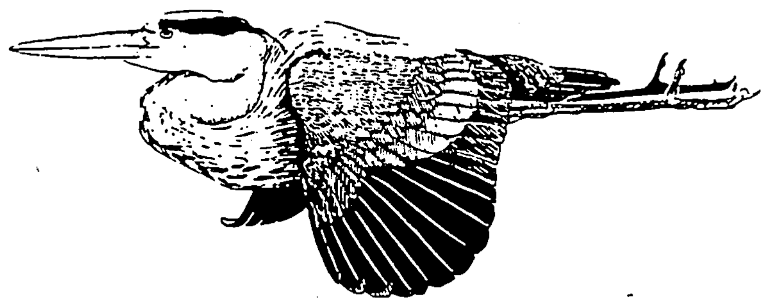
# THE DIET OF THICK-BILLED MURRES, Uria lomvia, IN THE EASTERN CANADIAN ARCTIC DURING THE BREEDING SEASON

M. S. W. Bradstreet
A. J. Gaston





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# THE DIET OF THICK-BILLED MURRES, *Uria lomvia*, IN THE EASTERN CANADIAN ARCTIC DURING THE BREEDING SEASON



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## ABSTRACT

The diet of Thick-billed Murres collected near six colonies in the eastern Canadian Arctic comprised invertebrates (84% of 23,462 items) and fish (16%). No differences in diet were found between the sexes, or between adults and subadults. Differences at individual colonies between stages of the breeding season and between years were generally small. Adult diets differed significantly among colonies, both within the Low Arctic (Hudson Strait), between Low and High Arctic (Lancaster Sound-Baffin Bay), and between Low Arctic colonies and a colony close to the High/Low Arctic boundary (Davis Strait). Murres from the High Arctic took more invertebrates, fewer fish, and a smaller number of species overall, than those from the Low Arctic. This data supplements a more detailed inter-colony comparison made by Gaston and Bradstreet (1993).

CONTENTS

## 1. INTRODUCTION

Information on the diet of Thick-billed Murres (Uria lomvia) during the breeding season was obtained for waters adjacent to six major breeding colonies: three in the High Arctic, two in the Low Arctic and one close to the boundary between these two oceanographic zones (as defined by Salomonsen 1965, 1972). All samples were obtained by collecting birds that were actively feeding, hence minimizing the effect of differential rates of digestion on comparisons among samples (Gaston and Noble 1985). An analysis of this material, comparing diet diversity and composition among colonies and marine zones, is published elsewhere (Gaston and Bradstreet 1993). This report complements that paper and gives full details of all taxa identified and their abundance.

The Thick-billed Murre is the most numerous seabird breeding in the eastern Canadian Arctic. About 1.4 million pairs breed in the Lancaster Sound, east Baffin Island and Hudson Strait regions, comprising >99% of the total Canadian Atlantic population (Nettleship and Evans 1985). In Lancaster Sound, murres represent 50% of all nesting seabirds (Gaston and Nettleship 1981); this percentage increases to 85% in Hudson Strait and northeast Hudson Bay (Gaston 1982).

The diets of adult Thick-billed Murres in the Canadian High Arctic have been described for the early part of the breeding season by Bradstreet (1980) and Bradstreet and Cross (1982), and for the incubation and chick-rearing periods by Gaston and Nettleship (1981). However, the latter study was based on birds collected at the colony, where differential rates of digestion probably affected the occurrence of different taxa. In the Low Arctic adult diet has been studied at Digges Sound, in northeast Hudson Bay (Gaston and Noble 1985).

In this report we compare the diets of murres collected at different stages of the breeding cycle, and in different years, to examine how diet varies with sex and time of year and how this variation may affect inter-colony comparisons. We also compare the diet of adult and sub-adult birds.

## 2. METHODS

Feeding Thick-billed Murres were shot at sea from small boats during 8 of 11 summers from 1976 to 1985. Birds were taken near six colonies: west of Cape Hay, Bylot Island (CH, abbreviations refer to Fig. 1), Cambridge Point, Coburg Island (CP), north of Cape Graham Moore, Bylot Island (GM), the Minarets on eastern Baffin Island (MI, also known as "North of Reid Bay", Brown et al. 1975), Digges Sound (DI) off northern Ungava, and Akpatok Island (AK), in Ungava Bay. The first three colonies are situated in High Arctic waters, while the last two are Low Arctic. The Minarets is situated close to the boundary between the High and Low Arctic zones.

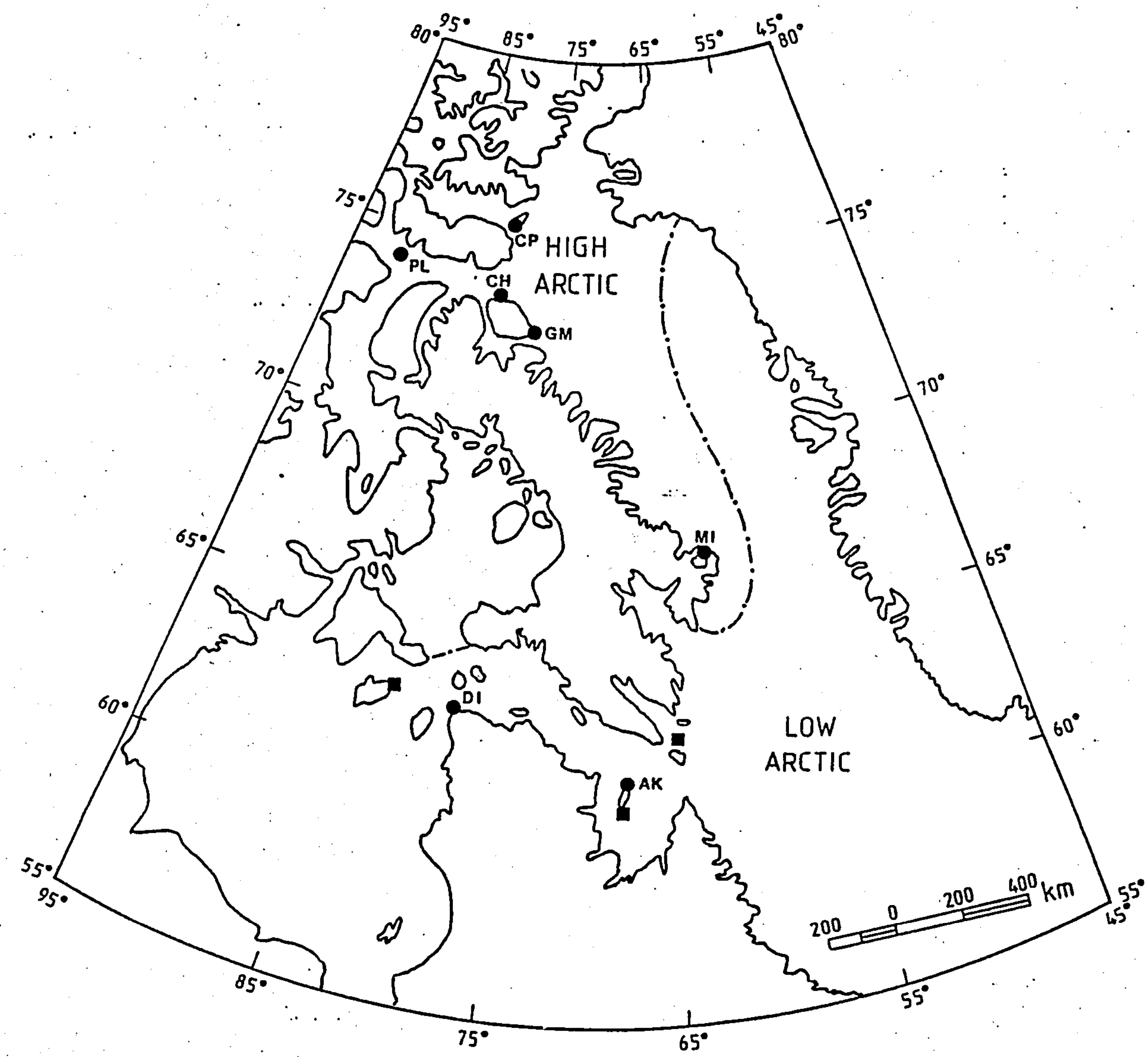
Birds were assigned to a colony of origin on the basis of their position when collected and the observed flight behaviour of birds at the collection sites. Banding studies at several colonies have revealed that non-breeding Thick-billed Murres are almost invariably found in the vicinity of their natal colony, except in their first and second years (A.J. Gaston unpublished). Hence the distribution of non-breeders during the breeding season, with respect to their colonies of origin, is probably similar to that of breeders. Birds collected at places approximately equidistant from two colonies, or where flight directions suggested that birds from more than one colony were present, were excluded from our analysis. Field processing of specimens was as described by Bradstreet (1980) for birds collected near colonies 1-3 above, and by Gaston and Noble (1985) for birds collected near colonies 4-6. Alcohol was squirted into the proventriculus as soon as the bird was collected and the stomach and proventriculus were removed as soon as possible and preserved in 75% isopropyl alcohol, within a maximum of 12 h. Only stomachs (proventriculi and muscular stomachs) that contained food (Appendix 1) are considered in this paper. For each year, samples were assigned to one of three stages of the breeding cycle, incubation (IN), chick rearing (CR), or postfledging (PF), based on available information about the timing of breeding (Table 1). The incubation period was assumed to begin at the median date of egg laying. Birds collected earlier than that were excluded. Incubation was assumed to be 32 days and chick rearing 21 days (Gaston and Nettleship 1981). Because we used date ranges specific to each year, groups of samples for the Digges Sound collections were not exactly the same as those used by Gaston and Noble (1985).

Birds were sexed by gonadal inspection and aged by one of two methods. Birds collected near colonies 1-3 were considered to be subadult if a bursa was present; otherwise birds were assumed to be adult. In a very few cases, very small bursae were present in birds with developed reproductive tracts; these birds were classified as adults. Birds were classified as age unknown if no ageing information was recorded. Birds collected near colonies 4-6 were classified as adult if a brood patch was present, developing or regrowing, and as subadult if no brood patch was present. When the presence of a brood patch was not recorded, birds were classified as age unknown.

Food items were processed in the laboratory, as described in Bradstreet (1980) for colonies 1-3 and Gaston and Noble (1985) for colonies 4-6. The methods were very similar and there is no reason to believe that any biases arose due to differences in methodology. Plankton names follow Shih et al. (1971) and fish names follow American Fisheries Society (1980).

Most diet comparisons are based on the presence/absence of prey taxa. We calculate the exact probability of the observed differences in the proportions of stomachs containing each taxon under the null hypothesis by using a multiple hypergeometric approach (Gaston and Noble 1985) to calculate the probability of the observed plus all possible more extreme combinations of events. We reject the null hypothesis of consistent murre diets among groups only if the probability calculated for one or more prey taxa was less than 0.05/n, where n is the total number of taxa in the birds being compared. For descriptive purposes, the frequencies of various taxa in the diet are given.

FIGURE 1. The eastern Canadian Arctic showing locations of Thick-billed Murre colonies mentioned in the text. PL = Prince Leopold Island, CP = Cambridge Point, CH = Cape Hay, GM = Cape Graham Moore, MI = Minarets, AK = Akpatok Island, and DI = Digges Sound. Squares indicate other colonies of Thick-billed Murres.



## 3. RESULTS

When all samples were included, numbers of prey organisms in the diet of adult Thick-billed Murres were dominated by invertebrates (84% of 23,462 items in 448 stomachs), primarily hyperiid amphipods (60%) and mysids (15%) (Table 2). Other invertebrate groups that occurred in the diet included gammaridean amphipods of nine families (3%), copepods (2.5%), polychaetes (1.8%), and squid, cumaceans, pelagic snails, euphausiids, decapods and ostracods (all <1%). Fish comprised 16% of diet items with sand lance (Ammodytes spp.) -- 2.9%, snailfish (Liparis spp.) -- 2.4%, and arctic cod (Boreogadus saida) -- 2.2%, predominating; sculpins (Cottidae), capelin (Mallotus villosus), flatfish (Pleuronectidae) and eelpouts (Gymnelus spp.) each comprised <1% of diet items.

Hyperiid amphipods, mysids, and fish predominated among prey items from adult stomachs (91% of items). Most (76%) of the hyperiids enumerated belonged to the genus Parathemisto. Parathemisto taken by adult murres collected in the High Arctic (CH, CP, GM) were significantly larger than those from the Low Arctic (DI, AK; Fig. 3, variances unequal, $t'=35.61$, $P<0.01$). We also compared the sizes of mysids of the genus Mysis taken by adults from the Minarets and from the Low Arctic zone (Fig. 4) and found that those taken in the Low Arctic were significantly larger ($t'=4.07$, $P<0.01$). Conversely, mean lengths of fish from the Low Arctic were significantly smaller than those from the High Arctic ($t'=-2.30$, $P<0.05$), as were those from the Minarets vs. High Arctic (equal variances, $t=-2.61$, $P<0.01$) (Fig. 5). These differences were mainly due to a difference in the composition of the fish consumed. Comparisons within species showed that Boreogadus saida from the Low Arctic were marginally larger in size than those from the High Arctic ($t'=1.93$, $0.1>P>0.05$), but sculpins from the Low Arctic were smaller than those from the Minarets ($t'=-2.57$, $0.01<P<0.02$).

Variation between the sexes

We found no differences in the diets of male and female murres, controlled for year of collection, colony of origin, and period of the breeding cycle: in 326 comparisons involving stomachs from 202 male and 202 female murres, no significant differences were found (Table 3). We have therefore combined the sexes, as well as unsexed birds in subsequent analyses.

Variation among stages of the breeding cycle

Examination of the occurrence of food taxa in relation to stage of the breeding cycle revealed few consistent trends (Table 4). Significant differences were found in only 4% of 142 comparisons.

In 1976 near Cape Hay, Parathemisto spp. occurred in 38% and 46% of stomachs from the incubation and chick-rearing periods, respectively, but in only 9% of stomachs from the postfledging period ($P<0.003$). In 1978, we found no difference in the occurrence of Parathemisto between the incubation and chick rearing periods, although sample sizes were small.

There were significant differences in the frequencies of three taxa in stomachs of birds collected near Digges Sound (Table 4). In 1980, there was a significant increase in the occurrence of Mallotus during the breeding season ($P<0.002$). In 1982, the occurrence of Boreogadus varied significantly, peaking during chick rearing. In 1980 and 1982, there were significant differences in the proportions of stomachs that contained polychaete worms among the three stages of the breeding season, but the pattern was not consistent between 1980 and 1982, and no difference was evident in 1981.

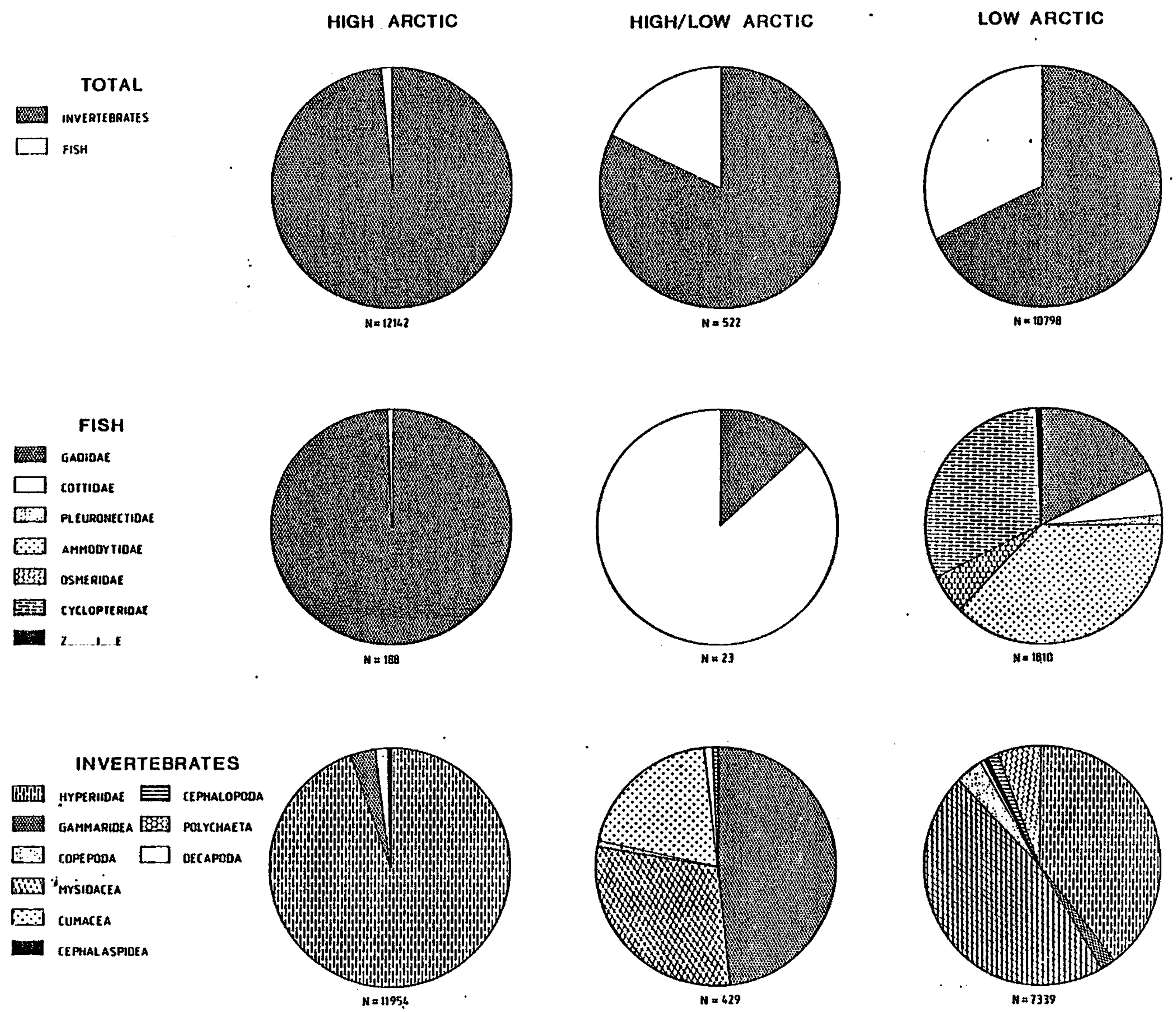



FIGURE 2. Proportion of major prey taxa in the diets of Thick-billed Murr s in three oceanographic zones.

FIGURE 3. Lengths of measured <u>Parathemisto</u> from adult Thick-billed Murre stomachs collected in the High Arctic and Low Arctic marine zones.

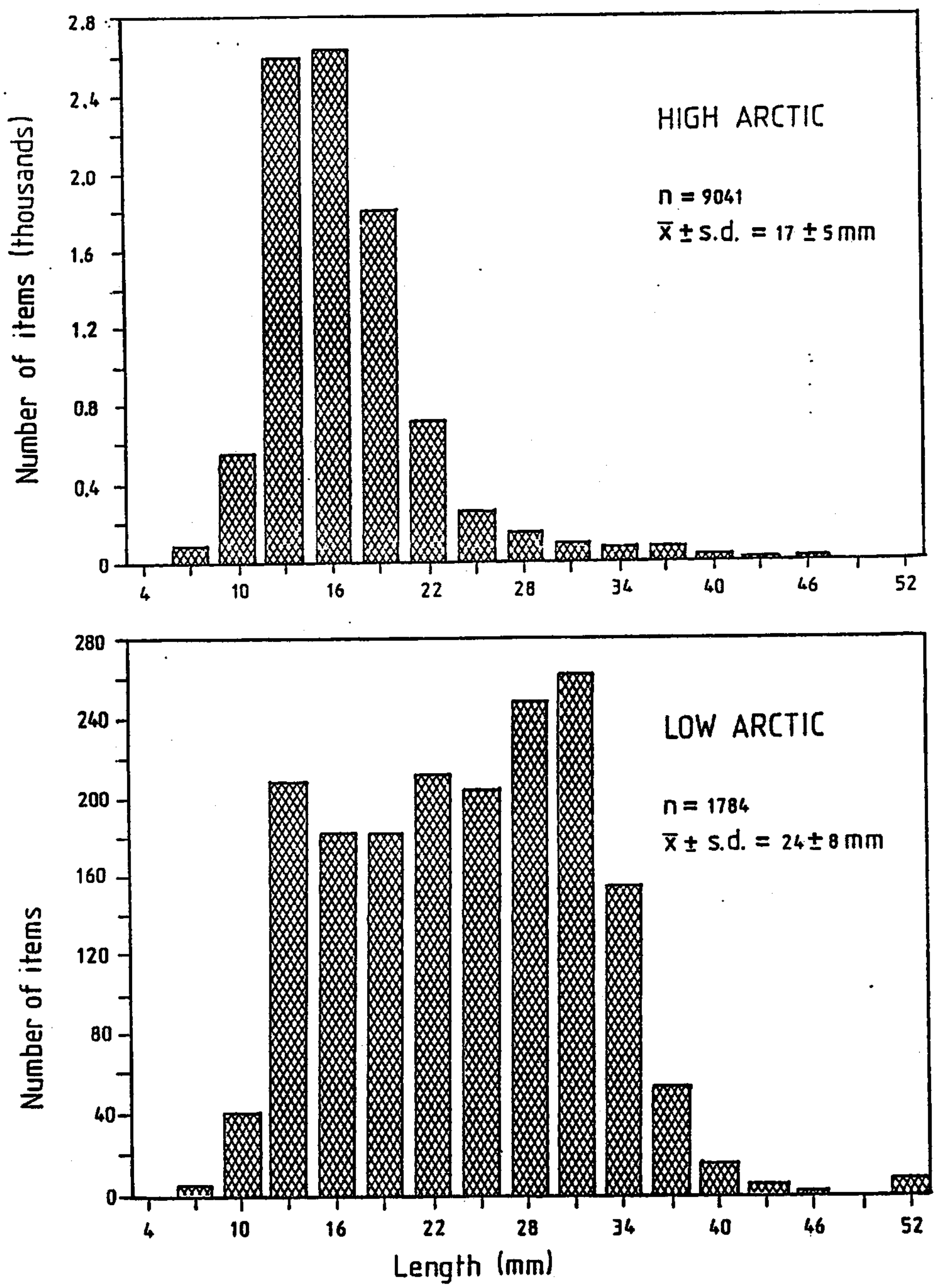


FIGURE 4. Lengths of measured *Mysis* from adult Thick-billed Murre stomachs collected near the boundary between the High and Low Arctic marine zones and in the Low Arctic.

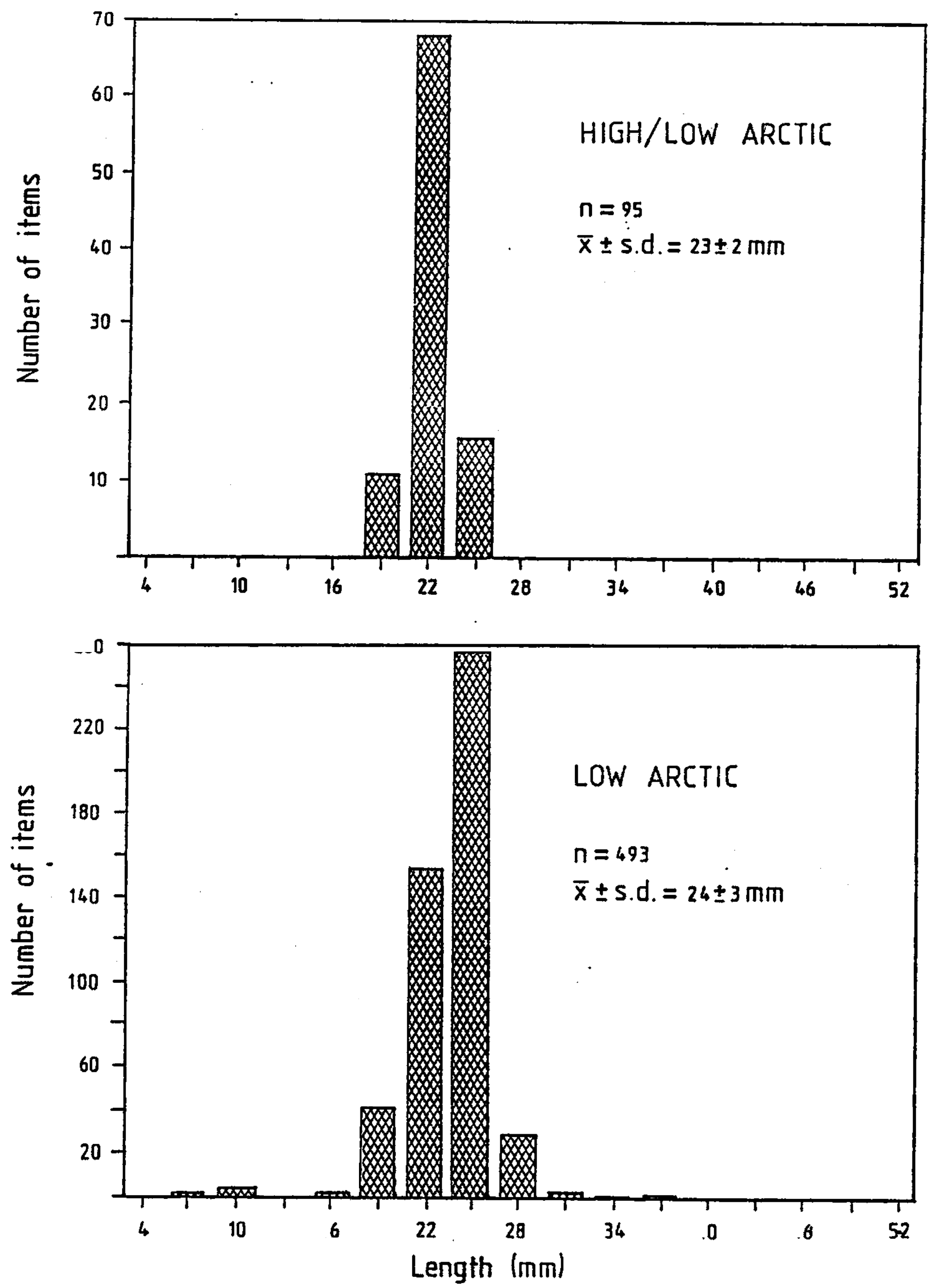
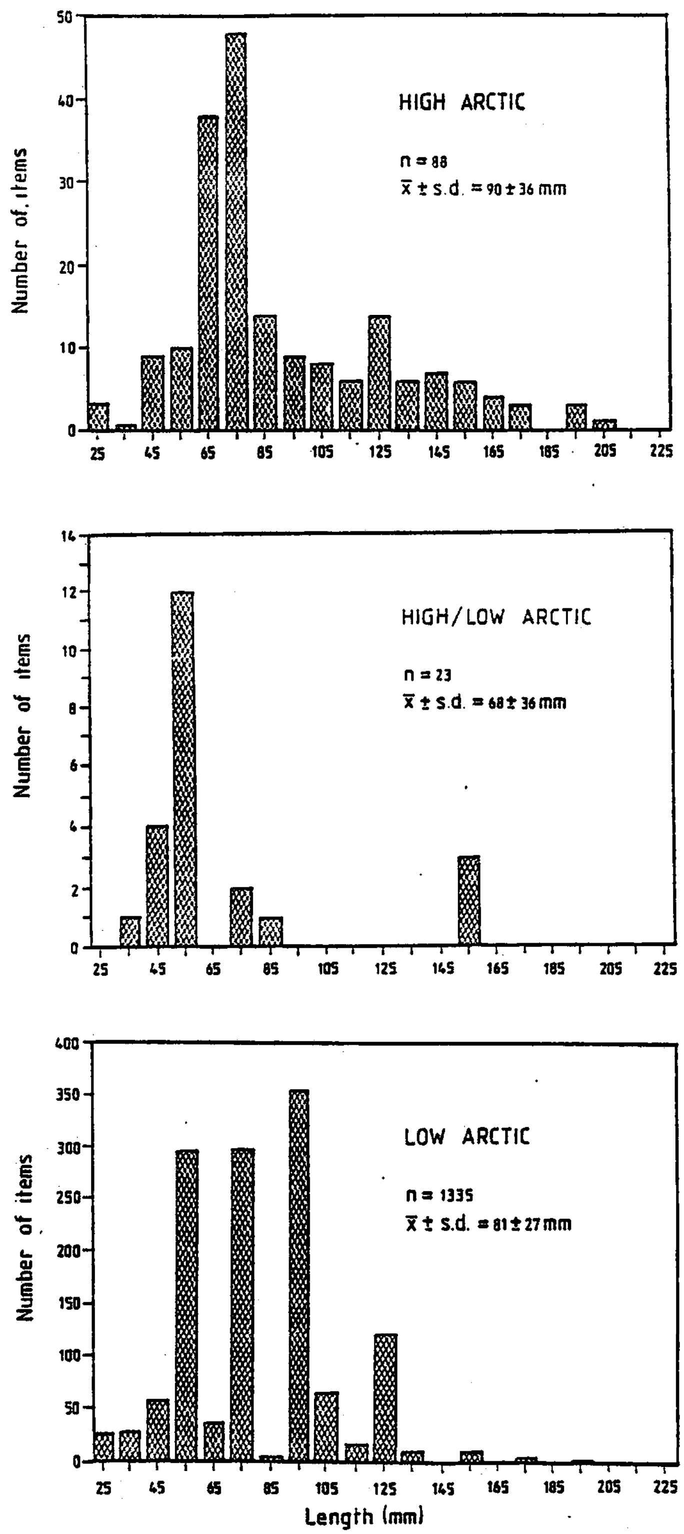


FIGURE 5. Lengths of measured fish from Thick-billed Murre stomachs collected in the High and Low Arctic marine zones and near the boundary between these two zones.



Variation among years at the same colony

Combining all samples from a given year, we found year-to-year differences in the proportions of stomachs containing some food taxa at 2 of 4 colonies for which comparisons were possible (Table 5). These differences involved eight taxa (7% of 107 comparisons). Again, there were few consistent trends in the occurrence of various food taxa. At Cape Hay, Parathemisto spp. occurred in increasing proportions of stomachs from 1976 to 1979 ($P<0.002$), but at Cambridge Point and Cape Graham Moore, there was no significant difference in the occurrence of Parathemisto between 1978 and 1979.

Few of the 252 lysianassid amphipods enumerated from birds collected near Cape Hay were identified as Onisimus spp. (0.9%). Although there was a significant difference in the occurrence of this taxon in the three years, there were no such differences for the more commonly enumerated O. glacialis (n = 205). Also, there were no differences in the occurrence of any lysianassid amphipods between 1978 and 1979 at the two other High Arctic colonies, Cambridge Point and Cape Graham Moore. Atylus carinatus, a gammarid amphipod, was too rare (0.7% of items at Cape Hay) to permit generalization from the significant difference noted in its occurrence, nor did this species occur in birds collected near Cambridge Point or Cape Graham Moore.

The most striking difference at Digges Sound was the variation in occurrence of snailfish, Liparis spp. among years ($P<0.001$, Gaston and Noble 1985). Unidentified fish otoliths also occurred in markedly different proportions of stomachs collected in the three years, but Gaston and Noble did not consider them in their analysis. Euchaeta copepods occurred only in 1982, but these may have been ingested indirectly in fish stomachs (Gaston and Noble 1985). The proportion of stomachs in which unidentified mysids occurred also varied significantly among years, but there were no such differences for any of the six mysid taxa identified to species or the two taxa identified more broadly to genus (Mysis spp., Boreomysis spp.).

From the above, we concluded that differences in diet among years at the same colony were generally small. The only important difference was the increase in snailfish at Digges Sound between 1980 and 1982, presumably the consequence of a change in the abundance of these fishes. Consequently, we combined all samples from a given colony in making inter-colony comparisons (Appendix 1).

Diet of Subadult Birds

Too few subadult murres were collected in the High Arctic (n=13) and Low Arctic (n=4) marine zones to make the controlled comparisons that were possible for adult birds. However, we compared the diets of all adults vs. all subadults collected in the two zones. We found no difference in the occurrence of 29 food taxa between adults and subadults in the high arctic, or in the occurrence of 65 taxa in the Low Arctic. No taxa occurred in subadult diets that were not also found in the adult diet.

The composition of adult and subadult diets was similar (Table 6) and the general geographic trends apparent in adult diets occurred also in subadults (a decrease in invertebrates, an increase in fish and an increase in the number of species taken from the High Arctic to the Low Arctic). The major difference observed occurred in the Low Arctic. There, squid (Gonatus fabricii) formed 24% of diet items in subadult murres but <1% in adult birds. There was a slight tendency in both zones for subadults to take relatively more fish and relatively fewer invertebrates than adults.

## 4. DISCUSSION

Our conclusion from the results presented here is that within and between-season variation in diet at the same colony and variation between age classes and sexes is relatively small. This contrasts with the major differences found between colonies in High and Low Arctic waters, and between Akpatok Island and Digges Sound birds, both in the Low Arctic (Gaston and Bradstreet 1993). The relatively small amount of variation observed within seasons is not surprising, given that the entire period considered was only a little over two months, during which most prey organisms should have been continuously present in the marine areas covered. Lack of inter-year variation is more surprising, and may relate to the fact that sampling at a given colony was in adjacent years. If the relative abundance of different prey species tends to alter over periods of several years our sampling would have been inadequate to reveal it. However, data on chick diets at Coats Island, NWT in seven years revealed only minor variation in diet composition (Gaston 1991).

Lack of variation in diet between the sexes emphasizes the similarity in roles of pair members during breeding, with males and females taking equal turns at incubation and provisioning the chick (Gaston and Nettleship 1981, Verspoor et al. 1987). Towards the end of the chick-rearing period there is a tendency for males and females to be present at the colony at different times of day (Gaston and Nettleship 1981). Croll et al. (1992) showed that diving depth changes considerably with time of day, with more deep dives occurring in the middle of the day than during the night. With males and females on different schedules we might anticipate differences in diving depths, and consequently in the spectrum of prey taken. More detailed study of birds foraging for chicks during the second half of the growth period might reveal this, but there was no evidence for it in our study. Otherwise, the similarity of the sexes in size and bill-structure (Storer 1952) makes it unlikely that they would find it efficient to take different prey.

## 5. ACKNOWLEDGEMENTS

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REFERENCES

AMERICAN FISHERIES SOCIETY. 1980. A list of common and scientific names of fishes from the United States and Canada. American Fisheries Society. Special Publication No. 12.

BRADSTREET, M.S.W. 1980. Thick-billed murres and black guillemots in the Barrow Strait area, N.W.T., during spring: diets and food availability along ice edges. Can. J. Zool. 58: 2120-2140.

BRADSTREET, M.S.W. 1985. Feeding studies. Pp. 257-306. In Population estimation, productivity and food habits of nesting seabirds at Cape Pierce and the Pribilof Islands, Bering Sea, Alaska. Edited by S.R. Johnson. Rep. by LGL Ltd., Bryan, Texas, for Minerals Management Service, Anchorage, Alaska. 330 pp. MMS 85-0068, NTIS PB86-216918. Available from Nat. Tech. Inf. Serv., Springfield, VA.

CROLL, D.A., A.J. GASTON, A.E. BURGER, AND D. KONNOFF. 1992. Foraging behaviour and physiological adaptation for diving in Thick-billed Murres. Ecology 73: 344-356.

GASTON, A.J. 1991. Project on the population dynamics of the Thick-billed Murre, Uria lomvia: interim report of studies at Coats Island. C.W.S. Tech. Rep. Ser. No. 134. CWS, Ottawa.

GASTON, A.J., AND M.S.W. BRADSTREET. 1993. Inter-colony differences in the summer diet of Thick-billed Murres in the eastern Canadian Arctic. Can. J. Zool. in press.

GASTON, A.J., AND D.N. NETTLESHIP. 1981. The Thick-billed Murres of Prince Leopold Island. Canadian Wildlife Service Monograph Series No. 6. Ottawa.

GASTON, A.J., AND D.G. NOBLE. 1985. The diet of Thick-billed Murres (Uria lomvia) in west Hudson Strait and northeast Hudson Bay. Can. J. Zool. 63: 1148-1160.

SALOMONSEN, F. 1965. The geographical variation of the Fulmar (Fulmarus glacialis) and the zones of marine environment in the North Atlantic. Auk 82: 327-355.

SALOMONSEN, F. 1972. Zoogeographical and ecological problems in arctic birds. p. 25-77. In Proc. XVth Int. Ornithol. Congr., The Hague.

SHIH, C.T., A.J.G. FIGUERA, AND E.H. GRAINGER. 1971. A synopsis of Canadian marine zooplankton. Fisheries Research Board of Canada. Bull. No. 176.

STORER, R.W. 1952. A comparison of variation, behaviour and evolution in the seabird genera Uria and Cepphus. Univ. California Publ. Zool. 52: 121-222.

VERSPOOR, E., T.R. BIRKHEAD, AND D.N. NETTLESHIP. 1987. Incubation and brooding shift duration in the Common Murre, Uria aalge. Can. J. Zool. 65: 247-252.

Table 1. Date ranges for different stages of the breeding cycle at the colonies considered

| | | Period | | | |
|---|---|---|---|---|---|
| Year | Colony | Incubation | Chick rearing | Postfledging | Source |
| 1978 | CH | 20 Jul - 18 Aug | 21 Aug - 11 Sep | ≥ 10(12) Sep | Nettleship et al. 1984 |
| 1979 | CP | 2 Jul - 2 Aug | 3 - 24 Aug | ≥ 25 Aug | Birkhead and Nettleship 1981 |
| 1979 | CH | 6 Jul - 6 Aug | 7 - 28 Aug | ≥ 29 Aug | Birkhead and Nettleship 1981 |
| 1980 | DI | 26 Jun - 27 Jul | 28 Jul - 19 Aug | ≥ 20 Aug | Gaston et al. 1985 |
| 1981 | DI | 30 Jun - 30 Jul | 31 Jul - 25 Aug | ≥ 26 Aug | Gaston et al. 1985 |
| 1982 | DI | 29 Jun - 3 Aug | 4 Aug - 26 Aug | ≥ 27 Aug | Gaston et al. 1985 |
| 1983 | AK | - | 7 Aug - 7 Sept | - | Gaston unpubl. |
| 1985 | MI | - | - | - | Gaston and Smith 1985 |

Table 2. Proportion (%) of different taxa among all food items in enumerated from adult thick-billed murres

| Colony | CH | CP | GM | MI | DI | AK | All col. |
|---|---|---|---|---|---|---|---|
| Year(s) | 76-79 | 78-79 | 78-79 | 85 | 80-82 | 83 | 76-85 |
| No. of stomachs | 117 | 66 | 20 | 17 | 205 | 19 | 448 |
| No. of items | 4511 | 5113 | 2511 | 522 | 9638 | 1160 | 27455 |
| **All Hyperiidae** | **84.48** | **98.59** | **96.93** | **0.00** | **21.72** | **67.41** | **14161** |
| **Lysianassidae** | **5.56** | **0.68** | **1.27** | **14.18** | **0.03** | **0.26** | **398** |
| **Calliopiidae** | **0.00** | **0.00** | **0.00** | **0.00** | **0.01** | **0.00** | **1** |
| Gammaridae | 0.31 | 0.10 | 0.08 | 0.38 | 0.51 | 0.00 | 72 |
| Atylidae | 0.73 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 33 |
| Eusiridae | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 1 |
| Ischyroceridae | 0.00 | 0.00 | 0.00 | 23.95 | 0.86 | 0.00 | 208 |
| Oedicerotidae | 0.00 | 0.00 | 0.00 | 0.19 | 0.01 | 0.00 | 2 |
| Ampeliscidae | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 1 |
| Pontogeneidae | 0.00 | 0.00 | 0.00 | 0.19 | 0.01 | 0.00 | 2 |
| All Gammaridea | 6.67 | 0.78 | 1.35 | 39.27 | 1.45 | 0.34 | 724 |
| **Amphipoda** | **91.44** | **99.39** | **98.2** | **39.46** | **23.17** | **67.76** | **14901** |
| **Mysidacea** | **0.00** | **0.00** | **0.00** | **24.14** | **32.78** | **19.74** | **3514** |
| All Calanoida | 4.70 | 0.00 | 1.47 | 0.00 | 2.98 | 1.72 | 556 |
| All Harpacticoida | 0.00 | 0.00 | 0.00 | 0.19 | 0.06 | 0.00 | 7 |
| All Cyclopoida | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 | 1 |
| **Copepoda** | **4.70** | **0.00** | **1.47** | **0.19** | **3.30** | **1.72** | **588** |
| **Decapoda** | **0.04** | **0.00** | **0.00** | **0.38** | **0.07** | **0.43** | **16** |
| **Cumacea** | **0.02** | **0.00** | **0.00** | **17.43** | **0.00** | **0.00** | **92** |
| **Ostracoda** | **0.00** | **0.02** | **0.00** | **0.00** | **0.02** | **0.00** | **3** |
| **Euphausiacea** | **0.00** | **0.00** | **0.00** | **0.00** | **0.07** | **0.09** | **8** |
| **All Crustacea** | **96.23** | **99.45** | **99.76** | **81.80** | **59.73** | **90.26** | **19164** |
| All Cephalaspidae | 0.38 | 0.02 | 0.00 | 0.00 | 0.21 | 0.00 | 38 |
| All Cephalopoda | 0.04 | 0.02 | 0.00 | 0.38 | 0.87 | 0.52 | 95 |
| **Mollusca** | **0.42** | **0.04** | **0.00** | **0.38** | **1.09** | **0.52** | **134** |
| **Polychaeta** | **0.00** | **0.00** | **0.00** | **0.00** | **4.16** | **1.98** | **424** |
| **ALL INVERTEBRATA** | **96.65** | **99.49** | **99.76** | **82.18** | **64.98** | **92.76** | **19722** |
| Gadidae | 3.33 | 0.51 | 0.24 | 0.57 | 3.28 | 0.17 | 508 |
| Cottidae | 0.02 | 0.00 | 0.00 | 3.83 | 1.18 | 0.00 | 135 |
| Pleuronectidae | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 2.16 | 25 |
| Ammodytidae | 0.00 | 0.00 | 0.00 | 0.00 | 7.06 | 0.00 | 680 |
| Osmeridae | 0.00 | 0.00 | 0.00 | 0.00 | 0.99 | 0.00 | 95 |
| Cyclopteridae | 0.00 | 0.00 | 0.00 | 0.00 | 5.92 | 0.00 | 571 |
| Zoarcidae | 0.00 | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 | 7 |

Table 2 (continued)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **ALL OSTEICHTHYES** | **3.35** | **0.51** | **0.24** | **17.82** | **35.02** | **7.24** | **3740** |
| **ALL TAXA** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **100.00** | **23462** |

* Includes four stomachs from Prince Leopold Island

Table 3. Diet comparisons between male and female murres controlled for year, colony, period of the breeding cycle, and age of bird

| <u>Adults</u> | | | | No. stomachs | | No. significant differences |
|---|---|---|---|---|---|---|
| Year | Colony | Period* | No. taxa | males | females | (p=0.05/no. taxa) |
| 1976 | CH | IN | 13 | 12 | 20 | 0 |
| | CH | CR | 12 | 8 | 18 | 0 |
| | CH | PF | 7 | 5 | 3 | 0 |
| 1978 | CH | IN | 15 | 16 | 19 | 0 |
| | CP | CR | 7 | 5 | 15 | 0 |
| | GM | IN | 8 | 2 | 8 | 0 |
| 1979 | CH | IN | 5 | 6 | 6 | 0 |
| | CP | IN | 10 | 7 | 14 | 0 |
| | CP | CR | 8 | 2 | 20 | 0 |
| 1980 | DI | IN | 27 | 26 | 18 | 0 |
| | DI | CR | 17 | 8 | 16 | 0 |
| | DI | PF | 11 | 6 | 3 | 0 |
| 1981 | DI | IN | 27 | 26 | 18 | 0 |
| 1982 | DI | IN | 45 | 29 | 8 | 0 |
| | DI | CR | 22 | 10 | 5 | 0 |
| | DI | PF | 28 | 13 | 7 | 0 |
| 1983 | AK | IN | 19 | 8 | 10 | 0 |
| 1985 | MI | IN | 31 | 14 | 3 | 0 |

Table 3 (continued)

| Sub adults | | | | No. stomachs | | No. significant differences |
|---|---|---|---|---|---|---|
| Year | Colony | Period* | No. taxa | males | females | (p=0.05/no. taxa) |
| 1978 | CH | IN | 8 | 3 | 1 | 0 |
| 1979 | CP | IN | 2 | 1 | 1 | 0 |
| 1979 | GM | IN | 4 | 2 | 1 | 0 |
| 1980 | DI | CR | 8 | 1 | 1 | 0 |

* IN = incubation, CR = chick-rearing, and PF = postfledging

Table 4. Seasonal differences in adult murre diets controlled for year and colony.*

| Year | Colony | No. samples | No. taxa | No. sign. differences (p 0.05/no. taxa) | Significant taxa |
|---|---|---|---|---|---|
| 1976 | CH | IN(32), CR(26), PF(11) | 18 | 1 | Parathemisto spp. |
| 1979 | CH | IN(12), CR(1) | 5 | 0 | - |
| | CP | IN(22), CR(24) | 12 | 1 | P. libellula+ |
| 1980 | DI | IN(46), CR(37), PF(11) | 35 | 3 | Mallotus villosus<br>unid. polychaetes |
| 1981 | DI | IN(30), CR(9) | 24 | 0 | - |
| 1982 | DI | IN(37), CR(15), PF(20) | 48 | 2 | B. saida, unid. polychaetes |

* Includes after hatching year and age unknown birds.

+ Few Parathemisto were identified to species in samples collected during the incubation period. Items identified only to generic level were represented in similar proportions of stomachs from the incubation and chick rearing periods.

Table 5. Inter-year differences in adult murre diets controlled for colony.*

| Colony | Years Compared | No. samples | No. taxa | No. sign. differences (p 0.05/no. taxa) | Significant taxa |
|---|---|---|---|---|---|
| CH | 1976, 1978, 1979 | 69, 35, 13 | 26 | 4 | *Parathemisto* spp.<br>*P. libellula*<br>*Anonyx nugax*<br>*Atylus carinatus* |
| CP | 1978, 1979 | 20, 46 | 14 | 0 | - |
| GM | 1978, 1979 | 10, 10 | 8 | 0 | - |
| DI | 1980, 1981, 1982 | 94, 39, 72 | 59 | 4 | unid. Mysidacea<br>*Euchaeta* spp.<br>*Liparis* spp.<br>unid. fish otoliths |

* Includes after hatching year and age unknown birds.

Table 6. Proportion (%) of food items in the stomachs of adult (AD) and sub adult (SA) thick-billed murres.

| | High arctic | | Low arctic | |
|---|---|---|---|---|
| Age | AD | SA | AD | SA |
| Number of stomachs | 207 | 13 | 224 | 4 |
| Number of items | 12142 | 686 | 10798 | 144 |
| | | PERCENT FREQUENCY | | |
| **AMPHIPODA** | **96.2** | **93.0** | **28.0** | **13.2** |
| ALL Hyperiidae | **93.0** | **90.5** | **26.6** | **13.2** |
| ALL Gammaridae | 3.1 | 2.3 | 1.3 | 0.0 |
| **MYSIDACEA** | **0.0** | **0.0** | **31.4** | **27.1** |
| **COPEPODA** | **2.1** | **3.4** | **3.1** | **0.0** |
| **DECAPODA** | **0.0** | **0.0** | **0.1** | **0.7** |
| **CUMACEA** | 0.0 | 0.0 | 0.0 | 0.0 |
| **OSTRACODA** | 0.0 | 0.0 | 0.0 | 0.0 |
| **EUPHAUSIACEA** | **0.0** | **0.0** | **0.1** | **0.0** |
| **MOLLUSCA** | **0.2** | **0.0** | **1.0** | **24.3** |
| ALL Cephalaspidae | 0.1 | 0.0 | 0.2 | 0.0 |
| ALL Cephalopoda | 0.0 | 0.0 | 0.8 | 24.3 |
| **POLYCHAETA** | 0.0 | 0.0 | 3.9 | 0.0 |
| **ALL INVERTEBRATA** | 98.5 | 96.4 | 68.0 | 66.0 |

Table 6 (continued)

| | High arctic | | Low arctic | |
|---|---|---|---|---|
| **Age** | **AD** | **SA** | **AD** | **SA** |
| **Gadidae** | **1.5** | **3.6** | **2.9** | **2.8** |
| **Cottidae** | **0.0** | **0.0** | **1.1** | **0.0** |
| **Pleuronectidae** | **0.0** | **0.0** | **0.2** | **0.0** |
| **Ammodytidae** | **0.0** | **0.0** | **6.3** | **2.8** |
| **Osmeridae** | **0.0** | **0.0** | **0.9** | **0.7** |
| **Cyclopteridae** | **0.0** | **0.0** | **5.3** | **9.7** |
| **Zoarcidae** | **0.0** | **0.0** | **0.1** | **0.0** |
| **ALL OSTEICHTHYES** | **1.5** | **3.6** | **32.0** | **34.0** |
| **ALL TAXA** | **100.0** | **100.0** | **100.0** | **100.0** |

Appendix 1 Numbers of thick-billed murres collected during three periods of the breeding cycle.

| Year | Colony* | Age+ | Sex§ | No. collected (no. empty) Incubation | Chick rearing | Postfledging | Total with food |
|---|---|---|---|---|---|---|---|
| 1976 | CH | AD | M | 12(0) | 8(0) | 5(0) | 25 |
| | | AD | F | 20(0) | 18(0) | 3(0) | 41 |
| | | SA | F | 2(0) | - | - | 2 |
| | | AH | F | - | - | 2(0) | 2 |
| | | AH | U | - | - | 1(0) | 1 |
| 1978 | CH | AD | M | 17(1) | - | - | 16 |
| | | AD | F | 19(0) | - | - | 19 |
| | | SA | M | 3(0) | - | - | 3 |
| | | SA | F | 1(0) | - | - | 1 |
| | CP | AD | M | - | 6(1) | - | 5 |
| | | AD | F | - | 15(0) | - | 15 |
| | | SA | M | - | 1(0) | - | 1 |
| | GM | AD | M | 2(0) | - | - | 2 |
| | | AD | F | 8(0) | - | - | 8 |
| 1979 | CH | AD | M | 7(1) | 3(2) | - | 7 |
| | | AD | F | 7(1) | 1(1) | - | 6 |
| | CP | AD | M | 7(0) | 2(0) | - | 9 |
| | | AD | F | 15(1) | 20(0) | - | 34 |
| | | AD | U | - | 2(0) | - | 2 |
| | | SA | M | 1(0) | 1(0) | - | 2 |
| | | SA | F | 1(0) | - | - | 1 |
| | | UN | F | 1(0) | - | - | 1 |
| | GM | AD | F | 10(0) | - | - | 10 |
| | | SA | M | 2(0) | - | - | 2 |
| | | SA | F | 1(0) | - | - | 1 |

Appendix 1 (continued)

| Year | Colony* | Age+ | Sex§ | No. collected (no. empty) | | | Total with food |
|---|---|---|---|---|---|---|---|
| | | | | Incubation | Chick rearing | Postfledging | |
| 1980 | DI | AD | M | 26(0) | 8(0) | 6(0) | 40 |
| | | AD | F | 18(0) | 16(0) | 3(0) | 37 |
| | | AD | U | - | 1(0) | - | 1 |
| | | AH | M | 1(0) | - | - | 1 |
| | | SA | M | - | 1(0) | - | 1 |
| | | SA | F | - | 1(0) | - | 1 |
| | | UN | M | - | 6(0) | - | 6 |
| | | UN | F | 1(0) | 6(0) | - | 7 |
| | | UN | U | - | - | 2(0) | 2 |
| 1981 | DI | AD | M | 18(0) | - | - | 18 |
| | | AD | F | 5(0) | - | - | 5 |
| | | AD | U | - | 9(0) | - | 9 |
| | | SA | F | 1(0) | - | - | 1 |
| | | UN | U | 7(0) | - | - | 7 |
| 1982 | DI | AD | M | 29(0) | 10(0) | 13(0) | 52 |
| | | AD | F | 8(0) | 5(0) | 7(0) | 20 |
| | | SA | F | 1(0) | - | - | 1 |
| 1983 | AK | AD | M | 8(0) | - | - | 8 |
| | | AD | F | 10(0) | - | - | 10 |
| | | AH | F | 1(0) | - | - | 1 |
| 1985 | MI | AD | M | 14(0) | - | - | 14 |
| | | AD | F | 3(0) | - | - | 3 |

Appendix 1 (continued)

* Colonies are as follows: PL = Prince Leopold Island; CH = west of Cape Hay, Bylot Island; CP = Cambridge Point, Coburg Island; GM = near Cape Graham Moore, Bylot Island; DI = Digges Island; AK = Akpatok Island; and MI = the Minarets near Cape Dyer, Baffin Island.

+ AD = adult, SA = sub adult, AH = after hatching year (adult or subadult), and UN = unknown.

§ M = male, F = female, and U = unknown.

Appendix 2. Number of stomachs containing various food taxa in adult murres. Includes birds aged as after hatching year and age unknown

| Colony | CH | | CP | | GM | | MI | | DI | | AK | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year(s) | 1976-79 | | 1978-79 | | 1978-79 | | 1985 | | 1980-82 | | 1983 | |
| Number of stomachs | 117 | | 66 | | 20 | | 17 | | 205 | | 19 | |
| | No. | % | No. | % | No. | % | No. | % | No. | % | No. | % |
| INVERTEBRATA | | | | | | | | | | | | |
| AMPHIPODA | | | | | | | | | | | | |
| Hyperiidae | | | | | | | | | | | | |
| *Parathemisto libellula* | 22 | 19 | 36 | 55 | 13 | 65 | 0 | 0 | 52 | 25 | 17 | 89 |
| *Parathemisto abyssorum* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 1 | 5 |
| *Parathemisto gaudichaudi* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| *Parathemisto* spp. | 74 | 63 | 64 | 97 | 19 | 95 | 0 | 0 | 72 | 35 | 2 | 11 |
| *Hyperia galba* | 2 | 2 | 3 | 5 | 0 | 0 | 0 | 0 | 6 | 3 | 0 | 0 |
| *Hyperia* spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 |
| *Hyperoche medusarum* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 |
| Unid. Hyperiidae | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 6 | 2 | 11 |
| Lysianassidae | | | | | | | | | | | | |
| *Onisimus glacialis* | 29 | 25 | 11 | 17 | 7 | 35 | 3 | 18 | 0 | 0 | 0 | 0 |
| *Onisimus litoralis* | 1 | 1 | 1 | 2 | 0 | 0 | 7 | 41 | 0 | 0 | 0 | 0 |
| *Onisimus nanseni* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 1 | 0 | 0 | 0 |
| *Onisimus plauti* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| *Onisimus edwardsii* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 1 | 5 |
| *Onisimus* spp. | 8 | 7 | 8 | 12 | 4 | 20 | 1 | 6 | 0 | 0 | 0 | 0 |
| *Anonyx nugax* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| *Orchomene* spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 5 |
| Unid. Lysiannasidae | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 35 | 1 | 0 | 0 | 0 |
| Calliopiidae | | | | | | | | | | | | |
| *Apherusa* spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Gammaridae | | | | | | | | | | | | |
| *Gammarus wilkitzkii* | 5 | 4 | 0 | 0 | 1 | 5 | 0 | 0 | 8 | 4 | 0 | 0 |
| *Gammarus setosus* | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gammarus* spp. | 0 | 0 | 3 | 5 | 1 | 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gammaracanthus loricatus* | 2 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Gammarellus homari* | 3 | 3 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| *Weyprechtia pinguis* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 9 | 4 | 0 | 0 |
| Unid. Gammaridae | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 0 | 0 |

Appendix 2 (continued)

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Atylidae | | | | | | | | | | | | |
| Atylus carinatus | 11 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eusiridae | | | | | | | | | | | | |
| Rhachotropis spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Ischyroceridae | | | | | | | | | | | | |
| Ischyrocerus spp. | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 29 | 11 | 5 | 0 | 0 |
| Oedicerotidae | | | | | | | | | | | | |
| Monoculodes spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Unid. Oedicerotidae | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| Ampeliscidae | | | | | | | | | | | | |
| Ampelisca eschrichti | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Pontogenia inermis | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 1 | 0 | 0 | 0 |
| Unid. Gammaridea | 3 | 3 | 0 | 0 | 0 | 0 | 2 | 12 | 0 | 0 | 1 | 5 |
| Unid. Amphipod | 13 | 11 | 1 | 2 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| MYSIDACEA | | | | | | | | | | | | |
| Mysis oculata | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 24 | 11 | 5 | 0 | 0 |
| Mysis litoralis | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 24 | 1 | 0 | 0 | 0 |
| Mysis polaris | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 3 | 0 | 0 |
| Mysis mixta | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 12 | 63 |
| Mysis spp. | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 29 | 23 | 11 | 1 | 5 |
| Boreomysis nobilis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 7 | 0 | 0 |
| Boreomysis spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 0 | 0 |
| Meterythrops robusta | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 0 |
| Meterythrops spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 |
| Unid. Mysidacea | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 18 | 35 | 17 | 3 | 16 |
| COPEPODA | | | | | | | | | | | | |
| Euchaeta glacialis | 10 | 9 | 0 | 0 | 6 | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| Euchaeta spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 10 | 0 | 0 |
| Metridia longa | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pseudocalanus spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Xanthocalanus spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Calanus glacialis | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Calanus hyperboreus | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 |
| Calanus spp. | 7 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 2 | 0 | 0 |
| Unid. Calanoida | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 12 | 6 | 7 | 37 |
| Unid. Harpacticoida | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 2 | 1 | 0 | 0 |
| Cyclopina spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Unid. Copepoda | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 3 | 0 | 0 |

Appendix 2 continued.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DECAPODA | | | | | | | | | | | | |
| Sclerocrangon boreas | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Argis dentata | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Unid. Caridea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Unid. Natantia | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 12 | 0 | 0 | 5 | 26 |
| Unid. Decapoda | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 |
| CUMACEA | | | | | | | | | | | | |
| Diastylis rathkei | 1 | 1 | 0 | 0 | 0 | 0 | 6 | 35 | 0 | 0 | 0 | 0 |
| Lamproos fuscata | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| Unid. Cumacea | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| OSTRACODA | | | | | | | | | | | | |
| Unid. Ostracoda | 0 | 0 | 1 | 2 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| EUPHAUSIACEA | | | | | | | | | | | | |
| Thysanoessa raschii | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Thysanoessa spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 |
| Unid. Euphausiacea | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 5 |
| UNID. CRUSTACEA | 1 | 1 | 2 | 3 | 0 | 0 | 1 | 6 | 24 | 12 | 6 | 32 |
| MOLLUSCA | | | | | | | | | | | | |
| Limacina helicina | 4 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Unid. Pteropoda | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 2 | 0 | 0 |
| Gonatus fabricii | 2 | 2 | 1 | 2 | 0 | 0 | 2 | 12 | 29 | 14 | 5 | 26 |
| Unid. Mollusca | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| POLYCHAETA | | | | | | | | | | | | |
| Unid. Polychaeta | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 72 | 35 | 7 | 37 |
| OSTEICHTHYES | | | | | | | | | | | | |
| Boreogadus saida | 48 | 41 | 22 | 33 | 5 | 25 | 3 | 18 | 59 | 29 | 2 | 11 |
| Triglops nybelini | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 0 | 0 | 0 | 0 |
| Unid. sculpins | 1 | 1 | 0 | 0 | 0 | 0 | 4 | 24 | 30 | 15 | 0 | 0 |
| Reinhardtius hippoglossoides | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9 | 47 |
| Ammodytes spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 60 | 29 | 0 | 0 |
| Mallotus villosus | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 36 | 18 | 0 | 0 |
| Liparis spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 | 39 | 0 | 0 |
| Gymnelis viridis | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 0 | 0 |

Appendix 2 continued.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Gymnelis* spp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 |
| Unid. fish | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 35 | 82 | 40 | 1 | 5 |
| All unid. fish otoliths | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 59 | 29 | 13 | 68 |
| **ALL TAXA** | 117 | 100 | 66 | 100 | 20 | 100 | 17 | 100 | 205 | 100 | 19 | 100 |