Exxon Valdez Oil Spill State/Federal
Natural Resource Damage Assessment
Final Report

Sea Otter Foraging Behavior and Hydrocarbon Concentrations in Prey Following the *Exxon Valdez* Oil Spill in Prince William Sound, Alaska

Marine Mammal Study 6-8
Final Report

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July 1997

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Study History: Marine Mammal Study 6 (MM6), titled *Assessment of the Magnitude, Extent and Duration of Oil Spill Impacts on Sea Otter Populations in Alaska*, was initiated in 1989 as part of the Natural Resource Damage Assessment (NRDA). The study had a broad scope, involving more than 20 scientists over a three year period. Final results are presented in a series of 19 reports that address the various project components. Earlier versions of this report were included in NRDA Draft Preliminary Status Reports for MM6.

Abstract: In summer 1991, sea otter foraging success and prey composition were determined by visual observation at 2 sites affected by shoreline oiling during the *Exxon Valdez* oil spill and at a non-oiled site in western Prince William Sound, Alaska. Prey species were also determined by scat analysis at Green Island. Bivalve prey were collected subtidally at each study site to determine petroleum hydrocarbon concentrations in sea otter prey. The proportion of successful dives did not differ among sites for adults or between adults and juveniles. The mean number of prey captured per dive was 1.2 and did not differ among study sites. Size class of sea otter prey was similar among study sites: >96% of the prey items were estimated to be <9 cm. Adults differed in the proportion of dives retrieving clams, crabs, and mussels among study sites. Clams were retrieved on 34%, 61% and 44% of successful foraging dives observed at Squirrel, Green, and Montague islands, respectively. *Saxidomus giganteus* was the most frequently identified clam species. Mussels and crabs contributed ≤20% of the total prey items recovered by otters at each study site. Juvenile sea otters in the Green Island site had a significantly higher proportion of dives resulting in the capture of mussels than did adults; no differences were detected in the proportion of dives resulting in clam or crab. Other species contributed ≤5% at each study site. Sea otter scat collected at Green Island contained primarily mussels and clams. Tissue samples of subtidal sea otter prey from oiled sites did not appear to differ from the non-oiled site in concentrations of alkanes, aromatics, or unresolved complex mixture.

Key Words: *Enhydra lutris*, *Exxon Valdez*, oil spill, sea otter.

Citation: Doroff, A. M., and J. L. Bodkin. 1996. Sea otter foraging behavior and hydrocarbon concentrations in prey following the *Exxon Valdez* oil spill in Prince William Sound, Alaska, *Exxon Valdez* Oil Spill State/Federal Natural Resource Damage Assessment Final Report (Marine Mammal Study 6-8), U.S. Fish and Wildlife Service, Anchorage, Alaska.

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EXECUTIVE SUMMARY

In summer 1991, sea otter (*Enhydra lutris*) foraging success and prey composition were determined by visual observation at 2 sites affected by shoreline oiling during the *Exxon Valdez* oil spill (Squirrel and Green islands) and at a non-oiled site (Montague Island) in western Prince William Sound, Alaska. Prey species were also determined by scat analysis at Green Island. Bivalve prey were collected subtidally at each study site to determine petroleum hydrocarbon concentrations in sea otter prey.

The proportion of successful dives did not differ among sites for adults or between adults (90%) and juveniles (92%). The mean number of prey captured per dive was 1.2 and did not differ among study sites. Size class of sea otter prey was similar among study sites: >96% of the prey items were estimated to be <9 cm.

Adults differed in the proportion of dives retrieving clams (P = 0.01), crabs (P = 0.03), and mussels (P = 0.03) among study sites. Clams were retrieved on 34%, 61% and 44% of successful foraging dives observed at Squirrel (n = 833), Green (n = 759), and Montague (n = 752) islands, respectively. *Saxidomus giganteus* was the most frequently identified clam species. Mussels (*Mytilis edulis*) and crabs (*Telmessus* spp.) contributed ≤20% of the total prey items recovered by otters at each study site. Juvenile sea otters in the Green Island site had a significantly higher proportion of dives resulting in the capture of mussels than did adults (P = 0.02); no differences were detected in the proportion of dives resulting in clam or crab. Other species contributed ≤5% at each study site. Sea otter scat collected at Green Island contained primarily mussels (60%) and clams (46%, n = 253).

Tissue samples of subtidal sea otter prey from oiled sites did not appear to differ from the non-oiled site in concentrations of alkanes, aromatics, or unresolved complex mixture.

INTRODUCTION

Following the *Exxon Valdez* oil spill in March 1989, Prudhoe Bay heavy crude oil spread on the sea surface and on coastal shores from western Prince William Sound to the Alaska Peninsula. In Prince William Sound alone, acute mortality of sea otters at the time of the spill was estimated to be greater than 2,000 otters (Doroff et al. 1993; Garrott et al. 1993). Potential long-term chronic effects of oiled intertidal and subtidal prey on the sea otter population are of concern. Marine bivalves are susceptible to the accumulation of petroleum hydrocarbons from both chronic and acute sources (Blumer et al. 1970; Ehrhardt 1972; Boehm and Quinn 1977).

Shoreline oiling was observed on approximately 24% of 1,182 miles of coastline surveyed within Prince William Sound (*Exxon Valdez* Oil Spill Damage Assessment Geoprocessing Group 1991). The effect of oil on the abundance of nearshore marine invertebrate populations is unclear. The concentration and persistence of hydrocarbons present in tissues of most of these invertebrate species remains unknown.

Sea otters prey on a wide variety of benthic marine invertebrates (Riedman and Estes 1990) and forage in shallow coastal waters (Wild and Ames 1974), which vary widely in exposure to the open ocean, substrate type, and community composition. Sea otters have high metabolic demands relative to other marine mammals and can consume 20-25% of their body weight per day in invertebrate prey (Kenyon 1969; Costa and Kooyman 1984).

Sea otters have occupied southwestern Prince William Sound since at least the early 1950's (Lensink 1962; Garshelis et al. 1986). The sea otter population in the Prince William Sound spill region was likely near equilibrium density and limited by prey availability before the oil spill occurred (Estes et al. 1981; Garshelis et al. 1986; Johnson 1987). Sea otters in this region spent 59% of daylight hours foraging, while otters in recently reoccupied habitats of eastern Prince William Sound spent only 27% (Garshelis et al. 1986). Therefore, small differences in abundance of prey or net caloric availability due to heavy oiling in portions of the southwestern Sound may lead to reduced carrying capacity and delayed recovery of the sea otter population in this region.

Recovery of sea otter populations may be influenced by several factors. Decreased food availability caused by oil-related prey mortality or consumption of contaminated prey may be detrimental. Prey availability in western Prince William Sound may have declined due to increased mortality of invertebrates at the time of shoreline oiling, or by oil removal activities. In addition, relative prey availability may have been decreased by sea otters avoiding invertebrate prey contaminated with petroleum hydrocarbons. However, we lack the baseline data on abundance and distribution of nearshore invertebrates necessary to estimate a reduction in prey availability. In addition, the effects of ingesting prey contaminated with petroleum hydrocarbons on sea otters are unknown.

Our objectives were to determine if sea otter foraging success and prey composition differed between oiled and non-oiled areas, and to assess hydrocarbon concentrations in sea otter prey between oiled and non-oiled areas.

METHODS

Study Sites

The study area included sea otter foraging sites at Squirrel, Green, and Montague islands, in western Prince William Sound, Alaska (Figure 1). Sites were selected on the basis of two criteria: 1) degree of shoreline oiling (based on Alaska Department of Environmental Conservation shoreline oiling maps) with Squirrel, Green, and Montague islands representing heavy (>50% of the beach area covered or penetrated with oil), moderate (10-50% of the beach area covered or penetrated with oil) and no shoreline oiling, respectively; and 2) sufficient sea otter densities to obtain foraging data, determined by sea otter survey and capture data from other spill-related studies. In general, the study area was a female area where breeding and pup-rearing occurred (Estes et al. 1981; Garshelis 1983; Riedman and Estes 1990) and foraging data were collected on adults and juveniles of both sexes. Sea otter foraging data were collected in the study area between mid-April and July and subtidal sea otter prey were collected during August 1991.

Foraging Observations

Visual observations of foraging sea otters were made by trained individuals with the aid of high-resolution telescopes (Questar Corporation, New Hope, PA) and 10 X 40 binoculars. Foraging behavior was documented using focal animal sampling (Altmann 1974). A foraging otter was located and observed until a maximum of 50 identifiable prey items were observed or until visual contact with the animal was lost or foraging ceased. When possible, data recorded for each dive included age (adult, juvenile or unknown) and sex of focal animal, number of prey and relative prey size, dive interval (seconds), surface interval between foraging dives (seconds), and prey item to lowest identifiable taxon. Prey were classified into one of 5 size classes (<5 m, ≥5 to <7 cm, ≥7 cm to <9 cm, ≥9 to <12 cm and ≥12 cm). Size class of prey was estimated by observers based on the mean forepaw width (4.5 cm) and mean skull width (10 cm) for adult sea otters in this region (Johnson 1987, U.S. Fish and Wildlife Service, unpublished data). Adult animals were categorized as male, independent female or female with a pup. Small (estimated at ≤18 kg), dark-headed otters were identified as juveniles. Foraging dives were classified as successful (prey item captured), unsuccessful (no prey item captured) or as producing an unknown result (observer could not determine if the dive was successful or unsuccessful). The locations of foraging sea otters were recorded on a Geographic Information System coverage map gridded with a Universal Transverse Mercator projection. Data were collected only during daylight hours and during all tidal cycles.

Scat Analysis

During 20 April to 2 May 1991, 253 sea otter scat samples were examined in the field along 8.5 km of beach within the Green Island study site (Figure 1). For each scat sample encountered, the species of prey (when possible) were recorded within each scat. The estimated percentage that each prey type (mussel, clam, crab, or other) contributed to the entire scat was categorized as follows: 100, 90, 75, 50, 25, 10, and 5%.

Collection and Hydrocarbon Analysis of Prey

Collection. At each study site, clam species identified as sea otter prey were collected and tissues were analyzed for hydrocarbon content. Coordinates of foraging observations were plotted for each study site. The outermost coordinate locations delineated a polygon over which a grid of 100-m^2 plots was laid. Ten 100-m^2 plots were chosen randomly within each study site, and SCUBA divers searched for prey within each plot, beginning at the boat anchor. The boat anchor location was haphazard within each of the plot boundaries. Clams were recovered using a venturi dredge (Keene Engineering, Northridge, CA). Water depth averaged 8 m (range, 5-12 m). Clams were brought to the surface in nylon mesh dive bags, wrapped in chemically cleaned aluminum foil (acetone-and hexane-washed) and frozen whole. During prey collection, divers attempted to obtain 3 *Saxidomus giganteus* within each plot. However, this could not be accomplished in all plots and, where possible, 3 of each clam species encountered were submitted for analysis. When more than 3 clams of the same species were retrieved from a single plot, 3 were randomly selected for hydrocarbon analyses. Clams were thawed in the laboratory and soft tissue was removed (using instruments cleaned with acetone and hexane) from the shell and placed in chemically clean jars, weighed and refrozen. Samples were shipped to the Geochemical and Environmental Research Group (GERG) at College Station, Texas, for analysis of the hydrocarbon content. The tissue extraction method used in the analysis was developed by MacLeod et al. (1985) and modified by Wade et al. (1988, 1993) and Jackson et al. (1993). Laboratory methodology for the hydrocarbon analysis for this study was standardized with all Natural Resource Damage Assessment Studies by GERG (GERG standard operating procedures 8901-8905).

Extraction and purification. Approximately 1 gram (wet weight, $\bar{x} = 1.08 \pm 0.17$g) of macerated clam tissue was placed in a centrifuge tube. 100 ml of CH2Cl2, 50 g of Na2SO4, and the internal surrogates were added. The tissue was macerated for 3 minutes using a tissuemizer. The dichloromethane was decanted into a flask. This extraction was repeated two more times with 100 ml aliquots of CH_2Cl_2. Using a 3-ball Snyder column the CH_2Cl_2 was concentrated to 10-20 ml then transferred into a concentrator tube and concentrated to 1 ml. The extract was fractionated by alumina:silica gel open column chromatography. The extract was sequentially eluted with pentane and pentane:dichloromethane for the aliphatic and aromatic fractions respectively.

Aliphatic hydrocarbon determination. High resolution, capillary gas chromatography with a split/splitless injection system and a flame ionization detector (GC/FID) was used to quantitatively determine the aliphatic hydrocarbons (n-C10 to n-C34, pristane and phytane) and the unresolved complex mixture (UCM). Analyte amounts were calculated based on methods of internal standards with concentrations corrected for the surrogate recoveries.

Aromatic hydrocarbon determination. Quantitation of polynuclear aromatic hydrocarbons (PAH) and their alkylated homologues was performed by gas chromatography mass spectrometry (GC/MS) in the selected ion monitoring (SIM) mode. Qualitative identification of target compounds was based on relative retention time criteria supported by comparison with confirmation ions. The actual sample concentration of each compound was calculated using the response factor for each analyte and corrected for surrogate recoveries.

Quality assurance. Both the GC/FID and the GC/MS were calibrated using a five point response curve to show the linear range of the instrument before, during, and after sample runs. If the average daily response factors for any analyte exceeded ±25%(aliphatic compounds) or ±35% (aromatic compounds) of the corresponding calibration curve value then a five point calibration curve must be repeated for that analyte before analysis of samples could proceed. A method blank, standard reference material (SRM), matrix spike and matrix spike duplicate (MS/MSD) were analyzed with each batch of samples. If the method blank was greater than 3x the method detection limit (MDL) then the samples were reextracted and reanalyzed. Results of SRM analyses were used to establish laboratory control charts. The average recoveries for all analytes in the MS/MSD must fall between 40 and 120%. All samples were spiked with surrogates prior to extraction and purification. Corrective action was taken if surrogate recovery fell outside of 40 and 120%.

Data Analysis

The foraging record is defined in this paper as the foraging data specific to a focal animal and was used as the sample unit in the analyses of foraging behavior. The sample unit in the analysis of dive and surface intervals was individual dives.

The percentage of successful dives was determined for all foraging records of adult and juvenile sea otters having ≥10 dives. Dives of unknown result were not included in this analysis. An arcsine transformation of the square-root of the proportion of successful dives was used to normalize distributions and an analysis of variance (ANOVA) was used to test for differences in foraging success among sites and between adults and juveniles.

Number of prey items captured per dive was averaged for each foraging record by site. Dives resulting in the capture of mussels were excluded from this analysis due to the difficulty in obtaining accurate counts on a per dive basis. Dives of unknown result were not used in this analysis. ANOVA was used to test for differences in the number of prey retrieved per dive among sites.

Mean dive and surface intervals were tested among study sites and prey types (clams, crabs, and mussels) by a two-way ANOVA for an unbalanced sample.

Foraging records for each focal animal having ≥10 foraging dives were summarized into the proportion of dives resulting in the capture of clams, crabs, or mussels within each study site. Kruskal-Wallis nonparametric tests were used to determine differences in the proportion of clams, crabs, and mussels captured among sites for adult sea otters and between adults and juveniles (sample sizes were sufficient to test age differences only for the Green Island study site).

Analytical data are always estimates of the concentrations of the compounds being measured. However, the uncertainties of the estimated concentrations can be assessed. The minimum concentration of a substance that can be measured and reported with a specified statistical confidence that the analyte concentration is greater than zero can be determined and is termed the method detection limit (MDL). Using spiked oyster (*Crassostrea virginica*) tissue samples (n=7) obtained from the Gulf of Mexico, GERG estimated the MDLs of the hydrocarbon analytes at the 99% confidence level; these are listed in Appendix Table A-1. Only values above MDL were included in any comparisons or analyses in this paper; however, all concentrations of individual hydrocarbons in clam tissues above and below the computed MDL were reported by GERG and are included in Appendix Tables A-2 and A-3.

Hydrocarbon concentrations were reported from GERG in ng/g wet weight for alkanes and aromatics, and in μg/g wet weight for UCM.

RESULTS

Foraging Behavior

At Squirrel Island, 69 foraging records were observed (68 adults and 1 juvenile). Thirty-eight foraging records (29 adults and 9 juveniles) were observed at Green Island and 72 foraging records (69 adults and 3 juveniles) were observed at Montague Island.

Sea otters at all sites recovered prey items on 87-92% of their foraging dives and foraging success did not differ among sites ($F = 1.23$, $P = 0.29$) (Table 1). Mean foraging success rates were 90% ($n = 82$) for adult and 92% ($n = 10$) for juvenile sea otters in all study sites combined and did not differ significantly ($F = 0.50$, $P = 0.48$).

Mean number of prey retrieved per dive were 1.2, 1.0, and 1.3 for Squirrel, Green, and Montague Islands, respectively; differences were not detected among sites ($F = 2.19$, $P = 0.11$). Size class was estimated for 1,867 prey items; the majority of prey items, 96% or greater, were <9 cm in all sites (Table 1).

Mean dive intervals varied from 43 to 88 seconds, and surface intervals varied from 37 to 48 seconds for all prey types within the study sites. Dive intervals differed significantly for dives retrieving clams (80-119 seconds), mussels (20-35 seconds), and crabs (63-82 seconds) among study sites ($F = 19.83$, $P < 0.001$), and among prey types ($F = 135.92$, $P < 0.001$), and the interaction between site and prey type also differed ($F = 24.16$, $P < 0.001$).

Prey Composition

Adults differed in the proportion of dives resulting in the capture of clams ($X^2 = 9.73$, $P = 0.01$), crabs ($X^2 = 7.03$, $P = 0.03$), and mussels ($X^2 = 7.21$, $P = 0.03$) among sites (Table 2). The median proportion of dives resulting in the capture of clams was higher than that for mussels or crabs in all study sites for adults and was less (0.29) for the Squirrel Island than for Green (0.75) or Montague (0.62) islands. Sample sizes were insufficient to test for differences in prey composition related to sex or reproductive status. Juvenile sea otters in the Green Island site captured mussels on a significantly higher proportion of dives than did adults ($X^2 = 5.73$, $P = 0.02$) (Table 2). Differences between adult and juvenile sea otters were not detected for the proportion of dives in which clam or crab were captured (in the Green Island area). Sample sizes were insufficient to test for age class differences of the proportion of dives resulting in the capture of clams, crabs, and mussels in the Squirrel and Montague island study sites.

Clams were retrieved on 34, 61, and 44% of successful sea otter foraging dives at Squirrel ($n = 833$), Green ($n = 759$), and Montague ($n = 752$) islands, respectively (Table 3). *Saxidomus giganteus* was the most commonly identified clam in the sea otter diet for all study sites. Other clam species identified in all study sites were *Mya* spp. and *Protothaca staminea*. Mussels (*Mytilis edulis*), and crabs (primarily *Telmessus* spp.) each contributed 20% or less of the identified species for each study site. Other prey types observed included: limpets

(*Notoacmea* spp.), barnacles (*Balanus* spp.), cockles (*Clinocardium* spp.), scallops (*Chlamys* spp.), sea cucumbers (*Cucumaria* spp.), fat innkeepers (*Echiurus echiurus alaskensis*), octopus (*Octopus* spp.), sea stars (*Pisaster* spp.), jingles (*Posodesmus* spp.), sunflower sea stars (*Pycnopodia helianthoides*), sea urchins (*Strongylocentrotus* spp.), chitons (class Polyplacophora) and tunicates (class Ascidiacea). These species contributed 5% or less to otter diets at each study site (Table 3).

Fifty-six percent of the 253 scat samples examined in the Green Island study site contained more than one prey species (Table 4). Mussels were observed in 153 of 253 (60%) sea otter scat and clams were observed in 116 of 253 (46%) scat examined. Clam species were primarily *P. staminea* and *S. giganteus* with trace amounts of *Humilaria kennerleyi* and *Gari californica*. Crab and other small invertebrates were found in 19 and 20%, respectively of scat sampled. Of scats containing a single prey type, 76 contained only mussels, 23 contained only clams and 13 contained either scallops (*Chlamys* sp.), snails (*Natica* sp.), cockles (*Clinocardium* sp.), or limpets (*Notoacmea scutum*).

Prey Hydrocarbon Analysis

A total of 79 prey samples were collected for hydrocarbon analyses. Twenty-five prey were collected in 7 plots at Squirrel Island; 33 prey in 7 plots at Green Island, and 21 prey in 6 plots at Montague Island. *P. staminea* (n = 24), *Mya* spp. (n = 23), and *S. giganteus* (n = 20) were most frequently collected. Species composition and mean size are presented in Table 5. Concentrations of individual hydrocarbon analytes in prey samples are listed in the Appendix (Table A-2, aliphatics; Tables A-3, aromatics).

Tissue samples of subtidal bivalves obtained from sites which had received heavy to moderate shoreline oiling in 1989 had no apparent differences in alkane and aromatic hydrocarbon concentrations and distributions, and UCM concentrations from the site where no shoreline oiling occurred. The aliphatic hydrocarbons in all the samples showed a pattern suggestive of biogenic origins. An odd chain predominance over the n-C_{14} to n-C_{23} range with the highest concentrations for n-C_{15} and pristane characterize the samples from all three study areas (Figures 2, 3, 4). The odd:even ratios across the n-C_{14} to n-C_{23} range varied from 1.04 - 4.13 ($\bar{x}$ = 2.5 ± 1.98) at Squirrel Island, 0.96 - 6.94 ($\bar{x}$ = 2.3 ± 1.33) at Green Island, and 0.89 - 2.73 ($\bar{x}$ = 1.4 ± 0.45) at Montague Island. The UCM was low for all three areas; 5.70 ± 8.48 μg/g, 4.14 ± 10.86 μg/g, and 3.57 ± 6.36 μg/g for Squirrel, Green, and Montague Islands, respectively. At all sites, *Mya arenaria* contained the highest concentrations of alkanes of all species sampled. Rarely did any of the values for aromatic analytes exceed the MDL. In all areas, a few samples had naphthalene concentrations slightly above MDL. At Squirrel Island, one sample had a measurement for methylated naphthalene above MDL and one sample had a measurement for biphenyl that was also above MDL (Appendix Tables A-2, A-3). Statistical analyses were not performed on the hydrocarbon data because a majority of the reported concentrations were below the estimated MDL values.

DISCUSSION

Although foraging success was high (90% for all observations), the majority of clams (95% of 1,126) observed were small (estimated to be <7 cm). Garshelis et al. (1986) reported clams captured by sea otters rarely exceeded 6 cm in the Green Island site during 1980-1981. During 1991, 79% (n = 479) of the clams captured at Green Island were estimated to be <5 cm, 20% ranged from ≥5-<7 cm, and none were estimated to be greater than 9 cm. Mean shell length for clams recovered in the dredge samples in the Green Island area ranged from 3.3 to 4.7 cm.

Dive duration and surface intervals between dives were variable for individuals but significantly different depending on the type of prey captured. Individual animals, water depth, geographic location and food item all contribute to variation in duration of foraging dives (Estes et al. 1981; Garshelis 1983). Sea otters at Squirrel, Green, and Montague islands foraged on the same principal species in 1991 as were observed in previous years (Calkins 1978; Garshelis et al. 1986; Johnson 1987) suggesting there has been no detectable shift in prey composition over time or as a result of shoreline oiling at these study sites. Clams, mussels and crabs were the primary prey of sea otters at all sites, however, there were differences in the proportion with which these prey were captured among sites. Differences in the proportions of prey type captured by sea otters among sites may have been influenced by the proportion of unidentified prey within each site (Table 3) or by variation in prey availability within each site. There was no replication of treatment types (heavy oil, moderate oil, and no oil), therefore we have no measure of natural variation within each treatment.

Prey composition determined from scat contents also indicated mussels, clams, and crabs to be important prey of sea otters. Sea otters haul out most frequently during the winter in Prince William Sound; therefore, these data primarily represent the overwinter diet near Green Island (Johnson 1987; VanBlaricom 1988). Johnson (1987) examined 3,275 scat in the Green Island site during 1974-1984 and found 58, 34, 36, and 16% of the scat contained clams, mussels, crabs, and other species, respectively. In our sample from the same region, we observed mussels most frequently (60%). Whether the observed differences reflect changes in prey use over time, changes in the ratio of adults and juveniles using the haul-out through time, or variation in scat content between observation periods is unknown.

Determination of sea otter prey composition through visual observation or scat analysis can yield different results; both methods have inherent biases. Prey composition based on visual observations is biased toward: 1) prey captured from near-shore areas, 2) larger prey items (greater than the paw size of the animal), and 3) prey captured during daylight hours. Prey composition based on scat analysis is biased against larger prey where no hard parts are ingested. Scat analysis also cannot reveal potential variation in diet between adult and juvenile or male and female otters.

Adult sea otters foraged primarily on species found in the subtidal, whereas juveniles had a higher proportion of an intertidal species, the mussel, in their diet based on visual observation. Johnson (1987) also reported dietary differences between adult (19% mussel and 59% clam) and juvenile (63% mussel and 16% clam) sea otters at Green Island during 1974-1984. In California, Estes et al. (1981) found that juveniles commonly foraged in water ranging from 1 to 2 fathoms while adults nearly always foraged in deeper water. Mussels can easily be obtained by foraging sea otters because they occur intertidal and require little effort to capture (Estes et al. 1981; VanBlaricom 1988). Mean dive intervals for mussels were shorter than those recorded for other prey. However, mussels are less valuable calorically than other sea otter prey (Garshelis 1983).

The presentation and discussion of hydrocarbon data which are quantitatively less than the calculated MDL for each hydrocarbon are controversial (Rhodes 1981, Berthouex 1993). MDLs are statistical values obtained from replicate analyses of samples with known quantities of the compound of interest. In the literature, hydrocarbon concentrations which fall below the MDL are presented in various ways: as "trace", "not detected (ND)", "<MDL", zero, or some incremental number between zero and the MDL. Alternate strategies, which include simply presenting the measured concentration regardless of its relationship to the MDL, presentation of both the measured concentration and the MDL (our choice), or giving the measured concentration followed by a statistical estimate of its precision, are considered superior (Berthouex 1993, Gilbert 1987). These methods prevent the discarding of useful information which occurs with the former methods, all of which censor some of the data.

Mean total aromatic and UCM concentrations in intertidal mussel tissue collected at our study site on Green Island during 1989 were 2,566 ng/g ($\pm$ 853) and 171.4 μg/g ($\pm$ 58.6), respectively (Andres and Cody (MS)). These values are as much as 40 times greater than the mean concentrations we observed in the subtidal clam tissue at Green Island sampled in 1991. Unfortunately, no intertidal mussels were collected in 1991 to assess the persistence of hydrocarbons in the mussel tissues at the Green Island site. Andres and Cody (MS) also reported hydrocarbon concentrations in mussel tissue of 82 ng/g ($\pm$ 21) and 7.4 μg/g ($\pm$1.7) for total aromatic and UCM, respectively, from our Montague Island study site; aromatic and UCM concentrations were lower in the subtidal bivalve tissue collected in 1991 ($<$MDL for aromatic, 4.16 ± 7.38 μg/g for UCM). Other sites in Prince William Sound were sampled annually (1989-1992) and, at some sites, mussel tissue and the underlying sediments consistently contained high concentrations (up to 50 parts per million) of total aromatic hydrocarbons (Babcock et al. 1993; Rounds et al. 1993). In this study the elevated hydrocarbon concentrations measured in *Mya arenaria* with respect to the other species sampled are most likely due to the fact that *Mya arenaria* is a detritus feeder while the other species are filter feeders.

Juvenile sea otters foraged on mussels to a greater extent than adults. However, individual adults and juveniles may specialize on only a few species, some of which occur in the intertidal (Ralls et al. 1988; Riedman and Estes 1990). Therefore, juveniles and individual adults specializing in intertidal species could have a higher probability of encountering hydrocarbon contamination in their prey than individuals foraging in the subtidal regions.

CONCLUSIONS

Sea otter foraging success, in terms of the percentage of successful dives or mean number of prey items captured per dive, was not affected in the oiled area two years post-spill. Prey composition (primarily clam, mussel, and crab) was similar among oiled and non-oiled study sites and to pre-spill data from the western Prince William Sound region. Adult sea otters foraged primarily in the subtidal region, while juveniles foraged more frequently intertidally. Tissues of subtidal bivalve prey tested for hydrocarbon content did not appear to differ regardless of the degree of shoreline oiling. Mussel tissue sampled 1989-1992 in the intertidal regions exhibited, in site specific areas, hydrocarbon concentrations similar to crude oil (Babcock et al. 1993). Contamination of mussels and other intertidal prey species may be of concern for juvenile sea otters and for adults specializing in the use of intertidal prey.

ACKNOWLEDGEMENTS

This work was conducted as part of *Exxon Valdez* Oil Spill Natural Resources Damage Assessment process. We thank K. Modla who was a primary observer during data collection and assisted with data entry. D. Bruden, C. Doroff and M. Fedorko also assisted with data collection. B. Ballachey, L. Holland-Bartels, A. R. DeGange, K. Kloecker, D. Mulcahy, K. Oakley, M. Riedman and two anonymous reviewers provided draft reviews of the manuscript and made many valuable suggestions. We thank M. Ronaldson for her help in preparing the manuscript.

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Table 1. Prey type, size class, proportion of successful dives, and mean number of prey retrieved per dive estimated for sea otters (*Enhydra lutris*) at three sites in western Prince William Sound, Alaska, during April-July 1991.

Prey type	Size class (cm)	Squirrel Island	Green Island	Montague Island
Clam	<5	63%	79%	49%
	≥5 <7	28%	20%	46%
	≥7 <9	8%	1%	5%
	≥9 <12	1%	0%	0%
	≥12	<1%	0%	0%
		(n = 296)	(n = 479)	(n = 351)
Mussel	<5	100%	100%	100%
		(n = 142)	(n = 159)	(n = 53)
Crab	<5	18%	21%	43%
	≥5 <7	43%	71%	52%
	≥7 <9	30%	7%	5%
	≥9 <12	7%	0%	0%
	≥12	2%	0%	0%
All Prey[a]	<5	63%	79%	49%
	≥5 <7	23%	17%	42%
	≥7 <9	10%	4%	8%
	≥9 <12	3%	<1%	<1%
	≥12	1%	0%	1%
		(n = 598)	(n = 690)	(n = 579)
Mean number of prey per dive[b]		1.2	1.0	1.3
Percentage of successful dives		87%	92%	90%

[a] Includes clams, mussels, crab, and all other prey identified as to size class.

[b] Dives resulting in capture of mussels were excluded for this analysis due to the difficulty in obtaining accurate counts on a per dive basis.

Table 2. Median proportion of dives resulting in the capture of clams, crabs, and mussels for adult and juvenile sea otters (*Enhydra lutris*) in Prince William Sound, Alaska, 1991.

	Green Island				Squirrel Island				Montague Island			
Age class	Clam[a]	Crab[b]	Mussel[b]	N[c]	Clam[a]	Crab[b]	Mussel[b]	N[c]	Clam[a]	Crab[b]	Mussel[b]	N[c]
Adults	0.75	0.0	0.0[d]	15 (356)	0.29	0.03	0.06	34 (754)	0.62	0.07	0.0	28 (531)
Juveniles	0.16	0.0	0.44[d]	8 (365)	--	--	--	--	0.17	0.41	0.0	2 (59)

[a] Significant differences among areas in the proportion of dives resulting in the capture of clam ($P = 0.01$) by adults determined by a Kruskal-Wallace test.

[b] Significant differences among areas in the proportion of dives resulting in the capture of crab ($P = 0.03$) and mussel ($P = 0.03$) by adults determined by Kruskal-Wallace tests.

[c] Number of foraging records (total number of foraging dives).

[d] Significant differences among age classes in the proportion of dives capturing mussels at Green Island ($P = 0.02$) determined by a Kruskal-Wallace test.

Table 3. Composition of sea otter (*Enhydra lutris*) prey determined by visual observation at three sites in western Prince William Sound, Alaska, during April-July 1991.

	Squirrel Is. (%)	Green Is. (%)	Montague Is. (%)
Clam[a]	34	61	44
Mya spp.	2	-	3
Protothaca staminea	3	5	<1
Saxidomus giganteus	21	20	9
Tresus capax	<1	<1	<1
Unknown Clams	73	75	87
Mussel[a]	17	20	7
Mytilus edulis	100	100	100
Crab[a]	11	2	14
Telmessus spp.	46	27	72
Unknown Crabs	54	73	28
Other	5	4	4
Balanus spp.	3	12	-
Chlamys spp.	-	-	6
Clinocardium spp.	21	3	33
Cucumaria spp.	5	-	-
Echiurus echiurus	3	67	12
Notoacmea spp.	3	-	-
Octopus spp.	3	-	3
Pisaster ochraceus	47	12	39
Posodesmus macrochisma	-	3	-
Pycnopodia helianthoides	3	-	-
Strongylocentrotus spp.	10	-	3
Chiton (class Polyplacophora)	3	-	-
Tunicate (class Ascidiacea)	-	3	3
Unknown prey	33	12	30

[a] Adults differed in the proportion of dives retrieving clam (P = 0.01), crab (P = 0.03), and mussel (P = 0.03) among study areas.

Table 4. Estimated percentage of prey type (mussel, clam, crab, and other small invertebrates) found in 253 scat samples examined during 20 April to 2 May 1991 in western Prince William Sound, Alaska.

	Estimated percentage							
Prey type	100%	90%	75%	50%	25%	10%	5%	Occurrence in sample (percentage)
Mussel[a]	76	24	10	13	14	6	10	153 (60%)
Clam[b]	23	22	8	15	21	10	17	116 (46%)
Crab[c]	0	2	2	5	21	10	7	47 (19%)
Other[d]	13	4	5	8	4	6	10	50 (20%)

[a] *Mytilus edulis*.

[b] *Protothaca staminea*, *Saxidomas giganteus*, *Humilaria kennerleyi*, *Gari california*: includes unidentified shell fragments.

[c] Species not identified.

[d] Other is equivalent to one or more of the following species: scallop (*Chlamys* spp.), snail (*Natica* sp.), cockle (*Clinocardium* spp.), limpet (*Notoacmea scutum*), and other unidentified snail shell fragments.

Table 5. Size class means for bivalves collected subtidally near Squirrel (oiled), Green (oiled), and Montague (non-oiled) islands in western Prince William Sound, Alaska, summer 1991.

Sample location and species sampled	Mean shell length (mm)	Mean wet meat mass (g)	N
Squirrel Island			
Humilaria kennerleyi	46	7.8	3
Mya arenaria	41	4.4	4
Protothaca staminea	44	10.0	6
Saxidomas giganteus	51	14.6	11
Serripes groenlandicus	56	16.2	1
Site mean ± SD	47 ± 17.4	11.2 ± 6.1	25
Green Island			
Gari california	47	0.4	4
Humilaria kennerleyi	33	2.7	1
Mya arenaria	40	4.1	15
Protothaca staminea	41	8.0	9
Saxidomas giganteus	41	8.2	4
Site mean ± SD	41 ± 6.1	6.3 ± 3.5	33
Montague Island			
Gari california	49	5.5	1
Humilaria kennerleyi	52	13.7	2
Mya arenaria	48	7.1	4
Protothaca staminea	41	8.3	9
Saxidomas giganteus	33	4.0	5
Site mean ± SD	42 ± 7.9	7.4 ± 4.0	21

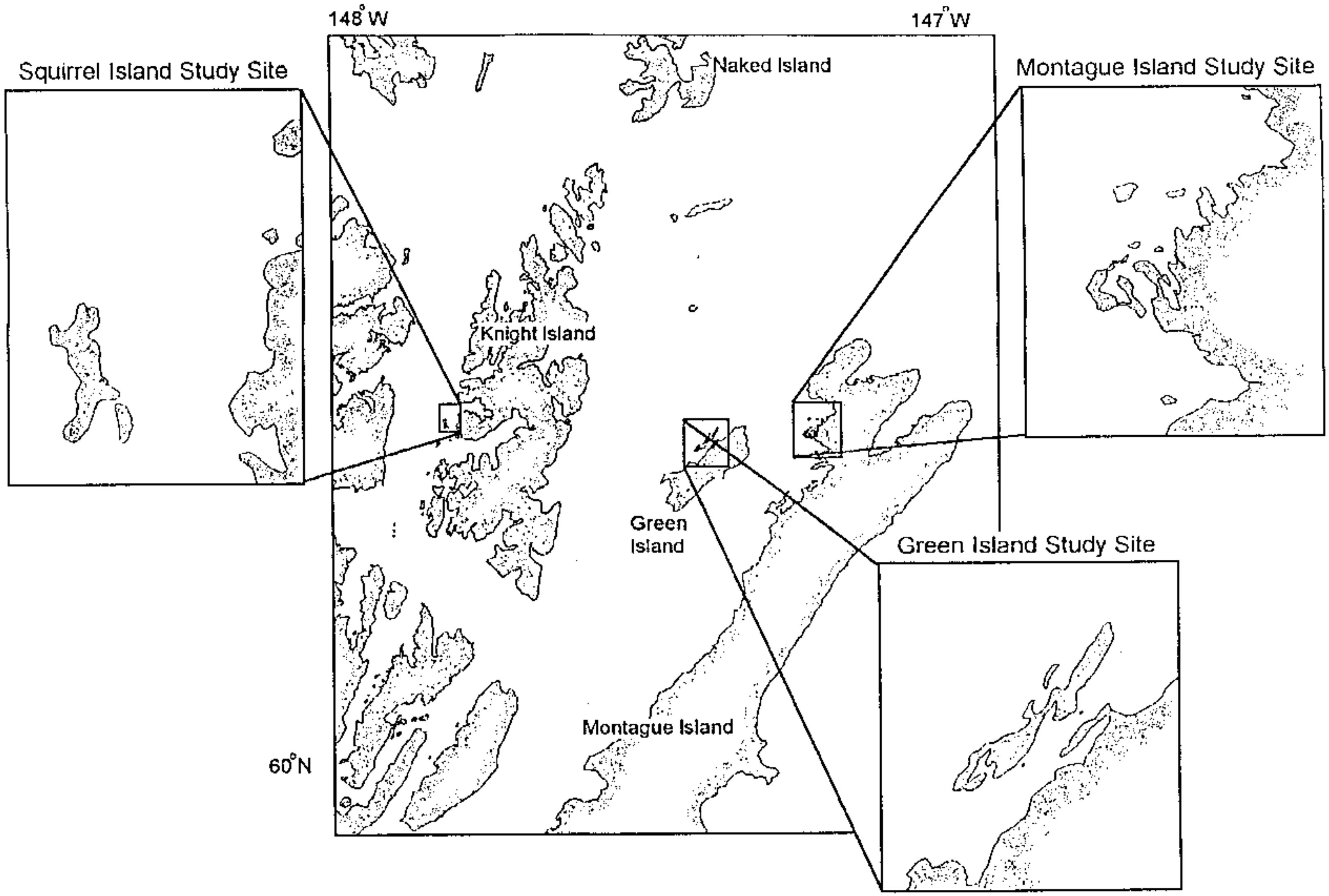

Figure 1. Sea otter forage study site locations in western Prince William Sound, 1991. Prince William Sound is located in south-central Alaska.

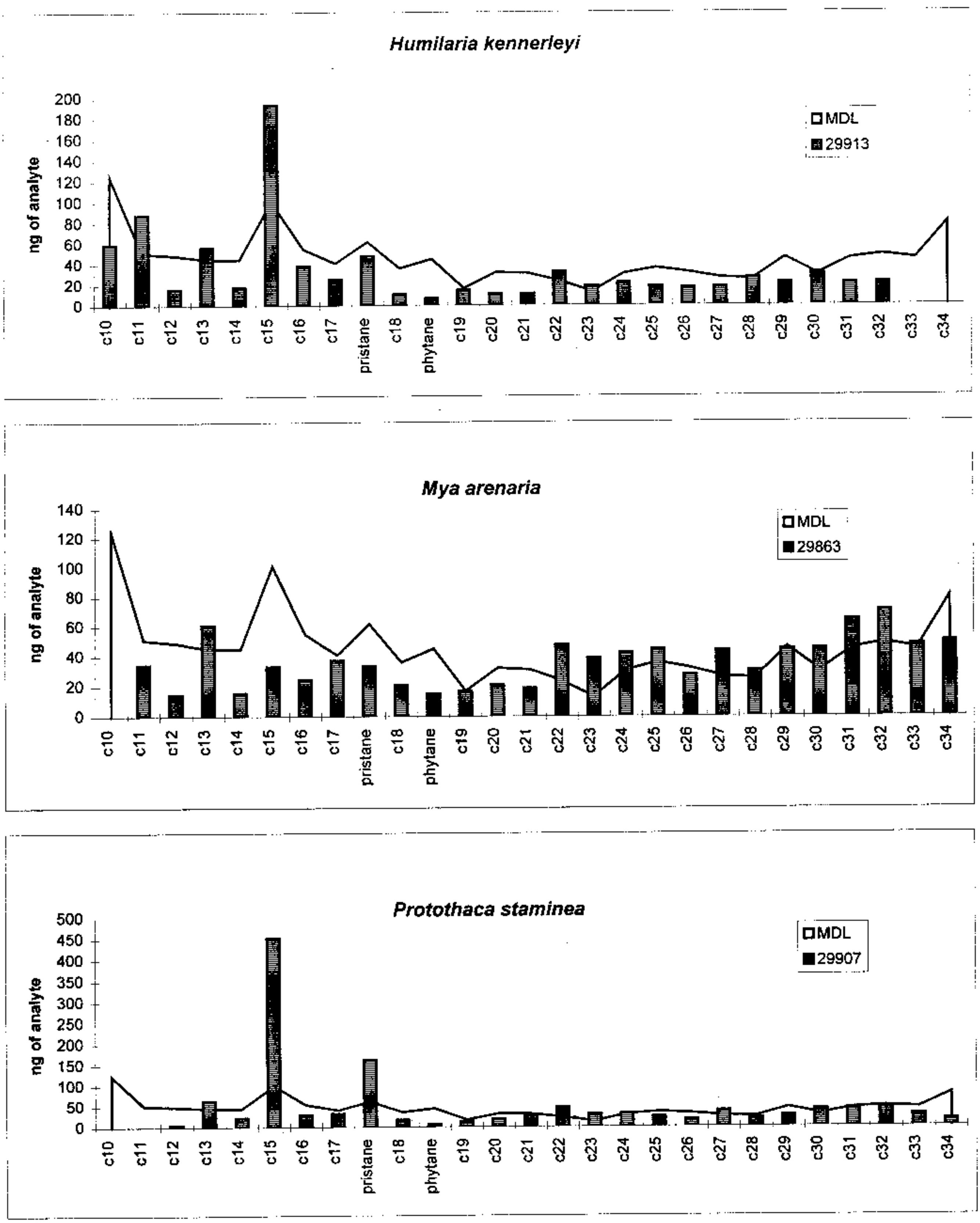

Figure 2. Aliphatic hydrocarbons in representative clams from Squirrel Island. Note that the area under the MDL curve is not a significant factor, rather the points are connected to highlight the MDL.

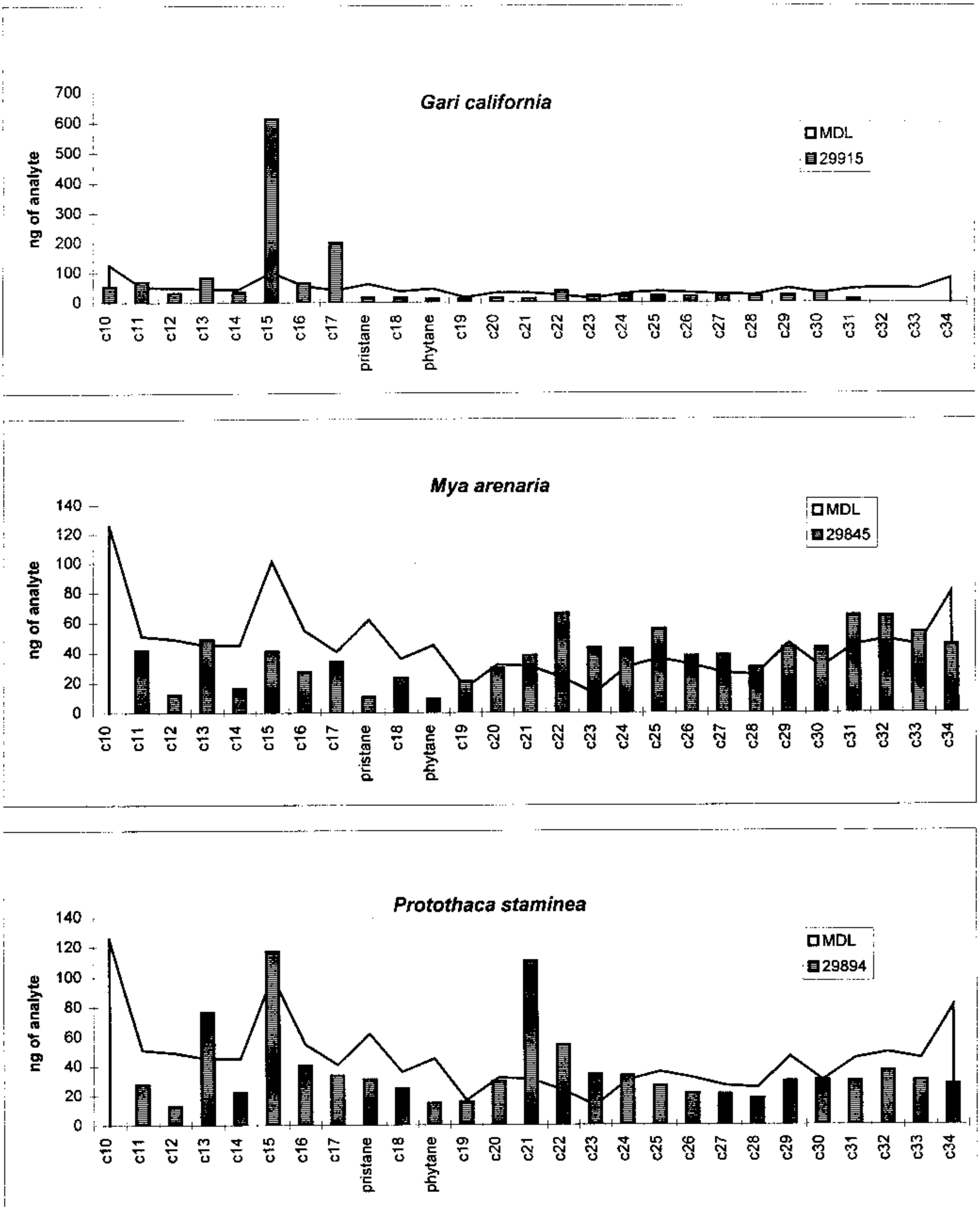

Figure 3. Aliphatic hydrocarbons in representative clams from Green Island. Note that the area under the MDL curve is not a significant factor, rather the points are connected to highlight the MDL.

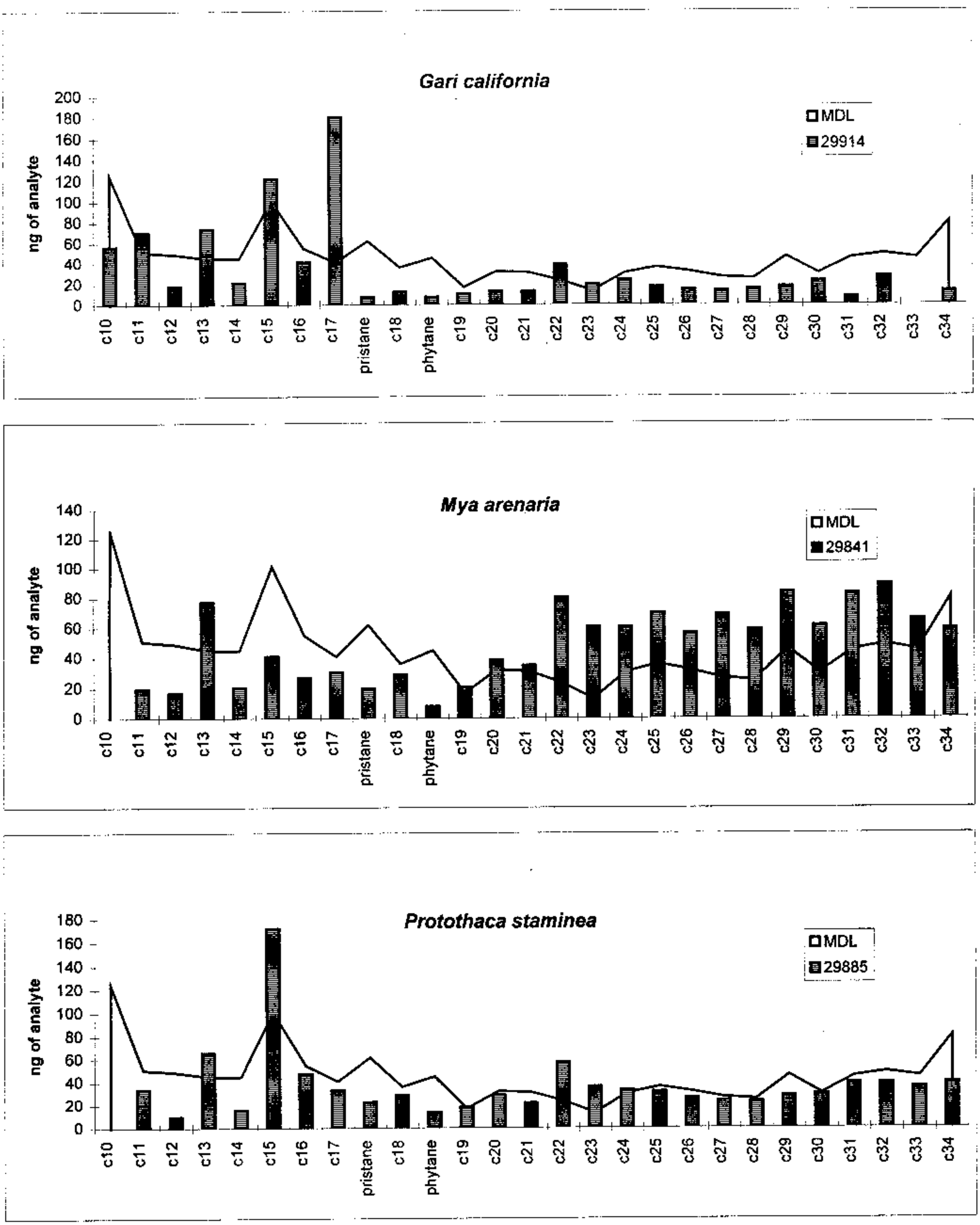

Figure 4. Aliphatic hydrocarbons in representative clams from Montague Island. Note that the area under the MDL curve is not a significant factor, rather the points are connected to highlight the MDL.

APPENDICES

Table A-1. Method detection limits (MDLs) in ng and ng/g for aliphatic and aromatic hydrocarbons analyzed by GERG.[a, b]

Aliphatic hydrocarbons	MDL		Aromatic hydrocarbons	MDL			MDL	
	ng	ng/g		ng	ng/g		ng	ng/g
C10	124.6	95.9	NAP	29.4	22.6	1MP	37.7	29.0
C11	50.9	39.1	C1N	--	--	DIB	--	--
C12	48.9	37.6	C2N	--	--	C1D	--	--
C13	--	--	C3N	--	--	C2D	--	--
C14	--	--	C4N	--	--	C3D	--	--
C15	101.0	77.7	1MN	32.8	25.2	FLA	8.2	6.3
C16	54.8	42.1	2MN	46.5	35.	PYR	11.7	9.0
C17	40.8	31.4	2,6MN	33.4	25.7	CFP	--	--
C18	35.9	27.6	2,3,5MN	28.6	22.0	BAA	32.4	24.9
C19	16.6	12.8	BIP	19.5	15.0	CHR	24.2	18.6
C20	31.9	24.5	ANP	13.0	10.0	C1C	--	--
C21	30.9	23.8	ANH	27.3	21.0	C2C	--	--
C22	23.3	17.9	FLU	16.3	12.5	C3C	--	--
C23	12.8	9.9	C1F	--	--	C4C	--	--
C24	30.2	23.2	C2F	--	--	BBF	25.5	19.6
C25	35.9	27.6	C3F	--	--	BLF	24.9	19.1
C26	31.8	24.5	ANT	11.8	9.1	BEF	25.2	19.4
C27	26.4	20.3	PHE	14.3	11.0	BAP	28.1	21.6
C28	25.0	19.2	C1P	--	--	PER	12.9	9.9
C29	46.1	35.5	C2P	--	--	IDE	29.4	22.6
C30	30.1	23.1	C3P	--	--	DBN	25.7	19.8
C31	--	--	C4P	--	--	BEQ	20.0	15.4
C32	48.9	37.6						
C33	44.9	34.6						
C34	--	--						
PRI	61.7	47.5						
PHY	--	--						
UCM	--	--						

[a] ng/g are on a dry weight basis.

[b] Abbreviations: C_{10} through C_{34}: n-alkanes (the subscript represents the number of carbon atoms); PRI: pristane; PHY: phytane; UCM: unresolved complex mixture; NAP: naphthalene; C1N: C1-naphthalene; C2N: C2-naphthalene; C3N: C3-naphthalene; C4N: C4-naphthalene; 1MN: 1-methylnaphthalene; 2MN: 2-methylnaphthalene; 2,6MN: 2,6-dimethylnaphthalene; 2,3,5MN: 2,3,5-trimethylnaphthalene; BIP: biphenyl; ANP: acenaphthylene; ANH: acenaphthene; FLU: fluorene; C1F: C1-fluorene; C2F: C2-fluorene; C3F: C3-fluorene; ANT: anthracene; PHE: phenanthrene; C1P: C1-phenanthrene; C2P: C2-phenanthrene; C3P: C3-phenanthrene; C4P: C4-phenanthrene; 1MP: 1-methylphenanthrene; DIB: dibenzothiophene; C1D: C1-dibenzothiophene; C2D: C2-dibenzothiophene; C3D: C3-dibenzothiophene; FLA: fluoranthene; PYR: pyrene; CFP: methyl fluoranthene-pyrene; BAA: benz(a)anthracene; CHR: chrysene; C1C: C1-chrysene; C2C: C2-chrysene; C3C: C3-chrysene; C4C: C4-chrysene; BBF: benzo(b)fluoranthene; BKF: benzo(k)fluoranthene; BEP: benzo(e)pyrene; BAP: benzo(a)pyrene; PER: perylene; IDE: ideno(1,2,3-cd)pyrene; DBN: dibenzo(a,h)anthracene; BEQ: benzo(g,h,i)perylene.

Table A-2. Aliphatic hydrocarbon concentrations (ng/g) in clam tissue samples collected in Prince William Sound, summer 1991.[a,b] Values in boldface are greater than MDL.

Species[c]	Lab ID	Sample wt.[d]	C10	C11	C12	C13	C14	C15	C16	C17	PRI	C18	PHY	C19	C20	C21	C22
Green Island																	
GC	29915	1.4	37.28	**49.62**	22.6	**59.41**	24.48	**437.51**	**46.51**	**143.5**	11.2	11.8	7.2	8.6	10.3	8.3	**26.4**
GC	29916	1.34	44.62	**49.95**	9.36	31.63	15.74	**353.92**	29.29	**116.7**	16.6	9.8	5.8	8.0	7.6	8.5	**24.0**
GC	29917	1.01	48.47	17.08	6.43	11.13	24.95	**552.81**	40.69	**161.1**	0.0	15.5	0.0	9.2	9.9	18.6	20.9
GC	29918	1.	62.35	**72.28**	12.45	**48.03**	24.53	**387.7**	**55.89**	**266.8**	13.6	33.8	14.5	**41.2**	**34.5**	**33.3**	**68.2**
HK	29910	0.81	97.46	**108.76**	11.21	**67.7**	24.53	**198.32**	43.63	41.2	21.5	20.6	14.4	18.5	20.2	18.3	**46.3**
MA	29845	1.08	0.0	38.27	10.98	**45.07**	15.15	37.88	25.35	31.5	9.7	21.5	8.7	**19.4**	27.2	**35.2**	**61.2**
MA	29846	1.01	0.0	43.71	22.0	**64.24**	31.28	53.98	41.54	**46.8**	19.7	33.2	9.4	**26.7**	**38.0**	**61.0**	**76.2**
MA	29847	1.04	0.0	0.0	10.6	40.48	18.41	33.06	22.84	22.2	9.4	27.9	9.3	**22.3**	29.9	**32.0**	**53.6**
MA	29848	1.04	0.0	17.57	15.92	**47.46**	17.96	39.11	23.2	26.9	11.3	24.4	7.5	**18.5**	**31.6**	25.4	**61.3**
MA	29849	1.03	0.0	19.0	10.25	**48.15**	17.01	61.68	21.59	23.5	13.1	19.2	9.8	12.7	21.1	20.6	**51.2**
MA	29850	1.04	0.0	14.44	10.3	**50.75**	16.27	36.4	24.84	24.3	18.8	21.2	8.4	**19.7**	**30.9**	**31.0**	**62.0**
MA	29851	1.01	0.0	21.95	17.23	**63.49**	18.7	48.63	24.22	15.0	18.8	25.5	9.2	**19.1**	**34.1**	**192.2**	**69.3**
MA	29852	0.84	0.0	30.52	15.16	**86.74**	19.1	48.44	29.24	39.2	15.0	26.4	9.8	**24.3**	33.7	**583.7**	**81.1**
MA	29853	0.48	0.0	27.91	22.63	**104.01**	36.87	82.04	40.08	39.8	41.3	26.4	14.2	24.0	36.7	**394.0**	**105.8**
MA	29854	1.03	**141.46**	17.18	13.25	**44.27**	17.57	68.42	23.95	28.0	**108.8**	13.2	15.4	9.9	19.9	**53.5**	**61.4**
MA	29855	0.82	0.0	20.67	17.62	**83.93**	20.39	35.72	21.24	31.9	23.0	15.5	7.3	14.3	23.7	**66.4**	**85.7**
MA	29856	1.03	0.0	23.46	19.62	**49.33**	23.94	34.62	18.85	22.7	4.0	11.8	6.6	13.6	14.2	**41.3**	**43.3**
MA	29857	0.55	0.0	45.22	26.38	**93.63**	30.73	54.6	42.9	63.3	20.3	42.2	15.8	**48.1**	37.2	**540.3**	**84.6**
MA	29858	0.91	0.0	0.0	28.67	**63.04**	18.89	37.31	22.5	33.8	9.7	22.1	7.7	**30.2**	24.7	**143.8**	**58.2**
MA	29859	0.87	0.0	42.67	20.1	**70.06**	27.89	42.37	49.66	**153.5**	58.0	**209.7**	**93.6**	**281.1**	**261.7**	**289.0**	**287.1**
PS	29893	1.12	0.0	29.23	6.73	**61.14**	19.23	**99.25**	36.04	31.1	27.1	19.6	14.0	14.1	24.5	**84.2**	**53.9**
PS	29894	1.07	0.0	25.74	11.92	**71.27**	20.65	**109.19**	37.84	31.3	28.8	22.9	13.6	14.6	27.7	**103.3**	**50.4**
PS	29895	1.12	0.0	29.22	0.0	**55.67**	28.63	**359.3**	42.64	25.6	21.9	23.8	13.9	**16.7**	**30.5**	**190.6**	**48.2**
PS	29896	1.38	0.0	32.05	9.2	**70.51**	23.78	**293.57**	32.24	23.0	12.9	18.2	6.4	9.8	21.0	14.9	**38.2**
PS	29897	1.22	0.0	28.22	7.12	**39.99**	9.76	45.09	24.7	19.2	8.8	12.1	8.0	9.9	16.2	16.9	**39.1**

Species [c]	Lab ID	Sample wt. [d]	C10	C11	C12	C13	C14	C15	C16	C17	PRI	C18	PHY	C19	C20	C21	C22
PS	29898	1.46	0.0	14.97	6.15	**38.26**	15.32	**232.15**	26.49	21.9	17.8	13.2	10.5	**11.8**	16.8	4.6	**35.2**
PS	29899	1.21	0.0	20.26	0.0	**53.47**	0.0	41.65	27.48	26.4	21.0	16.5	7.6	**18.2**	**32.5**	**56.9**	**55.8**
PS	29900	1.04	0.0	6.11	5.63	42.36	6.77	65.92	25.66	25.8	18.0	14.2	5.8	10.8	14.3	**174.2**	**28.2**
PS	29901	1.05	5.9	13.63	0.0	**84.57**	16.31	57.67	30.31	26.4	18.0	16.3	6.3	11.1	18.0	**88.8**	**52.2**
SG	29869	1.04	0.0	27.66	11.12	**92.16**	17.79	**115.37**	50.96	38.5	13.2	18.8	7.9	**16.1**	23.1	18.4	**67.8**
SG	29870	1.01	0.0	0.0	8.95	**118.79**	28.73	**366.82**	**55.17**	**46.1**	23.2	16.1	8.3	11.1	19.3	12.8	**68.7**
SG	29871	1.03	0.0	26.56	11.49	**67.02**	22.69	**231.87**	40.27	33.3	12.5	13.9	7.7	10.1	15.0	11.5	**45.2**
SG	29872	1.08	0.0	26.84	8.47	**84.09**	13.68	**155.74**	33.27	35.4	15.8	10.2	8.1	8.1	11.0	9.5	**43.4**
Montague Island																	
GC	29914	1.06	53.12	**66.24**	16.77	**69.24**	20.33	**115.43**	39.07	**169.9**	7.2	11.5	6.9	9.9	12.1	12.1	**36.3**
HK	29908	1.1	0.0	7.15	9.99	**61.88**	26.86	52.53	37.77	28.1	24.4	19.5	7.5	**17.2**	21.6	19.9	**49.2**
HK	29909	1.11	0.0	6.46	4.92	**96.47**	25.44	63.51	46.84	35.0	20.0	13.8	5.5	11.2	15.9	11.4	**43.5**
MA	29841	1.08	0.0	17.99	15.53	**71.64**	18.6	38.02	24.94	28.4	18.4	26.7	7.3	**18.9**	**35.7**	**32.2**	**74.2**
MA	29842	1.08	0.0	24.81	15.32	**73.23**	17.3	47.54	27.47	28.4	17.7	28.7	11.5	**21.8**	**36.1**	**36.2**	**70.8**
MA	29843	1.12	0.0	16.92	14.38	**50.17**	28.66	41.86	24.16	21.8	11.2	21.1	7.9	**17.6**	**29.3**	24.2	**56.6**
MA	29844	1.04	0.0	0.0	15.73	**51.06**	16.11	51.16	26.02	15.6	6.7	24.0	16.1	14.1	**31.8**	23.4	**78.5**
PS	29884	1.22	0.0	26.47	15.82	**83.46**	14.79	59.72	40.5	29.1	15.2	24.4	7.2	**19.4**	**28.4**	21.8	**56.3**
PS	29885	1.19	0.0	28.29	8.38	**55.29**	13.31	**144.69**	40.11	27.9	18.9	23.8	11.5	**15.2**	23.9	18.2	**47.8**
PS	29886	1.04	0.0	20.75	20.26	**51.09**	16.3	67.49	42.89	27.8	19.1	22.0	11.7	**19.0**	**31.9**	**29.9**	**57.3**
PS	29887	1.18	0.0	35.75	10.4	**47.7**	14.95	**160.1**	36.44	21.4	48.6	21.4	11.7	13.3	24.7	17.9	**46.6**
PS	29888	1.25	0.0	46.25	7.93	**57.03**	22.99	**173.6**	39.57	26.6	21.6	19.8	12.6	**13.3**	22.5	6.3	**46.4**
PS	29889	1.08	0.0	38.61	12.29	**86.03**	23.85	86.03	**56.04**	**47.1**	31.5	**38.3**	14.3	**33.4**	**41.7**	**36.5**	**76.0**
PS	29890	1.33	0.0	40.11	18.39	**71.11**	17.92	**82.4**	**60.02**	**42.1**	24.7	23.8	11.3	**14.8**	20.7	14.4	**39.4**
PS	29891	1.82	0.0	20.21	13.74	**59.16**	18.57	**85.37**	**40.5**	**32.0**	31.8	**21.1**	11.7	**14.3**	**21.4**	16.3	**38.7**
PS	29892	1.02	0.0	46.92	18.42	**59.15**	23.25	**240.04**	50.54	35.4	27.9	28.5	22.3	**19.9**	**32.5**	24.4	**49.4**
SG	29864	1.01	0.0	36.2	10.3	**61.1**	22.5	**143.9**	42.1	39.9	10.6	19.1	6.5	**16.7**	18.7	15.8	**49.0**
SG	29865	1.08	0.0	25.81	7.47	**65.12**	19.8	**154.88**	46.58	36.3	17.7	12.0	10.2	7.9	13.3	9.3	**45.3**
SG	29866	1.03	0.0	22.88	8.02	**71.17**	15.84	**132.67**	42.33	37.8	14.4	12.3	8.6	8.7	15.0	7.8	**47.0**
SG	29867	1.04	0.0	45.5	10.32	**72.63**	19.09	**97.39**	41.06	38.5	5.0	18.9	5.6	13.5	18.8	17.0	**51.3**

Species[c]	Lab ID	Sample wt.[d]	C10	C11	C12	C13	C14	C15	C16	C17	PRI	C18	PHY	C19	C20	C21	C22
SG	29868	1.	0.0	28.66	9.65	**80.77**	16.98	99.88	40.43	32.8	4.2	19.7	6.9	13.6	20.6	16.7	**47.3**
Squirrel Island (Western Knight Island)																	
HK	29911	1.03	43.71	**53.73**	21.95	**51.72**	20.23	**110.51**	48.1	**44.5**	**90.3**	22.1	11.1	**22.8**	24.6	23.3	**45.3**
HK	29912	1.04	59.94	**70.4**	11.69	**45.26**	12.92	79.01	28.48	23.8	37.2	8.3	0.0	7.2	9.7	8.6	**22.9**
HK	29913	1.04	56.93	**84.32**	15.17	**54.43**	17.13	**185.78**	37.12	24.4	46.0	10.3	6.6	14.2	10.9	10.7	**31.2**
MA	29860	1.01	0.0	18.56	23.3	**70.28**	19.91	91.06	36.35	**97.0**	**203.8**	**99.6**	**49.4**	**168.9**	**136.5**	**142.4**	**167.3**
MA	29861	1.06	0.0	39.52	23.28	**97.81**	19.17	46.07	29.54	**61.0**	**60.2**	17.8	9.4	**16.6**	25.5	26.1	**58.7**
MA	29862	1.04	0.0	33.1	18.59	**110.47**	20.05	42.18	32.16	**48.9**	34.5	19.6	13.3	15.9	22.3	11.6	**56.4**
MA	29863	1.04	0.0	33.0	13.95	**58.44**	15.13	31.82	23.28	35.8	32.2	19.8	14.4	**16.1**	20.2	17.8	**45.5**
PS	29902	1.04	0.0	0.0	5.58	**59.97**	16.36	32.82	26.69	25.7	47.8	17.2	12.5	15.5	19.2	15.4	**33.8**
PS	29903	1.02	0.0	12.29	0.0	**79.5**	17.39	35.83	28.36	25.1	**143.0**	13.4	11.4	13.2	19.0	**32.6**	**41.9**
PS	29904	1.08	0.0	6.5	0.0	38.6	17.23	41.52	24.38	19.5	**82.3**	11.4	11.3	10.2	15.7	9.4	**30.4**
PS	29905	1.1	11.33	17.9	5.71	**41.42**	17.61	82.74	26.85	15.9	**100.0**	12.8	12.0	11.5	15.6	11.9	**25.8**
PS	29906	1.4	0.0	0.0	3.84	**39.66**	11.34	42.0	14.81	13.8	**57.1**	9.8	5.1	8.8	14.2	11.9	**26.4**
PS	29907	1.08	0.0	0.0	4.78	**59.65**	21.35	**418.95**	27.44	30.0	**151.2**	16.1	6.1	12.1	17.2	28.0	**43.1**
SG	29873	1.	0.0	14.99	10.68	**93.64**	17.63	**183.65**	33.5	27.9	17.3	16.9	11.1	11.0	16.0	10.8	**51.8**
SG	29874	1.16	0.0	12.4	8.57	**88.23**	7.13	**272.95**	33.78	25.1	14.2	11.0	6.5	11.1	14.3	7.4	**46.4**
SG	29875	1.07	0.0	20.34	6.08	**54.28**	12.55	**143.34**	28.42	31.6	11.7	20.9	5.6	13.6	17.3	14.5	**42.9**
SG	29876	1.13	0.0	19.82	11.62	**92.63**	19.37	**234.56**	33.16	30.0	13.9	16.1	4.9	13.0	13.9	10.0	**46.0**
SG	29877	1.06	0.0	25.32	6.86	**84.41**	16.98	**151.2**	28.29	20.6	21.8	19.1	11.0	11.8	13.5	11.7	**56.3**
SG	29878	1.13	0.0	26.95	8.72	**67.43**	22.35	**347.05**	32.34	**36.7**	35.1	17.7	4.7	12.6	15.2	12.3	**45.7**
SG	29879	1.08	0.0	20.62	9.83	**84.88**	30.17	**392.81**	39.43	35.9	45.3	11.8	15.1	8.6	10.7	8.2	**37.5**
SG	29880	1.26	28.99	18.81	5.43	**58.07**	12.02	55.65	34.51	27.2	**79.9**	6.9	7.0	6.8	7.9	7.9	**25.8**
SG	29881	1.11	0.0	33.87	27.41	**64.08**	**114.65**	**272.24**	**105.0**	**47.3**	19.2	21.3	11.1	**18.2**	23.7	21.6	**34.3**
SG	29882	1.26	0.0	**45.5**	8.57	**66.38**	28.27	**420.83**	**45.99**	**37.8**	33.6	18.6	10.4	**16.8**	**27.9**	23.7	**51.3**
SG	29883	1.12	0.0	**46.14**	10.81	**65.13**	28.52	**408.29**	**50.43**	**39.7**	16.9	21.3	11.2	**16.8**	27.3	16.7	**44.8**
SG	29919	1.01	47.01	**67.94**	31.61	**57.16**	21.11	**220.21**	26.99	**40.7**	28.9	19.1	7.6	**23.8**	21.9	21.8	**48.1**

Table A-2. Continued.

Species[c]	Lab ID	Sample wt.[d]	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	Total	UCM[e]
Green Island																
GC	29915	1.4	**15.77**	17.19	15.26	13.43	**14.55**	14.14	16.17	**23.51**	7.57	0.0	0.0	0.0	1042.3	**1.4**
GC	29916	1.34	**14.56**	14.15	14.35	9.23	12.81	9.33	9.74	11.35	0.0	0.0	0.0	0.0	827.0	2.3
GC	29917	1.01	**35.0**	**80.5**	28.7	19.1	18.5	10.2	15.2	28.13	29.19	24.23	17.14	15.48	1258.1	0.0
GC	29918	1.	**65.58**	**72.01**	**67.29**	**64.07**	**76.12**	**78.43**	**90.38**	**123.66**	**120.12**	**58.41**	0.0	0.0	1985.2	11.2
HK	29910	0.81	**29.64**	31.47	29.13	21.82	23.95	26.69	32.18	24.72	33.91	28.06	0.0	0.0	1034.2	56.1
MA	29845	1.08	**39.77**	**39.06**	**51.42**	**34.75**	**35.25**	**27.62**	40.17	**40.11**	**59.84**	**59.52**	**49.54**	41.82	906.0	4.9
MA	29846	1.01	**52.05**	**62.48**	**63.77**	**48.77**	**40.63**	**36.36**	**48.38**	**60.03**	**72.69**	**78.97**	**67.9**	60.35	1260.1	0.4
MA	29847	1.04	**43.3**	**43.1**	**95.6**	**31.6**	**39.6**	**24.4**	**70.5**	**33.79**	**57.81**	44.08	39.26	35.18	890.2	0.0
MA	29848	1.04	**42.12**	**47.99**	**52.07**	**39.13**	**45.01**	**31.66**	**59.34**	**47.26**	**67.71**	**65.7**	**57.33**	50.54	974.0	0.0
MA	29849	1.03	**41.38**	**52.66**	**52.66**	**34.05**	**39.49**	**30.59**	43.55	**37.72**	**58.5**	**50.3**	**49.87**	42.94	882.6	0.0
MA	29850	1.04	**47.72**	**54.7**	**49.75**	**39.33**	**34.38**	**30.54**	**48.23**	**39.54**	**58.07**	**57.96**	**49.51**	47.02	926.1	0.0
MA	29851	1.01	**46.18**	**45.78**	**44.07**	**31.53**	**48.29**	**41.26**	**56.73**	**63.59**	**86.75**	**92.86**	**74.85**	70.24	1279.6	1.7
MA	29852	0.84	**50.43**	**53.86**	**56.29**	**47.39**	**40.32**	**32.74**	44.46	**42.61**	**60.62**	55.98	52.31	43.47	1613.9	2.6
MA	29853	0.48	**67.51**	**63.6**	66.61	32.05	44.71	25.32	43.1	30.47	32.09	29.17	32.3	36.73	1499.4	**1.5**
MA	29854	1.03	**36.77**	**29.94**	31.95	17.48	25.32	16.88	42.4	23.54	35.42	38.09	30.82	21.51	986.3	0.0
MA	29855	0.82	**43.48**	**37.31**	42.77	30.84	**36.2**	15.67	50.56	17.99	41.73	27.64	19.73	15.5	846.8	0.0
MA	29856	1.03	**30.47**	28.97	**35.6**	12.77	25.04	11.97	24.54	13.56	17.39	10.72	0.0	0.0	538.3	7.8
MA	29857	0.55	**72.4**	**76.7**	**79.5**	**73.4**	**75.8**	**47.2**	66.7	**64.36**	**89.25**	74.64	50.52	28.67	1944.4	0.0
MA	29858	0.91	**54.73**	**60.61**	**65.68**	**61.11**	**69.53**	**51.69**	**68.92**	**73.8**	**88.04**	**101.2**	**61.09**	20.98	1278.0	12.9
MA	29859	0.87	**252.3**	**253.39**	**267.75**	**232.3**	**299.53**	**316.86**	**401.23**	**456.07**	**564.13**	**650.71**	**547.85**	**461.17**	6589.7	27.8
PS	29893	1.12	**39.53**	**35.85**	**36.25**	**28.8**	**31.08**	**26.42**	**46.78**	**34.24**	**44.59**	**50.88**	39.68	27.95	962.1	0.0
PS	29894	1.07	**32.09**	**31.08**	24.7	19.84	19.23	16.7	27.43	**28.44**	27.46	33.87	27.79	25.51	883.4	0.0
PS	29895	1.12	**32.2**	**33.6**	28.6	24.3	22.7	**23.9**	32.9	**35.95**	31.99	**50.61**	33.49	37.45	1274.3	0.0
PS	29896	1.38	**19.54**	21.85	20.64	16.51	16.01	16.01	28.1	**25.98**	28.15	**37.57**	22.2	29.23	887.6	0.0
PS	29897	1.22	**17.9**	19.4	16.9	10.1	12.3	7.5	19.1	8.73	8.63	0.0	0.0	7.33	413.0	0.0
PS	29898	1.46	**18.41**	18.41	22.84	12.88	12.58	11.47	19.52	13.38	14.79	16.32	10.23	1.85	637.8	0.0
PS	29899	1.21	**37.3**	**32.7**	29.5	23.6	21.2	**21.0**	20.8	**29.93**	30.67	37.15	27.38	21.02	710.0	0.0

Species[c]	Lab ID	Sample wt.[d]	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	Total	UCM[e]
PS	29900	1.04	**22.37**	23.38	19.84	14.07	12.96	13.66	17.11	18.97	17.28	18.86	14.34	7.9	644.5	0.0
PS	29901	1.05	**27.73**	**29.58**	20.85	17.36	16.23	18.69	17.56	**30.4**	22.1	30.63	17.89	4.79	699.3	4.3
SG	29869	1.04	**42.46**	**46.73**	**46.83**	**31.72**	**33.81**	**32.32**	36.39	**38.59**	38.49	**47.07**	30.64	28.52	972.4	0.0
SG	29870	1.01	**33.0**	**35.5**	**35.8**	**32.4**	21.2	19.1	22.9	19.58	22.79	27.29	18.19	6.53	1078.3	0.0
SG	29871	1.03	**29.6**	**33.6**	31.3	26.8	22.5	18.4	27.3	22.17	21.53	22.07	19.59	15.29	839.2	1.8
SG	29872	1.08	**27.8**	**30.5**	29.6	24.2	19.5	15.5	17.9	16.51	16.4	16.62	14.69	8.36	701.2	0.0
Montague Island																
GC	29914	1.06	**18.07**	22.07	15.71	13.35	12.63	14.06	15.91	21.02	7.14	25.65	0.0	11.63	823.3	3.8
HK	29908	1.1	**26.5**	26.5	22.92	18.93	19.34	20.47	18.93	22.97	10.73	21.47	0.0	0.0	592.3	1.4
HK	29909	1.11	**18.6**	17.69	13.92	9.25	11.79	11.89	15.04	19.21	16.28	12.24	0.0	0.0	545.8	21.7
MA	29841	1.08	**56.02**	**55.72**	**64.25**	**52.05**	**63.75**	**54.13**	**77.04**	**56.64**	**76.29**	**82.35**	**60.61**	54.34	1181.7	4.6
MA	29842	1.08	**56.3**	**63.1**	**62.9**	**51.2**	**55.6**	**36.0**	**60.2**	**41.98**	**76.0**	**56.65**	**49.96**	42.62	1109.4	0.0
MA	29843	1.12	**46.2**	**43.3**	**40.3**	**30.4**	**39.4**	**24.8**	37.9	**37.52**	**50.2**	**50.84**	**40.29**	37.63	844.6	0.0
MA	29844	1.04	**52.2**	**50.7**	**42.7**	26.9	**35.6**	**25.4**	39.9	**35.97**	**53.84**	**47.88**	34.26	34.37	850.0	0.0
PS	29884	1.22	**35.34**	**34.84**	**33.03**	**27.29**	**25.47**	**27.49**	**41.08**	**39.58**	**49.21**	**57.43**	**49.64**	43.48	906.4	18.3
PS	29885	1.19	**30.3**	**27.5**	26.5	21.8	19.9	19.2	23.6	24.94	33.07	32.97	30.08	33.39	800.5	13.4
PS	29886	1.04	**36.68**	**36.48**	33.1	26.74	23.06	22.17	24.95	26.27	28.61	39.68	24.25	22.02	781.5	6.7
PS	29887	1.18	**29.38**	**26.76**	21.93	**17.61**	**17.1**	15.59	25.55	20.41	22.69	28.33	23.99	21.06	781.3	0.9
PS	29888	1.25	**29.8**	**28.3**	27.9	20.7	19.2	17.4	23.3	19.38	26.52	28.26	18.51	20.25	796.0	0.0
PS	29889	1.08	**44.81**	**36.65**	**34.34**	24.97	**24.77**	18.83	21.35	18.0	13.96	22.25	0.0	15.05	896.7	0.0
PS	29890	1.33	**23.93**	20.41	17.9	13.17	13.37	11.46	15.79	15.16	21.77	18.41	17.87	11.26	681.7	0.0
PS	29891	1.82	**24.66**	**26.17**	**23.05**	**17.92**	**14.6**	**14.39**	13.59	**19.84**	19.62	21.88	13.58	12.29	646.5	2.8
PS	29892	1.02	**35.14**	**33.42**	29.77	22.38	20.66	18.83	28.35	20.18	24.37	24.37	28.78	0.0	964.9	0.0
SG	29864	1.01	**38.5**	**42.5**	**37.3**	27.3	**30.3**	**28.9**	35.8	**53.57**	**57.31**	**81.15**	**64.04**	61.69	1050.8	1.4
SG	29865	1.08	**26.3**	**28.1**	23.6	20.0	14.0	12.8	13.4	14.86	12.27	18.09	6.46	7.97	669.5	0.0
SG	29866	1.03	**27.5**	**30.9**	29.2	16.8	15.5	15.9	15.6	16.74	20.85	21.6	20.09	15.56	690.8	0.0
SG	29867	1.04	**35.38**	**40.05**	**34.59**	**32.9**	23.26	**25.34**	30.61	**46.13**	**48.05**	**68.08**	**49.86**	46.66	935.5	0.0
SG	29868	1.	**31.34**	**37.01**	30.24	26.06	22.48	**26.76**	27.16	**45.35**	37.02	**65.18**	39.02	42.71	868.5	0.0
Squirrel Island																
HK	29911	1.03	**33.6**	**34.92**	30.97	27.83	**33.6**	**32.69**	37.75	**49.75**	**49.87**	**50.68**	23.47	0.0	1039.1	27.0

Species[c]	Lab ID	Sample wt.[d]	C23	C24	C25	C26	C27	C28	C29	C30	C31	C32	C33	C34	Total	UCM[e]
HK	29912	1.04	**16.19**	15.98	11.81	8.96	9.06	8.25	8.76	10.26	0.0	0.0	0.0	0.0	514.7	6.8
HK	29913	1.04	**17.91**	20.88	17.09	15.97	16.58	**25.59**	20.68	30.45	20.13	21.13	0.0	0.0	811.6	10.5
MA	29860	1.01	**156.1**	**159.0**	**147.4**	**128.3**	**188.1**	**199.0**	**227.7**	**269.6**	**345.83**	**406.21**	**343.55**	**294.25**	4189.4	0.0
MA	29861	1.06	**35.24**	**42.78**	**40.2**	**34.54**	**39.51**	**23.82**	40.89	**35.38**	**45.02**	**55.8**	38.11	39.26	1001.2	0.0
MA	29862	1.04	**37.44**	**42.8**	**44.88**	21.75	**44.19**	**24.43**	34.56	27.66	**45.78**	46.63	34.55	32.11	915.8	0.0
MA	29863	1.04	**37.18**	**40.66**	**42.84**	26.14	**42.05**	**28.93**	42.84	**42.93**	**61.85**	**67.77**	**45.89**	47.58	904.1	0.0
PS	29902	1.04	**28.99**	27.08	22.15	16.81	14.4	17.72	22.25	21.94	22.06	23.23	12.32	0.0	557.5	0.0
PS	29903	1.02	**24.28**	28.73	19.02	12.14	12.24	**14.57**	6.68	8.83	11.53	7.53	0.0	0.0	618.5	7.2
PS	29904	1.08	**20.04**	19.94	14.65	10.48	8.95	11.19	6.82	12.17	0.0	0.0	0.0	0.0	422.7	0.0
PS	29905	1.1	**16.82**	18.45	14.47	10.4	9.68	10.7	10.91	15.03	14.29	0.0	0.0	0.0	529.8	0.0
PS	29906	1.4	**16.98**	17.08	14.44	13.02	13.02	17.8	18.71	**26.21**	21.38	28.51	12.44	9.79	468.1	0.0
PS	29907	1.08	**28.38**	**29 58**	22.84	14.89	**35.62**	19.12	24.55	**38.72**	40.28	43.83	27.85	15.87	1177.5	15.9
SG	29873	1.	**32.4**	**37.2**	32.8	28.7	23.5	22.6	27.9	27.78	33.32	38.2	27.56	19.97	868.8	0.0
SG	29874	1.16	**30.1**	**34.8**	**32.2**	22.1	**23.0**	19.9	22.1	22.16	22.7	26.25	15.6	15.82	845.8	0.0
SG	29875	1.07	**30.32**	**32.51**	31.52	25.95	**28.34**	20.18	26.75	24.09	27.6	22.61	16.56	14.33	723.9	9.8
SG	29876	1.13	**25.1**	**33.0**	26.0	24.1	20.9	13.1	21.3	**14.47**	20.69	21.44	13.61	12.33	805.0	0.0
SG	29877	1.06	**35.45**	**40.51**	**38.82**	27.41	**28.6**	23.24	36.54	**29.59**	31.62	35.36	25.53	25.32	856.8	0.0
SG	29878	1.13	**30.09**	**33.66**	28.31	28.11	**34.45**	20.49	34.75	**27.75**	32.3	39.82	29.55	17.79	1041.9	1.2
SG	29879	1.08	**24.09**	27.32	24.69	16.19	16.39	12.45	12.65	10.47	7.41	9.59	0.0	0.0	912.1	0.0
SG	29880	1.26	**19.3**	23.8	20.6	12.6	11.1	6.8	8.0	7.19	13.61	6.21	1.96	0.0	514.1	0.0
SG	29881	1.11	**34.15**	**29.39**	25.71	18.07	18.17	15.79	25.52	19.32	20.91	20.91	19.21	15.07	1076.2	22.0
SG	29882	1.26	**37.7**	**33.6**	26.6	24.5	**25.2**	**21.0**	28.8	**25.57**	33.99	34.52	24.3	32.71	1184.1	18.1
SG	29883	1.12	**38.54**	**35.46**	26.22	16.69	17.48	16.59	25.63	20.56	21.62	26.52	14.49	11.29	1075.1	18.2
SG	29919	1.01	**35.53**	**38.88**	34.92	**32.58**	**39.79**	**41.42**	**47.91**	**65.79**	**76.99**	**79.65**	40.28	7.5	1225.2	6.3

[a] Reported by GERG, NRDA Aliphatic Hydrocarbon Data, Catalog 6712.

[b] Abbreviations: C_{10} through C_{34}: n-alkanes (the subscript represents the number of carbon atoms); PRI: pristane; PHY: phytane; UCM: unresolved complex mixture; Total: total aliphatic (not including the UCM).

[c] Species: GC-*Gari california*, HK-*Humilaria kennerleyi*, MA-*Mya arenaria*, PS-*Protothaca staminea*, SG-*Serripes groenlandicus*.

[d] Sample wet weight, in grams.

[e] $\mu g/g$.

Table A-3. Aromatic hydrocarbon concentrations (ng/g) in clam tissue samples collected in Prince William Sound, summer 1991[a, b]. Values in boldface are greater than MDL.

Species[c]	Lab ID	Sample wt.[d]	NAP	C1N	C2N	C3N	C4N	BIP	ANP	ANH	FLU	C1F	C2F	C3F	PHE	ANT	C1P	C2P	C3P	C4P	DIB	C1D
Green Island																						
GC	29915	1.4	14.1	5.13	0.0	0.0	0.0	1.52	0.83	4.39	2.0	0.0	0.0	0.0	2.01	0.6	0.0	0.0	0.0	0.0	0.14	0.0
GC	29916	1.34	13.33	4.38	0.0	0.0	0.0	3.67	0.76	3.45	1.93	0.0	0.0	0.0	2.42	1.41	0.0	0.0	0.0	0.0	0.77	0.0
GC	29917	1.01	9.66	6.68	0.0	0.0	0.0	3.42	0.84	1.71	1.8	0.0	0.0	0.0	2.7	1.84	0.0	0.0	0.0	0.0	0.53	0.0
GC	29918	1.	21.22	6.22	0.0	0.0	0.0	1.17	0.89	1.56	3.51	0.0	0.0	0.0	4.06	0.63	0.0	0.0	0.0	0.0	0.79	0.0
HK	29910	0.81	25.95	8.72	0.0	0.0	0.0	4.53	2.84	6.24	2.3	0.0	0.0	0.0	3.79	2.19	0.0	0.0	0.0	0.0	1.2	0.0
MA	29845	1.08	**24.02**	7.09	0.0	0.0	0.0	2.42	0.74	0.82	4.04	0.0	0.0	0.0	3.01	1.05	0.0	0.0	0.0	0.0	0.36	0.0
MA	29846	1.01	**23.68**	11.46	0.0	0.0	0.0	2.15	2.03	3.75	5.17	0.0	0.0	0.0	5.46	0.82	0.0	0.0	0.0	0.0	0.96	0.0
MA	29847	1.04	16.38	8.96	0.0	0.0	0.0	2.91	2.27	2.79	1.38	0.0	0.0	0.0	1.8	0.32	0.0	0.0	0.0	0.0	1.21	0.0
MA	29848	1.04	18.65	8.23	0.0	0.0	0.0	4.29	0.56	1.38	1.83	0.0	0.0	0.0	4.88	1.18	0.0	0.0	0.0	0.0	1.23	0.0
MA	29849	1.03	17.17	7.89	0.0	0.0	0.0	3.01	1.17	2.86	2.36	0.0	0.0	0.0	2.51	1.55	0.0	0.0	0.0	0.0	0.65	0.0
MA	29850	1.04	**22.65**	10.36	0.0	0.0	0.0	3.35	1.79	4.57	3.9	0.0	0.0	0.0	3.2	2.14	0.0	0.0	0.0	0.0	0.34	0.0
MA	29851	1.01	16.36	10.09	0.0	0.0	0.0	4.9	2.8	3.41	2.46	0.0	0.0	0.0	2.85	2.39	0.0	0.0	0.0	0.0	1.07	0.0
MA	29852	0.84	26.16	14.11	0.0	0.0	0.0	2.43	1.86	1.39	1.93	0.0	0.0	0.0	4.07	3.22	0.0	0.0	0.0	0.0	0.26	0.0
MA	29853	0.48	44.13	17.18	0.0	0.0	0.0	9.37	3.75	5.29	9.86	0.0	0.0	0.0	10.85	5.56	0.0	0.0	0.0	0.0	2.18	0.0
MA	29854	1.03	19.46	8.05	0.0	0.0	0.0	1.95	0.87	1.57	1.1	0.0	0.0	0.0	3.45	1.15	0.0	0.0	0.0	0.0	1.59	0.0
MA	29855	0.82	20.84	12.02	0.0	0.0	0.0	2.84	1.47	2.54	1.62	0.0	0.0	0.0	3.25	1.48	0.0	0.0	0.0	0.0	2.16	0.0
MA	29856	1.03	18.21	9.25	0.0	0.0	0.0	2.67	1.83	2.18	1.7	0.0	0.0	0.0	1.93	0.69	0.0	0.0	0.0	0.0	1.78	0.0
MA	29857	0.55	28.5	**17.7**	0.0	0.0	0.0	3.23	1.62	5.47	3.47	0.0	0.0	0.0	4.22	1.27	0.0	0.0	0.0	0.0	1.57	0.0
MA	29858	0.91	**26.81**	7.73	0.0	0.0	0.0	7.22	2.25	1.87	1.41	0.0	0.0	0.0	2.85	1.78	0.0	0.0	0.0	0.0	1.5	0.0
MA	29859	0.87	**26.58**	5.74	0.0	0.0	0.0	4.76	1.23	1.71	2.58	0.0	0.0	0.0	4.34	1.15	0.0	0.0	0.0	0.0	1.71	0.0
PS	29893	1.12	**27.92**	5.93	0.0	0.0	0.0	2.45	0.85	1.24	2.65	0.0	0.0	0.0	3.22	1.14	0.0	0.0	0.0	0.0	1.51	0.0
PS	29894	1.07	20.99	11.96	0.0	0.0	0.0	2.74	1.38	2.19	1.86	0.0	0.0	0.0	3.12	1.42	0.0	0.0	0.0	0.0	0.86	0.0
PS	29895	1.12	**22.23**	12.83	0.0	0.0	0.0	1.85	1.2	1.44	1.92	0.0	0.0	0.0	2.26	1.03	0.0	0.0	0.0	0.0	1.06	0.0
PS	29896	1.38	**18.46**	6.66	0.0	0.0	0.0	3.47	1.17	2.01	1.57	0.0	0.0	0.0	2.82	1.34	0.0	0.0	0.0	0.0	0.59	0.0
PS	29897	1.22	**22.99**	7.32	0.0	0.0	0.0	1.73	0.86	1.51	1.33	0.0	0.0	0.0	3.53	2.3	0.0	0.0	0.0	0.0	0.8	0.0

Species[c]	Lab ID	Sample wt.[d]	NAP	C1N	C2N	C3N	C4N	BIP	ANP	ANH	FLU	C1F	C2F	C3F	PHE	ANT	C1P	C2P	C3P	C4P	DIB	C1D
PS	29898	1.46	14.7	6.03	0.0	0.0	0.0	1.3	1.13	1.09	2.56	0.0	0.0	0.0	2.27	1.59	0.0	0.0	0.0	0.0	0.56	0.0
PS	29899	1.21	**19.85**	10.26	0.0	0.0	0.0	3.72	1.76	1.58	1.42	0.0	0.0	0.0	3.18	0.55	0.0	0.0	0.0	0.0	1.08	0.0
PS	29900	1.04	20.96	11.5	0.0	0.0	0.0	7.37	0.78	1.59	3.79	0.0	0.0	0.0	4.59	2.27	0.0	0.0	0.0	0.0	1.29	0.0
PS	29901	1.05	**24.9**	11.16	0.0	0.0	0.0	3.59	2.22	3.11	2.33	0.0	0.0	0.0	4.98	1.81	0.0	0.0	0.0	0.0	1.52	0.0
SG	29869	1.04	9.7	8.75	0.0	0.0	0.0	5.05	2.08	1.63	2.48	0.0	0.0	0.0	4.48	0.99	0.0	0.0	0.0	0.0	1.12	0.0
SG	29870	1.01	12.09	10.35	0.0	0.0	0.0	2.62	2.47	3.64	3.58	0.0	0.0	0.0	3.76	2.1	0.0	0.0	0.0	0.0	0.4	0.0
SG	29871	1.03	9.83	8.12	0.0	0.0	0.0	2.39	0.98	3.26	1.8	0.0	0.0	0.0	3.84	0.81	0.0	0.0	0.0	0.0	1.52	0.0
SG	29872	1.08	10.85	11.85	0.0	0.0	0.0	2.66	0.99	1.56	3.02	0.0	0.0	0.0	2.96	1.28	0.0	0.0	0.0	0.0	0.69	0.0
Montague Island																						
GC	29914	1.06	17.02	7.19	0.0	0.0	0.0	3.19	1.12	3.2	1.64	0.0	0.0	0.0	3.41	1.49	0.0	0.0	0.0	0.0	1.0	0.0
HK	29908	1.1	**23.5**	7.39	0.0	0.0	0.0	1.15	2.25	3.74	4.38	0.0	0.0	0.0	4.24	3.2	0.0	0.0	0.0	0.0	3.47	0.0
HK	29909	1.11	18.39	8.81	0.0	0.0	0.0	1.51	0.86	1.12	1.87	0.0	0.0	0.0	4.23	1.97	0.0	0.0	0.0	0.0	1.02	0.0
MA	29841	1.08	**24.18**	9.43	0.0	0.0	0.0	9.52	0.84	2.5	3.27	0.0	0.0	0.0	4.94	2.65	0.0	0.0	0.0	0.0	1.62	0.0
MA	29842	1.08	**27.11**	10.48	0.0	0.0	0.0	4.5	2.26	3.18	5.88	0.0	0.0	0.0	4.97	1.63	0.0	0.0	0.0	0.0	1.76	0.0
MA	29843	1.12	19.52	7.21	0.0	0.0	0.0	3.2	0.77	6.0	1.91	0.0	0.0	0.0	3.12	1.73	0.0	0.0	0.0	0.0	0.66	0.0
MA	29844	1.04	**24.43**	9.88	0.0	0.0	0.0	3.16	1.38	2.33	3.48	0.0	0.0	0.0	3.65	2.44	0.0	0.0	0.0	0.0	0.94	0.0
PS	29884	1.22	**19.86**	6.88	0.0	0.0	0.0	2.14	2.74	0.87	1.29	0.0	0.0	0.0	2.7	0.84	0.0	0.0	0.0	0.0	0.63	0.0
PS	29885	1.19	18.78	8.63	0.0	0.0	0.0	4.72	1.46	2.05	1.64	0.0	0.0	0.0	2.99	1.89	0.0	0.0	0.0	0.0	0.39	0.0
PS	29886	1.04	7.95	6.85	0.0	0.0	0.0	2.83	0.63	2.41	1.89	0.0	0.0	0.0	3.56	1.61	0.0	0.0	0.0	0.0	1.94	0.0
PS	29887	1.18	**19.92**	9.49	0.0	0.0	0.0	11.86	0.9	3.09	1.69	0.0	0.0	0.0	3.97	2.19	0.0	0.0	0.0	0.0	0.87	0.0
PS	29888	1.25	**21.86**	11.9	0.0	0.0	0.0	5.63	1.19	1.84	8.24	0.0	0.0	0.0	4.24	1.19	0.0	0.0	0.0	0.0	1.08	0.0
PS	29889	1.08	**23.18**	7.43	0.0	0.0	0.0	3.78	1.28	4.03	4.1	0.0	0.0	0.0	4.04	0.73	0.0	0.0	0.0	0.0	0.46	0.0
PS	29890	1.33	16.99	11.22	0.0	0.0	0.0	2.48	1.09	1.25	1.44	0.0	0.0	0.0	3.01	0.44	0.0	0.0	0.0	0.0	0.37	0.0
PS	29891	1.82	**15.78**	7.99	0.0	0.0	0.0	2.79	0.87	1.02	1.3	0.0	0.0	0.0	2.72	0.49	0.0	0.0	0.0	0.0	0.93	0.0
PS	29892	1.02	**24.84**	11.89	0.0	0.0	0.0	5.35	2.23	1.35	3.25	0.0	0.0	0.0	3.15	1.2	0.0	0.0	0.0	0.0	1.07	0.0
SG	29864	1.01	10.22	8.73	0.0	0.0	0.0	2.58	1.79	7.76	3.76	0.0	0.0	0.0	3.54	1.03	0.0	0.0	0.0	0.0	0.78	0.0
SG	29865	1.08	8.96	8.38	0.0	0.0	0.0	3.31	1.35	3.18	1.66	0.0	0.0	0.0	3.72	1.82	0.0	0.0	0.0	0.0	1.26	0.0
SG	29866	1.03	11.34	5.51	0.0	0.0	0.0	3.41	2.42	2.5	1.74	0.0	0.0	0.0	3.16	2.0	0.0	0.0	0.0	0.0	0.84	0.0
SG	29867	1.04	11.14	6.97	0.0	0.0	0.0	3.62	1.62	0.75	0.91	0.0	0.0	0.0	3.58	1.38	0.0	0.0	0.0	0.0	1.6	0.0

Species[c]	Lab ID	Sample wt.[d]	NAP	C1N	C2N	C3N	C4N	BIP	ANP	ANH	FLU	C1F	C2F	C3F	PHE	ANT	C1P	C2P	C3P	C4P	DIB	C1D
SG	29868	1.	13.69	11.8	0.0	0.0	0.0	4.0	2.24	2.73	2.96	0.0	0.0	0.0	1.98	0.68	0.0	0.0	0.0	0.0	1.5	0.0
Squirrel Island																						
HK	29911	1.03	20.86	9.14	0.0	0.0	0.0	4.99	0.81	2.07	1.45	0.0	0.0	0.0	3.99	2.8	0.0	0.0	0.0	0.0	0.47	0.0
HK	29912	1.04	17.29	6.48	0.0	0.0	0.0	1.23	2.11	2.1	0.91	0.0	0.0	0.0	2.15	1.82	0.0	0.0	0.0	0.0	0.52	0.0
HK	29913	1.04	20.39	6.28	0.0	0.0	0.0	2.94	1.22	2.27	1.8	0.0	0.0	0.0	3.5	2.94	0.0	0.0	0.0	0.0	0.27	0.0
MA	29860	1.01	**22.5**	10.84	0.0	0.0	0.0	4.89	2.24	1.39	1.69	0.0	0.0	0.0	2.19	1.67	0.0	0.0	0.0	0.0	0.97	0.0
MA	29861	1.06	7.61	10.06	0.0	0.0	0.0	5.68	1.79	1.17	3.4	0.0	0.0	0.0	3.52	2.8	0.0	0.0	0.0	0.0	1.15	0.0
MA	29862	1.04	12.32	11.84	0.0	0.0	0.0	4.2	1.1	3.25	5.21	0.0	0.0	0.0	4.78	0.8	0.0	0.0	0.0	0.0	0.75	0.0
MA	29863	1.04	15.75	**31.89**	0.0	0.0	0.0	6.83	2.96	3.73	2.49	0.0	0.0	0.0	9.57	6.78	0.0	0.0	0.0	0.0	3.98	0.0
PS	29902	1.04	20.69	12.31	0.0	0.0	0.0	7.68	1.63	1.07	1.11	0.0	0.0	0.0	4.2	1.2	0.0	0.0	0.0	0.0	0.94	0.0
PS	29903	1.02	**22.55**	11.76	0.0	0.0	0.0	4.77	0.89	2.69	3.36	0.0	0.0	0.0	3.34	1.86	0.0	0.0	0.0	0.0	0.89	0.0
PS	29904	1.08	14.78	5.27	0.0	0.0	0.0	2.78	1.78	4.11	2.03	0.0	0.0	0.0	3.59	1.1	0.0	0.0	0.0	0.0	0.99	0.0
PS	29905	1.1	20.01	7.04	0.0	0.0	0.0	2.17	0.93	2.07	2.2	0.0	0.0	0.0	5.01	1.59	0.0	0.0	0.0	0.0	1.09	0.0
PS	29906	1.4	**16.56**	6.36	0.0	0.0	0.0	2.78	1.13	2.27	1.87	0.0	0.0	0.0	2.9	0.63	0.0	0.0	0.0	0.0	0.98	0.0
PS	29907	1.08	20.76	4.75	0.0	0.0	0.0	4.02	1.8	2.88	3.75	0.0	0.0	0.0	3.65	1.07	0.0	0.0	0.0	0.0	2.01	0.0
SG	29873	1.	8.49	12.25	0.0	0.0	0.0	4.25	2.97	5.18	2.68	0.0	0.0	0.0	2.66	1.82	0.0	0.0	0.0	0.0	1.57	0.0
SG	29874	1.16	8.28	11.13	0.0	0.0	0.0	4.79	2.58	2.6	1.66	0.0	0.0	0.0	2.2	0.75	0.0	0.0	0.0	0.0	0.35	0.0
SG	29875	1.07	8.27	9.87	0.0	0.0	0.0	3.3	1.65	3.04	3.75	0.0	0.0	0.0	2.97	2.34	0.0	0.0	0.0	0.0	1.37	0.0
SG	29876	1.13	7.34	6.2	0.0	0.0	0.0	2.26	1.4	2.83	3.5	0.0	0.0	0.0	4.22	1.23	0.0	0.0	0.0	0.0	0.77	0.0
SG	29877	1.06	11.8	11.41	0.0	0.0	0.0	2.23	1.85	1.57	2.05	0.0	0.0	0.0	1.74	2.04	0.0	0.0	0.0	0.0	0.83	0.0
SG	29878	1.13	11.58	17.29	0.0	0.0	0.0	3.69	2.24	2.26	1.14	0.0	0.0	0.0	2.77	3.35	0.0	0.0	0.0	0.0	1.13	0.0
SG	29879	1.08	13.68	12.36	0.0	0.0	0.0	5.71	1.7	3.01	3.43	0.0	0.0	0.0	4.38	0.84	0.0	0.0	0.0	0.0	0.72	0.0
SG	29880	1.26	11.28	9.71	0.0	0.0	0.0	1.2	0.77	3.2	1.91	0.0	0.0	0.0	2.32	2.11	0.0	0.0	0.0	0.0	0.97	0.0
SG	29881	1.11	**23.56**	7.72	0.0	0.0	0.0	8.48	1.58	1.18	1.4	0.0	0.0	0.0	3.22	1.37	0.0	0.0	0.0	0.0	2.36	0.0
SG	29882	1.26	**24.06**	7.99	0.0	0.0	0.0	**15.53**	1.59	2.49	1.68	0.0	0.0	0.0	3.95	1.29	0.0	0.0	0.0	0.0	1.29	0.0
SG	29883	1.12	**22.91**	7.32	0.0	0.0	0.0	3.86	1.08	2.15	1.48	0.0	0.0	0.0	3.27	0.81	0.0	0.0	0.0	0.0	0.83	0.0
SG	29919	1.01	19.87	7.36	0.0	0.0	0.0	5.39	0.87	3.06	2.52	0.0	0.0	0.0	6.21	0.69	0.0	0.0	0.0	0.0	0.54	0.0

Table A-3. Continued.

Species[c]	Lab ID	Sample wt.[d]	C2D	C3D	FLA	PYR	CFP	BAA	CHR	C1C	C2C	C3C	C4C	BBF	BKF	BEP	BAP	PER	IDE	DBN	BEQ	Total
Green Island																						
GC	29915	1.4	0.0	0.0	0.75	0.75	0.0	0.82	0.81	0.0	0.0	0.0	0.0	0.22	0.13	0.28	0.28	0.34	0.2	0.48	0.43	36.21
GC	29916	1.34	0.0	0.0	1.57	1.12	0.0	0.48	0.85	0.0	0.0	0.0	0.0	0.37	0.17	0.43	0.28	0.24	0.18	0.19	0.16	38.16
GC	29917	1.01	0.0	0.0	1.73	1.09	0.0	0.44	0.68	0.0	0.0	0.0	0.0	0.51	0.45	0.53	1.03	0.63	0.49	0.37	0.19	37.32
GC	29918	1.	0.0	0.0	1.57	0.97	0.0	0.7	0.27	0.0	0.0	0.0	0.0	0.22	0.17	0.25	0.37	1.02	0.47	0.72	0.43	47.21
HK	29910	0.81	0.0	0.0	3.4	2.72	0.0	0.75	4.11	0.0	0.0	0.0	0.0	0.53	0.72	0.59	1.31	0.38	0.82	0.5	1.08	74.67
MA	29845	1.08	0.0	0.0	1.6	1.81	0.0	1.22	2.6	0.0	0.0	0.0	0.0	0.87	0.81	1.37	0.41	3.69	0.41	0.92	0.83	60.09
MA	29846	1.01	0.0	0.0	1.08	2.95	0.0	0.78	2.32	0.0	0.0	0.0	0.0	0.88	1.19	1.46	0.88	4.24	0.55	0.7	0.77	73.28
MA	29847	1.04	0.0	0.0	1.56	3.03	0.0	0.69	3.5	0.0	0.0	0.0	0.0	1.12	0.82	1.67	0.7	3.84	0.41	0.61	1.01	56.98
MA	29848	1.04	0.0	0.0	1.91	2.18	0.0	0.59	2.41	0.0	0.0	0.0	0.0	0.37	0.48	0.81	0.59	1.72	0.89	0.47	0.5	55.15
MA	29849	1.03	0.0	0.0	2.33	2.69	0.0	0.72	0.58	0.0	0.0	0.0	0.0	0.75	0.63	0.64	2.0	2.54	0.51	0.91	0.83	54.3
MA	29850	1.04	0.0	0.0	3.69	3.6	0.0	1.57	3.17	0.0	0.0	0.0	0.0	0.5	0.58	1.85	0.39	2.22	0.62	0.72	0.82	72.03
MA	29851	1.01	0.0	0.0	1.81	2.61	0.0	1.55	1.23	0.0	0.0	0.0	0.0	0.61	1.08	1.37	0.47	1.51	0.41	0.56	1.12	60.66
MA	29852	0.84	0.0	0.0	1.42	1.65	0.0	0.5	2.2	0.0	0.0	0.0	0.0	1.09	0.75	0.87	1.09	2.08	0.98	0.43	0.44	68.93
MA	29853	0.48	0.0	0.0	1.55	6.05	0.0	2.58	2.65	0.0	0.0	0.0	0.0	0.79	1.34	1.91	2.6	4.45	0.74	1.41	0.74	134.98
MA	29854	1.03	0.0	0.0	2.1	2.07	0.0	1.12	2.19	0.0	0.0	0.0	0.0	0.6	0.33	0.85	0.81	3.17	0.47	0.59	0.44	53.93
MA	29855	0.82	0.0	0.0	1.14	1.55	0.0	0.89	1.92	0.0	0.0	0.0	0.0	1.28	0.65	0.74	0.67	3.54	0.53	0.62	1.81	63.56
MA	29856	1.03	0.0	0.0	1.17	1.76	0.0	1.09	2.05	0.0	0.0	0.0	0.0	0.74	0.56	0.63	0.99	2.51	0.75	0.57	0.95	54.01
MA	29857	0.55	0.0	0.0	1.4	6.06	0.0	1.05	4.72	0.0	0.0	0.0	0.0	0.96	1.48	1.23	0.92	2.36	0.6	2.43	0.96	91.22
MA	29858	0.91	0.0	0.0	1.47	2.33	0.0	0.87	2.07	0.0	0.0	0.0	0.0	0.44	1.13	0.82	1.03	1.92	0.5	0.66	0.38	67.04
MA	29859	0.87	0.0	0.0	0.82	2.12	0.0	0.78	2.34	0.0	0.0	0.0	0.0	0.81	1.25	0.87	0.75	4.31	0.58	0.41	0.71	65.55
PS	29893	1.12	0.0	0.0	1.69	1.81	0.0	0.77	0.68	0.0	0.0	0.0	0.0	0.54	0.56	0.45	0.29	0.48	0.49	0.41	0.48	55.56
PS	29894	1.07	0.0	0.0	0.86	1.71	0.0	1.11	0.81	0.0	0.0	0.0	0.0	0.56	0.37	0.79	0.53	0.42	0.49	0.32	0.31	54.8
PS	29895	1.12	0.0	0.0	1.74	1.53	0.0	0.69	0.77	0.0	0.0	0.0	0.0	0.38	0.26	0.37	0.45	0.39	0.15	0.23	0.54	53.32
PS	29896	1.38	0.0	0.0	2.68	1.86	0.0	0.91	0.31	0.0	0.0	0.0	0.0	0.26	0.33	0.56	0.22	0.7	0.49	0.29	0.39	47.09
PS	29897	1.22	0.0	0.0	1.42	1.96	0.0	0.5	0.53	0.0	0.0	0.0	0.0	0.21	0.21	0.42	0.38	0.51	0.24	0.36	0.39	49.5
PS	29898	1.46	0.0	0.0	1.3	1.36	0.0	0.6	0.42	0.0	0.0	0.0	0.0	0.44	0.34	0.35	0.47	1.11	0.29	0.22	0.38	38.51
PS	29899	1.21	0.0	0.0	1.91	1.27	0.0	1.05	0.38	0.0	0.0	0.0	0.0	0.23	0.28	0.78	0.32	0.76	0.41	0.2	0.5	51.49
PS	29900	1.04	0.0	0.0	1.37	0.76	0.0	1.47	1.36	0.0	0.0	0.0	0.0	1.35	1.61	1.23	0.66	2.48	0.88	1.84	0.42	69.57

Species[c]	Lab ID	Sample wt.[d]	NAP	C1N	C2N	C3N	C4N	BIP	ANP	ANH	FLU	C1F	C2F	C3F	PHE	ANT	C1P	C2P	C3P	C4P	DIB	C1D
SG	29868	1.	13.69	11.8	0.0	0.0	0.0	4.0	2.24	2.73	2.96	0.0	0.0	0.0	1.98	0.68	0.0	0.0	0.0	0.0	1.5	0.0
Squirrel Island																						
HK	29911	1.03	20.86	9.14	0.0	0.0	0.0	4.99	0.81	2.07	1.45	0.0	0.0	0.0	3.99	2.8	0.0	0.0	0.0	0.0	0.47	0.0
HK	29912	1.04	17.29	6.48	0.0	0.0	0.0	1.23	2.11	2.1	0.91	0.0	0.0	0.0	2.15	1.82	0.0	0.0	0.0	0.0	0.52	0.0
HK	29913	1.04	20.39	6.28	0.0	0.0	0.0	2.94	1.22	2.27	1.8	0.0	0.0	0.0	3.5	2.94	0.0	0.0	0.0	0.0	0.27	0.0
MA	29860	1.01	**22.5**	10.84	0.0	0.0	0.0	4.89	2.24	1.39	1.69	0.0	0.0	0.0	2.19	1.67	0.0	0.0	0.0	0.0	0.97	0.0
MA	29861	1.06	7.61	10.06	0.0	0.0	0.0	5.68	1.79	1.17	3.4	0.0	0.0	0.0	3.52	2.8	0.0	0.0	0.0	0.0	1.15	0.0
MA	29862	1.04	12.32	11.84	0.0	0.0	0.0	4.2	1.1	3.25	5.21	0.0	0.0	0.0	4.78	0.8	0.0	0.0	0.0	0.0	0.75	0.0
MA	29863	1.04	15.75	**31.89**	0.0	0.0	0.0	6.83	2.96	3.73	2.49	0.0	0.0	0.0	9.57	6.78	0.0	0.0	0.0	0.0	3.98	0.0
PS	29902	1.04	20.69	12.31	0.0	0.0	0.0	7.68	1.63	1.07	1.11	0.0	0.0	0.0	4.2	1.2	0.0	0.0	0.0	0.0	0.94	0.0
PS	29903	1.02	**22.55**	11.76	0.0	0.0	0.0	4.77	0.89	2.69	3.36	0.0	0.0	0.0	3.34	1.86	0.0	0.0	0.0	0.0	0.89	0.0
PS	29904	1.08	14.78	5.27	0.0	0.0	0.0	2.78	1.78	4.11	2.03	0.0	0.0	0.0	3.59	1.1	0.0	0.0	0.0	0.0	0.99	0.0
PS	29905	1.1	20.01	7.04	0.0	0.0	0.0	2.17	0.93	2.07	2.2	0.0	0.0	0.0	5.01	1.59	0.0	0.0	0.0	0.0	1.09	0.0
PS	29906	1.4	**16.56**	6.36	0.0	0.0	0.0	2.78	1.13	2.27	1.87	0.0	0.0	0.0	2.9	0.63	0.0	0.0	0.0	0.0	0.98	0.0
PS	29907	1.08	20.76	4.75	0.0	0.0	0.0	4.02	1.8	2.88	3.75	0.0	0.0	0.0	3.65	1.07	0.0	0.0	0.0	0.0	2.01	0.0
SG	29873	1.	8.49	12.25	0.0	0.0	0.0	4.25	2.97	5.18	2.68	0.0	0.0	0.0	2.66	1.82	0.0	0.0	0.0	0.0	1.57	0.0
SG	29874	1.16	8.28	11.13	0.0	0.0	0.0	4.79	2.58	2.6	1.66	0.0	0.0	0.0	2.2	0.75	0.0	0.0	0.0	0.0	0.35	0.0
SG	29875	1.07	8.27	9.87	0.0	0.0	0.0	3.3	1.65	3.04	3.75	0.0	0.0	0.0	2.97	2.34	0.0	0.0	0.0	0.0	1.37	0.0
SG	29876	1.13	7.34	6.2	0.0	0.0	0.0	2.26	1.4	2.83	3.5	0.0	0.0	0.0	4.22	1.23	0.0	0.0	0.0	0.0	0.77	0.0
SG	29877	1.06	11.8	11.41	0.0	0.0	0.0	2.23	1.85	1.57	2.05	0.0	0.0	0.0	1.74	2.04	0.0	0.0	0.0	0.0	0.83	0.0
SG	29878	1.13	11.58	17.29	0.0	0.0	0.0	3.69	2.24	2.26	1.14	0.0	0.0	0.0	2.77	3.35	0.0	0.0	0.0	0.0	1.13	0.0
SG	29879	1.08	13.68	12.36	0.0	0.0	0.0	5.71	1.7	3.01	3.43	0.0	0.0	0.0	4.38	0.84	0.0	0.0	0.0	0.0	0.72	0.0
SG	29880	1.26	11.28	9.71	0.0	0.0	0.0	1.2	0.77	3.2	1.91	0.0	0.0	0.0	2.32	2.11	0.0	0.0	0.0	0.0	0.97	0.0
SG	29881	1.11	**23.56**	7.72	0.0	0.0	0.0	8.48	1.58	1.18	1.4	0.0	0.0	0.0	3.22	1.37	0.0	0.0	0.0	0.0	2.36	0.0
SG	29882	1.26	**24.06**	7.99	0.0	0.0	0.0	**15.53**	1.59	2.49	1.68	0.0	0.0	0.0	3.95	1.29	0.0	0.0	0.0	0.0	1.29	0.0
SG	29883	1.12	**22.91**	7.32	0.0	0.0	0.0	3.86	1.08	2.15	1.48	0.0	0.0	0.0	3.27	0.81	0.0	0.0	0.0	0.0	0.83	0.0
SG	29919	1.01	19.87	7.36	0.0	0.0	0.0	5.39	0.87	3.06	2.52	0.0	0.0	0.0	6.21	0.69	0.0	0.0	0.0	0.0	0.54	0.0

Species[c]	Lab ID	Sample wt.[d]	C2D	C3D	FLA	PYR	CFP	BAA	CHR	C1C	C2C	C3C	C4C	BBF	BKF	BEP	BAP	PER	IDE	DBN	BEQ	Total
PS	29901	1.05	0.0	0.0	2.05	2.67	0.0	2.61	1.62	0.0	0.0	0.0	0.0	1.01	0.63	1.59	1.6	1.81	0.34	0.69	1.34	73.58
SG	29869	1.04	0.0	0.0	1.92	1.92	0.0	0.57	0.98	0.0	0.0	0.0	0.0	0.52	0.27	0.2	0.23	1.13	0.17	0.37	0.45	45.01
SG	29870	1.01	0.0	0.0	0.99	2.87	0.0	0.44	0.76	0.0	0.0	0.0	0.0	0.87	0.84	0.9	1.26	0.32	0.54	0.4	0.68	51.88
SG	29871	1.03	0.0	0.0	0.77	1.18	0.0	0.61	1.9	0.0	0.0	0.0	0.0	0.35	0.32	0.64	0.92	0.14	0.51	0.4	0.34	40.63
SG	29872	1.08	0.0	0.0	1.36	2.37	0.0	1.12	1.56	0.0	0.0	0.0	0.0	0.41	0.31	0.24	0.67	0.81	0.38	0.45	0.4	45.94
Montague Island																						
GC	29914	1.06	0.0	0.0	1.27	2.52	0.0	1.45	0.47	0.0	0.0	0.0	0.0	0.65	0.98	0.67	0.66	0.32	0.15	0.4	0.4	49.2
HK	29908	1.1	0.0	0.0	3.09	2.72	0.0	0.69	1.23	0.0	0.0	0.0	0.0	0.6	0.84	1.01	0.45	1.39	0.52	1.31	0.62	67.79
HK	29909	1.11	0.0	0.0	1.9	2.11	0.0	0.66	1.32	0.0	0.0	0.0	0.0	0.73	0.93	0.67	0.62	0.69	1.03	0.69	0.52	51.65
MA	29841	1.08	0.0	0.0	7.13	2.7	0.0	1.35	1.29	0.0	0.0	0.0	0.0	0.43	0.71	0.8	1.27	4.23	0.37	1.33	1.09	81.65
MA	29842	1.08	0.0	0.0	2.81	3.42	0.0	1.45	2.23	0.0	0.0	0.0	0.0	0.72	0.97	1.29	1.51	5.42	0.7	1.0	1.1	84.39
MA	29843	1.12	0.0	0.0	1.46	2.09	0.0	0.93	1.26	0.0	0.0	0.0	0.0	0.52	0.73	0.64	0.76	2.45	0.27	0.43	0.91	56.57
MA	29844	1.04	0.0	0.0	2.37	2.62	0.0	1.43	1.79	0.0	0.0	0.0	0.0	0.84	0.38	1.01	0.8	1.9	1.71	0.86	1.0	68.4
PS	29884	1.22	0.0	0.0	1.2	1.38	0.0	0.19	0.94	0.0	0.0	0.0	0.0	0.32	0.37	0.58	0.34	0.61	0.16	0.23	0.38	44.65
PS	29885	1.19	0.0	0.0	1.48	1.56	0.0	0.27	0.41	0.0	0.0	0.0	0.0	0.62	0.43	0.75	0.29	0.51	0.35	0.38	0.36	49.96
PS	29886	1.04	0.0	0.0	1.09	1.64	0.0	0.81	1.01	0.0	0.0	0.0	0.0	0.78	0.58	0.61	0.49	0.2	0.43	0.59	0.86	38.76
PS	29887	1.18	0.0	0.0	1.61	1.04	0.0	0.66	0.67	0.0	0.0	0.0	0.0	0.32	0.15	0.24	0.36	1.8	0.57	0.45	0.27	62.22
PS	29888	1.25	0.0	0.0	1.79	1.42	0.0	0.56	0.77	0.0	0.0	0.0	0.0	0.42	0.46	0.45	0.37	0.68	0.27	0.47	0.23	65.06
PS	29889	1.08	0.0	0.0	3.02	2.12	0.0	1.79	0.67	0.0	0.0	0.0	0.0	0.37	0.58	0.83	0.38	0.94	0.29	0.63	0.83	61.48
PS	29890	1.33	0.0	0.0	0.96	1.63	0.0	0.59	0.89	0.0	0.0	0.0	0.0	0.25	0.49	0.25	0.22	0.38	0.25	0.2	0.16	44.56
PS	29891	1.82	0.0	0.0	1.32	0.98	0.0	0.57	0.95	0.0	0.0	0.0	0.0	0.12	0.16	0.43	0.23	0.59	0.19	0.19	0.2	39.82
PS	29892	1.02	0.0	0.0	1.19	1.58	0.0	0.9	0.71	0.0	0.0	0.0	0.0	0.44	0.38	1.3	0.74	0.7	0.26	0.65	0.4	63.58
SG	29864	1.01	0.0	0.0	1.38	2.55	0.0	1.03	1.36	0.0	0.0	0.0	0.0	0.99	0.6	0.99	1.96	1.28	0.81	0.82	0.51	54.47
SG	29865	1.08	0.0	0.0	2.61	2.11	0.0	0.62	1.6	0.0	0.0	0.0	0.0	0.31	0.26	0.39	0.61	0.98	0.56	0.63	0.45	44.77
SG	29866	1.03	0.0	0.0	1.17	3.56	0.0	1.95	1.25	0.0	0.0	0.0	0.0	0.79	0.81	0.66	0.76	0.87	0.44	1.37	1.25	47.8
SG	29867	1.04	0.0	0.0	1.83	1.83	0.0	0.42	0.31	0.0	0.0	0.0	0.0	0.55	0.56	0.28	0.68	0.37	0.46	0.75	0.58	40.19
SG	29868	1.	0.0	0.0	3.5	3.28	0.0	2.1	2.26	0.0	0.0	0.0	0.0	0.6	0.68	0.73	0.5	0.28	0.93	0.89	0.44	57.77
Squirrel Island																						
HK	29911	1.03	0.0	0.0	1.35	1.2	0.0	1.49	1.02	0.0	0.0	0.0	0.0	0.57	0.35	0.72	0.43	0.23	0.39	0.53	0.47	55.33
HK	29912	1.04	0.0	0.0	1.07	2.2	0.0	0.14	0.93	0.0	0.0	0.0	0.0	0.41	0.51	0.39	0.53	0.47	0.43	0.27	0.17	42.13

Species[c]	Lab ID	Sample wt.[d]	C2D	C3D	FLA	PYR	CFP	BAA	CHR	C1C	C2C	C3C	C4C	BBF	BKF	BEP	BAP	PER	IDE	DBN	BEQ	Total
HK	29913	1.04	0.0	0.0	0.31	1.23	0.0	0.74	0.69	0.0	0.0	0.0	0.0	0.14	0.23	0.52	0.62	0.52	0.3	0.49	0.31	47.71
MA	29860	1.01	0.0	0.0	2.35	1.71	0.0	1.15	1.25	0.0	0.0	0.0	0.0	0.91	1.29	0.52	0.44	0.75	0.32	0.64	0.83	60.54
MA	29861	1.06	0.0	0.0	2.64	3.47	0.0	1.17	5.58	0.0	0.0	0.0	0.0	1.32	0.51	2.17	0.76	2.3	0.54	0.78	0.83	59.25
MA	29862	1.04	0.0	0.0	2.88	2.01	0.0	0.48	5.08	0.0	0.0	0.0	0.0	1.09	0.6	1.63	0.91	1.25	0.36	0.38	0.42	61.34
MA	29863	1.04	0.0	0.0	5.73	7.24	0.0	2.89	11.06	0.0	0.0	0.0	0.0	1.65	2.29	7.13	5.51	1.51	1.55	3.58	2.35	136.47
PS	29902	1.04	0.0	0.0	1.13	2.04	0.0	1.34	5.05	0.0	0.0	0.0	0.0	0.52	0.69	1.2	0.72	1.38	0.48	0.73	0.6	66.71
PS	29903	1.02	0.0	0.0	3.31	3.47	0.0	1.23	5.49	0.0	0.0	0.0	0.0	0.39	0.5	1.82	0.86	0.89	0.53	0.58	0.61	71.79
PS	29904	1.08	0.0	0.0	1.0	1.4	0.0	0.5	1.6	0.0	0.0	0.0	0.0	0.67	0.78	0.99	0.7	0.8	0.44	0.42	0.52	46.25
PS	29905	1.1	0.0	0.0	1.64	1.71	0.0	0.62	0.87	0.0	0.0	0.0	0.0	0.64	0.64	0.61	0.9	0.39	0.53	0.75	0.4	51.81
PS	29906	1.4	0.0	0.0	1.66	1.13	0.0	0.51	0.58	0.0	0.0	0.0	0.0	0.39	0.94	1.07	0.62	0.78	0.54	0.45	0.25	44.4
PS	29907	1.08	0.0	0.0	0.72	0.81	0.0	1.07	1.06	0.0	0.0	0.0	0.0	0.42	0.65	0.85	0.65	0.32	0.53	0.51	0.56	52.84
SG	29873	1.	0.0	0.0	2.2	1.32	0.0	0.57	2.76	0.0	0.0	0.0	0.0	0.77	0.75	1.14	0.71	0.88	0.58	0.5	0.59	54.64
SG	29874	1.16	0.0	0.0	1.74	1.75	0.0	1.11	0.54	0.0	0.0	0.0	0.0	1.06	0.23	0.31	0.64	0.12	0.85	0.52	0.39	43.6
SG	29875	1.07	0.0	0.0	2.08	1.87	0.0	0.49	0.54	0.0	0.0	0.0	0.0	0.6	0.33	0.44	0.34	0.19	0.71	0.33	0.36	44.84
SG	29876	1.13	0.0	0.0	2.47	1.85	0.0	1.47	0.5	0.0	0.0	0.0	0.0	0.29	0.95	0.42	0.45	0.23	0.18	0.66	0.76	39.98
SG	29877	1.06	0.0	0.0	1.95	1.52	0.0	1.02	0.3	0.0	0.0	0.0	0.0	0.2	0.4	0.57	0.25	0.86	0.44	0.65	0.34	44.02
SG	29878	1.13	0.0	0.0	1.68	2.38	0.0	0.87	0.91	0.0	0.0	0.0	0.0	0.65	0.83	0.68	0.91	1.73	0.74	1.06	0.4	58.29
SG	29879	1.08	0.0	0.0	2.72	2.21	0.0	0.83	1.56	0.0	0.0	0.0	0.0	0.39	0.26	0.67	0.93	0.56	0.19	1.11	0.81	58.07
SG	29880	1.26	0.0	0.0	2.45	1.11	0.0	0.92	0.84	0.0	0.0	0.0	0.0	0.69	0.23	0.51	0.8	0.85	0.34	0.97	0.24	43.42
SG	29881	1.11	0.0	0.0	1.63	2.01	0.0	0.7	0.7	0.0	0.0	0.0	0.0	0.33	0.34	0.48	0.17	0.47	0.4	0.32	0.22	58.64
SG	29882	1.26	0.0	0.0	2.23	1.63	0.0	0.24	0.93	0.0	0.0	0.0	0.0	0.42	0.4	0.5	0.23	1.42	0.4	0.49	0.25	69.00
SG	29883	1.12	0.0	0.0	2.72	2.12	0.0	1.09	0.91	0.0	0.0	0.0	0.0	0.36	0.46	0.73	0.32	0.36	0.35	0.54	0.51	54.18
SG	29919	1.01	0.0	0.0	1.68	2.56	0.0	0.58	1.06	0.0	0.0	0.0	0.0	1.0	0.67	0.51	0.64	0.47	0.25	0.62	0.41	56.96

[a] Reported by GERG, NRDA Aliphatic Hydrocarbon Data, Catalog 6712.

[b] Abbreviations: NAP: naphthalene; C1N: C1-naphthalene; C2N: C2-naphthalene; C3N: C3-naphthalene; C4N C4-naphthalene; BIP: biphenyl; ANP: acenaphthylene; ANH: acenaphthene; FLU: fluorene; C1F: C1-fluorene; C2F: C2-fluorene; C3F: C3-fluorene; ANT: anthracene; PHE: phenanthrene; C1P: C1-phenanthrene; C2P: C2-phenanthrene; C3P: C3-phenanthrene; C4P: C4-phenanthrene; DIB: dibenzothiophene; C1D: C1-dibenzothiophene; C2D: C2-dibenzothiophene; C3D: C3-dibenzothiophene; FLA: fluoranthene; PYR: pyrene; CFP: methyl fluoranthene-pyrene; BAA: benz(a)anthracene; CHR: chrysene; C1C: C1-chrysene; C2C: C2-chrysene; C3C: C3-chrysene; C4C: C4-chrysene; BBF: benzo(b)fluoranthene; BKF: benzo(k)fluoranthene; BEP: benzo(e)pyrene; BAP: benzo(a)pyrene; PER: perylene; IDE: ideno(1,2,3-cd)pyrene; DBN: dibenzo(a,h)anthracene; BEQ: benzo(g,h,i)perylene.

[c] Species: GC-*Gari californía*, HK-*Humilaria kennerleyi*, MA-*Mya arenaria*, PS-*Protothaca staminea*, SG-*Serripes groenlandicus*.

[d] Sample wet weight, in grams.