Rocky Subtidal Communities in Massachusetts Bay: Lovell Island to Nahant Transect. A final report on the 1992-1993 sampling period

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ROCKY SUBTIDAL COMMUNITIES IN MASSACHUSETTS BAY:

LOVELL'S ISLAND TO NAHANT TRANSECT

A FINAL REPORT ON THE
1992 - 1993 SAMPLING PERIOD

Submitted to:

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I. INTRODUCTION

This study represents a continuation of our efforts to monitor change in shallow rocky subtidal communities along a transect of six sites spanning a gradient from degraded habitats in the vicinity of the Deer Island sewage outfall to less degraded subtidal habitats off Nahant, Massachusetts. Two sites, Lovell's Island and Can 5, are in the vicintity of the sewage plume (< 1 mile to two miles distant). The Deer Island and Winthrop sites are probably less impacted by the sewage plume. The Flip Rock and Shags Rocks sites are least affected by the sewage discharge from Deer Island, since they are 5 - 6 miles northeast of the outfall.

This report describes spatial and temporal variability in the distribution of sessile and mobile invertebrates, crustose algae, demersal fish and sediment cover along the Nahant - Lovell's Island transect in summer 1992 and winter 1993. It supplements a previous report on rocky subtidal community structure along the transect in 1991 - 1992 by Witman and Sebens (1993).

II. METHODS

Benthic sampling was conducted at the six sites listed in table 1 in summer (September 2 - 3) 1992 and winter (April 15 - 16) 1993. The standard sampling protocol described in Witman and Sebens (1993) was repeated using SCUBA diving at five of the sites and a Remotely Operated Vehicle (ROV) at the Lovell's Island site which was too polluted for safe diving. The abundance of macrofaunal invertebrates and algae in shallow (10-14 m depth) hard bottom habitats was quantified by stratified sampling with substrate type as the strata. The procedure consisted of divers taking twelve haphazardly located quadrat photos (0.25 m^{-2} area) each on horizontal rock surfaces (boulders or bedrock), cobble and vertical rock surfaces with a camera framer ('quadrapod', Coyer and Witman 1990) yielding a total sample area of 9.0 m^{-2} per site (36 quadrats). The Can 5 site had little solid rock and was dominated by cobble substrata, so it was not possible to sample horizontal or vertical rock surfaces at this site. A Nikonos V camera mounted with a 15 mm Nikkor lens was used to take the quadrat photographs. Because the lens is corrected for distortion, it produces high resolution images allowing organisms down to 2 mm maximum dimension to be identified.

The resulting 35 mm color slides were analyzed for the percent cover of macrofauna, algae and substrata by the random dot technique (Menge 1976, Meese and Tomich 1992). This involved projecting the quadrat slides in a rear projection Kodak Ektagraphic ^{TM} slide projector and covering the screen with a transparent plastic overlay with 200 randomly placed dots (2.5 mm circles). The organism under each dot was identified to species if possible, or assigned to a higher taxonomic category (eg. hydroids, table 2). Some assemblages of organisms and sediment could not be as accurately identified from the photographs. These were termed 'hydroid-bryozoan

complex' for dead or living bases of erect hydroids and bryozoans and 'tube complex' referring to sediment bound into tubes of amphipods or small polychaetes. 'Thick sediment' represented a veneer of sediment thick enough to obscure epifaunal organisms beneath it. Percent cover estimates were restricted to the organisms occupying primary substratum. Species forming a canopy above the substratum were not included as part of the 200 random dot census. Small mobile epifauna such as gastropods, sea stars, etc. were also counted from the quadrat photos and reported as densities in tables 6 - 9 and 14 - 16.

The larger mobile fauna such as crabs, lobsters, large sea stars and demersal fish were not adequately censused by quantitative photography. Therefore, four replicate band transects 25 m long and 1 m wide were censused by divers at each site except Lovell's Island where the ROV was used. Mobile fauna surveys were set up by divers swimming one to two meters off the bottom while laying out two chain link transects that were twenty five meters long. A diver would then swim along one side of the transect and count all macrobenthic organisms within a one meter wide band of the chain. The transect sampling thus provided the number of large mobile fauna (> 3 cm maximum dimension) in four 25 m^2 transects per site.

A Phantom 300 ROV with an 8 mm Panasonic video camera was used as a surrogate SCUBA diver to conduct the band transects for large mobile fauna at Lovell's Island. The ROV was piloted out along the bottom to the end of its 60 m tether. The vehicle was then carefully guided back along the yellow tether which was marked at 1 m intervals.The original intention was for the area of each ROV transect to be equivalent to the diver based band transects (above), but this was prevented by strong bottom currents and obstructions which made it difficult for the ROV to travel the full 25 meters transect length. Typical ROV transects were five to fifteen meters long by 60 cm wide. The average width of the the transect was determined from the projected video by measuring the width of the tether on the monitor, which was then used as a scale to determine the actual width of the video transect. Percent cover of macrobenthos and substrate categories was estimated from the videos by randomly 'freeze framing' the image and then identifying organisms or substrate categories under 10 random dots (2.5 mm circles) on transparent plastic overlain across the lower half of the video image. This procedure was repeated until 20 video images were processed for a total of 200 random dots per transect. Three to five ROV transects were conducted in each of the two sampling periods.

Untransformed mean values were plotted in Figs. 3 - 11 for the most abundant taxa. The percent cover data were arcsin square root transformed while the mobile fauna data were square root transformed to account for Poisson distributed data (Sokal and Rohlf 1981). Back transformed means and standard deviations are presented with sample sizes in tables 3 - 18. The mean values in these tables are not standardized to 100%, but rather are reported as proportions (1.0 maximum value).

III. RESULTS

A. Percent Cover

The most abundant organism encrusting rock substrata along the transect was the crustose coralline alga *Lithothamnion glaciale.* The abundance of this crustose alga increased with distance from the outfall during both sampling periods, attaining maximum mean coverage of nearly 80 percent on cobble at Flip Rock in summer 1992 (Fig. 2). *Lithothamnion* cover was almost three fold higher on horizontal rock than on cobble substrata during the winter sampling.The coralline algae group (smooth *Lithothamnion* and *Phymatolithon* lumped) showed the same trend of high percent cover of Flip and Shag Rocks (Fig. 9). Indeed, the epibenthic communities on cobble and horizontal rock substrata farthest from the outfall are predominately coralline algal communities with low percent covers of sessile invertebrates. The red "fleshy" crustose alga *Peyssonnellia* sp.was most abundant at the mid - transect site (Winthrop) on either vertical rock (summer) or horizontal rock surfaces (winter, Fig. 5).

Sediment covered most of the rock surfaces at the inner Massachussets Bay sites with maximum coverage of 82 percent at Can 5, one of the sites adjacent to the outfall (Fig 1). There was a striking pattern of decreasing mean percent cover of thick sediment from the Can 5 site to Flip Rock in summer 1992, but not in winter 1993 (Fig 1). The inverse relationship between thick sediment cover and the abundance of *Lithothamnion* sp. at sites along the transect may result from high mortality or low recruitment of *Lithothamnion* sp. in heavily sedimented habitats, or to the sediment obscuring live coralline algae from view.

Mussel beds composed of either *Mytilus edulis* or *Modiolus modiolus* were the most conspicuous sessile invertebrate assemblage (Fig. 8 and tables 3-5, 10-12, 17). Mussel beds (mostly *Mytilus edulis*) continued to be most abundant near the outfall at Lovell's Island reaching a maximum percent cover of 41% (summer) and 22% (winter, Fig. 8). It was difficult to identify mussels in the ROV videos from Lovell's Island to species, so they were graphed as 'mussels' although it was evident from previous still photos at this site that they are nearly all *M.edulis.* The dense mussel beds at Lovell's Island sustain large populations of the northern sea star *Asterias vulgaris* and *Cancer* spp. crabs (Table 17). The percent cover of *M.modiolus* in cobble habitats was highest at the Winthrop site in summer 1992 and at Flip Rock during the winter 1993 sampling period (Fig. 8). The large decrease in *Modiolus* abundance between summer and winter may have been caused by dislodgement of mussels during winter storms, which is a major source of mortality for this species (Witman 1987).

An assemblage of hydroids and bryozoans (hydroid/bryozoan complex) were locally abundant on cobble at Flip Rock (Fig. 3) in winter 1993 but lacked any spatial trend of abundance along the

transect. Barnacles, *Balanus balanus,* were also abundant at one site only (Winthrop), where they attained 8 to 10 percent cover in vertical rock and cobble habitats respectively.

B. Abundance of Mobile Fauna

The rock crab, *Cancer irroratus*, was the most abundant decapod counted in the band transects, reaching maximum mean densities of 13 individuals per 25.0 m $^{-2}$ in summer at Deer Island (Fig. 10). Cancrid crabs were also numerous at Lovell's Island, but they were referred to as *Cancer* spp. in Fig 10 because it was not always possible to distinguish between the two species in the ROV videos. *C.irroratus* densities were lower at the outer transect sites of Flip and Shags Rocks than at the inner transect sites of Can 5 and Deer Island. The abundance of the Jonah crab, *Cancer borealis,* did not show any clear spatial pattern along the transect, but it was most abundant at Can 5 (Fig 10). There was, however, a consistent temporal pattern of low crab and lobster (*Homarus americanus*) abundance in the winter for five of the six sites. Surprisingly, there was little difference in lobster abundance between winter and summer at Flip Rock (Fig 10). Maximum mean lobster densities of five individuals per 25.0 m $^{-2}$ occured at Deer Island in summer 1992 .

Sea urchins, *Stronglyocentrotus droebachiensis*, were the most abundant mobile invertebrate censused, with maximum mean densities of 32 urchins per 25.0 m $^{-2}$ on vertical rock walls at Flip Rock in summer 1992 (Fig 11). In both summer and winter sampling periods, there was a striking pattern of increasing abundance of urchins with distance from the sites adjacent to the outfall (Fig 11). Grazing by adundant urchins undoubtably help maintain the low cover of erect algae and encrusting invertebrates at the outer transect sites (Flip and Shags rock) as in other subtidal habitats of Massachusetts Bay and Gulf of Maine (Sebens 1986, Witman 1985, 1987).
Sea urchins were also the most abundant small mobile fauna enumerated in the photo quadrats on horizontal rock surfaces at the outer transect sites of Flip and Shags Rocks (tables 8 and 15).

Populations of demersal fish censused in the band transects included winter flounder, *Pseudopleuronectes americanus*, the rock eel, *Pholis gunnellis*, eelpout, *Macrozoaraces americanus*, cunner, *Tautogolabrus adspersus*, the shanny *Ulvaria subbifurcata*, and the sculpins *Myoxocephalus octodecemspinosus, M. aenaeus and M. scorpius* (Tables 6 and 13). While the small rock eel, *P.gunnellis*, was the most abundant species (table 6), densities of demersal fish were generally low with average densities rarely exceeding one individual per 25 m $^{-2}$. Fish were conspicuously less abundant in winter (table 13) than summer (table 6) at all sites.

IV. CONCLUSIONS

Spatial differences in the abundance of macrofauna and mobile epibenthos documented for the

Nahant - Lovell's Island transect in 1987 - 1992 (Witman and Sebens 1993) were generally maintained throughout the 1992 - 1993 sampling period. The inner transect sites (Lovell Island, Can 5 and Deer Island were generally characterized by greater sediment cover, lower densities of sea urchins and lower percent cover of crustose coralline algae than the outer transect sites of Flip and Shags Rocks. Extensive mussel beds (*Mytilus edulis*) continued to cover horizontal rock surfaces at Lovell's Island only, although their cover was reduced during the winter.

Temporal differences revealed by comparing the present data to the 1991 - 1992 data in Witman and Sebens (1993) are listed below.

1. The percent cover of thick sediment was 10 to 50% lower in Winter 1993 than in Winter 1992.
2. The percent cover of the hydroid/bryozoan complex was substantially lower in 1992 - 1993, especially in summer 1992.
3. Lobster densities were substantially lower in 1992 - 1993 in 1991 - 1992.
4. Sea urchin densities were more than three fold higher at Flip Rock in summer 1992 than in summer 1991.

Statistical analyses need to be conducted as the next phase of this research program to determine whether or not the temporal trends described above are significant.

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Table 1. Location of research sites in Massachusetts Bay. The Lovell's Island site is closest to the Deer Island outfall and the Shags Rock site is farthest from the outfall. However, the Lovell's and Deer Island sites are directly in the path of the effluent and sludge plume. H=high, M=moderate, L=low

SITE	Sewage Impact	Latitude / Longitude
Lovell's Island	H	42 20. 32 x 70 55. 89
Deer Island	M	42 22. 09 x 70 56. 16
Can 5	H	42 21.18 x 70 54. 49
Winthrop	M	42 23. 07 x 70 55. 49
Flip Rock	L	42 24. 14 x 70 55. 52
Shags Rock	L	42 24. 69 x 70 54. 23

Table 2. Species and categories identified in photographs and transects in Lovell's Island to Nahant surveys.

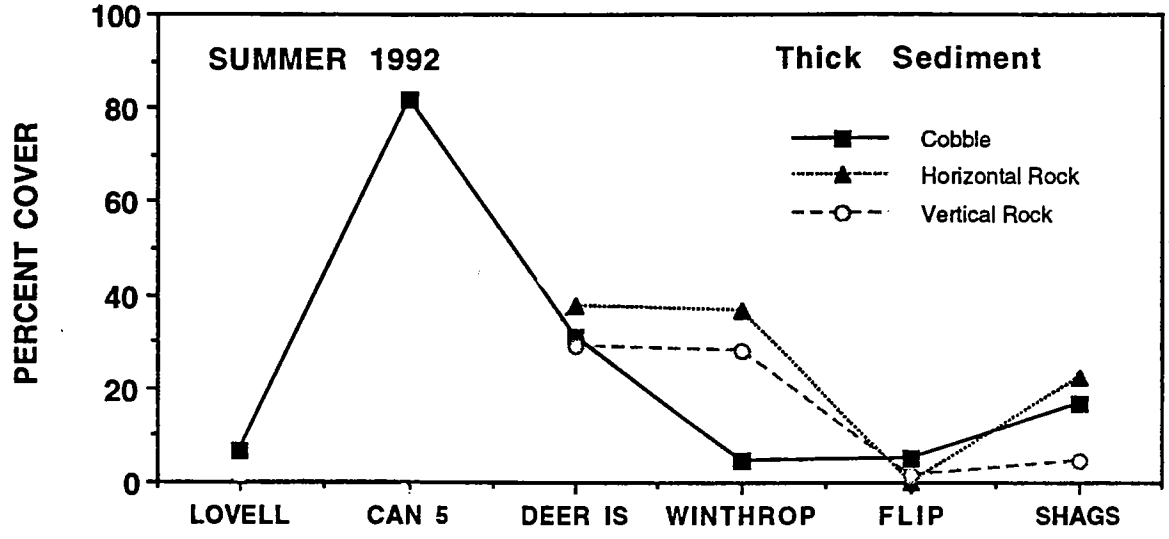
Scientific Name or Category	Description
Acmaea testudinalis	limpet (gastropod mollusk), only species present in this region, grazes algae
Aeolidia papillosa	nudibranch mollusk, predator on sea anemones
Algae (Red, Green, Brown)	erect foliose or filamentous algae, s=substratum, c=canopy
Anemone	unidentified anemone, usually juvenile *Metridium senile*
Anomia spp.	bivalve mollusk (jingle shell) attached by one shell, two species not dist. in photographs
Aplidium constellatum	colonial ascidian, white translucent, most common species
Asterias vulgaris	common sea star (starfish), predator on most invertebrates
Asterias forbesi	second most common sea star, predator on mussels primarily
Balanus balanus	barnacle, the only common subtidal species
Bryozoans	bryozoans, encrusting or erect, species not det. in photographs
Buccinum undatum	gastropod mollusk, predator on mussels and other invertebrates
Cancer irroratus	common Rock Crab, pointed sides of carapace, predator on mussels and other invertebrates
Cancer borealis	Jonah Crab, rounded sides of carapace, predator on mussels and other invertebrates
Carcinus maenas	Green Crab, a predator on mussels and barnacles
Complex	bound sediment with worm and amphipod tubes (tube) or bound to bases of hydroids and bryozoans (hydroid-bryo)

Crepidula fornicata	gastropod mollusk, slipper shell
Dendrodoa carnea	solitary ascidian, orange red, common
Didemnum albidum	colonial ascidian, bright white, thin and uncommon
Gravel	small pebbles and gravel between larger cobbles, usually less than 3 cm diameter and without encrusting species. Measured as percent cover in photos of cobble areas, but not part of total percent cover on cobbles.
Halichondria panicea	sponge, yellow or greenish, very common
Halisarca spp.	sponge, yellow, two species not dist. in photographs
Hemitripterus americanus	fish, sea raven, a predator on smaller fish
Henricia spp.	smooth armed sea star, orange, purple and other colors. a complex of species of which *H. sanguineolenta* is most common.
Homarus americanus	American Lobster, a predator on mussels, crabs and other invertebrates
Hyas spp.	decorator crabs, at least two species locally
Hydroids	all hydroid species, c=canopy, s=substratum
Ischnochiton spp.	a group of small chitons, including several species of the genus plus small *Tonicella marmorea.*
Isodictya spp.	sponge, orange erect, two species not dist. in photographs
Limanda ferruginea	fish, yellowtail flounder, predator on benthic invertebrates
Lithothamnion glaciale	crustose coralline alga, pink, bumpy surface. Also spelled *Lithothamnium*, may include *L. lemoinae* as well

Metridium senile	sea anemone, c = canopy, s=substratum
Molgula spp.	solitary ascidians, yellow-brown, *M. citrina* most common *M. manhattensis* larger, *Molgula sp.*, orange, not dist. from *D. carnea* in photographs
Modiolus modiolus	horse mussel, brown with hairy periostracum
Myoxocephalus aeneaus	fish, a small sculpin (grubby), predator on small mobile invertebrates, primarily crustaceans
Myoxocephalus octodecemspinusus	fish, sculpin (longhorn), predator on fish and invertebrates
Myoxocephalus scorpius	fish, sculpin (shorthorn), predator on fish and invertebrates
Myxicola infundibulum	tube dwelling pollychaete worm, secretes mucus collar
Mud	mud found between cobbles in photographs. Measured as percent cover in photos of cobble areas, but not part of total percent cover <u>on</u> cobbles.
Orange sponge	encrusting sponge, unidentified species
Pagurus spp.	hermit crabs, counted in transects if large (3 cm or greater)
Peysonnelia sp.	crustose red alga, non-calcified, formerly known as 'red crust' or *Waernis*an. sp. (proposed), very thin, maroon or red/brown
Pholis gunnelus	fish, gunnel or rock eel, very elongate species that preys on small invertebrates
Phymatolithon rugulosum	crustose coralline alga, pink, smooth or pitted surface
Placopecten magellanicus	large sea scallop
Pseudopleuronectes americanus	fish, winter flounder, a predator on infaunal and epifaunal invertebrates

Psolus fabriciius	attached sea cucumer (holothurian), orange-red
Rock (Bare Space)	recently cleared rock surface, may have a film of algae or bacteria but this cannot be seen in photographs
Sediment	thin sediment is loose on rock surface, can see org. through it thick sediment can be bound to surface, cannot see org. through
Spirorbis borealis	Serpulid polychaete, white calcified spiral tubes, actually a complex of several species not dist. in photographs
Strongylocentrotus droebachiensis	the only sea urchin at these sites, green to off-white, a major herbivore on algae and predator on many invertebrates
Tautogolabrus adspersus	fish, Cunner (a wrasse), predator on mussels and other small invertebrates
Ulvaria subbifurcata	fish, shanny, an elongate species that preys on small invertebrates
Urosalpinx sp.	gastropod mollusk, oyster drill, uncommon predator on bivalve mollusks

Figure 1. Mean percent cover of thick sediment on different substrata.



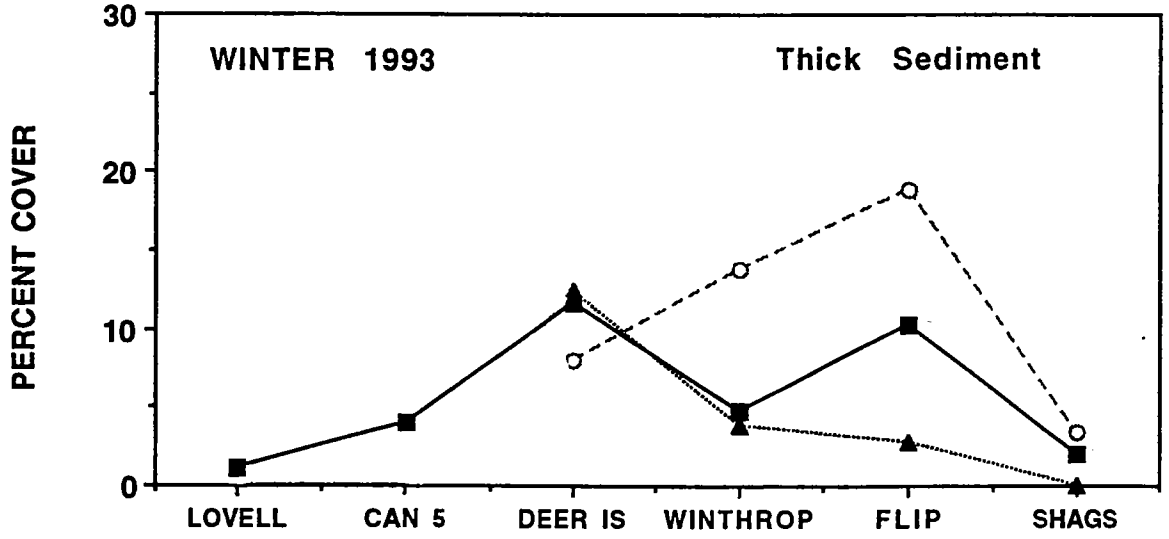
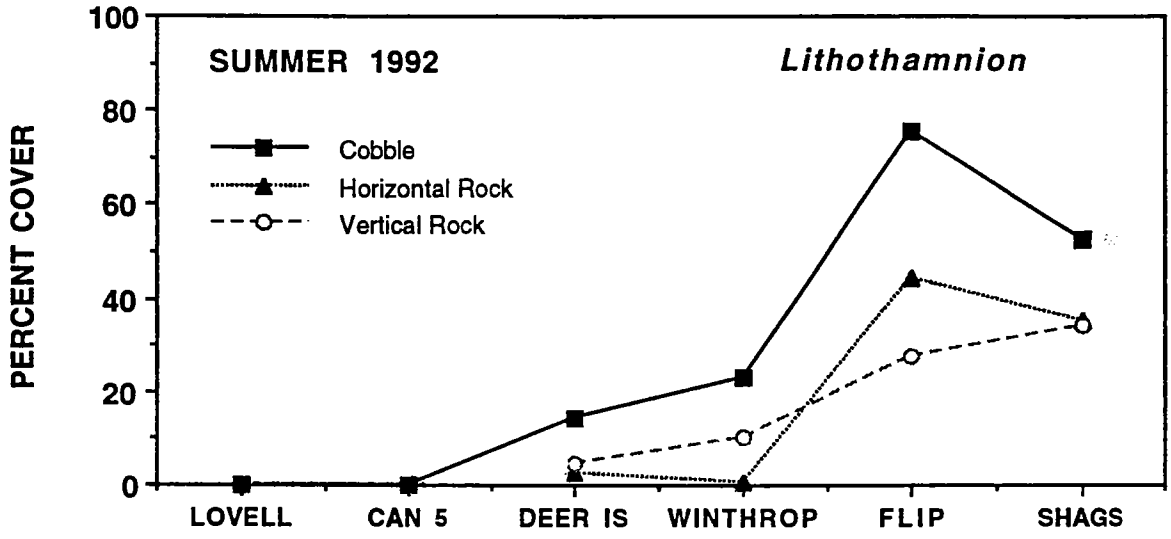


Figure 2. Mean percent cover of the coralline alga, *Lithothamnion* sp..



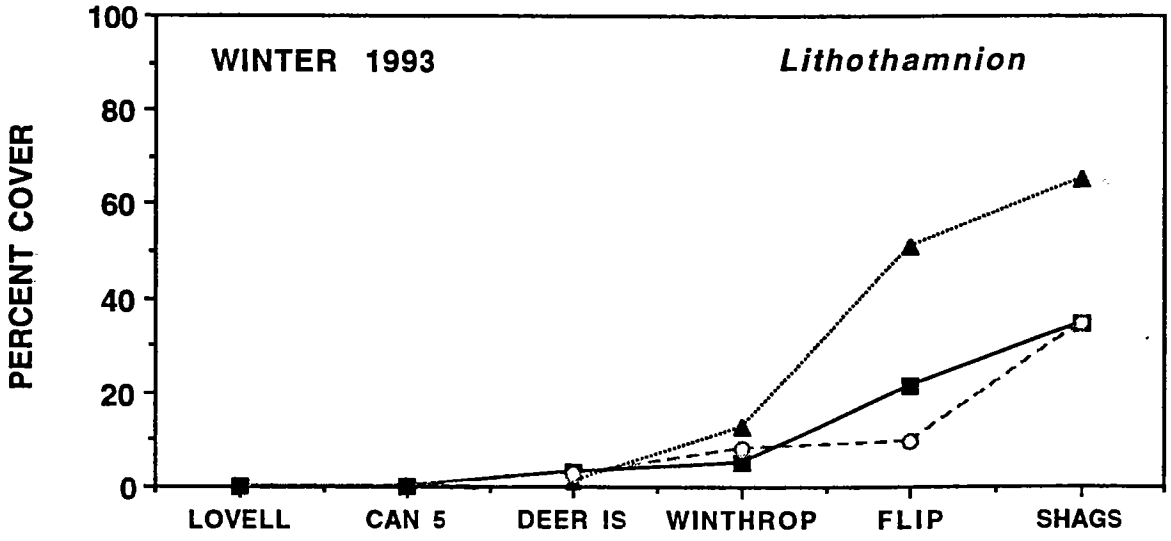
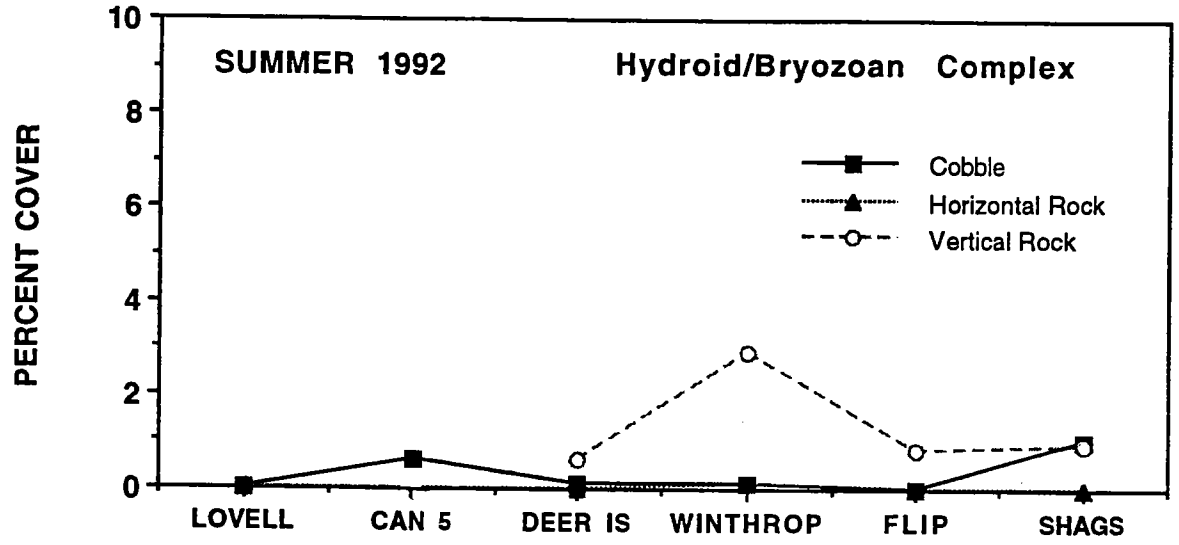


Figure 3. Mean percent cover of hydroid-bryozoan complex.



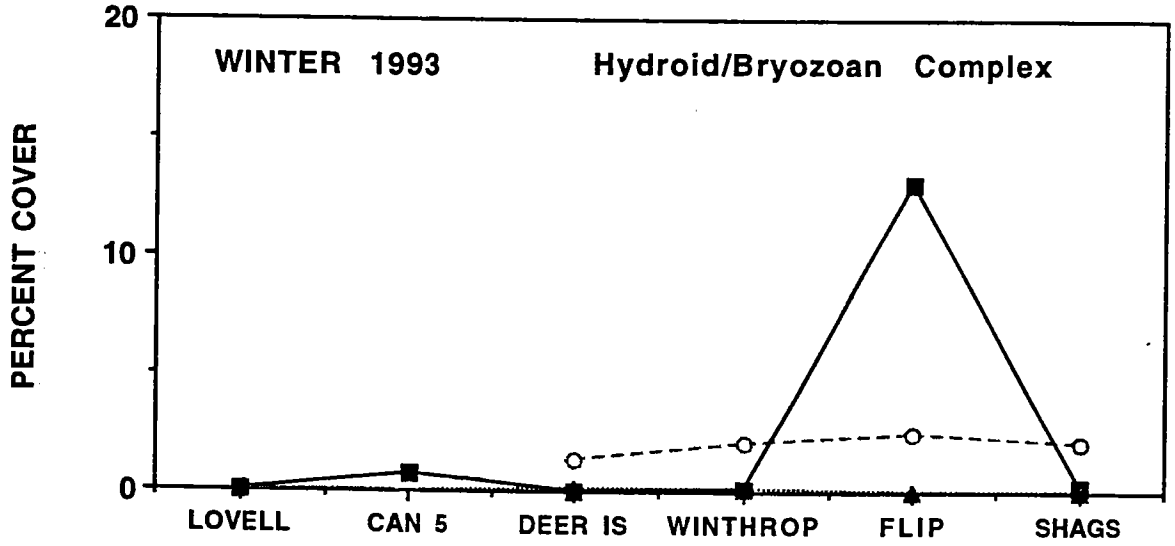


Figure 4. Mean percent cover of barnacles, *Balanus balanus*.

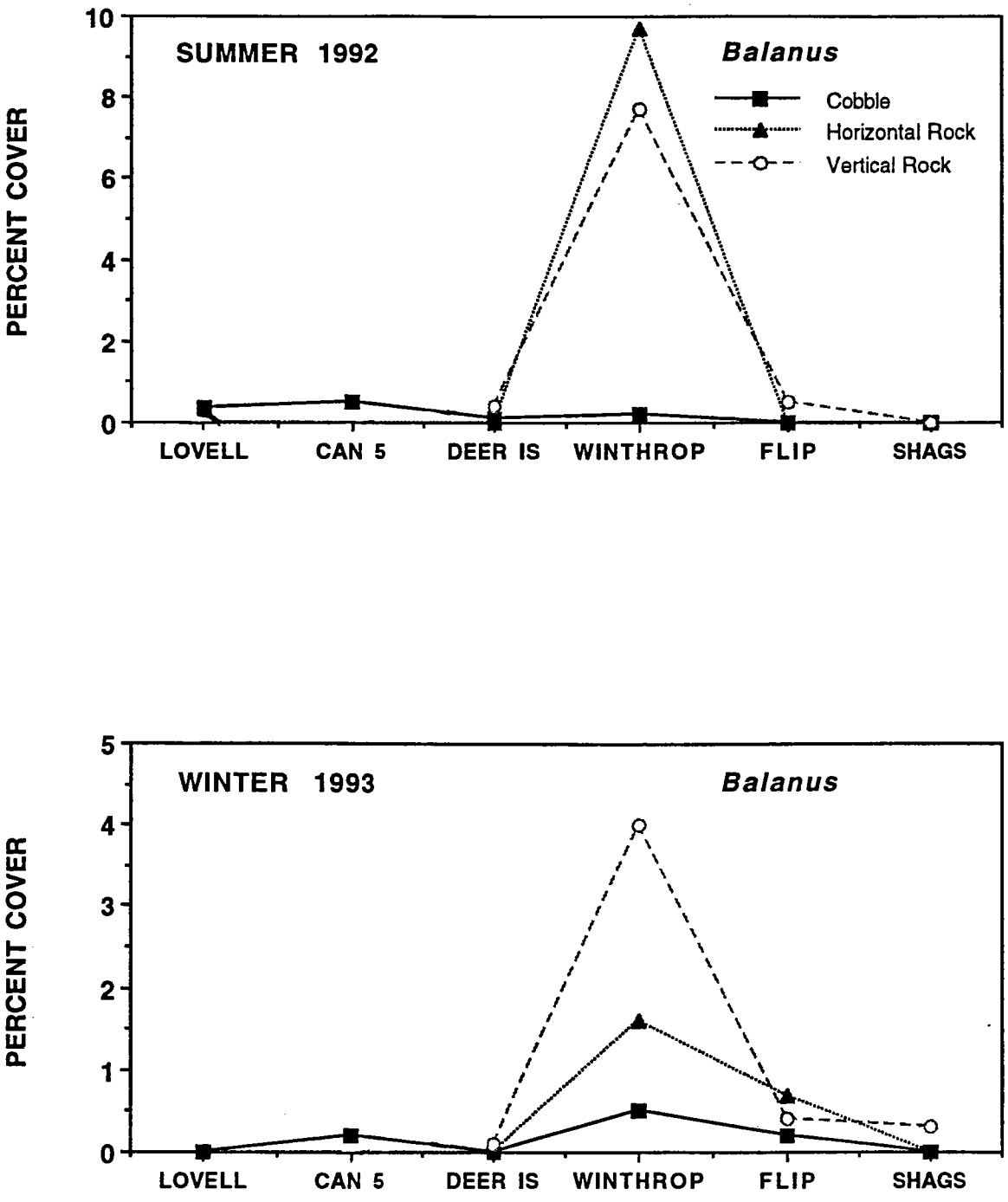
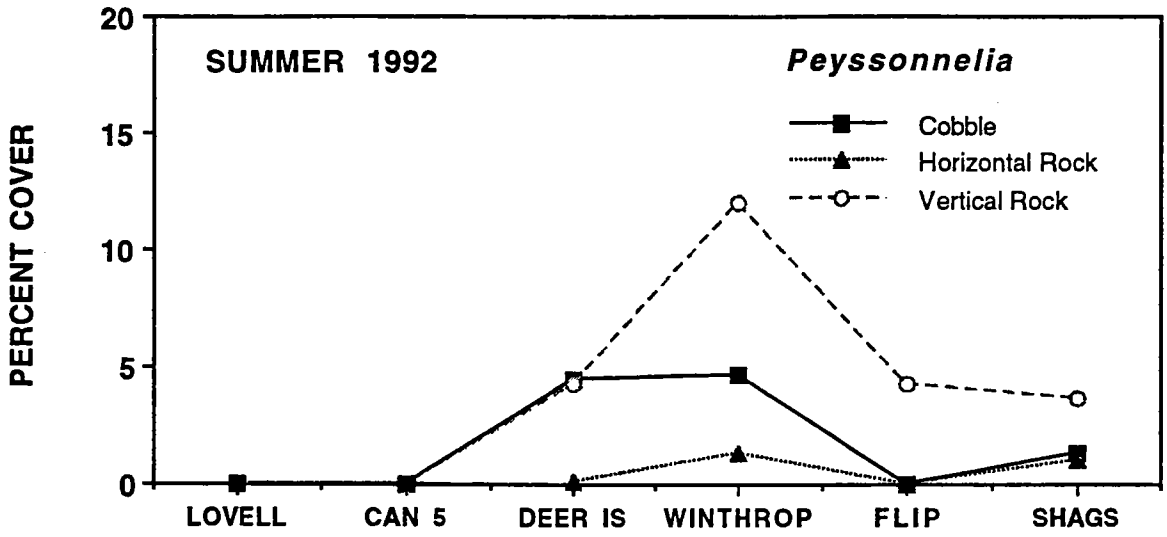


Figure 5. Mean percent cover of *Peyssonnelis* sp..



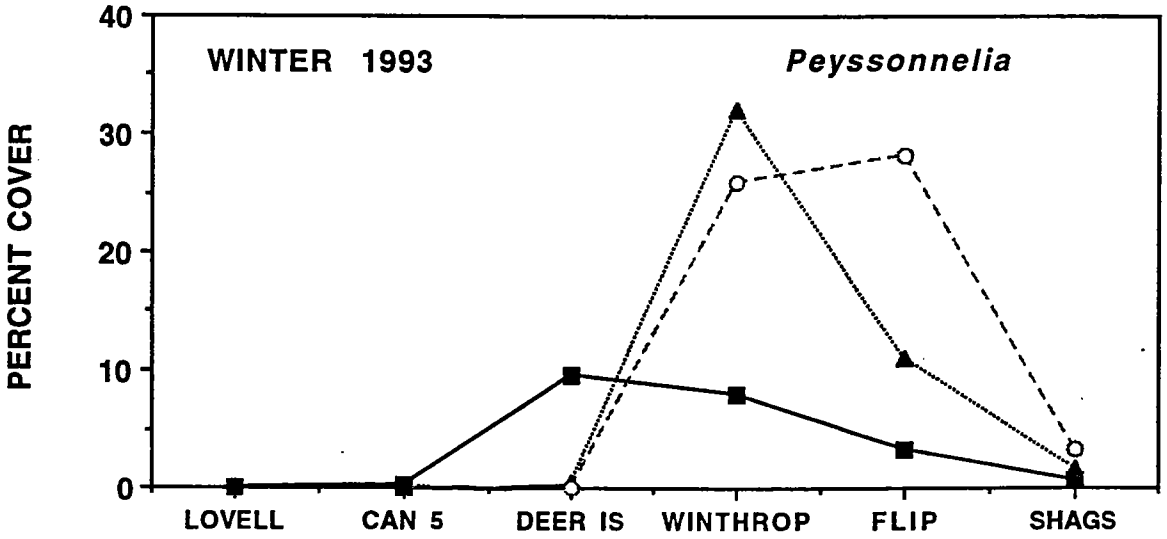
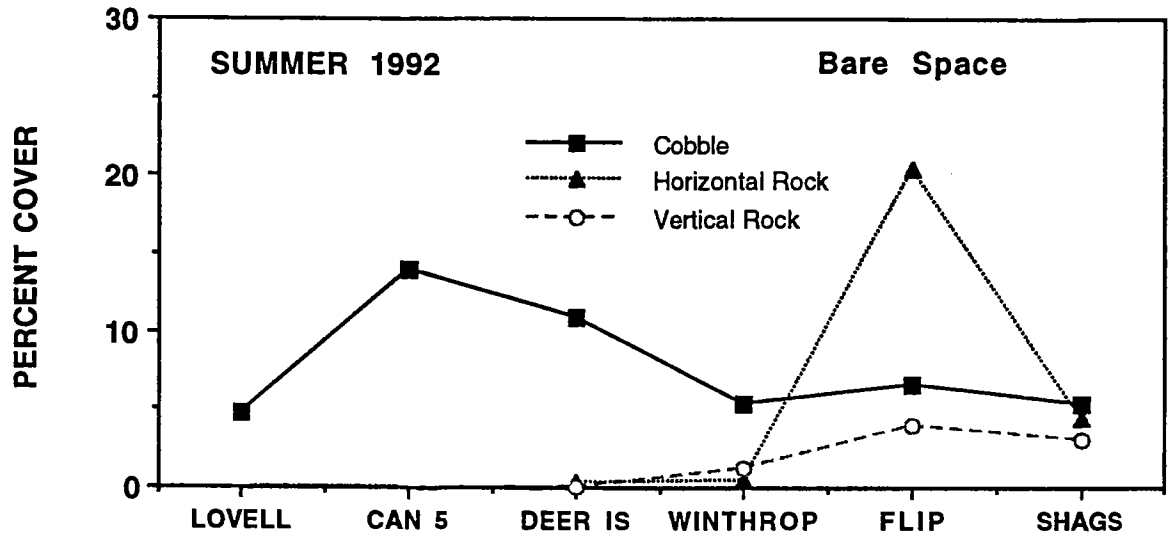


Figure 6. Mean percent cover of bare space.



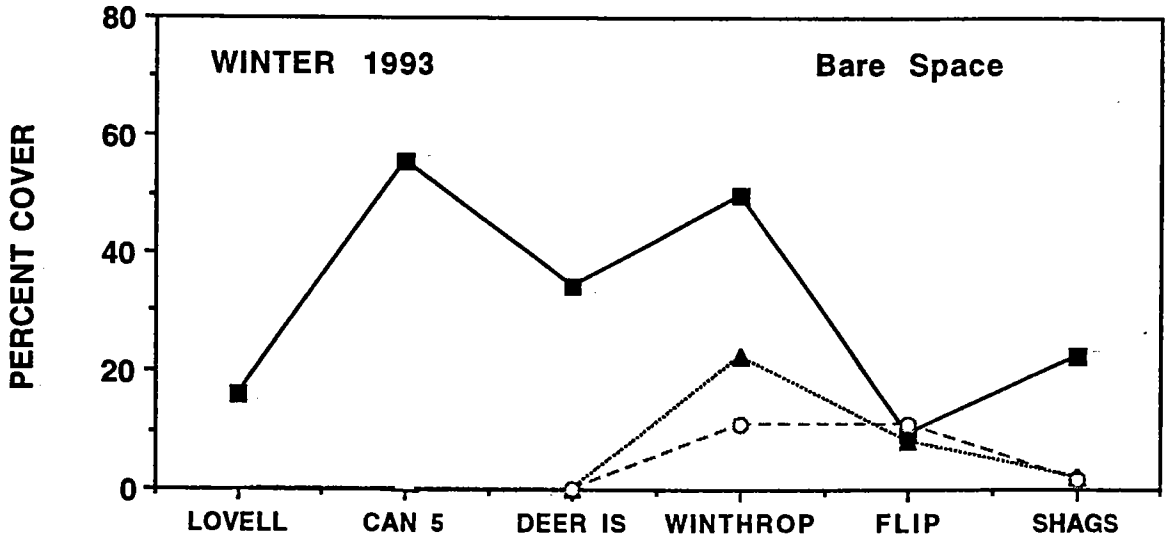
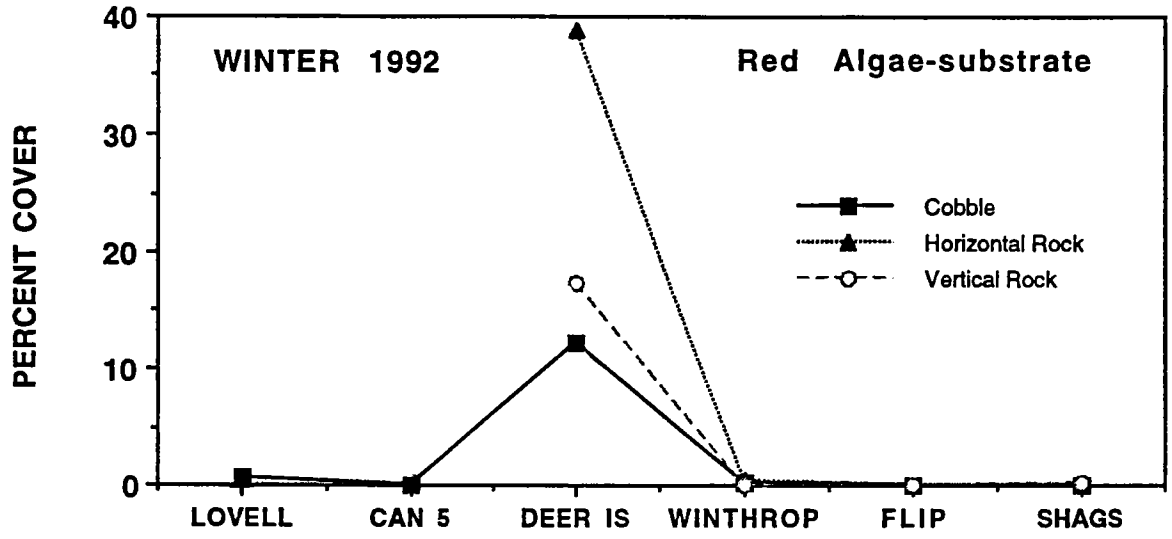


Figure 7. Mean percent cover of red algae-substrate (erect red algae).



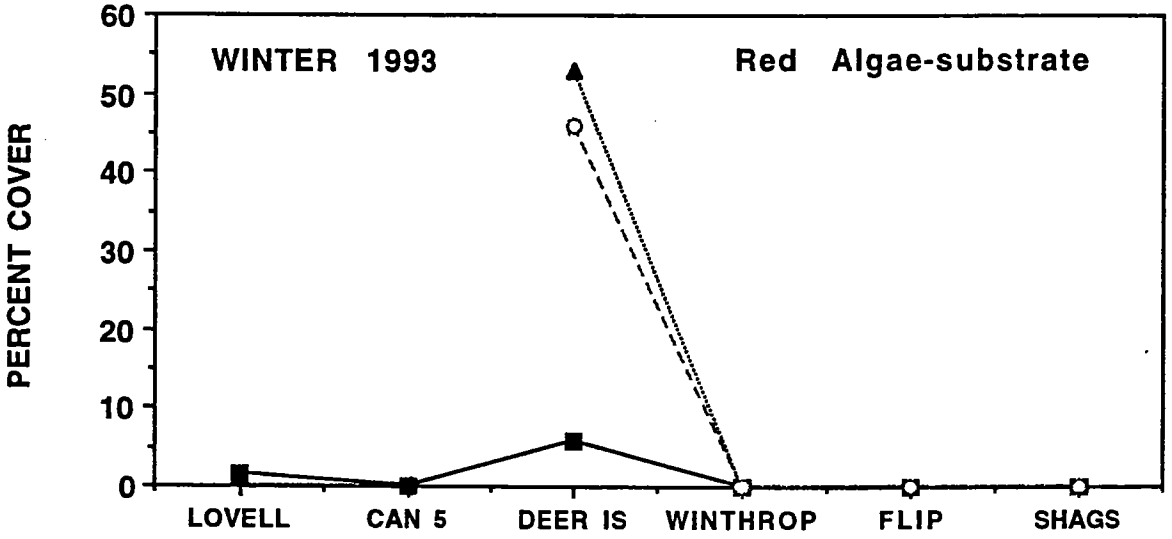
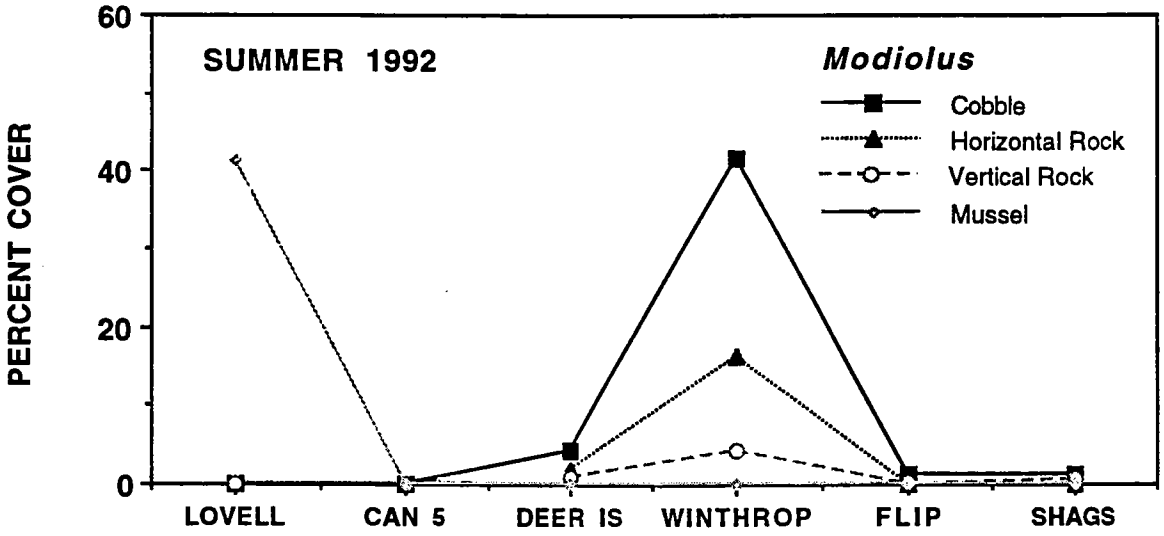


Figure 8. Mean percent cover of *Modiolus modiolus*.



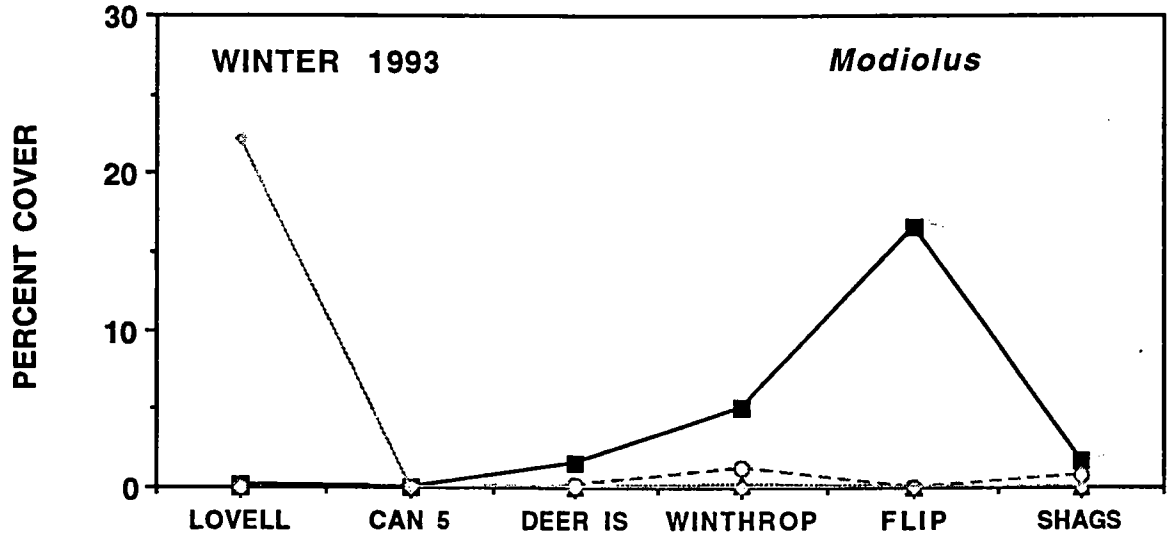
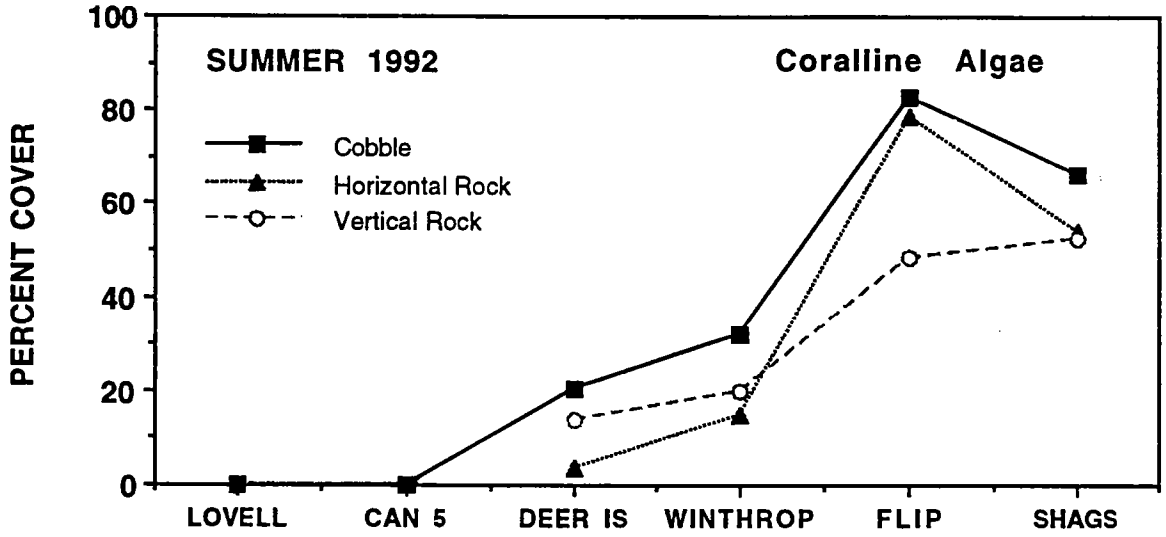


Figure 9. Mean percent cover of total coralline algae (*Lithothamnion*, *Phymatolithon*, and unidentified species).



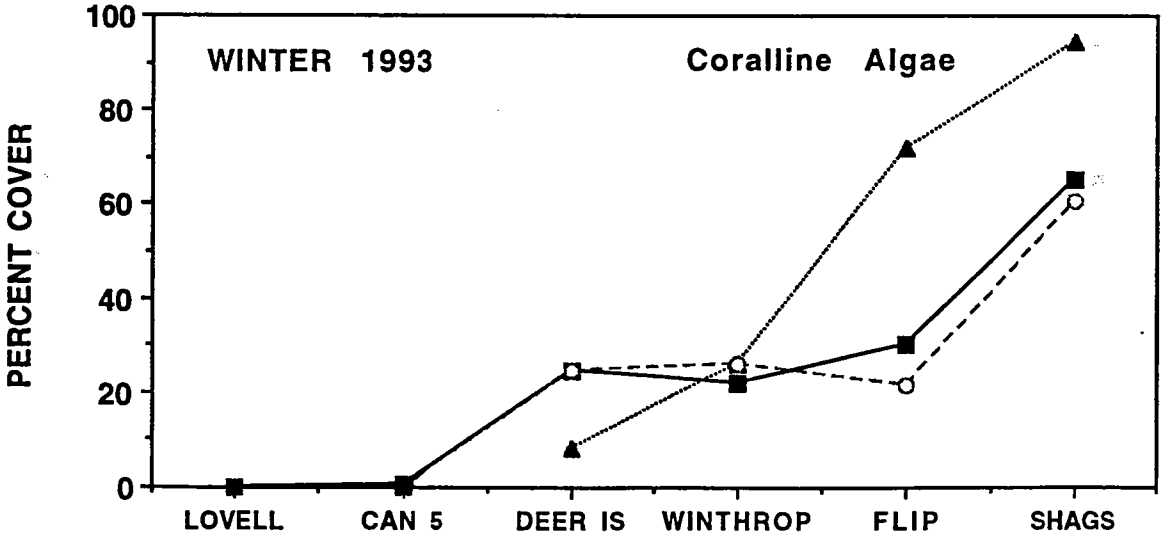


Figure 10. Mean density of decapod crustaceans.

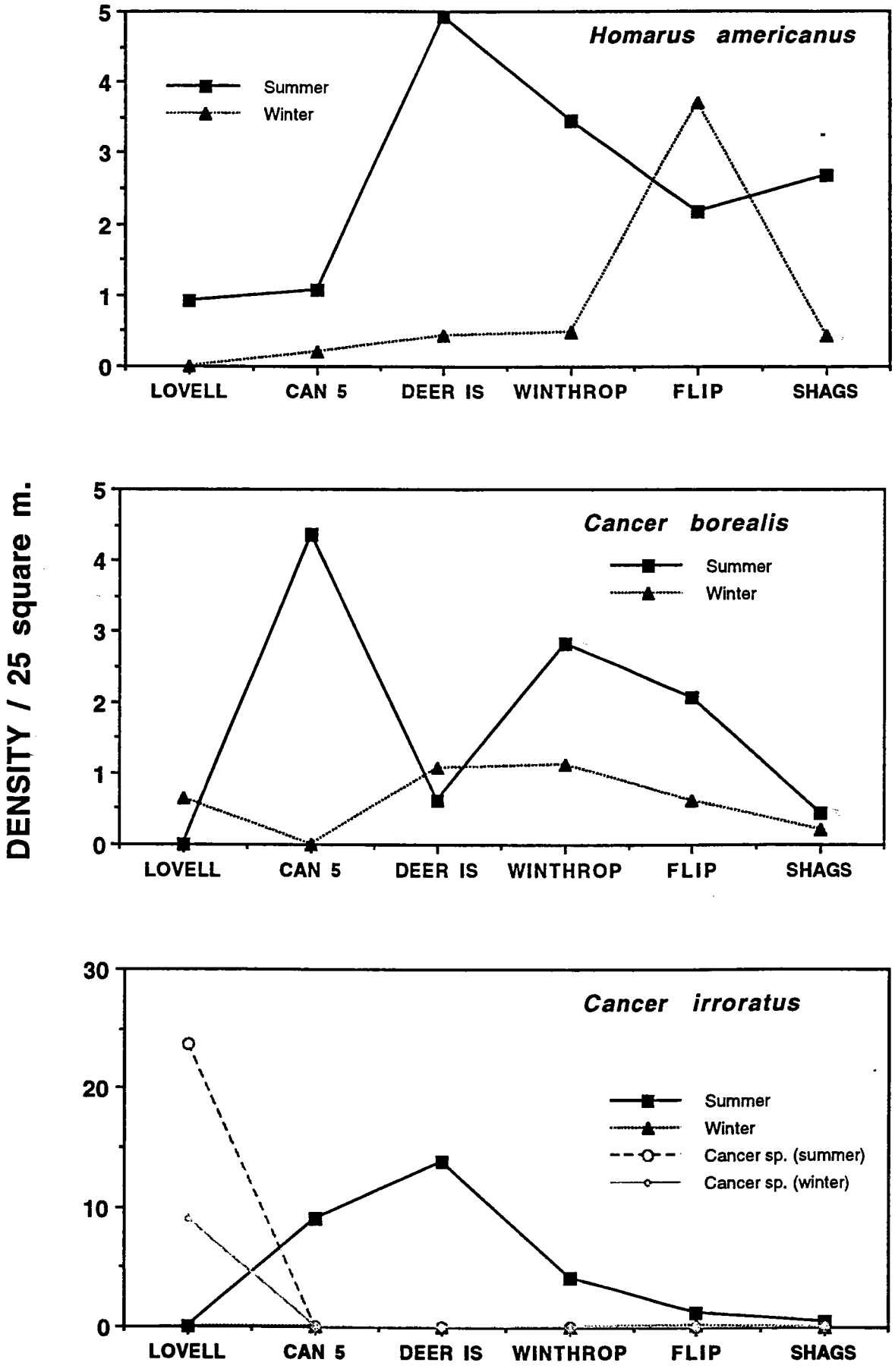


Figure 11. Mean density of sea urchins, *Stronglyocentrotus droebachiensis.*

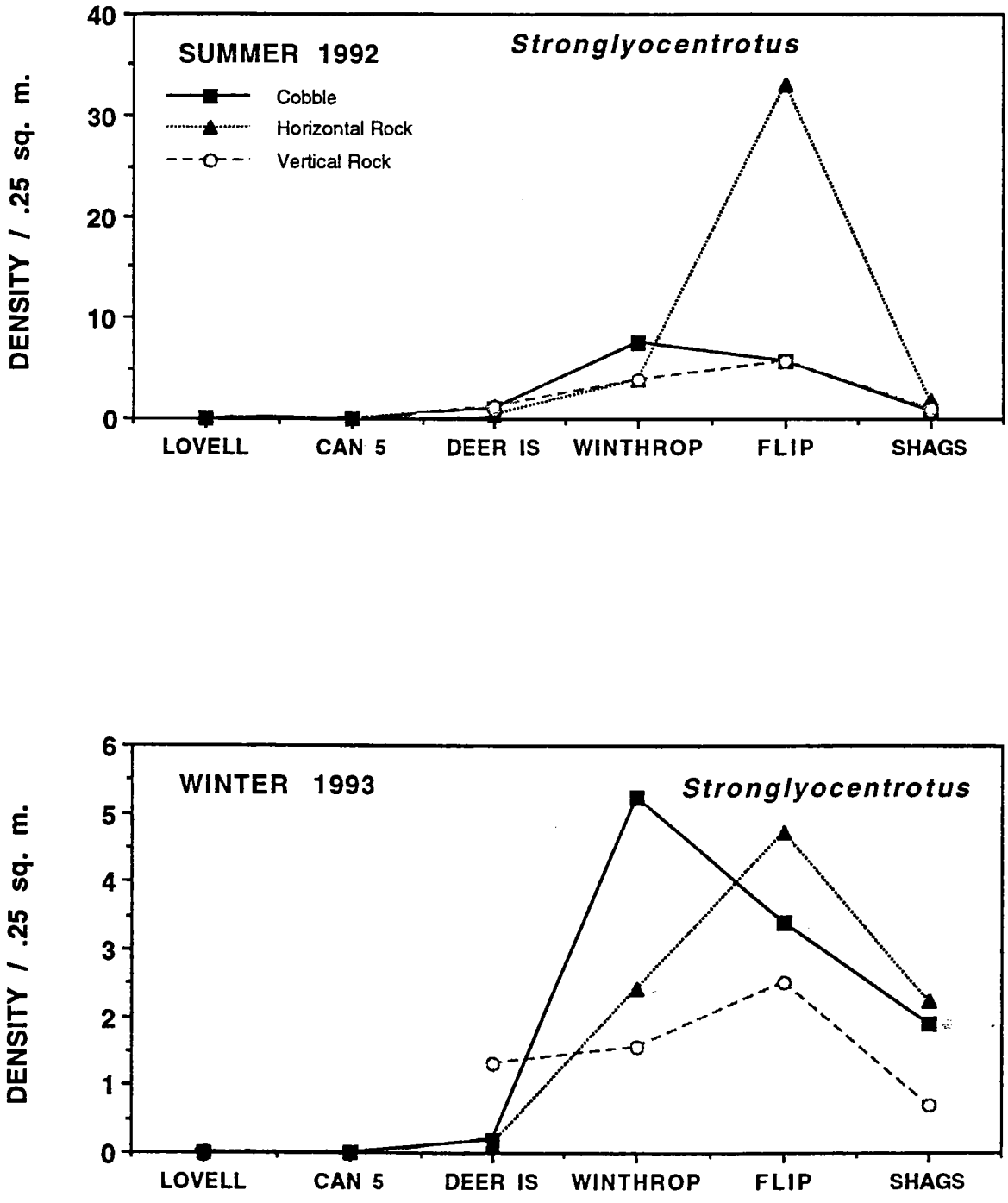


Table 3. Percent cover on cobble substrata

		Metridium-s	Metridium-c	Hydroids-s	Hydroids-c	Balanus	Aplidium
CAN 5	B.T. mean	0.000	0.000	0.001	0.000	0.005	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.014	0.002	0.026	0.000
	N	35	35	35	35	35	35
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000	0.001	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	<0	0.000
	B.T. (mean+sd)	0.001	0.001	0.002	0.001	0.006	0.000
	N	10	10	10	10	10	10
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.003	0.000	0.000	0.000	0.003	0.000
	N	7	7	7	7	7	7
SHAGS	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.002
	B.T. (mean-sd)	0.000	0.000	<0	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.002	0.001	0.003	0.009
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.002	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.014	0.000
	N	12	12	12	12	12	12

Table 3. Percent cover on cobble substrata

		Didemnum	Dendrodoa	Halichondria	Isodictya	Encr. Bryo	Erect Bryo-s
CAN 5	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000	0.000
	N	35	35	35	35	35	35
DEER ISLAND	B.T. mean	0.000	0.000	0.003	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.003	0.057	0.000	0.000	0.000
	N	10	10	10	10	10	10
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.003	0.000	0.000	0.000
	N	7	7	7	7	7	7
SHAGS	B.T. mean	0.000	0.001	0.001	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.001	0.003	0.012	0.002	0.001	0.003
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12	12

Table 3. Percent cover on cobble substrata

		Erect bryo-c	Tube Complex	Thick sediment	Hyd/Bryo Complex	Peyssonnelia
CAN 5	B.T. mean	0.000	0.000	0.818	0.006	0.000
	B.T. (mean-sd)	0.000	0.000	0.702	<0	<0
	B.T. (mean+sd)	0.000	0.000	0.911	0.031	0.006
	N	35	35	35	35	35
DEER ISLAND	B.T. mean	0.000	0.000	0.313	0.001	0.045
	B.T. (mean-sd)	0.000	0.000	0.170	<0	0.010
	B.T. (mean+sd)	0.000	0.000	0.477	0.005	0.105
	N	10	10	10	10	10
FLIP ROCK	B.T. mean	0.000	0.000	0.049	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.011	0.000	0.000
	B.T. (mean+sd)	0.000	0.001	0.112	0.000	0.000
	N	7	7	7	7	7
SHAGS	B.T. mean	0.000	0.000	0.170	0.010	0.013
	B.T. (mean-sd)	<0	<0	0.055	<0	0.001
	B.T. (mean+sd)	0.001	0.001	0.331	0.039	0.039
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.045	0.001	0.047
	B.T. (mean-sd)	0.000	0.000	0.012	<0	0.005
	B.T. (mean+sd)	0.000	0.000	0.097	0.011	0.132
	N	12	12	12	12	12

Table 3. Percent cover on cobble substrata

		Lithothamnion	Phymatolithon	Bare space	Spirorbis	Modiolus	Red algae-s
CAN 5	B.T. mean	0.000	0.000	0.139	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.058	0.000	<0	<0
	B.T. (mean+sd)	0.000	0.000	0.247	0.000	0.002	0.000
	N	35	35	35	35	35	35
DEER ISLAND	B.T. mean	0.145	0.050	0.109	0.000	0.042	0.123
	B.T. (mean-sd)	0.078	0.020	0.037	0.000	<0	0.013
	B.T. (mean+sd)	0.229	0.092	0.213	0.000	0.174	0.320
	N	10	10	10	10	10	10
FLIP ROCK	B.T. mean	0.753	0.044	0.066	0.000	0.012	0.001
	B.T. (mean-sd)	0.612	0.003	0.021	0.000	<0	<0
	B.T. (mean+sd)	0.871	0.130	0.134	0.000	0.048	0.011
	N	7	7	7	7	7	7
SHAGS	B.T. mean	0.528	0.119	0.053	0.000	0.012	0.001
	B.T. (mean-sd)	0.363	0.058	0.011	<0	<0	<0
	B.T. (mean+sd)	0.690	0.198	0.123	0.001	0.065	0.004
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.228	0.080	0.054	0.002	0.416	0.002
	B.T. (mean-sd)	0.138	0.023	0.013	<0	0.172	<0
	B.T. (mean+sd)	0.334	0.167	0.121	0.052	0.685	0.014
	N	12	12	12	12	12	12

Table 3. Percent cover on cobble substrata

		Red algae-c	Brown algae-s	Brown algae-c	Anomia	Orange Enc. Sponge
CAN 5	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	<0
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.002
	N	35	35	35	35	35
DEER ISLAND	B.T. mean	0.012	0.004	0.023	0.000	0.002
	B.T. (mean-sd)	0.000	<0	<0	<0	<0
	B.T. (mean+sd)	0.042	0.016	0.100	0.001	0.016
	N	10	10	10	10	10
FLIP ROCK	B.T. mean	0.001	0.000	0.000	0.000	0.002
	B.T. (mean-sd)	<0	0.000	0.000	0.000	<0
	B.T. (mean+sd)	0.013	0.000	0.000	0.000	0.026
	N	7	7	7	7	7
SHAGS	B.T. mean	0.002	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	<0
	B.T. (mean+sd)	0.008	0.000	0.000	0.000	0.001
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.001	0.000	0.005	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	0.000	<0
	B.T. (mean+sd)	0.005	0.003	0.049	0.000	0.001
	N	12	12	12	12	12

Table 3. Percent cover on cobble substrata

		Gravel
CAN 5	B.T. mean	0.486
	B.T. (mean-sd)	0.291
	B.T. (mean+sd)	0.683
	N	35
DEER ISLAND	B.T. mean	0.149
	B.T. (mean-sd)	0.074
	B.T. (mean+sd)	0.245
	N	10
FLIP ROCK	B.T. mean	0.227
	B.T. (mean-sd)	0.019
	B.T. (mean+sd)	0.568
	N	7
SHAGS	B.T. mean	0.219
	B.T. (mean-sd)	0.123
	B.T. (mean+sd)	0.334
	N	12
WINTHROP	B.T. mean	0.104
	B.T. (mean-sd)	0.024
	B.T. (mean+sd)	0.230
	N	12

Table 4. Percent cover on horizontal substrata, summer 1992.

		Metridium-s	Metridium-c	Hydroids-s	Hydroids-c	Aplidium	Balanus
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	<0	<0	<0	<0
	B.T. (mean+sd)	0.000	0.000	0.001	0.001	0.002	0.002
	N	12	12	12	12	12	12
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.003	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.000	0.000	0.000	0.000	0.001	0.000
	B.T. (mean-sd)	<0	<0	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.002	0.002	0.000	0.000	0.005	0.000
	N	11	11	11	11	11	11
WINTHROP	B.T. mean	0.000	0.000	0.001	0.000	0.001	0.097
	B.T. (mean-sd)	<0	<0	<0	<0	<0	0.024
	B.T. (mean+sd)	0.001	0.001	0.024	0.001	0.022	0.211
	N	12	12	12	12	12	12

Table 4. Percent cover on horizontal substrata, summer 1992.

		Dendrodoa	Encr Bryo	Didemnum	Mogula	Halichondria	Tube Complex
DEER ISLAND	B.T. mean	0.001	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.011	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12	12
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.003	0.000
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.001	0.000	0.000	0.000	0.000	0.006
	B.T. (mean-sd)	<0	<0	0.000	0.000	0.000	<0
	B.T. (mean+sd)	0.008	0.001	0.000	0.000	0.000	0.109
	N	11	11	11	11	11	11
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	<0	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.007	0.001	0.004	0.000
	N	12	12	12	12	12	12

Table 4. Percent cover on horizontal substrata, summer 1992.

		Thick sediment	Hyd/Bryo complex	Peyssonnella	Lithothamnion	Phymatolithon
DEER ISLAND	B.T. mean	0.375	0.000	0.001	0.024	0.003
	B.T. (mean-sd)	0.132	0.000	<0	<0	<0
	B.T. (mean+sd)	0.658	0.000	0.020	0.121	0.011
	N	12	12	12	12	12
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.442	0.312
	B.T. (mean-sd)	<0	0.000	0.000	0.285	0.146
	B.T. (mean+sd)	0.005	0.000	0.000	0.605	0.507
	N	12	12	12	12	12
SHAGS	B.T. mean	0.222	0.000	0.010	0.351	0.163
	B.T. (mean-sd)	0.022	0.000	<0	0.219	0.055
	B.T. (mean+sd)	0.547	0.000	0.061	0.496	0.314
	N	11	11	11	11	11
WINTHROP	B.T. mean	0.367	0.001	0.013	0.007	0.126
	B.T. (mean-sd)	0.214	<0	<0	<0	0.016
	B.T. (mean+sd)	0.535	0.018	0.053	0.038	0.319
	N	12	12	12	12	12

Table 4. Percent cover on horizontal substrata, summer 1992.

		Bare space	Spirorbis	Modiolus	Red algae-s	Red algae-c	Brown algae-s
DEER ISLAND	B.T. mean	0.003	0.000	0.018	0.387	0.030	0.000
	B.T. (mean-sd)	<0	0.000	<0	0.058	0.004	<0
	B.T. (mean+sd)	0.031	0.000	0.236	0.793	0.079	0.001
	N	12	12	12	12	12	12
FLIP ROCK	B.T. mean	0.204	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.094	<0	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.343	0.001	0.000	0.000	0.000	0.000
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.044	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.200	0.005	0.002	0.000	0.000	0.000
	N	11	11	11	11	11	11
WINTHROP	B.T. mean	0.004	0.000	0.163	0.005	0.001	0.000
	B.T. (mean-sd)	<0	0.000	0.021	<0	<0	0.000
	B.T. (mean+sd)	0.029	0.000	0.401	0.089	0.020	0.000
	N	12	12	12	12	12	12

Table 4. Percent cover on horizontal substrata, summer 1992.

		Brown algae-c	Anomia	Halocynthia	Orange Encr. Sponge	Dead Coralline
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	<0	<0	0.000
	B.T. (mean+sd)	0.001	0.000	0.001	0.001	0.000
	N	12	12	12	12	12
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.000	0.001
	B.T. (mean-sd)	0.000	<0	0.000	0.000	<0
	B.T. (mean+sd)	0.000	0.001	0.000	0.000	0.004
	N	12	12	12	12	12
SHAGS	B.T. mean	0.000	0.001	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	0.000	<0
	B.T. (mean+sd)	0.000	0.008	0.000	0.000	0.002
	N	11	11	11	11	11
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.001	0.000	0.000	0.000
	N	12	12	12	12	12

Table 5. Percent cover on vertical substrata, summer 1992.

		Metridium-s	Metridium-c	Hydroids-s	Hydroids-c	Balanus	Aplidium
DEER ISLAND	B.T. mean	0.000	0.000	0.001	0.000	0.004	0.022
	B.T. (mean-sd)	<0	<0	<0	<0	<0	0.001
	B.T. (mean+sd)	0.002	0.001	0.008	0.001	0.016	0.071
	N	13	13	13	13	13	13
FLIP	B.T. mean	0.120	0.001	0.006	0.001	0.005	0.001
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.465	0.006	0.044	0.010	0.022	0.008
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.037	0.004	0.005	0.002	0.000	0.002
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.238	0.046	0.034	0.019	0.001	0.018
	N	14	14	14	14	14	14
WINTHROP	B.T. mean	0.000	0.000	0.001	0.000	0.077	0.002
	B.T. (mean-sd)	<0	0.000	<0	<0	0.032	<0
	B.T. (mean+sd)	0.004	0.000	0.006	0.003	0.139	0.012
	N	14	14	14	14	14	14

Table 5. Percent cover on vertical substrata, summer 1992.

		Didemnum	Dendrodoa	Molgula	Halichondria	Halisarca	Isodictya
DEER ISLAND	B.T. mean	0.009	0.023	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.003	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.052	0.062	0.000	0.000	0.000	0.000
	N	13	13	13	13	13	13
FLIP	B.T. mean	0.000	0.001	0.000	0.013	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.006	0.000	0.057	0.001	0.000
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.000	0.006	0.000	0.000	0.000	0.001
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.003	0.026	0.001	0.003	0.005	0.011
	N	14	14	14	14	14	14
WINTHROP	B.T. mean	0.000	0.013	0.000	0.001	0.000	0.000
	B.T. (mean-sd)	<0	<0	0.000	<0	0.000	0.000
	B.T. (mean+sd)	0.002	0.059	0.000	0.009	0.000	0.000
	N	14	14	14	14	14	14

Table 5. Percent cover on vertical substrata, summer 1992.

		Encrusting Bryo	Erect Bryo-s	Erect Bryo-c	Tube Complex	Thick sediment
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000	0.293
	B.T. (mean-sd)	<0	0.000	0.000	0.000	0.166
	B.T. (mean+sd)	0.001	0.000	0.000	0.000	0.440
	N	13	13	13	13	13
FLIP	B.T. mean	0.000	0.000	0.000	0.000	0.016
	B.T. (mean-sd)	0.000	<0	<0	<0	<0
	B.T. (mean+sd)	0.000	0.004	0.004	0.001	0.092
	N	12	12	12	12	12
SHAGS	B.T. mean	0.000	0.002	0.002	0.004	0.044
	B.T. (mean-sd)	<0	<0	<0	<0	0.004
	B.T. (mean+sd)	0.001	0.009	0.009	0.064	0.127
	N	14	14	14	14	14
WINTHROP	B.T. mean	0.000	0.001	0.000	0.000	0.279
	B.T. (mean-sd)	0.000	<0	<0	0.000	0.124
	B.T. (mean+sd)	0.000	0.004	0.003	0.000	0.466
	N	14	14	14	14	14

Table 5. Percent cover on vertical substrata, summer 1992.

		Hyd/Bryo complex	Peyssonnella	Lithothamnion	Phymatolithon	Bare space
DEER ISLAND	B.T. mean	0.006	0.043	0.044	0.053	0.000
	B.T. (mean-sd)	<0	<0	<0	0.001	<0
	B.T. (mean+sd)	0.046	0.200	0.177	0.179	0.004
	N	13	13	13	13	13
FLIP	B.T. mean	0.008	0.043	0.275	0.127	0.040
	B.T. (mean-sd)	<0	<0	0.088	0.001	0.002
	B.T. (mean+sd)	0.030	0.170	0.518	0.419	0.122
	N	12	12	12	12	12
SHAGS	B.T. mean	0.009	0.037	0.344	0.120	0.031
	B.T. (mean-sd)	<0	0.001	0.078	0.009	0.002
	B.T. (mean+sd)	0.063	0.126	0.681	0.329	0.091
	N	14	14	14	14	14
WINTHROP	B.T. mean	0.029	0.120	0.104	0.068	0.012
	B.T. (mean-sd)	<0	0.016	0.014	0.004	<0
	B.T. (mean+sd)	0.119	0.298	0.265	0.197	0.062
	N	14	14	14	14	14

Table 5. Percent cover on vertical substrata, summer 1992.

		Spirorbis	Modiolus	Red algae-s	Red algae-c	Brown algae-s	Brown algae-c
DEER ISLAND	B.T. mean	0.000	0.009	0.173	0.008	0.000	0.002
	B.T. (mean-sd)	0.000	<0	0.007	<0	<0	<0
	B.T. (mean+sd)	0.000	0.069	0.488	0.033	0.004	0.015
	N	13	13	13	13	13	13
FLIP	B.T. mean	0.001	0.001	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	0.000	0.000	<0	<0
	B.T. (mean+sd)	0.007	0.008	0.000	0.000	0.001	0.001
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.001	0.006	0.002	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.007	0.075	0.020	0.000	0.000	0.000
	N	14	14	14	14	14	14
WINTHROP	B.T. mean	0.000	0.042	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.001	<0	<0	0.000	0.000
	B.T. (mean+sd)	0.002	0.135	0.001	0.001	0.000	0.000
	N	14	14	14	14	14	14

Table 5. Percent cover on vertical substrata, summer 1992.

		Anomia	Halocynthia	Orange Encr Sponge	Purple Encr Sponge
DEER ISLAND	B.T. mean	0.000	0.000	0.011	0.000
	B.T. (mean-sd)	0.000	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.001	0.065	0.000
	N	13	13	13	13
FLIP	B.T. mean	0.001	0.001	0.000	0.000
	B.T. (mean-sd)	<0	<0	0.000	0.000
	B.T. (mean+sd)	0.010	0.014	0.000	0.000
	N	12	12	12	12
SHAGS	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	<0
	B.T. (mean+sd)	0.003	0.000	0.000	0.001
	N	14	14	14	14
WINTHROP	B.T. mean	0.001	0.000	0.006	0.000
	B.T. (mean-sd)	<0	0.000	<0	0.000
	B.T. (mean+sd)	0.008	0.000	0.055	0.000
	N	14	14	14	14

Table 5. Percent cover on vertical substrata, summer 1992.

		Styela Sponge	Dead Coralline	Coralline sp.	Crepidula
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.003	0.000
	N	13	13	13	13
FLIP	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	<0
	B.T. (mean+sd)	0.000	0.001	0.000	0.001
	N	12	12	12	12
SHAGS	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	0.000
	B.T. (mean+sd)	0.000	0.001	0.000	0.000
	N	14	14	14	14
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	<0
	B.T. (mean+sd)	0.001	0.000	0.000	0.001
	N	14	14	14	14

Table 6. Abundance of large mobile fauna, summer 1992.

		Buccinum	Cancer borealis	C. irroratus	Homarus	Hyas
CAN 5	B.T. mean (#/25m2)	0.000	4.366	9.005	1.080	0.000
	B.T. (mean-sd)	0.000	1.720	2.719	0.109	0.000
	B.T. (mean+sd)	0.000	8.036	18.611	2.505	0.000
	N	4	4	4	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.000	0.613	13.831	4.936	0.000
	B.T. (mean-sd)	0.000	-0.106	8.733	3.664	0.000
	B.T. (mean+sd)	0.000	1.697	20.047	6.379	0.000
	N	4	4	4	4	4
FLIP ROCK	B.T. mean (#/25m2)	0.000	2.059	1.241	2.179	0.200
	B.T. (mean-sd)	0.000	0.193	0.036	1.269	-0.166
	B.T. (mean+sd)	0.000	5.101	3.137	3.278	0.700
	N	4	4	4	4	4
SHAGS	B.T. mean (#/25m2)	0.000	0.433	0.496	2.669	0.000
	B.T. (mean-sd)	0.000	-0.055	-0.327	0.744	0.000
	B.T. (mean+sd)	0.000	1.100	1.996	5.477	0.000
	N	4	4	4	4	4
WINTHROP	B.T. mean (#/25m2)	0.200	2.841	4.119	3.445	0.000
	B.T. (mean-sd)	-0.166	1.371	2.500	2.445	0.000
	B.T. (mean+sd)	0.700	4.735	6.087	4.591	0.000
	N	4	4	4	4	4

Table 6. Abundance of large mobile fauna, summer 1992.

		Lophopsetta maculata	Myoxocephalus aenaeus	M. octodecemspinosus
CAN 5	B.T. mean (#/25m2)	0.000	0.433	0.000
	B.T. (mean-sd)	0.000	-0.055	0.000
	B.T. (mean+sd)	0.000	1.100	0.000
	N	4	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.000	0.000	1.312
	B.T. (mean-sd)	0.000	0.000	0.214
	B.T. (mean+sd)	0.000	0.000	2.912
	N	4	4	4
FLIP ROCK	B.T. mean (#/25m2)	0.000	0.433	0.000
	B.T. (mean-sd)	0.000	-0.055	0.000
	B.T. (mean+sd)	0.000	1.100	0.000
	N	4	4	4
SHAGS	B.T. mean (#/25m2)	0.200	0.000	0.000
	B.T. (mean-sd)	-0.166	0.000	0.000
	B.T. (mean+sd)	0.700	0.000	0.000
	N	4	4	4
WINTHROP	B.T. mean (#/25m2)	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000
	N	4	4	4

Table 6. Abundance of large mobile fauna, summer 1992.

		M. scorpius	Pagurus	Pholis gunnellus
CAN 5	B.T. mean (#/25m2)	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000
	N	4	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.000	0.000	1.468
	B.T. (mean-sd)	0.000	0.000	0.933
	B.T. (mean+sd)	0.000	0.000	2.088
	N	4	4	4
FLIP ROCK	B.T. mean (#/25m2)	0.000	0.200	0.903
	B.T. (mean-sd)	0.000	-0.166	0.180
	B.T. (mean+sd)	0.000	0.700	1.885
	N	4	4	4
SHAGS	B.T. mean (#/25m2)	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000
	N	4	4	4
WINTHROP	B.T. mean (#/25m2)	0.613	0.000	0.200
	B.T. (mean-sd)	-0.106	0.000	-0.166
	B.T. (mean+sd)	1.697	0.000	0.700
	N	4	4	4

Table 6. Abundance of large mobile fauna, summer 1992.

		Pseudopleuronectes americanus	P. americanus (juv.)
CAN 5	B.T. mean (#/25m2)	0.357	0.000
	B.T. (mean-sd)	-0.261	0.000
	B.T. (mean+sd)	1.357	0.000
	N	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.200	0.000
	B.T. (mean-sd)	-0.166	0.000
	B.T. (mean+sd)	0.700	0.000
	N	4	4
FLIP ROCK	B.T. mean (#/25m2)	0.000	0.200
	B.T. (mean-sd)	0.000	-0.166
	B.T. (mean+sd)	0.000	0.700
	N	4	4
SHAGS	B.T. mean (#/25m2)	0.357	0.000
	B.T. (mean-sd)	-0.261	0.000
	B.T. (mean+sd)	1.357	0.000
	N	4	4
WINTHROP	B.T. mean (#/25m2)	0.000	0.000
	B.T. (mean-sd)	0.000	0.000
	B.T. (mean+sd)	0.000	0.000
	N	4	4

Table 6. Abundance of large mobile fauna, summer 1992.

		Tautogolabrus adspersus	T. adspersus (juv.)	Ulvaria subbifurcata
CAN 5	B.T. mean (#/25m2)	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000
	N	4	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000
	N	4	4	4
FLIP ROCK	B.T. mean (#/25m2)	0.916	0.000	0.903
	B.T. (mean-sd)	-0.226	0.000	0.180
	B.T. (mean+sd)	2.949	0.000	1.885
	N	4	4	4
SHAGS	B.T. mean (#/25m2)	0.000	0.200	0.200
	B.T. (mean-sd)	0.000	-0.166	-0.166
	B.T. (mean+sd)	0.000	0.700	0.700
	N	4	4	4
WINTHROP	B.T. mean (#/25m2)	0.613	0.000	0.000
	B.T. (mean-sd)	-0.106	0.000	0.000
	B.T. (mean+sd)	1.697	0.000	0.000
	N	4	4	4

Table 7. Abundance of small mobile fauna on cobble substrata, summer 1992.

		Acmaea	Asterias vulgaris	Asterias/Leptasterias juvs.	Buccinum
CAN 5	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000
	N	35	35	35	35
DEER ISLAND	B.T. mean	0.000	0.216	0.076	0.000
	B.T. (mean-sd)	0.000	-0.207	-0.146	0.000
	B.T. (mean+sd)	0.000	0.826	0.351	0.000
	N	10	10	10	10
FLIP ROCK	B.T. mean	0.110	0.110	0.110	0.000
	B.T. (mean-sd)	-0.157	-0.157	-0.157	0.000
	B.T. (mean+sd)	0.454	0.454	0.454	0.000
	N	7	7	7	7
SHAGS	B.T. mean	0.000	0.063	0.063	0.000
	B.T. (mean-sd)	0.000	-0.139	-0.139	0.000
	B.T. (mean+sd)	0.000	0.309	0.309	0.000
	N	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.063
	B.T. (mean-sd)	0.000	0.000	0.000	-0.139
	B.T. (mean+sd)	0.000	0.000	0.000	0.309
	N	12	12	12	12

Table 7. Abundance of small mobile fauna on cobble substrata, summer 1992.

		Cancer borealis	C. irroratus	Cancer sp.	Henricia	Homarus	Ischnochiton
CAN 5	B.T. mean	0.174	0.087	0.021	0.021	0.065	0.000
	B.T. (mean-sd)	-0.160	-0.141	-0.098	-0.098	-0.135	0.000
	B.T. (mean+sd)	0.620	0.371	0.155	0.155	0.307	0.000
	N	35	35	35	35	35	35
DEER ISLAND	B.T. mean	0.000	0.076	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	-0.146	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.351	0.000	0.000	0.000	0.000
	N	10	10	10	10	10	10
FLIP ROCK	B.T. mean	0.000	0.000	0.000	0.110	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	-0.157	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.454	0.000	0.000
	N	7	7	7	7	7	7
SHAGS	B.T. mean	0.000	0.000	0.000	0.200	0.063	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	-0.137	-0.139	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.646	0.309	0.000
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.063	0.063	0.000	0.428	0.063	0.269
	B.T. (mean-sd)	-0.139	-0.139	0.000	-0.196	-0.139	-0.274
	B.T. (mean+sd)	0.309	0.309	0.000	1.391	0.309	1.134
	N	12	12	12	12	12	12

Table 7. Abundance of small mobile fauna on cobble substrata, summer 1992.

		Myoxocephalus scorpius	Stronglyocentrotus	Stronglyocentrotus juvs.
CAN 5	B.T. mean	0.021	0.000	0.000
	B.T. (mean-sd)	-0.098	0.000	0.000
	B.T. (mean+sd)	0.155	0.000	0.000
	N	35	35	35
DEER ISLAND	B.T. mean	0.000	0.969	0.000
	B.T. (mean-sd)	0.000	-0.360	0.000
	B.T. (mean+sd)	0.000	3.700	0.000
	N	10	10	10
FLIP ROCK	B.T. mean	0.000	5.705	2.437
	B.T. (mean-sd)	0.000	1.093	0.149
	B.T. (mean+sd)	0.000	13.339	6.372
	N	7	7	7
SHAGS	B.T. mean	0.000	0.730	0.000
	B.T. (mean-sd)	0.000	-0.068	0.000
	B.T. (mean+sd)	0.000	1.936	0.000
	N	12	12	12
WINTHROP	B.T. mean	0.000	0.000	7.634
	B.T. (mean-sd)	0.000	0.000	3.216
	B.T. (mean+sd)	0.000	0.000	13.760
	N	12	12	12

Table 8. Abundance of small mobile fauna on horizontal substrata, summer 1992.

		Acmaea	Asterias vulgaris	Asterias/Leptasterias juv.	Cancer borealis
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000
	N	12	12	12	12
FLIP ROCK	B.T. mean	0.933	0.129	0.000	0.063
	B.T. (mean-sd)	-0.021	-0.150	0.000	-0.139
	B.T. (mean+sd)	2.397	0.490	0.000	0.309
	N	12	12	12	12
SHAGS	B.T. mean	0.717	0.000	0.250	0.000
	B.T. (mean-sd)	-0.350	0.000	-0.237	0.000
	B.T. (mean+sd)	2.806	0.000	0.987	0.000
	N	11	11	11	11
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000
	N	12	12	12	12

Table 8. Abundance of small mobile fauna on horizontal substrata, summer 1992.

		C. irroratus	Henricia	Ischnochiton	Leptasterias	Polychaete	Strongylocentrotus
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.373
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000	-0.414
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000	1.983
	N	12	12	12	12	12	12
FLIP ROCK	B.T. mean	0.000	0.000	0.200	0.063	0.063	32.973
	B.T. (mean-sd)	0.000	0.000	-0.137	-0.139	-0.139	13.112
	B.T. (mean+sd)	0.000	0.000	0.646	0.309	0.309	61.620
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.000	0.069	0.000	0.000	0.000	1.933
	B.T. (mean-sd)	0.000	-0.142	0.000	0.000	0.000	0.259
	B.T. (mean+sd)	0.000	0.329	0.000	0.000	0.000	4.554
	N	11	11	11	11	11	11
WINTHROP	B.T. mean	0.063	2.754	0.129	0.000	0.000	3.838
	B.T. (mean-sd)	-0.139	0.642	-0.150	0.000	0.000	0.094
	B.T. (mean+sd)	0.309	5.948	0.490	0.000	0.000	11.027
	N	12	12	12	12	12	12

Table 8. Abundance of small mobile fauna on horizontal substrata, summer 1992.

		Stronglyocentrotus (juv.)
DEER ISLAND	B.T. mean	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd)	0.000
	N	12
FLIP ROCK	B.T. mean	13.492
	B.T. (mean-sd)	0.772
	B.T. (mean+sd)	39.866
	N	12
SHAGS	B.T. mean	0.349
	B.T. (mean-sd)	-0.370
	B.T. (mean+sd)	1.701
	N	11
WINTHROP	B.T. mean	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd)	0.000
	N	12

Table 9. Abundance of small mobile fauna on vertical rock substrata, summer 1992.

		Acmaea	Asterias vulgaris	Asterias sp.	Asterias/Leptasterias juv.
DEER ISLAND	B.T. mean	0.163	0.058	0.000	0.119
	B.T. (mean-sd)	-0.205	-0.136	0.000	-0.149
	B.T. (mean+sd)	0.678	0.293	0.000	0.463
	N	13	13	13	13
FLIP ROCK	B.T. mean	0.000	0.327	0.000	0.534
	B.T. (mean-sd)	0.000	-0.144	0.000	-0.441
	B.T. (mean+sd)	0.000	0.994	0.000	2.707
	N	12	12	12	12
SHAGS	B.T. mean	0.214	0.000	0.660	1.697
	B.T. (mean-sd)	-0.295	0.000	-0.121	0.123
	B.T. (mean+sd)	1.031	0.000	1.865	4.232
	N	14	14	14	14
WINTHROP	B.T. mean	0.054	0.054	0.000	0.211
	B.T. (mean-sd)	-0.133	-0.133	0.000	-0.186
	B.T. (mean+sd)	0.279	0.279	0.000	0.768
	N	14	14	14	14

Table 9. Abundance of small mobile fauna on vertical rock substrata, summer 1992.

Cancer borealis	C. irroratus	Cancer sp.	Carcinus maenus	Henricia	Homarus	Ischnochiton
0.058	0.119	0.000	0.000	0.480	0.058	0.470
-0.136	-0.149	0.000	0.000	-0.239	-0.136	-0.255
0.293	0.463	0.000	0.000	1.659	0.293	1.677
13	13	13	13	13	13	13
0.000	0.000	0.000	0.000	0.250	0.000	0.250
0.000	0.000	0.000	0.000	-0.180	0.000	-0.180
0.000	0.000	0.000	0.000	0.862	0.000	0.862
12	12	12	12	12	12	12
0.000	0.000	0.000	0.000	0.824	0.000	0.504
0.000	0.000	0.000	0.000	-0.382	0.000	-0.223
0.000	0.000	0.000	0.000	3.332	0.000	1.683
14	14	14	14	14	14	14
0.000	0.000	0.054	0.054	1.881	0.000	0.275
0.000	0.000	-0.133	-0.133	0.183	0.000	-0.160
0.000	0.000	0.279	0.279	4.605	0.000	0.887
14	14	14	14	14	14	14

Table 9. Abundance of small mobile fauna on vertical rock substrata, summer 1992.

		Stonglyocentrotus	Stonglyocentrotus (juv.)
DEER ISLAND	B.T. mean	1.164	0.000
	B.T. (mean-sd)	-0.413	0.000
	B.T. (mean+sd)	4.719	0.000
	N	13	13
FLIP ROCK	B.T. mean	5.770	31.173
	B.T. (mean-sd)	3.924	-0.449
	B.T. (mean+sd)	7.936	121.145
	N	12	12
SHAGS	B.T. mean	1.010	0.000
	B.T. (mean-sd)	-0.119	0.000
	B.T. (mean+sd)	2.887	0.000
	N	14	14
WINTHROP	B.T. mean	3.880	0.000
	B.T. (mean-sd)	0.359	0.000
	B.T. (mean+sd)	10.121	0.000
	N	14	14

Table 10. Percent cover on cobble substrata, winter 1993

		Metridium-s	Metridium-c	Hydroids-s	Hydroids-c	Balanus	Aplidium
CAN 5	B.T. mean	0.000	0.000	0.000	0.000	0.002	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.011	0.000
	N	12	12	12	12	12	12
DEER ISLAND	B.T. mean	0.002	0.002	0.000	0.000	0.000	0.002
	B.T. (mean-sd)	<0	<0	0.000	0.000	<0	<0
	B.T. (mean+sd)	0.008	0.007	0.000	0.000	0.002	0.018
	N	12	12	12	12	12	12
FLIP	B.T. mean	0.000	0.000	0.005	0.001	0.002	0.000
	B.T. (mean-sd)	0.000	0.000	<0	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.027	0.004	0.010	0.000
	N	11	11	11	11	11	11
SHAGS	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.002	0.002	0.003	0.002	0.002	0.006
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.005	0.000
	B.T. (mean-sd)	<0	0.000	<0	<0	0.000	0.000
	B.T. (mean+sd)	0.002	0.000	0.001	0.001	0.021	0.000
	N	13	13	13	13	13	13

Table 10. Percent cover on cobble substrata, winter 1993

		Dendrodoa	Halichondria	Isodictya	Erect Bryo-s	Erect Bryo-c
CAN 5	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12
DEER ISLAND	B.T. mean	0.001	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.007	0.003	0.000	0.000	0.000
	N	12	12	12	12	12
FLIP	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.003	0.000	0.000	0.001	0.000
	N	11	11	11	11	11
SHAGS	B.T. mean	0.001	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.004	0.001	0.002	0.002	0.001
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.001	0.000	0.000	0.000	0.000
	N	13	13	13	13	13

Table 10. Percent cover on cobble substrata, winter 1993

		Tube Complex	Thick sediment	Hyd/Bryo complex	Peyssonnelia
CAN 5	B.T. mean	0.000	0.402	0.007	0.002
	B.T. (mean-sd)	0.000	0.131	<0	<0
	B.T. (mean+sd)	0.000	0.710	0.028	0.009
	N	12	12	12	12
DEER ISLAND	B.T. mean	0.000	0.116	0.000	0.096
	B.T. (mean-sd)	0.000	0.041	<0	0.041
	B.T. (mean+sd)	0.000	0.223	0.004	0.171
	N	12	12	12	12
FLIP	B.T. mean	0.000	0.102	0.131	0.033
	B.T. (mean-sd)	<0	0.021	0.035	0.004
	B.T. (mean+sd)	0.003	0.232	0.274	0.088
	N	11	11	11	11
SHAGS	B.T. mean	0.000	0.020	0.002	0.006
	B.T. (mean-sd)	0.000	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.110	0.014	0.021
	N	12	12	12	12
WINTHROP	B.T. mean	0.000	0.048	0.001	0.080
	B.T. (mean-sd)	0.000	0.005	<0	0.016
	B.T. (mean+sd)	0.000	0.132	0.007	0.187
	N	13	13	13	13

Table 10. Percent cover on cobble substrata, winter 1993

		Lithothamnion	Phymatolithon	Bare space	Spirorbis	Modiolus
CAN 5	B.T. mean	0.000	0.004	0.557	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.268	<0	<0
	B.T. (mean+sd)	0.000	0.017	0.826	0.005	0.001
	N	12	12	12	12	12
DEER ISLAND	B.T. mean	0.031	0.202	0.343	0.000	0.015
	B.T. (mean-sd)	0.005	0.112	0.141	0.000	<0
	B.T. (mean+sd)	0.077	0.309	0.582	0.000	0.065
	N	12	12	12	12	12
FLIP	B.T. mean	0.215	0.064	0.092	0.001	0.166
	B.T. (mean-sd)	0.125	0.004	0.017	<0	0.016
	B.T. (mean+sd)	0.322	0.191	0.220	0.005	0.428
	N	11	11	11	11	11
SHAGS	B.T. mean	0.349	0.278	0.224	0.000	0.017
	B.T. (mean-sd)	0.207	0.117	0.163	<0	<0
	B.T. (mean+sd)	0.505	0.477	0.292	0.001	0.087
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.051	0.149	0.497	0.003	0.050
	B.T. (mean-sd)	0.006	0.045	0.210	<0	0.002
	B.T. (mean+sd)	0.139	0.299	0.785	0.023	0.157
	N	13	13	13	13	13

Table 10. Percent cover on cobble substrata, winter 1993

		Red algae-s	Red algae-c	Brown algae-s	Brown algae-c	Anomia
CAN 5	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12
DEER ISLAND	B.T. mean	0.057	0.000	0.001	0.001	0.000
	B.T. (mean-sd)	0.000	<0	<0	<0	<0
	B.T. (mean+sd)	0.203	0.002	0.006	0.008	0.001
	N	12	12	12	12	12
FLIP	B.T. mean	0.001	0.000	0.001	0.000	0.000
	B.T. (mean-sd)	<0	0.000	<0	<0	0.000
	B.T. (mean+sd)	0.009	0.000	0.009	0.007	0.000
	N	11	11	11	11	11
SHAGS	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.001	0.000
	B.T. (mean-sd)	0.000	0.000	<0	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.001	0.017	0.000
	N	13	13	13	13	13

Table 10. Percent cover on cobble substrata, winter 1993

		Orange Encr Sponge	Dead coralline	Crepidula	Gravel (100)
CAN 5	B.T. mean	0.000	0.000	0.000	0.143
	B.T. (mean-sd)	0.000	0.000	0.000	0.064
	B.T. (mean+sd)	0.000	0.000	0.000	0.248
	N	12	12	12	12
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.173
	B.T. (mean-sd)	<0	0.000	0.000	0.078
	B.T. (mean+sd)	0.003	0.000	0.000	0.296
	N	12	12	12	12
FLIP	B.T. mean	0.000	0.000	0.000	0.038
	B.T. (mean-sd)	0.000	0.000	<0	0.011
	B.T. (mean+sd)	0.000	0.000	0.003	0.080
	N	11	11	11	11
SHAGS	B.T. mean	0.000	0.000	0.000	0.194
	B.T. (mean-sd)	<0	0.000	0.000	0.114
	B.T. (mean+sd)	0.002	0.000	0.000	0.288
	N	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.482
	B.T. (mean-sd)	0.000	<0	0.000	0.272
	B.T. (mean+sd)	0.000	0.001	0.000	0.695
	N	13	13	13	13

Table 11. Percent cover on horizontal substrata, winter 1993.

		Hydroids-s	Hydroids-c	Balanus	Aplidium	Didemnum	Dendrodoa
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.171	0.002	0.004
	B.T. (mean-sd)	0.000	0.000	0.000	0.087	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.276	0.023	0.013
	N	12	12	12	12	12	12
FLIP	B.T. mean	0.000	0.000	0.007	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	0.000	0.000	<0
	B.T. (mean+sd)	0.003	0.002	0.054	0.000	0.000	0.001
	N	11	11	11	11	11	11
SHAGS	B.T. mean	0.000	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000	<0
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000	0.002
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.016	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.003	<0	0.000	<0
	B.T. (mean+sd)	0.005	0.000	0.039	0.002	0.000	0.003
	N	12	12	12	12	12	12

Table 11. Percent cover on horizontal substrata, winter 1993.

		Halichondria	Thick sediment	Hyd/Bryo complex	Peyssonnelia	Lithothamnion
DEER ISLAND	B.T. mean	0.000	0.124	0.001	0.004	0.012
	B.T. (mean-sd)	0.000	0.025	<0	<0	<0
	B.T. (mean+sd)	0.000	0.283	0.006	0.049	0.046
	N	12	12	12	12	12
FLIP	B.T. mean	0.000	0.027	0.000	0.111	0.512
	B.T. (mean-sd)	0.000	0.005	<0	0.029	0.327
	B.T. (mean+sd)	0.000	0.067	0.003	0.235	0.697
	N	11	11	11	11	11
SHAGS	B.T. mean	0.002	0.000	0.000	0.016	0.651
	B.T. (mean-sd)	<0	0.000	0.000	0.001	0.482
	B.T. (mean+sd)	0.019	0.000	0.000	0.050	0.803
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.038	0.001	0.321	0.127
	B.T. (mean-sd)	0.000	<0	<0	0.211	0.076
	B.T. (mean+sd)	0.000	0.150	0.008	0.442	0.189
	N	12	12	12	12	12

Table 11. Percent cover on horizontal substrata, winter 1993.

		Phymatolithon	Bare space	Spirorbis	Modiolus	Red algae-s	Red algae-c
DEER ISLAND	B.T. mean	0.049	0.000	0.000	0.000	0.531	0.043
	B.T. (mean-sd)	0.007	<0	0.000	<0	0.408	0.005
	B.T. (mean+sd)	0.127	0.001	0.000	0.001	0.651	0.118
	N	12	12	12	12	12	12
FLIP	B.T. mean	0.183	0.080	0.007	0.000	0.000	0.000
	B.T. (mean-sd)	0.085	0.040	0.001	0.000	0.000	0.000
	B.T. (mean+sd)	0.309	0.133	0.019	0.000	0.000	0.000
	N	11	11	11	11	11	11
SHAGS	B.T. mean	0.275	0.022	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.170	0.001	<0	<0	0.000	0.000
	B.T. (mean+sd)	0.394	0.066	0.002	0.010	0.000	0.000
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.122	0.224	0.003	0.010	0.001	0.000
	B.T. (mean-sd)	0.055	0.086	<0	<0	<0	0.000
	B.T. (mean+sd)	0.212	0.403	0.060	0.042	0.008	0.000
	N	12	12	12	12	12	12

Table 11. Percent cover on horizontal substrata, winter 1993.

		Brown algae-s	Brown algae-c	Anomia	Crepidula	Dead coralline
DEER ISLAND	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12
FLIP	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	<0	<0
	B.T. (mean+sd)	0.000	0.000	0.000	0.002	0.005
	N	11	11	11	11	11
SHAGS	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000	0.000
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.001	0.001	0.001	0.000	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	0.000
	B.T. (mean+sd)	0.003	0.014	0.003	0.003	0.000
	N	12	12	12	12	12

Table 11. Percent cover on horizontal substrata, winter 1993.

		Halocynthia
DEER ISLAND	B.T. mean	0.000
	B.T. (mean-sd)	<0
	B.T. (mean+sd)	0.002
	N	12
FLIP	B.T. mean	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd)	0.000
	N	11
SHAGS	B.T. mean	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd)	0.000
	N	12
WINTHROP	B.T. mean	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd)	0.000
	N	12

Table 12. Percent cover on vertical substrata, winter 1993.

		Metridium-s	Metridium-c	Hydroids-s	Hydroids-c	Balanus	Aplidium
DEER ISLAND	B.T. mean	0.000	0.000	0.001	0.005	0.001	0.025
	B.T. (mean-sd)	0.000	0.000	<0	<0	<0	<0
	B.T. (mean+sd)	0.000	0.000	0.005	0.004	0.005	0.129
	N	11	11	11	11	11	11
FLIP	B.T. mean	0.005	0.000	0.009	0.003	0.004	0.000
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.028	0.001	0.051	0.021	0.021	0.002
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.028	0.002	0.000	0.000	0.003	0.001
	B.T. (mean-sd)	<0	<0	<0	<0	<0	<0
	B.T. (mean+sd)	0.190	0.016	0.005	0.002	0.011	0.006
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.001	0.001	0.000	0.000	0.040	0.004
	B.T. (mean-sd)	<0	<0	<0	<0	0.015	<0
	B.T. (mean+sd)	0.020	0.010	0.001	0.004	0.076	0.036
	N	10	10	10	10	10	10

Table 12. Percent cover on vertical substrata, winter 1993.

		Didemnum	Dendrodoa	Halichondria	Hallsarca	Isodictya	Encrusting Bryo
DEER ISLAND	B.T. mean	0.010	0.012	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	<0	0.000	<0
	B.T. (mean+sd)	0.055	0.043	0.000	0.003	0.000	0.004
	N	11	11	11	11	11	11
FLIP	B.T. mean	0.000	0.001	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	<0	<0	<0
	B.T. (mean+sd)	0.000	0.010	0.000	0.002	0.001	0.001
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.001	0.000	0.000	0.000	0.000	0.001
	B.T. (mean-sd)	<0	<0	<0	0.000	0.000	<0
	B.T. (mean+sd)	0.010	0.004	0.002	0.000	0.000	0.012
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.001	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.005	0.000	0.000	0.000	0.000
	N	10	10	10	10	10	10

Table 12. Percent cover on vertical substrata, winter 1993.

		Erect Bryo-s	Erect Bryo-c	Thick sediment	Hyd/Bryo complex	Peyssonnella
DEER ISLAND	B.T. mean	0.000	0.000	0.080	0.013	0.000
	B.T. (mean-sd)	0.000	0.000	0.022	<0	<0
	B.T. (mean+sd)	0.000	0.000	0.170	0.081	0.002
	N	11	11	11	11	11
FLIP	B.T. mean	0.000	0.000	0.188	0.025	0.281
	B.T. (mean-sd)	<0	0.000	0.067	0.001	0.110
	B.T. (mean+sd)	0.002	0.000	0.353	0.084	0.494
	N	12	12	12	12	12
SHAGS	B.T. mean	0.001	0.001	0.034	0.020	0.032
	B.T. (mean-sd)	<0	<0	0.000	<0	0.003
	B.T. (mean+sd)	0.008	0.004	0.122	0.114	0.089
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.138	0.020	0.259
	B.T. (mean-sd)	0.000	0.000	0.012	0.001	0.108
	B.T. (mean+sd)	0.000	0.000	0.366	0.062	0.448
	N	10	10	10	10	10

Table 12. Percent cover on vertical substrata, winter 1993.

		Lithothamnion	Phymatolithon	Bare space	Spirorbis	Modiolus	Red algae-s
DEER ISLAND	B.T. mean	0.025	0.185	0.000	0.000	0.001	0.459
	B.T. (mean-sd)	<0	0.029	<0	0.000	<0	0.205
	B.T. (mean+sd)	0.138	0.433	0.003	0.000	0.010	0.725
	N	11	11	11	11	11	11
FLIP	B.T. mean	0.099	0.099	0.110	0.029	0.000	0.000
	B.T. (mean-sd)	0.034	0.019	0.035	0.009	0.000	<0
	B.T. (mean+sd)	0.193	0.232	0.221	0.061	0.000	0.007
	N	12	12	12	12	12	12
SHAGS	B.T. mean	0.347	0.155	0.018	0.001	0.007	0.000
	B.T. (mean-sd)	0.092	0.011	0.002	<0	<0	0.000
	B.T. (mean+sd)	0.664	0.416	0.052	0.006	0.109	0.000
	N	12	12	12	12	12	12
WINTHROP	B.T. mean	0.081	0.164	0.109	0.000	0.013	0.001
	B.T. (mean-sd)	0.017	0.052	0.034	0.000	<0	<0
	B.T. (mean+sd)	0.186	0.322	0.218	0.000	0.051	0.008
	N	10	10	10	10	10	10

Table 12. Percent cover on vertical substrata, winter 1993.

		Red algae-c	Anomia	Dead coralline	Halocynthia	Buccinum egg case-c
DEER ISLAND	B.T. mean	0.012	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	0.000	0.000	0.000	<0
	B.T. (mean+sd)	0.071	0.000	0.000	0.000	0.006
	N	11	11	11	11	11
FLIP	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	<0	<0	0.000	0.000	0.000
	B.T. (mean+sd)	0.001	0.002	0.000	0.000	0.000
	N	12	12	12	12	12
SHAGS	B.T. mean	0.000	0.000	0.000	0.017	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	<0	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.103	0.000
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	<0	<0	0.000	0.000
	B.T. (mean+sd)	0.000	0.002	0.003	0.000	0.000
	N	10	10	10	10	10

Table 13. Abundance of large mobile fauna, winter 1993.

		Buccinum	Cancer borealis	C. irroratus	Homarus	H. americanus juv.
CAN 5	B.T. mean (#/25m2)	0.000	0.000	0.000	0.200	0.200
	B.T. (mean-sd)	0.000	0.000	0.000	-0.166	-0.166
	B.T. (mean+sd)	0.000	0.000	0.000	0.700	0.700
	N	4	4	4	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.000	1.080	0.000	0.433	0.000
	B.T. (mean-sd)	0.000	0.109	0.000	-0.055	0.000
	B.T. (mean+sd)	0.000	2.505	0.000	1.100	0.000
	N	4	4	4	4	4
FLIP	B.T. mean (#/25m2)	0.357	0.625	0.200	3.709	0.000
	B.T. (mean-sd)	-0.261	-0.375	-0.166	1.540	0.000
	B.T. (mean+sd)	1.357	2.625	0.700	6.654	0.000
	N	4	4	4	4	4
SHAGS	B.T. mean (#/25m2)	0.433	0.200	0.000	0.433	0.000
	B.T. (mean-sd)	-0.055	-0.166	0.000	-0.055	0.000
	B.T. (mean+sd)	1.100	0.700	0.000	1.100	0.000
	N	4	4	4	4	4
WINTHROP	B.T. mean (#/25m2)	1.965	1.122	0.000	0.496	0.000
	B.T. (mean-sd)	0.410	0.240	0.000	-0.327	0.000
	B.T. (mean+sd)	4.280	2.345	0.000	1.996	0.000
	N	4	4	4	4	4

Table 13. Abundance of large mobile fauna, winter 1993.

		Hyas	Macrozoarces americanus
CAN 5	B.T. mean (#/25m2)	0.000	0.000
	B.T. (mean-sd)	0.000	0.000
	B.T. (mean+sd)	0.000	0.000
	N	4	4
DEER ISLAND	B.T. mean (#/25m2)	0.000	0.000
	B.T. (mean-sd)	0.000	0.000
	B.T. (mean+sd)	0.000	0.000
	N	4	4
FLIP	B.T. mean (#/25m2)	0.200	0.200
	B.T. (mean-sd)	-0.166	-0.166
	B.T. (mean+sd)	0.700	0.700
	N	4	4
SHAGS	B.T. mean (#/25m2)	0.000	0.000
	B.T. (mean-sd)	0.000	0.000
	B.T. (mean+sd)	0.000	0.000
	N	4	4
WINTHROP	B.T. mean (#/25m2)	0.000	0.000
	B.T. (mean-sd)	0.000	0.000
	B.T. (mean+sd)	0.000	0.000
	N	4	4

Table 13. Abundance of small mobile fauna on cobble substrata, winter 1993.

		Acmaea	Asterias vulgaris	Asterias/Leptasterias juvs	Buccinum
CAN 5	B.T. mean	0.000	0.000	0.063	0.000
	B.T. (mean-sd)	0.000	0.000	-0.139	0.000
	B.T. (mean+sd)	0.000	0.000	0.309	0.000
	N	12	12	12	12
DEER ISLAND	B.T. mean	0.357	0.000	0.000	0.000
	B.T. (mean-sd)	-0.219	0.000	0.000	0.000
	B.T. (mean+sd)	1.245	0.000	0.000	0.000
	N	12	12	12	12
FLIP	B.T. mean	0.422	0.375	0.410	0.069
	B.T. (mean-sd)	-0.150	-0.340	-0.177	-0.142
	B.T. (mean+sd)	1.266	1.665	1.295	0.329
	N	11	11	11	11
SHAGS	B.T. mean	0.691	0.000	0.129	0.000
	B.T. (mean-sd)	-0.363	0.000	-0.150	0.000
	B.T. (mean+sd)	2.782	0.000	0.490	0.000
	N	12	12	12	12
WINTHROP	B.T. mean	0.000	0.058	0.229	0.119
	B.T. (mean-sd)	0.000	-0.136	-0.184	-0.149
	B.T. (mean+sd)	0.000	0.293	0.812	0.463
	N	13	13	13	13

Table 13. Abundance of small mobile fauna on cobble substrata, winter 1993.

		Cancer irroratus	Henricia	Ischnochiton	Strongiyocentrotus
CAN 5	B.T. mean	0.000	0.000	0.000	0.000
	B.T. (mean-sd)	0.000	0.000	0.000	0.000
	B.T. (mean+sd)	0.000	0.000	0.000	0.000
	N	12	12	12	12
DEER ISLAND	B.T. mean	0.000	0.063	0.303	0.177
	B.T. (mean-sd)	0.000	-0.139	-0.205	-0.206
	B.T. (mean+sd)	0.000	0.309	1.059	0.720
	N	12	12	12	12
FLIP	B.T. mean	0.000	0.681	0.426	3.412
	B.T. (mean-sd)	0.000	-0.013	-0.269	0.510
	B.T. (mean+sd)	0.000	1.677	1.584	8.208
	N	11	11	11	11
SHAGS	B.T. mean	0.063	0.063	0.555	1.908
	B.T. (mean-sd)	-0.139	-0.139	-0.179	0.541
	B.T. (mean+sd)	0.309	0.309	1.715	3.840
	N	12	12	12	12
WINTHROP	B.T. mean	0.000	0.600	0.477	5.243
	B.T. (mean-sd)	0.000	-0.291	-0.138	2.853
	B.T. (mean+sd)	0.000	2.191	1.392	8.273
	N	13	13	13	13

Table 15. Abundance of small mobile fauna on horizontal rock substrata, winter 1993.

		Acmaea	Asterias/Leptasterias juvs	Cancer irroratus	Henricia	Ischnochiton
DEER ISLAND	B.T. mean	0.000	0.000	0.063	0.129	0.063
	B.T. (mean-sd)	0.000	0.000	-0.139	-0.150	-0.139
	B.T. (mean+sd)	0.000	0.000	0.309	0.490	0.309
	N	12	12	12	12	12
FLIP	B.T. mean	5.352	0.276	0.000	0.000	0.485
	B.T. (mean-sd)	1.237	-0.176	0.000	0.000	-0.158
	B.T. (mean+sd)	11.893	0.921	0.000	0.000	1.461
	N	11	11	11	11	11
SHAGS	B.T. mean	5.807	0.177	0.000	0.063	2.264
	B.T. (mean-sd)	1.492	-0.206	0.000	-0.139	0.833
	B.T. (mean+sd)	12.543	0.720	0.000	0.309	4.210
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.181	0.063	0.000	0.330	0.896
	B.T. (mean-sd)	-0.326	-0.139	0.000	-0.269	0.033
	B.T. (mean+sd)	1.021	0.309	0.000	1.299	2.168
	N	12	12	12	12	12

Table 15. Abundance of small mobile fauna on horizontal rock substrata, winter 1993.

		Polychaetes	Stronglyocentrotus	Stronglyocentrotus juv
DEER ISLAND	B.T. mean	0.000	0.108	0.000
	B.T. (mean-sd)	0.000	-0.222	0.000
	B.T. (mean+sd)	0.000	0.566	0.000
	N	12	12	12
FLIP	B.T. mean	0.000	4.723	0.250
	B.T. (mean-sd)	0.000	2.220	-0.237
	B.T. (mean+sd)	0.000	8.035	0.987
	N	11	11	11
SHAGS	B.T. mean	0.000	2.249	0.347
	B.T. (mean-sd)	0.000	0.467	-0.239
	B.T. (mean+sd)	0.000	4.942	1.267
	N	12	12	12
WINTHROP	B.T. mean	0.147	2.417	0.000
	B.T. (mean-sd)	-0.281	0.441	0.000
	B.T. (mean+sd)	0.800	5.483	0.000
	N	12	12	12

Table 16. Abundance of small mobile fauna on vertical rock substrata, winter 1993.

		Acmaea	Asterias vulgaris	Asterias/Leptasterias juvs	Buccinum	Henricia
DEER ISLAND	B.T. mean	0.349	0.000	0.220	0.069	0.069
	B.T. (mean-sd)	-0.370	0.000	-0.132	-0.142	-0.142
	B.T. (mean+sd)	1.701	0.000	0.688	0.329	0.329
	N	11	11	11	11	11
FLIP	B.T. mean	2.438	0.250	0.579	0.000	0.063
	B.T. (mean-sd)	-0.144	-0.180	0.032	0.000	-0.139
	B.T. (mean+sd)	7.519	0.862	1.317	0.000	0.309
	N	12	12	12	12	12
SHAGS	B.T. mean	0.254	0.429	1.498	0.000	0.573
	B.T. (mean-sd)	-0.301	-0.410	0.154	0.000	-0.144
	B.T. (mean+sd)	1.164	2.150	3.574	0.000	1.676
	N	12	12	12	12	12
WINTHROP	B.T. mean	0.000	0.131	0.580	0.000	0.836
	B.T. (mean-sd)	0.000	-0.232	-0.202	0.000	-0.123
	B.T. (mean+sd)	0.000	0.647	1.851	0.000	2.381
	N	10	10	10	10	10

Table 16. Abundance of small mobile fauna on vertical rock substrata, winter 1993.

		Ischnochiton	Onchidoris	Polychaete	Strongiyocentrotus
DEER ISLAND	B.T. mean	0.000	0.000	0.000	1.326
	B.T. (mean-sd)	0.000	0.000	0.000	-0.027
	B.T. (mean+sd)	0.000	0.000	0.000	3.562
	N	11	11	11	11
FLIP	B.T. mean	0.468	0.000	0.063	2.507
	B.T. (mean-sd)	-0.231	0.000	-0.139	0.502
	B.T. (mean+sd)	1.600	0.000	0.309	5.588
	N	12	12	12	12
SHAGS	B.T. mean	1.458	0.063	0.063	0.692
	B.T. (mean-sd)	0.197	-0.139	-0.139	-0.238
	B.T. (mean+sd)	3.356	0.309	0.309	2.294
	N	12	12	12	12
WINTHROP	B.T. mean	0.815	0.000	0.000	1.575
	B.T. (mean-sd)	-0.018	0.000	0.000	0.383
	B.T. (mean+sd)	2.059	0.000	0.000	3.267
	N	10	10	10	10

Table 16. Abundance of small mobile fauna on vertical rock substrata, winter 1993.

		Stronglyocentrotus juv
DEER ISLAND	B.T. mean	0.069
	B.T. (mean-sd)	-0.142
	B.T. (mean+sd	0.329
	N	11
FLIP	B.T. mean	0.544
	B.T. (mean-sd)	-0.353
	B.T. (mean+sd	2.254
	N	12
SHAGS	B.T. mean	0.595
	B.T. (mean-sd)	-0.355
	B.T. (mean+sd	2.428
	N	12
WINTHROP	B.T. mean	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd	0.000
	N	10

Table 17. Percent Cover at Lovell's Island (R.O.V. Data)

		Hydroids-s	Balanus	Erect Bryo-s	Thick sediment	Bare space	Mussel
SUMMER 1992	B.T. mean	0.000	0.004	0.034	0.069	0.047	0.414
	B.T. (mean-sd)	0.000	<0	0.014	0.032	0.027	0.194
	B.T. (mean+sd)	0.000	0.022	0.063	0.117	0.074	0.653
	N	5	5	5	5	5	5
WINTER 1993	B.T. mean	0.006	0.000	0.003	0.010	0.161	0.002
	B.T. (mean-sd)	0.000	0.000	<0	0.002	0.098	<0
	B.T. (mean+sd)	0.019	0.000	0.021	0.023	0.236	0.017
	N	3	3	3	3	3	3

Table 17. Percent Cover at Lovell's Island (R.O.V. Data)

		Red algae-s	Brown algae-s	Boltenia	Mytilus	Shell	Clay	Gravel
SUMMER 1992	B.T. mean	0.006	0.020	0.000	0.002	0.170	0.000	0.156
	B.T. (mean-sd)	<0	0.003	0.000	<0	0.104	0.000	0.045
	B.T. (mean+sd)	0.024	0.052	0.000	0.025	0.250	0.000	0.320
	N	5	5	5	5	5	5	5
WINTER 1993	B.T. mean	0.014	0.002	0.001	0.003	0.129	0.056	0.340
	B.T. (mean-sd)	0.000	<0	<0	0.000	0.067	0.022	0.204
	B.T. (mean+sd)	0.050	0.012	0.008	0.012	0.209	0.102	0.490
	N	3	3	3	3	3	3	3

Table 18. Abundance of mobile fauna at Lovell's Island (R.O.V. data)

		Asterias vulgaris	Cancer borealis	Cancer sp.	Homarus
SUMMER 1992	B.T. mean (#/25m2)	29.882	0.000	23.787	0.918
	B.T. (mean-sd)	5.758	0.000	13.041	-0.221
	B.T. (mean+sd)	72.132	0.000	37.651	2.937
	N	5	5	5	5
WINTER 1993	B.T. mean (#/25m2)	19.309	0.634	8.960	0.000
	B.T. (mean-sd)	-0.349	-0.302	<0	0.000
	B.T. (mean+sd)	71.980	2.338	42.439	0.000
	N	3	3	3	3

Table 18. Abundance of mobile fauna at Lovell's Island (R.O.V. data)

		Tautogalabrus adspersus
SUMMER 1992	B.T. mean (#/25m2)	0.918
	B.T. (mean-sd)	-0.221
	B.T. (mean+sd)	2.937
	N	5
WINTER 1993	B.T. mean (#/25m2)	0.000
	B.T. (mean-sd)	0.000
	B.T. (mean+sd)	0.000
	N	3

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