmarestia sp.	0.60	1.58	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Encrusting brown algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	11.06	15.71	9	0.00	0.00	10	0.00	0.00	5
Encrusting coralline algae	0.90	1.52	10	1.80	1.80	10	0.00	0.00	10	8.94	16.88	9	1.20	3.12	10	0.00	0.00	5
Encrusting green algae	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Encrusting red algae	0.50	1.58	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Enteromorpha spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	2.25	4.85	10	0.00	0.00	5
Filamentous brown algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.05	0.16	10	0.00	0.00	5
Filamentous green algae	10.60	12.84	10	45.10	27.33	10	2.05	3.12	10	7.05	16.18	9	4.60	4.48	10	41.00	23.56	5
Filamentous red algae	16.00	10.94	10	0.40	0.97	10	20.70	27.61	10	1.61	3.30	9	3.90	6.52	10	0.40	0.89	5
Flagelliform brown algae	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	9	0.35	0.67	10	0.00	0.00	5
Fucus gardneri	13.70	12.02	10	21.00	19.31	10	41.90	26.74	10	22.44	16.47	9	25.90	22.05	10	43.00	18.91	5
Gloiopeltis furcata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.10	0.21	10	0.00	0.00	5
Halosaccion glandiforme	6.80	7.45	10	4.65	3.27	10	7.00	12.23	10	1.00	1.80	9	2.80	3.49	10	0.00	0.00	5
Haplogloia andersoni	0.00	0.00	10	2.30	2.04	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Neorhodomela larix	3.00	6.18	10	15.10	16.66	10	0.40	1.26	10	0.00	0.00	9	4.60	6.26	10	21.00	19.49	5
Neorhodomela oregona	1.70	3.74	10	3.40	2.80	10	1.50	3.17	10	8.78	9.30	9	1.00	3.16	10	0.30	0.45	5
Odonthalia floccosa	4.35	10.88	10	0.00	0.00	10	7.00	8.07	10	0.00	0.00	9	15.70	15.31	10	0.10	0.22	5
Odonthalia kamschatica ?	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.30	0.67	10	0.00	0.00	5
Palmaria callophylloides	5.60	7.49	10	0.20	0.35	10	0.60	1.24	10	5.00	8.90	9	1.10	1.90	10	1.80	2.49	5
Palmaria hecatensis	9.90	18.25	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	9	4.25	6.71	10	0.00	0.00	5
Phycodrys riggii	0.05	0.16	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	1.40	1.52	5
Pilayella littoralis	10.30	9.99	10	0.00	0.00	10	1.05	1.61	10	0.00	0.00	9	1.30	1.70	10	0.00	0.00	5
Ralfsia fungiformis	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Ralfsia spp.	0.20	0.42	10	0.00	0.00	10	2.10	6.30	10	0.00	0.00	9	0.10	0.32	10	0.00	0.00	5
Rhodoglossum/Mastocarpus	1.70	1.49	10	2.60	3.37	10	2.65	2.11	10	2.39	3.24	9	3.05	4.39	10	1.20	1.25	5
Soranthera ulvoidea	0.05	0.16	10	0.65	0.58	10	1.15	1.31	10	0.00	0.00	9	1.60	1.94	10	0.00	0.00	5
Tokidadendron kurilensis	2.40	3.03	10	0.00	0.00	10	0.50	0.47	10	0.00	0.00	9	6.30	12.79	10	0.00	0.00	5
Ulva/Ulvaria spp.	14.90	13.78	10	1.20	1.69	10	11.05	13.80	10	0.06	0.17	9	14.40	8.30	10	10.40	4.56	5
Alcyonidium spp. (%)	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Balanus crenatus (%)	0.00	0.00	10	0.10	0.21	10	0.00	0.00	10	0.06	0.17	9	0.00	0.00	10	0.00	0.00	5
Balanus glandula (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	5.80	5.31	5
Chthamalus dalli (%)	0.00	0.00	10	2.05	3.10	10	2.25	3.05	10	0.22	0.26	9	0.25	0.35	10	0.40	0.42	5
Encrusting bryozoan (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.05	0.16	10	0.30	0.45	5
Halichondria panicea (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.10	0.22	5
Mytilus cf. trossulus (%)	0.00	0.00	10	0.30	0.26	10	0.00	0.00	10	1.06	1.61	9	0.10	0.21	10	0.00	0.00	5
Rhynchozoon bispinosum (%)	0.00	0.00	10	0.10	0.32	10	7.30	8.03	10	0.00	0.00	9	4.30	9.27	10	0.00	0.00	5
Semibalanus balanoides (%)	0.00	0.00	10	0.30	0.95	10	0.00	0.00	10	0.39	0.65	9	0.70	1.23	10	0.00	0.00	5
Semibalanus cariosus (%)	0.00	0.00	10	0.25	0.35	10	17.00	25.68	10	0.00	0.00	9	2.55	6.20	10	0.00	0.00	5
Spirorbidae, unid. (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.30	0.27	5
Anthopleura artemisia	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5

Table B-6 continued.

Taxon	Crab Bay			Eshamy Bay			Hogg Bay			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Buccinum baeri	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.40	0.55	5
Cryptobranchia concentrica	0.10	0.32	10	0.40	0.84	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Evasterias troschelii	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Hapalogaster grebnitzkii	0.00	0.00	10	0.60	1.90	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Hiatella arctica	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Katharina tunicata	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Lacuna variegata	0.00	0.00	10	1.10	2.81	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Leptasterias hexactis	0.30	0.67	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.20	0.45	5
Littorina scutulata	0.10	0.32	10	2.80	8.51	10	0.00	0.00	10	50.22	109.28	9	31.00	56.65	10	0.00	0.00	5
Littorina sitkana	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	12.00	33.03	9	0.70	1.49	10	0.20	0.45	5
Lottia pelta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.44	0.73	9	0.00	0.00	10	0.00	0.00	5
Lottiidae, unid.	5.40	14.08	10	14.20	22.70	10	3.30	4.57	10	0.00	0.00	9	6.10	9.40	10	0.00	0.00	5
Margarites marginatus	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Margarites pupillus	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Mitrella spp.	0.00	0.00	10	0.50	1.27	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Modiolus modiolus	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.40	0.89	5
Nucella lamellosa	0.40	0.70	10	0.20	0.63	10	14.30	18.31	10	0.00	0.00	9	7.20	14.93	10	0.00	0.00	5
Onchidella borealis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	2.10	5.04	10	0.00	0.00	5
Pagurus beringanus	0.70	1.06	10	0.30	0.95	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Pagurus hirsutiusculus	0.20	0.42	10	0.90	1.66	10	3.70	2.58	10	2.00	3.71	9	1.30	1.95	10	1.00	1.73	5
Pagurus spp.	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Pentidotea wosnesenskii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.10	0.32	10	0.00	0.00	5
Pholidae/Stichaeidae	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Pholis laeta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.60	1.34	5
Pholis ornata	0.00	0.00	10	0.40	1.26	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Pisaster ochraceus	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Protothaca staminea	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Pugettia dalli	0.20	0.42	10	0.80	1.03	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Pycnopodia helianthoides	0.20	0.42	10	0.20	0.42	10	0.10	0.32	10	0.00	0.00	9	0.00	0.00	10	0.20	0.45	5
Searlesia dira	1.30	1.64	10	0.00	0.00	10	0.00	0.00	10	0.56	1.01	9	0.00	0.00	10	0.00	0.00	5
Siphonaria thersites	0.00	0.00	10	0.00	0.00	10	0.30	0.95	10	0.00	0.00	9	0.50	0.71	10	0.00	0.00	5
Strongylocentrotus droebachiensis	0.00	0.00	10	0.80	2.20	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Telmessus cheiragonus	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Tonicella lineata	0.20	0.63	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Turridae, unid.	0.20	0.63	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	9	0.00	0.00	10	0.00	0.00	5
Halosaccion glandiforme (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.22	0.67	9	0.00	0.00	10	0.00	0.00	5
Mytilus cf. trossulus (dead)	0.00	0.00	10	3.60	6.22	10	0.30	0.95	10	5.11	8.22	9	0.20	0.42	10	0.00	0.00	5
Nucella lamellosa (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	9	0.70	2.21	10	0.00	0.00	5
Odonthalia sp. (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.56	1.67	9	0.00	0.00	10	0.00	0.00	5
Protothaca staminea (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.11	0.33	9	0.00	0.00	10	0.00	0.00	5
Oil cover (%) (primary)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	72.78	33.46	9	0.00	0.00	10	0.00	0.00	5
Oil scale (primary)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.78	0.67	9	0.00	0.00	10	0.00	0.00	5

Table B-7 Rocky upper intertidal epibiota, Cruise 4, September 1989.

Taxon	Bass Harbor			Eshamy Bay			Herring Bay			Hogg Bay			Mussel Beach S			NW Bay Islet			Outside Bay			Snug Harb	Eshamy Bs	
	Mean	S. D.	Count	Mean	S. D.	Count	Mean	S. D.	Count	Mean	S. D.	Count	Mean	S. D.	Count	Mean	S. D.	Count	Mean	S. D.	Count	Mean	S. D.	Count
Acrosiphonia saxatilis	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Blue-green algae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	5.00	11.18	5
Blue-green algae, crust	0.00	0.00	5	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	18.10	14.58	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Blue-green algae, spheroids	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Bryophyta, unid.	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.27	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Elachista fucicola	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5
Encrusting brown algae	0.80	1.25	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5
Encrusting red algae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.00	1.41	5
Endocladia muricata	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Fucus gardneri	0.20	0.27	5	3.90	6.27	5	0.80	1.10	5	0.90	0.74	5	0.10	0.22	5	0.00	0.00	5	5.00	2.00	5	5.40	10.99	5
Fucus gardneri (sporelings)	4.20	8.64	5	0.20	0.27	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.20	4.37	5	0.00	0.00	5
Gloiopeltis furcata	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.90	1.24	5
Verrucaria spp.	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	96.60	1.64	5	0.00	0.00	5	0.00	0.00	5	1.80	2.17	5	0.00	0.00	5
Balanus glandula (%)	0.40	0.42	5	0.00	0.00	5	0.00	0.00	5	0.30	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.22	5
Balanus/Semibalanus spp., (% set)	0.00	0.00	5	0.20	0.27	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5
Chthamalus dalli (%)	0.50	0.00	5	0.20	0.27	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.40	0.22	5	0.10	0.22	5
Mytilus cf. trossulus (%)	0.60	0.22	5	0.60	0.82	5	0.30	0.27	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.80	0.27	5
Semibalanus balanoides (%)	7.40	3.71	5	1.20	1.25	5	0.20	0.27	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.40	0.22	5	2.90	2.01	5
Littorina scutulata	198.20	145.63	5	31.40	30.57	5	0.20	0.45	5	0.20	0.45	5	0.00	0.00	5	2.80	3.90	5	65.80	60.18	5	12.20	10.03	5
Littorina sitkana	1.80	1.82	5	15.60	23.84	5	1.20	1.64	5	0.60	0.89	5	0.00	0.00	5	3.20	2.28	5	8.40	12.22	5	19.40	19.48	5
Lottidae, unid.	49.00	28.43	5	10.00	10.07	5	0.00	0.00	5	0.60	1.34	5	0.00	0.00	5	0.00	0.00	5	2.60	2.07	5	1.80	4.02	5
Nucella lamellosa	7.80	7.30	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Nucella lima	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Pagurus hirsutiusculus	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.00	1.73	5
Balanus glandula (% dead)	2.10	2.01	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.27	5	0.00	0.00	5
Balanus/Semibalanus spp. (% dead)	1.60	1.92	5	0.00	0.00	5	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5	0.30	0.27	5	0.00	0.00	5	0.00	0.00	5
Chthamalus dalli (% dead)	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.27	5	0.00	0.00	5
Mytilus cf. trossulus (dead)	21.80	29.80	5	1.00	2.24	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	4.40	4.22	5
Semibalanus balanoides (% dead)	0.00	0.00	5	0.40	0.22	5	0.20	0.27	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.30	0.27	5	0.70	0.27	5
Fucus gardneri (dead)	0.00	0.00	5	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	2.10	4.42	5
Oil cover (%) (primary)	0.00	0.00	5	0.00	0.00	5	61.00	14.32	5	0.00	0.00	5	57.00	24.90	5	39.00	33.05	5	0.60	1.79	5	76.00	34.89	5
Oil scale (primary)	0.00	0.00	5	0.00	0.00	5	4.00	0.00	5	0.00	0.00	5	3.60	0.55	5	3.20	0.45	5	0.60	1.79	5	4.60	0.55	5

Table B-8. Rocky middle intertidal epibiota, Cruise 4, September 1999.

Taxon	Crab Bay			Eshamy Bay			Herring Bay			Hogg Bay			Bay of Isles			NW Bay Islet			Outside Bay			Snug Harbor			NWB W Arm Cat 3			NW BAY W Arm Cat 7		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Acrosiphonia sonderiis	0.00	0.00	10	0.90	1.73	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10	0.10	0.21	10	0.15	0.34	10	0.60	0.81	10	0.00	0.00	4	0.00	0.00	4
Blue-green algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	1.26	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Blue-green algae, crust	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	32.00	33.18	10	0.00	0.00	4	0.00	0.00	4
Blue-green algae, spherical	0.05	0.16	10	0.20	0.26	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Cryptosiphonia woodii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Elachista fucicola	0.00	0.00	10	0.55	1.57	10	0.00	0.00	10	5.95	4.96	10	0.00	0.00	10	0.00	0.00	10	3.60	1.90	10	0.55	0.60	10	0.00	0.00	4	0.00	0.00	4
Encrusting brown algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	13.70	21.34	10	0.30	0.48	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Encrusting coralline algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.30	3.13	10	0.00	0.00	10	0.00	0.00	4	1.38	1.80	4
Encrusting green algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.25	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	4	0.00	0.00	4
Encrusting red algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	12.00	15.90	4	9.50	9.47	4
Endocladia muricata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.35	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Enteromorpha linza	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Filamentous green algae	0.00	0.00	10	0.00	0.00	10	2.50	4.14	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.50	2.35	4	1.25	1.55	4
Filamentous red algae	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	1.25	2.50	4
Fucus gardneri	71.50	12.26	10	68.00	18.59	10	38.60	30.86	10	67.50	29.27	10	60.00	19.15	10	0.00	0.00	10	39.00	21.58	10	6.45	6.48	10	7.00	6.27	4	87.50	8.66	4
Fucus gardneri (sporelings)	1.25	1.55	10	1.70	4.68	10	0.00	0.00	10	1.45	1.85	10	0.25	0.35	10	0.05	0.16	10	2.15	4.55	10	0.55	0.16	10	0.00	0.00	4	0.00	0.00	4
Gloiopeltis furcata	0.60	0.57	10	0.20	0.35	10	0.00	0.00	10	0.00	0.00	10	0.25	0.63	10	0.00	0.00	10	1.35	1.45	10	0.35	0.34	10	0.00	0.00	4	0.00	0.00	4
Halosaccion glandiforme	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.50	0.67	10	0.00	0.00	10	0.00	0.00	10	2.25	2.49	10	0.00	0.00	10	0.00	0.00	4	0.38	0.25	4
Iridaea papillosus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.90	0.94	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Iridaea sp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Leathesia difformis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	4	0.00	0.00	4
Mastocarpus spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.63	0.95	4	0.88	0.25	4
Melanosiphon intestinalis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Neorhodomela oregona	0.10	0.21	10	3.40	7.77	10	1.00	1.63	10	0.15	0.24	10	0.00	0.00	10	0.00	0.00	10	0.35	0.41	10	0.25	0.63	10	4.00	7.34	4	8.25	6.40	4
Neorhodomela larix	0.00	0.00	10	0.30	0.95	10	0.25	0.35	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	6.25	12.50	4
Palmaria callophylloides	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	3.10	9.46	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Palmaria hecatensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Pikayella littoralis	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.60	0.75	10	0.00	0.00	4	0.00	0.00	4
Porphyra spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	4	0.00	0.00	4
Pterosiphonia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	4	0.00	0.00	4
Ralfsia fungiformis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.45	0.69	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Ralfsia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.00	1.89	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Rhodochorton purpureum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.50	0.33	10	0.00	0.00	4	0.00	0.00	4
Rhodophyta, unid. (sporeling)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.35	0.94	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Soranthera ulvoidea	0.00	0.00	10	0.00	0.00	10	0.15	0.24	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Ulva/Ulvaria spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	0.61	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.13	0.25	4
Balanus glandula (%)	0.20	0.26	10	1.10	1.71	10	0.00	0.00	10	0.35	0.67	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Balanus nubilus (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Balanus/Semibalanus spp. (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Balanus/Semibalanus spp., (% set)	0.15	0.34	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.40	0.21	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Chthamalus dalli (% set)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.70	0.78	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Chthamalus dalli (%)	0.25	0.35	10	0.20	0.26	10	0.05	0.16	10	1.10	1.49	10	0.00	0.00	10	0.00	0.00	10	2.90	3.34	10	0.05	0.16	10	3.75	4.19	4	9.25	7.80	4
Mytilus cf. trossulus (%)	0.35	0.24	10	6.30	5.71	10	1.25	0.82	10	0.45	0.93	10	4.30	4.78	10	0.20	0.35	10	0.00	0.00	10	1.05	0.83	10	0.13	0.25	4	0.00	0.00	4
Semibalanus balanoides (% set)	0.00	0.00	10	0.25	0.26	10	0.00	0.00	10	0.40	0.70	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Semibalanus balanoides (%)	0.80	1.51	10	6.20	5.15	10	26.00	13.90	10	13.75	25.16	10	10.70	6.85	10	0.00	0.00	10	0.25	0.26	10	4.30	4.42	10	0.13	0.25	4	0.00	0.00	4
Semibalanus carioeus (% set)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.00	1.68	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Semibalanus carioeus (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	14.90	16.90	10	0.00	0.00	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10	0.25	0.29	4	0.50	0.41	4
Anthopleura xanthogrammica	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.25	0.50	4
Cottidae, unid.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.25	0.50	4	0.00	0.00	4
Evasterias troschelii	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Gammaridae, unid.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Gnorimosphaeroma oregonensis	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.20	2.76	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Hemigrapsus oregonensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Lacuna spp.	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Leptasterias hexactis	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	4	0.00	0.00	4
Littorina scutulata	41.00	36.02	10	88.00	77.84	10	259.20	260.38	10	19.40	32.47	10	41.50	33.93	10	7.00	7.94	10	0.00	0.00	10	16.50	27.72	10	12.25	7.27	4	0.25	0.50	4
Littorina sitkana	116.30	75.69	10	342.20	352.14	10	57.90	62.54	10	10.00	22.39	10	120.60	61.57	10	0.20	0.42	10	0.00	0.00	10	1.00	1.89	10	1.75	2.36	4	1.75	2.06	4
Lottidae, unid.	25.50	19.87	10	28.00	19.18	10	33.50	15.64	10	2.50	4.17	10	20.00	19.40	10	0.20	0.63	10	12.40	16.66	10	10.50	12.97	10	0.75	0.96	4	22.25	12.84	4
Nucella lamellosa	10.90	13.60	10	0.60	1.58	10	0.00	0.00	10	1.20	1.62	10	0.00	0.00	10	0.00	0.00	10	1.30	1.83	10	0.00	0.00	10	3.25	1.50	4	10.75	16.25	4
Nucella lima	0.20	0.42	10	0.20	0.42	10	1.20	1.03	10	0.00	0.00	10	2.40	3.41	10	0.00	0.00	10	0.00	0.00	10	0.60	1.07	10	0.00	0.00	4	0.00	0.00	4
Onchidella borealis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Pagurus hirsutiusculus	4.60	7.17	10	27.60	23.62	10	7.70	10.52	10	0.50	0.85	10	11.60	13.71	10	0.20	0.42	10	1.10	1.29	10	5.70	9.13	10	5.00	6.22	4	3.00	1.83	4
Panidotea spp.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Pholis laeta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Saxidomus gigantea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	0.84	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Siphonaria thersites	2.50	3.60	10	0.00	0.00	10	0.00	0.00	10	2.70	2.71	10	0.00	0.00	10	0.10	0.32	10	2.60	7.48	10	0.00	0.00	10	0.00	0.00	4	3.75	1.50	4
Tectura scutum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	1.26	10	0.00	0.00	4	0.00	0.00	4
Volutharpa ampullacea	0.00	0.00	10	0.60	1.26	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Articulated coralline algae (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.13	0.25	4	0.00	0.00	4
Encrusting coralline algae (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	5.00	6.48	4	0.25	0.50	4
Fucus gardneri (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	3.50	3.16	10	0.00	0.00	10	0.00	0.00	10	7.63	8.86	4	1.50	3.00	4
Balanus glandula (% dead)	0.55	0.80	10	0.05	0.16	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.10	0.21	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Balanus/Semibalanus spp. (% dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.70	0.86	10	0.85	1.60	10	3.80	4.52	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Chthamalus dalli (% dead)	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Modiolus modiolus (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.25	0.50	4	0.00	0.00	4
Mytilus cf. trossulus (dead)	29.30	37.12	10	13.40	10.15	10	3.70	2.50	10	6.60	14.15	10	7.40	5.40	10	6.00	7.42	10	0.00	0.00	10	3.60	3.17	10	0.00	0.00	4	0.00	0.00	4
Semibalanus balanoides (% dead)	0.95	1.50	10	0.30	0.26	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.15	0.24	10	0.90	0.46	10	0.00	0.00	4	0.00	0.00	4
Semibalanus carioeus (% dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	4	0.00	0.00	4
Tidepool (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	5.00	10.00	4	0.00	0.00	4
Oil cover (%) (primary)	0.00	0.00	10	0.00	0.00	10	2.30	4.64	10	0.00	0.00	10	1.30	2.04	10	21.15	19.23	10	0.00	0.00	10	8.40	12.75	10	22.50	12.58	4	0.00	0.00	4
Oil scale (primary)	0.00	0.00	10	0.00	0.00	10	1.50	1.96	10	0.00	0.00	10	1.25	1.51	10	2.40	0.52	10	0.00	0.00	10	3.90	0.32	10	3.00	0.00	4	0.00	0.00	4
Rock (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	91.25	8.54	4	100.00	0.00	4
Boulder/Cobble (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	3.75	4.79	4	0.00	0.00	4

Table B-9. Rocky lower intertidal epibiota, Cruise 4, September 1989.

	NW Bay Islet		
Taxon	Mean	SD	Count
Algae (juv.)	1.15	3.13	10
Blue-green algae, spheroids	0.20	0.26	10
Cryptosiphonia woodii	3.70	7.83	10
Encrusting red algae	8.25	9.99	10
Filamentous green algae	2.95	3.12	10
Filamentous red algae	0.05	0.16	10
Fucus gardneri	16.80	18.44	10
Halosaccion glandiforme	0.10	0.32	10
Neorhodomela oregona	0.05	0.16	10
Neorhodomela larix	3.50	9.44	10
Odonthalia floccosa	2.55	3.50	10
Ralfsia spp.	0.40	0.66	10
Rhodoglossum/Mastocarpus	0.85	2.19	10
Balanus/Semibalanus spp. (%)	0.10	0.32	10
Mytilus cf. trossulus (%)	0.15	0.34	10
Semibalanus balanoides (%)	0.25	0.35	10
Lottiidae, unid.	2.30	3.53	10
Pagurus hirsutiusculus	2.70	4.30	10
Articulated coralline algae (dead)	0.50	0.94	10
Encrusting coralline algae (dead)	12.65	21.92	10
Fucus gardneri (dead)	2.30	3.40	10
Mytilus cf. trossulus (dead)	0.30	0.95	10
Oil cover (%) (primary)	38.00	45.41	10
Oil scale (primary)	0.60	0.52	10
Bare substrate (%)	10.00	16.50	10

Table B-10. Rocky upper intertidal epibiota, July 1993.

Taxon	Block Island			Eshamy Bay			Herring Bay			Mussel Beach N			Mussel Beach S			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Blue-green algae, spheroids	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Bryophyta, unid.	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5
Endocladia muricata	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5
Endozoic green algae	0.30	0.27	5	0.00	0.00	5	0.00	0.00	5	0.40	0.21	10	0.10	0.22	5	0.00	0.00	5	0.40	0.22	5
Enteromorpha intestinalis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.05	0.16	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Fucus gardneri	21.50	28.87	5	0.80	1.10	5	0.10	0.22	5	24.20	19.52	10	4.00	8.94	5	9.00	12.04	5	37.00	33.35	5
Fucus gardneri (sporelings)	0.20	0.27	5	0.40	0.42	5	0.40	0.22	5	0.55	0.16	10	0.40	0.22	5	0.50	0.35	5	0.60	0.22	5
Gloiopeltis furcata	0.10	0.22	5	0.00	0.00	5	0.10	0.22	5	0.35	0.67	10	0.00	0.00	5	5.10	11.13	5	4.80	2.59	5
Hildenbrandia rubra	3.80	3.63	5	0.10	0.22	5	0.50	0.35	5	6.45	9.39	10	0.40	0.55	5	0.40	0.89	5	0.30	0.27	5
Leathesia difformis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.05	0.16	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Melanosiphon intestinalis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.40	0.70	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Petrocelis spp.	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.30	0.95	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Ralfsia spp.	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	3.20	9.42	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Neorhodomela oregona	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.70	1.89	10	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5
Soranthera ulvoidea	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Verrucaria spp.	11.70	16.20	5	4.60	4.72	5	0.20	0.27	5	7.30	13.91	10	5.50	3.39	5	12.50	12.18	5	0.00	0.00	5
Cladophora sericea	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.50	7.91	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Balanus glandula (%)	0.80	0.27	5	0.10	0.22	5	0.40	0.22	5	1.35	0.97	10	0.30	0.45	5	0.40	0.42	5	0.60	0.42	5
Balanus glandula (% set)	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.20	0.45	5	0.00	0.00	5	0.10	0.22	5
Chthamalus dalli (% set)	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5	0.15	0.24	10	0.10	0.22	5	0.50	0.87	5	0.10	0.22	5
Chthamalus dalli (%)	0.30	0.27	5	0.50	0.35	5	0.50	0.50	5	0.85	0.47	10	1.30	1.57	5	1.30	2.08	5	0.40	0.22	5
Mytilus cf. trossulus (%)	0.50	0.87	5	1.00	2.24	5	0.10	0.22	5	2.45	4.11	10	0.10	0.22	5	0.00	0.00	5	1.00	0.94	5
Mytilus cf. trossulus (% spat)	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5	0.25	0.42	10	0.00	0.00	5	0.00	0.00	5	0.10	0.22	5
Semibalanus balanoides (% set)	0.10	0.22	5	0.00	0.00	5	0.00	0.00	5	0.05	0.16	10	0.10	0.22	5	0.20	0.27	5	0.30	0.45	5
Semibalanus balanoides (%)	2.40	4.26	5	0.50	0.35	5	0.00	0.00	5	1.00	1.53	10	0.00	0.00	5	0.10	0.22	5	1.10	1.14	5
Balanus/Semibalanus spp., (% set)	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.10	0.22	5	0.00	0.00	5	0.30	0.27	5
Siphonaria thersites, eggs (%)	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.15	0.24	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Clinocottus acuticeps	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Hemigrapsus oregonensis	0.40	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Littorina scutulata	175.80	163.28	5	71.60	70.35	5	70.20	26.54	5	105.90	79.16	10	79.60	107.69	5	392.40	454.70	5	52.00	36.41	5
Littorina sitkana	219.40	201.87	5	157.40	84.38	5	6.60	7.16	5	130.50	117.12	10	155.00	135.07	5	95.80	156.74	5	119.20	19.56	5
Lottia pelta	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.50	0.97	10	0.00	0.00	5	0.20	0.45	5	0.20	0.45	5
Lottia strigatella	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Lottiidae, unid.	0.40	0.89	5	0.40	0.89	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Lottiidae, unid. (juv.)	8.80	12.32	5	0.00	0.00	5	0.00	0.00	5	6.80	10.57	10	0.00	0.00	5	8.40	8.08	5	1.80	4.02	5
Nucella lamellosa	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.60	1.34	5	0.00	0.00	5
Pagurus hirsutiusculus	1.00	2.24	5	0.00	0.00	5	0.00	0.00	5	1.60	3.13	10	0.00	0.00	5	0.00	0.00	5	2.20	3.03	5
Siphonaria thersites	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.40	1.26	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Tectura persona	1.20	0.84	5	1.20	2.17	5	4.20	2.68	5	1.30	1.77	10	7.00	9.27	5	0.40	0.89	5	12.60	5.81	5
Tectura scutum	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Telmessus cheiragonus	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Prosobranchia, eggs	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5	0.10	0.22	5
Acarina	0.00	0.00	5	P	P	2	0.00	0.00	5	P	P	8	P	P	3	0.00	0.00	5	0.00	0.00	5
Ligia sp.	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.10	1.29	10	0.00	0.00	5	2.40	2.30	5	0.20	0.45	5
Fucus gardneri (dead)	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.05	0.16	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5
Balanus glandula (% dead)	0.20	0.27	5	0.00	0.00	5	0.30	0.27	5	0.30	0.26	10	0.10	0.22	5	0.00	0.00	5	0.10	0.22	5
Chthamalus dalli (% dead)	0.00	0.00	5	0.20	0.27	5	0.20	0.27	5	0.15	0.24	10	0.00	0.00	5	0.10	0.22	5	0.00	0.00	5
Mytilus cf. trossulus (dead)	0.20	0.45	5	2.00	4.47	5	0.20	0.45	5	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5

Table B-10. Rocky upper intertidal epibiota, July 1993.

	Block Island			Eshamy Bay			Herring Bay			Mussel Beach N			Mussel Beach S			Outside Bay			Snug Harbor		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Semibalanus balanoides (% dead)	0.40	0.22	5	0.00	0.00	5	0.00	0.00	5	0.15	0.24	10	0.00	0.00	5	0.00	0.00	5	0.40	0.22	5
Boulder/Cobble (%)	0.00	0.00	5	19.00	42.49	5	4.00	8.94	5	0.00	0.00	10	50.00	46.23	5	0.00	0.00	5	96.40	4.98	5
Gravel/Sand(%)	0.00	0.00	5	1.00	2.24	5	4.00	4.18	5	0.00	0.00	10	10.00	11.73	5	0.00	0.00	5	3.60	4.98	5
Oil scale (primary)	0.00	0.00	5	0.00	0.00	5	6.00	0.00	5	0.00	0.00	10	3.60	3.29	5	0.00	0.00	5	1.20	2.68	5
Oil cover (%) (primary)	0.00	0.00	5	0.00	0.00	5	0.90	0.65	5	0.00	0.00	10	0.30	0.27	5	0.00	0.00	5	0.10	0.22	5
Rock (%)	100.00	0.00	5	80.00	44.72	5	92.00	10.37	5	100.00	0.00	10	40.00	54.77	5	100.00	0.00	5	0.00	0.00	5
Water (%)	2.00	4.47	5	0.00	0.00	5	0.00	0.00	5	8.10	18.79	10	0.00	0.00	5	0.60	1.34	5	0.00	0.00	5

Table B-11. Rocky middle intertidal epibiota, July 1993.

	Block Island			Crab Bay			Eshamy Bay			Herring Bay			Mussel Beach N			NW Bay Islet		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Blidingia minima	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Blue-green algae, spheroids	0.25	0.26	10	0.10	0.21	10	0.25	0.26	10	0.05	0.16	10	0.40	0.39	10	0.20	0.26	10
Callithamnion pikeanum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10
Corallina frondescens	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.25	0.35	10	0.00	0.00	10
Cryptosiphonia woodii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10
Elachista fucicola	0.00	0.00	10	0.00	0.00	10	1.50	4.74	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Encrusting coralline algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.45	4.71	10	0.00	0.00	10
Encrusting green algae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Endocladia muricata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Endozoic green algae	0.55	0.60	10	0.35	0.24	10	0.20	0.26	10	0.15	0.24	10	0.25	0.26	10	0.90	2.50	10
Enteromorpha intestinalis	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10
Fucus gardneri	87.80	20.85	10	42.80	28.63	10	24.80	27.51	10	87.70	19.41	10	20.50	21.66	10	32.15	41.32	10
Fucus gardneri (sporelings)	0.30	0.26	10	1.35	1.42	10	0.80	1.14	10	0.05	0.16	10	1.40	1.02	10	0.70	1.01	10
Gloiopeltis furcata	0.85	1.43	10	2.00	1.97	10	1.15	1.60	10	0.15	0.34	10	0.70	0.86	10	0.40	0.94	10
Halosaccion glandiforme	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10
Hildenbrandia rubra	1.25	1.77	10	0.30	0.95	10	0.30	0.95	10	0.00	0.00	10	0.10	0.21	10	0.10	0.21	10
Leathesia difformis	0.05	0.16	10	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10	0.70	1.21	10	0.05	0.16	10
Mastocarpus papillatus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10
Melanosiphon intestinalis	0.05	0.16	10	0.20	0.63	10	0.30	0.63	10	0.00	0.00	10	2.05	2.10	10	0.40	0.66	10
Neorhodomela larix	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10
Odonthalia floccosa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Petrocelis spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10
Pilayella littoralis	0.00	0.00	10	0.15	0.34	10	0.35	0.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Pterosiphonia bipinnata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10
Pterosiphonia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ralfsia fungiformis	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ralfsia spp.	0.15	0.24	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	3.70	4.72	10	0.00	0.00	10
Rhodochorton purpureum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Rhodoglossum/Mastocarpus	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10
Neorhodomela oregona	1.10	1.85	10	0.35	0.94	10	1.90	2.55	10	0.65	0.58	10	5.35	6.63	10	0.05	0.16	10
Soranthera ulvoidea	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	10	2.90	6.21	10	0.00	0.00	10
Sphacelaria rigidula	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ulva/Ulvaria spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Cladophora sericea	0.05	0.16	10	0.00	0.00	10	0.65	1.56	10	0.05	0.16	10	1.80	3.07	10	0.40	0.97	10
Dictyosiphon foeniculaceus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.80	2.53	10
Chaetomorpha tortuosa	0.00	0.00	10	0.30	0.67	10	2.80	3.76	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Acrosiphonia arcta	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10
Ulva fenestrata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10
Polysiphonia hendryi	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	1.05	3.15	10	0.00	0.00	10
Ulva sp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Ectocarpus parvus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.70	6.27	10	0.00	0.00	10
Balanus glandula (%)	3.60	5.03	10	0.40	0.21	10	6.90	20.42	10	2.05	4.62	10	2.65	2.82	10	1.95	1.89	10
Balanus glandula (% set)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Balanus/Semibalanus spp. (%)	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10

Table B-11 continued.

Taxon	Block Island			Crab Bay			Eshamy Bay			Herring Bay			Mussel Beach N			NW Bay Islet		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Mytilus cf. trossulus (%)	11.60	8.65	10	7.05	6.63	10	8.55	13.95	10	6.35	4.78	10	9.95	15.77	10	4.80	5.71	10
Mytilus cf. trossulus (% spat)	1.55	2.41	10	0.50	0.00	9	0.45	0.28	10	0.55	0.96	10	2.55	4.60	10	0.60	0.88	10
Semibalanus balanoides (% set)	0.30	0.63	10	0.35	0.24	10	0.00	0.00	10	8.45	10.25	10	0.20	0.35	10	0.15	0.24	10
Semibalanus balanoides (%)	13.10	7.49	10	1.55	1.77	10	0.65	1.56	10	3.65	5.28	10	2.60	7.87	10	11.55	12.27	10
Semibalanus cariosus (% set)	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10
Semibalanus cariosus (%)	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	4.35	9.15	10	0.00	0.00	10
Spirorbidae, unid. (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.21	10	0.00	0.00	10
Balanus/Semibalanus spp., set (%)	0.00	0.00	10	0.05	0.16	10	0.10	0.21	10	3.00	9.49	10	0.10	0.21	10	0.05	0.16	10
Siphonaria thersites, eggs (%)	0.00	0.00	10	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.30	0.42	10	0.00	0.00	10
Musculus spp. (% spat)	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Anthopleura artemisia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Buccinum baeri	0.70	1.16	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Clinocottus acuticeps	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Emplectonema gracile	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Evasterias troschelii	0.20	0.42	10	0.10	0.32	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10
Gammaridea, unid.	*P	*P	7	*P	*P	9	*P	*P	9	0.00	0.00	10	0.00	0.00	10	*P	*P	9
Gnorimosphaeroma oregonensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.50	1.08	10	0.00	0.00	10	0.00	0.00	10
Hemigrapsus oregonensis	0.40	0.52	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Leptasterias hexactis	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.80	1.40	10	0.00	0.00	10	0.00	0.00	10
Leptasterias spp.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.10	1.60	10	0.00	0.00	10
Littorina scutulata	16.70	9.93	10	12.40	6.50	10	166.10	406.63	10	207.20	156.58	10	62.00	98.62	10	360.50	274.47	10
Littorina sitkana	71.60	112.04	10	79.80	136.00	10	31.00	31.79	9	207.20	208.57	10	1.50	3.24	10	63.80	152.25	10
Lottia pelta	9.80	5.98	10	3.20	4.24	10	1.60	2.22	10	25.50	19.45	10	3.50	3.34	10	6.40	9.71	10
Lottia strigatella	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10
Lottiidae, unid.	0.00	0.00	10	1.30	3.20	10	0.40	0.84	10	49.50	43.76	10	0.60	1.90	10	0.00	0.00	10
Lottiidae, unid. (juv.)	33.60	17.15	10	30.00	17.50	10	22.80	20.64	10	6.70	15.26	10	79.20	59.71	10	21.50	21.47	10
Nemertea, white	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Nucella lamellosa	0.00	0.00	10	1.00	1.49	10	9.80	17.42	10	0.10	0.32	10	1.20	1.87	10	0.00	0.00	10
Nucella lima	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	5.50	6.77	10	1.50	4.40	10	0.00	0.00	10
Onchidella borealis	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Pagurus beringanus	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Pagurus granosimanus	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.70	7.86	10	0.00	0.00	10
Pagurus hirsutiusculus	36.50	34.77	10	7.90	11.65	10	39.40	50.36	10	20.67	12.13	9	10.20	19.59	10	4.80	8.28	10
Pagurus spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.80	4.10	10	0.00	0.00	10
Pentidotea wosnesenskii	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10
Pholidae/Stichaeidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10
Pisaster ochraceus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Searlesia dira	0.80	1.87	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	5.30	6.68	10	0.00	0.00	10
Siphonaria thersites	0.10	0.32	10	0.20	0.42	10	0.10	0.32	10	0.00	0.00	10	10.70	27.67	10	0.00	0.00	10
Strongylocentrotus droebachiensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10
Tectura persona	0.00	0.00	10	1.20	2.20	10	0.40	0.84	10	0.00	0.00	10	0.60	1.90	10	0.00	0.00	10

Table B-11 continued.

Taxon	Block Island			Crab Bay			Eshamy Bay			Herring Bay			Mussel Beach N			NW Bay Islet		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Acarina	*P	*P	6	*P	*P	7	*P	*P	8	*P	*P	8	*P	*P	9	*P	*P	8
Ligia sp.	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Tectura testudinalis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.70	2.45	10	0.00	0.00	10
Gobiesox spp.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Anthopleura elegantissima	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10
Nucella lamellosa (juv.)	0.00	0.00	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Tectura spp.	0.00	0.00	10	0.00	0.00	10	1.00	1.76	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Nucella lima (juvenile)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10
Encrusting coralline algae (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10
Fucus gardneri (dead)	0.00	0.00	10	0.15	0.24	10	0.00	0.00	10	0.00	0.00	10	0.25	0.63	10	0.05	0.16	10
Balanus glandula (% dead)	0.15	0.34	10	0.00	0.00	10	0.60	0.88	10	0.35	0.41	10	0.55	0.37	10	0.10	0.21	10
Balanus/Semibalanus spp. (% dead)	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.45	0.93	10	0.00	0.00	10	0.05	0.16	10
Chthamalus dalli (% dead)	0.00	0.00	10	0.10	0.32	10	0.55	0.28	10	0.00	0.00	10	1.05	1.01	10	0.05	0.16	10
Mytilus cf. trossulus (dead)	10.60	16.65	10	2.60	4.35	10	22.00	22.94	10	18.90	24.90	10	19.90	15.59	10	1.20	1.62	10
Nucella lamellosa (dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Semibalanus balanoides (% dead)	2.95	2.91	10	0.50	0.62	10	0.15	0.24	10	0.75	1.32	10	0.15	0.34	10	0.10	0.21	10
Semibalanus cariosus (% set, dead)	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Mytilus sp. (% set, dead)	0.00	0.00	10	0.15	0.34	10	2.00	6.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Balanus/Semibalanus spp. (% set, dea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10
Boulder/Cobble (%)	0.00	0.00	10	46.20	42.44	10	43.60	39.89	10	0.00	0.00	10	0.00	0.00	10	6.70	20.49	10
Gravel/Sand(%)	0.00	0.00	10	8.00	16.02	10	4.20	9.59	10	0.00	0.00	10	0.05	0.16	10	0.50	1.58	10
Mud (%)	0.00	0.00	10	0.70	1.57	10	1.30	3.77	10	0.00	0.00	10	0.00	0.00	10	0.40	1.26	10
Oil scale (primary)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.60	1.90	10	0.00	0.00	10
Oil cover (%) (primary)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10
Rock (%)	100.00	0.00	10	45.20	47.79	10	50.90	42.27	10	100.00	0.00	10	100.00	0.00	10	92.80	22.07	10
Water (%)	3.10	6.71	10	2.50	4.72	10	0.00	0.00	10	0.00	0.00	10	7.10	10.28	10	2.40	4.72	10

Table B-11 continued

Taxon	Outside Bay		Snug Harbor			NW Bay W Arm Cat 3			NW Bay W Arm Cat ?		
	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Blidingia minima	0.81	10	0.10	0.21	10	0.00	0.00	5	0.00	0.00	5
Blue-green algae, spheroids	0.16	10	0.40	0.21	10	0.70	1.30	5	0.00	0.00	5
Callithamnion pikeanum	0.00	10	0.00	0.00	10	0.00	0.00	5	0.20	0.27	5
Corallina frondescens	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Cryptosiphonia woodii	0.63	10	0.00	0.00	10	0.00	0.00	5	0.40	0.55	5
Elachista fucicola	3.88	10	0.00	0.00	10	0.20	0.45	5	0.00	0.00	5
Encrusting coralline algae	1.24	10	0.00	0.00	10	1.00	2.24	5	1.30	0.97	5
Encrusting green algae	0.00	10	0.00	0.00	10	0.00	0.00	5	0.10	0.22	5
Endocladia muricata	1.55	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Endozoic green algae	0.21	10	0.00	0.00	10	0.10	0.22	5	0.10	0.22	5
Enteromorpha intestinalis	0.00	10	0.00	0.00	10	0.10	0.22	5	0.00	0.00	5
Fucus gardneri	16.63	10	46.33	23.37	9	65.40	22.93	5	74.00	7.42	5
Fucus gardneri (sporelings)	2.00	10	0.35	0.34	10	0.40	0.42	5	1.80	1.10	5
Gloiopeltis furcata	1.03	10	2.10	2.40	10	2.00	3.37	5	3.30	3.15	5
Halosaccion glandiforme	2.73	10	0.00	0.00	10	0.00	0.00	5	3.40	0.89	5
Hildenbrandia rubra	4.81	10	0.10	0.32	10	7.50	11.58	5	12.60	13.79	5
Leathesia difformis	0.32	10	0.00	0.00	10	0.00	0.00	5	1.40	1.64	5
Mastocarpus papillatus	0.32	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Melanosiphon intestinalis	2.66	10	0.00	0.00	10	0.00	0.00	5	0.50	0.50	5
Neorhodomela larix	0.00	10	0.00	0.00	10	3.30	5.56	5	2.40	5.37	5
Odonthalia floccosa	0.00	10	0.00	0.00	10	3.00	6.71	5	0.00	0.00	5
Petrocelis spp.	0.64	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Pilayella littoralis	2.95	10	0.70	1.06	10	1.00	2.24	5	2.20	2.49	5
Pterosiphonia bipinnata	0.24	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Pterosiphonia spp.	0.00	10	0.00	0.00	10	0.00	0.00	5	4.60	3.44	5
Ralfsia fungiformis	0.16	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Ralfsia spp.	1.26	10	0.00	0.00	10	0.00	0.00	5	1.40	1.34	5
Rhodochorton purpureum	3.90	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Rhodoglossum/Mastocarpus	4.89	10	0.00	0.00	10	0.30	0.45	5	1.30	1.20	5
Neorhodomela oregona	0.82	10	0.15	0.34	10	2.20	3.35	5	5.60	3.21	5
Soranthera ulvoidea	0.21	10	0.00	0.00	10	0.30	0.45	5	0.30	0.27	5
Sphacelaria rigidula	1.86	10	0.00	0.00	10	0.00	0.00	5	0.40	0.42	5
Ulva/Ulvaria spp.	0.00	10	0.00	0.00	10	0.00	0.00	5	0.10	0.22	5
Cladophora sericea	2.54	10	0.15	0.34	10	0.90	1.02	5	6.60	6.54	5
Dictyosiphon foeniculaceus	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Chaetomorpha tortuosa	0.00	10	0.05	0.16	10	0.00	0.00	5	0.00	0.00	5
Acrosiphonia arcta	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Ulva fenestrata	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Polysiphonia hendryi	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Ulva sp.	0.35	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Ectocarpus parvus	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Balanus glandula (%)	0.00	10	0.85	0.67	10	0.30	0.27	5	0.50	0.35	5
Balanus glandula (% set)	0.00	10	0.00	0.00	10	0.10	0.22	5	0.80	1.10	5
Balanus/Semibalanus spp. (%)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5

Table B-11 continued.

Taxon	Outside Bay		Snug Harbor			NW Bay W Arm Cat 3			NW Bay W Arm Cat ?		
	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Mytilus cf. trossulus (%)	0.17	9	9.50	8.28	10	0.10	0.22	5	0.00	0.00	5
Mytilus cf. trossulus (% spat)	0.16	10	0.55	0.28	10	0.20	0.27	5	1.20	0.76	5
Semibalanus balanoides (% set)	0.32	10	0.30	0.35	10	0.10	0.22	5	0.00	0.00	5
Semibalanus balanoides (%)	0.34	10	6.70	6.82	10	0.40	0.42	5	0.00	0.00	5
Semibalanus cariosus (% set)	0.24	10	0.05	0.16	10	0.00	0.00	5	0.20	0.45	5
Semibalanus cariosus (%)	0.00	10	0.00	0.00	10	0.00	0.00	5	1.30	1.15	5
Spirorbidae, unid. (%)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Balanus/Semibalanus spp., set (%)	0.00	10	0.15	0.24	10	0.10	0.22	5	0.20	0.27	5
Siphonaria thersites, eggs (%)	0.33	10	0.00	0.00	10	0.20	0.27	5	1.10	0.55	5
Musculus spp. (% spat)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Anthopleura artemisia	0.00	10	0.00	0.00	10	0.00	0.00	5	0.20	0.45	5
Buccinum baeri	0.00	10	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5
Clinocottus acuticeps	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Emplectonema gracile	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Evasterias troschelii	0.00	10	0.10	0.32	10	1.00	1.00	5	0.60	0.89	5
Gammaridea, unid.	*P	7	*P	*P	9	*P	*P	3	*P	*P	4
Gnorimosphaeroma oregonensis	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Hemigrapsus oregonensis	0.00	10	0.30	0.48	10	0.00	0.00	5	0.00	0.00	5
Leptasterias hexactis	0.00	10	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5
Leptasterias spp.	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Littorina scutulata	0.42	10	75.80	71.39	10	16.20	17.70	5	2.00	3.46	5
Littorina sitkana	0.32	10	38.30	38.97	10	1.60	3.58	5	0.60	0.55	5
Lottia pelta	1.93	10	1.30	2.00	10	1.00	1.41	5	0.40	0.89	5
Lottia strigatella	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Lottiidae, unid.	0.00	10	1.20	3.16	10	0.00	0.00	5	0.00	0.00	5
Lottiidae, unid. (juv.)	18.82	10	15.20	12.86	10	30.60	26.52	5	60.00	31.22	5
Nemertea, white	0.00	10	0.00	0.00	10	0.00	0.00	5	0.20	0.45	5
Nucella lamellosa	3.14	10	3.50	6.95	10	5.40	2.88	5	9.40	8.08	5
Nucella lima	0.00	10	1.30	2.87	10	0.00	0.00	5	0.00	0.00	5
Onchidella borealis	0.32	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Pagurus beringanus	0.00	10	0.10	0.32	10	0.00	0.00	5	0.20	0.45	5
Pagurus granosimanus	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Pagurus hirsutiusculus	1.17	10	25.80	28.19	10	16.80	12.79	5	9.40	2.70	5
Pagurus spp.	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Pentidotea wosnesenskii	0.00	10	0.00	0.00	10	0.20	0.45	5	0.00	0.00	5
Pholidae/Stichaeidae	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Pisaster ochraceus	0.00	10	0.00	0.00	10	0.00	0.00	5	0.20	0.45	5
Searlesia dira	0.00	10	0.40	1.26	10	0.20	0.45	5	0.00	0.00	5
Siphonaria thersites	18.84	10	0.00	0.00	10	2.80	2.17	5	21.40	8.62	5
Strongylocentrotus droebachiensis	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Tectura persona	0.00	10	0.10	0.32	10	0.00	0.00	5	0.00	0.00	5

Table B-11 continued.

Taxon	Outside Bay		Snug Harbor			NW Bay W Arm Cat 3			NW Bay W Arm Cat ?		
	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Acarina	*P	9	*P	*P	8	*P	*P	4	*P	*P	0
Ligia sp.	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Tectura testudinalis	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Gobiesox spp.	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Anthopleura elegantissima	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Nucella lamellosa (juv.)	1.08	10	0.80	1.87	10	4.80	5.72	5	1.00	1.00	5
Tectura spp.	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Nucella lima (juvenile)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Encrusting coralline algae (dead)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Fucus gardneri (dead)	0.21	10	0.05	0.16	10	0.00	0.00	5	0.20	0.27	5
Balanus glandula (% dead)	0.00	10	0.30	0.26	10	0.30	0.27	5	0.10	0.22	5
Balanus/Semibalanus spp. (% dead)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Chthamalus dalli (% dead)	4.25	10	0.00	0.00	10	7.00	3.16	5	5.40	3.13	5
Mytilus cf. trossulus (dead)	1.26	10	7.90	5.65	10	12.20	18.70	5	37.20	19.72	5
Nucella lamellosa (dead)	0.00	10	0.20	0.63	10	0.00	0.00	5	0.00	0.00	5
Semibalanus balanoides (% dead)	0.16	10	1.65	1.53	10	1.10	1.14	5	0.00	0.00	5
Semibalanus cariosus (% set, dead)	0.16	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Mytilus sp. (% set, dead)	0.32	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Balanus/Semibalanus spp. (% set, d	0.00	10	0.05	0.16	10	0.00	0.00	5	0.00	0.00	5
Boulder/Cobble (%)	0.00	10	92.80	6.96	10	0.00	0.00	5	0.00	0.00	5
Gravel/Sand(%)	0.00	10	5.20	3.05	10	0.00	0.00	5	0.00	0.00	5
Mud (%)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Oil scale (primary)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Oil cover (%) (primary)	0.00	10	0.00	0.00	10	0.00	0.00	5	0.00	0.00	5
Rock (%)	0.00	10	2.00	6.32	10	100.00	0.00	5	100.00	0.00	5
Water (%)	0.00	10	1.00	3.16	10	3.00	4.47	5	3.20	3.90	5

*P = present, not counted

Table B-12. Rocky lower intertidal epibiota, July 1993.

Taxon	Crab Bay			Eshamy Bay			Mussel Beach N			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Articulated coralline algae	0.00	0.00	10	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Blue-green algae, spheroids	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.21	10	0.00	0.00	6	0.07	0.19	7
Bossiella cretacea	0.00	0.00	10	0.05	0.16	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Ceramium cimbricum	0.00	0.00	10	0.20	0.35	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Constantinea subulifera	0.00	0.00	10	0.15	0.24	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Corallina frondescens	0.15	0.24	10	1.35	1.80	10	4.70	9.13	10	0.05	0.16	10	4.00	7.86	6	0.00	0.00	7
Cryptosiphonia woodii	2.85	2.24	10	3.45	1.98	10	7.50	4.88	10	1.30	2.26	10	7.33	4.72	6	7.79	10.52	7
Elachista fucicola	0.00	0.00	10	0.70	0.82	10	1.70	1.69	10	2.45	1.83	10	0.00	0.00	6	0.00	0.00	7
Encrusting coralline algae	1.05	1.66	10	7.55	5.57	10	9.30	8.10	10	0.50	0.94	10	1.00	0.84	6	0.00	0.00	7
Enteromorpha intestinalis	0.00	0.00	10	0.05	0.16	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	6	0.00	0.00	7
Enteromorpha linza	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	6	0.00	0.00	7
Fucus gardneri	12.00	10.21	10	51.80	29.61	10	32.40	10.22	10	67.00	23.28	10	7.25	5.55	6	47.14	17.04	7
Fucus gardneri (sporelings)	0.00	0.00	10	0.50	0.67	10	0.00	0.00	10	1.80	1.86	10	0.00	0.00	6	0.57	0.35	7
Gloiopeltis furcata	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.85	2.52	10	0.00	0.00	6	0.07	0.19	7
Halosaccion glandiforme	9.80	5.41	10	6.50	6.17	10	5.60	5.50	10	0.90	1.07	10	3.58	3.85	6	0.00	0.00	7
Hildenbrandia rubra	0.00	0.00	10	2.25	3.70	10	0.00	0.00	10	5.90	9.58	10	0.00	0.00	6	0.00	0.00	7
Iridaea heterocarpa	3.10	1.91	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	3.17	3.82	6	0.00	0.00	7
Laminaria bongardiana	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Laminaria saccharina	1.20	3.79	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Leathesia difformis	0.45	0.16	10	0.20	0.26	10	0.40	0.39	10	0.20	0.26	10	5.83	7.22	6	0.00	0.00	7
Mastocarpus papillatus	0.00	0.00	10	1.50	3.17	10	0.00	0.00	10	0.00	0.00	10	13.83	10.46	6	0.14	0.38	7
Melanosiphon intestinalis	0.10	0.21	10	1.30	1.53	10	1.75	3.81	10	0.55	0.80	10	0.50	1.22	6	0.29	0.39	7
Neorhodomela larix	3.35	5.26	10	10.60	21.18	10	12.70	16.01	10	0.00	0.00	10	13.17	19.15	6	0.00	0.00	7
Odonthalia floccosa	7.10	8.10	10	0.00	0.00	10	3.50	6.19	10	0.00	0.00	10	1.00	2.45	6	0.00	0.00	7
Palmaria callophylloides	1.40	2.01	10	0.45	0.69	10	0.25	0.35	10	0.10	0.32	10	0.25	0.42	6	1.00	1.12	7
Palmaria hecatensis	2.55	4.40	10	0.05	0.16	10	7.25	11.13	10	0.00	0.00	10	12.17	12.32	6	0.00	0.00	7
Petrocelis spp.	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.20	6	0.00	0.00	7
Pilayella littoralis	5.35	9.45	10	0.95	1.64	10	0.00	0.00	10	1.90	2.96	10	0.17	0.26	6	20.14	13.43	7
Porphyra spp.	0.15	0.24	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Pterosiphonia bipinnata	0.65	1.06	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	9.25	10.99	6	0.00	0.00	7
Pterosiphonia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.14	0.38	7
Ptilota filicina	0.90	1.26	10	0.00	0.00	10	3.10	3.35	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Ptilota spp.	0.00	0.00	10	0.35	0.41	10	0.00	0.00	10	0.00	0.00	10	1.42	2.11	6	0.00	0.00	7
Ralfsia fungiformis	0.00	0.00	10	0.70	1.49	10	1.10	1.71	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Ralfsia spp.	0.25	0.42	10	3.35	3.18	10	7.10	13.02	10	6.55	8.39	10	0.00	0.00	6	0.93	1.43	7
Rhodochorton purpureum	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.50	0.41	10	0.00	0.00	6	0.00	0.00	7
Rhodoglossum/Mastocarpus	0.00	0.00	10	0.00	0.00	10	8.80	7.91	10	2.35	2.45	10	0.00	0.00	6	1.43	1.88	7
Neorhodomela oregona	0.00	0.00	10	16.60	13.50	10	17.30	15.60	10	13.00	14.57	10	2.17	1.72	6	22.00	11.27	7
Soranthera ulvoidea	0.35	0.24	10	0.35	0.34	10	1.05	1.21	10	0.05	0.16	10	1.50	1.84	6	0.21	0.39	7
Sphacelaria rigidula	2.20	3.76	10	5.10	4.15	10	2.20	2.94	10	3.10	5.15	10	3.17	4.75	6	0.00	0.00	7
Ulva/Ulvaria spp.	7.35	3.99	10	0.70	0.59	10	0.00	0.00	10	2.65	3.33	10	0.00	0.00	6	3.00	3.06	7
Punctaria lobata	0.35	0.67	10	0.00	0.00	10	0.40	0.97	10	0.05	0.16	10	0.00	0.00	6	0.07	0.19	7
Palmaria mollis	5.75	4.74	10	0.60	1.90	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Eudesme virescens	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.50	1.58	10	0.00	0.00	6	0.00	0.00	7

Table B-12 continued

Taxon	Crab Bay			Eshamy Bay			Mussel Beach N			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Monostroma grevillei	10.30	5.10	10	0.65	0.67	10	12.80	6.94	10	0.75	1.21	10	0.17	0.26	6	7.21	8.45	7
Tokidadendron kurilensis	1.95	2.19	10	0.40	0.32	10	1.75	2.02	10	0.00	0.00	10	6.83	6.55	6	0.00	0.00	7
Polysiphonia/Pterosiphonia spp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.86	0.85	7
Dumontia contorta	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Blidingia subsalsa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.21	10	0.00	0.00	6	0.00	0.00	7
Cladophora sericea	7.95	6.41	10	6.95	8.81	10	2.30	3.68	10	0.80	2.19	10	5.83	4.92	6	40.00	29.30	7
Dictyosiphon foeniculaceus	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.43	0.73	7
Phycodrys riggii	6.00	5.44	10	0.95	1.07	10	5.30	7.92	10	0.00	0.00	10	10.50	9.07	6	0.00	0.00	7
Chaetomorpha melagonium	0.10	0.21	10	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Ahnfeltia cf. fastigiata	0.00	0.00	10	2.00	2.40	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Chaetomorpha tortuosa	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.10	0.21	10	0.00	0.00	6	0.50	0.76	7
Acrosiphonia arcta	1.60	1.81	10	1.40	2.49	10	3.70	3.74	10	0.10	0.32	10	3.58	2.76	6	0.00	0.00	7
Ulva fenestrata	0.00	0.00	10	0.00	0.00	10	1.70	1.49	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Polysiphonia pacifica	0.25	0.26	10	0.25	0.42	10	0.45	0.69	10	0.15	0.24	10	2.25	2.23	6	0.00	0.00	7
Antithamnionella pacifica	0.80	1.21	10	0.00	0.00	10	0.20	0.35	10	0.00	0.00	10	0.50	0.77	6	0.00	0.00	7
Rhodoglossum sp.	1.25	2.07	10	10.20	10.09	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Corallina officianalis	0.00	0.00	10	0.90	1.29	10	0.10	0.32	10	0.00	0.00	10	0.08	0.20	6	0.00	0.00	7
Ulva sp.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	5.08	5.08	6	0.00	0.00	7
Ceramium pacificum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.20	6	0.00	0.00	7
Corallina vancouverensis	0.00	0.00	10	0.00	0.00	10	1.75	2.28	10	0.00	0.00	10	0.08	0.20	6	0.00	0.00	7
Alcyonidium spp. (%)	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Balanus crenatus (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.30	0.26	10	0.00	0.00	6	0.86	1.18	7
Balanus glandula (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	1.14	1.46	7
Balanus rostratus (%)	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	6	0.29	0.76	7
Balanus/Semibalanus spp. (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	6	0.00	0.00	7
Chthamalus dalli (% set)	0.00	0.00	10	0.60	1.58	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Chthamalus dalli (%)	0.00	0.00	10	0.20	0.26	10	0.00	0.00	10	0.05	0.16	10	0.17	0.41	6	0.36	0.48	7
Encrusting bryozoan (%)	4.20	3.32	10	2.65	6.18	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	6	0.00	0.00	7
Foliose bryozoan (%)	0.10	0.21	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Halichondria panicea (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.21	0.27	7
Mytilus cf. trossulus (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.20	6	0.29	0.39	7
Mytilus cf. trossulus (% spat)	1.75	2.21	10	0.10	0.21	10	0.15	0.24	10	0.30	0.26	10	0.17	0.26	6	0.93	0.79	7
Rhynchozoon bispinosum (%)	0.00	0.00	10	0.40	0.61	10	2.00	3.02	10	0.00	0.00	10	0.50	0.55	6	0.00	0.00	7
Semibalanus balanoides (% set)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.07	0.19	7
Semibalanus balanoides (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	1.43	2.94	7
Semibalanus cariosus (%)	0.00	0.00	10	0.05	0.16	10	0.20	0.63	10	0.00	0.00	10	0.08	0.20	6	0.00	0.00	7
Spirorbidae, unid. (%)	2.40	3.05	10	1.25	1.96	8	0.40	0.21	10	0.50	0.35	5	0.58	0.20	6	0.14	0.24	7
Balanus/Semibalanus spp., set (%)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	6	0.21	0.27	7
Musculus spp. (% spat)	0.35	0.34	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Bittium sp.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Buccinum baeri	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.14	0.38	7
Cancer oregonensis	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7

Table B-12 continued

Taxon	Crab Bay			Eshamy Bay			Mussel Beach N			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Cottidae, unid.	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	6	0.00	0.00	7
Dermasterias imbricata	0.15	0.34	10	0.10	0.32	10	0.00	0.00	10	0.40	0.70	10	0.00	0.00	6	0.00	0.00	7
Evasterias troschelii	0.30	0.67	10	0.40	0.70	10	0.80	1.62	10	0.10	0.32	10	0.00	0.00	6	0.00	0.00	7
Gammaridea, unid.	*P	*P	7	*P	*P	8	*P	*P	6	*P	*P	7	*P	*P	2	*P	*P	4
Gastropoda, unid.	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.29	0.76	7
Gnorimosphaeroma oregonensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	2.86	7.56	7
Heptacarpus sp.	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Katharina tunicata	0.00	0.00	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Lacuna spp.	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.30	0.95	10	0.00	0.00	6	1.00	1.53	7
Leptasterias hexactis	0.00	0.00	10	0.20	0.63	10	0.20	0.42	10	0.20	0.42	10	0.00	0.00	6	0.57	0.79	7
Leptasterias spp.	0.50	0.97	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.50	1.22	6	0.00	0.00	7
Littorina scutulata	0.00	0.00	10	0.20	0.63	10	0.10	0.32	10	2.40	3.92	10	0.00	0.00	6	7.29	6.50	7
Littorina sitkana	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.71	1.50	7
Lottia pelta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	6	0.14	0.38	7
Lottiidae, unid.	0.10	0.32	10	0.10	0.32	10	1.00	2.54	10	0.00	0.00	10	0.17	0.41	6	0.29	0.76	7
Lottiidae, unid. (juv.)	0.10	0.32	10	1.90	3.67	10	0.00	0.00	10	82.00	86.89	10	0.83	1.17	6	15.14	9.99	7
Margarites marginatus	4.30	3.71	10	0.40	1.26	10	0.30	0.67	10	0.00	0.00	10	0.33	0.82	6	0.00	0.00	7
Margarites pupillus	0.10	0.32	10	0.50	0.71	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Metridium senile	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Mitrella spp.	0.20	0.42	10	0.10	0.32	10	0.90	1.45	10	0.00	0.00	10	1.50	2.81	6	0.00	0.00	7
Mopalia spp.	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Nemertea, pink	0.10	0.32	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Nemertea, white	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Nucella lamellosa	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.50	0.84	6	0.00	0.00	7
Nucella lima	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.71	1.89	7
Pagurus beringanus	0.00	0.00	10	0.50	1.08	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Pagurus granosimanus	0.00	0.00	10	0.60	0.97	10	0.80	1.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Pagurus hirsutiusculus	0.50	0.85	10	4.70	3.30	10	7.10	5.43	10	25.30	20.69	10	0.33	0.52	6	5.71	4.61	7
Paranemertes peregrina	0.10	0.32	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Pentidotea wosnesenskii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.14	0.38	7
Pholidae/Stichaeidae	0.00	0.00	10	0.30	0.48	10	0.10	0.32	10	0.00	0.00	10	0.17	0.41	6	0.43	1.13	7
Pholidae/Stichaeidae (juv.)	0.80	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Pisaster ochraceus	0.30	0.48	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	6	0.00	0.00	7
Pugettia dalli	0.10	0.32	10	0.20	0.63	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Pugettia spp.	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.00	2.00	6	0.00	0.00	7
Pycnopodia helianthoides	0.70	1.89	10	0.30	0.67	10	0.30	0.67	10	0.20	0.42	10	0.00	0.00	6	0.00	0.00	7
Searlesia dira	5.40	4.65	10	0.00	0.00	10	2.50	2.72	10	0.00	0.00	10	0.00	0.00	6	0.29	0.49	7
Serpula vermicularis	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	*P	*P	9	0.00	0.00	6	0.00	0.00	7
Serpulidae, unid.	0.00	0.00	10	*P	*P	9	*P	*P	8	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Strongylocentrotus droebachiensis	0.40	1.26	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Tectura scutum	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	6	0.57	1.13	7
Tonicella lineata	0.00	0.00	10	0.20	0.42	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Prosobranchia, eggs	0.10	0.21	10	0.10	0.32	10	0.00	0.00	10	0.05	0.16	10	0.00	0.00	6	0.00	0.00	7
Acarina	*P	*P	3	*P	*P	5	*P	*P	1	*P	*P	2	*P	*P	3	*P	*P	2

Table B-12 continued

Taxon	Crab Bay			Eshamy Bay			Mussel Beach N			NW Bay Islet			Outside Bay			Snug Harbor		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count
Platyhelminthes unid., red	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Nucella lamellosa (juv.)	0.00	0.00	10	1.20	3.79	10	0.00	0.00	10	0.00	0.00	10	0.33	0.52	6	0.00	0.00	7
Anthozoa, unid.	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	6	0.00	0.00	7
Asteriidae spp. (juv.)	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Lacuna vincta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	4.83	4.36	6	0.00	0.00	7
Pycnopodia helianthoides (juvenile)	0.50	0.53	10	0.50	0.85	10	0.10	0.32	10	0.10	0.32	10	0.50	0.84	6	0.00	0.00	7
Strongylocentrotus droebachiensis (j	0.00	0.00	10	0.70	1.25	10	0.00	0.00	10	0.00	0.00	10	0.17	0.41	6	0.00	0.00	7
Nucella lima (juvenile)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.29	0.49	7
Articulated coralline algae (dead)	0.00	0.00	10	0.00	0.00	10	0.20	0.35	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Fucus gardneri (dead)	0.00	0.00	10	0.10	0.21	10	0.00	0.00	10	0.50	0.33	10	0.00	0.00	6	0.00	0.00	7
Balanus crenatus (% dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.75	1.51	10	0.00	0.00	6	0.36	0.24	7
Balanus glandula (% dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.15	0.34	10	0.00	0.00	6	0.29	0.39	7
Balanus/Semibalanus spp. (% dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.14	0.24	7
Chthamalus dalli (% dead)	0.00	0.00	10	0.45	0.93	10	0.00	0.00	10	0.40	0.66	10	0.00	0.00	6	0.00	0.00	7
Mytilus cf. trossulus (dead)	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	6	2.86	3.63	7
Semibalanus balanoides (% dead)	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	6	0.43	0.45	7
Semibalanus cariosus (% set, dead)	0.00	0.00	10	0.05	0.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Mytilus sp. (% set, dead)	0.00	0.00	10	0.40	1.26	10	3.70	3.53	10	2.40	4.06	10	4.17	4.12	6	0.07	0.19	7
Boulder/Cobble (%)	10.70	16.28	10	10.00	29.91	10	0.00	0.00	10	1.00	3.16	10	100.00	0.00	6	78.57	34.97	7
Gravel/Sand(%)	8.00	17.67	10	0.00	0.00	10	0.00	0.00	10	2.00	4.83	10	0.00	0.00	6	7.14	5.67	7
Mud (%)	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Rock (%)	81.00	31.03	10	90.00	29.91	10	100.00	0.00	10	97.00	6.32	10	0.00	0.00	6	14.29	37.80	7
Tidepool (%)	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7
Water (%)	0.00	0.00	10	3.40	6.08	10	0.55	1.57	10	0.00	0.00	10	0.00	0.00	6	0.00	0.00	7

*P = present, not counted

Appendix C

Microinfaunal Taxa

Table C-1. Average number of macroinfaunal taxa in 0.009-m2 cores from middle intertidal zone at sites sampled in Prince William Sound during Cruise 1, April 1989 and Cruise 4, September 1989.

		Category 1			Category 1										Category 3		
		Outside Bay-Cruise 1			Crab Bay-Cruise 4			Outside Bay-Cruise 4			Sheep Bay-Cruise 4			Category	Shelter Bay-Cruise 4		
	Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
	Allorchestes angusta	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.10	0.32	10	0.03	0.06	0.00	0.00	10
	Amphitrite cirrata	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
*	Ampithoe	0.00	0.00	5	0.20	0.45	5	0.10	0.32	10	0.00	0.00	10	0.10	0.10	0.00	0.00	10
	Ampithoe kussakini	0.00	0.00	5	0.00	0.00	5	0.60	0.97	10	0.00	0.00	10	0.20	0.35	0.00	0.00	10
	Aoroides	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Armandia brevis	0.00	0.00	5	0.00	0.00	5	3.20	6.39	10	0.10	0.32	10	1.10	1.82	0.00	0.00	10
	Autolytus	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Barantolla nr. americana	0.00	0.00	5	0.00	0.00	5	0.30	0.67	10	0.00	0.00	10	0.10	0.17	0.00	0.00	10
	Brania brevipharyngea	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Capitella capitata	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Chiridota	0.00	0.00	5	0.00	0.00	5	0.30	0.67	10	0.00	0.00	10	0.10	0.17	0.00	0.00	10
	Cingula	0.00	0.00	5	0.00	0.00	5	39.30	52.05	10	0.00	0.00	10	13.10	22.69	0.00	0.00	10
	Cirratulidae	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
	Cirratulus spectabilis	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
*	Corophium	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Corophium acherusicum	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
*	Cumacea	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Cumella vulgaris	0.00	0.00	5	17.00	25.44	5	0.80	1.32	10	0.00	0.00	10	5.93	9.59	0.00	0.00	10
	Eteone cf. longa	0.00	0.00	5	0.20	0.45	5	5.10	3.48	10	0.00	0.00	10	1.77	2.89	0.00	0.00	10
	Exogone gemmifera	0.00	0.00	5	0.00	0.00	5	1.80	2.86	10	0.00	0.00	10	0.60	1.04	0.00	0.00	10
*	Exogoninae	0.00	0.00	5	0.00	0.00	5	0.80	1.62	10	0.00	0.00	10	0.27	0.46	0.00	0.00	10
	Fabriciola berkeleyi	0.40	0.89	5	0.00	0.00	5	0.00	0.00	10	0.60	1.26	10	0.20	0.35	0.10	0.32	10
	Fartulum	0.00	0.00	5	0.00	0.00	5	9.10	12.99	10	0.00	0.00	10	3.03	5.25	0.00	0.00	10
*	Gastropoda	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Glycera capitata	0.00	0.00	5	0.00	0.00	5	0.80	0.79	10	0.00	0.00	10	0.27	0.46	0.00	0.00	10
	Glycinde picta	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Gyptis	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Harmothoe imbricata	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
	Hesionidae	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Hyale frequens	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.80	1.87	10	0.27	0.46	0.00	0.00	10
	Leptochelia savignyi	0.00	0.00	5	0.00	0.00	5	0.80	2.20	10	0.00	0.00	10	0.27	0.46	0.00	0.00	10
*	Macoma	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
	Macoma balthica	0.00	0.00	5	0.60	0.55	5	0.00	0.00	10	0.00	0.00	10	0.20	0.35	0.00	0.00	10
	Macoma inquinata	0.20	0.45	5	0.00	0.00	5	2.30	2.79	10	0.00	0.00	10	0.77	1.33	0.00	0.00	10
	Mediomastus	0.20	0.45	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10

Table C-1. Average number of macroinfaunal taxa in 0.009-m2 cores from middle intertidal zone at sites sampled in Prince William Sound during Cruise 1, April 1989 and Cruise 4, September 1989.

		Category 1			Category 1									Category 3				
		Outside Bay-Cruise 1			Crab Bay-Cruise 4			Outside Bay-Cruise 4			Sheep Bay-Cruise 4			Category		Shelter Bay-Cruise 4		
	Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
	Modiolus modiolus	0.00	0.00	5	0.00	0.00	5	0.70	0.67	10	0.00	0.00	10	0.23	0.40	0.00	0.00	10
	Mya arenaria	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.10	0.32	10	0.03	0.06	0.00	0.00	10
	Mysella tumida	0.00	0.00	5	0.40	0.89	5	27.90	18.39	10	0.00	0.00	10	9.43	15.99	0.00	0.00	10
	Naineris quadricuspida	0.00	0.00	5	0.00	0.00	5	3.60	6.00	10	0.00	0.00	10	1.20	2.08	0.00	0.00	10
*	Nereis	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Nereis pelagica	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Nereis vexillosa	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Odostomia	0.00	0.00	5	0.00	0.00	5	1.00	1.25	10	0.00	0.00	10	0.33	0.58	0.00	0.00	10
*	Odostomia/Alvania	0.00	0.00	5	0.00	0.00	5	3.10	2.18	10	0.00	0.00	10	1.03	1.79	0.00	0.00	10
	Ophelia limacina	0.00	0.00	5	0.00	0.00	5	1.70	2.26	10	0.00	0.00	10	0.57	0.98	0.00	0.00	10
	Orbiniella nuda	0.00	0.00	5	0.20	0.45	5	0.00	0.00	10	0.20	0.42	10	0.13	0.12	0.00	0.00	10
	Owenia fusiformis	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
	Paradexiospira vitrea	0.00	0.00	5	0.00	0.00	5	0.30	0.67	10	0.00	0.00	10	0.10	0.17	0.00	0.00	10
*	Paramoera	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
	Paramoera columbiana	0.00	0.00	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.30	0.95	10
	Parapleustes pugettensis	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
	Pectinaria granulata	0.00	0.00	5	0.00	0.00	5	0.50	0.85	10	0.00	0.00	10	0.17	0.29	0.00	0.00	10
	Phascolosoma agassizii	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Pholoe minuta	0.00	0.00	5	0.20	0.45	5	1.80	2.15	10	0.20	0.42	10	0.73	0.92	0.00	0.00	10
	Platynereis bicanaliculata	0.00	0.00	5	0.00	0.00	5	0.50	1.08	10	0.00	0.00	10	0.17	0.29	0.00	0.00	10
	Pleustidae	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
*	Polycirrus	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Polycirrus III	0.00	0.00	5	0.00	0.00	5	0.30	0.67	10	0.00	0.00	10	0.10	0.17	0.00	0.00	10
	Polydora brachycephala	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Polydora quadrilobata	0.00	0.00	5	0.00	0.00	5	0.30	0.67	10	0.00	0.00	10	0.10	0.17	0.00	0.00	10
*	Polynoidae	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
*	Prionospio	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.10	0.32	10	0.07	0.06	0.00	0.00	10
	Protodorvillea gracilis	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Protothaca staminea	0.00	0.00	5	0.00	0.00	5	3.50	1.90	10	0.00	0.00	10	1.17	2.02	0.00	0.00	10
	Pygospio elegans	0.00	0.00	5	0.20	0.45	5	0.20	0.42	10	0.30	0.67	10	0.23	0.06	0.00	0.00	10
	Saccocirrus	1.60	2.51	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.10	0.32	10
	Saxidomus giganteus	0.00	0.00	5	0.00	0.00	5	0.50	0.85	10	0.00	0.00	10	0.17	0.29	0.00	0.00	10
	Scoloplos armiger alaskensi	0.00	0.00	5	0.00	0.00	5	1.20	2.70	10	0.00	0.00	10	0.40	0.69	0.00	0.00	10
	Sipuncula	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
	Sphaerosyllis pirifera	0.00	0.00	5	0.00	0.00	5	1.50	3.81	10	0.00	0.00	10	0.50	0.87	0.00	0.00	10
	Spio	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.10	0.32	10	0.07	0.06	0.00	0.00	10
*	Spionidae	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10

Table C-1. Average number of macroinfaunal taxa in 0.009-m2 cores from middle intertidal zone at sites sampled in Prince William Sound during Cruise 1, April 1989 and Cruise 4, September 1989.

	Category 1													Category 3		
	Outside Bay-Cruise 1			Crab Bay-Cruise 4			Outside Bay-Cruise 4			Sheep Bay-Cruise 4			Category	Shelter Bay-Cruise 4		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Syllis	0.00	0.00	5	0.00	0.00	5	0.20	0.42	10	0.00	0.00	10	0.07	0.12	0.00	0.00	10
Syllis alternata	0.00	0.00	5	0.00	0.00	5	1.10	1.20	10	0.00	0.00	10	0.37	0.64	0.00	0.00	10
Tharyx	0.00	0.00	5	0.00	0.00	5	1.90	2.64	10	0.00	0.00	10	0.63	1.10	0.00	0.00	10
Veneroida	0.00	0.00	5	0.00	0.00	5	0.10	0.32	10	0.00	0.00	10	0.03	0.06	0.00	0.00	10
Mean diversity (H')	0.14	0.31	5	0.37	0.31	5	1.86	0.34	10	0.31	0.59	10	0.85	0.88	0.00	0.00	10
Mean abundance (N)	2.40	2.07	5	19.00	25.48	5	121.00	56.68	10	2.60	2.72	10	47.53	64.15	0.50	0.97	10
Mean number of taxa (S)	1.20	0.45	5	2.00	1.41	5	15.90	3.51	10	1.50	1.72	10	6.47	8.17	0.30	0.48	10
Meiofauna																	
Oligochaeta	0.60	0.55	5	9.20	15.02	5	16.00	19.33	10	2.60	2.07	10	9.27	6.70	7.30	10.11	10
Harpacticoida	0.20	0.45	5	0.00	0.00	5	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Nematoda	0.20	0.45	5	14.20	26.29	5	150.20	102.23	10	0.80	0.79	10	55.07	82.66	4.80	7.74	10
Ostracoda	0.00	0.00	5	0.60	1.34	5	1.70	4.69	10	0.00	0.00	10	0.77	0.86	0.00	0.00	10

* Taxa dropped from the calculation of H' and S but retained for calculation of N.

Table C-2. Average number of macroinfaunal taxa in 0.009-m2 cores from lower intertidal zone at sites sampled in Prince William Sound during cruises 1 and 2, spring 1989.

	Category 1						Category 2															Category		Category 3		
	Outside Bay			Bay of Isles			Herring Bay			Mussel Beach			Snug Harbor			NW Bay W Arm (untreated)			Shelter Bay					NW Bay W Arm (treated)		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Acrocirridae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.60	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.24	0.00	0.00	5
Ampithoe	0.00	0.00	5	1.60	2.07	5	1.80	3.03	5	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	0.00	0.00	5	0.63	0.84	0.00	0.00	5
Ampithoe kussakini	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Aoroides	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Armandia brevis	0.00	0.00	5	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	0.00	0.00	5	9.40	8.17	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Barantolla americana	0.00	0.00	5	0.20	0.45	5	0.60	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	3.40	2.88	5	0.70	1.34	0.00	0.00	5
Bivalvia	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Capitella	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.60	1.34	5	0.17	0.27	0.00	0.00	5
Cingula	7.60	9.45	5	1.00	2.24	5	59.00	21.01	5	0.00	0.00	5	2.60	3.29	5	0.00	0.00	5	0.60	0.89	5	10.53	23.76	0.00	0.00	5
Cirratulus spectabilis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.80	0.84	5	0.20	0.45	5	0.00	0.00	5	0.20	0.33	0.00	0.00	5
Clinocardium	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Corophium	0.00	0.00	5	0.60	0.89	5	24.20	4.87	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	4.17	9.82	0.00	0.00	5
Cumella vulgaris	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.00	0.71	5	0.33	0.82	0.00	0.00	5
Cylichnella	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Diaphana	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Diplodonta	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Echiurus echiurus	0.80	1.30	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.60	0.89	5	0.10	0.24	0.00	0.00	5
Eteone cf. longa	2.40	1.82	5	0.40	0.55	5	0.60	0.89	5	0.20	0.45	5	7.80	3.83	5	0.00	0.00	5	4.80	3.70	5	2.37	3.19	0.00	0.00	5
Exogone	0.20	0.45	5	0.00	0.00	5	0.80	0.84	5	5.80	5.45	5	0.20	0.45	5	0.00	0.00	5	0.60	0.55	5	1.23	2.26	0.00	0.00	5
Fabricíola berkeleyi	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Fartulum	0.00	0.00	5	13.00	27.96	5	1.80	2.17	5	7.00	6.75	5	2.40	2.88	5	0.00	0.00	5	0.00	0.00	5	4.03	5.09	0.00	0.00	5
Glycinde picta	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Guernea	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Gyptis	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Harmothoe	0.20	0.45	5	0.20	0.45	5	0.80	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.17	0.32	0.00	0.00	5
Harmothoe imbricata	0.00	0.00	5	1.40	0.89	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.27	0.56	0.00	0.00	5
Hemipodus borealis	0.00	0.00	5	0.60	0.55	5	0.00	0.00	5	2.20	1.79	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.50	0.86	0.00	0.00	5
Heptacarpus	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.00	1.73	5	0.00	0.00	5	0.00	0.00	5	0.17	0.41	0.00	0.00	5
Holothuroidea	1.80	0.84	5	5.60	3.85	5	1.60	1.52	5	4.80	4.44	5	0.80	0.84	5	0.00	0.00	5	0.00	0.00	5	2.13	2.46	0.00	0.00	5
Ianiropsis kincaidi	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.03	0.08	0.00	0.00	5
Kellia	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.60	0.89	5	0.00	0.00	5	0.00	0.00	5	0.13	0.24	0.00	0.00	5
Laonice	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Leptochelia savignyi	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.40	1.67	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.23	0.57	0.00	0.00	5
Leptosynapta	0.00	0.00	5	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Macoma balthica	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.80	1.79	5	0.17	0.32	0.00	0.00	5
Macoma inquinata	0.00	0.00	5	0.80	1.30	5	2.40	1.52	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.57	0.95	0.00	0.00	5
Mediomastus	0.20	0.45	5	0.20	0.45	5	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.13	0.16	0.00	0.00	5
Melita desdichada	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.03	0.08	0.00	0.00	0
Melita oregonensis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Microphthalmus	0.00	0.00	5	0.00	0.00	5	0.60	1.34	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.24	0.00	0.00	5
Microphthalmus sczelkowi	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.20	2.68	5	0.20	0.49	0.00	0.00	5
Modiolus modiolus	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.20	2.28	5	1.00	1.33	5	0.00	0.00	5	0.00	0.00	5	0.53	0.91	0.00	0.00	5
Mysella tumida	1.40	2.92	5	3.40	3.97	5	8.40	6.73	5	2.60	3.58	5	1.80	2.05	5	0.20	0.45	5	0.40	0.65	5	2.80	3.01	0.00	0.00	5
Naineris quadricuspida	2.00	2.92	5	0.00	0.00	5	0.00	0.00	5	4.60	3.21	5	4.00	3.67	5	0.60	1.34	5	1.00	1.22	5	1.70	2.06	0.40	0.89	5
Nephtyidae	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Nereidae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.03	0.08	0.00	0.00	5
Nereis vexillosa	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Ocenebra interfossa	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5
Odostomia	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Odostomia/Alvania	0.40	0.55	5	10.80	20.85	5	5.00	1.22	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.70	4.43	0.20	0.45	5
Ophelina breviata	0.60	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Orbiniella nuda	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.00	1.73	5	0.00	0.00	5	37.60	25.04	5	0.60	0.89	5	6.53	15.23	0.60	0.89	5
Owenia fusiformis	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5
Paramoera	0.00	0.00	5	0.60	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.60	0.89	5	0.20	0.31	0.00	0.00	5
Pectinaria granulata	0.00	0.00	5	0.60	0.89	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.13	0.24	0.00	0.00	5
Pelecypoda	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.10	0.11	0.00	0.00	5

Table C-2 continued

	Category 1						Category 2															Category		Category 3		
	Outside Bay			Bay of Isles			Herring Bay			Mussel Beach			Snug Harbor			NW Bay W Arm (untreated)			Shelter Bay					NW Bay W Arm (treated)		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Phascolosoma agassizii	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.20	1.79	5	0.00	0.00	5	0.00	0.00	5	20.49	0.00	5	0.20	0.49	0.00	0.00	5
Pholoe minuta	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	2.20	1.30	5	0.80	0.84	5	9.40	8.17	5	1.20	0.84	5	2.33	3.54	1.40	1.52	5
Platynereis bicanaliculata	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Pleustidae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.20	3.19	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.37	0.90	0.00	0.00	5
Poecilostomatoida	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.25	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.10	0.00	0.00	5
Polycirrus	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	2.00	1.87	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.33	0.82	0.00	0.00	5
Polycladida	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Polydora brachycephala	0.80	0.84	5	0.80	1.30	5	0.00	0.00	5	0.80	1.79	5	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.33	0.39	0.00	0.00	5
Polynoidae	0.00	0.00	5	0.00	0.00	5	0.80	1.30	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.17	0.32	0.00	0.00	5
Porifera	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.03	0.08	0.00	0.00	5
Prionospio	0.20	0.45	5	0.20	0.45	5	0.00	0.00	5	0.80	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.17	0.32	0.00	0.00	5
Prionospio steenstrupi	0.00	0.00	5	0.40	0.89	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.17	0.00	0.00	5
Protothaca staminea	1.20	1.64	5	0.80	0.84	5	0.80	1.10	5	0.40	0.89	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.37	0.37	0.00	0.00	5
Sabellidae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Saxidomus giganteus	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Scalibregma inflatum	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Scoloplos armiger	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5
Sphaerosyllis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	9.80	6.87	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.63	4.00	0.00	0.00	5
Spio butleri	0.00	0.00	5	0.20	0.45	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.10	0.00	0.00	5
Synaptidae	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5
Tanaidae	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	2.00	1.41	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.33	0.82	0.00	0.00	5
Terebellidae	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.60	2.07	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.27	0.65	0.00	0.00	5
Tharyx ?parvus	1.60	1.14	5	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.07	0.16	0.00	0.00	5
Turbonilla	0.00	0.00	5	0.60	1.34	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.10	0.24	0.00	0.00	5
Turtonia minuta	0.40	0.55	5	5.40	5.41	5	10.20	10.52	5	1.40	1.95	5	2.60	3.21	5	0.00	0.00	5	0.00	0.00	5	3.27	3.95	0.00	0.00	5
Typosyllis alternata	0.00	0.00	5	0.40	0.55	5	0.00	0.00	5	8.60	3.29	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	1.50	3.48	0.00	0.00	5
Mean diversity (H')	1.42	0.37	5	1.66	0.65	5	1.31	0.16	5	2.30	0.22	5	1.72	0.19	5	0.61	0.10	5	1.93	0.44	5	1.59	0.58	0.25	0.35	5
Mean abundance (N)	23.40	10.67	5	46.60	35.15	5	113.00	21.15	5	69.00	21.81	5	27.60	4.16	5	48.80	32.81	5	20.80	12.46	5	64.30	33.43	2.60	2.07	5
Mean number of taxa (S)	6.20	2.17	5	8.60	2.30	5	10.00	1.22	5	15.40	3.65	5	7.80	1.79	5	3.20	0.84	5	9.00	4.30	5	9.00	3.93	1.40	0.55	5
Meiofauna																										
Oligochaeta	2.40	1.82	5	0.00	0.00	5	3.00	4.24	5	0.80	1.30	5	5.40	5.13	5	6.00	5.15	5	39.40	16.77	5	0.10	15.04	0.60	0.89	5
Harpacticoida	0.00	0.00	5	1.00	1.22	5	11.00	12.79	5	10.20	16.21	5	11.40	11.55	5	0.20	0.45	5	16.00	9.22	5	8.30	6.30	0.00	0.00	5
Nematoda	1.00	1.00	5	1.20	0.45	5	37.20	25.79	5	5.40	2.97	5	2.80	2.39	5	0.80	1.30	5	49.00	26.15	5	16.07	21.33	1.00	0.71	5
Ostracoda	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.03	0.08	0.00	0.00	5

*Taxa dropped from the calculation of H' and S but retained for calculation of N.

Table C-3. Average number of macroinfaunal taxa in 0.009-m2 cores from lower intertidal zone at sites sampled in Prince William Sound during Cruise 3, July 1989.

	Category 1								Category 2														Category 3		
	Outside Bay			Sheep Bay			Category		Herring Bay			Mussel Beach			Snug Harbor			Bay of Isles			Shelter Bay			Category				
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Acmira catherina	0.20	0.42	10	0.00	0.00	10	0.10	0.14	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Allorchestes	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Allorchestes anjusta	0.00	0.00	10	0.00	0.00	10	0.05	0.07	0.10	0.32	10	0.00	0.00	10	0.70	2.21	10	0.00	0.00	10	0.00	0.00	10	0.16	0.30	0.00	0.00	10
*Ampharetinae	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Amphissa	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Amphitrite cirrata	0.10	0.32	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Ampithoe	0.00	0.00	10	0.00	0.00	10	0.05	0.07	5.80	4.98	10	0.30	0.95	10	0.40	1.26	10	0.20	0.42	10	0.00	0.00	10	1.34	2.59	0.00	0.00	10
Ampithoe kussakini	0.10	0.32	10	0.10	0.32	10	0.15	0.07	3.00	3.65	10	0.20	0.63	10	0.40	0.70	10	0.20	0.42	10	0.00	0.00	10	0.76	1.28	0.00	0.00	10
Ampithoe sectimanus	0.30	0.95	10	0.20	0.42	10	0.25	0.07	0.90	1.91	10	0.00	0.00	10	0.40	1.26	10	0.00	0.00	10	0.00	0.00	10	0.26	0.40	0.00	0.00	10
*Ampithoidae	0.20	0.42	10	0.20	0.63	10	0.10	0.14	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Anisogammanrus pugettensis	0.00	0.00	10	0.00	0.00	10	1.75	2.47	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
AAphitritinae	0.00	0.00	10	3.50	8.29	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Apodida	0.30	0.67	10	0.00	0.00	10	0.15	0.21	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.13	0.00	0.00	10
Arcteobia anticostiensis	0.10	0.32	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Aricidea minuta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Armandia brevis	0.20	0.63	10	0.00	0.00	10	0.40	0.28	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Asabellides sibirica	0.00	0.00	10	0.60	0.84	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Axinopsida serricata	0.00	0.00	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Barantolla americana	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.04	0.09	0.00	0.00	10
Barantolla nr. americana	0.00	0.00	10	0.00	0.00	10	0.30	0.42	0.40	0.52	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.18	0.00	0.00	10
Capitella capitata	0.20	0.42	10	0.60	0.52	10	0.15	0.07	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.18	0.00	0.00	10
*Capitellidae	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Chaetozone	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Chirldota	0.20	0.42	10	0.00	0.00	10	0.15	0.14	0.20	0.63	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.16	0.15	0.00	0.00	10
Cingula	29.80	51.69	10	0.00	0.00	10	14.95	21.00	163.90	104.75	10	0.00	0.00	10	0.30	0.95	10	0.50	0.71	10	3.90	8.36	10	33.72	72.79	0.00	0.00	10
*Cirratulidae	0.00	0.00	10	0.10	0.32	10	0.10	0.14	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Cirratulus spectabilis	0.20	0.42	10	0.20	0.42	10	0.10	0.14	0.00	0.00	10	0.90	1.29	10	1.30	1.25	10	0.20	0.42	10	0.00	0.00	10	0.48	0.59	0.00	0.00	10
*Corophium	0.00	0.00	10	0.00	0.00	10	0.05	0.07	0.20	0.42	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.08	0.11	0.00	0.00	10
Corophium acherusicum	0.00	0.00	10	0.10	0.32	10	0.00	0.00	1.10	2.18	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.28	0.48	0.00	0.00	10
Corophium bravis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.04	0.09	0.00	0.00	10
Corophium insidiosum	0.00	0.00	10	0.00	0.00	10	0.15	0.21	0.50	1.58	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.22	0.00	0.00	10
Cryptomya californica	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Cumacea	0.00	0.00	10	3.90	3.31	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Cumella vulgaris	0.00	0.00	10	0.00	0.00	10	1.95	2.76	1.90	3.28	10	0.00	0.00	10	2.30	2.95	10	0.00	0.00	10	1.00	1.70	10	1.04	1.06	0.00	0.00	10
Cylichnella	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Cyrtodaria kurriana	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Diaphana cf brunnea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Diplodonta cf orbellus	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.18	0.00	0.00	10
Echiurus echiurus	0.00	0.00	10	0.00	0.00	10	0.05	0.07	0.10	0.32	10	0.00	0.00	10	0.30	0.48	10	0.00	0.00	10	0.10	0.32	10	0.10	0.12	0.00	0.00	10
Enteropneusta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Echaustorius washingtonianus	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.80	1.32	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Eteone cf longa	3.90	4.12	10	0.00	0.00	10	2.00	2.69	2.30	3.13	10	3.70	4.74	10	10.50	24.49	10	0.00	0.00	10	1.30	2.54	10	3.80	4.12	0.00	0.00	10
Eleone pacificia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Eulalia viridis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Exogone gemmifera	0.40	0.97	10	0.00	0.00	10	0.20	0.28	0.00	0.00	10	0.70	1.06	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.14	0.31	0.00	0.00	10
Exogone lourei	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Fabricia oregonica	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.04	0.09	0.00	0.00	10
Fabricia sabella	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	1.70	3.13	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.34	0.76	0.00	0.00	10
Fabriciola berkeleyi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.10	0.32	10	0.60	0.70	10	38.20	24.48	10	0.00	0.00	10	0.00	0.00	10	7.78	17.01	0.00	0.00	10
Fartulum	13.60	23.30	10	0.00	0.00	10	6.80	9.62	37.20	78.43	10	6.90	9.19	10	14.60	27.64	10	6.10	15.54	10	0.00	0.00	10	12.96	14.51	0.10	0.32	10
*Gammaridea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.04	0.09	0.00	0.00	10
*Gastropoda	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.08	0.08	0.00	0.00	10
Gattyana cirrosa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Glcyera capitata	0.60	0.84	10	0.10	0.32	10	0.35	0.35	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.04	0.05	0.00	0.00	10
Clycinde picta	0.20	0.63	10	0.90	0.99	10	0.55	0.49	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10

Table C-3 continued

	Category 1								Category 2														Category 3				
	Outside Bay			Sheep Bay			Category		Herring Bay			Mussel Beach			Snug Harbor			Bay of Isles			Shelter Bay			Category				
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Guernea nordenskioldi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Harmothoe imbricata	1.20	1.40	10	0.80	1.23	10	1.00	0.28	4.20	5.65	10	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.88	1.86	0.00	0.00	10
*Harmothoinae	0.00	0.00	10	0.20	0.63	10	0.10	0.14	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Heteromastus filiformis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.10	0.32	10	0.00	0.00	10	0.40	0.70	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Ianiropsis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Ianiropsis kincaidi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.18	0.00	0.00	10
Ischyrocerus anguipes	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Kellia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.14	0.19	0.00	0.00	10
Lamprops cannata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Lamprops quadriplicata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Laphania boecki	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.60	0.84	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.12	0.27	0.00	0.00	10
Leitoscoloptos pugettensis	0.30	0.67	10	0.00	0.00	10	0.15	0.21	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Leptochelia savignyi	0.50	1.58	10	0.00	0.00	10	0.25	0.35	0.00	0.00	10	0.70	1.06	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.14	0.31	0.00	0.00	10
*Leptosynapta	0.10	0.32	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Leptosynapta clarki	0.90	1.10	10	0.00	0.00	10	0.45	0.64	0.00	0.00	10	2.00	2.11	10	0.00	0.00	10	0.50	0.97	10	0.00	0.00	10	0.50	0.87	0.00	0.00	10
Locustogammarus locustoides	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Lyonsia arenosa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Macoma	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.04	0.09	0.00	0.00	10
Macoma baithica	0.10	0.32	10	0.10	0.32	10	0.10	0.00	0.20	0.42	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.09	0.30	0.95	10
Macoma inquinata	2.00	2.75	10	3.20	2.66	10	2.60	0.85	0.80	0.92	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.16	0.36	0.00	0.00	10
Macrochaeta	0.10	0.32	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Magelona	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Magelona sacculata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Mediomastus	0.40	0.70	10	0.10	0.32	10	0.25	0.21	0.40	0.84	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.18	0.00	0.00	10
Mediomastus californiensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.13	0.00	0.00	10
Melita californica	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.80	1.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.16	0.36	0.00	0.00	10
Microphthalmus sczelkowii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Micropodarke dubia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Modiolus modiolus	1.10	2.08	10	0.00	0.00	10	0.55	0.78	0.00	0.00	10	3.10	3.25	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.66	1.37	0.00	0.00	10
Monoculodes spinipes	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Montacutidae	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.10	0.32	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.09	0.00	0.00	10
Munna stephenseni	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Mya arenaria	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Mysella tumida	6.10	4.68	10	2.60	4.81	10	4.35	2.47	2.30	1.77	10	4.50	5.06	10	0.30	0.48	10	0.40	1.26	10	0.00	0.00	10	1.58	1.83	0.70	1.89	10
Nameris quadricuspida	6.20	12.81	10	0.10	0.32	10	3.15	4.31	0.00	0.00	10	0.90	2.02	10	1.90	4.20	10	1.10	2.18	10	0.40	0.84	10	0.90	0.70	0.00	0.00	10
Nassarius mendicus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.60	1.90	10	0.00	0.00	0.00	0.00	10
Natica clausa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Nephtys	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Nephtys caeca	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Nereidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.09	0.00	0.00	10
*Nereis	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.02	0.04	0.00	0.00	10
vexillosaNereis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.10	0.32	10	0.00	0.00	10	0.20	0.42	10	0.20	0.63	10	0.00	0.00	10	0.14	0.09	0.00	0.00	10
Nereis virens	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.02	0.04	0.00	0.00	10
*Ocenebra	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.13	0.00	0.00	10
Ocenebra intertossa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.30	0.95	10	0.04	0.09	0.00	0.00	10
Odostomia	0.10	0.32	10	0.20	0.42	10	0.15	0.07	1.50	1.27	10	0.50	0.97	10	0.20	0.42	10	0.00	0.00	10	0.20	0.63	10	0.44	0.63	0.00	0.00	10
*Odostomia/Alvania	1.50	2.46	10	0.20	0.42	10	0.85	0.92	1.70	1.95	10	0.30	0.48	10	0.00	0.00	10	1.40	2.01	10	0.00	0.00	10	0.94	0.74	0.10	0.32	10
Ophelia limacina	1.70	1.64	10	0.30	0.95	10	1.00	0.99	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	1.30	1.77	10	0.02	0.04	0.00	0.00	10
*Opheliidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Orbiniella nuda	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	2.30	4.40	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.46	1.03	0.00	0.00	10
Owenix fusiformis	0.10	0.32	10	1.10	0.88	10	0.60	0.71	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Paradexiospira vitrea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	2.70	8.54	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.54	1.21	0.00	0.00	10
*Paramoera	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Paramoera bousfieldi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.20	2.20	10	1.20	2.20	10	0.36	0.54	0.00	0.00	10
Paraonella platybranchia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10

Table C-3 continued

	Category 1								Category 2																Category 3		
	Outside Bay			Sheep Bay			Category		Herring Bay			Mussel Beach			Snug Harbor			Bay of Isles			Shelter Bay			Category				
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Parvilucina tenuisculpta	0.00	0.00	10	0.20	0.42	10	0.10	0.14	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Pectinaria granulata	0.20	0.42	10	0.10	0.32	10	0.15	0.07	0.30	0.95	10	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.12	0.11	0.00	0.00	10
*Pelecypoda	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Perampithoe	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Phascolosoma agassizii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.60	0.84	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.12	0.27	0.30	0.67	10
Pholoe minuta	1.30	1.49	10	0.30	0.67	10	0.80	0.71	0.30	0.48	10	2.70	2.67	10	9.90	9.50	10	1.90	2.02	10	1.90	2.02	10	3.12	3.90	0.00	0.00	10
Phoronis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Phyllodace	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Phyllodace ?mucosa	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Phyllodace groenlandica	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Phyllodocidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Platyneris bicanaliculata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Polychaeta	0.20	0.42	10	0.00	0.00	10	0.10	0.14	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Polycirrus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.13	0.00	0.00	10
Polycirrus III	0.10	0.32	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.50	0.71	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.22	0.10	0.32	10
Polycladida	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.02	0.04	0.00	0.00	10
*Polydora	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polydora brachycephala	0.10	0.32	10	0.20	0.63	10	0.15	0.07	0.10	0.32	10	0.10	0.32	10	0.10	0.32	10	0.10	0.32	10	0.10	0.32	10	0.26	0.36	0.00	0.00	10
Polydora quadrilobata	0.20	0.42	10	0.20	0.42	10	0.20	0.00	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polydora socialis	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Polydora websteri	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Polyeunca tuta	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Prionospia	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Prionospia multibranchiata	0.20	0.42	10	0.00	0.00	10	0.10	0.14	0.00	0.00	10	0.30	0.48	10	0.80	1.62	10	0.00	0.00	10	0.00	0.00	10	0.12	0.16	0.00	0.00	10
Prionospia steenstrupi	0.40	1.26	10	0.70	1.34	10	0.55	0.21	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Protothaca staminea	1.90	1.20	10	1.90	1.37	10	1.90	0.00	0.30	0.48	10	2.60	3.44	10	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	1.12	1.06	0.10	0.32	10
Pygospio elegans	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Rhynchospio	0.00	0.00	10	0.10	0.32	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Saccocirrus ?eroticus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.60	1.58	10	0.60	1.58	10	0.12	0.27	0.00	0.00	10
Saxidomus giganteus	0.50	0.97	10	0.40	0.70	10	0.45	0.07	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Scoloplos	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Scoloplos acmeceps	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Scoloplos armiger	0.30	0.95	10	0.00	0.00	10	0.15	0.21	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Scoloplos armiger alkaskenis	0.80	2.53	10	0.40	0.84	10	0.60	0.28	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Scoloplos armiger armiger	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Sphaerosyllis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Sphaerosyllis perifiera	4.50	7.03	10	0.00	0.00	10	2.25	3.18	0.00	0.00	10	11.90	18.55	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	2.38	5.32	0.00	0.00	10
Spio cirrifera	0.30	0.67	10	0.10	0.32	10	0.15	0.21	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Spio filicornis	0.00	0.00	10	0.00	0.00	10	0.05	0.07	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Spio theeli	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Spionidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Spiophanes bombyx	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Spisula falcata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Stenothoidae	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Syllids japanica	0.00	0.00	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Syllides longocirrata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Syllis	0.00	0.00	10	0.10	0.32	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Syllis alternate	2.00	2.75	10	0.00	0.00	10	1.05	1.34	0.00	0.00	10	2.00	2.49	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.42	0.88	0.01	0.32	10
Syllis heterochaeta	0.10	0.32	10	0.00	0.00	10	0.05	0.07	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Syllis pulchra	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
Tellina modesta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
*Terebellidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.02	0.04	0.00	0.00	10
*Tharyx	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.04	0.09	0.00	0.00	10
Tharyx multifilis	0.70	1.06	10	0.00	0.00	10	0.35	0.49	0.00	0.00	10	0.10	0.32	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.04	0.05	0.00	0.00	10
Tharyx parvus	3.40	3.37	10	0.00	0.00	10	1.70	2.40	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10

Table C-3 continued

	Category 1								Category 2														Category 3			
	Outside Bay			Sheep Bay			Category		Herring Bay			Mussel Beach			Snug Harbor			Bay of Isles			Shelter Bay			Category				
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Travisia forbesii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Turridae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.06	0.13	0.00	0.00	10
Mean diversity (H')	2.18	0.45	10	2.03	0.43	10	2.10	0.10	0.74	0.22	10	2.03	0.58	10	1.24	0.45	10	1.27	0.60	10	0.93	0.54	10	1.24	0.49	0.22	0.37	10
Neab abybdabce *B)	90.20	89.62	10	25.80	9.10	10	58.00	45.54	232.30	149.62	10	54.90	42.97	10	86.70	33.90	10	16.70	20.78	10	13.80	16.65	10	60.88	89.80	2.00	3.06	10
Mean number of taxa (S)	14.80	2.30	10	10.60	2.80	10	12.70	2.97	9.60	1.84	10	13.60	6.88	10	8.70	3.37	10	5.30	2.63	10	3.60	2.32	10	8.16	3.90	1.00	1.33	10
Meiofauna																												
Oligochaeta	4.50	3.14	10	0.40	0.70	10	2.45	2.90	4.20	4.24	10	1.80	3.08	10	35.60	69.22	10	1.40	2.27	10	20.90	19.20	10	12.78	15.09	0.70	1.16	10
Harpacticoida	0.40	0.84	10	0.00	0.00	10	0.20	0.28	0.00	0.00	10	0.00	0.00	10	0.60	1.07	10	0.00	0.00	10	0.00	0.00	10	0.12	0.27	0.00	0.00	10
Nematoda	73.20	159.31	10	25.70	70.51	10	49.45	33.59	66.50	60.77	10	57.10	76.48	10	402.70	642.56	10	18.80	21.71	10	36.00	42.97	10	116.22	161.22	2.40	2.80	10
Ostracoda	0.20	0.42	10	0.10	0.32	10	0.15	0.07	1.40	3.75	10	0.00	0.00	10	24.90	67.35	10	0.00	0.00	10	0.00	0.00	10	5.26	11.00	0.00	0.00	10

*Taxa dropped from the calculation of H' and S, but retained for calculation of N.

Table C-4. Average number of macroinfaunal taxa in 0.009-m2 cores from lower intertidal zone at sites sampled in Prince William Sound during Cruise 4, September 1989.

	Category 2															Category 3		
	Herring Bay			Bay of Isles			Mussel Beach			Snug Harbor			Category			Shelter Bay		
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD		Mean	SD	Count
Abarenicola pacifica	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
Allorchestes angusta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.00	1.63	10	0.25	0.50		0.00	0.00	10
Amphitrite cirrata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
* Ampithoe	1.40	1.96	10	0.00	0.00	10	0.10	0.32	10	1.20	3.12	10	0.68	0.73		0.00	0.00	10
Ampithoe kussakini	3.60	4.03	10	0.00	0.00	10	0.00	0.00	10	2.40	1.65	10	1.50	1.80		0.00	0.00	10
Anisogammarus pugettensis	5.30	13.20	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	1.38	2.62		0.00	0.00	10
Aoroides	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
Armandia brevis	0.40	1.26	10	0.00	0.00	10	4.30	3.77	10	0.20	0.63	10	1.23	2.06		0.00	0.00	10
Autolytus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
Axinopsida serricata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.05	0.10		0.00	0.00	10
Barantolla nr. americana	0.10	0.32	10	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.13	0.19		0.00	0.00	10
Branchiomaldane	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
Brania brevipharyngea	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.05	0.10		0.00	0.00	10
Capitella capitata	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Chiridota	0.70	1.49	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.20	0.34		0.00	0.00	10
Cingula	28.70	21.95	10	0.00	0.00	10	0.20	0.63	10	0.20	0.63	10	7.28	14.28		0.30	0.67	10
Cirratulidae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Cirratulus spectabilis	0.00	0.00	10	0.00	0.00	10	0.60	1.58	10	1.90	2.23	10	0.63	0.90		0.00	0.00	10
Clinocardium	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
* Corophium	0.70	1.16	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.18	0.35		0.00	0.00	10
Corophium acherusicum	0.60	0.84	10	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.20	0.28		0.00	0.00	10
Corophium brevis	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
* Cumacea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
Cumella vulgaris	0.20	0.42	10	0.00	0.00	10	0.00	0.00	10	0.30	0.67	10	0.13	0.15		0.20	0.42	10
Cylichnella	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Diplodonta	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.05	0.10		0.00	0.00	10
Dysponetus ?pygmaeus	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Echiurus echiurus	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Eteone cf. longa	7.10	6.94	10	0.10	0.32	10	5.00	8.56	10	1.30	1.57	10	3.38	3.24		1.60	2.41	10
* Eulalia	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Eulalia viridis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
* Exogone	0.30	0.67	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.13	0.15		0.00	0.00	10
Exogone gemmifera	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.05	0.10		0.00	0.00	10
* Exogoninae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00		0.00	0.00	10
Fabricia oregonica	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Fabricia sabella	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.05	0.06		0.00	0.00	10
* Fabricinae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05		0.00	0.00	10
Fabriciola berkeleyi	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	13.90	14.08	10	3.53	6.92		0.10	0.32	10
Fartulum	1.20	1.75	10	0.00	0.00	10	3.80	6.09	10	0.40	1.26	10	1.35	1.71		0.00	0.00	10

Table C-4 continued.

Taxon	Category 2												Category		Category 3		
	Herring Bay			Bay of Isles			Mussel Beach			Snug Harbor					Shelter Bay		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
* Gammaridea	0.20	0.63	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.08	0.10	0.00	0.00	10
* Gastropoda	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	0.84	10	0.10	0.20	0.00	0.00	10
Glycera capitata	0.20	0.42	10	0.00	0.00	10	0.30	0.48	10	0.00	0.00	10	0.13	0.15	0.00	0.00	10
Glycinde picta	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Gyptis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Harmothoe imbricata	1.90	3.75	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.50	0.93	0.00	0.00	10
* Harmothoinae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Hesionidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Hyale frequens	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
* Ianiropsis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.03	0.05	0.00	0.00	10
Ianiropsis kincaidi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	1.00	1.70	10	0.25	0.50	0.00	0.00	10
* Kellia	0.00	0.00	10	0.10	0.32	10	0.50	1.58	10	0.00	0.00	10	0.15	0.24	0.00	0.00	10
Kellia cf. orbellus	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.05	0.10	0.00	0.00	10
Lamprops carinata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Lamprops quadriplicata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Leptochelia savignyi	0.00	0.00	10	0.00	0.00	10	1.80	2.10	10	0.00	0.00	10	0.45	0.90	0.00	0.00	10
* Leptosynapta	0.30	0.95	10	0.00	0.00	10	0.40	0.97	10	0.00	0.00	10	0.18	0.21	0.00	0.00	10
Leptosynapta clarki	0.00	0.00	10	0.00	0.00	10	0.60	0.84	10	0.00	0.00	10	0.15	0.30	0.00	0.00	10
Locustogammarus locustoides	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
* Macoma	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Macoma balthica	1.40	3.13	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.35	0.70	0.00	0.00	10
Macoma inquinata	1.00	0.82	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.25	0.50	0.00	0.00	10
Maera	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.03	0.05	0.00	0.00	10
Mediomastus	0.50	0.71	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.13	0.25	0.00	0.00	10
Melita californica	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.05	0.10	0.00	0.00	10
Modiolus modiolus	0.10	0.32	10	0.00	0.00	10	1.80	2.39	10	0.30	0.67	10	0.55	0.84	0.00	0.00	10
Montacutidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Munna chromatocephala	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Mya arenaria	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Mysella tumida	2.30	3.47	10	0.00	0.00	10	3.60	4.40	10	0.50	0.85	10	1.60	1.66	0.30	0.67	10
Naineris quadricuspida	0.00	0.00	10	0.00	0.00	10	2.60	3.20	10	0.80	1.14	10	0.85	1.23	0.10	0.32	10
Nassarius mendicus	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Nephasoma	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Nephtys caeca	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
* Nereidae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.50	0.97	10	0.15	0.24	0.20	0.42	10
* Nereididae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
* Nereis	0.30	0.95	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.08	0.15	0.00	0.00	10
Nereis pelagica	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Nereis vexillosa	0.00	0.00	10	0.60	0.84	10	0.00	0.00	10	0.20	0.42	10	0.20	0.28	0.30	0.67	10

Table C-4 continued.

Taxon	Category 2												Category 3				
	Herring Bay			Bay of Isles			Mussel Beach			Snug Harbor			Category		Shelter Bay		
	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count
Nereis virens	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.10	0.32	10
Nerilla digitata	0.20	0.63	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.10	0.12	0.00	0.00	10
Odostomia	0.00	0.00	10	0.00	0.00	10	0.40	1.26	10	0.00	0.00	10	0.10	0.20	0.00	0.00	10
* Odostomia/Alvania	0.60	1.26	10	0.00	0.00	10	0.90	0.99	10	0.00	0.00	10	0.38	0.45	0.10	0.32	10
Ophelia limacina	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.05	0.06	0.00	0.00	10
Ophryotrocha	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Orbiniella nuda	0.00	0.00	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.05	0.10	0.00	0.00	10
Owenia fusiformis	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Paradexiospira vitrea	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Parallorchestes	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
* Paramoera	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.70	1.64	10	0.18	0.35	0.10	0.32	10
Paramoera bousfieldi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.03	0.05	0.20	0.63	10
Paramoera bucki	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.40	1.26	10	0.10	0.20	0.00	0.00	10
Paramoera columbiana	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Parapleustes pugettensis	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.00	0.00	10	0.05	0.10	0.00	0.00	10
Pectinaria granulata	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.05	0.06	0.00	0.00	10
* Pelecypoda	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Phascolosoma agassizii	0.00	0.00	10	0.00	0.00	10	0.80	1.14	10	0.00	0.00	10	0.20	0.40	0.00	0.00	10
Pholoe minuta	0.20	0.42	10	0.90	1.85	10	4.80	9.68	10	9.30	9.84	10	3.80	4.19	7.20	9.94	10
Phoxichilidium femoratum	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Pileolaria cf. potswaldi	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.10	0.32	10
Platynereis bicanaliculata	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
* Pleustidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
* Polycirrus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polycirrus III	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polycladida	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Polydora brachycephala	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.30	0.95	10	0.10	0.14	0.00	0.00	10
Polydora commensalis	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10
Polydora quadrilobata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polydora socialis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polydora websteri	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Polyeunoa tuta	0.00	0.00	10	0.00	0.00	10	0.30	0.67	10	0.00	0.00	10	0.08	0.15	0.00	0.00	10
* Polynoidae	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
* Prionospio	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Prionospio multibranchiata	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Protodorvillea gracilis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Protothaca staminea	0.30	0.67	10	3.60	3.98	10	2.40	2.88	10	0.60	1.26	10	1.73	1.56	0.20	0.63	10
Pygospio elegans	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10
Rhynchospio	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10

Table C-4 continued.

	Category 2													Category 3				
	Herring Bay			Bay of Isles			Mussel Beach			Snug Harbor			Category	Shelter Bay				
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	
* Sabellidae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10	
Saccocirrus	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	1.50	3.24	10	
Saxidomus giganteus	0.20	0.42	10	0.00	0.00	10	0.20	0.42	10	0.00	0.00	10	0.10	0.12	0.00	0.00	10	
Scoloplos armiger alaskensis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	
Serripes groenlandicus	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10	
Sipuncula	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	
Sphaerosyllis pirifera	0.00	0.00	10	0.00	0.00	10	5.60	8.02	10	0.00	0.00	10	1.40	2.80	0.00	0.00	10	
* Spio	0.00	0.00	10	0.00	0.00	10	0.30	0.95	10	0.00	0.00	10	0.08	0.15	0.00	0.00	10	
Spio cirrifera	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.05	0.06	0.00	0.00	10	
Spio filicornis	0.10	0.32	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10	
* Spionidae	0.10	0.32	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.05	0.06	0.00	0.00	10	
* Syllis	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	
Syllis adamantea	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	
Syllis alternata	0.00	0.00	10	0.10	0.32	10	9.90	12.94	10	0.00	0.00	10	2.50	4.93	0.00	0.00	10	
Syllis pulchra	0.00	0.00	10	0.00	0.00	10	0.50	0.97	10	0.00	0.00	10	0.13	0.25	0.00	0.00	10	
* Terebellidae	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10	
Tharyx	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	
Travisia forbesii	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	10	0.00	0.00	0.00	0.00	10	
* Veneroida	0.00	0.00	10	0.00	0.00	10	0.10	0.32	10	0.00	0.00	10	0.03	0.05	0.00	0.00	10	
Mean diversity (H')	1.39	0.44	10	0.46	0.49	10	2.08	0.33	10	1.53	0.47	10	1.36	0.67	0.61	0.50	10	
Mean abundance (N)	61.20	38.00	10	5.60	5.34	10	57.00	50.17	10	38.60	27.89	10	40.60	25.31	12.60	9.31	10	
Mean number of taxa (S)	8.60	3.03	10	2.00	1.25	10	12.80	4.96	10	7.40	2.72	10	7.70	4.45	3.00	1.49	10	
Meiofauna																		
Oligochaeta	8.90	12.91	10	0.40	0.70	10	4.70	4.95	10	3.30	3.71	10	4.33	3.54	22.30	28.34	10	
Harpacticoida	0.00	0.00	10	0.00	0.00	10	0.20	0.63	10	0.20	0.42	10	0.10	0.12	0.00	0.00	10	
Nematoda	93.90	96.09	10	1.70	2.06	10	84.30	62.66	10	170.70	319.45	10	87.65	69.13	53.30	46.85	10	
Ostracoda	1.60	3.66	10	0.00	0.00	10	0.00	0.00	10	1.30	2.98	10	0.73	0.85	0.00	0.00	10	

* Taxa dropped from the calculation of H' and S but retained for the calculation of N.

Table C-5. Average number of macroinfaunal taxa in 0.009-m2 cores from lower intertidal zone at sites sampled in Prince William Sound during May 1991.

	Category 1								Category 2										Category 3							
	Bainbridge Bight			Outside Bay			Category		Block Island			Herring Bay			Snug Harbor			Category		NW Bay W Arm			Shelter Bay			Category	
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD
Allorchestes angusta	0.20	0.45	5	0.00	0.00	5	0.00	0.14	0.20	0.45	5	0.20	0.45	5	0.40	0.89	5	0.27	0.12	0.40	0.89	5	0.00	0.00	5	0.20	0.28
Alvania compacta	1.40	1.67	5	4.80	3.63	5	3.10	2.40	5.60	9.24	5	14.20	14.72	5	0.40	0.89	5	6.73	6.97	0.20	0.45	5	0.00	0.00	5	0.10	0.14
Amphitrite cirrata	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Ampithoe kussakini	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	1.60	1.14	5	0.20	0.45	5	0.60	0.87	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Arhynchite pugettensis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Armandia brevis	2.00	2.92	5	0.00	0.00	5	1.00	1.41	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Barantolla americana	0.00	0.00	5	0.00	0.00	5	0.00	0.00	1.80	1.92	5	1.00	1.73	5	0.20	0.45	5	1.00	0.80	0.00	0.00	5	0.80	1.79	5	0.40	0.57
Bivalvia	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Capitella capitata	0.60	0.89	5	0.00	0.00	5	0.30	0.42	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Chirldota	0.00	0.00	5	0.40	0.55	5	0.20	0.28	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Cingula sp. 1	0.00	0.00	5	11.60	22.07	5	5.80	8.20	0.00	0.00	5	3.00	2.35	5	0.20	0.45	5	1.07	1.68	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Cingula sp. 2	0.00	0.00	5	5.80	8.73	5	2.90	4.10	0.00	0.00	5	13.60	14.31	5	0.00	0.00	5	4.53	7.85	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Cirratulus spectabilis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.40	0.89	5	0.13	0.23	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Clinocardium ciliatum	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Corophium	0.60	1.34	5	0.00	0.00	5	0.30	0.42	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Cryptomya californica	0.00	0.00	5	0.40	0.55	5	0.20	0.28	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Cumella vulgaris	0.80	1.79	5	0.00	0.00	5	0.40	0.57	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Eteone longa	0.80	1.30	5	12.60	9.37	5	6.70	8.34	0.60	0.89	5	2.60	3.78	5	1.60	1.82	5	1.60	1.00	0.00	0.00	5	0.20	0.45	5	0.10	0.14
Eteone spetsbergensis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.40	0.55	5	0.00	0.00	5	0.20	0.28
Exogone gemmifera	0.20	0.45	5	1.00	2.24	5	0.60	0.57	1.80	2.95	5	0.00	0.00	5	0.00	0.00	5	0.60	1.04	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Fabriciola berkeleyi	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.80	1.10	5	0.27	0.46	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Fartulum	0.00	0.00	5	2.20	3.49	5	1.10	1.56	0.00	0.00	5	1.60	3.05	5	2.40	3.78	5	1.33	1.22	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Gammaridea	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.20	0.45	5	0.00	0.00	5	0.10	0.14
Gastropoda	0.80	0.84	5	0.00	0.00	5	0.40	0.57	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Glycera capitata	0.00	0.00	5	1.40	1.14	5	0.70	0.99	0.20	0.45	5	0.20	0.45	5	0.00	0.00	5	0.13	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Glycinde picta	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.40	0.89	5	0.00	0.00	5	0.13	0.23	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Holothuroidea	0.40	0.55	5	0.00	0.00	5	0.20	0.28	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Ianiropsis kincaidi	0.80	1.10	5	0.00	0.00	5	0.40	0.57	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Leitoscoloplos pugettensis	0.00	0.00	5	3.20	3.27	5	1.60	2.26	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Leptochelia savignyi	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.13	0.23	0.00	0.00	5	0.20	0.45	5	0.10	0.14
Leptosynapta	0.00	0.00	5	1.80	2.05	5	0.90	1.27	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Macoma balthica	0.00	0.00	5	0.00	0.00	5	0.00	0.00	1.60	1.67	5	1.80	2.68	5	1.60	3.58	5	1.67	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Macoma inquinata	0.00	0.00	5	1.00	1.41	5	0.50	0.71	4.60	3.85	5	5.00	6.32	5	0.00	0.00	5	3.20	2.78	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Micromaldane ornithochaeta	0.20	0.45	5	0.00	0.00	5	0.10	0.14	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Mysella tumida	0.20	0.45	5	16.60	5.59	5	8.40	11.60	3.60	4.28	5	3.20	3.96	5	0.00	0.00	5	2.27	1.97	0.20	0.45	5	0.20	0.45	5	0.00	0.00
Naineris quadricuspida	1.00	1.73	5	2.80	2.39	5	1.90	1.27	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Nereis	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.20	0.45	5	0.00	0.00	5	0.07	0.12	0.20	0.45	5	0.20	0.55	5	0.30	0.14
Nereis procera	0.60	1.34	5	0.00	0.00	5	0.30	0.42	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.20	0.55	5	0.20	0.28
Nereis vexillosa	0.20	0.45	5	0.00	0.00	5	0.10	0.14	1.40	3.13	5	0.00	0.00	5	0.00	0.00	5	0.47	0.81	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Nereis zonata	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.40	0.89	5	0.00	0.00	5	0.20	0.28
Odostomia	0.00	0.00	5	0.80	0.45	5	0.40	0.57	0.00	0.00	5	3.40	2.88	5	0.00	0.00	5	1.13	1.96	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Ophelia limacina	0.00	0.00	5	3.00	1.87	5	1.50	2.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Orbiniella nuda	13.60	9.45	5	0.00	0.00	5	6.80	9.62	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Paramoera	0.20	0.45	5	0.00	0.00	5	0.10	0.14	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Paramoera sp. 1	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.40	0.55	5	0.13	0.23	1.20	1.30	5	0.00	0.00	5	0.60	0.85
Paramoera sp. 2	13.40	19.15	5	0.00	0.00	5	6.70	9.48	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.80	1.30	5	0.40	0.57
Pectinaria granulata	0.00	0.00	5	0.20	0.45	5	0.10	0.14	1.40	2.61	5	0.60	0.89	5	0.00	0.00	5	0.67	0.70	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Pholoe minuta	20.20	6.14	5	1.20	0.84	5	10.70	13.44	0.00	0.00	5	0.20	0.45	5	1.20	1.64	5	0.47	0.64	0.20	0.45	5	0.00	0.00	5	0.10	0.14
Polydora	0.00	0.00	5	0.20	0.45	5	0.10	0.14	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Polydora brachycephala	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.40	0.55	5	0.00	0.00	5	0.00	0.00	5	0.13	0.23	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Polydora giardi	0.00	0.00	5	1.80	4.02	5	0.90	1.27	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00

Table C-5 continued.

	Category 1																										
	Bainbridge Bight			Outside Bay			Category		Block Island			Herring Bay			Snug Harbor			Category		NW Bay W Arm			Shelter Bay			Category	
Taxon	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD	Count	Mean	SD	Mean	SD	Count	Mean	SD	Count	Mean	SD
Polydora quadrilobata	2.40	2.19	5	1.20	1.30	5	1.80	0.85	0.40	0.55	5	0.80	1.79	5	0.00	0.00	5	0.40	0.40	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Prionospio cirrifera	0.00	0.00	5	0.20	0.45	5	0.10	0.14	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Protothaca staminea	1.00	1.25	5	1.80	1.10	5	1.40	0.57	2.20	1.30	5	0.80	1.10	5	0.00	0.00	5	1.20	0.87	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Rhynchospio glutaea	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.20	0.45	5	0.00	0.00	5	0.00	0.00	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Rissoidae	0.00	0.00	5	5.40	7.40	0	2.70	3.82	0.00	0.00	5	4.00	4.90	5	0.00	0.00	5	1.33	2.31	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Saccocirrus eroticus	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	3.40	7.60	5	1.80	4.02	5	2.60	1.13
Saxidomus gigantea	0.00	0.00	5	0.20	0.45	5	0.10	0.14	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Spio	0.40	0.89	5	0.00	0.00	5	0.20	0.28	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Spio cirrifera	0.20	0.45	5	0.00	0.00	5	0.10	0.14	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Spio filicornis	0.00	0.00	5	0.20	0.45	5	0.10	0.14	1.20	1.30	5	0.00	0.00	5	0.00	0.00	5	0.40	0.69	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Syllis elongata	0.00	0.00	5	0.40	0.55	5	0.20	0.28	2.20	1.92	5	0.00	0.00	5	0.00	0.00	5	0.73	1.27	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Tharyx multifilis	0.00	0.00	5	3.00	1.87	5	1.50	2.12	0.00	0.00	5	0.00	0.00	5	0.20	0.45	5	0.07	0.12	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Turbellaria	0.00	0.00	5	0.80	1.79	5	0.40	0.57	0.00	0.00	5	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Mean diversity (H')	1.55	0.33	5	2.21	0.13	5	1.88	0.47	1.94	0.40	5	1.76	0.18	5	1.31	0.82	5	1.67	0.32	0.60	0.56	5	0.43	0.59	5	0.51	0.12
Mean abundance (N)	62.20	14.74	5	86.00	50.11	5	74.10	16.83	30.40	22.22	5	59.20	18.63	5	11.60	7.40	5	33.73	23.97	6.80	9.76	5	4.80	6.69	5	5.80	1.41
Mean number of taxa (S)	8.80	2.49	5	15.20	2.39	5	12.00	4.53	10.00	4.80	5	9.80	1.48	5	5.40	3.48	5	8.40	2.60	2.20	1.64	5	1.80	2.17	5	2.00	0.28
Meiofauna																											
Oligochaeta	25.60	7.00	5	1.40	2.61	5	13.50	17.11	5.80	4.97	5	4.60	9.74	5	1.00	1.41	5	3.80	2.50	0.60	0.55	5	15.40	10.29	5	8.00	1.0.47
Harpacticoida	0.40	0.89	5	0.80	1.30	5	0.60	0.28	3.00	5.66	5	21.00	18.03	5	4.60	9.21	5	9.53	9.96	0.00	0.00	5	0.00	0.00	5	0.00	0.00
Harpacticus uniremis	0.80	1.30	5	9.00	14.82	5	4.90	5.80	7.60	5.94	5	12.60	9.71	5	15.80	29.88	5	12.00	4.13	8.80	13.59	5	0.60	0.89	5	4.70	5.80
Total Harpacticoids	0.00	0.00	5	0.00	0.00	5	0.00	0.00	0.00	0.00	5	1.60	2.07	5	0.40	0.55	5	0.67	0.83	0.00	0.00	5	0.00	0.00	5	0.00	0.00

* Taxa dropped from the calculation of H' and S but retained for calculation of N.

Appendix D

Age and Growth of *Protothaca Staminea*

Table D-1. Age and growth of Protothaca staminea from July 1993, Block Island transplant experiment (all quadrats combined).

		Mean Length (mm)													
		Total length		Last Annulus (1992-93)			Age-1 (1991-92)			Age-2 (1990-91)			Age-3 (1989-90)		
Age	No.	Length	SD	Length	SD	93 Growth	Length	SD	92 Growth	Length	SD	91 Growth	Length	SD	90 Growth
0	0														
1	4	10.70	0.50	5.50	1.50	5.20									
2	33	13.80	2.40	11.40	2.20	2.40	4.40	1.50	7.00						
3	67	22.90	10.00	19.40	2.70	3.50	13.90	3.30	5.50	5.20	1.60	8.70			
4	193	25.60	2.70	23.80	2.60	1.80	19.40	2.70	4.40	13.00	2.70	6.40	5.10	1.50	7.90
5	187	28.90	3.10	27.40	6.10	1.50	23.70	6.30	3.70	18.30	2.90	5.40	11.60	2.40	6.70
6	130	30.50	3.50	28.90	3.50	1.60	25.90	3.50	3.00	21.60	3.30	4.30	16.40	3.10	5.20
7	48	31.00	3.90	29.50	3.70	1.50	27.10	3.40	2.40	23.90	3.20	3.20	19.30	3.70	4.60
8	11	32.20	2.40	30.40	2.30	1.80	28.40	2.40	2.00	25.60	2.90	2.80	21.80	2.50	3.80
9	6	29.50	3.50	28.00	3.20	1.50	27.20	3.30	0.80	25.30	2.80	1.90	23.80	2.30	1.50
10	0														
Total	679	25.01	3.56												

Table D-2 Age and growth of Protothaca staminea from July 1993 samples, Block Island transplant experiment (by individual quadrat).

Quad 1 (near terminus)		Mean Length (mm)													
		Total length		Last Annulus (1992-93)			Age-1 (1991-92)			Age-2 (1990-91)			Age-3 (1989-90)		
Age	No.	Length	SD	Length	SD	93 Growth	Length	SD	92 Growth	Length	SD	91 Growth	Length	SD	90 Growth
0	0														
1	0														
2	0														
3	3	21.90	0.20	19.70	1.70	2.20	13.80	1.40	5.90	5.40	1.60	8.40			
4	26	24.10	2.20	22.20	2.00	1.90	19.00	2.30	3.20	12.60	1.90	6.40	5.60	1.40	7.00
5	25	27.20	1.60	24.90	1.60	2.30	21.70	2.20	3.20	16.60	2.30	5.10	10.50	2.40	6.10
6	24	30.90	3.20	29.30	3.30	1.60	26.20	3.60	3.10	21.90	3.10	4.30	16.10	2.20	5.80
7	5	34.00	1.80	32.50	2.20	1.50	29.10	2.70	3.40	25.50	2.60	3.60	21.40	1.80	4.10
8	0														
9	0														
10	0														
Total	83	27.62	1.80												

Quad 2		Mean Length (mm)													
		Total length		Last Annulus (1992-93)			Age-1 (1991-92)			Age-2 (1990-91)			Age-3 (1989-90)		
Age	No.	Length	SD	Length	SD	93 Growth	Length	SD	92 Growth	Length	SD	91 Growth	Length	SD	90 Growth
0	0														
1	0														
2	0														
3	0														
4	16	25.20	2.50	24.10	2.40	1.10	19.30	2.30	4.80	13.50	2.50	5.80	5.50	1.50	8.00
5	13	27.00	2.00	25.30	2.10	1.70	21.90	2.00	3.40	18.30	2.60	3.60	12.20	2.60	6.10
6	12	27.20	3.30	26.20	2.90	1.00	24.00	2.80	2.20	20.00	3.30	4.00	15.60	2.80	4.40
7	15	28.50	2.90	27.30	2.80	1.20	25.80	2.80	1.50	22.90	2.80	2.90	17.90	3.10	5.00
8	4	33.10	3.10	31.20	2.40	1.90	30.00	2.70	1.20	27.30	3.90	2.70	21.70	3.30	5.60
9	6	29.50	3.50	28.00	3.20	1.50	27.20	3.30	0.80	25.30	2.80	1.90	23.80	2.30	1.50
10	0														
Total	66	28.42	2.88												

Table D-2 continued.

Quad 3		Mean Length (mm)												
		Total length		Last Annulus (1992-93)			Age-1 (1991-92)			Age-2 (1990-91)			Age-3 (1989-90)		
Age	No.	Length	SD	Length	SD	93 Growth	Length	SD	92 Growth	Length	SD	91 Growth	Length	SD	90 Growth
0	0														
1	0														
2	1	14.50		12.30		2.20	7.20		5.10						
3	8	20.80	4.40	18.10	4.00	2.70	12.70	4.50	5.40	4.90	1.30	7.80			
4	27	25.40	2.10	23.70	2.00	1.70	19.40	2.30	4.30	13.60	2.50	5.80	5.40	1.50	8.20
5	25	27.60	3.00	26.20	2.60	1.40	22.60	2.60	3.60	18.10	2.80	4.50	11.80	2.70	6.30
6	11	30.80	2.70	29.50	3.00	1.30	26.90	2.50	2.60	22.30	2.30	4.60	16.10	2.90	6.20
7	3	32.80	5.30	30.60	3.90	2.20	26.40	2.50	4.20	22.20	2.20	4.20	17.60	1.30	4.60
8	0														
9	0														
10	0														
Total	75	25.32	3.50												

Quad 4		Mean Length (mm)												
		Total length		Last Annulus (1992-93)			Age-1 (1991-92)			Age-2 (1990-91)			Age-3 (1989-90)		
Age	No.	Length	SD	Length	SD	93 Growth	Length	SD	92 Growth	Length	SD	91 Growth	Length	SD	90 Growth
1	0														
2	2	12.40	0.40	9.50	0.90	2.90									
3	20	21.30	1.90	19.10	2.10	2.20	13.80	2.20	5.30	5.30	1.70	8.50			
4	41	25.20	2.70	22.90	2.50	2.30	18.70	2.00	4.20	12.40	1.90	6.30	4.70	1.30	7.70
5	20	29.20	3.10	27.40	2.70	1.80	23.30	2.50	4.10	18.70	2.30	4.60	12.50	2.20	6.20
6	1	32.10		30.10		2.00	26.60		3.50	24.10		2.50	15.70		8.40
7	0														
8	0														
9	0														
10	0														
Total	84	24.04	2.03												

Table D-2 continued.

Quad 5 (near origin)		Mean Length (mm)													
		Total length		Last Annulus (1992-93)			Age-1 (1991-92)			Age-2 (1990-91)			Age-3 (1989-90)		
Age	No.	Length	SD	Length	SD	93 Growth	Length	SD	92 Growth	Length	SD	91 Growth	Length	SD	90 Growth
0	0														
1	0														
2	0														
3	6	23.80	2.70	21.80	1.70	2.00	15.40	1.30	6.40	6.10	1.30	9.30			
4	24	26.90	2.80	24.70	2.50	2.20	19.70	3.20	5.00	13.20	3.00	6.50	5.00	1.40	8.20
5	28	29.70	2.50	28.10	2.40	1.60	24.50	2.00	3.60	18.90	2.50	5.60	11.80	2.30	7.10
6	12	32.80	2.20	31.30	2.40	1.50	27.60	2.20	3.70	23.10	2.70	4.50	17.40	2.90	5.70
7	1	27.40		26.80		0.60	24.70		2.10	22.70		2.00	19.70		3.00
8	0														
9	0														
10	0														
Total	71	28.12	2.55												